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PART ONE ARCHITECTURAL DESIGN OCTOBER 1928



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VOLUME XLIX

THE ARCHITECTURAL FORUM

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BOOK DEPARTMENT

A PARALLEL OF THE ORDERS, GREEK AND ROMAN

A Review by

CLIFFORD WAYNE SPENCER

FOR thousands of years men have been living among buildings whose decorative treatment and general proportions are based on the Classical orders of Greek and Roman architecure, so they have come to be regarded as the standard of beauty and symmetry in all important structures. The science of building has developed from earliest times, each new development being founded on what has gone before it. The present modernistic style represents the most radical departure from the traditional method of building since the introduction of Gothic architecture, but even such an innovation, if it is to develop sanely, must be based on a thorough knowledge of the history and conventions of academic architecture. Moreover, it is not likely that buildings based directly on the Classical orders will ever cease to be built, and it is very probable that an intelligent understanding of architecture will always continue to be based on a thorough knowledge of the Greek and Roman orders. Our records of these orders consist of more or less ruined examples of ancient buildings and of the drawings of great masters of architecture and archæology, such as Palladio, Scamozzi, Vignola, Lescot, De

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Lorme and Bullant. These men have adapted the orders to their own uses and have standardized them so as to make them readily available for students and architects.

6

A most valuable and usable collection of drawings after these masters and many taken direct from the ruins themselves has been compiled by Charles Normand and is presented in the "comparative" or "parallel" manner. John Tiranti & Company, of London, have issued an English edition of this work in a very compact and usable form and at a surprisingly low price. The subject is covered most completely and in a manner to make it most practical for use by the student or the busy architect. The various orders are each illustrated by examples according to the different classical designers, shown in juxtaposition, so that it is very easy for the user to compare them and adopt the form best suited to his particular problem. In addition to data on the columns and entablatures themselves, there is considerable material on intercolumniation, pedestals, pediments, doorways and much other valuable information. The drawings are all clearly scaled and dimensioned, the unit module being the same in all cases, and the module adopted for the

THE DAVANZATI PALACE, FLORENCE

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In this monograph the famous building is illustrated in a most careful manner; half-tone reproductions of original photographs show the exterior and different rooms of the interior, all accompanied by measured drawings and full descriptions.

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MEASURED drawings of bases, columns, capitals, mouldings and corbels; mantels, ceilings, door and window trim, paneled doors and inner blinds or shutters; floors laid in tile or specially modeled Roman brick; wrought iron hinges, bolts, knockers, escutcheons, holders for flag poles or torches, and hooks for wall hangings. Measured drawings for polychrome ornament on plaster walls or wooden coffered ceilings or tabernacle doors, with descriptions of colors used.

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orders of Vignola also being given. The quality of the binding, paper and printing is exceptionally good, and the book itself is a valuable source of ready reference on this important subject, a part of all architectural study.

A PARALLEL OF THE ORDERS OF ARCHITECTURE, GREEK AND ROMAN. By Charles Normand. Explanatory Foreword and 63 Plates; 9³/₄ x 12¹/₂ ins. Price, bound in cloth, \$3; in portfolio, \$2.50. John Tiranti & Co., London, W.

PICTURES AND PAINTING. By Margaret H. Bulley. 240 pp., 5 x 7½ ins. Price \$3. E. P. Dutton & Company, New York.

H^{OW} to identify true art from its counterfeit is the theme of the author's discourse in this book. What makes a painting good art, what bad, what indifferent? How may the amateur critic recognize a great picture without depending for his guidance on the artist's reputation or, still worse, on the "Baedeker" star?

The author opens her discussion by conducting nine imaginary and typical visitors through a famous gallery. Each has come to study art and enjoy its pleasures. Each looks for a different quality in a picture and admires it or rejects it, depending on whether or not he finds that particular quality. There is the dilettante, who studies art to keep in fashion and to be able to talk about it. There is the art historian, the Sherlock Holmes of the gallery, who thinks he knows art if he can identify the painter, his epoch, nationality and school. There is the wealthy collector, whose end and aim are expenditure of cash. There is the man who looks only for beauty in the faces or scenes depicted. The characters include all the varying types, and with catalogs in hand, they surge indifferently or confidently through an art museum, intent upon "getting art." But to make a long story short, the first eight are all wrong in their methods of approach and their aims. They do not know what to look for. It is only the ninth who holds the key to the door that reveals art. He is indifferent to the painter's reputation; he needs no catalog to guide him to the masterpiece. He is engrossed by something the others do not even seek. He finds it in certain pictures, and those that possess it please him. This important something is design.

What is design? In its simplest form it is composition, the author explains. More accurately, it is order and balance, a "satisfying arrangement of lines, masses, spaces and colors" so unified and balanced as to give equilibrium and harmony to the whole. And underlying the whole there must be some universal significance of what the artist wishes to express. Giotto had design in his paintings, although today they are often called crude. Masaccio had it; so did Raphael, Michelangelo, Rembrandt, and Velasquez. Every truly "great master" had design, and those of the later era show no advance over those of the mediæval centuries, save in the development of technical skill, important as technical skill may be.

"One should judge the paintings of the stone age," says Miss Bulley, "by the same standards as those of today,—not by formal structure only, since this is psychologically impossible, but by the quality, richness and precision of the experience as conceived, embodied and communicated in terms of design." When one uses design as the "polar star," the sea of art is no longer uncharted, she declares. One may wander without confusion through a vast exposition where the paintings of all schools and all times are hung without labels or sig-

Any book reviewed may be obtained at published price from THE ARCHITECTURAL FORUM

natures, and with unerring eye pick out the great planets from the "will-o'-the-wisps and wandering fires." But o know design when one meets it,-that is the acid test which the unschooled amateur will find it difficult to meet. For design implies many things which compose, in total, all the fine points of art. It implies the proper relation between details and the whole; the former must not overshadow the latter. It implies solidity and depth. A flat, two-dimensional surface may be beautiful as a photograph is beautiful, but a suggestion of the third dimension makes for the greater art. For this reason certain portraits by Rembrandt, Franz Hals and Velasquez are superior in design to those of Sargent. Sargent's women are more beautiful of feature, but they tend to be "flattened forms against a flatter background," while those of the earlier three artists appear to have weight,-they stand out as if "carved in stone."

Accurate imitation of nature does not necessarily imply great art, for "the beauty of art and the beauty of nature represent, broadly speaking, two different kinds of beauty." The picture must have an emotional value in itself in addition to its value as description or representation. It is the artist's experience that must be communicated by his works. The virtue of art, therefore, does not lie in the accuracy with which the painter imitates the appearance of things. Design implies strength and sincerity as distinguished from mere prettiness and sentimentality. Beauty alone does not mean design, although as Miss Bulley observes, "it takes genius to turn a flayed ox into a thing of beauty."

It is because so few of us, she explains, can recognize design, that many great works of art lie outside our comprehension. She quotes a verse which, perhaps, expresses the confusion of many who "do" the galleries:

"Although the world is fair to see,

The artist cannot let it be.

He fiddles with the works of God

And makes them look uncommon odd."

Using *design* as the polar star of judgment, the latter half of the book deals with painting in general. It is a discussion of the aims and purposes of the great artists, rather than a mere history of their works. The author includes a clarifying exposition of the difference between the various schools of painting, from ancient days, when men painted religious pictures for their cathedrals and when painters were tradesmen like blacksmiths and tinkers, to modern times when the artist is likely to take himself and his work too self-consciously. Everyone, she says, should form his own judgment on art, rather than accept the ready-made opinions of others. "It is better honestly to admire bad or counterfeit art than to simulate admiration for some famous work. Admiration for the Baedeker star is fatal." And, she adds encouragingly, that one may learn how to incline one's judgment toward the best. Her chapters on the postimpressionists, the cubists and modern artists are particularly helpful, since they show the contribution of each movement to art.

The book is one of the "Simple Guide" series and is, therefore, of value and interest to the amateur lover of art as well as to the student or true artist himself. It is simply and entertainingly written, and included with the text are 31 plates of famous paintings illustrating the points she makes clear in her valuable subject matter.



THE search tor effective types of architecture for domestic use led logically to the re-discovery of the style known as the "Greek Revival." In the hands of a few particularly skillful architects it is being used with marked success, their use being based largely upon study of such examples as have survived the period, just prior to the Civil War, when use of the type was widespread throughout the United States. It is an entirely American style, founded not upon a following of current English architecture but upon a study by Americans of classic types adapted to domestic uses.

Mr. Major's excellent work is the result of a careful study of the style as it was interpreted in the North and East, and particularly in the South. The illustrations of exteriors and interiors are full of suggestions for anyone seeking a variety of architecture bold, simple and effective, which supplies a fitting background for life in America. The book is richly illustrated, and shows existing work, large as well as small, in both city and country.

236 Pages; 7%x10% inches. Price \$15

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ART STUDIES, MEDLÆVAL, RENAISSANCE AND MODERN. Edited by Members of the Departments of the Fine Arts at Harvard and Princeton Universities. 156 pp., 8¼ x 11¾ ins. Price \$7.50. Harvard University Press, Cambridge.

"HE editorial statement of the first issue of "Art Studies," in 1923, gives a clear exposition of the purpose of the publication which it is well to bear in mind in reading the later issues. To quote only a few sentences: "The purpose of this annual is to offer better facilities than have heretofore existed in America for the publication of studies in the mediæval, Renaissance and modern fields. We welcome scholarship which adds to ideas as well as that which adds mostly to facts. We also shall prefer articles of some extent and substance to notes and reports on single monuments." This, together with the title "Art Studies, An Extra Number of the American Journal of Archæology," ought to give the prospective reader an idea of its contents. If he is a practicing architect, who seeks illustrative material for help in designing churches and public buildings, there is little use in his even turning the cover. If he is an architect of purely domestic work, looking for contemporary examples of residences, he too will seek in vain. This is no publication for professionals or laymen, but one primarily and superlatively for the scholar, the archæologist and the graduate research worker in art.

Here the connoisseur in iconography will find a truly fascinating discourse on the representation of round and square tables in the pictures of the Last Supper and possible connections with the Round Table of King Arthur. ("The Table of the Last Supper in Religious and Secular Iconography," by Laura Hubbard Loomis.)

The student of architectural history will here find variou articles on very special, often out of the way, subjects which are contributory to one phase or another of ar history. The article by Edgar W. Anthony on th Florentine baptistry is a skillful and readable account of that ancient and much discussed monument. In turn ing the erudite pages the glimpses of St. George and hi excessively spikey dragon by the mediæval sculptor o Lubeck, Bernb Notke, cannot fail to delight. The title of the short article "A Plastic Cyclone" (by Kund Francke) is well chosen. The articles are not confined to the English language, and for those who read Italian and are interested in Eastern Art, "Il Problema dell Arte Sasanide," by Ugo Monneret de Villard, will prove informative on the complexity of sources which con tributed to the art of Iran. The field is evidently one to be explored. There are two articles in French in this issue, one by Monsieur Charles Diehl, an authority of Byzantine art, entitled "Monuments Byzantins Inedit. du Onzieme Siecle"; and the other by Monsieur Charle Oursel, a member of the Faculte des Lettres at Dijon The latter is an article of ample proportions, profusely illustrated, dealing with that magnificent and unique church in Burgundy, the abbey of Vezelay. The struggl for its possession between the Cistercians and the monks of Cluny becomes a real issue, as one reads, and the study of the resultant effect on the architecture of this abbey makes this article particularly interesting. One of the other titles in this issue will suffice to give an idea of the range of subject matter: "Apostolados," by Dorothea C. Shipley, a graduate of Bryn Mawr and a follower in the footsteps of Miss Georgiana G. King

"The Spanish House for America" By Rexford Newcomb, University of Illinois

"HE undoubted charm of T the simpler type of Spanish architecture is due largely to its close relation to the soil. Set close to the ground, and built as a rule of brick, stucco, adobe, or some other material directly of the soil, Spanish domestic buildings have the appearance of belonging in a particular sense to the places where they stand. The simplicity which characterizes their structure is equaled by the simplicity of their design, always given in Spain a direct, naïve quality, which the early Spanish settlers in America secured when they began



colonizing and building in Florida, California, and the other regions in America where they were the pioneers. The simple grace and charm of their buildings are being equaled today, and some of the most strikingly successful of recent domestic work owes its excellence to this following.

various forms of craftsmanship which aid in giving the strong character upon which such buildings largely depend. The volume is also helpful because of its including illustrations of the exteriors and interiors of houses built by the architects who are leaders among those successful in use of the Spanish style.

IN this volume an architect

ture deals with the most suc-

cessful adaptation of Spanish

domestic architecture in the

sunny parts of America where

its use is most appropriate. Disregarding the extremely or-

nate work, where the simplicity

of the type is ruined by overelaboration, he presents the

American following of the early

Spanish style in its most charming aspect. The work deals with

the design of the house ; its patio and general plan; its construc-

tion, decoration and furnishing;

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of the volume discusses the

and professor of architec-

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Part On



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Part One



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COLUMBUS MEMORIAL COMPETITION

N the island of Santo Domingo, discovered by Christopher Columbus on his first voyage to the western hemisphere, a lighthouse and a Pan-American flying field equipped for trans-continental service, memorials to him, are to be designed by an architect chosen in a world-wide competition. Well located for air travel between New York and Buenos Aires, the light of the memorial will guide not only sailors but, fittingly, aviators too, whose intrepid spirit perpetuates that of the great navigator. Wisely, a monument that will "contribute to knowledge and to thought" is sought. A flying field provides great opportunity. With rare exceptions, such as the field designed for Pau, France, by Maurice Chaucon, the present flying fields, which undoubtedly will soon be national gateways, have unfortunately been developed without architectural treatment, simply as utilitarian needs increased, and fully as inferior in design and facilities as are many railway terminals.

In designing a flying field, the architect, like Columbus, treads new ground. His problem has no precedent; there is no tradition to which he can turn for help. He must, then, seek out the requirements, and from them, if he is able, construct a plan meeting all contingencies and a group of buildings imposing, admirably landscaped in every detail, and as a whole more truly modern than any that the world has seen. There must be provisions for housing and landing both airplanes and dirigibles; transporting passengers and freight to and from the field; refueling and complete repair shops; a radio station and floodlight signals; ticket booths and customs offices; quarters for the pilots and the field staff; restaurants and, perhaps, hotel accommodations; facilities for exchanging foreign money and for supplying passengers with personal necessities left, by mistake, at home. Even if machines that can take the air vertically are perfected, it is unlikely that flying fields will ever be located, as railway stations are, in the midst of unrelated structures, for the hazards of taking the air and landing would thereby be foolishly increased. The flying field is a problem of a self-contained, all-inclusive unit. Fortunately requiring open land, it provides gratis, unlike most modern architectural problems, a splendid landscape for its buildings, to give the entire composition a proper setting and to secure adequate dignity.

The program gives the competitor the utmost freedom. The site is near the city of Santo Domingo itself; the traffic routes between the city, the seaport, and the airport are left to his discretion. The only mandatory demands are: (1.) that the memorial lighthouse,—which will be the first unit to be completed,—shall stand on a mound, or terrace, or ter-

races, about 40 feet high, in order that its base may be visible over the treetops from every direction: (2.) that the structure, whatever form it may take. shall contain a chapel large enough to receive the Columbus monument now in the cathedral; (3.) that a museum be provided, either as part of the chapel or elsewhere, to contain such appropriate relics as may become available over a long term of years; (4.) that it shall support at least one great lantern; (5.) that the design, as seen from a distance, shall have a significance that will grip the imagination; (6.) that all the technical resources of modern illumination shall be considered for the production of an effect quite as interesting by night as by day. The competitor, besides selecting a site for the lighthouse in the 2,500 acres of restricted property, must indicate a comprehensive development of the remainder of the tract, providing for a complete airport measuring at least 2,000 by 3,000 feet with a runway about a mile long, an official center with a new residence for the President of the Republic, and one or more additional residential structures.

1

In the future, island airports will be more vital links in trans-continental service than the coaling stations of today. With the present rapid development of aviation, air transport between America and Europe, and between America and Asia seems certain, but a linking of the Pan-American countries by this means should be realized even sooner. Santo Domingo lies almost in the direct route between Montreal, New York, and Buenos Aires, and in direct line between the important centers of northeastern United States and Canada and those of northern South America. Col. Lindbergh has proved the feasibility of flying between them. That Santo Domingo, contemplating building an important airport, turns to the architects of the world for its design, shows fine perception of the need for coherent and beautiful schemes for what will be salient points in national and international life. It challenges architectural ingenuity to produce something in line and mass inherently as graceful and as simply impressive as the airplane itself.

The peculiar tropical conditions of terrain, atmosphere, and vegetation will have to be considered. There must be strength sufficient to withstand possible hurricanes and earthquakes. The function of the project demands that the architecture be modern, and its location and memorial purpose require that it be American. Santo Domingo has issued a formidable challenge. All communications relative to information should be addressed to Albert Kelsey, Technical Adviser, Permanent Committee on Columbus Lighthouse, Pan-American Building, Washington. No inquiries received after December 1, 1928 will be answered. The competition closes April 1, 1929.

The Invisible Superintendent at the Mortar Box

Part On

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PONTE FABRICIO, ROME From an Etching by Louis C. Rosenberg

The Architectural Forum

ARCHITECTURAL FORUM

VOLUME XLIX

OCTOBER 1928

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THE NEW BUILDING OF THE GERMANIC MUSEUM, HARVARD UNIVERSITY

BY KUNO FRANCKE

I N speaking of the Germanic Museum building as "new," it should be said that it was completed during the World War and opened to the public in 1921. At that time, however, the state of public feeling aroused by the war was still such that this essentially German building failed to attract the attention which it otherwise, by reason of its originality and artistic merit, would have received.

Its designer is Professor G. Bestelmeyer, one of the foremost living German architects, now President of the Munich Academy of Fine Arts. His general drawings arrived in Cambridge in various installments before and after the outbreak of the war. His personal supervision of the construction being out of the question, the firm of Warren & Smith, of Boston, appointed by the Harvard Corporation as associate architects, undertook this task, the senior partner, Professor H. Langford Warren, then Dean of the Harvard School of Architecture, devoting himself chiefly to the supervision and, wherever necessary, the modification of the architectural features, while F. Patterson Smith, the junior partner, attended to all matters connected with the engineering part of the work. Both men rendered invaluable service in this cause. In fact, it is they who translated the ideas of the German architect into American terms and thus produced a structure in which different conceptions of artistic problems have been blended with remarkable success.

To Professor Warren belongs the credit of choosing the decorative finish of most of the architectural detail. He selected the Indiana limestone for the structural supports of outer and inner walls, the patterns of the tile floors in the transept and chapel, and the plain quarry tiles in the Renaissance wing. He devised with the greatest care the whole color scheme of the interior. He supervised all the fine decorative ironwork, made after Professor Bestelmeyer's designs by Frank Koralewsky, of Boston. Professor Warren engaged Roger Noble Burnham as sculptor of the centaur figure on the stone dormer of the west side of the Renaissance wing and the Minerva head over the Divinity Avenue entrance. He directed the remarkable modeling by Mr. Kirchmayer of the heads of Wotan, Siegfried and Brun-

hild on the south facade of the Renaissance wing, and of the Apollo head over the front entrance, and brought all the other carved decorations over doors, windows, and balustrades into harmony. He made necessary changes in the levels of various floors and in the shape of the arches of the cloister. That death should have removed him from the midst of his devoted work gives to the connection of his name with the Germanic Museum a tender association.

NUMBER FOUR

Mr. Smith selected the red tiles of the roof, the Vermont porphyry for the columns of the Renaissance Hall, the slabs of split slate for the floor of the Romanesque Hall, and the solid and unsmoothed oak timbers framed in antique manner for the cloister of the court, and he worked out the whole scheme of designing, placing and finishing the reinforced concrete frame of the building,-a task attended with considerable difficulty because of the great structural variety of Professor Bestelmeyer's design. Indeed, it may without any exaggeration be said that many features of this construction had never been attempted in this country, and therefore they constitute a real contribution to American engineering. Particular mention should be made of the use of the precast segments of the dome over the Baroque vestibule as forms for the concrete ribs, and of the tooling of the surfaces of the concrete arches and vaults in both the Romanesque Hall and the Gothic Chapel, thereby exposing the coarse aggregate of the concrete. Credit for one part of the building belongs entirely to Mr. Smith. Professor Bestelmeyer's plans had left the upper story unfinished. Here Mr. Smith, having after Professor Warren's death established a firm of his own, constructed over the Renaissance Hall a very attractive lecture room of monastic appearance, and connected it by stairways with both the street level and the gallery of the second story. The completed building, as it now stands, is a fine example of the modern Munich school of architecture of which Bestelmeyer is the most illustrious living representative. He began some 25 years ago as a pupil of Gabriel and Emanuel Seidl, the architects of the great Bayrisches National Museum, with whom he shares a love of the picturesqueness of Bavarian popular art. His first

work, of unquestionable genius, was the enlargement to more than four times its original size of the main building of Munich University. Leaving untouched the old severely monumental front on the Ludwigstrasse, he erected on the parallel Amalienstrasse a front of equal length, but of much greater richness of detail, and connected the two facades by

a system of halls and galleries surrounding a magnificent vaulted court of bold and striking originality.

It was this splendid achievement by a young man, showing both respect for traditional forms and a marked power of developing them into something new, which made it clear to me that here there was a most unusual opportunity of acquiring a type of build-



Germanic Museum, Harvard University Professor G. Bestelmeyer, Architect Warren & Smith, Associated Architects



Ground Plan

Clerestory Plan

October, 1928

ing for our museum in Cambridge, which, instead of repeating the meaningless formulæ of classicist imitation, should be an original artistic expression of what this particular museum stands for,-the history of German culture. Together with Professor Warren, I arranged, in the summer of 1910, a meeting with Bestelmeyer, then a professor at the Dresden Academy of Art, and it was a delight at this meeting, held at a quiet inn near Goethe's garden house in Weimar, to see with what enthusiasm and deep understanding he entered into the matter. From the very first he saw that the building must be, above all else, an adequate setting for the objects constituting our collection, and that each of these objects,casts of sculpture and architecture,-should, as far as possible, form an integral part of the structure, that they should be set against a background suggesting the time and the local surroundings of the originals, and that the whole building therefore should be a visible epitome of the various epochs through which German art has passed since the Karolingian era. And this is what the design, within the limitations set to it by available space and money, has indeed achieved.

I cannot refrain from mentioning that before we knew of Bestelmeyer, Professor Warren had himself drawn a tentative plan of a building for us, the elevation of which I published as a frontispiece of the first edition of my Museum Handbook. That after having become acquainted with Bestelmeyer's work he should not only have immediately withdrawn his own sketches, but should have devoted himself wholeheartedly to the most scrupulously exact and careful carrying out of the plan of his German colleague, is but another proof of the nobility of his character.

Perhaps the most striking impression on approaching the main entrance on Kirkland Street is that in spite of its small dimensions the building produces a decidedly monumental effect. This is due largely to the fact that in front of the main structure there stands out on the south side a breastwork, so to speak, of lower structures connected with one another, a continuous line running from a little square pavilion to a wall of cloistered arcades and thence to a little square vestibule back of the main entrance. This line of walled enclosures permits only a glimpse, through a wrought iron gate, of the decorative court lying back of it and shuts off the view of the whole lower story of the main building, thereby producing illusions of perspective which make the limestone and stucco walls of the second story and the massive red tile roof resting upon them appear much larger than they really are. This imposing effect is heightened by the complicated floor plan of the main building. It consists of two wings of unequal length, placed at a right angle to each other. The longer wing, containing the Romanesque and Gothic Halls, extends along Divinity Avenue, ending in a chapel-like apse; the shorter wing, containing



Plan of Garden Cloister, and Elevations on Garden Court

Part One



NORTH AND SOUTH ELEVATIONS GERMANIC MUSEUM, HARVARD UNIVERSITY PROFESSOR G. BESTELMEYER, ARCHITECT WARREN & SMITH, ASSOCIATED ARCHITECTS

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EAST AND WEST ELEVATIONS GERMANIC MUSEUM, HARVARD UNIVERSITY PROFESSOR G. BESTELMEYER, ARCHITECT WARREN & SMITH, ASSOCIATED ARCHITECTS



GARDEN COURT GERMANIC MUSEUM, HARVARD UNIVERSITY PROFESSOR G. BESTELMEYER, ARCHITECT WARREN & SMITH, ASSOCIATED ARCHITECTS



NORTH END OF ROMANESQUE HALL



SOUTH END OF ROMANESQUE HALL GERMANIC MUSEUM, HARVARD UNIVERSITY PROFESSOR G. BESTELMEYER, ARCHITECT WARREN & SMITH, ASSOCIATED ARCHITECTS chiefly the Renaissance Hall, stretches from Divinity Avenue to Frisbie Place. The inner sides of the angle formed by them, together with the arcades just mentioned, form the enclosure of the decorative court. A terrace on the roof of the lower story of the Renaissance wing offers a particularly charming view of the details of this court, with its shrubbery, its stone water basin and balustrades, and its bronze replica of the Brunswick Lion. At the junction of the two wings there rises a massive tower of the full width of the wings, duminishing above the roof in receasing stages, until at the height of 102 feet it ends in a crowning octagonal cupola. This tower more than anything else serves to hold all the parts of the structure together,-a structure marked by a happy combination of diversity and unity, of picturesque and monumental strength.

There is no lack in the exterior of the building of suggestions of the various epochs in Germany's art development. The round arch frieze, articulated by vertical bands, forms the prevailing ornament of the Romanesque tower, the chapel shows vaguely Gothic outlines, the window frames of the Renaissance wing in a general way suggest sixteenth century patterns, and there are classicist reminiscences in the pediment over the Divinity Avenue entrance. But nowhere is there over-emphasis of these differences of style; nowhere is there direct imitation of any particular work of the past, and nowhere are there sudden clashes of form. Light transitions and modifications of decorative detail lead from one type to another. The whole exterior constitutes one central conception and not an accumulation of unrelated parts.

Still more impressively does this harmonious blending of one central idea with a great variety of individual forms manifest itself in the interior of the building. Everywhere is there seen the attempt to suggest by the architectural construction some particular phase in the development of style. Everywhere the most important of the casts are used as organic parts of the structure. Everywhere there exists an atmosphere transporting the visitor into the spirit of the time from which each of these works of art arose. That there is a constant change of floor level as well as of height between the different rooms contributes to making the whole interior, like the outside of the building, appear larger and more monumental than it actually is. From a low vaulted passageway, suggestive of early mediæval convent corridors and containing a collection of Byzantine, Karolingian and Ottonian fictile ivories, a few steps lead down to the Romanesque Hall, about 40 feet in width and 60 in length, with an arched ceiling about 25 feet in span, intersected by four arched openings. Into the wall opposite the entrance there is fitted the cast of the Golden Gate of the Cathedral of Friedberg, in Saxony, through the opening of which a number of steps lead up to the next room, the Gothic Hall. This latter consists of two parts, an oblong transept and a hexagonal chapel, the two separated by a cast of the rood screen of

Naumburg Cathedral. Thus the whole wing of the building, from first to last, presents the essential elements of a mediæval church, and the arrangement of all the various objects,—statues, tympanums, fonts, pulpits, choir stalls, tombs, crucifixion groups. etc., in what may be called the nave, side aisles, transept and choir, has a decidedly ecclesiastical and solemn effect. And yet, this church-like construction is not in any sense an imitation of a real church but rather an adaptation of ecclesiastical motifs to museum purposes, guided above all by the prime necessity of giving the visitor the opportunity to observe and study each of the exhibits in detail.

In a recent monograph on Bestelmeyer, the Berlin art critic, Fritz Stahl, has thus defined the characteristic quality of his style: "The combination of what serves the practical purpose with a higher element,call it feeling or harmony or imagination or all of these together,-is perhaps Bestelmeyer's most essential trait. The rigid dogmatism of the most recent school of so-called pure objectivity is wont to look upon such a style as romantic or sentimental. We shall not be deterred thereby from calling it genuinely artistic and emphatically constructive. There has never been true architecture which did not desire to stimulate the æsthetic sense, the imagination, the soul. The great question is as to the fitness and the refinement of the devices for satisfying this desire. Bestelmever is particularly rich in such devices.' From all that I have said about the Germanic Museum at Cambridge, it has become clear, I hope, that this building amply bears out the correctness of such words as these. Harvard University has every reason to be proud of possessing so worthy an example of the style of this German master.

It remains to say a few words about the man whose generosity made the carrying out of all these building plans possible,-the late Adolphus Busch, of St. Louis. Mr. Busch's was in many ways a remarkable personality. In every sense he was a man of large caliber. Passionately devoted to hard work and to business adventure, he was a royal spender and giver. He loved praise and honors, but was entirely free from petty jealousies and always ready to give due recognition to the achievements of others. He won the affection of all his workmen by his fatherly care for their well-being and his just appreciation of their needs. With a high sense of American citizenship he combined firm love of Germany, the country of his birth, and deep pride in her political and industrial ascendency. His patriotic hopes centered in seeing the United States and Germany leading the world in all higher public activities, and he was fully convinced that by endowing the Germanic Museum he was helping to realize this noblest dream of his life. It was a deserved tribute that at the hour of his funeral the City of St. Louis should have halted public and private traffic, and it was entirely fitting that the Corporation of Harvard University should have given to the building of the Germanic Museum the name "Adolphus Busch Hall."

OCTOBER, 1928

ENTRANCE FRONT



Photos. John Wallace Gillies, Inc.

GARDEN FRONT HOUSE OF JOHN F. WILKINS, ESQ., ROCKVILLE, MD. OFFICE OF JOHN RUSSELL POPE, ARCHITECT

PLATE 81



OCTOBER, 1928

THE ARCHITECTURAL FORUM

PLATE 82



Detail on Back

MAIN ENTRANCE HOUSE OF JOHN F. WILKINS, ESQ., ROCKVILLE, MD. OFFICE OF JOHN RUSSELL POPE, ARCHITECT









GARAGE AND CHAUFFEUR'S QUARTERS



ENTRANCE TO CHAUFFEUR'S QUARTERS ESTATE OF JOHN F. WILKINS, ESQ., ROCKVILLE, MD. OFFICE OF JOHN RUSSELL POPE, ARCHITECT



PLATE 85



ENTRANCE TO GARAGE COURT ESTATE OF JOHN F. WILKINS, ESQ., ROCKVILLE, MD. OFFICE OF JOHN RUSSELL POPE, ARCHITECT



PLATE 86



FARMER'S COTTAGE ESTATE OF JOHN F. WILKINS, ESQ., ROCKVILLE, MD. OFFICE OF JOHN RUSSELL POPE, ARCHITECT



OCTOBER, 1928

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PLATE 87



ENTRANCE GATEWAY



GARAGE COURT ESTATE OF JOHN F. WILKINS, ESQ., ROCKVILLE, MD. OFFICE OF JOHN RUSSELL POPE, ARCHITECT



OCTOBER, 1928

THE ARCHITECTURAL FORUM PLATE 88



DINING ROOM



ENTRANCE HALL HOUSE OF JOHN F. WILKINS, ESQ., ROCKVILLE, MD. OFFICE OF JOHN RUSSELL POPE, ARCHITECT



HOME OFFICE BUILDING FOR THE MUTUAL BENEFIT LIFE INSURANCE COMPANY, NEWARK

BY JOHN H. & WILSON C. ELY, ARCHITECTS

'HE problem of planning and designing a home office building for a large life insurance company is, first of all, a business problem. The conditions of such a problem demand a thorough understanding, from the first, of the business methods and requirements of the institution. The Mutual Benefit Life Insurance Company until lately occupied a fine building, one of the landmarks of downtown Newark. In the course of a comparatively few years the Company had outgrown these quarters, and demanded more space for its business, with room for future growth to take care of a fairly certain rate of increase. It could be quite definitely estimated, knowing the size of each department, what would be the size of that department at the end of, approximately, a ten-year period. The property the Company had purchased required moving from the heart of the city to a location in an outlying section. More "elbow room" was thus to be provided. This, however, demanded an absolutely complete building,one which would provide the employes with all re-

quirements, such as dining rooms, rest rooms, gymnasium, etc.,—every convenience and comfort. A careful study was made, first of all, by the

architects, of the business and methods of the Company as a whole; next, a study of each department in the same manner,-the locations of the departments, those most directly in contact with the public, those most directly in contact with the administration, and those whose main service is with distant outside agencies, and also departments which function directly in connection with the social and physical welfare of the employes of the Company. A carefully worked up scheme was first devised to provide a building of maximum size to cover as much of the lot as would be required for the Company's ultimate needs. It was determined how large a building was required to care for the present business, with room for growth over a pre-determined number of years. Then the portion of the scheme not to be built as a part of the present program was divided into definite divisions, to be provided after





Directors' Room

Mutual Benefit Life Insurance Building, Newark John H. & Wilson C. Ely, Architects





AUDITORIUM MUTUAL BENEFIT LIFE INSURANCE BUILDING, NEWARK JOHN H. & WILSON C. ELY, ARCHITECTS



MUTUAL BENEFIT LIFE INSURANCE BUILDING, NEWARK JOHN H. & WILSON C. ELY, ARCHITECTS

NUMPLE THORE

Part One

rooms are provided for

the Company's officers,

with a serving pantry

connected by a lift with

the kitchen on the top

floor. The balcony of

the auditorium is not

connected with the main

building on the second

floor level, save by a

roof. A large outside motion picture booth is

provided. The third and

fourth floors have large

open working areas for

departments. The fifth

floor provides a new

business department with

laboratory, doctor's

rooms, and examination

certain stipulated periods of time, following a well planned future building program. From this, the Company knew just where it stood, from the start of the new program well on into the future, in so far as building and equipment could be determined in advance. After the present and future were satisfactorily settled, that is to say when a present program which provided a workable future program

had been made, the further detail work was devoted completely to the present building program to be undertaken.

The structure was designed to provide a main building with two wings. The main building fronts on two important streets and is L-shaped, having a portico with several entrances on each street. One wing is devoted to service, such as elevators, toilets, locker rooms, etc. The other wing provides rooms for social activities, such as an auditorium and a gymnasium. There is an outlying building, adjacent to the service wing, but entirely separate from the main building, which houses a boiler plant for heating the entire structure. A study was made of the problem of elevator service to get employes from the street to their

work and back again with the least amount of delay and the most efficiency. The plan provides for 12 cars; for present demands six were considered enough, but as growth continues under the present roof, other cars will be added in shafts now ready to take them. In a general way the basement provides for vaults and record files, with a large shipping and receiving room, a laundry, fan room, printing room, furniture repair room, and house electrician's room, with general service rooms of a like nature, a gymnasium,—fully equipped,—providing a standard basket ball court, four bowling alleys, lockers and showers and a visitors' gallery. This floor is also used for dancing upon certain occasions.

The first floor of the main building has two wide corridors, crossing at the center under a rotunda. On this floor are located the departments most in contact with the outside world. The elevator lobby is directly off the rotunda, flanked on each side with staircases. The auditorium is located in the service wing directly over the gymnasium, and it is so planned that it may be entered directly from the street without entering the main building. The floor and balcony of the auditorium together seat 1,000 people. The stage is thoroughly equipped to take any modern theatrical production, and has ample dressing room accommodations. The second floor is devoted to executive offices and board room, with mathematical and legal departments. In addition to the utilitarian rooms in the service wing, two dining



rooms used in connection with the work of examination of physical specimens, etc. used in connection with proposed new risks. The top floor is devoted mainly to a large dining room, with kitchen and pantry service. One wing is given over to infirmaries for male and female wards, this space

Chandelier in the Rotunda

employes, with male and female wards, this space being directly over the doctors' rooms below. Outside the dining room, back of the parapet, is an open tile roof, which is used as an outdoor promenade. The grounds about the building are laid out to provide automobile parking area as well as driveways.

As far as the architectural treatment of the building is concerned, the architects desire to pay their respects to the monumental structure which the Company was obliged to vacate because of the growth of its business. It was of a past period of American architectural design, but a wonderful example of the best of that period, and it was an inspiration to have it to "live up to." In the new building it was felt that the architects had to express the strength of a large, important American business enterprise with the dignity and scale obtained by using a large but simple type of Classic architecture. This was their endeavor. But, after all, the judgment of the successful solution of any architectural problem rests with those who view the building and with those who use it,-and not with its architects.

PLATE 89





PLATE 90



Photos. P. A. Nyholm

ENTRANCE PORTICO MUTUAL BENEFIT LIFE INSURANCE BUILDING, NEWARK JOHN H. & WILSON C. ELY, ARCHITECTS

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THE ARCHITECTURAL FORUM

PLATE 91



ROTUNDA MUTUAL BENEFIT LIFE INSURANCE BUILDING, NEWARK JOHN H. & WILSON C. ELY, ARCHITECTS


THE ARCHITECTURAL FORUM

PLATE 92



ENTRANCE VESTIBULE MUTUAL BENEFIT LIFE INSURANCE BUILDING, NEWARK JOHN H. & WILSON C. ELY, ARCHITECTS



THE ARCHITECTURAL FORUM

PLATE 93





THE ARCHITECTURAL FORUM

PLATE 94



ENTRANCE DETAIL CINNAMINSON BANK AND TRUST COMPANY, PHILADELPHIA DAVIS, DUNLAP & BARNEY, ARCHITECTS





PLATE 95



MASONIC TEMPLE, SPRINGFIELD, MASS. McCLINTOCK & CRAIG, ARCHITECTS



FLATE 96



MAIN ENTRANCE MASONIC TEMPLE, SPRINGFIELD, MASS. Meclintock & craig, architects



NORTH HILLS GOLF CLUB

BY

CLIFFORD C. WENDEHACK, ARCHITECT

HE trend of club house design and construction in the metropolitan district has been marked in the past five years by many innovations. Club houses are beginning to acquire "personalities," both as a result of the activities of the memberships and the type and design of the buildings, for it will be found upon careful study that the characters of different memberships vary as much as the characters of individuals with regard to their habits, tastes and general modes of living. The North Hills Golf Club has something of this personality, for it is situated on one of the highest spots on Long Island, with gently rolling hills and sandy soil, suggesting in its general character portions of provincial Spain. It seemed but natural that the Spanish style be employed, with an idea that the Spanish atmosphere could be created in the immediate vicinity by landscaping. Another governing factor making for the employment of this style was the type of the club's membership, which demanded a comfortable atmosphere accompanied with dignity for personal entertainment as well as a background on a par with the best hotels in the South, and a reminder, during the golfing season, of the play days spent at America's greatest winter resorts. The advertising sense of the times was also a contributing factor, since it was found that a building erected on such a prominent site would be visible for many miles over the surrounding country. The orange and red roof is proving this to be the case, for the tower treatment over

the grill has already become a distinguished landmark.

Club house planning in recent years has been entirely revolutionized, primarily because golfers' requirements have grown by leaps and bounds until the frame of mind at the present time of new building committees is such that they are not contented unless their clubs possess more in many ways of convenience and size than their neighbors'; larger lockers, more area in their dressing room accommodations, and commodious showers, form a basis of their demands. The popularity of the club house as a scene of entertainment has increased tremendously during the last few years, with the men, and still more with their wives,-as it is considered more economical and more convenient to entertain at a club than in one's home. The popularity of the game with women in general has perhaps tripled the number of active women golfers throughout the country during the past five years, until their separate demands and the extent of their accommodations have become almost as great as those of the men. These factors alone have been responsible for the ever-increasing costliness of an up-to-date club structure and have caused many interchangeable relations of the component parts of the building.

The proper relation of the building to the golf course has also become an important factor. The handling of great numbers of cars and the starting and finishing of men and women golfers in close succession throughout the golfing season make it



North Hills Golf Club, Douglaston, N. Y. Clifford C. Wendehack, Architect 517

Part One



Grill Room Fireplace

imperative not only to have the locker rooms in close proximity to the starting points of the course and the parking space for comfort, but also to have the porches and living portions of the club properly orientated for shade and prevailing breezes. A close study of the North Hills plan in relation to the course reveals how conveniently it is related to the first and tenth tees, with an ideal position for the ninth and eighteenth greens within full view of the porches and terraces. This close relation of the home greens to the building not only saves much unnecessary walking but is an actual factor of safety in crossing roads, and a money-saver with regard to guests on the starting time. This was made possible by the preliminary coöperation by the course architect and the architect for the building, and it demonstrates most satisfactorily what can be done when building committees heed the advice so often given them by both architects to let them work out the problem together before planning of either course or building assumes form.

The main entrance to the North Hills club house is protected by a stone *porte cochere* which opens directly into a vaulted lobby, adjoining which are



Photos. Kenneth Clark

Lounge, with Dining Room Beyond North Hills Golf Club, Douglaston, N. Y. Clifford C. Wendehack, Architect

October, 1928

THE ARCHITECTURAL FORUM

the office, coat room, women's room and main stairs, and the women's entrance leading to their quarters and lockers on the second floor. Opening from this lobby there is a wide loggia which affords means of communication to the grill, dining room and lounge which are arranged in such a manner that they can be converted into one large area for entertainment, thereby economizing space under normal conditions and affording ample room for large gatherings on special occasions. An unusual effect, which adds to the spaciousness of the lounge, is the twostory hall treatment with its clerestory windows and decorative trusses. At one end is a huge fireplace, and a gallery at the side overlooks the entire floor area. Porches are provided to the west and south of this room, connected with flagstone terraces extending past the dining room and completely encircling the grill, permitting the dining and drinking out of doors so much in vogue. The locker room is placed at an angle from the main club house in order to connect directly with the first tee and to obtain a southeast exposure for the main building. It may be entered from the main hall or from the spacious men's lobby directly from the



Dining Room Fireplace



Entrance Lobby, with Dining Room Beyond North Hills Golf Club, Douglaston, N. Y. Clifford C. Wendehack, Architect

ALC: NOTIFIC

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main driveway. This separate entrance for the men will prove a very popular feature. It is octagonal in shape, and from each of its eight sides is an opening leading to the men's locker room, coat room and wash rooms. Over the first floor is a wide light well running the entire length of the locker room, and directly over this is provided a continuous row of skylights. Ventilation is provided over each row of lockers and around the entire roof area, making an unusually light and freshly aired room. A covered loggia or porch is provided on the second floor as well as on the first. It is furnished with card tables and easy chairs for golfers who wish to lounge about in informal attire.

The vista down the loggia illustrates better than any words can do the relationship between color of material and forms. The loggia furnishes the keynote for the entire club and was inspired by the old hospital at Vich, Catalonia. The floors of this room are of dark red and yellow tiles, highly polished. The walls are rough hand-made plaster and are treated dead white with old style kalsomine. The ceiling is antiqued rough lumber with brilliant orange, blue, green and black stencils. The colors of the floor, walls and ceiling are recalled in the draperies and pieces of pottery, which latter form not only spots of color but, being filled with sand, are ideal for ash receivers. While the ensemble is startling and usually calls forth an exclamation of surprise, it is restful and extremely cool in effect.

The lounge and dining room express the general result obtained by contrasting scale of rooms. The effect of coziness in the dining room and spacious freedom in the lounge affords a contrast which makes for an unusual atmosphere at social affairs. Here the color key is carried to its highest pitch, starting with the coloring of the antique drapery over the balcony and in the carpet which is of brilliant oranges, yellows and blues. The two Spanish iron grilles separating these rooms are removable when the rooms are thrown into one. The dining room probably contains more color, both in the room proper and on the tables, than has ever before been attempted in club decoration. The walls are rough, bumpy plaster antiqued to a mellow orange hue. The beams are natural wood color, decorated in blues, greens, whites and blacks, and they blend into the walls, except for their ornamentation. The ceiling is a green-blue, recalled again in the chair coverings, which are peacock green. The unusual use of arm and side chairs develops an atmosphere of informality. The table coverings are natural Spanish linen, furnishing an ideal background for the colorful Deruta china of individual designs and various colors. The mantel in this room focuses all its color on the Spanish horseman plaque, done in the same color as the wall, and the antique Renaissance fire screen. The novel use of wrought iron gates with stone supports in place of a fire screen, creates a new note in fireplace treatment.

The men's grill is truly masculine in its scale

and simplicity of treatment. The brown and orange floor is an excellent resistant to hob nails. The rough plaster walls are treated with soft green tones, which are recalled in the beam treatment of the ceiling. The huge fireplace on the left burns 5-foot logs, whose warmth can be felt throughout the room. The cloisonne vases on the fireplace shelf frame a fine piece of Spanish mosaic in tones of black, white, red and green, with a gold field containing the names of the officers who were associated with the erection of the building. The stairway to the left of the main entrance, leading up to the women's lounge and locker rooms on the second floor, is constructed of red tiles and black marble treads with iron handrail and twisted balusters. It is a feature which is interesting without being ostentatious. The white walls of the loggia are continued out into this lobby and on the second floor. A novel adaptation of a bulletin board, so often an unsightly object in the main entrance, is secured by the use of an old Spanish mirror frame with cork board insert for posting notices. It admirably serves a utilitarian function.

The inspiration and benefits to be derived from rich coloring and correct forms in club buildings are at last being recognized as an important factor in their success. The atmosphere created by color and form unconsciously affects the frame of mind of every club member, producing within him, at its best, satisfaction and poise, which will be reflected not only in his improved score on the course, but in the general harmonious attitude toward his fellow members and the employes of the club. Scientists declare that color is a positive force which affects our nervous systems, probably by an electrochemical activity, and that all persons with normal eyesight feel its influence. This influence is based upon the stimulation of the senses which results when white light, broken by reflection into its various wave lengths, falls upon our vision, so that instead of somber grays we see varying hues which appear to add a kind of vitality to forms. Each hue exerts its particular effect upon us, and the impression is so specific that even animals and insects appear to have marked preferences for certain colors which seem to affect their behavior. The ideal state of mind produced by right color environment must be assisted by a smooth working of all practical parts. The sequence of rooms, their sizes, character and functioning must unconsciously serve the members with ease and convenience. Economy of steps, speed, and the certainty of having every want immediately supplied at their command must be assured before their æsthetic natures can be appealed to. The North Hills Golf Club's building committee realized this fact and permitted the architect and decorator a free hand in determining the layout of the plan, the character of the various units and the color combinations, in fact they were permitted to use more color in a bolder manner than up to the present time has been done in club work. The result is original, bold, and highly interesting.

THE ARCHITECTURAL FORUM

PLATE 97



LOUNGE NORTH HILLS GOLF CLUB, DOUGLASTON, N. Y. CLIFFORD C. WENDEHACK, ARCHITECT



THE ARCHITECTURAL FORUM

PLATE 98



ARCH BETWEEN LOUNGE AND DINING ROOM NORTH HILLS GOLF CLUB, DOUGLASTON, N. Y. CLIFFORD C. WENDEHACK, ARCHITECT



PLATE 99



Detail on Back

STAIRWAY TO WOMEN'S LOUNGE NORTH HILLS GOLF CLUB, DOUGLASTON, N. Y. CLIFFORD C. WENDEHACK, ARCHITECT



PLATE 100



DINING ROOM, FROM LOUNGE NORTH HILLS GOLF CLUB, DOUGLASTON, N. Y. CLIFFORD C. WENDEHACK, ARCHITECT





LOGGIA NORTH HILLS GOLF CLUB, DOUGLASTON, N. Y. CLIFFORD C. WENDEHACK, ARCHITECT



PLATE 102



ENTRANCE HALL, FROM DINING ROOM NORTH HILLS GOLF CLUB, DOUGLASTON, N. Y. CLIFFORD C. WENDEHACK, ARCHITECT



THE ARCHITECTURAL FORUM

PLATE 103



WROUGHT IRON GRILLE BETWEEN LOUNGE AND DINING ROOM NORTH HILLS GOLF CLUB, DOUGLASTON, N. Y. CLIFFORD C. WENDEHACK, ARCHITECT



THE ARCHITECTURAL FORUM

PLATE 104



DINING ROOM



MEN'S GRILL ROOM NORTH HILLS GOLF CLUB, DOUGLASTON, N. Y. CLIFFORD C. WENDEHACK, ARCHITECT



SANTO DOMINGO THE SITE OF THE COLUMBUS MEMORIAL

BY EDWIN LACLEDE HOWARD

F ROM Porto Rico, which is four days' journey from New York, an overnight trip on the boat brings one to the old Spanish colonial city of Santo Domingo, the capital of the Dominican Republic and the site of the Columbus Memorial Lighthouse, toward which the eyes of the architectural world will be turned during the international competition for its design and plan, which is very shortly to be held. The boat leaves San Juan, Porto Rico, as the setting sun throws its last rays on the magnificent fortress at the mouth of the harbor, and when daylight comes again, the island of Haiti, the eastern three-

comes again, the Island of Haiti, the eastern threequarters of which is held by the Dominican Republic, appears apparently floating on the water. The calm sea dashes itself with unexpected violence in long lines of breakers against the narrow strip of coral rock which forms the shore. There are few beaches, and the low cliffs are crowned with great palms and in the far distance, like vague clouds, there may be seen the outlines of mountains. The sun's rays beat down with a merciless intensity, which is somewhat relieved by the trade wind from the east, which, seemingly actuated by clockwork, starts to blow. Soon we come upon the mouth of the Ozama River and catch our first glimpse of the proposed location of the lighthouse and of the old city. To the east of the river, a strip of coral rock, bearing palms and other large trees, pushes its way out into the white breakers and the marvelously blue sea. Save for the gray, vine-clad ruins of an old chapel, there are no signs of human habitation. On the west bank are one- or two-storied stucco houses, pink, red, yellow and white, with pink predominating; here and there a low, dark mass of a church or monastery roof may be seen. To the west, the buildings dwindle away amid groves of cocoanut palms.

On the shore, still pounded by breakers, is the wreck of the U. S. S. "Memphis," a warning not to forget the West Indian hurricanes which sweep these shores during the summer months. Our ship anchors in the open roadstead, and a tiny launch, performing marvelous convolutions, carries the passengers toward the shore. As the river is entered, the memorial site, to the left, stretches along with a slight rise from the sea, deserted. The city becomes dominated by the fortress called the "Homage Tower," which was the chief bulwark of the old walled city. This tower was built when the city was moved from the opposite bank in 1503; the first settlement was by Don Bartolome Colon, or Columbus, brother of the discoverer, in 1486. An engineer-architect, Don Cristobal de Topia, came from Spain especially commissioned for the work, as the Spanish saw the need of having a stronghold in this, the governing city of



North Facade, Cathedral of Santo Domingo

ARCHITECTURAL DESIGN

Part One



Entrance, Casa Diego Colon

the Indies. Their judgment was confirmed, since later the wealth of Mexico and Peru flowed through this port on its way to add to the greatness of the old country. An illustration of this tower from the land gate is given on page 540.

The launch ties up before the gate of San Diego, illustrated on page 543. The wall is pierced diagonally by the gateway, which is surmounted by a curious moulding which curls itself up to be received upon a Spanish Renaissance motif. The gate is a scene of much activity. Along the quay are small freighters, tied up where the boats of Pizarro and Cortez were made fast, unloading crates of American automobiles, American canned foods and potatoes, Scandinavian lumber, and taking on cargoes of sugar and bananas. Inside the gate, to the right and dominating it on a small hill, are the ruins of the Casa de Diego Colon. The residence of the son of Christopher Columbus, or Cristobal Colon, was built by him in 1510, and it was to this palace that he brought his bride, Maria de Toledo, cousin of King Ferdinand of Aragon. From this building he governed the Spanish colonies; it was occupied by his family for several generations, and here Don Bartolome Colon, the founder of the city, died. The illustration of the ruins on page 542 shows something of the character of the masonry. The walls, over 2 feet thick, are of the local coarse, brown-gray coral rock, pieced out here and there with long Roman brick. The plan is H-shaped, and the fragments of



Doorway, the Old Mint

the arcades closing the ends of the H are still clearly discernible. The windows are mostly elliptical, and some of them still retain their Gothic cusps. The mouldings are crude and probably, like the walls of the building, were coated over with stucco. The finest bit of detail still existing is the entrance from the land elevation, which was probably entered through the arcade.

From the gate of San Diego very narrow streets lead up into the city. The low buildings, one and two stories high, have occasionally an interesting motif, but for the most part are simple and massive. Iron grilles keep the general public from walking into the parlor, which is usually at the front and on the street level; behind this room is a second, and then an open patio, behind which is the kitchen with its earthen stove, burning charcoal. The door shown in the illustration on this page is that of the old Royal Mint which was the first building of its kind to be erected in this country. Such relics of the past as this should be preserved, and in the memorial competition program there is included a museum in which it is to be hoped that this old doorway may be saved from the encroachments of modern times. The door itself is painted pale blue; the ornament is whitewashed and stands out brilliantly against the Pompeian red walls. This bold use of color is one of the most striking things about Santo Domingo.

The door to the shop shown upon page 544 is surrounded by coral stucco and surmounted by a white

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Doorway, Convent of Santa Clara



Entrance to a Private House

stucco lintel, at the ends of which are small brackets supported by cherub heads. The cornice is typical. built of brick with stucco mouldings "run over" them. As there is no frost, stucco is a fairly durable material. The severe entrance of the convent of Santa Clara, shown upon this page, was built during the early part of the fifteenth century, and in the pediment there is a fine polychrome effigy of Santa Clara holding a reliquary. Inside the doorway is a great and beautiful room whose solid mahogany rafters are supported on Gothic arches. Iron water spouts, which throw the rain over the narrow sidewalk, remind one that during the rainy season the heavens frequently open and pour forth a short-lived but mighty deluge. The similar doorway, shown upon this page still retains its original wooden door, which has never been painted, and which has now the soft dove color of old driftwood. The window grille beyond is very typical, with its moulded cornice and sill. Behind such grilles as this are wooden shutters (there are no glazed windows), which serve to keep out the heavy rains and the noonday sun. During the daily two-hour siesta, throughout the city, these blinds are closed, and the streets are deserted.

The ruins of the church and monastery of San Francisco are among the most imposing monuments of the city and contain interesting fragments of Gothic vaulting. The heavy masonry walls, sometimes 3 or 4 feet thick, are a reminder to present-day

designers that this country is subject, fortunately not frequently, to earthquakes, and that structures must be built in the most substantial manner possible.

The chief center of interest to a visiting architect is the lovely old cathedral of Santo Domingo. Its construction was started in 1514, under the direction of an architect named Rodriguez, who came from Spain, and in 1540 the church was dedicated. The interior is chiefly Gothic in feeling, with a very wonderfully vaulted nave, but the exterior felt the influence of the Renaissance, as may be judged from the sketch of the west, or main, facade, an illustration of which is given in this issue of THE ARCHITECT-URAL FORUM. It was to this old building that the bones of Christopher Columbus were removed from Havana, and today, according to very substantial evidence, they rest in the nave of the cathedral directly in front of the main entrance. The north side of the cathedral is shown upon page 537 and is typical of the peculiar type of design used throughout the city. It was erected probably by Indian laborers who did not understand just what was required of them. The color is the soft gray which all the local masonry assumes if left undisturbed. A visit to Santo Domingo gives an architect a closer insight into the lives of the earlier discoverers. It shows the type of building to which they were accustomed, and it furnishes inspiration to us today, to help solve our problems of construction in a happy manner.

建制

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Part One



ENTRANCE TO THE FORT, SHOWING THE "HOMAGE TOWER," BUILT IN 1503





CASA DIEGO COLON


SAN DIEGO GATE



A SHOP DOOR

SMALL BUILDINGS



TOWN OFFICE BUILDING, HYANNIS, MASS. J. WILLIAMS BEAL, SONS, ARCHITECTS; L. FRANK PAINE, ASSOCIATE ARCHITECT

D URING the past few years there have been a great many excellent small public buildings erected in different parts of the country. Space does not permit us to publish in this section many of these small but interesting designs. We have, therefore, chosen a group of buildings differing greatly in character of design and point of location. The first of these small buildings is the new town building at Hyannis, Mass. This is a simple Colonial structure, comprising a two-story central building balanced on either side by a one-story wing. A classic cornice with brick parapet above emphasizes the top of the main building, while simpler cornices and parapets crown the two low wings. Arched windows and a

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semi-circular porch of rather heavy classical design emphasize the main story and entrance to the building. On the first floor is a large hearing room or town hall. Suites of offices occupy the rest of the first floor. A stairway at one side of the entrance hall leads to a second story, where seven smaller offices are located. This second floor is so planned that the one-story wings may be built up another story and connected with it by means of doorways at either end of the center corridor. The style of architecture chosen for this building is more English Georgian in its character than Colonial, but this style is what the Colonial was derived from, and its use is quite consistent with architectural propriety.



ARCHITECTURAL DESIGN

COST AND CONSTRUCTION DATA

Town Office Building, Hyannis, Mass.

J. Williams Beal, Sons, Architects; L. Frank Paine, Associate Architect

DATE OF COMPLETION: July, 1927.

GENERAL TYPE OF CONSTRUCTION: Concrete foundations; exterior walls, brick with tile backing; first floor concrete, second floor and roof, wood framing; steel stairs.

EXTERIOR MATERIALS: Waterstruck brick with wood trim.

ROOF: Tar and gravel, with copper flashing.

FLOORS: First floor, terrazzo, rubber tile and linoleum; second floor, hard pine.

HEATING: Vapor system. Magazine feed boiler, burning buckwheat coal. Direct radiation throughout, with indirect heater for fresh air supply to hall.

INTERIOR WOODWORK: Birch and whitewood.

INTERIOR WALL FINISH: Plaster.

INTERIOR DECORATIVE TREATMENT: Plain painting.

APPROXIMATE CUBIC FOOTAGE: 156,500.

COMPLETED COST PER CUBIC FOOT: 51 cents. TOTAL COST: \$79,336.49.



Town Office Building, Hyannis, Mass. J. Williams Beal, Sons, Architects; L. Frank Paine, Associate Architect

THE ARCHITECTURAL FORUM



ADMINISTRATION BUILDING, MANCHESTER, CONN. FRANK C. FARLEY AND WILLIAM HARMON BEERS, ASSOCIATED, ARCHITECTS

H ERE is a building thoroughly monumental and consistent with its location and purpose. Located in one of Connecticut's oldest and most aristocratic communities, dignity and distinction are secured through the sizes of the windows, the heights of the walls, the restrained and refined Colonial details of the entrance portico, with its rich entabla-

October, 1928

ture and pediment executed in white marble, and the tall, graceful, well proportioned cupola. The location of this town hall on the ridge or plateau which dominates the town is particularly fortunate. Together with the fine Colonial church just beyond, a most harmonious group is formed, almost giving the semblance of a town center. The similarity in scale



Part One



ENTRANCE PORTICO ADMINISTRATION BUILDING, MANCHESTER, CONN. FRANK C. FARLEY AND WILLIAM HARMON BEERS, ASSOCIATED, ARCHITECTS



ENTRANCE DETAIL ADMINISTRATION BUILDING, MANCHESTER, CONN. FRANK C. FARLEY AND WILLIAM HARMON BEERS, ASSOCIATED, ARCHITECTS

COST AND CONSTRUCTION DATA

Administration Building, Manchester, Conn.

Frank C. Farley and William Harmon Beers, Associated, Architects

street.

heating system.

YEAR OF COMPLETION: 1927.

GENERAL TYPE OF CONSTRUCTION: Basement walls, concrete; first and second story walls, hollow tile brick veneer; vault walls, solid brick; floor construction, hollow tile and reinforced concrete.

EXTERIOR MATERIALS: Selected common brick.

ROOF: Mottled green and purple slate laid on 2-inch plank supported on steel framing.

FLOORS: Finished floors in halls and corridors, terrazzo; offices, linoleum.

HEATING: Vapor vacuum system; provision made for

TOTAL COST: \$169.270. floor are located the various offices of the town officials, grouped around a center hall, which has a monumental stairway and balcony above railed with interesting ironwork. At the front of the second floor is a spacious room for the use of the selectmen. No auditorium was included in this town structure, because the high school building not far away has an auditorium of sufficient size to accommodate large town gatherings. The interior detail is all of Colonial character appropriate to the exterior design of the building. White painted woodwork, deep toned walls

and mahogany doors carry out the public character.

heating former Hall of Records, located across the

ELECTRICAL EQUIPMENT: Circulating pump for

INTERIOR WOODWORK: White pine; doors, birch.

INTERIOR DECORATIVE TREATMENT: Walls

COMPLETED COST PER CUBIC FOOT: 571/2 cents.

INTERIOR WALL FINISH: Painted plaster.

APPROXIMATE CUBIC FOOTAGE: 294,000.

buff; trim and ceilings, white enamel.

and character of the detail of the town hall and the church is fortunate and pleasing. An even more monumental character is secured in the former by the use of the Corinthian order contrasting well with the Tuscan order used in the church beyond. The first floor of the building is sufficiently high above the grade to permit the locating of numerous storage rooms and vaults on the basement floor. As the building is of fireproof construction throughout, these basement rooms can safely be used for the storage of valuable documents and records. The plan is practical, well balanced and convenient. On the first

Stair Hall

Entrance Lobby

Administration Building, Manchester, Conn. Frank C. Farley and William Harmon Beers, Associated, Architects



Part One



Photos. F. E. Geisler

FIRE HOUSE, PALM BEACH CLARK J. LAWRENCE, ARCHITECT



HE Spanish style has been consistently and attractively used in the design of this fire house at Palm Beach. It is always gratifying to see an experiment in architectural design successfully carried out. The irregular plan and grouping of the different parts of this design are interesting. The apparatus room, which is the chief part of any fire house, is the chief feature. Three large doorways designed in the manner of an open arcade are surmounted by a long covered gallery, onto which open the dormitory and recreation room on the second floor. A locker room and lavatory occupy the rear of the second floor. On the third floor, combining in one group with the tower of the building, are living room, bathroom, kitchen and dining alcove. These are intended for the use of the fire lieutenant in charge



Part One

COST AND CONSTRUCTION DATA

Fire House, Palm Beach

Clark J. Lawrence, Architect

YEAR OF COMPLETION: 1927.

GENERAL TYPE OF CONSTRUCTION: Semi-fire-

EXTERIOR MATERIALS: Stucco.

ROOF: Spanish tile. APPROXIMATE CUBIC FOOTAGE: 95,000. COMPLETED COST PER CUBIC FOOT: 50 cents. TOTAL COST: \$40,000.

of this station, as the main dining room for the firemen, together with a large kitchen and pantry, and the operator's and chief's offices are located in a onestory wing adjoining the apparatus room. The informal plan of the building gives an opportunity for an exterior more picturesque and attractive than is usually possible in the design of a fire house. The structure as a whole composes well and convinces one of the appropriateness and desirability of using so definite a style as the Spanish for the design of a purely utilitarian and municipal building in a Florida town. The tinted stucco walls, the Spanish tile roof and the stone door trim further add to the distinctive character of the building. The residential character of its appearance is due partly to the spacious overhanging gallery across the front. This aids in taking away the "public building" aspect so common to structures of this nature and helps it to fit pleasantly into its surroundings, which are those of a high class residential district. At the same time, the utility of the layout is not interfered with in any way; the tower which adds so much to the appearance of the exterior is utilized for the drying of hose, and the screened-in porch is greatly appreciated by the firemen as a lounging and sleeping place. The entire effect of the fire house is derived from a study of mass and the building up of an interesting silhouette. There is no elaborate or expensive detail, and yet it is not lacking in interest and charm which tie it well into its setting.



Side Entrance Fire House, Palm Beach Clark J. Lawrence, Architect

proof.



FIRE STATION, WHITE PLAINS, N. Y. THEODORE RICHARDS, ARCHITECT

T HIS two-apparatus fire building may logically be called a fire house. The character of its design distinctly marks it as a house and not as a typical fire station with several large doors and two or three stories of brick walls. The building is not only well designed but is well located at the corner of two streets in a suburban section of the important New York county seat of White Plains. The fact that a fire house is occupied for the greater part of

the day as a place of residence makes it additionally appropriate, that the building should be designed as a house and not as a large stable or garage. The several gables, the long, sloping, deeply pitched roof and the tinted stucco walls are all features which add to the domestic quality of the design. The roof is high and its pitch sufficiently steep to permit excellent head room for the two large dormitories, locker room, wash room and officer's bedroom on the sec-



ARCHITECTURAL DESIGN

Part One



ond floor. The proverbial brass pole as well as a stairway connects this floor with the floor below, where there is located a deep apparatus room sufficiently large to take two pieces of apparatus, one behind the other. Parallel with this long, deep room is an office for the fire captain or lieutenant, and a large living room, kitchen and lavatory. As no separate dining room is provided, it is evident that the living room is used also for dining.

Compared with the typical fire engine house of 25 and 30 years ago, the design and plan of this building mark a great step in advance. The building

is convenient, spacious and sensibly planned. Rooms for all of the various requirements of the fire fighters' residence are here, provided in suitable locations. The architect has succeeded in obtaining not only a home-like but a picturesque quality in this design. In comparison with some of the uninteresting neighboring small houses, it is indeed in pleasing contrast. As no tower is provided in this building,—a tower in which long lengths of hose may be hung up for drying after use,—this design is suitable for a fire house where only a motor chemical wagon and hook and ladder are stationed, which is often the case.



Fire Station, White Plains, N. Y. Theodore Richards, Architect



FIRE DEPARTMENT HEADQUARTERS, WHITE PLAINS, N. Y. RANDELL HENDERSON, ARCHITECT

н favor 30 years ago. In general mass the design is good. The emphasis laid on the three large entrance doors is well carried out by the tall arches, in the lower parts of which these deep openings are located. The rather thin towers or bays at either corner at triple arches which form the principal motif of the the front of the building, one of which has a castellated top reminiscent of the wooden Gothic architecture of the Victorian period, do not add to the dig-

ERE is a design for a fire department building nity of an otherwise satisfactory design. In fact following more closely the style of design in these corner towers give to the building a suggestion of the type of design frequently used for state armory buildings several decades ago. The structure would have been simpler and more dignified, and greater emphasis would have been placed on the entrance elevation of the building, had these corner towers been entirely omitted. The use of Spanish tile in preference to slate or a flat tile also seems in-



COST AND CONSTRUCTION DATA

Fire Department Headquarters, White Plains, N. Y.

Randell Henderson, Architect

 DATE OF COMPLETION: August, 1927. GENERAL TYPE OF CONSTRUCTION: Entirely fireproof. EXTERIOR MATERIALS: Black face brick; terra cotta trimmings. ROOF: Spanish tile. 	 INTERIOR WOODWORK: Birch veneer doors; no wood trim. INTERIOR WALL FINISH: Public halls and bathrooms tiled; apparatus room, glazed brick; remainder, ornamental plaster. INTERIOR DECORATIVE TREATMENT: Orna-
	mental plaster glazed. All fireplaces of tile.
FLOORS: Composition; apparatus room, brick.	APPROXIMATE CUBIC FOOTAGE: 396,800.
HEATING: Vapor system.	TOTAL COST: \$150,000.

consistent with the style and character of the building. The general proportions and the plan of the building are good. The apparatus room is sufficiently large to take four pieces of fire apparatus. Office, rest and work rooms are located in a wing at one side of this apparatus room. The fact that this latter room is only one story high gives a tremendous amount of floor space above. Although the building does not seem to be located sufficiently high above grade to permit of a well lighted basement, the principal living quarters for the firemen resident in this building, such as the two large lounges with corner

fireplaces, a large dining room and kitchen, are located in the basement, where the windows are lighted by means of large areas. Such an arrangement is, of course, an economy in the cost of the building, as otherwise it would have been necessary to place these principal living rooms on the third floor, as it is always essential that dormitories and sleeping quarters of the firemen shall be not more than one story above the apparatus room and always connected by the typical brass fire pole, down which the firemen slide in their speedy preparation to get out the apparatus and be off in answer to the insistent call of fire.



Fire Department Headquarters, White Plains, N. Y. Randell Henderson, Architect



FIRE HOUSE, WESTON, MASS. ALEXANDER S. JENNEY, ARCHITECT

HIS is a good example of the use of the Colonial L style of architecture for a semi-monumental public building. As has already been said in connection with one of the other fire houses shown in this group, it is consistent and logical to give a somewhat domestic quality to buildings designed for this purpose. The town of Weston, Mass., contains many fine old examples of Colonial architecture. So the architect in designing this fire house showed good judgment in the selection of style. The well proportioned dormer windows and the gambrel roof with large end chimneys are characteristic of the style. The use of exterior stone capped piers at each corner of the main building is an interesting variation which undoubtedly serves some structural purpose. The steep drop in the grade of the lot on which the building stands makes it possible to have a high basement and small garage under the building at the rear, where special interest is added to the elevation by the introduction of a well proportioned, low, square tower surmounted by a balustrade and cupola reminiscent of Colonial work in Newburyport and Portsmouth. As the cupola is enclosed, there seems to be no provision for an outside fire bell on this building. Whether the pipe projecting from the roof of this cupola is used as a fire whistle or for ventilation purposes, cannot be determined.

Three large doors on the front emphasize the

building's purpose. At the right of these doors is a platform supported by concrete retaining walls onto which opens a side door leading out of the large apparatus room, which apparently occupies the entire first floor. From the number of windows on the second story it is obvious that the dormitory and living rooms are located there. From the location of three second-story windows at the west end of the building it would seem that the chimney which rises directly above the middle window must be broken around it and carried down grade in two sections; or else this is a dummy chimney put up to balance that at the opposite end of the roof. The brickwork of the entire building shows unusual care in laving, and the use of recessed brick arches at the three large entrance doors, gives a suggestion of English rather than American design. This is also true of the main cornice of the building, which is entirely carried out in brick. The only wooden trim on the building requiring occasional attention in the way of repairs and painting is the cupola, and the trim on the dormer windows and under the roof's overhang.

This is a successful piece of architectural design. The elevations clearly indicate the character and purpose of the building. Although a definite style of architecture has been used as the inspiration for the design, there has been a certain amount of freedom shown in the handling of the style.



FIRE HOUSE, WESTON, MASS. ALEXANDER S. JENNEY, ARCHITECT



FIRE HOUSE, SACRAMENTO DEAN & DEAN, ARCHITECTS

H ERE is another interesting example of the use design of the chimneys, and the low, one-story rooms of the "Mediterranean" type of architecture which abut the higher dormitory wing of the build-for the design of a fire house. The character and ing are suggestive of the sunny South. The plan is plan of the building are plainly indicated in the ex- simple and compact. The large, deep apparatus terior elevation. The main apparatus room is made room is of sufficient size for two pieces of fire apthe chief element of the design, with its two large paratus. A paved passage leads from this room arched doorways and low tiled roof, which give the into the living portion of the building, where there

effect of an old farm barn in southern Italy. The are a dormitory, lavatory, living room and kitchen.



Part One



Photos. M. W. Reeves

COMFORT STATION, ST. PETERSBURG, FLA. HENRY L. TAYLOR, ARCHITECT

T HIS building is designed in the style known as "Lombard Romanesque," which is one of the most interesting in Italian architecture. Although one of the lesser important types of municipal buildings, the excellence of this design proves that even such buildings as comfort stations can be made to have architectural interest and merit. Characteristic of the style, most of the detail, such as the main cornice and frieze, some of the wall panels and the base course, is carried out in brick. In this type of design it is thoroughly consistent and appropriate, as well as pleasing to the eye, to use the typical corrugated Spanish tile. Any type of flat tile would have made the building much less interesting and consistent. The octagonal plan is simple, well balanced and direct. A narrow passageway, in which all of the pipes from the various toilets are located, extends through the center of the building. This pipe passage is accessible from the small tool room at the rear. On one side of this passage is the men's room, and on the other the women's room. These rooms are reached from separate entrances, each of which has a small vestibule, as seen in the accompanying illustration. Some sort of vestibule or entryway is always essential in the plan of a comfort station. Frequently these vestibules are placed inside instead of outside the building. In this case there was no room on the inside, so the architect very wisely designed small exterior vestibules, which add to rather than detract from the exterior interest of the station.





Men's Entrance

INTERIOR ARCHITECTURE

DETAILS FROM THE FRENCH CHATEAUX

TEXT AND MEASURED DRAWINGS BY

ALBERT A. CHADWICK

THE Louis XII wing at Blois is one of the few great buildings in France in which brick and stone are combined. The beautiful mellow red of its brickwork is a relief after the monotony of drab stone. At Blois we find motifs from the Louis XII wing, which is almost purely Gothic, constantly repeated in a modified form in the Renaissance wing of Francis I. This is not surprising, since there was practically no break in time between the completion of one wing and the beginning of the other, and it is also true that the same men carried on the work. The two balconies on the entrance front of the Louis XII wing with their fleur-de-lis ornamentation are

very beautiful and unusual. They serve to give balance to a facade which would otherwise be rather uninteresting. The balconies on the north front, although they are flush with the face of the building and although their detail is entirely different, were evidently inspired by the two balconies on the entrance facade. However, this north front is not as pleasing in its design as is that of the wing of Louis XII, because the balconies are here rather monotonously repeated, detracting from their interest.

Many of the Renaissance cornices in France show that their inspiration was derived from the unique cornices at Blois. The cornice of the stair tower



Detail of Balcony on Back

Entrance Front, Chateau de Blois 561









Chateau de Chenonceaux

in the Louis XII wing served especially as a prototype to be copied and repeated again and again. The cornice under the balcony in the court at Chaumont seems to represent the intermediate phase, while the cornice of the Francis I wing at Blois is the ultimate achievement. At Chenonceaux we find a regular entablature with architrave, frieze and cornice; but here ends any adherence to Italian precedent. The architrave has rather clumsy Gothic pendants located under the balusters of the frieze, while in the frieze itself is repeated the balustrade design of the lower balconies. The cornice, which has modillions with Gothic rosettes between them, was built at the same time as the Francis I wing of Blois, but the cornice of the latter was very much influenced by the earlier Louis XII, wing while that at Chenonceaux suggests much more the Italian precedent. The character of the work is cruder than that at Blois and nowhere nearly as effective. The chimneypiece in the Chambre de Salle de Gardes, which is one of the most beautiful of all the Renaissance fireplaces in France, was inspired by a chimney in the Louis XII wing. It is almost pure Gothic, and unusually rich and refined in ornament. The frieze below the shelf. with its foliated scroll, is especially beautiful. One cannot but marvel at the delicacy of carving and the beauty of line achieved by these old workmen, especially when one notes their lack of precision, which perhaps adds much to their charm and character.



Chimneypiece, Chateau de Blois



The Architectural Forum



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The Architectural Forum

Part One



Oratory of Catherine de Medici, Chateau de Blois





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AUTHENTIC PLASTER ORNAMENT



F. BURRALL HOFFMAN, JR., Architect

Reproduction of Ceiling from Feathers Inn, England, Circa 1550

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Infinite care has been exercised to make the center of the large square is a sure that the designs in the Jacobson Tudor rose, characteristic of 16th catalogues are authentic in their reproduction. A supplementary catalogue, tionalized feathers at the corners of "Second Book of Old English Dethe squares may have been suggested signs," is ready for distribution to recognized architects and decorators. design as a whole is similar to several Please write to make sure that you of the well known Haddon Hall receive your copy as there are only a limited number available.

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Part One



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FURNITURE BY DE LONG

ARCHITECTURAL DESIGN

Part One

CRETAN STONE



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Part One







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October, 1928



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A VERY desirable quality in a flat paint is that it be washable. Important, too, is "How long does it *remain* washable?" Can it be safely cleaned with soap and water not only a few months after it is applied, but a year, or two years, or longer?

Washability is one of the outstanding



In the case of figured finishes that have become soiled, washing restores, as shown, the original color contrast between the top coat and undercoat. characteristics of paint made with Dutch Boy white-lead and flatting oil. Here is a flat paint that will withstand many washings . . . that stays washable throughout its long life.

There are very definite reasons for the extreme washability of this paint. Its vehicle, flatting oil, binds the pigment particles together strongly. Its pigment, white-lead, undergoes no chemical change under ordinary conditions indoors . . . it is insoluble in water and stays so. Therefore, it does not wash off and leave streaks on the wall or woodwork.

No brushmarks-no laps

Furthermore, with Dutch Boy white-lead and flatting oil you can count on an interior finish unspoiled by brushmarks, laps and joints. This flat paint possesses to an unusual extent the ability to level itself out. Thus it gives a smooth, even finish free from brushmarks. At the same time, it "sets up" slowly. It remains workable on the wall long enough to permit the joining of one painted surface to another without laps or joints showing.

Color, design, finish

Being mixed to order specially for each job, this pure all-lead paint is extremely adaptable. You can obtain the exact tints required to express fully your color ideas. You can get both flat and "eggshell" finYou see here how pencil marks can be removed from a white-lead and flatting oil finish by washing it. This paint remains washable throughout its long life.

ishes. And if figuration is desired, you ha access to the crumpled roll and spon mottle effects, not to mention blend finishes—the Tiffany, for example.

If you wish further information abo these finishes, let us send you a bookl which describes them—"Decorative Pc sibilities of Paint." We shall also be gli to send a complete specification boo which gives formulas for all work, coa and finishes. Address nearest branch.

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Selected List of Manufacturers' Publications FOR THE SERVICE OF ARCHITECTS. ENGINEERS, DECORATORS, AND CONTRACTORS

The publications listed in these columns are the most important of those issued by leading manufacturers identified with the building industry. They may be had without charge, unless otherwise noted, by applying on your business stationery to *The Architectural Forum*, 383 Madison Ave., New York, or the manufacturer direct, in which case kindly mention this publication.

ACOUSTICS

- R. Guastavino Co., 40 Court St., Boston. Akoustolith Plaster. Brochure, 6 pp., 8½ x 11 ins. Important data on a valuable material.
 U. S. Gypsum Co., 205 W. Monroe St., Chicago, Ill. A Scientific Solution of an Old Architectural Problem. Folder 6 pp., 8½ x 11 ins. Describes Sabinite Acoustical Plaster.

AIR FILTERS

- Staynew Filter Corporation, Rochester, N. Y. Protectomotor High Efficiency Industrial Air Filters. Booklet, 20 pp., 8½ x 11 ins. Illustrated. Data on valuable detail of 20 pp., 81/ apparatus.

BASEMENT WINDOWS

Genfire Steel Company, Youngstown, Ohio. Architectural Details. Booklet, 28 pp., 8½ x 11 ins. Details on steel windows. A. I. A. File No. 16E.

BATHROOM FITTINGS

- ATHROOM FITTINGS
 A. P. W. Paper Co., Albany, N. Y.
 Onliwon for Fine Buildings. Folder, 8 pp., 3½ x 6 ins. Illustrated. Deals with toilet paper fittings of metal and porcelain. Architects' File Card. 3½ x 11 ins. Illustrated. Filing card on toilet paper and paper towel cabinets.
 A Towel Built for Its Job. Booklet, 8 pp., 4¼ x 9½ ins. Illustrated. Paper Towel System and Cabinets.
 Cabinets and Fixtures. Booklet, 31 pp., 5¼ x 4¼ ins. Illustrated. Catalog and price list of fixtures and cabinets.

BRICK

- RICK
 American Face Brick Association, 1751 Peoples Life Building, Chicago, III.
 Brickwork in Italy. 298 pages, size 7½ x 10½ ins., an attractive and useful volume on the history and use of brick in Italy from ancient to modern times, profusely illustrated with 69 line drawings, 300 half-tones, and 20 colored plates with a map of modern and XII century Italy. Bound in linen. Price now \$3.00, postpaid (formerly \$6.00). Half Morocco, \$7.00.
 Industrial Buildings and Housing. Bound Volume, 112 pp. 8½ x 11 ins. Profusely illustrated. Deals with the planning of factories and employes' housing in detail. Suggestions and rest rooms. Price now \$1.00, postpaid (formerly \$2.00).
 Common Brick Mfrs. Asan. of America. 2134 Guarantee Title Bldg.,
- mmon Brick Mfrs. Assn. of America, 2134 Guarantee Title Bldg., Cleveland.
- Ommon Brick Mirs. Asan. of America, 2139 Guarantee Inter Diag., Cleveland. Brick; How to Build and Estimate. Brochure, 96 pp., 8½ x 11 ins. Illustrated. Complete data on use of brick. The Heart of the Home. Booklet, 24 pp., 8½ x 11 ins. Illus-trated. Price 25 cents. Deals with construction of fireplaces
- trated. Price 25 cents. Deals with construction of inteplaces and chimneys. Skintled Brickwork. Brochure, 15 pp., 8½ x 11 ins. Illustrated. Tells how to secure interesting effects with common brick. Building Economy. Monthly magazine, 22 pp., 8½ x 11 ins. Illustrated. \$1 per year, 10 cents a copy. For architects, builders and contractors.

CEMENT

- Carney Company, The, Mankato, Minn. A Remarkable Combination of Quality and Economy. Booklet, 20 pp., 8½ x 11 ins. Illustrated. Important data on valuable material.

- material.
 International Cement Corporation, New York.
 Incor Cement. Brochure, 12 pp., 8½ x 11 ins. Illustrated. Data on a perfected, early strength Portland cement.
 Kosmorar for Enduring Masonry. Folder, 6 pp., 3½ x 6½ ins. Data on strength and working qualities of Kosmortar.
 Kosmortar, the Mortar for Cold Weather. Folder, 4 pp., 3½ x 6½ ins. Tells why Kosmortar should be used in cold weather.
 Lawrence Cement Co., New York, Boston and Philadelphia. Dragon Super Cement. Booklet, 20 pp., 8½ x 11 ins. Illustrated. Data on a valuable waterproof material.
 Louisville Cement Co., 315 Guthrie St., Louisville, Ky.
 BRIXMENT for Perfect Mortar. Self-filing handbook, 8½ x 11 ins. 16 pp. Illustrated. Contains complete technical description of BRIXMENT for brick, tile and stone masonry, specifications, data and tests.
- Missouri Portland Cement Company, St. Louis, Kansas City,
- Memphis. Twenty-four Hour Cement. Booklet, 15 pp., 8½ x 11 ins. Illus-trated. Data on a cement which makes a quick-drying concrete. Precautions for Concrete Paving Construction in Cold Weather.

- Precautions for Concrete Paving Construction in Cold Weather. Folder, 4 pp. 6 x 9 ins.
 Design and Control of Concrete Mixtures. Booklet, 32 pp. 8½ x 11 ins. Illustrated.
 Concrete Paving Construction in Hot Weather. Booklet, 11 pp. 6 x 9 ins. Illustrated.
 North American Cement Corporation, 285 Madison Ave., New York. The Cal Boon. Brochure. 32 pp. 6 x 9 ins. Illustrated. Use of Cal in Portland Cement mixtures.
 Pennsylvania-Dixie Cement Corp'n, 131 East 46th St., New York. Celluloid Computing Scale for Concrete and Lumber, 45% x 2% ins. Useful for securing accurate computations of aggregates and cement; also for measuring lumber of different sizes.

CEMENT-Continued

- Portland Cement Association, Chicago.
 Concrete Masonry Construction. Booklet, 47 pp., 8½ x 11 ins. Illustrated. Deals with various forms of construction.
 Town and Country Houses of Concrete Masonry. Booklet, 19 pp., 8½ x 11 ins. Illustrated.
 Facts About Concrete Building Tile. Brochure, 16 pp., 8½ x 11 ins. Illustrated.
 The Key to Firesafe Homes. Booklet, 20 pp., 8½ x 11 ins. Illus-trated.
- trated. Design and control of Concrete Mixtures. Brochure, 32 pp., 8½ x 11 ins. Illustrated. Portland Cement Stucco. Booklet, 64 pp., 8½ x 11 ins. Illus-trated.
- Concrete in Architecture. Bound Volume. 60 pp., 8½ x 11 ins., Illustrated. An excellent work, giving views of exteriors and interiors

CONCRETE BUILDING MATERIALS

- ONCRETE BUILDING MATERIALS
 Celite Products Company, Chicago, New York, Los Angeles. Designing Concrete for Workability as Well as Strength. Brochure. 8 pp. Illustrated. Data on how improved workability in concrete is secured without excessive quantities of water. Better Concrete; Engineering Service Bulletin X.325. Booklet, 10 pp., 8½ x 11 ins. Illustrated. On use of Celite to secure workability in concrete, to prevent segregation and to secure workability in concrete, to prevent segregation and to secure workability of papers by J. C. Pearson and Frank A. Hitchcock before 1924 American Concrete. Booklet, 12 pp., 6½ x 9½ ins. Reprint of papers by J. C. Pearson and Frank A. Hitchcock before 1924 American Concrete. Booklet, 12 pp., 8 x 11 ins. Illustrated. Deals with an important detail of building.
 Komme Portland Compation Concrete Louisville Kr.

- osmos Portland Cement Company, Louisville, Ky. High Early Strength Concrete, Using Standard Cosmos Portland Cement. Folder, 1 p., 8½ x 11 ins. Complete data on securing high strength concrete in short time.

CONCRETE COLORINGS

- The Master Builders Co., 7016 Euclid Ave., Cleveland. Color Mix, Colored Hardened Concrete Floors (Integral). Bro-chure. 16 pp. 81/2 x 11 ins. Illustrated. Data on coloring for floors.
- noors. hychrome. Concrete Surface Hardener in Colors. Folder. 4 pp. 8 x 11 ins. Illustrated. Data on a new treatment. Dychrome.

CONSTRUCTION, FIREPROOF

- Master Builders Co., Cleveland, Ohio. Color Mix. Booklet, 18 pp., 8½ x 11 ins. Illustrated. Valuable data on concrete hardener, waterproofer and dustproofer in permanent colors.
- permanent colors.
 National Fire Proofing Co., 250 Federal St., Pittsburgh, Pa.
 Standard Fire Proofing Bulletin 171. 8½ x 11 ins. 32 pp. Illustrated. A treatise on fireproof floor construction.
 Northwestern Expanded Metal Co., 1234 Old Colony Building, Chicago III
- trated. A treatise on fireproof floor construction.
 Northwestern Expanded Metal Co., 1234 Old Colony Building, Chicago, Ill.
 Northwestern Expanded Metal Products. Booklet. 8½ x 1034 ins. 16 pp. Fully illustrated, and describes different products of this company, such as Kno-burn metal lath, 20th Century Corrugated. Plaster-Sava and Longspan lath channels, etc.
 A. I. A. Sample Book. Bound volume, 8½ x 11 ins., contains actual samples of several materials and complete data regard-ing their use.

CONSTRUCTION, STONE AND TERRA COTTA

- Cowing Pressure Relieving Joint Company, 160 North Wells St.,
- Chicago, III. Pressure Relieving Joint for Buildings of stone, terra cotta or marble. Booklet. 16 pp., 8½ x 11 ins. Illustrated. Deals with preventing cracks, spalls and breaks.

DAMPPROOFING

- CAMPPROOFING
 Genfire Steel Company, Youngstown, Ohio.
 Waterproofing Handbook. Booklet. 8½ x 11 ins. 80 pp. A. I. A. File No. 7. Illustrated. Thoroughly covers subject of waterproofing concrete, wood and steel preservatives, dusting and hardening concrete floors and accelerating the setting of concrete. Free distribution.
 The Master Builders Co., 7016 Euclid Ave., Cleveland.
 Waterproofing and Damproofing Specification Manual. Booklet. 18 pp. 8½ x 11 ins. Deals with methods and materials used. Waterproofing and Damproofing. File. 36 pp. Complete descriptions and detailed specifications for materials used in building and concrete.
 Someborn Sons, Inc., L., 116 Fifth Ave., New York.
 Specification Sheet, 8½ x 11 ins. Descriptions and specifications of compounds for dampproofing interior and exterior surfaces.
 The Vortex Mfg. Co., Cleveland, Ohio.
 Par-Lock Specification "Form J" for dampproofing the wall surfaces that are to be plastered.
 Par-Lock Dampproofing. Specification Forms C, F, I and J. Sheets 8½ x 11 ins. Data on gun-applied asphalt dampproofing for floors and walls.

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—Continued from page 63

DOORS AND TRIM, METAL

The American Brass Company, Waterbury, Conn. Anaconda Architectural Bronze Extruded Shapes. Brochure, 180 pp., 8½ x 11 ins., illustrating and describing more than 2,000 standard bronze shapes of cornices, jamb casings, mould-ings, etc.

ings, etc.
Richards-Wilcox Mfg. Co., Aurora, Ill.
Fire-Doors and Hardware. Booklet. 8½ x 11 ins. 64 pp. Illustrated. Describes entire line of tin-clad and corrugated fire doors, complete with automatic closers, track hangers and all the latest equipment—all approved and labeled by Underwriters' Laboratories.

Truscon Steel Company, Youngstown, Ohio. Copper Alloy Steel Doors. Catalog 110. Booklet, 48 pp. 8½ x 11 ins. Illustrated.

DORS, SOUNDPROOF Irving Hamlin, Evanstone, Ill. The Evanston Soundproof Door. Folder, 8 pp., 8½ x 11 ins. Illustrated. Deals with a valuable type of door.

DUMBWAITERS

Sedgwick Machine Works, 151 West 15th St., New York. Catalog and Service Sheets. Standard specifications, plans and prices for various types, etc. 474 x 874 ins. 60 pp. Illustrated. Catalog and pamphlets, 8½ x 11 ins. Illustrated. Valuable data on dumbwaiters.

ELECTRICAL EQUIPMENT

- Baldor Electric Co., 4358 Duncan Avenue, St. Louis.
 Baldor Electric Motors. Booklet, 14 pp., 8 x 10½ ins. Illustrated.
 Data regarding motors.
 Benjamin Electric Mfg. Co., 120 So. Sangamon St., Chicago.
 Reference Wall Chart, 22 x 28½ ins. "Enables one to select at a glance the right type of reflector or other lighting equipment. ment
 - Benjamin-Starrett Panelboards and Steel Cabinets. Booklet, 80 pp. 8½ x 10½ ins. Full data on these details for light and pp. a
 - power. Benjamin-Starrett Panelboards for Light and Power. Booklet, 80 pp., 8½ x 11 ins. Illustrated. Full data on company's line of panelboards, steel cabinets, etc. Benjamin Electric Ranges. Booklet, 8 pp., 8½ x 11 ins. Illus-trated. Data on an excellent line of ranges for apartment bounce with the start of the st

- of panelboards, steer cannets, 222, 8 pp., 8½ x 11 ms. Inustrated. Data on an excellent line of ranges for apartment house use.
 General Electric Co., Merchandise Dept., Bridgeport, Conn. Wiring System Specification Data for Apartment Houses and Apartment Hotels. Booklet, 20 pp. 8 x 10 ins. Illustrated.
 "Electrical Specification Data for Architects. Brochure, 36 pp., 8 x 10½ ins. Illustrated. Data regarding G. E. wiring materials and their use.
 "The House of a Hundred Comforts." Booklet, 40 pp., 8 x 10½ ins. Illustrated. Dwells on importance of adequate wiring. School Cafeterias. Booklet. 9 x 6 ins. Illustrated. The design and equipment of school cafeterias with photographs of installation and plans for standardized outfits.
 Signal Engineering & Mfg. Co., 154 W. 14th St., New York. Signal Call Code System. Booklet, 16 pp., 8½ x 9½ ins. Illustrated. Data on fire alarm equipment.
 Electrical Signaling Devices and Control Equipment. Booklet, 11 pp., 8½ x 11 ins. Illustrated.
 Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Electric Flower for Buildings. Brochure, 14 pp., 8½ x 11 ins. Illustrated.
 Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Electric Flower for Buildings. Brochure, 14 pp., 8½ x 11 ins. Illustrated. Data in mortant to architects and engineers. Variable-Voltage Central Systems as applied to Electric Elevation of the second se

 - Illustrated. A publication important to architects and engineers.
 Variable-Voltage Central Systems as applied to Electric Elevators. Booklet, 13 pp., 8½ x 11 ins. Illustrated. Deals with an important detail of elevator mechanism.
 Modern Electrical Equipment for Buildings. Booklet, 8½ x 11 ins. Illustrated. Lists many useful appliances.
 Electrical Equipment for Heating and Ventilating Systems. Booklet, 24 pp., 8½ x 11 ins. Illustrated. This is "Motor Application Circular 7379."
 Westinghouse Panelboards and Cabinets (Catalog 42-A). Booklet, 32 pp., 8½ x 11 ins. Illustrated. Important data on these details of equipment.
 Beauty; Power; Silence; Westinghouse Fans (Dealer Catalog 45). Brochure, 16 pp., 8½ x 11 ins. Illustrated. Valuable information on fans and their uses.
 Electric Range Book for Architects (A. I. A. Standard Classification 31 G-4). Booklet, 24 pp., 8½ x 11 ins. Illustrated. Standard Classification aparatus for buildings of various types.
 Westinghouse Commercial Cooking Equipment (Catalog 280). Booklet, 32 pp., 8½ x 11 ins. Illustrated. Equipment for cooking on a large scale.
 Electric Appliances (Catalog 44-A). 32 pp., 8½ x 11 ins. Deals with accessories for home use.
 EVATORS
- ELEVATORS

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 Otis Elevator Company, 260 Eleventh Ave., New York, N. Y. Otis Push Button Controlled Elevators. Descriptive leaflets. 8½ x 11 ins. Illustrated. Full details of machines, motors and controllers for these types.
 Otis Geared and Gearless Traction. Elevators of All Types. De-scriptive leaflets. 8½ x 11 ins. Illustrated. Full details of machines, motors and controllers for these types.
 Escalators. Booklet. 8½ x 11 ins. 22 pp. Illustrated. Describes use of escalators in subways, department stores, theaters and industrial buildings. Also includes elevators and dock elevators.
 Richards-Witcox Mfg. Co., Aurora, 111.
 Elevators. Booklet. 8½ x 11 ins. 24 pp. Illustrated. Describes complete line of "Ideal" elevator door hardware and checking devices, also automatic safety devices.
 Sedgwick Machine Works, 151 West 15th St., New York, N. Y. Catalog and descriptive pamphlets, 4¼ x 8¼ ins. 70 pp. Illust

ELEVATORS-Continued

trated. Descriptive pamphlets on hand power freight elevators, sidewalk elevators, automobile elevators, etc. Catalog and pamphlets. $8\frac{1}{2} \ge 11$ ins. Illustrated. Important data on different types of elevators.

ESCALATORS

- SCALATORS Otis Elevator Company, 260 Eleventh Ave., New York, N. Y. Escalators. booklet, 32 pp. 8½ x 11 ins. Illustrated. A valua-ble work on an important item of equipment.

FIREPROOFING

- IREPROOFING
 Concrete Engineering Co., Omaha, Nebr.
 "Handbook of Fireproof Construction." Booklet, 53 pp., 8½ x 11 ins. Valuable work on methods of fireproofing.
 Genfire Steel Company, Youngstown, Ohio.
 Fireproofing Handbook, 8½ x 11 ins. 32 pp. Illustrated. Gives methods of construction, specifications, data on Herringbone metal lath, steel, tile., Trussit solid partitions, steel joists. Self-Sentering formless concrete construction.
 North Western Expanded Metal Co., 407 South Dearborn St., Chicago.
- Chicago. A. I. A. Sample Book. Bound volume, 8½ x 11 ins. Contains actual samples of several materials and complete data regard-ing their use.

FLAGSTONES

- J. G. Robinson, 6202 Germantown Avenue, Philadelphia. Robinson Flagstones. Brochure, 12 pp., 8½ x 11 ins. Illustrated. Data and specification.

FLOOR HARDENERS (CHEMICAL)

- Master Builders Co., Cleveland, Ohio. Concrete Floor Treatment. File, 50 pp. Data on Securing hard-ened dustproof concrete. Concrete Floor Treatments-Specification Manual. Booklet, 23 pp. 8½ x 11 ins. Illustrated. Valuable work on an important
- pp. 8%2 subject.
- subject. onneborn Sons, Inc., L., 116 Fifth Ave., New York, N. Y. Lapidolith, the liquid chemical hardener. Complete sets of speci-fications for every building type in which concrete floors are used, with descriptions and results of tests.

FLOORS-STRUCTURAL

- Truscon Steel Co., Youngstown, Ohio.
 Truscon Floretyle Construction. Booklet. 8½ x 11 ins. 16 pp. Illustrations of actual jobs under construction. Lists of prop-erties and information on proper construction. Proper method of handling and tables of safe loads.
 Structural Gypsum Corporation, Linden, N. J. Gypsteel Pre-cast Fireproof Floors. Booklet, 36 pp., 8½ x 11 ins. Illustrated. Data on flooring.
- FLOORING

- Blabor in Context of Book and States and State

- Illustrated. Specifications for Resilient Floors. Leather bound booklet, 48 pp., 8½ x 11 ins. Illustrated. Practical working specifications for installing battleship linoleum, cork composition tile and cork tile. Carter Bloxonend Flooring Co., Keith & Perry Bldg., Kansas City, Mo.
- Mo. Bloxonend Flooring. Booklet. 3¼ x 6¼ ins. 20 pp. Illustrated. Describes uses and adaptability of Bloxonend Flooring to con-crete, wood or steel construction, and advantages over loose wood blocks.



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SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—Continued from page 64

FLOORING-Continued

- FLOORING-Continued
 File Folder. 9% x 11% ins. For use in connection with A. I. A. system of filing. Contains detailed information on Bloxonend Flooring in condensed, loose-leaf form for specification writer and drafting room. Literature embodied in folder includes standard Specification Sheet covering the use of Bloxonend in general industrial service and Supplementary Specification Sheet No. 1, which gives detailed description and explanation of an approved method for installing Bloxonend in gymnasiums, armories, drill rooms and similar locations where maximum resiliency is required.
 Albert Grauer & Co., 1408 Seventeenth St., Detroit, Mich. Grauer-Watkins Red Asphalt Flooring. Folder, 4 pp., 8½ x 11 ins. Data on a valuable form of flooring.
 Thomas Moulding Floor Co., 165 W. Wacker Drive, Chicago. Better Floors. Folder, 4 pp., 11¼ x 13¼ ins. Illustrated. Floors for office, administration and municipal buildings.
 Better School Floors. Folder, 4 pp., 11¼ x 13¼ ins. Illustrated. Floors for office, administration and floor coverings.
 W. & J. Sloane Mig. Co., 577 Fifth Avenue, New York.
 Linoleum Patterns. Brochure, 10 pp., 8½ x 11 ins. Illustrated. Linoleum Patterns. Brochure, 10 pp., 8½ x 11 ins. Illustrated. Deals with fine assortment of floor coverings.
 Linoleum Patterns. Booklet, 42 pp., 8½ x 11 ins. Illustrated. Linoleum Patterns. Brochure, 10 pp., 8½ x 11 ins. Illustrated. Linoleum Data and Specifications for Architets.
 Structural Gypsum Corporation, Linden, N. J. Gypsue Ce, Chicago.
 Protor File. Folder. 8½ x 11 ins. Illustrated. Data on building floors of hollow tile and tables on floor loading.
 U. S. Gypsum Ce, Ohicago.
 Protori File. Folder. 8½ x 11 ins. Illustrated. Data on building floors of hollow tile and tables on floor loading.
 United States Quarry Tile Co., Parkersburg, W. Va.
 Quarry Tiles for Floors. Booklet, 119 pp., 8½ x 11 ins. Illustrated in colors. Patterns of quarry file

- FURNITURE
- CURNITURE
 American Seating Co., 14 E. Jackson Blvd., Chicago, Ill.
 Ars Ecclesiastica Booklet. 6 x 9 in. 48 pp. Illustrations of church fitments in carved wood.
 Theatre Chairs. Booklet. 6 x 9 in. 48 pp. Illustrations of theater chairs.
 Kittinger Co., 1893 Elmwood Ave., Buffalo, N. Y.
 Kittinger Club & Hotel Furniture. Booklet. 20 pp. 61/4 x 91/4 ins. Illustrated. Deals with fine line of furniture for hotels, clubs, institutions, schools, etc.
 Kittinger Club and Hotel Furniture. Booklet. 20 pp. 6 x 9 ins. Illustrated. Data on furniture for hotels and clubs.
 A Catalog of Kittinger Furniture. Booklet, 78 pp., 14 x 11 ins. Illustrated. General Catalog.
 McKinney Mfg. Co., Pittsburgh.
 Forethought Furniture Plans. Sheets, 61/4 x 9 ins., drawn to 1/4. inch scale. An ingenious device for determining furniture arrangement.
- w York Galleries, Madison Avenue and 48th Street, New York group of Distinguished Interiors. Brochure, 4 pp., 834 x 1134 ins. Filled with valuable illustrations. Ne

GARAGES

- ARAGES Ramp Buildings Corporation, 21 East 40th St., New York. Building Garages for Profitable Operation. Booklet. 8½ x 11 ins. 16 pp. Illustrated. Discusses the need for modern mid-city parking garages, and describes the d'Humy Motoramp system of design, on the basis of its superior space economy and fea-tures of operating convenience. Gives cost analyses of garages of different sizes, and calculates probable earnings. Garage Design Data. Series of informal bulletins issued in loose-leaf form, with monthly supplements.

GLASS CONSTRUCTION

- SCONSTRUCTION
 Adamson Flat Glass Co., Clarksburg, W. Va. Quality and Dependability. Folder, 2 pp., 8½ x 11 ins. Illustrated. Data in the company's product.
 Libbey-Owens Sheet Glass Co., Toledo, Ohio.
 Flat Glass. Brochure, 11 pp., 5½ x7% ins. Illustrated. History of manufacture of flat, clear, sheet glass.
 Mississippi Wire Glass Co., 220 Fifth Ave., New York. Mississippi Wire Glass. Catalog. 3½ x 8½ ins. 32 pp. Illustrated. Covers the complete line.

GREENHOUSES

Villiam H. Lutton Company, 267 Kearney Ave., Jersey City, N. J. Greenhouses of Quality. Booklet, 50 pp., 8½ x 11 ins. Illus-trated. Conservatories making use of Lutton Patented Gal-vanized Steel V-Bar.

HARDWARE

- IARDWARE
 P. & F. Corbin, New Britain, Conn.
 Early English and Colonial Hardware. Brochure, 8½ x 11 ins. An important illustrated work on this type of hardware.
 Locks and Builders' Hardware. Bound Volume, 486 pp., 8½ x 11 ins. An exhaustive. splendidly prepared volume.
 Colonial and Early English Hardware. Booklet, 48 pp. 8½ x 11 in Illustrated. Data on hardware for houses in these styles.
 Cutler Mail Chute Company, Rochester, N. Y.
 Cutler Mail Chute Model F. Booklet. 4 x 9¼ in. 8 pp. Illustrated.

- trated.
- trated.
 McKinney Mfg. Co., Pittsburgh.
 Forged Iron by McKinney. Booklet, 6 x 9 ins. Illustrated.
 Deals with an excellent line of builders' hardware.
 Forged Lanterns by McKinney. Brochure, 6 x 9 ins. Illustrated.
 Describes a fine assortment of lanterns for various uses.
- Richards-Wilcox Mfg. Co., Aurora, Ill. Distinctive Garage Door Hardware. Booklet. 8½ x 11 ins. 65 pp. Illustrated. Complete information accompanied by data and illustrations on different kinds of garage door hardware.

HARDWARE-Continued

- Distinctive Elevator Door Hardware. Booklet, 89 pp., 16 x 101/2 ins. Illustrated.
- ins. Illustrated. kussell & Erwin Mfg. Co., New Britain, Conn. Hardware for the Home. Booklet, 24 pp., 3½ x 6 ins. Deals with residence hardware. Door Closer Booklet. Brochure, 16 pp., 3½ x 6 ins. Data on a valuable detail. Garage Hardware Booklet, 12 pp., 3½ x 6 ins. Hardware intended for garage use. Famous Homes of New England. Series of folders on old homes and hardware in style of each.

HEATING EQUIPMENT

- American Blower Co., 6004 Russell St., Detroit. Heating and Ventilating Utilities. A binder containing a large number of valuable publications, each 8½ x 11 ins., on these important subjects.
- annoct of valuable publications, each 8½ x 11 ins., on these important subjects.
 American Radiator Company, The, 40 West 40th St., N. Y. C. Ideal Boilers for Oil Burning. Catalog 5½ x8½ in. 36 pp. Illustrated in 4 colors. Describing a line of Heating Boilers especially adapted to use with Oil Burners.
 Corto—The Radiator Classic. Brochure 5½ x 8½ in. 16 pp. Illustrated. A brochure on a space-saving radiator of beauty and high efficiency.
 Ideal Arcola Radiator Warmth.Brochure 6¼ x 9¼. Illustrated. Describes a central all-on-one-floor heating plant with radiators for small residences, stores, and offices.
 How Shall I Heat My Home? Brochure, 16 pp., 5¼ x 8½ ins. Illustrated. Full data on heating and hot water supply.
 New American Radiator Products. Booklet, 44 pp., 5 x 7¼ ins. Illustrated. Complete line of heating products.
 A New Heating Problem. Brilliantly Solved. Broadside, 4 pp. 10¼ x 15 ins. Illustrated. Data on the IN-AIRID invisible air valve.

- air valve. In-Airid, the Invisible Air Valve. Folder, 8 pp. $3\frac{1}{2} \ge 6$ ins. Illustrated. Data on a valuable detail of heating. The 999 ARCO Packless Radiator Valve. Folder, 8 pp. $3\frac{1}{2} \ge 6$ ins. Illustrated.
- James B. Clow & Sons, 534 S. Franklin St., Chicago. Clow Gasteam Vented Heating System. Brochure, 24 pp., 8½ x 11 ins. Illustrated. Deals with a valuable form of heating equipment for using gas.
- C
- equipment for using gas. **A. Dunham Company**, 450 East Ohio St., Chicago, Ill.
 Dunham Radiator Trap. Bulletin 101, 8 x 11 in. 12 pp. Illustrated. Explains working of this detail of heating apparatus.
 Dunham Packless Radiator Valves. Bulletin 104. 8 x 11 in.
 B pp. Illustrated. A valuable brochure on valves.
 Dunham Return Heating System. Bulletin 109, 8 x 11 ins. Illustrated. Covers the use of heating apparatus of this kind.
 Dunham. Vacuum Heating System. Bulletin 100, 8 x 11 ins.
 Illustrated.
 The Dunham Differential Vacuum Heating System. Bulletin 114.
 Brochure, 8 pp., 8 x 11 ins. Illustrated. Deals with heating for small buildings.
 The Dunham Differential Vacuum Heating System. Bulletin 115.
 Brochure, 12 pp., 8 x 11 ins. Illustrated. Deals with heating for large buildings.
 Lacelso Products Corporation, 119 Clinton St., Buffalo, N. Y.

- Excelso Products Corporation, 119 Clinton St., Buffalo, N. Y. Excelso Water Heater. Booklet. 12 pp. 3 x 6 in. Illustrated. Describing the new Excelso method of generating domestic hot water in connection with heating boilers. (Firepot Coil eliminated.)
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 The Fulton Sylphon Company, Knoxville, Tenn.
 Sylphon Temperature Regulators. Illustrated brochures, 8½ x 11 ins., dealing with general architectural and industrial applications; also specifically with applications of special instruments.
 Sylphon Heating Specialties. Catalog No. 200, 192 pp., 3½ x 6¾ ins. Important data on heating.
 S. T. Johnson Co., Oakland, Calif.
 Bulletin No. 4A. Brochure, 8 pp., 8½ x 11 ins. Illustrated. Data on different kinds of oil-burning apparatus.
 Bulletin No. 31. Brochure, 8 pp., 8½ x 11 ins. Illustrated. Deals with Johnson Rotary Burner With Full Automatic Control.
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- Deals with Johnson Rotary Burner With Full Automatic Control.
 Kewanee Boiler Corporation, Kewanee, Ill.
 Kewanee on the Job. Catalog. 8½ x 11 ins. 80 pp. Illustrated. Showing installations of Kewanee boilers, water heaters, radiators, etc.
 Catalog No. 78, 6 x 9 ins. Illustrated. Describes Kewanee Firebox Boilers with specifications and setting plans.
 Catalog No. 79, 6 x 9 ins. Illustrated. Describes Kewanee power boilers and smokeless tubular boilers with specifications.
 May Oil Burner Corp., Baltimore.
 Adventures in Comfort. Booklet, 24 pp., 6 x 9 ins. Illustrated. Non-technical data on oil as fuel.
 Taking the Quest out of the Question. Brochure, 16 pp., 6 x 9 ins. Illustrated. For home owners interested in oil as fuel.
 McQuay Radiator Corporation, 35 East Wacker Drive, Chicago. Ill.
 McQuay Visible Type Cabinet Heater. Booklet, 3 pp., 8½ x 11 ins. Illustrated. Cabinets and radiators adaptable to decorative schemes.
 McQuay Concealed Radiators. Brochure, 3 pp., 8½ x 11 ins. Illustrated.
 McQuay Unit Heater. Booklet, 8 pp., 8½ x 11 ins. Illustrated.

- McGuay Concealed Radiators. Brochure, 3 pp., 8½ x 11 ins. Illustrated.
 McGuay Unit Heater. Booklet, 8 pp., 8½ x 11 ins. Illustrated. Gives specifications and radiator capacities.
 Milwaukee Valve Co., Milwaukee.
 MILVACO Vacuum & Vapor Heating System. Nine 4-p. bulle-tins, 8½ x 11 ins. Illustrated. Important data on heating.
 MILVACO Vacuum & Vapor Heating Specialties. Nine 4-p. bulletins, 8½ x 11 ins. Illustrated. Deal with a valuable line of specialties used in heating.
 Modine Mfg. Company, Racine, Wis. Thermodime Unit Heater. Brochure, 24 pp., 8½ x 11 ins. Illus-trated. Apparatus for industrial heating and drying.
 Thermodine Cabinet Heater. Booklet, 12 pp., 8½ x 11 ins. Illus-trated. Cabinet heaters to buildings of different kinds.

October, 1928



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SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—Continued from page 66

HEATING EQUIPMENT-Continued

- HEATING EQUIPMENT—Continued
 Nash Engineering Company, South Norwalk, Conn.
 No. 37. Devoted to Jennings Hytor Return Line Vacuum Heating Pumps, electrically driven, and supplied in standard sizes up to 300,000 square feet equivalent direct radiation.
 No. 16. Dealing with Jennings Hytor Air Line Heating Pumps.
 No. 17. Describing Jennings Hytor Condensation Pumps, sizes up to 70,000 square feet equivalent direct radiation.
 No. 25. Illustrating Jennings Return Line Vacuum Heating Pumps. Size M, for equivalent direct radiation up to 5,000 square feet.
- up to 70,000 No. 25. Illustrating Jennings Pumps. Size M, for equivalent direct random square feet. National Radiators: Beauty and Worth. Catalog 34. Booklet 6 x 9 Aero Radiators: Beauty and Worth. Catalog 34. Booklet 6 x 9 ins., 20 pp., describing and illustrating radiators and accessories. Six Great Companies Unite to Form a Great Corporation. Book-let, 27 pp., 8½ x 10½ ins. Illustrated. Valuable data on heat-ing. Homes the Modern Way. Booklet, 8½ x 1134 ins. Illus-Dates Burner.
- let, 27 pp., 672 x 1072 intr. International and the state of the state of

- That about the Supply of Oil Fuel? Booklet, 16 pp. 5½ x 8 ins. Illustrated.
 Petroieum Heat & Power Co., 511 Fifth Avenue, New York.
 Petro Mechanical Oil Burner & Air Register. Booklet, 23 pp., 8½ x 11 ins. Illustrated. Data on industrial installations of Petro Burners.
 Present Accepted Practice in Domestic Oil Burners. Folder, 4 pp., 8½ x 11 ins. Illustrated. A reprint from Heating and Ventilating Magazine.
 Trane Co., The, La Crosse, Wis.
 Bulletin 14. 16 pp. 8½ x 10½ ins. Covers the complete line of Trane Bellows Packless Valves.
 Bulletin 20. 24 pp. 8½ x 10½ ins. Explains in detail the opera-tion and construction of Trane Condensation. Vacuum, Booster. Circulating, and similar pumps.
 How to Cut Heating Costs. Booklet, 18 pp., 8½ x 11 ins. Illus-trated.

HOSPITAL EQUIPMENT

- IOSPITAL EQUIPMENT
 The Frink Co., Inc., 24th St. and Tenth Ave., New York City. Catalog 426. 7 x 10 ins. 16 pp. A booklet illustrated with pho-tographs and drawings, showing the types of light for use in hospitals, as operating table reflectors, linolite and multilite concentrators, ward reflectors, bed lights and microscopic reflectors, giving sizes and dimensions, explaining their par-ticular fitness for special uses.
 The International Nickel Company, 67 Wall St., New York, N. Y. Hospital Applications of Monel Metal. Booklet. 8½ x 11½ ins. 16 pp. Illustrated. Gives types of equipment in which Monel Metal is used, reasons for its adoption, with sources of such equipment.
- equipment

- Architects' Data Sheet, Netson's for its adoption, with sources of such equipment.
 The Pick-Barth Companies, Chicago and New York.
 Some Thoughts About Hospital Food Service Equipment. Booklet, 21 pp., 7½ x 9¼ ins. Valuable data on an important subject.
 Wilmot Castle Company, Rochester, N. Y.
 Sterilizer Equipment for Hospitals. Book, 76 pp., 8½ x 11 ins. Illustrated. Gives important and complete data on sterilization of utensils and water, information on dressings, etc.
 Sterilizer Specifications. Brochure, 12 pp., 8½ x 11 ins. Practical specifications for use of architects and contractors. Architects' Data Sheets. Booklet, 16 pp., 8½ x 11 ins. Illustrated. Information on piping, venting, valving and wiring for hospital sterilizing Technique. Five booklets. 8 to 16 pp. 6x 9 ins. Illustrated. Deals specifically with sterilizing instruments. dressings, utensils, water, and rubber gloves.
 HOTEL EQUIPMENT

HOTEL EQUIPMENT

Dick & Company, Albert, 208 West Randolph St., Chicago, Ill Some Thoughts on Furnishing a Hotel. Booklet. 71/2 x 9 Data on complete outfitting of hotels. x 9 ins

INCINERATORS

- Home Incinerator Co., Milwaukee, Wis. The Decent Way. Burn it with Gas Brochure, 30 pp., 5¼ x 7¼ ins. inside. Illustrated, incinerator sanitation equipment for

- The Decent Way. Burn it with Gas Brochure, 30 pp., 5¼ x 7¼ ins. inside. Illustrated, incinerator sanitation equipment for residence use.
 A. I. A. File. 12 pp., 8¼ x 10¼ ins. inside. Suggestions for architect on incineration, showing installation and equipment. Specialized Home Comforts Service Plan Book. 40 pp., 8½ x 11 ins. mside, illustrated. A complete outline of the many advantages of incineration.
 Blue Star Standards in Home Building. 16 pp., 5½ x 8½ ins. inside. Illustrated, explaining fully the Blue Star principles, covering heat, incineration, refrigreration, etc.
 Kerner Incinerator Company, 715 E. Water St., Milwaukee, Wis. Incinerators (Chimney-fed). Catalog No. 15 (Architect and Builders' Edition). Size 8½ x 11 ins. 16 pp. flustrated. Describes principles and design of Kernerator Chimney-fed Incinerator for residences, apartments, hospitals, schools, apartment hotels, clubs and other buildings. Shows all standard models and gives general information and working data.
 Sanitary Elimination of Household Waste, booklet, 4 x 9 ins. 16 pp. Illustrated. Describes principle and design of Kernerator for apartments and gives list of buildings where it has been installed.
 Sanitary Disposal of Waste in Hospitals. Booklet. 4 x 9 ins. 12 pp. Illustrated. Describes principle and design of Kernerator. Gives list of hospitals where it has been installed.
 Sanitary Disposal of Waste in Hospitals. Booklet. 4 x 9 ins. 12 pp. Illustrated. Describes principle and design of Kernerator. Chimney-fed Booklet. Catalog No. 17, 20 pp. 8½ x 11 ins. Illustrated. Data on a valuable detail of equipment.

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INSULATING LUMBER Masonite Corporation, 111 West Washington St., Chicago, Ill. BOOKER, 1- Phys. 692 x 11 ms. Illustrated. Gives complete speci-fications for use of insulating lumber and details of construction involving its use.

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 "The Cork Lined House Makes a Comfortable Home." 5 x 7 in. 32 pp. Illustrated.
 Armstrong's Corkboard. Insulation for Walls and Roofs of Buildings. Booklet, 66 pp., 9½ x 1134 ins. Illustrates and describes use of insulation for structural purposes.
 Cabot, Inc., Samuel, Boston, Mass.
 Cabot's Insulating Quilt. Booklet. 7½ x 10½ ins. 24 pp. Illustrated.
 Philip Carey Co., The, Cincinnati, Ohio.
 Carey Asbestos and Magnesia Products. Catalog. 6 x 9 ins. 72 pp. Illustrated.
 Celite Products Co., 1320 South Hope St.; Los Angeles.
 The Insulation of Boilers. Booklet, 8 pp., 8½ x 11 ins. Illustrated. On insulating boiler walls, breechings, and stacks to reduce amount of radiation.
 Sil-O-Cel Insulation Materials and Allied Products. Brochure. 16 pp., 8½ x 11 ins. Illustrated. Important data on insulation.

- sulation. Heat Insulating Specifications and Blue Prints. Booklet, 20 pp., 8½ x 11 ms. Illustrated. On approved types of insulation. Structural Gypsum Corporation, Linden, N. J. Heat Insulation Value of Gypsteel. Folder, 4 pp., 8½ x 11 ins. Brochure, by Charles L. Norton, of M. I. T. JOISTS
- OISTS
 Bates Expanded Steel Truss Co., East Chicago, Ind.
 Catalog No. 4. Booklet, 32 pp., 8½ x 11 ins. Illustrated. Gives details of truss construction with loading tables and specifications.
 Genfire Steel Company, Youngstown, Ohio.
 Steel Joists. 8½ x 11 ins. 32 pp. A. I. A. File Number 13G. Illustrated. Complete data on T-Bar and Plate-Girder joists, including construction details and specifications.
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- Steel Joists. 8% x 11 ins. 32 pp. A. I. A. File Number 13G. Illustrated. Complete data on T-Bar and Plate-Girder joists, including construction details and specifications.
 KITCHEN EQUIPMENT
 The International Nickel Company, 67 Wall St., New York, N. Y. Hotels, Restaurants and Cafeteria Applications of Monel Metal. Booklet. 8% x 11 ins. 32 pp. Illustrated. Gives types of equipment in which Monel Metal is used, with service data and sources of equipment.
 Pick & Company, Albert, 208 W. Randolph St., Chicago, III. School Cafeteria. Portfolio. 17 x 11 ins. 44 pp. Illustrated. An exhaustive study of the problems of school feeding, with copious illustrations and blue prints. Very valuable to the architect. School Cafeterias. Booklet. 9 x 6 ins. Illustrated. The design and equipment of school cafeterias with photographs of in-stallation and plans for standardized outfits.
 LABORATORY EQUIPMENT
 Alberene Stone Co., 153 West 23rd Street, New York City. Booklet 8¼ x 114 ins., 26 pp. Stone for laboratory equipment, shower partitions, stair treads, etc.
 Duriron Company, Dayton, Ohio. Duriron Acid, Alkali and Rust-proof Drain Pipe and Fittings. Booklet, 8½ x 11 ins., 20 pp. Full details regarding a valuable form of piping.
 LANTERNS
 Todhunter, Arthur, 119 E. 57th St., New York. Hand Wrought Lanterns. Booklet, 554 x 644 ins. 20 pp. Illus-

LANTERNS
 Todhunter, Arthur, 119 E. 57th St., New York.
 Hand Wrought Lanterns. Booklet, 5½ x 6½ ins. 20 pp. Illustrated in Black and White. With price list. Lanterns appropriate for exterior and interior use, designed from old models and meeting the requirements of modern lighting.
 LATH, METAL AND REINFORCING
 Genfire Steel Company, Youngstown, Ohio.
 Herringbone Metal Lath Handbook. 8½ x 11 ins. 32 pp. Illustrated. Standard specifications for Cement Stucco on Herringbone. Rigid Metal Lath and interior plastering.
 National Steel Fabric Co., Pittsburgh.
 Better Walls for Better Homes. Brochure. 16 pp. 7½ x 10¼ ins. Illustrated. Metal lath, particularly for residences.
 Steeltex for Floors. Booklet. 24 pp. 8½ x 11 ins. Illustrated. Combined reinforcing and form for concrete or gypsum floors and roofs.

- Combined reinforcing and form for concrete and roofs. and roofs. Steeltex Data Sheet No. 1. Folder. 8 pp. 8½ x 11 ins. Illus-trated. Steeltex for floors on steel joists with round top chords. Steeltex Data Sheet No. 2. Folder. 8 pp. 8½ x 11 ins. Illus-trated. Steeltex for floors on steel joists with flat top flanges. Steeltex Data Sheet No. 3. Folder. 8 pp. 8½ x 11 ins. Illus-trated. Steeltex for folders on wood joists. Jorthwestern Expanded Metal Co., 1234 Old Colony Building, Chicago, Ill.

- trated. Steeltex for folders on wood joists. Northwestern Expanded Metal Co., 1234 Old Colony Building, Chicago, Ill. Northwestern Expanded Metal Products. Booklet, 8½ x 10¾ ins., 20 pp. Fully illustrated, and describes different products of this company, such as Kno-burn metal lath, 20th Century Corrugated. Plasta-saver and longspan lath channels, etc. Longspan ¾-inch Rib Lath. Folder 4 pp., 8½ x 11 ins. Illus-trated. Deals with a new type of V-Rib expanded metal. A. 1. A. Sample Book. Bound volume, 8½ x 11 ins. Contains actual samples of several materials and complete data regard-ing their use.

actual samples of several materials and complete data regard-ing their use. Norwest Metal Lath. Folder. 8½ x 11 ins. Illustrated. Data on Flat Rib Lath. Truscon Steel Company, Youngstown, Ohio. Truscon 34-inch Hy-Rib for Roofs, Floors and Walls. Booklet, ½ x 11 ins., illustrating Truscon 34-inch Hy-Rib as used in in-dustrial buildings. Plates of typical construction. Progressive steps of construction. Specification and load tables.

ctober, 1928



Each Selector (one for exteriors and one for interiors) by a simple turn of the dial brings to view 15 attractive color schemes. They solve the problem of color harmony. Selectors will be sent upon request.

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CHILDREN are easily impressed, favorably or otherwise. In early life it is necessary that their surroundings be of the type that will develop good character and happy dispositions.

The children's room where the greater portion of their time is spent, should be bright, cheery and conducive to happiness and healthfulness.

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Pee Gee Mastic Paint

For home exteriors. Retains its luster long after inferior paints have gone dead. Economical because of its great covering capacity and unusual durability.

Pee Gee China Enamel

With charming effect Pee Gee China Enamel Gloss White is used on doors, stairways, pillars, wainscoting, and all interior or exterior woodwork. It gives a smooth, hard brilliantfinishthatdoesnotyellow with age. Also made in various tints and eggshell finish.

Pee Gee Flatkoatt

Beautifies the walls and celiings of the home. Made in a rich range of shades to match any decorative scheme. Durable and sanitary, this oll paint dries with a flat, smooth, velvety finish. Various decorativeeffects are easily produced. Easily and quickly cleaned.

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—Continued from page 68

LAUNDRY CHUTES

AUNDER CHOTES The Pfaudler Company, 217 Cutler Building, Rochester, N. Y. Pfaudler Glass-Lined Steel Laundry Chutes. Booklet, 5½ x 7½ ins. 16 pp. Illustrated. A beautifully printed brochure de-scribing in detail with architects' specifications THE PFAUD-LER GLASS LINED STEEL LAUNDRY CHUTES. Contains views of installations and list of representative examples.

LAUNDRY MACHINERY

American Laundry Machinery Co., Norwood Station, Cincinnati. Ohio. Functions of the Hotel and Hospital Laundry. Brochure, 8 pp., 8½ x 11 ins. Valuable data regarding an important subject.

LIBRARY EQUIPMENT

- Art Metal Construction Co., Jamestown, N. Y. Planning the Library for Protection and Service. Brochure. 52 pp. 8½ x 11 ins. Illustrated. Deals with library fittings of different kinds. Library Bureau Division, Remington Rand, N. Tonawanda, N. Y. Like Stepping into a Story Book. Booklet. 24 pp. 9 x 12 ins. Deals with equipment of Los Angeles Public Library.

LIGHTING EQUIPMENT

- The Frink Co., Inc., 24th St. and 10th Ave., New York City. Catalog 415, 83/4 x 11 ins. 46 pp. Photographs and scaled cross-sections. Specialized bank lighting, screen and partition re-flectors, double and single desk reflectors and Polaralite Signs.

- flectors, double and single desk reflectors and Polarante Signs.
 Holophane Company, Inc., 342 Madison Ave., New York. The Lighting of Schools: A Guide to Good Practice. Booklet, 24 pp. 8½ x 11 ins. Illustrated.
 Lighting Specifications for Hospitals. Brochure, 30 pp. 8½ x 11 ins. Illustrated.
 Smyser-Royer Co., 1700 Walnut Street, Philadelphia.
 Catalog "J" on Exterior Lighting Fixtures. Brochure, illus-trated, giving data on over 300 designs of standards, lanterns and brackets of bronze or cast iron.
 Todhunter, 119 East 57th St., New York.
 Lighting Fixtures, Lamps and Candlesticks. 24 pp. 8½ x 11 ins. Illustrated. Fine assortment of lighting accessories.
 UMBER

LUMBER

National Lumber Mfrs. Assn., Washington, D. C. Use of Lumber on the Farm. Booklet, 38 pp., 81/2 x 11 ins. Use of and illustrated.

MAIL CHUTES

Cutler Mail Chute Company, Rochester, N. Y. Cutler Mail Chute Model F. Booklet. 4 x 91/4 ins. 8 pp. Illustrated.

MANTELS

- Arthur Todhunter, 119 E. 57th St., New York, N. Y. Georgian Mantels. New Booklet. 24 pp., 5½ x 6½ ins. A fully illustrated brochure on eighteenth century mantels. Folders give prices of mantels and illustrations and prices of fireplace equipment.

MARBLE

- ARBLE
 The Georgia Marble Company, Tate, Ga. New York Office, 1328
 Broadway.
 Why Georgia Marble is Better. Booklet. 33% x 6 ins. Gives analysis, physical qualities, comparison of absorption with granite, opinions of authorities, etc.
 Convincing Proof. 33% x 6 in. 8 pp. Classified list of buildings and memorials in which Georgia Marble has been used, with names of Architects and Sculptors.
 Hurt Building, Atlanta; Senior High School and Junior College, Muskegon, Mich. Folders, 4 pp. 8½ x 11 ins. Details.

METALS

The International Nickel Company, 67 Wall St., New York, N. Y. The Choice of a Metal. Booklet, 6½ x 3 ins. 166 pp. Illus-trated. Monel Metal—its qualities, use and commercial forms, briefly described.

- MILL WORK—See also Wood Curtis Companies Service Bureau, Clinton, Iowa. Architectural Interior and Exterior Woodwork. Standardized Book. 9 x 11½ ins. 240 pp. Illustrated. This is an Architects' Edition of the complete catalog of Curtis Woodwork, as de-signed by Trowbridge & Ackerman. Contains many color roletes.
 - Edition of the complete catalog of Curtis Woodwork, as de-signed by Trowbridge & Ackerman. Contains many color plates. Better Built Homes. Vols. XV-XVIII incl. Booklet. 9 x 12 ins. 40 pp. Illustrated. Designs for houses of five to eight rooms, respectively, in several authentic types, by Trowbridge & Ackerman, architects for the Curtis Companies. Curtis Details. Booklet, 19½ x 23½ ins. 20 pp. Illustrated Complete details of all items of Curtis woodwork, for the use of architects.

 - Bartmann-Sanders Company, 2155 Elston Ave., Chicago, Ill. Column Catalog, 7½ x 10 in. 48 pp. Illustrated. Contains prices on columns 6 to 36 ins. diameter, various designs and illustrations of columns and installations. The Pergola Catalog. 7½ x 10 ins. 64 pp. Illustrated. Con-tains illustrations of pergola lattices, garden furniture in wood and cement, garden accessories.
- and cement, garden accessories. Roddis Lumber and Veneer Co., Marshfield, Wis. Roddis Doors. Brochure, 24 pp., 5½ x 8½ ins. Illustrated price list of doors for various types of buildings. Roddis Doors, Catalog G. Booklet, 183 pp., 8½ x 11 ins. Com-pletely covers the subject of doors for interior use. Roddis Doors for Hospitals. Brochure, 15 pp., 8½ x 11 ins. Illustrated work on hospital doors. Roddis Doors for Hotel. Brochure, 15 pp., 8½ x 11 ins. Illustrated work on doors for hotel and apartment buildings. Climton Metallic Paint Co., Clinton, N. Y. Clinton Mortar Colors. Folder. 8½ x 11 ins. 4 pp. Illustrated in color, gives full information concerning Clinton Mortar Colors with specific instructions for using them.

MORTAR AND CEMENT COLORS

Color Card. $6\% \times 3\%$ ins. Illustrates in color the ten shades in which Clinton Mortar Colors are manufactured. Something new in Stucco. Folder, $3\% \times 6$ ins. An interesting folder on the use of coloring matter for stucco-coated walls.

ORNAMENTAL PLASTER

- JRNAMENTAL PLASTER
 A. C. Horn Company, Art Craft Division, 101 Park Ave., New York, N. Y.
 Tex-Crete, for One-Operation Fixturing. Booklet, 24 pp. 8½ x 11 ins. Illustrated. A work on decorative plastering.
 Jacobson & Co., 241 East 44th St., New York.
 A book of Old English Designs. Brochure. 47 plates. 12 x 9 ins. Deals with a fine line of decorative plaster work.
 Architectural and Decorative Ornaments. Cloth bound volume. 183 plates. 9 x 12 ins. 18 plates. Price, \$3.00 A general catalog of fine plaster ornaments.
 Geometrical ceilings. Booklet. 23 plates. 7 x 9 ins. An important work on decorative plaster ceilings.

PAINTS, STAINS, VARNISHES AND WOOD FINISHES

- abot, Inc., Samuel, Boston, Mass. Cabot's Creosote Stains. Booklet. 4 x 8½ ins. 16 pp. Illus-trated.

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PAPER

- A. P. W. Paper Co., Albany, N. Y. "Here's a Towel Built for Its Job." Folder, 8 pp., 4 x 9 ins. Deals with "Onliwon" paper towels.

PARTITIONS

- PARTITIONS
 Circle A Products Corporation, New Castle, Ind. Circle A Partitions Sectional and Movable. Brochure. Illustrated. 8½ x 11½ ins. 32 pp. Full data regarding an important line of partitions, along with Erection Instructions for partitions of three different types.
 Hauserman Company, F., F., Cleveland, Ohio.
 Hollow Steel Standard Partitions. Various folders, 8½ x 11 ins. Illustrated. Give full data on different types of steel partitions, together with details, elevations and specifications.
 Improved Office Partition Company, 25 Grand St., Elmhurst, L. I. Telesco Partition. Catalog. 8½ x 11 ins. 14 pp. Illustrated. Shows typical offices laid out with Telesco partitions, excits of finished partition units in various woods. Gives specifications and cuts of buildings using Telesco.
 Detailed Instructions for erecting Telesco Partitions. Booklet. 24 pp. 8½ x 11 ins. Illustrated. Complete instructions, with cuts and drawings, showing how easily Telesco Partition can be erected.
 Richards-Wilcox Mfg. Co., Aurora, Ill.

- Richards-Wilcox Mfg. Co., Aurora, Ill. Partitions. Booklet. 7 x 10 ins. 32 pp. Illustrated. Describes complete line of track and hangers for all styles of sliding parallel, accordion and flush door partitions. U.
- b. S. Gypsum Co., Chicago. Pyrobar Partition and Furring Tile. Booklet. 8½ x 11 ins. 24 pp. Illustrated. Describes use and advantages of hollow tile for inner partitions.

MURPHY FINE FINISHES

Famous for 63 years among architects, master painters, and makers of products requiring a fine finish

In 1902 the interior of the Equitable Building of Denver was finished with Murphy Transparent Interior Varnish. Mr. L. C. Reitze of Denver was the painting contractor and he informs us that the finish of all the rooms is in perfect condition today.

> For many years, Murphy Finishes have been a standard for beautiful and enduring results. It is eminently proper that the efforts of architects to produce distinguished and permanent interiors should have the full cooperation of the company that has been known for fine finishes for over 60 years.

Murphy Varnish Company Member of the Producers' Council

Newark

Chicago



San Francisco

Montreal

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—Continued from page 70

PIPE

- American Brass Company, Waterbury, Conn. Bulletin B-1. Brass Pipe for Water Service. 8½ x 11 ins. 28 pp. Illustrated. Gives schedule of weights and sizes (I.P.S.) of seamless brass and copper pipe, shows typical installations of brass pipe, and gives general discussion of the corrosive effect of water on iron, steel and brass pipe.
- American Rolling Mill Company, Middletown, Ohio. How ARMCO Dredging Products Cut Costs. Booklet, 16 pp., 6 x 9 ins. Data on dredging pipe.
- Clow & Sons, James B., 534 S. Franklin St., Chicago, Ill. Catalog "A." 4 x 16½ ins. 700 pp. Illustrated. Shows a full line of steam, gas and water works supplies.
- Cohoes Rolling Mill Company, Cohoes, N. Y. Cohoes Pipe Handbook. Booklet, 40 pp., 5 x 7½ ins. Data on wrought iron pipe.
- Duriron Company, Inc., Dayton, Ohio. Duriron Acid, Alkali, Rust-proof Drain Pipe and Fillings. Book-let, 20 pp., 8½ x 11 ins., Illustrated. Important data on a valuable line of pipe.
- National Tube Co., Frick Building, Pittsburgh, Pa. "National" Bulletin No. 2. Corrosion of Hot Water Pipe, 8½ x 11 ins. 24 pp. Illustrated. In this bulletin is summed up the most important research dealing with hot water systems. The text matter consists of seven investigations by authorities on
- text matter consists of seven investigations by authorities on this subject. "National" Bulletin No. 3. The Protection of Pipe Against In-ternal Corrosion, 8½ x 11 ins. 20 pp. Illustrated. Discusses various causes of corrosion, and details are given of the de-activating and deaerating systems for eliminating or retarding corrosion in hot water supply lines. "National" Bulletin No. 25. "National" Pipe in Large Build-ings. 8½ x 11 ins. 88 pp. This bulletin contains 254 illustra-tions of prominent buildings of all types, containing "National" Pipe, and considerable engineering data of value to architects, envincers. etc.
- modern Welded Pipe. Book of 88 pp. 8½ x 11 ins., profusely illustrated with haltone and line engravings of the important operations in the manufacture of pipe.

PLASTER

- Best Bros. Keene's Cement Co., Medicine Lodge, Kans. Information Book. Brochure, 24 pp., 5 x 9 ins. Lists grades of plaster manufactured; gives specifications and uses for plaster. Plasterers' Handbook.
- plaster.' Handbook. Booklet, 16 pp., 3¹/₂ x 5¹/₂ ins. A small manual for use of plasterers.
 Interior Walls Everlasting. Brochure, 20 pp., 6¹/₄ x 9¹/₄ ins. Illustrated. Describes origin of Keene's Cement and views of buildings in which it is used.

PLUMBING EQUIPMENT

- C. F. Church Mfg. Co., Holyoke, Mass.
 Catalog S. W.-3. Booklet, 95 pp., 734 x 10½ ins. Illustrated. Data on Sani-White and Sani-Black toilet seats.
 Clow & Sons, James B., 534 S. Franklin St., Chicago, Ill.
 Catalog "M." 9½ x 12 ins. 184 pp. Illustrated. Shows complete line of plumbing fixtures for Schools, Railroads and Industrial Plonet line of Plants.

- Crane Company, 836 S. Michigan Ave., Chicago, Ill.
 Plumbing Suggestions for Home Builders. Catalog. 3 x 6 ins. 80 pp. Illustrated.
 Plumbing Suggestions for Industrial Plants. Catalog. 4 x 6½ ins. 34 pp. Illustrated.
 Planning the Small Bathroom. Booklet. 5 x 8 ins. Discusses planning bathrooms of small dimensions.

- John Douglas Co., Cincinnati, Ohio. Douglas Plumbing Fixtures. Bound Volume. 200 pp. 8½ x 11 ins. Illustrated. General catalog. Another Douglas Achievement. Folder. 4 pp. 8½ x 11 ins. Illustrated. Data on new type of stall. Hospital, Brochure. 60 pp. 8½ x 11 ins. Illustrated. Deals with fixtures for hospitals.

- Duriron Company, Dayton, Ohio. Duriron Acid, Alkali and Rust-Proof Drain Pipe and Fittings. Booklet, 8½ x 11 ins., 20 pp. Full details regarding a valuable form of piping.
- Imperial Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill. Watrous Patent Flush Valves, Duojet Water Closets, Liquid Soap Fixtures, etc. 8½ x 11 ins., 136 pp., loose-leaf catalog, showing roughing-in measurements, etc.
- Maddock's Sons Company, Thomas, Trenton, N. J. Catalog "K." 10% x 7% ins. 242 pp. Illustrated. Complete data on vitreous china plumbing fixtures with brief history of Sanitary Pottery.
- Speakman Company, Wilmington, Del. Catalog K. Booklet, 150 pp., 8½ x 10% ins. Illustrated. Data on showers and equipment details.

PUMPS

- PUMPS
 Chicago Pump Company, 2300 Wolfram St., Chicago, Ill.
 The Correct Pump to Use. Portfolio containing handy data. Individual bulletins, 8½ x 11 ins., on blige, sewage, condensa-tion, circulating, house, boiler feed and fire pumps.
 Kewanee Private Utilities Co., 442 Franklin St. Kewanee, Ill.
 Bulletin E, 734 x 10¼ ins. 32 pp. Illustrated. Catalog. Com-plete descriptions, with all necessary data, on Standard Service Pumps, Indian Brand Pneumatic Tanks, and Complete Water Systems, as installed by Kewanee Private Utilities Co.
 The Trane Co., LaCrosse, Wis.
 Trane Small Centrifugal Pumps. Booklet. 334 x 8 ins. 16 pp. Complete data on an important type of pump.

PUMPS-Continued

Weil Pump Co., 215 W. Superior St., Chicago. Pumps. Booklet, 8½ x 11 ins. Illustrated. Individual bulletins with specifications on sewage ejectors, and bilge, house, condensation, booster and boiler feed pumps.

RAMPS

- Ramp Buildings Corporation, 21 East 40th St., New York. Building Garages for Profitable Operation. Booklet. 8½ x 11 ins. 16 pp. Illustrated. Discusses the need for modern mid-city. parking garages, and describes the d'Humy Motoramp system of design, on the basis of its superior space economy and fea-tures of operating convenience. Gives cost analyses of garages of different sizes, and calculates probable earnings. Garage Design Data. Series of informal bulletins issued in loose-leaf form, with monthly supplements.

REFRIGERATION

- The Fulton Syphon Company, Knoxville, Tenn. Temperature Control of Refrigeration Systems. Booklet, 8 pp., 8½ x 11 ins. Illustrated. Deals with cold storage, chilling of water, etc.

REINFORCED CONCRETE-See also Construction, Concrete

- Genfire Steel Company, Youngstown, Ohio.
- Self-Centering Handbook. 8½ x 11 ins. 36 pp. Illustrated. Methods and specifications on reinforced concrete floors, roofs and floors with a combined form and reinforced material.
 Truscon Steel Company, Youngstown, Ohio.
 Shearing Stresses in Reinforced Concrete Beams. Booklet. 8½ x 11 ins. 12 pp.

- North Western Expanded Metal Company, Chicago, Ill. Designing Data. Book. 6 x 9 ins. 96 pp. Illustrated. Covers the use of Econo Expanded Metal for various types of rein-forced concrete construction. Longspan ¼-inch Rib Lath. Folder 4 pp., 8½ x 11 ins. Illus-trated. Deals with a new type of V-Rib expanded metal.

ROOFING

- Barber Asphalt Co., Philadelphia, Pa.
- Specifications, Genasco Standard Trinidad Lake Asphalt Built-up Roofing. Booklet. 8 x 10½ ins. Gives specifications for use of several valuable roofing and waterproofing materials.
- The Barrett Company, 40 Rector St., New York City.
 - Architects' and Engineers' Built-up Roofing Reference Series; Volume IV Roof Drainage System. Brochure. 63 pp. 8½ x 11¼ ins. Gives complete data and specifications for many details of roofing.
- Bird & Son, Inc., E. Walpole, Mass. Bird's Roofs. Folder, 16 pp., 3½ x 6 ins. Illustrated. Data of roofing materials.
- Philip Carey Co., Lockland, Cincinnati, Ohio.
- Architects Specifications for Carey Built-up Roofing. Booklet. 8 x 103/4 ins. 24 pp. Illustrated. Complete data to aid in speci-fying the different types of built-up roofing to suit the kind of roof construction to be covered. Carey Built-up Roofing for Modern School Buildings. Booklet. 8 x 103/4 ins. 32 pp. Illustrated. A study of school buildings of a number of different kinds and the roofing materials adapted for each.
- Heinz Roofing Tile Co., 1925 West Third Avenue, Denver.
- Plymouth-Shingle Tile Co., 1925 West Third Avenue, Denver.
 Plymouth-Shingle Tile with Sprocket Hips. Leaflet, 8½ x 11 ins.
 Illustrated. Shows use of English shingle tile with special hips.
 Italian Promenade Floor Tile. Folder, 2 pp., 8 ½ x 11 ins.
 Illustrated. Floor tiling adapted from that of Davanzati Palace.
 Mission Tile. Leaflet, 8½ x 11 ins.
 Illustrated. Tile such as are used in Italy and southern California.
 Georgian Tile. Leaflet, 8½ x 11 ins.
 Illustrated. Tiling as used in old English and French farmhouses.

- Ludowici-Celadon Company, 104 So. Michigan Ave., Chicago, Ill. "Ancient" Tapered Mission Tiles. Leaflet. 8½ x 11 ins. 4 pp. Illustrated. For architects who desire something out of the ordinary, this leaflet has been prepared. Describes briefly the "Ancient" Tapered Mission Tiles, hand-made with full corners and designed to be applied with irregular exposures.

Structural Gypsum Corporation, Linden, N. J.

- Relative Effectiveness of Various Types of Roofing Construction in Preventing Condensation of the Under Surface. Folder, 4 pp., 834 x 11 ins. Important data on the subject. Gypsteel Pre-cast Fireproof Roofs. Booklet, 48 pp., 83_2 x 11 ins. Illustrated. Information regarding a valuable type of roofing.
- U. S. Gypsum Co., Chicago.

Pyrobar Roof Construction. Booklet. 8 x 11 ins. 48 pp. Illus-trated. Gives valuable data on the use of tile in roof con-struction. Sheetrock Pyrofill Roof Construction. Folder. 8½ x 11 ins. Illustrated. Covers use of roof surfacing which is poured in

place.

SEWAGE DISPOSAL

- Kewanee Private Utilities, 442 Franklin St., Kewanee, Ill. Specification Sheets. 73/4 x 101/4 ins. 40 pp. Illustrated. Detailed drawings and specifications covering water supply and sewage disposal systems.

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The floors in this apartment hotel are made wear-resistant and waterproof with

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VERY apartment in The Cloisters at the southeast corner orchester Avenue and Street, Chicago, has made beautiful by perproportion of design er than by excessive ment. This desirable t has been heightened he use of such Pratt & ibert Varnish Products 61" Floor Varnish r Gloss and Dull Finand Vitralite, the Long-Enamel — White —

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desired, this can be quickly and economically secured by applying a coat of "61" Floor Varnish, Dull Finish, over two coats of "61" Clear Gloss.

"61" Floor Varnish and Vitralite, the Long-Life Enamel, are but two of many Pratt & Lambert Varnish Products which have been used for beautifying and protecting the interior and exterior surfaces of fine structures everywhere.

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Vitralite The Long-Life Enamel Available in gloss and eggshell finish, in white and six attractive tints. It produces a porcelain-like finish of rare beauty and is so durable that it is guaranteed for three years inside or outside. It is specified by architects on modest homes and large city buildings. 73

SCREENS

- American Brass Co., The., Waterbury, Conn. Facts for Architects About Screening. Illustrated folder, 9½ x 11¾ ins., giving actual samples of metal screen cloth and data on fly screens and screen doors.
- Athey Company, 6015 West 65th St., Chicago, Ill. The Athey Perennial Window Shade. An accordion pleated win-dow shade, made from translucent Herringbone woven Coutil cloth, which raises from the bottom and lowers from the top. It eliminates awnings, affords ventilation, can be dry-cleaned and will wear indefinitely.

- Orange Screen Co., Maplewood, N. J. Orsco Aluminum Screens. Booklet, 8 pp., 8 x 11 ins. Illustrated. Data on a valuable line of screens. Orsco Screens and Other Products. Brochure, 20 pp., 8 x 11 ins. Illustrated. Door and window screens and other hardware.

SHADE CLOTH AND ROLLERS

Columbia Mills, Inc., 225 Fifth Avenue, New York. Window Shade Data Book. Folder, 28 pp., 8½ x 11 ins. Illustrated.

SHELVING-STEEL

- David Lupton's Sons Company, Philadelphia, Pa. Lupton Steel Shelving. Catalog E. Illustrated brochure, 40 pp., 85% x 11 ins. Deals with steel cabinets, shelving, racks, doors, partitions, etc.

SKYLIGHTS

- Albert Grauer & Co., 1408 Seventeenth St., Detroit, Mich.
 Grauer Wire Glass Skylights. Folder, 4 pp., 8½ x 11 ins. Illustrated. Data on an important line of wire glass lights.
 The Effectiveness of Sidewalk Lights. Folder, 4 pp., 8½ x 11 ins. Illustrated. Sidewalk or vault lights.
 Let in the Light—The Light That's Free. Folder, 4 pp., 8½ x 11 ins. Illustrated. Data on securing good lighting.

SOUND DEADENER

abot, Inc., Samuel, Boston, Mass. Cabot's Deadening Quilt. Brochure, 7½ x 10½ ins., 28 pp. Illus-trated. Gives complete data regarding a well-known protec-tion against sound.

STAIRWAYS

Woodbridge Ornamental Iron Co., 1515 Altgeld St., Chicago. Presteel Tested for Strength-stairways, catalog, 92 pp., 8½ x 11 ins. Illustrated. Important data on stairways.

STEEL PRODUCTS FOR BUILDING

Bethlehem Steel Company, Bethlehem, Pa.
 Steel Joists and Stanchions. Booklet, 72 pp., 4 x 6¾ ins. Data for steel for dwellings, apartment houses, etc.
 Genfire Steel Company, Youngstown, Ohio.
 Herringbone Metal Lath Handbook. 8½ x 11 ins. 32 pp. Illustrated.
 Standard specifications for Cement Stucco on Herringbone.

- bone. Rigid Metal Lath and interior plastering. Fireproofing Handbook. 8½ x 11 ins. 32 pp. Illustrated. De-scribes the full line of products manufactured by the Genfire
- Scribes the full line of product. Steel Company. Vestinghouse Electric & Mfg. Co., East Pittsburgh, Pa. The Arc Welding of Structural Steel. Brochure, 32 pp., 3½ x 11 ins. Illustrated. Deals with an important structural process.

STONE, BUILDING

- BTONE, BUILDING
 Indiana Limestone Company, Bedford, Ind.
 Volume 3, Series A.3. Standard Specifications for Cut Indiana Limestone work, 8½ x 11 ins., 56 pp. Containing specifications and supplementary data relating to the best methods of specifying and using this stone for all building purposes.
 Vol. 1. Series B. Indiana Limestone Library. 6 x 9 ins. 36 pp. Illustrated. Giving general information regarding Indiana Limestone, its physical characteristics, etc.
 Vol. 4. Series B. Booklet. New Edition. 8½ x 11 ins. 64 pp. Illustrated. Indiana Limestone as used in Banks.
 Volume 5. Series B. Indiana Limestone Library. Portfolio. 11¼ x 8¼ ins. Illustrated. Describes and illustrates the use of stone for small houses with floor plans of each.
 Volume 6, Series B-Indiana Limestone School and College Buildings. 8¼ x 11 ins., 80 pages, illustrated.
 Volume 12, Series B. Distinctive Homes of Indiana Limestons. 8½ x 11 ins., 48 pages, illustrated.
 Old Gothic Random Ashlar. 8½ x 11 ins., 16 pages, Illustrated.

STORE FRONTS

Brasco Manufacturing Co., 5025-35 South Wabash Avenue, Chicago.

III.
Catalog No. 31. Series 500. All-Copper Construction. Illustrated brochure. 20 pp. 8½ x 11 ins. Deals with store fronts of a high class.
Brasco Copper Store Fronts. Catalog No. 32. Series 202.
Brasco Standard Construction. Illustrated brochure. 16 pp. 8½ x 11 ins. Complete data on an important type of building.
Detail Sheets. Set of seven sheets; printed on tracing paper, showing full sized details and suggestions for store front designing, enclosed in envelope suitable for filing. Folds to 8½ x 11 ins.

STORE FRONTS-Continued

- Davis Solid Architectural Bronze Sash. Set of five sheets, printed on tracing paper, giving full sized details and sugges-tions for designing of special bronze store front construction, enclosed in envelope suitable for filing. Folds to 8½ x 11 ins. The Kawneer Company, Niles, Mich.
- Store Front Suggestions. Booklet, 96 pp., 6 x 81/2 ins. Illus-trated. Shows different types of Kawneer Solid Copper Store Fronts.
- Fronts. Catalog K. 1927 Edition. Booklet, 32 pp., 8½ x 11 ins. Illus-trated. Details of Kawneer Copper Store Fronts. Detail Sheets for Use in Tracing. Full-sized details on sheets 17 x 22 ins.
- Kawneer Construction in Solid Bronze or Copper. Booklet, 64 pp., 8½ x 11 ins. Illustrated. Complete data on the subject. Modern Bronze Store Front Co., Chicago Heights, Ill.
- Folder, Introducing Extruded Bronze Store Front Construction. Fold 4 pp., 8½ x 11 ins. Illustrated. Contains full sized details metal store fronts.
- Zouri Drawn Metals Company, Chicago Heights, Ill.
- Zouri Safety Key-Set Store Front Construction. Catalog. 8½ x 10½ ins. 60 pp. Illustrated. Complete information with detailed sheets and installation instructions convenient for architecta sheet files.
- International Store Front Construction. Catalog. 8½ x 10 ins. 70 pp. Illustrated. Complete information with detailed sheets and installation instructions convenient for architects' files.

TERRA COTTA

- National Terra Cotta Society, 19 West 44th St., New York, N. Y. National Terra Cotta Society, 19 West 44th St., New York, N. Y. Standard Specifications for the Manufacture, Furnishing and Setting of Terra Cotta. Brochure. 8½ x 11 ins. 12 pp. Complete Specification, Glossary of Terms Relating to Terra Cotta and Short Form Specification for incorporating in Architects' Specification.
 Color in Architecture. Revised Edition. Permanently bound volume, 9½ x 12¼ ins., containing a treatise upon the basic principles of color in architectural design, illustrating early European and modern American examples. Excellent illustrations in color.
 Present Day Schools. 8½ x 11 ins. 32 pp. Illustrating 42 examples of school architecture with article upon school building design by James O. Betelle, A. I. A.
 Better Banks. 8½ x 11 ins. 32 pp. Illustrating many banking buildings in terra cotta with an article on its use in bank design by Alfred C. Bossom, Architect.

TILE, HOLLOW

- National Fire Proofing Co., 250 Federal St., Pittsburgh, Pa.
 - Standard Wall Construction Bulletin 174. 8½ x 11 ins. 32 pp. Illustrated. A treatise on the subject of hollow tile wall construction.
- Standard Fireproofing Bulletin 171. 8% x 11 ins. 32 pp. Illus-trated. A treatise on the subject of hollow tile as used for floors, girder, column and beam covering and similar construction.
- Natco Double Shell Load Bearing Tile Bulletin. 81/2 x 11 ins.
- 6 pp. Illustrated. Natco Uninbacker Tile Bulletin. 8½ x 11 ins. 4 pp. Illustrated. Natco Header Backer Tile Bulletin. 8½ x 11 ins. 4 pp. Illus-
- Natcoffor Bulletin. $8\frac{1}{2} \times 11$ ins. 6 pp. Illustrated. Natco Face Tile for the Up-to-Date. Farm Bulletin. $8\frac{1}{2} \times 11$ ins.

TILES

- Kraftile Company, 55 New Montgomery St., San Francisco.
- High Fired Faience Tile. Booklet. 32 pp. 8½ x 11 ins. Illus-trated. Presents a fine line of tiles for different purposes.
- Unites States Quarry Tile Co., Parkersburg, W. Va. Quarry Tiles for Floors. Booklet, 119 pp., 8½ x 11 ins. Illus-trated. General catalog. Details of patterns and trim for floors. Art Portfolio of Floor Designs. 9¼ x 12¼ ins. Illustrated in colors. Patterns of quarry tiles for floors.

VALVES

- Crane Co., 836 S. Michigan Ave., Chicago, Ill.
 No. 51. General Catalog. Illustrated. Describes the complete line of the Crane Co.
 C. A. Dunham Co., 450 East Ohio St., Chicago.
 The Dunham Packless Radiator Valve Brochure, 12 pp., 8 x 11 ins. Illustrated. Data on an important type of valve.
- Jenkins Bros., 80 White St., New York. The Valve Behind a Good Heating System. Booklet. 4½ x 7½ ins. 16 pp. Color plates. Description of Jenkins Radiator Valves for steam and hot water, and brass valves used as boiler connections.
- Jenkins Valves for Plumbing Service. Booklet. 4½ x 7½ ins. 16 pp. Illustrated. Description of Jenkins Brass Globe, Angle Check and Gate Valves commonly used in home plumbing, and Iron Body Valves used for larger plumbing installations.

VENETIAN BLINDS

- Burlington Venetian Blind Co., Burlington, Vt. Venetian Blinds. Booklet. 7 x 10 ins., 24 pp. Illustrated. De-scribes the "Burlington" Venetian blinds, method of operation, advantages of installation to obtain perfect control of light in the room.

tober, 1928

THE ARCHITECTURAL FORUM

Cremax Globes to light new Wesleyan College



Cremax Globe No. 5123 J-30, specified for Wesleyan College buildings. **C**REMAX GLOBES, the newest development from Macbeth Laboratories, were chosen to light the buildings of Wesleyan College, now being built at Macon, Ga.

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For Better



Lighting

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—Continued from page 74

VENTILATION

American Blower Co., Detroit, Mich.

- American H. S. Fans. Brochure, 28 pp., 81/2 x 11 ins. Data on an important line of blowers.
- Duriron Company, Dayton, Ohio.
- Acid-proof Exhaust Fans. Folder. 8 x 10½ ins. 8 pp. Data regarding fans for ventilation of laboratory fume hoods. Specification Form for Acid-proof Exhaust Fans. Folder, 8 x 10½ ins.

Globe Ventilator Company, 205 River St., Troy, N. Y.

Globe Ventilators Catalog. 6 x 9 ins. 32 pp. Illustrated pro-fusely. Catalog gives complete data on "Globe" ventilators as to sizes, dimensions, gauges of material and table of capacities. It illustrates many different types of buildings on which "Globe" ventilators are in successful service, showing their adaptability to meet varying requirements.

Staynew Filter Corporation, Rochester, N. Y.

Protectomotor High Efficiency Industrial Air Filters. Booklet, 20 pp., 8½ x 11 ins. Illustrated. Data on valuable detail of apparatus.

WATERPROOFING

- Carey Company, The Philip, Lockland, Cincinnati, Ohio.
- Waterproofing Specification Book. 81/2 x 11 ins. 52 pp. Genfire Steel Company, Youngstown, Ohio.
 - Waterproofing Handbook. Booklet. 81/2 x 11 ins. 80 pp. Illus-trated. Thoroughly covers subject of waterproofing concrete, wood and steel preservatives, dustproofing and hardening con-crete floors, and accelerating the setting of concrete. Free distribution.
- Master Builders Company, Cleveland, Ohio.
 - Waterproofing and Dampproofing and Allied Products. Sheets in loose index file, 9 x 12 in. Valuable data on different types of materials for protection against dampness.
 - Waterproofing and Dampproofing File, 36 pp. Complete descrip-tions and detailed specifications for materials used in building with concrete.
- Sommers & Co., Ltd., 342 Madison Ave., New York City.
- "Permantile Liquid Waterproofing" for making concrete and cement mortar permanently impervious to water. Also circu-lars on floor treatments and cement colors. Complete data and specifications. Sent upon request to architects using busi-ness stationery. Circular size, 8½ x 11 ins.
- onneborn Sons, Inc., L., 116 Fifth Ave., New York, N. Y.
- Pamphlet. 334 x 834 ins. 8 pp. Explanation of waterproofing principles. Specifications for waterproofing walls, floors, swim-ming pools and treatment of concrete, stucco and mortar.
- Toch Brothers, 110 East 42d St., New York City. Specifications for Dampproofing, Waterproofing, Enameling and Technical Painting. Complete and authoritative directions for use of an important line of materials.
- The Vortex Mfg. Co., 1978 West 77th St., Cleveland, Ohio.
- Par-Lock Specification "Form D" for waterproofing surfaces to be finished with Portland cement or tile.
- Par-Lock Specification "Forms E and G" membrane waterproof-ing of basements, tunnels, swimming pools, tanks to resist hydrostatic pressure.
- Par-Lock Waterproofing. Specification Forms D, E. F and G. Sheets, 8½ x 11 ins. Data on combinations of gun-applied asphalt and cotton or felt membrane, built up to suit requirements.
- Par-Lock Method of Bonding Plaster to Structural Surfaces. Folder, 6 pp., 8½ x 11 ins. Official Bulletin of Approved Products,-Investigating Committees of Architects and Engincers.

WEATHER STRIPS

- Athey Company, 6035 West 65th St., Chicago.
- The Only Weatherstrip with a Cloth to Metal Contact. Booklet. 16 pp., 8½ x 11 ins. Illustrated. Data on an important type of weather stripping.

WINDOWS

- The Kawneer Company, Niles, Mich.
- Kawneer Solid Nickel Silver Windows. In casement and weight-hung types and in drop-down transom type. Portfolio, 12 pp., 9 x 11½ ins. Illustrated, and with demonstrator.
- David Lupton's Sons Company, Philadelphia, Pa.
- Lupton Pivoted Sash. Catalog 12-A. Booklet, 48 pp., 854 x 11 ins. Illustrates and describes windows suitable for manufacturing buildings.

WINDOWS, CASEMENT

Crittall Casement Window Co., 10951 Hearn Ave., Detroit. Mich. Catalog No. 22. 9 x 12 ins. 76 pp. Illustrated. Photographs of actual work accompanied by scale details for casements and composite steel windows for banks, office buildings. hospitals and residences.

WINDOWS, CASEMENT-Continued

- Genfire Steel Company, Youngstown, Ohio.
- Architectural Details, Casement Windows and Doors. 8½ x 11 ins. 28 pp. A. I. A. File No. 16e. Specifications and con-struction details.
- Hope & Sons, Henry, 103 Park Ave., New York, N. Y.
- Catalog. 1234 x 1834 ins. 30 pp. Illustrated. Full size details of outward and inward opening casements.

The Kawneer Company, Niles, Mich.

Kawneer Solid Nickel Silver Windows. In casement and weight-hung types and in drop-down transom type. Portfolio, 12 pp., 9 x 11½ ins. Illustrated, and with demonstrator.

David Lupton's Sons Company, Philadelphia, Pa.

- Lupton Casement of CopperSteel. Catalog C-217. Booklet, 20 pp., 85% x 11 ins. Illustrated brochure on casements, particularly for
- 85% x 11 ins residences. Lupton Heavy Casements. Detail Sheet No. 101, 4 pp., 8½ x 11 ins. Details and specifications only.

Richards-Wilcox Mfg. Co., Aurora, Ill.

Casement Window Hardware. Booklet, 24 pp., 8½ x 11 ins. Illustrated. Shows typical installations, detail drawings, con-struction details, blue-prints if desired. Describes AIR-way Multifold Window Hardware.

- Architectural Details. Booklet. 81/2 x 11 ins. 16 pp. Tables of specifications and typical details of different types of construction.
- List of Parts for Assembly. Booklet. 8½ x 11 ins. 16 pp. Full lists of parts for different units.

WINDOW SHADES AND ROLLERS

Columbia Mills, Inc., 225 Fifth Avenue, New York. Window Shade Data Book. Folder, 28 pp., 81/2 x 11 ins. Illus-trated.

WINDOWS, STEEL AND BRONZE

- Genfire Steel Company, Youngstown, Ohio.
 - Architectural Details, Steel Pivoted, Commercial and Architec-tural Projected Windows. 8½ x 11 ins. 24 pp. A. I. A. File No. 16e. Specification and construction details.
- David Lupton's Sons Company, Philadelphia, Pa.
- A Rain-shed and Ventilator of Glass and Steel. Pamphlet, 4 pp., 856 x 11 ins. Deals with Pond Continuous Sash. Sawtooth 85% x 11 in Roofs, etc.
- How Windows Can Make Better Homes. Booklet. 3% x 7 ins. 12 pp. An attractive and helpful illustrated publication on use of steel cosements for domestic buildings.
- Truscon Steel Company, Youngstown, Ohio.
 - Drafting Room Standards. Book. 8½ x 11 ins. 120 pages of mechanical drawings showing drafting room standards, speci-fications and construction details of Truscon Steel Windows, Steel Lintels, Steel Doors and Mechanical Operators.
- Truscon Solid Steel Double-Hung Windows. 24 pp. Booklet. 8½ x 11 ins. Containing illustrations of buildings using this type of window. Designs and drawings of mechanical details.
- Continuous Steel windows and Mechanical Operators. Catalog 126. Booklet, 32 pp., 8½ x 11 ins. Illustrated.

WOOD-See also Millwork

- American Walnut Mfrs. Association, 618 So. Michigan Blvd., Chicago, Ill.
 - Concase, III. merican Walnut. Booklet 7 x 9 ins. 45 pp. Illustrated. A very useful and interesting little book on the use of Walnut in Fine Furniture with illustrations of pieces by the most notable furniture makers from the time of the Renaissance down to the present. American
 - "American Walnut for Interior Woodwork and Paneling." 7 x 9 ins. Pages illustrated. Discusses interior woodwork, giving costs, specifications of a specimen room, the different figures in Walnut wood, Walnut floors, finishes, comparative tests of physical properties and the advantages of American Walnut for woodwork.

Curtis Companies Service Bureau, Clinton, Iowa.

- Better Built Homes. Vols. XV-XVIII, inc. Booklet. 9 x 12 ins. 40 pp. Illustrated. Designs for houses of five to eight rooms, respectively, in several authentic types, by Trowbridge & Ackerman, architects, for the Curtis Companies.
- National Lumber Mfrs. Assn., Washington. Airplane Hangar Construction. Booklet, 24 pp., 8½ x 11 ins. Use of lumber for hangars.

West Coast Lumber Trade Extension Bureau, Scattle, Wash.

- "Durable Douglas Fir; America's Permanent Lumber Supply." Booklet, 32 pp., 7 x 11 ins. Illustrated. Complete data on this valuable wood.
- this valuable wood.
 "Douglas Fir Wall Hanger." Metal-bound hanger, 31 x 32 ins. An attractive advertisement for Douglas fir.
 "Where to Use Douglas Fir in Your Farm." Brochure, 32 pp., 6 x 9 ins. Data on use of this wood for farm buildings.

Dctober, 1928



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Part On



THE ARCHITECTURAL FORUM

)ctober, 1928



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Dctober, 1928

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THE ARCHITECTURAL FORUM

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ARCHITECTURAL DESIGN



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It represents an absorbing interest in the improvement of construction methods and materials which has prompted the investment of ability and money in the most exhaustive and conclusive tests of Prestolith Velo in the laboratory and in actual work on a commercial scale over a period of five years.

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ARCHITECTURAL DESIGN

Part One



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IRVING HAMLIN Manufacturers Sound-Proof Doors and Folding Partitions 1506 Lincoln St. Evanston, Ill.



October, 1928





Cook County Criminal Court and Jail Building, Chicago. From an original drawing by Hugh Ferriss. Hall, Lawrence & Ratcliffe, Architects, Chicago; Great Lakes Construction Co., Chicago, Engineers; Material Service Corporation, Chicago, Kosmortar Dealers.

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ARCHITECTURAL DESIGN

Part On





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Cement	Fine-	Con- crete Batch- es	Slump in.	Flow	Concrete Strength lb. per sq. in.				
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"Incor"	6.5	10	21/4	180	2230	3220	3630	4320	5340

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48 (I day in moist air) (I day in water) 350 The average tensile strength of standard mortar at 48 hours shall be higher than the strength at 24 hours.

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MOREWOOD GARDEN APARTMENT BUILDING Pittsburgh, Pa. Architects—Marks & Kann Associate Architect—Victor C. Farrar Contractors—W. T. Grange Construction Co.

All the brick, tile and terra cotta used on these buildings were laid up in Carney Cement mortar. Part On







HERRON HILL HIGH SCHOOL, Pittsburgh, Pa. Architects—Jas. T. Steen & Sons Contractor—Edw. H. Canon

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DIOCESE OF ERIE ORPHANAGE, Erie, Pa. Architect-J. P. Brenot Contractors-Kirschner Bros.

GARDEN



Houses at University Gardens Great Neck, Long Island Arthur W. Copte, Architect

Trouble-free casement operation assured - even where salt gales blow and sea-damp prevails

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Like so many architects who would give their clients casements as convenient as they are beautiful, Mr. Coote has chosen Win-Dor for each of these houses. Win-Dor is handsome, it is practical, it is inexpensive. The oldest in reputation, the newest in design and operability. Specify Win-Dor. It pays.

Fits all sash, wood or steel. See Sweet's



Series 61 Automatic Casement Stay

Win-Dor

CASEMENT HARDWARE

The Casement Hardware Co. 402-P North Wood Street, Chicago

CASEMENT HARDWARE HEADQUARTERS

SOLID BRONZE



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What a wealth of meaning in the term! Solid, substantial worth—everlasting beauty—architectural adaptability! Little wonder that this distinctive metal has come into its own for framing the plate glass of modern office, hotel and apartment building shops.

Davis has brought new meaning to solid bronze in its application to store fronts. For the first time, the Architect has available a *complete system of solid bronze* members—related parts, designed for each other and for perfect unity.

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RICHARDS-WILCOX MANUFACTURING COMPANY, Aurora, III. "Distinctive Elevator Door Hardware."

The building and installing of elevators now constitute work so specialized, dealing as it does with elevators of many different types, that it might well be said to have become a profession in itself, and of the greatest importance to the workability or efficiency of elevators is the hardware of one kind or another which is used upon them. This publication is "Catalog No. 44" of a firm widely known as manufacturers of elevator hardware, particularly for elevator doors, including closers of several types, hangers, switches, interlocking devices, and other details with which the writer of elevator specifications should be quite familiar. The illustrations in the brochure are accompanied by diagrams so drawn to scale that the working of all the various devices in question is easily understood and provided for.

AMERICAN SEATING COMPANY, 14 East Jackson Boulevard, Chicago. "Furnishings of Modern Churches."

The traveler in England who is architecturally inclined knows that among the most glorious details of the old churches are their marvels in the way of woodwork,—the comparatively few, that is, which escaped destruction in the upheavals of the sixteenth century. That craftsmen who work in wood have by no means lost their skill is abundantly proved by this collection of illustrations issued by a firm specializing in ecclesiastical woodwork. The illustrations show installations which have been made in a number of American churches,—altar and organ screens, rood lofts and rood screens, pulpits, choir stalls, benches, etc., designed with rare taste either by individual architects or by the American Seating Company's designers, the execution of the work involving wood carving of several kinds, —strong and virile carving in the way of bas-relief, and the delicate and fragile carving, almost lace-like, of finials and canopies. The illustrations abound in suggestions likely to be useful to church architects interested in accessories.

HOCKADAY, INC. 1823 Carroll Avenue, Chicago. "Decoration." The Use of Hockaday Paints.

Since the average architect is concerning himself rather more with the decoration and furnishing of his buildings than he probably did some years ago, it is necessary that close study be made of painting, one of the most important details involved in interior decoration. This brochure deals with the advantage of using for interior work the washable paint manufactured by this widely known firm, and it contains illustrations showing the exteriors and interiors of many important buildings for which large quantities of this paint have been used. "Hockaday washable interior paint is compounded according to a formula which evolved as an exceptional success in 1906. It was perfected by I. Newton Hockaday after years of intensive and extensive experiment. Here was a material that filled the wide demand for a washable interior paint which was not affected by lime, air, or water. These were vital considerations for good first results, long wear, and for sanitation. The liquid for the body and reducer were given a place of high importance and there was made a liquid that was practically all binder to hold the pigments together and to the wall. The paste is thinned with the same liquid that it is ground in. Skilled handling, blending and treating of the expensive oils and materials gives a perfect result on plastered walls without a size. Only two coats are needed to make good work. It works easily and with speed under the brush and because of its hiding power will cover readily. Its cost is no greater than the cheapest. The original Hockaday formula has never been changed in its essentials. There have been marked improvements in the paint's odor and working qualities, however. Hockaday as made today is strained in electric vibrators through fine mesh screens to remove all sediment and to make a smoother, finer material. Excellent results can be secured on all painted walls, wood, brick, plaster and metal ceilings, whether old or new surfaces. No sizing is needed on new walls. Hockaday durability is from 10 to 12 y

AMERICAN RADIATOR COMPANY. "Ideal Type A Heat Machine." Data on its advantages.

Progress in the matter of designing heating apparatus has been accompanied by progress in the matter of economizing fuel,—highly important, since it has been found that to operate the usual heating boiler it is necessary to spend during each heating season a sum which equals or exceeds the cost of the boiler itself. This publication describes and illustrates the "Ideal Type A Heat Machine," adapted to use in residences, hotels, banks, schools, churches, theaters and other buildings, and designed to burn hard coal or coke, oil or gas. "For more or less heat, the turn of a handle is all that is required. The machine responds quickly to every heating need, automatically maintaining any desired flow of warmth throughout the home. It serves without attention from eight hours up to thirty-six hours."

PORTLAND CEMENT ASSOCIATION. "Portland Cement Stucco." An authoritative work on its correct use.

Since stucco in one form or another has been employed for many centuries in the architecture of almost every country in the world, there have been devised countless methods of using it and numerous finishes which may be used for surfacing. This booklet, one of many useful publications issued by the Portland Cement Association, deals with just this, describing use of stucco with a number of architectural types and illustrating actual surfaces finished in Spanish, Mexican, Californian, Italian, English Cottage, Colonial, Modern American, English, French Trowel, Moorish, and Italian Travertine textures. To make the booklet even more serviceable, the methods of creating these textures by using different tools are described and illustrated, condensed specifications are included, recommendations on design and construction are made, use of coloring materials is dealt with, and the covering of old structures with stucco is considered. Of course the successful use of stucco often depends upon the proper building of the framework.

MASTER BUILDERS COMPANY, Cleveland. "Plain Talk About Concrete Floors."

Writers on subjects connected with architecture, building and building maintenance have often called attention to the fact that the floors of a structure are the only parts with which, as a rule, the occupants come into bodily contact. Often the wear and tear caused by much walking over a floor is increased vastly by use of the trucks and by traffic of one sort or another which the use of certain buildings makes necessary. Engineers have brought the structural designing of floors to a high point of excellence, but the utility of a floor depends not only on its structural stability but likewise on the wearing qualities of its surface. This brochure presents a careful study into the matter of surfacing concrete floors for giving lasting service in heavy-duty areas, the prestige of the Master Builders Company, the excellence of its surfacing materials, and with which the booklet has been prepared uniting the care to give the publication a high value to architects, engineers and specification writers. That the economical floor in the long run is that which is laid with sound, tested materials by skilled workmanship and that later up-keep is inversely proportional to the initial care, form the book's theme. To prove their conclusions, the authors conducted an extensive survey of actual industrial plant floors of various types and have obtained reports from over 420 plant engineers on their experiences with cement floor finishes. twenty years engineers and builders have been trying to lay floors that will stand up under modern industrial traffic. "Plain Talk About Concrete Floors" reviews the principal methods that have been used and sums up their relative efficiencies based on the surveys of actual floors and the reports of the engineers mentioned. The engineering laboratories of the Ohio State University have coöperated in supplying the information by reporting extensive abrasion tests of cement floor finishes of different types. It is in-teresting and important to find what are the materials and methods which have rendered the most satisfactory service.



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SPECIALISTS IN ORNAMENTAL METAL WORK

TRUSCON STEEL COMPANY, Youngstown, O. "Truscon Standard Casements and Basement Windows."

The popularity of casement windows is due to their attractive appearance as well as to their highly practical qualities. In the popular mind the casement is associated chiefly, perhaps, with "English cottage" architecture, and yet since in one form or another it was used with all architectural types until the invention of the "double-hung" window, it can hardly be said to "belong" to any one form, and designers have learned to use the stock casements supplied by manufacturers for buildings of almost every description and of every architectural type. This brochure deals with the standard casements supplied by this widely known firm as well as with the windows which are particularly suitable for basements. For the guidance of designers, draftsmen and specification writers, there are illustrated all of the types and sizes in which the casements are carried.

PRATT & LAMBERT, INC., 73 Tonawanda Street, Buffalo. "Some Early American Wood Finishes."

The domestic interiors which have been arranged in the American Wing at the Metropolitan Museum have done far more than is generally believed in increasing public interest in interior architecture and decoration. Here there may be studied the development of interior architecture in the early settlements along the Atlantic seaboard, and actual interiors from New England, from the middle colonies, and from Maryland and Virginia show the gradual change from extreme and rigid simplicity, not to say austerity, to the suave and polished sophistication which obtained toward the end of the eighteenth century. Of course the ceilings, walls and floors of these rooms are finished with paints, stains, varnishes and other materials easily had today. The only thing is to know how to use them to the best advantage, and to make this possible and to show the excellence of the results so readily to be had, Pratt & Lambert, Inc., have been issuing to architects a series of miniature photographs of these rooms, accompanied by descriptive letters.

OTIS ELEVATOR COMPANY, 260 Eleventh Avenue, New York. "Escalators." Data on function and installation.

For certain purposes the escalator performs work which the elevator could not do so well, though at a much higher cost. The escalator owes its success to its continuity of motion, its great capacity, and the small amount of current consumed for each passenger carried, due to its constant running and the elimination of the stopping and starting feature that consumes so much current on elevators. A verv important consideration is the fact that no operators are required, which results in quite a large saving. Its popularity with the public is due to its great convenience and its saving in time and energy. One may step upon it at any moment and be carried upward or downward at a moderate rate of speed, comfortably, without crowding, safely, and without physical effort. It is always ready to receive passengers. There is no time lost in loading, starting, stopping and unloading; consequently its capacity is enor-mous. From 4,000 to 8,000 passengers may be carried in an hour, depending upon the width of the escalator. Escalators are built at a standard angle of 30 degrees from the horizontal, and in three standard widths, -2, 3 and 4 feet inside measurement between the balustrading, and operat-ing at a speed of 90 feet per minute.

The benefits derived from the use of escalators, which are discussed in this brochure, are nowhere more apparent than in department stores, and nowhere have they been more valued as a sound commercial investment. It is only necessary to note the large number of stores throughout the entire world using escalators, to realize the astonishing growth in their use in the last few years. The proof of their advantageous qualities lies in the fact that practically all of the stores using them have added to their original installations as their business expanded. Escalators are primarily an adjunct to the elevator equipment in the store, each performing its own particular function. They promote circulation through the store because of their inviting and easy method of travel from floor to floor over the building.

GENERAL ELECTRIC COMPANY, Merchandise Department, Bridgeport, Conn. "Wiring Data for Apartments."

The construction everywhere of apartment houses and apartment hotels and the necessity of their having adequate electric wiring have brought about the careful study of the problem by engineers of the General Electric Company and the publication of their recommendations for the guidance of architects. The wiring of a large apartment building involves much more care and thought than the wiring of an individual residence, owing to the diversity of its entrance requirements and the necessity of planning for each separate suite or apartment what is practically the wiring for an individual house. In this brochure there is presented a study of apartments of a number of types,—small apartments, large apartments, hotel apartments, "maisonettes," duplex studio apartments, giving their floor plans together with diagrams which show approved methods of wiring them.

THE JOHN DOUGLAS COMPANY, Cincinnati. "General Catalog." A valuable assortment of plumbing fittings.

The excellence of American plumbing is of course due quite as much to the efforts of the manufacturers of plumbfixtures and accessories as to the resourcefulness and ingenuity of engineers and inventors. One does not always realize how great is the variety of such fittings until attention is directed toward it by a catalog dealing with the vast assortment carried by a leading manufacturer. Here, for example, is the general catalog of the widely known John Douglas Company, a leather-bound volume of 200 pages. The catalog lists and illustrates a great variety of fittings for the bathrooms, pantries and kitchens of residence structures, for lavatories and toilet rooms of buildings of other kinds, and other fittings which have evidently been designed to meet certain specific needs. Whatever may be the nature of a building, its plumbing is of the first importance, and this extremely useful volume should be in the every architect and on the desk or table of every office of writer of specifications. It is full of suggestions of value.

CONCRETE STEEL COMPANY, 42 Broadway, New York. "Havemeyer Trusses; Structural Economies for Concrete."

Engineering science is constantly seeking new economies in the design and construction of buildings. The search is always directed toward better and less costly materials, toward saving labor and toward increasing the rapidity with which buildings may be erected, all without sacrificing qual-ity of construction. These efforts are increasing the permanency and safety of modern structures and are doing much to offset increasing costs of labor and materials. With the almost universal abandonment of combustible wooden construction, concrete has come into general use for the con-struction of structural floor slabs. It is a logical material, being highly fire-resistant and relatively easy to use. Steel beams and joists are equally logical substitutes for wood members, and various combinations of steel and concrete have been employed for several decades for fireproof floor and roof construction. Some of the problems in ordinary reinforced concrete and structural steel construction particularly involve the factor of their relatively high cost, due in a large measure to the need for more or less elaborate formwork. Forms are a substantial part of the cost of construction of either of these types of floors, and they introduce no corresponding benefit. Furthermore, the dead weight of these floors is relatively high, adding to the cost of foundations and framework. Out of these difficulties there has been evolved a new type of construction based upon the use of light trusses as structural floor members in conjunction with a relatively thin concrete slab which is poured on a supporting and reinforcing material which eliminates the need for forms. Havemeyer Trusses, fully dealt with in this booklet, are among the most scientifically designed and successful members used in this type of floor and roof construction. They are placed on the structural steel or masonry framework of the building without rivet-ing or fabricating on the site. Metal lath or one of the newer types of welded reinforcing fabrics having a heavy waterproof backing which eliminates use of forms is used.

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Part Tw

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Why?

- 1. WHY did over 400 building owners vote 5 to 1 in favor of one type of concrete floor hardener? -(Answered on page 8)*
- 2. WHY did up-keep costs for Northwestern Terra Cotta Company floors amount to only \$14 in 15 years?

-(Answered on page 16)* **3.** WHY did floors laid in 1917 save the Richman Brothers Company \$7000 in 11 years? -(Answered on page 18)*

- 4. WHY is metal superior to sand in concrete floor finish? -(Answered on page 24)*
- 5. WHY is there so much difference today between two kinds of concrete floors laid side by side in a Pennsylvania Railroad Station in 1912?

(Answered on page 6)*

6. WHY did the Ohio State University test prove one type of concrete floor finish three times more wear-resisting than the type in ordinary use?

-(Answered on page 23)*

7. WHY is "surface treatment" impractical for many types of concrete floors? __(Answered on page 9)*

*Answered in the book

"PLAIN TALK ABOUT CONCRETE FLOORS," a survey presenting official tests, expert investigations and performance reports on actual floors in different industries.

Every architect, engineer or building owner with floors to build or maintain should have this book. Sent free to those who return the coupon or request it on their business letterheads.

THE MASTER BUILDERS COMPANY CLEVELAND, OHIO

Factories in Cleveland, Ohio Buffalo, N. Y. and Irvington, N. J.

Sales Offices in 110 Cities

Facts in This Book-

plain talk about concrete floors

E NABLED one of the world's greatest tire and rubber companies* to secure a floor finish that would hold their heavy traffic at far less cost than material originally specified. This improved type of cement finish saved them thousands of dollars in initial investment and will save hundreds in maintenance.

Area-300,000 square feet

SATISFIED a very large automobile manufacturer* that a super-wear-resisting concrete floor was exactly what his new plant needed. He used the finish which has proven to be the lowest-cost-per-year floor known.

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These are three out of a long list of builders who have found in this book proven economies they could profit by. That the book must carry important, usable information, is self-evident.

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The Master Builders Company 7016 Euclid Avenue, Cleveland, Ohio Send a free copy of "Plain Talk About Concrete Floors" to Name Position Company

Address

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Jennings Vacuum Heating Pump, for removing condensation and air from return line heating systems.

JN this impressive school building, of recognized architectural excellence, it is fitting that a Jennings Vacuum Heating Pump is to be found on the return line of the heating plant.

A Jennings unit designed for continuous operation that, by closely regulating the steam flow, enables the system to meet elastic heating requirements satisfactorily—to facilitate the distribution of controlled heat over extensive areas —and to maintain comfortable temperatures in every section of the structure.

For specification details, see Bulletin 71.

RETURN LINE AND AIR LINE VACUUM HEATING PUMPS and CONDENSATION PUMPS and COMPRESSOR'S AND VACUUM PUMPS FOR AIR AND GASES and STANDARD AND SUCTION CENTRIFUGAL PUMPS







Nash Engineering Corp., Norwalk, Conn.

Chicago Hardware Foundry Co., Chicago, Ill.

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American Can Company, New Orleans, La. Floored throughout with Bloxonend.

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The American Can Company has placed 29 orders totaling more than one-half million square feet. The Continental Can Company, Link Belt Company, Crane Company—these and hundreds of other well known concerns have increased trucking efficiency and reduced floor maintenance by installing BLOXONEND. Its construction and method of laying insure long life, resiliency and lasting smoothness.

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Branch offices in principal cities







Part Two

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Isn't it true nine times out of ten?

NO ALLEY-

Very few of the new subdivisions have alleys. Where's the garbage can going? Some places it has to be carried out to the front door.

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automatic heat. They're not going to be able to cram their garbage, rubbish and trash in the furnace.

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Installs as easy as a gas range. Uses about 1000 cu. ft. of gas per month. No chute to get slimy, cock-roachy, mousy,

or clog up.

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The Decent Way to dispose of garbage, rubbish and trash is to burn it with gas. Investigate, and you will specify Incinor.

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NCINOR Good Riddance GARBAGE · RUBBISH · TRASH

HOME INCINERATOR COMPANY Security Building, Milwaukee, Wisconsin

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Ideally Designed for Stoker Operation

THE combustion chamber of the Heggie-Simplex boiler runs the entire length of the boiler bringing a far greater amount of heating surface in direct contact with the fire than is usually provided. A rear-front-rear flue passage for the gases and unrestricted circulation further assure maximum utilization of heat units. These features provide for the most economical and most efficient use of stoker equipment and explain why Heggie-Simplex boilers are seen in such rapidly increasing numbers wherever mechanical firing is employed.

> Heggie-Simplex Boiler Co., Joliet, Illinois. Representatives in principal cities — telephone and address listed under "Heggie-Simplex Boiler Company."



Part Two



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THE late E. M. Statler left many lasting memorials to his sound judgment and business acumen. He left hotels that will stand as models of their kind. But he also left in his own home kitchen an enduring record of his preference for Monel Metal.

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Monel Metal is now used in fine buildings of all kinds — in the most imposing institutions, the best built homes. In every case it is furnishing rust-immunity, corrosion-resistance, steel-like strength. It is adding to equipment's cleanliness, attractiveness, and long life. It is saving labor, repairs and replacements.

Isn't it evident that you protect your client's interests by specifying Monel Metal for food service equipment and decorative metal work?

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Monel Metal is a technically controlled Nickel-Copper alloy of high Nickel content. It is mined, smelted, refined, rolled and marketed solary by The International Nickel Company. The name "Monel Metal" is a registered trade mark



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Every architect should have our portfolio on refrigeration for his files, as well as the current catalogs of our various lines. Send now for your copies.

> McCRAY REFRIGERATOR SALES CORPORATION 864 Lake St., Kendallville, Indiana

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No. 49 of a series of advertisements featuring prominent laundry installation

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This modern, dependable laundry department, installed with the cooperation of "American" engineers, is operated under the direct supervision of Mt. Sinai Hospital's own officials.

HE "laundry I bag" at Cleveland's modern Mt. Sinai Hospital is a mammoth one; yet the handling of its vast weekly wash is merely a matter of routine. For Mt. Sinai Hospital has its own laundry-an "all-American" department-right in its own building.

The same is true in the case of so most every day architects confer with engineers of The American Laundry

Machinery Company in the planning of these indispen-sable laundry departments.

These experienced men know every phase of laundry practice; they can show you floor plans and photographs of "American"- equipped

laundries in hospitals, hotels and clubs of all sizes and types. Make many, many modern institutions. Al- use of this helpful "American" service-it is yours for the asking, of course.

> THE AMERICAN LAUNDRY MACHINERY COMPANY Norwood Station, CINCINNATI, OHIO

Mt. Sinai Hospital, Cleveland, Ohio, photo-graphed from the air.

Charles R. Greco, Architect

THE CANADIAN LAUNDRY MACHINERY CO., LTD. 47-93 Sterling Road, Toronto 3, Ont., Canada

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it promptly

THIS book, "Better Walls for Better Homes" describes how STEELTEX applies the principle of reinforcing to walls and ceilings.

STEELTEX reinforces plaster with steel exactly as concrete is reinforced.

* * *

Today, when the trend of architectural style is placing so much emphasis on bringing charm to walls and ceilings, the protection of plaster is vastly more important than ever before.

Architects will be quick to appreciate the value of a material that *reinforces* plaster by utilizing the same principle that is used to reinforce concrete—rigid steel embedded in the slab. It has a successful record in over 200,000 installations.

STEELTEX is used in place of lath. It is a fabric of rust-proofed (galvanized) cold-drawn steel, attached by a furring wire to a two-ply waterproofed backing. The steel has an average tensile strength of 78,000 pounds and is welded on 2''centers – giving it equal strength against stress from all directions. It comes in sheets $50'' \ge 52''$.

Plaster is applied by an ordinary sweep of the trowel and the furring wire provides space for the plaster to spread under the fabric. As a result the steel is uniformly and completely embedded.

Many advantages in one material

The backing not only produces automatic backplastering, but adds effective insulating, damp-proofing and sounddeadening qualities. Naturally it entirely eliminates lath marks. Never before has one material combined all these valuable qualities. The book, "Better Walls for Better Homes" gives complete details. May we send you a copy?

New-steeltex for floors

sTEELTEX for Floors, recently introduced, has already been used in numerous important installations. Heavier than other types of STEELTEX. It is quickly stretched and secured in place over any type of beam or joist. It comes in rolls, not sheets.

Its obvious advantages include maximum construction speed, elimination of forms, prevention of droppings, uniform reinforcement throughout the slab, better curing, etc. The booklet, "STEELTEX for Floors" contains full details with working designs. Send for your copy.

National Steel Fabric Company

Pillsburgh Steel Co.)

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A house isn't modern unless it has modern wiring

GENERAL ELECTRIC

One of the fundamental differences between a house of ten years ago and a house of today is its electrical wiring. Where two or three convenience outlets were considered enough, today there are twenty or thirty. In the place of the dangling pull chain there is the convenient wall switch—accessible to every door.

Specify a General Electric Wiring System—as the easiest, surest way of providing electrical comfort. This is the wiring that the homeowner has learned to demand through constant national advertising. The fact that it is made by General Electric assures him of lasting and dependable service.

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This Van Kitchen of the Mercy Hospital, Hamilton, Ohio, is representative of many fine Van Installations throughout the country. It was planned for efficient service today, with provisions for the future requirements of this splendid institution.

> Messrs. George Barkman & R A. Fryer, Architects

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Behind Van Equipment is the most authoritative and widespread engineering organization in the world. You are assured of a scientific plan, an economical arrangement and correct equipment.

> ARTISANS of many trades contribute their specialized knowledge to the many products of the Van line. Here is shown a metal spinner completing the copper cover of a giant steam kettle. Tasks such as this require the greatest accuracy and skill . . . the deftness of the craftsman is as important as the precision of the machine. The great Van Factory is practically a city of specialists in Kitchen Equipment.

Part Two

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RELY on Van Kitchen Equipment with all the confidence of a surgeon in his finest instrument. Trust it to perform every duty with precision...with accuracy...and with unfailing sturdiness. Van Equipment fulfills every requirement...today, tomorrow, a generation hence...justifying your faith by the kind of service that is a revelation and delight.

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ARCHITECTURAL ENGINEERING AND BUSINESS

An architect *does not* add screens to a building to enhance its architectural *beauty*.

We appreciate the fact that screens are used only *when* and *where* they are *necessary* equipment.

Bearing this in mind we build *mechanical excellence* into Orange *Aluminum Frame* Screens. . . . Satisfactory mechanical *performance* is the most important requirement in a screen.

And next in importance, Orange *Aluminum Frame* Screens are beautiful, in a quiet way, in so far as it is possible for such a practical article to be called beautiful.



UNITED STATES POST OFFICE, YONKERS, N. Y. James A. Wetmore, Architect.

This government building, nearing completion, is being screened with Orange Aluminum Frame Screens, fitted out with bronze wire screen cloth.

ORANGE SCREEN COMPANY

515 Valley Street

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Maplewood, New Jersey

Same Aluminum as used in Airplane Construction

Part Tw



Extruded Section

These screens are made of extruded bars of aluminum, a special alloy devel oped for our use by the Aluminum Company of America, and which is on of the strongest non-ferrous material made. Because of its lightness and many structural advantages, aluminum such as is used in our screen frame is now used in Airplane Construction

> Complete line of Standard Types



This shows stationary (removable) halfcircle screen with double frame screens below pivot-hinged at sides. The hardware is simple, strong, and easy action. We frequently supply small circular screens for yachts that rest at anchor a part of the time in southern waters.



Plain rectangular screen pivot-hinged at top or side, easily installed and removed. When this screen is used in very large double hung windows a crossbar is used at the meeting rail level.



The double frame vertical sliding screen can be used inside or out (as can any of the others shown here) and is used largely with double hung windows.



A triple horizontal sliding screen. Horizontal sliding screens are provided in batteries of two or more frames, and are the ideal screen installation to be used with *casement* windows that open *out*.

> Odd Shapes Specially Designed

We recently designed a number of outside screens for an industrial building in which food-stuffs were being handled and canned.

We have designed many screens to be used in connection with pivot and swinging windows and invite your inquiry on any screening problem that you may have, either domestic or industrial... write to our Maplewood, N. J., office for information or estimates and we shall instruct our nearest branch office to take care of your inquiry.



ROOF TROUBLES DON'T "BUTT IN" WHEN THE BUILDING HAS *THIS* ROOF !

THIS roof never interrupts ... never bursts in with a three-figure bill for repairs ... never distracts from important matters by forcing the owner to worry about damages or loss of production due to leaks.

"Forget it"—that's the net of the Barrett Specification story. Here is a roof so trouble-free that the owner never has to give it a thought.

"Forget it." In the owner's safe is a Surety Bond which gives him full license to dismiss the roof from his mind. He is insured against roof repair and maintenance for the next 20 years*—until 1948.

Twenty years is a long, long time for a roof to last without repairs. But Barrett Type "AA" Roofs do it.

Furthermore-

Many American business buildings, erected in the 70's, 80's and 90's, are still protected by the original roofs of Barrett Pitch and Felt.

The owners lived their lives—grew old and retired—without having to think once of their roofs.

And, because those old Barrett roofs proved themselves so good, the modern Barrett Specification Roof is recognized today as standard—chosen for our finest modern buildings.

For full details of these trouble-free roofs, dictate a brief note to us.

*The Barrett Company also offers a Specification Type "A" Roof which is bonded for 10 years. This type of roof is adaptable to a certain class of buildings. The same high-grade materials are used, the only difference being in the quantities.

Depend on the Barrett Approved Roofer

123

Throughout the United States and Canada a limited number of roofing contractors have been approved by Barrett to lay the Barrett Specification Bonded Roof. These men have earned a reputation for doing efficient work—a name for absolute dependability.

Good workmanship is a big part of any good roof. Good workmanship is a *certainty* when you provide for a Barrett Specification Roof.

THE BARRETT COMPANY 40 Rector Street, New York City IN CANADA: The Barrett Company, Limited

5551 St. Hubert Street, Montreal, Quebec the quantities. Barrett specification Roofs

A.P.W. PAPER COMPANY, ALBANY, N.Y. U.S.A.



Onlivon towel cabinet, pressed steel finished in white lacquer. Lock to prevent waste and theft. Window to show when refilling is needed.

Why one Onliwon Towel does the work of two

A^S it comes from the cabinet, each Onliwon towel is folded double. This increases its absorbency many times, doubles the strength of the towel -keeps wet hands from tearing through.

One Onliwon towel wipes hands or face completely dry. It does the work of two ordinary towels.

What's more, with the Onliwon cabinet a separate effort is necessary to get a second towel. It prevents waste. Onliwon service is nationwide. Wherever you are, there's an Onliwon dis-

tributor nearby. A. P. W. Paper Company, Albany, New York, U. S. A.


BOOK DEPARTMENT

"ESTIMATING BUILDING COSTS"

Reviewed by CLIFFORD WAYNE SPENCER

N this age of commercialism, the question of cost has come to be of prime importance in the business of building, and in no case can it be treated lightly. In addition to being an artist and designer, the architect must now be a cost expert and be able to make a fairly accurate estimate of the cost of the building for which he makes the plans. In fact a very large proportion of modern building is planned on the budget system, which means that it is absolutely essential for the architect to know labor and material costs in order that he may give his client the best possible building and still keep within the limits of the original appropriation. It is probably true that in no other respect is the architectural profession open to so much well deserved criticism as on the question of false or inaccurate estimates. Certainly it is easily understood that if a client has been told by his architect that his house will cost \$10,000 and then finds, as is so often the case, that it is to cost \$15,000, he will lose confidence in his own architect and much descredit will be cast on the profession in general. No doubt there are some cases where misleading estimates are deliberately given by unscrupulous practitioners for the purpose of encouraging clients to go ahead with building, but the general high standard of ethics in the profession makes

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such cases few and far between, and in the vast majority of instances such estimates are the result of insufficient preparation or lack of thought on the part of architects.

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Of course, a really thorough and complete knowledge of estimating may well require a lifetime of study, research and actual experience, and certainly no one can hope by the mere use of books and printed formulæ to arrive at the solution of a problem in which so much depends on local and rapidly changing conditions. Yet a great deal of preparatory knowledge can be gained from a careful study of the printed results of the experiences and researches of others which, when checked against one's own experience and adapted to circumstances of time and place, will furnish a satisfactory groundwork on which to proceed. The use of the more ponderous collections of data and tabulated information is often discouraged by their very vastness and completeness, and a beginner will be overawed by the great amount of information and the vast variety of different conditions to be complied with. According to a certain great teacher of language, it is better to use "a small grammar, when learning a language, than a big one." And the same is true when learning to estimate or when a person wishes to get a good general knowledge of building costs with-

Architectural Design in Concrete By T. P. Bennett, F. R. I. B. A.

THE great utility of concrete as a material for building lends im-portance to any work which deals with its use. Already centuries old, with its splendid durability and permanence amply demonstrated by structures of many kinds which have already been used for ages, concrete is one of the most valuable of all the substances used in building and engineering of every kind. Its very adaptability and workability give it a value possessed by few if any building materials, and its value is often enormously increased by the use with concrete of steel reinforcing which adds a strength which it never possessed before. "Reinforced concrete has earned its front rank position among materials for permanent construction because of its intrinsic merits. Its fireproof-ness protects life and property; its



THE text of this work dwells in de-tail upon the working of concrete; details of construction; continuous vertical support; verticality; monolithic concrete; concrete vaulting; textures; "crazing"; and treatments; and other subjects of importance to the architect, engineer or builder concerned with concrete. It sums up and presents the experience of many successful workers in concrete construction. The volume deals with concrete and with its design as influenced or governed by its construction. Its authors have been fortunate in selecting admirable examples of the use of the material, and the work contains, among a large number of illustrations, views of residences, tall structures such as hotels, theaters, power houses, or office buildings; bridges, aqueducts, retaining walls and walls of other kinds. The views are of work in more than one country, for there

strength and safety are increased by its monolithic nature; and its permanence is proved by long use."

are illustrations of buildings in England, France, Belgium and Germany, as well as many of structures in the United States

Text and 100 Plates; 81/2 x 11 ins. Price \$10 ROGERS & MANSON COMPANY, 383 MADISON AVENUE, NEW YORK

> Any book reviewed may be obtained at published price from THE ARCHITECTURAL FORUM 125

out spending the time to go through a mass of detail, much of which would probably have no bearing whatever on the particular work he is doing; and even in the case of one who is able to go more deeply into the subject, such a small volume will furnish a good preliminary training to enable him to make better use of the larger and more complete technical works, which are many.

An excellent little book for such preparation and for use in estimating costs of smaller buildings, such as dwellings, barns, stores and industrial structures of moderate cost, has been written by William Arthur and is called "Estimating Building Costs." It is now in its third edition. It is written as compactly as possible, in simple and direct terms so as not to be confusing even to the most elementary student. The material covers all the different steps of building construction from excavation to painting, and each important class of building material is treated in a separate chapter. There are 91 tables showing the number of hours needed and amounts of work done. As the price of labor varies greatly with locality and season, all labor costs are shown at the rate of \$1 per hour for mechanics and 60 cents per hour for laborers, so that they may be readily translated into terms of the prevailing local wage rates. In addition to being a reliable guide for use in estimating, the book contains many bits of useful information, and it even includes a chapter entitled "Hints on Drawing," which is no doubt rather elementary to be of much interest to the average architect but which will be very instructive to the beginner or those builders who are not familiar with architectural customs and practices. It discusses such things as plan indication, architects' charges, and general

Architectural Construction

By WALTER C. VOSS and RALPH COOLIDGE HENRY

DEALS with all types of construction, from the simplest suburban structure of wood to the more complex fire-resistant construction of our large cities, fully illustrated and described. The work consists of 358 plates, 9x11½ ins., 381 figures and 1246 pages and includes complete working documents of executed buildings, photographic records of results accomplished, with original drawings, details and specifications by a number of well known American architects. PRICE \$20

ROGERS & MANSON COMPANY 383 MADISON AVENUE NEW YORK information on the preparation and printing of plans. I the following chapter, however, there is considerable use ful information on building methods and materials whic may be of interest and use to the architect as well as t the builder. A list of the chapters will give an idea of the completeness of the work and includes, in additio to the two on drawing and building hints already men tioned, chapters dealing with-Excavation and Piling Concrete, Brickwork, Stonework, Plastering, Woodwork Millwork and Glass, Solid and Sheet Metal, Roofing Painting, Plumbing and Heating, and Miscellaneous Sub jects. The treatment under each of these headings is ver complete and is made especially effective by the fact that in all cases several easily understood examples are give illustrating the various processes and showing how the are applied to actual building problems. The reviews at th end of each chapter are in the form of questions and wi be very useful where the book is used as a text book especially since the answers to these questions are given in the key at the back of the volume. By the use of thes questions and answers it will be possible to condense th study of the most important points in a very effectiv manner. In looking through the pages of this volume one finds that it is much more than a collection of table for estimating and is really a very practical guide fo the construction of small buildings; and that it contain a great deal of information useful to the specification writer as well as the estimator, and certainly to contrac tor or builder or to anyone interested in construction.

ESTIMATING BUILDING COSTS. By William Arthur. Third Revised and Enlarged Edition, 233 pp., 4½ x 7 ins. Price \$2 Scientific Book Corporation, 15 East 26th Street, New York

American Architecture

Fiske Kimball

WRITTEN for the layman as well as for the architect, Mr. Kimball presents a survey of American architecture from its first beginnings in the seventeenth century to its latest achievements in the twentieth. Mention of no important detail is omitted, and the carefully prepared text is accompanied by well selected illustrations in half-tone.

> 262 pages, 5½ x 8½ inches Price \$4

ROGERS & MANSON COMPANY 383 Madison Avenue · New York

Any book reviewed may be obtained at published price from THE ARCHITECTURAL FORUM

Part Two

ctober, 1928



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REFERENCE OF

M AXIMUM Spans for ists and Raft-

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With this set of twenty-seven bles you have, right at your finers' tips and in the most conveent and accessible form imaginole, information on such subjects "Allowable Spans," "Working tresses," "Maximum Loads on imber Columns."

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ROGERS & MANSON COMPANY 383 Madison Avenue New York STAIR BUILDER'S GUIDE. By Morris Williams. New Edition 259 pp., 5¾ x 8½ inches. 358 illustrations. Price \$3. Scienti Book Corporation, 15 East 26th Street, New York.

NE of the most prominent features of almost a building is the stairway. It is seen by everyone; convenience and beauty are readily appreciated, and faults and defects instantly detected. Its construction considered the highest branch of joinery, and far mo care and knowledge are required in its planning a execution than in any other part of the building. the design of the staircase there may be achieved an a pearance of grandeur that will characterize the who interior of a building. The prime utilitarian object designing stairways is to secure ready access to the upp stories, and they should be planned to give ample her room and facilitate travel from one story to anothe while at the same time care should be taken to assemb the various members in a harmonious fashion so that the finished structure will present an appearance that as beautiful and pleasing as its prominence warrant

When one looks at a graceful flight of stairs circlin and spiraling upwards, it is easy to realize that the construction has been no simple matter, and indeed it true that the science of stair building has its fundame tals in the solution of the most intricate problems plain and solid geometry. Some of these have bee solved by mathematicians and have resulted in systems of cylindrical handrailing. The foremost exponent of th science was Peter Nicholson, and nearly all work alor this line since his time has been merely an attempt : simplify the results of his investigations. These attemp have been so successful that it is said that the art virtually perfect and that further improvement cannot be expected. The number of mechanics who are thou oughly competent to lay out and erect a set of compl cated stairs is relatively small, and it is desirable that the individual who designs and supervises the construction of such stairs have a thorough knowledge of the prol lems and principles involved in their erection. It is said that the chimneypiece is the central motif of a well de signed room, and that its design governs the room scale and treatment, but it is no doubt true that the stain way furnishes the central motif for the entire interio treatment of the building. Being such an important part of the structure, great care should be taken that the de sign and construction afford the maximum of safety convenience and æsthetic appeal. In a matter of suc importance too much cannot be left to the mechanic and stairways should always be carefully detailed an their construction supervised by an inspector who is fa miliar with the principles of scientific stair building.

In the "Stair Builders Guide," by Morris Williams, a the up-to-date information on this important science is presented in short and carefully prepared chapters. The layout of each working detail is carefully considered, explained and illustrated. Plans of many stairways are shown as they are often designed, contrary to all standard and prescribed rules of correct construction, but thes defects are pointed out and the correct plans are considered. The author confidently asserts that all those engaged in the building trades will find that this book gives the requisite instructions for becoming proficient in the art of making hand-railing. The book is now in its third edition, and it is considered a standard reference work

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STEEL AND TIMBER STRUCTURES. By G. A. Hool and W. S. Kinne, 695 pp., 6 x 9 ins. McGraw-Hill Book Co., Inc. Price \$6.

'HE technical considerations in building are becoming ever more important as the height of structures increases and their design becomes more and more intricate. In the planning of bridges and buildings it is necessary for the architect to coöperate with the engineer and to study the engineering problems involved in their construction. It is not necessary for the architect to go into the problems as deeply or as thoroughly as does the engineer, but he should have an intelligent idea of the principles involved so that he may not only talk intelligently on the subject but may be able to make plans that are plausible and practical from an engineering viewpoint. Several very useful and usable reference and text books on the technical phases of building have been compiled by George A. Hool, S. B., Consulting Engineer and Professor of Structural Engineering at the University of Wisconsin, and W. S. Kinne, B. S., Professor of Structural Engineering at the same institution. This series consists of volumes on: Foundations, Abutments and Footings: Structural Members and Connections: Stresses in Framed Structures; Steel and Timber Structures; Reinforced Concrete and Masonry Structures; and Movable and Long-Span Steel Bridges.

The volume on Steel and Timber Structures, which is the subject of the present review, is compiled by a staff of experts who act as associate editors. This staff includes such men as O. A. Bailey, Chief Engineer, Chicago Bridge and Iron Works; W. C. Buetow, State Bridge Engineer, Wisconsin; C. W. Chase, Drawing Room Engineer, American Bridge Co.; Charles D. Conk-

lin, Jr., Civil and Structural Engineer, Cheltenham, Pa F. W. Dean of Wheelock, Dean & Bogue, Inc.; F. V Dencer, Engineer, American Bridge Co.; Henry Dewell, Civil Engineer, San Francisco; Phil A. Frankli Structural Engineer, McClintic Marshall Co.; T. V Golding, Consulting Structural Engineer, New Yorl James H. Herron, President, James H. Herron Co Engineers and Chemists, Cleveland; C. K. Kenned Drawing Room Engineer, American Bridge Co.; H. Pulver, Associate Professor of Structural Engineerin University of Wisconsin: and Hermann von Schren Consulting Timber Engineer. The volume starts with section on buildings which consists of a discussion steel office buildings by F. W. Dencer; steel mill build ings by C. W. Chase and C. J. Kennedy; timber frame floors and roofs by Henry D. Dewell; and slow-burnin timber mill construction by F. W. Dean. All these type of construction are thoroughly discussed and illustrate by the use of formulæ, tables and diagrams. Section gives a thorough description of roof trusses by W. Kinne, under these sub-headings: General Design; De sign of Purlins for Sloping Roofs; Detailed Design of Wooden Roof Truss; Detailed Design of a Steel Roo Truss; Detailed Design of a Truss with Knee-Braces Arched Roof Trusses; and Ornamental Roof Trusse Section 3 is divided into two parts, one dealing with ste railway bridges by George A. Hool and W. S. Kinne and steel highway bridges by W. C. Buetow. Timbe bridges and trestles are discussed by Phil A. Franklin Section 4, and steel tanks by O. A. Bailey in Section The design of chimneys as discussed by H. E. Pulver i Section 6 will be found very useful and highly instructive

PROVINCIAL HOUSES IN SPAIN By Arthur Byne & Mildred Stapley

ARCHITECTS value Spanish types of domestic architecture because of their simplicity of design and plan and also because they are easily developed in materials inexpensive and easily had. Spain offers a choice of several kinds of residence architecture, types sufficiently different from one another to afford considerable range

other to afford considerable range of selection, yet all possessing the same strength and virility, the excellent lines, the same graceful but unaffected grouping, and the discriminating use of detail which renders distinguished so many Spanish domestic buildings.

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The book contains text and 190 plates 12^{1/2}x16 inches, and is bound in cloth. Price \$30, postpaid.

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CONSTRUCTION IN LONDON From a Pen Drawing by Harold Mundy

The Architectural Forum

THE ARCHITECTURAL

VOLUME XLIX

OCTOBER 1928

NUMBER FOUR

THE PROTECTION AND MAINTENANCE OF STRUCTURAL STEEL

•

BY FRANK W. SKINNER CONSULTING ENGINEER

UNDER ordinarily careful treatment, with rea- working stresses, because, unlike other materials, it sonable conditions and requirements, the steel framework of a building can be relied on for strength and safety. At the same time, it conforms most readily to architectural æsthetic and economic requirements, occupies a minimum amount of space, permits maximum dimensions of construction, rapidity of erection, ease of repairs, and demolition or extension in service. Structural steel for architectural purposes must almost of necessity be designed in accordance with accepted rules and standards. It must conform to well perfected types and details, be entirely fabricated by skilled workmen with machine tools in special shops, and erected by experts with special equipment which largely eliminates the probability, and most of the possibility, of bad workmanship, poor materials, mistakes, accidental damage, or departure from intended structural type.

Although within the 40 years since structural steel became commercially available for architectural purposes there have been no failures of buildings caused by the deterioration of the steel framework, the safety and durability of the latter have been unjustly attacked, and some prominence has been given to untrue statements concerning it. Within a few months metropolitan newspapers have been given currency to a wholly unwarranted statement that the structural steel frameworks of tall office buildings and the like have been found seriously damaged in service. It was said that they are likely to be, or soon to be, in a highly dangerous condition; that their life is very short and that they require very frequent and extremely rigid inspection, overhauling and repairing to avoid disaster. Such is far from being the case. The erroneous statements have been fully refuted in the public press and no contradiction has been made to the refutation. The present standard practice produces steel framework of ample strength, accurately proportioned for the required service and with a high degree of perfection in design, materials, and workmanship that, under proper conditions, insures practically unlimited safety and durability. Under ordinary conditions that govern the design and construction of steel buildings, the steel will never deteriorate through

retains its original strength, elasticity and reliability. So much has been achieved by the metallurgist, manufacturer, designer and builder, that it remains for the architect and owner only to insure conditions and treatment that will maintain the original integrity of the structure unimpaired by any anticipated future conditions. The vital points that practically govern the durability and safety of completed structures are: corrosion, fire hazard and the proper inspection and maintenance after erection. Their important practical features are here treated.

Corrosion. Under certain conditions, some of which are often continually present, all materials are subject to deterioration; wood will decay, stone and concrete will spall or disintegrate; brick and metals are subject to chemical changes that may be destructive. Almost the only agent destructive to structural steel under ordinary working conditions is corrosion, which is possible only through the presence of moisture or acids. Its prevention eliminates almost all possibility of deterioration of strength except by reason of accident, abuse or malicious treatment. Fortunately, corrosion can be absolutely prevented by keeping the steel perfectly dry and by avoiding contact with acids, fumes or liquids. Generally this is practically accomplished either by insuring a pure dry atmosphere, by encasing the steel in a solid protecting the mass, or by thorough painting. Unprotected steel should not be imbedded in cinder concrete because elements often contained in the latter are likely to promote rapid corrosion. Stone concrete or cement mortar well rammed around the steel and completely enclosing it gives a most excellent and satisfactory protection when thoroughly waterproofed. When it is applied the steel should not be covered with any oil paint, since the chemical action of the cement tends to saponify the oil and makes the paint injurious rather than beneficial. Unpainted steel may be covered with graphitic or asphaltic paint, which is often used for steel in footings, in foundations, and when exposed to wet earth. Concrete encasement is also suitable for the protection of superstructural steel when it is desirable for architectural or other purposes and

where it is properly applied, secured and waterproofed. The first inspection is likely to be the last.

In general, structural steel of all sorts may be satisfactorily protected by thorough painting. Before the first coat of paint is applied, the steel should be thoroughly cleaned; grease, scale and all dirt, old paint or other substances removed either by scrapers, wire brushes, washing or sand blast, and it should immediately after be treated with one or two coats of red lead and oil thoroughly applied on a warm, dry surface. This paint should be protected by one or two coats of some good elastic paint such as white lead and oil or other standard metallic paint. When columns, lintels, girders and other members are enclosed in outer walls, whether of concrete, or brick or stone masonry, the latter should be thoroughly waterproofed on their outer surfaces. They should be provided with horizontal water stops over horizontal members, and the steel members themselves should be thoroughly parged with cement mortar and the space between them and the masonry slushed full of mortar.

Some railroads and certain interests having large quantities of structural steelwork to preserve have developed special formulæ for their paints. It has been found that under different atmospheric conditions, different formulæ are necessary, since a paint giving excellent protection in one place may not do so in another place. Paint for the steelwork en-

closed in buildings is, however, much easier to select and more durable than that applied to outside structures such as bridges. When repainting any structure, it is very necessary to first thoroughly clean it and especially to remove all dirt and rubbish. Cavities, pockets and narrow clearances likely to retain dirt or moisture should be filled with solid cement or some other waterproof material to protect the paint and prevent the accumulation of moisture or the development of corrosive acids from decaying materials. Where the steelwork is thoroughly protected by concrete or masonry covering, or where it is exposed in a dry atmosphere under cover, the original paint may remain effective for many years, and practically require renewal only for decorative purposes; but where the steel is exposed to wet or salty atmosphere, the fumes of cooking or any other acid condition, it should be frequently inspected and have thorough painting as often as the paint may show signs of deterioration. Originally exposed steel in the interiors of buildings will not require frequent painting, but exposed work may require painting every two or three years or oftener. If thoroughly painted with good materials and at sufficiently frequent intervals, it will afford complete protection for the steel against corrosion.

Fire Hazard. Steel is uninjured by ordinary atmospheric temperatures. Its strength is normal up to 200° Fahr. and increases about 25 per cent as



Beams and Girders with Steel Fabric in Place to Receive Pneumatically Applied Cement Fireproofing

at 800°, and to less than half the normal (to approximately the maximum permissible working stress in columns) at 1000° Fahr., above which temperature it should never be called on to carry compressive stresses. Steel is fireproofed by casing it in a complete, durable, strong covering of incombustible, refractory material that may or may not enclose an air space around the steel. Usually the encasing material is brick, tile, gypsum or concrete, with a minimum thickness of from 2 to 8 inches. If concrete is used, it should be reinforced and anchored to the steel. Concrete may be poured in moulds, or may be plastered by hand, or installed by pneumatic pressure, which increases the strength and density of thin bodies of concrete.

Most large American cities and several insurance companies and technical organizations have prepared very careful specifications to govern the fireproofing of steel structures. The specifications recently issued by the American Institute of Steel Construction provide that: "Fire-resisting insulating material shall continue to function within the temperature range of its use, and shall be so applied that it will not crack, spall, or buckle to seriously expose the steel to direct heat from fire. If the insulating of columns contemplates the use of air spaces between the steel and the insulator, there shall be fire stops placed at the floor levels. Steel buildings whose condition of exterior exposure and whose contents

the temperature rises to 500°, decreasing to normal under fire hazards will not produce a temperature greater than 800° Fahr. in the steel shall be considered fire resisting without insulating protection for the steel. If the steel has an insulating protection, the safety factor shall be based on the fireproofing material providing protection for a greater period of time than the combustible contents of the building will burn, as shown in Section 3 of this specification; 16 pounds per square foot of combustible materials including wood floor and wood trim, constitutes a 1-hour fire hazard, 30 pounds a 3-hour hazard, 40 pounds a 41/2-hour hazard, etc. The safety factor for all skeleton frames and secondary members shall be 11/2. For example, if a building contains 10 pounds of combustible material per square foot of floor, and has a fire hazard of 1-hour duration, the steelwork shall be protected against the temperatures here defined for 11/2 hours."

Fire Protection Specifications

The tentative 1927 specifications of the National Fire Protection Association, Boston, require that all structural steel members which support loads or resist stresses shall have a fireproof protection of brick, concrete, hollow building tile or gypsum, plaster being unacceptable. Poured-in-place gypsum or concrete shall be secured by steel anchors. Bricks or blocks shall be accurately fitted and bonded, and the spaces between them and the structural steel shall be filled solid with masonry or concrete. Bricks



Encasement on Beams and Girders is Solid, but that on Truss Members is Hollow, Enclosing Air Spaces

ARCHITECTURAL ENGINEERING AND BUSINESS Part Two

or blocks are to be set in Portland cement mortar except gypsum mortar for gypsum blocks. All columns and girders shall be protected from corrosion. No pipes, ducts or wires shall be placed within the fireproofing area. All wall columns shall be enclosed with not less than 33/4 inches of brick or 3 inches of concrete well bonded and anchored. Fireproofing of wall girders shall be the same as for wall columns. Interior columns shall be enclosed in a continuous casing of concrete 3 inches thick, or cast-in-place gypsum not less than 2 inches thick. Where subject to mechanical injury from trucking, handling merchandise, etc., fireproofing shall be protected by jacketing. Webs and bottom flanges of interior girders and trusses shall be protected with fireproofing not less than 2 inches thick at all points. Beams, lintels, and all other structural members except roof trusses and roof purlins shall be similarly protected with fireproofing not less than 11/2 inches thick. Minor structural members supporting walls or other construction shall be protected by not less than 1 inch of expanded metal or wire lath and cement or gypsum plaster.

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The requirements of the building code of the National Board of Fire Underwriters correspond in general to the specifications of the Fire Protection Association and say that hollow building tiles for fireproofing must have webs and shells not less than 5/8 inch thick. Galvanized steel wire, not less than 12 gauge, shall be securely wrapped around block column coverings so that every block is crossed at least once by a wire. The wire shall not be wound spirally, but each turn shall be a separately fastened unit. Interior metal ties or interlocking blocks are preferable to the wire winding. No blocks shall exceed 12 inches in vertical dimension. Hollow tile protection for the lower flanges of beams, etc., shall be either dovetailed to or integral with the skewbacks, with solid mortar joints. All concrete protection shall be anchored to the structural steel member with interior pieces securely hooked to the enclosed members.

In discussing the most efficient type of fireproofing for structural steel columns, H. G. Balcom, consulting engineer, recommended a solid jacket of limestone concrete anchored to the column flanges.



Long Roof Trusses of Madison Square Garden in Perfect Condition after 35 Years of Service

October, 1928

A very popular alternative is the use of terra cotta blocks on all sides of the column. He recommended for ordinary beams a solid encasement of anchored concrete integral with the floor or ceiling slabs. For deep girders, the bottom flange may be protected by cinder concrete and the sides by properly secured terra cotta blocks thoroughly jointed to the floor Kort Berle of the Gunvald Aus Company, slab. consulting engineers, recommended that beams and girders be fireproofed with solid concrete encasement, and that interior columns be enclosed in a solid mass of concrete or brickwork of a minimum thickness of 2 to 41/2 inches respectively. Exterior col- umns should have one shop coat and one or two field coats of approved paint and in addition should be well parged.

There are various types of commercial fireproofing systems and details, and special provision is made to prevent the running of any pipes, wires or conduits inside the fireproofing jacket of any column or girder, entirely separate protection or chases being provided for them as is required by the building codes. Ordinary standard specifications, construction methods and equipment suffice for fireproofing concrete that is poured in forms, but to secure the durability, strength, hardness, watertightness and greatly decreased volume and weight, fireproofing pneumatically applied to any steel members should be made with the proportions of one bag of Portland cement well mixed with 3 cubic feet of dry screened sand under a minimum pressure in the receiving chamber of 30 pounds, mixed at the discharge nozzle with clean water at 60 pounds, and delivered at right angles to the fireproofed surface. The fireproofed members must be thoroughly cleaned of all paint, grease, rust, etc., and have $\frac{1}{2}$ -inch holes approximately 3 feet apart in the webs close to the top and bottom flanges. Anchor rods shall be secured through these holes, and to them longitudinal rods shall be attached and wired about every 12 inches to galvanized welded fabric or expanded metal of required size and weight that has been carefully cut to size and bent over templates so as to closely follow the outline of the member and insure a minimum thickness of $\frac{3}{4}$ inch of protection.

The outer edges of flanges and stiffeners are squared to true lines by the use of detachable "shooting strips." The main surfaces of girders, beams, columns, etc., are trued before the cement sets, by cutting off all high spots with the sharp edge of a trowel and dragging the surface with a wide, longhaired, wet, whitewash brush. Cement must not be placed during freezing weather, nor against frosty surfaces, and it must be kept wet for at least one week after placing. In no case shall the thickness of the cement be less than $1\frac{1}{2}$ inches on vertical surfaces and above horizontal surfaces, and not less than 2 inches below bottom surfaces and around edges of lower flanges. Thickness shall be measured from the surface of the steel and not from the tops



Types of Fireproofing for Columns, Beams and Girders



Table of Results of U. S. Bureau of Standards' Test of Columns and Fireproofing

of rivet heads. A Columbia University test of a pneumatically built cement slab was made with an average temperature of 1695° Fahr. for three hours, combined with a load test of 40 pounds per square foot, and after cooling, a load test of 200 pounds without failure, the 200-pound load producing tensile stresses of 7,450 and 62,000 pounds per square inch in the concrete and steel, respectively.

Examples of Steel and Wrought Iron Buildings. No deterioration was observed in small wrought iron beams removed after nearly 100 years' service in an old shot tower in New York. The roof trusses over the main shop of the Dominion Bridge Company, Montreal, erected in 1884, have been seriously overloaded, exposed to very injurious smoke and fumes, seldom repainted and never reinforced, yet they are still in service, and are considered to be in good condition. The Woman's Temple, one of the first so-called steel frame buildings in Chicago, was removed after 33 years, and only very slight deterioration was found in any of the steelwork. The Tower Building on lower Broadway, erected in 1888, was called the first steel cage building in New York, and its I-beams were in good condition when removed after 26 years' service. After 30 years'

service the steelwork in the Benoist Building, St. Louis, was found as good as the day it was erected. I-beams in the Rand & McNally Building, one of the first tall buildings in Chicago, were recently exposed during its demolition and found uninjured. About 300 tons of steel I-beams were salvaged and re-used in new building construction after 25 years' service in a New York hotel. When recently demolished to make room for modern structures, the steel frameworks of the Savoy, New Netherland, and Delmonico Buildings, New York, were found in good condition. Well protected steelwork, although exposed to dust, moisture, and sulphurous fumes, does not show deterioration in two generating stations and 15 sub-stations about 30 years old of the Brooklyn Edison Company, the framework being now in perfect condition. On a 40th Street, New York, sidewalk, I-beams, only partly waterproofed, showed no deterioration after 20 years' service. Foundation girders in the Samson Building, New York, were painted with graphite and asphalt, and were found uninjured after 22 years' exposure to drip and moisture. Many hundred tons of structural steel and iron were used in the roofs, floors, columns, and great trusses of the famous Madison Square Garden, New York, which was built about 35 years ago. When it was razed in 1925, careful inspection was made of its framework, and except for a very small portion of the ornamental top of the tower (perhaps 1 per cent of the whole) that was exposed, unprotected, seldom or never visited, and entirely neglected, all of the steel and iron was found in perfect condition ; as good as new. Large quantities of the I-beams were salvaged for re-use, and the great long span roof trusses were very carefully removed and stored for re-erection in a new Generally the I-beams provided by the building. demolition of old buildings are salvaged, cut to required lengths and sold for erection in new buildings. Columns, girders and other fabricated members could also be salvaged if their details and dimensions were adaptable to new work.

Jacob Volk, New York house wrecker, says: "In the demolition of more than 200,000 tons of structural steel and iron, the condition of the steel has been found, in general, excellent, and 90 per cent of the floor beams are reused." E. A. Prentis, president, Spencer, White & Prentis, New York, who for many years has done a large amount of underpinning, exposing old foundations at and below ground water level, says: "Usually the steel in them is in good condition; never dangerously corroded. In designing thousands of foundation piles made of heavy steel pipe, filled with concrete, an excess of 1/16 inch in thickness is ample to allow for corrosion. That portion of the unpainted pipe driven into clay or firm soil sometimes does not corrode at all, but usually the exterior does corrode a little, and the corrosion ceases, the oxidized steel combining with the earth to form a hard, dense jacket, resembling iron ore, that, when knocked off, discloses a

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bright, smooth, clean, uninjured metal surface, apparently free from progressive corrosion. This condition has been repeatedly observed in the oldest piles of this type in New York that have been in service 20 years or more." Answering charges of deterioration of the famous Eiffel Tower, erected in an exposed situation in Paris, M. Hubie, Chief Engineer 16th Arrondisement, Paris, and Secretary of the Eiffel Tower Inspection Committee, recently wrote: "We do not see any reason why the Eiffel Tower should not last indefinitely if properly cared for," and C. Marc, C.E. Administrator of the Eiffel Tower Society, says: "The Tower is in as good condition today as the day it was built."

In an exhaustive research of structural steel in the United States and Canada, conducted in 1926 by the writer for the American Institute of Steel Construction, a questionnaire of 63 interrogations on their practice, observation, records, opinions and beliefs regarding the principal features of the deterioration, durability, and best maintenance of structural steel was addressed to more than 1,000 of the most eminent engineers, architects, and builders in this country and Canada. From about 17,000 items of replies received, and from conferences with, and letters from more than 200 prominent architects, engineers and contractors of long experience in New York, Boston, Philadelphia, Chicago, San Francisco and other cities, these details were tabulated:

The safety of a structure in general is not endangered by corrosion.

There need be no fear of serious results from corrosion in well designed and maintained buildings. Serious corrosion in buildings would become obvious to reasonable inspection before the building could be endangered.

The worst peril from corrosion is due to accumulation of dirt and filth, from exposure to moisture, salt air, acid fumes, brine, and other artificial conditions.

All steel may be protected from corrosion.

The protection of buildings from corrosion may be 94 per cent perfect.

The best protection from corrosion is afforded by painting and cleaning.

Very efficient protection from corrosion may be afforded by enclosing it in dense, fine, stone concrete.

Unless buried or encased in concrete, steel should be protected by a priming coat of red lead paint followed by an elastic coat of waterproofing paint. Graphite or asphalt paint should be used rather than oil paint on steel enclosed in concrete.

Exterior walls containing steel members should be waterproofed, and stop courses built over lintels and wall girders.

There is no limit to the life of properly protected steel.

The worst neglect causing corrosion is failure to keep it clean and dry, and failure to provide good and adequate painting.



Sections of Several Columns Tested (Numerals Refer to Test Numbers of Table on Page 574)

There is practically no danger of corrosion from electrolysis.

The actual values and comparative efficiencies of different types of fireproofings on different steel columns have been thoroughly investigated by a recent series of official fire tests on building columns, etc.

Official Fire Tests of Structural Steel Columns. "Fire tests of Building Columns," Paper 184, published April 21, 1921, by the U. S. Bureau of Standards, describes in great detail 96 tests of structural steel columns made in Chicago in 1917 and 1918 under the joint direction of the Associated Factory

Mutual Fire Insurance Companies, the National Board of Fire Underwriters, and the United States Bureau of Standards. They were made to ascertain, first, the ultimate resistance against fire, of protected and unprotected columns as used in the interiors of buildings; second, their resistance against impact and sudden cooling from hose streams when in a highly heated condition. The columns were of ten standard cross sections, with cross sectional areas varying from about 7 to 14 square inches, lengths of about 121/2 feet, and designed for working loads of approximately 100,000 pounds. They were tested without protection; partly protected by concreting interior and re-entrant spaces; protected by 2-inch or 4-inch thicknesses of concrete, hollow clay tile, clay bricks, gypsum blocks; and by single or double layers of metal lath and plaster. The load pressure was uniformly maintained while the columns were heated in a gas-fired furnace whose temperature rise was regulated to conform with a predetermined time-temperature relation. Elaborate measurements were taken of the temperatures of the furnace and test columns, and of the deformations of the latter, due to load and heat.

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Firproofing was applied so as to reproduce, as nearly as possible, conditions obtaining in building construction. The machine-mixed concrete was spaded inside the forms which were tapped with hammers. The overtapping joints of wire lath were wired, the lath was supported on 3/8 x 3/4-inch channels, and the plaster coats were of maximum thickness. Hollow tiles and bricks were set in cement mortar, and when concrete was placed between tiles and column, the tiles were held in place by clamps 2 feet apart. Gypsum blocks were set in 1:3 gypsum mortar. The load pressures were applied by a hydraulic ram of 545,000 pounds' capacity and an accuracy usually within 1 per cent. The 7 x 7-foot brick testing chamber 12 feet high had four primary gas burners in the corners that were supplied through a 6-inch pipe from the city mains. Two of the furnace walls were movable to permit the application of a stream of cold water delivered through a 11/8inch nozzle. The columns in the fire test series were subjected to a constant working load and fire exposure, increasing according to a predetermined time-temperature relation until failure occurred, or until they had withstood the test eight hours or more.

In the fire and water tests, the working load was maintained constantly, and the column exposed to fire for a predetermined period when water at given pressures was applied by means of a hose stream. In case the columns withstood the fire test, they were immediately loaded to failure under full fire exposure. In the fire and water tests, three columns were loaded to failure after they had cooled, and four columns were loaded to twice the applied working load and then reserved for further tests. The time to failure in the fire test extended from the beginning of the test to the time when the column was unable to sustain the-working load. The duration of the fire and water test period varied from $22\frac{1}{2}$ minutes to one hour, and that of the subsequent water application from one to five minutes. The length of the maximum period of fire was the time within which the water is generally applied in building fires, estimated at one hour.

Maintenance. In order to insure the continued integrity of the steel framework of a building that has been properly designed, constructed and protected as has been here described, it is necessary that it should receive adequate periodical examinations and such maintenance as is required to prevent any injury or to correct any incipient trouble. Certain portions of the structure,—such as the steelwork in the foundation and footings and the steel embedded in exterior walls scrupulously protected with adequate covering,—are undoubtedly permanently safe, and need never be disturbed, notwithstanding the hysterical demands of a newspaper which insisted that the walls and foundations of important structures should be frequently torn open.

Wherever there is reason to fear the penetration of corrosive liquids, gases or moisture, there should be preventive measures taken. Ordinary corrosion, though it may present a rough and a scaly exterior, is seldom structurally important, unless long continued, and a very rough surface may not indicate the loss of 1 per cent of the original strength and efficiency of the member, an amount which is entirely admissible without impairing the safety of the steel. Extreme cases of excessive and prolonged corrosion may demand the replacing of the member. Usually a casual examination of the most exposed and vulnerable parts of the interior framework will indicate whether corrosion is present, and if found, it generally is necessary to repaint only the member and maintain the required protecting jacket to insure its safety. When local spots of corrosion are detected, they should be removed immediately and the places covered with one coat of red lead and oil plus the application of an additional coat of paint entirely covering the structure or members.

Exterior steelwork must be carefully and thoroughly inspected at intervals of from three months to one year, according to the character of the structure and the conditions obtaining. Two kinds of metal must not come in contact where there is a possibility of there being moisture. There should be no narrow spaces between or around steel members or portions thereof, and there should be no contact with dirt, rubbish, or any other materials at places where moisture or filth can accumulate. If such are inevitable, they must always be frequently exposed and cleaned, unless it is possible to eliminate them by filling with solid waterproof, watertight materials. The greatest care must always be taken to keep steelwork clean and dry. Accumulation of any kind of dirt or rubbish must never be permitted. If it is kept clean, and dry, and well painted, the steel's working life should be unlimited. Proper protective encasing of steel insures its structural integrity.

LINOLEUM AND CORK COMPOSITION FLOORING MATERIALS

BY

C. STANLEY TAYLOR

R ESILIENT flooring materials are the outgrowth of a definite need for a suitable and economical floor over wood, concrete and other hard floor surfaces, and for a material which can be easily applied as a replacement floor over old floors of any type. Cork composition products and rubber are the principal flooring materials having resiliency as a dominant characteristic. They have been evolved through many years of development and improvement, and have today reached a state of perfection and quality which places them very definitely in the class of quality materials having distinctive characteristics not present in similar combinations in any other type of floor surfacing material.

We are concerned in this discussion primarily with cork and cork composition floorings, which are known in the trade under the general titles of linoleum, linoleum tile, natural cork tile, and cork carpet. The evolution of cork composition flooring materials from the status of a floor cover to that of a finished flooring material has been slow, and architects have only recently awakened to the intrinsic values which such materials possess as contrasted with their use primarily as substitutes or replacement coverings. It must be acknowledged today that these products have earned for themselves a definite, permanent place in the building field, and that they offer to architects, builders and owners new opportunities for creating special effects in color, pattern and texture and for introducing other values of comfort, quietness, sanitation and maintenance that particularly adapt them to solving many modern flooring problems.

Types of Cork Flooring Products. The various types of resilient flooring materials, of which cork in some form is the principal component, each possess

special characteristics which make it important to differentiate one from the other, both in this discussion and in the use and specification of such materials. The prevalent use of trade names to distinguish the various types of products is somewhat confusing, and we must go back of the distinguishing and commonly employed trade names and classify the products in another manner. There are three major classes of cork flooring products; (1) cork composition floorings, broadly termed linoleums and linoleum tiles; (2) natural cork tiles; (3) cork carpets. Their characteristics deserve consideration.

Natural Cork Flooring Products. Cork tiles are composed of particles of cork, such as the thin shavings of cork which are largely produced as a byproduct in the manufacture of cork bottle stoppers. These particles are compressed under heat in such a manner that the natural gums of the cork are liquified and form the only binder required to produce a firm, rigid, and homogeneous product. The better grades of natural cork tile contain nothing but pure cork without any of the harder bits of cork bark or other foreign ingredients. The tile forms come in various size, usually in square or rectangular shapes, and in thicknesses ranging from approximately $\frac{1}{2}$ -inch.

Natural cork tiles take their color from the cork itself and from the baking process which is essential to their manufacture. They are thus available only in natural cork browns of various shades, ranging from light to dark, according to the amount of heat applied. The extreme hydraulic pressure usually employed in the manufacture of cork flooring produces a material which is quite resistent to wear and abrasion, and which is at the same time highly resilient, quiet, and pleasant to walk upon.



Cork Tile Showing Random Use of Several Shades



Embossed Inlaid Linoleum Resembling Tile Floor



Embossed Inlaid Linoleum Indicating Adaptability to Definite Architectural Styles

Cork Composition Flooring, Linoleum. In this type of flooring ground cork is a principal ingredient. The cork is pulverized almost to the fineness of flour and is mixed with oxidized linseed oil and various gums, fillers and pigments. The mixture is compressed under huge heated calendar rolls onto a burlap backing employed as a measure of reinforcement on the underside. A process of curing the cork composition aids in producing a firm, homogeneous material of considerable resiliency which will not buckle or crack and which is practically free from odor. Cork composition floorings are available in many forms and in a number of distinct types. The sheet forms may be classified as Battleship Linoleum, Jaspe, Inlaid Linoleum, Embossed Linoleum and Marbleized Linoleum.

Battleship Linoleum is a high quality, plain color cork composition flooring in sheet form, which earned its name from its original use as a decking material over the steel decks of warships. It is available in various thicknesses from slightly less than 1/8-inch to a full 1/4-inch.

Jaspe Linoleum is distinguished by its striated pattern in two tones of a single color, giving a variegated effect and a characteristic appearance of graining. It is otherwise similar to Battleship Linoleum in its composition, and is usually available in three weights. Small insets of contrasting color are frequently used in Jaspe Linoleum with interesting effects.

Inlaid Linoleums have various patterns in which each individual color runs through to the burlap back. In surface appearance these linoleums often resemble a floor laid with individual tiles, but possess the advantage of lower initial cost and considerably lower laying cost because of its sheet form. This type of linoleum is available in many combinations of colors and in a wide variety of patterns, some of the small tiles forms resembling mosaic tiles, and some patterns resemble quarried tiles or blocks of cut stone or slate, as well as other designs.

Embossed Linoleums are usually inlaid linoleums in which an apparent joint is introduced between the tile units of the pattern, and this joint is compressed below the surface of the sheet to give the appearance of a masonry joint in a hard tile floor. The tiles themselves may also be embossed for decorative effects.

Marbleized Linoleums are classified separately because of their special appearance. Ingenious processes of manufacture result in producing a variegated color effect which resembles with remarkable fidelity the color and appear-

ance of fine marbles, there apparently being no limitation to the manufacturing process in the reproduction of all types of colored marbles. Marbleized Linoleums may be in either full sheet forms, in which the marbleizing effect is carried out over the entire sheet, or of the inlaid type, having the appearance of blocks of marble laid in pattern.

The tile forms, which are sold under various distinguishing trade names, are essentially the same as in the sheet forms in composition but are usually available only in plain colors or in marbleized effects. There are in addition a number of newer types constantly being developed which produce various special flooring effects, including a reproduction of wood plank floor, accomplished by using the Jaspe Linoleum with inset joint strips, pegs and butterfly wedges of darker color. The tile forms are in plain colors and in marbleized effects. Some manufacturers are producing an embossed tile for special uses which have the appearance of decorative faience tiles and which are employed to introduce variety and interest in the pattern of a floor. The architect has at his disposal, in these materials, floorings to harmonize with any designs.

Cork Carpet. Though frequently classified with linoleum, cork carpet differs somewhat from both cork tiles and linoleums. It is composed of granulated cork using a different proportion of cork and linseed oil from that usually employed in Battleship Linoleum. It is compressed under heat. As the name implies, it is manufactured in sheet forms. It comes in several solid colors, and in thicknesses of approximately .22-inch (polished) and .26-inch (unpolished). Cork carpet has not the density nor therefore the resistance to wear of the several types of cork composition flooring materials, but its great resiliency and relatively low cost give it a very

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definite utility for solving certain flooring problems.

These classifications cover the principal standard types of cork composition flooring, but it should be noted that each individual manufacturer is constantly developing new combinations and new patterns which have their special uses from both the decorative and service point of view. The essential features here noted. however, may be applied to the newer forms, and hence an extended discussion of them is not necessary before we proceed to the next consideration.

An important new development in the manufacture of linoleum and cork composition flooring materials is the utilization of pyroxylin or nitrocollulose lacquers to produce a surface wholly impervious to



Border of Marbleized Linoleum as a Transition from Inlaid Marbleized Pattern to Embossed Tile Pattern

moisture, dirt and to the staining effects of many common materials such as ink, foods, greases, mild acids, and even synthetic gin. The lacquer finish is not merely a surface painting in the ordinary sense, for the leading manufacturers while retaining in secrecy the exact nature of the process employed, claim and demonstrate that there is a certain amount of penetration of the lacquer into the upper strata of the material, although no manufacturers claim complete penetration. The lacquer functions to close the minute pores in linoleums and other cork composition flooring products so that ordinary dirt and dust will not be ground into the surface, vastly simplifying the cleaning and maintenance operations. The nature of the lacquer employed is such that most common substances which will normally stain wood, marble, concrete and other types of flooring will not penetrate into the cork compound, and a spot can be readily wiped off from the surface without leaving any stain or mark. To a large extent the lacquer treatment eliminates or minimizes the need for waxing linoleum floors for their maintenance and preservation, although wax may be applied as usual if desired. Undoubtedly this new development marks a real advance in improving the life and utility of cork composition flooring materials, giving added qualities of sanitation, low maintenance cost, improved appearance and probably greater durability.

Appearance and Service Characteristics. While architects universally appreciate the decorative importance of floors in every type of room where architectural design deserves the least consideration, they also know that the selection of flooring materials must depend also on many service factors, including durability, safety (which means freedom

from excessive slipperiness when either wet or dry), ease of maintenance, ease of replacement, sanitation, quietness and comfort, and economy. To a surprising degree, cork composition and linoleum floorings possess the qualities of an ideal flooring material. It is hardly necessary to stress the appearance factor. The variety of colors and patterns available, not only in the sheet forms of linoleum, but also through the employment of the tile forms with which the architect can develop individual patterns to meet the specific design problems, is equaled by no other type of flooring. Color in almost unlimited variety is available in all forms except Battleship Linoleum, cork carpet and natural cork tile; the latter being confined to natural brown tones, and the first being available only in a limited number of plain colors, though special colors can be produced on large orders. The use of sheet linoleums and the tile forms in combination, one for the border and the other for the field, and the opportunities for developing special patterns by inlaying the sheet forms with decorative units of almost any required shape and color, gives further versatility to this type of flooring and challenges the ingenuity of the architect to create decorative effects appropriate to every architectural style, and to every design problem.

We have already noted the inherent resiliency of cork composition products, which is responsible for their making an exceptionally quiet and comfortable floor. From the safety angle, linoleum and cork flooring materials possess the well known non-slipping characteristics of plain cork when either wet or dry. The use of a wax finish for maintenance purposes introduces a slight hazard, but if the wax is thoroughly rubbed in and polished it does not pre-



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Special Pattern Set in a Marbleized Linoleum Floor

sent a slippery or dangerous surface. Linoleums also possess sanitary qualities in a high degree, particularly those which have been manufactured with the lacquer treatment.

Maintenance of linoleums and other types of cork and cork composition flooring is largely confined to waxing at periodical intervals and to dry cleaning with a soft brush on all other occasions. The use of caustic or gritty soaps or scouring compounds is both unnecessary and positively harmful to these flooring materials and should never be permitted at any time, though the newer forms employing the best lacquer treatments are not likely to be harmed.

Occasional washing with a mild household soap, washing a small area at a time and following the washing by immediate wiping with clean water, is permissible a few times a year, but the waxing process alone should be sufficient to remove surface dirt and leave a clean and fresh surface. Many of the difficulties that have been encountered with linoleums in the past have been due to the excessive use of water and strong soaps in their daily maintenance. These service characteristics are accompanied by ease of replacement where worn spots must be removed, a feature particularly notable with the tile forms, one or more of which can be readily taken up and replaced without relaying the entire floor. They are also accompanied by the important factor of considerable initial economy, for linoleum and cork floorings are less expensive than any other type of finished flooring material or floor covering, having equal characteristics of quality, durability, resiliency, color and pattern.

Proper Use of Cork Composition Floorings. The selection of flooring materials is properly based upon their characteristics and cost, and it is hardly necessary to itemize the types of floor space for which linoleums, cork composition tiles and pure cork flooring materials are adapted. It is sufficient to note that they have properly come into general use in residences of all types, and in any room, not as a substitute material, but primarily because of their distinctive features which adapt them to both the decorative and service requirements of domestic interiors. They have earned a prominent place in commercial and institutional buildings, particularly those which have concrete structural floors, because of their resiliency, comfort and quietness, their ease of maintenance, their excellent appearance, and their low cost. The Battleship Linoleums particularly make excellent service floors in commercial, industrial and institutional buildings of all types where trucking is not required.

One precaution should be noted in connection with



Sunburst Design Set in Linoleum Floor with Striking Effect



Unlimited Variety Is Possible with Inlaid Linoleum

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the use of resilient flooring materials. Heavy furniture standing on small casters or slender legs may compress the flooring and form a disfiguring indentation which will be apparent whenever the furniture is moved. For this reason architects should take care that their clients utilize wide face casters, caster cups, or the newer types of broad faced sliding casters or gliders on all furniture, a matter that is equally important for the protection of fine wood or marble floors.

In specifying linoleum and cork composition flooring materials, the architect should be concerned primarily with two considerations. First, the service characteristics of the floor should be adapted to the traffic which it must bear. The quality of the flooring material should also be related to the service requirements, for as in the case with every other building product, there are wide differences in quality and cost, and usually the best grades are lower in ultimate cost than the cheap products.

The second consideration involves the problem of laying. It is impossible here to describe in detail the correct laying methods for each type of floor, and it is quite unnecessary to do so, for the best results are obtained when the manufacturer's instructions are made a part of the specification and where, if possible, the floor laving contractor is one whose work is approved by the flooring manufacturer. The reason for this lies in the fact that use of correct laying methods produces a far superior result,-to such an extent that the method of laying is often considered of importance equal to the quality of the flooring material. Careless contractors and those who are untrained in the work will not only use inferior cements but will frequently omit the rolling and the use of sand bags or weights to hold the linoleum or tile in place while the cement hardens.

The manufacturer's specifications should also be followed with respect to the preparation of the subfloor surfaces and to the use of suitable flooring felts under linoleums and sometimes of rosin-sized



Marbleized Linoleum in Contrasting Squares

paper under cork tile, where these materials are installed over a wood floor. With these simple precautions and with careful supervision of the work, the architect may be sure of a satisfactory floor. It is never desirable, however, to lay these floors on wood or ordinary concrete in direct contact with the ground, either on or below grade.

In summarizing, it is perhaps worth while to point out the importance of these low cost resilient flooring materials as an alternative for more expensive types of flooring in those cases where the construction budget has been exceeded in the early part of a project, necessitating a reduction in finishing costs.



Jaspé Linoleum with Inset Pattern Used on Hospital Ramps Cork Composition Flooring Repeating Ceiling Design





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Cork Composition Flooring in Square Tile Form Used in Lobby of Small Theater



Resilient, Durable and Quiet, Cork Composition Floors Are Extensively Used in Offices

This circumstance arises so frequently that architects are often put to a severe test of their ingenuity and inventive genius to find materials which will produce a desired decorative effect and at the same time represent a substantial saving over the cost of luxurious or heavier materials having the same appearance.

It is important to bear in mind that the comparative low cost of resilient cork and cork composition floorings, combined with their many excellent characteristics, renders them exceptionally well adapted to the economical flooring of all types of buildings, and in harmony with any architectural style.



Battleship Linoleum Is an Ideal Floor for Many Commercial and Industrial Uses

GAS IN THE AMERICAN HOME I. HEATING WITH GAS

BY P. E. FANSLER

ASSOCIATE EDITOR, THE HEATING & VENTILATING MAGAZINE

AS is serving the home owner in many ways J not dreamed of when public utilities were first incorporated as "The Citizens' Gas Light Company" or under some similar title selected to suggest the scope of usefulness of this product. Executives of many of these utilities were gravely concerned when the use of electricity for illuminating purposes spread through the country like wildfire; they imagined that the knell of the gas industry had sounded. Fate was not so unkind, however, and the use of gas for cooking soon caused demands far in excess of the old lighting loads. Then came the beginning of the present phase,-the era of fluid fuels,-and far-seeing executives have already started aggressive campaigns for house-heating loads as well as for the other uses of gas that are now so much talked about,-refrigeration, incineration, air conditioning, and water heating. Also there came the development of industrial gas applications,-in laundries, bakeries, heat-treating and other metallurgical plants, for brick making, peanut roasting, and un-numbered highly specialized uses. It does seem passing strange that gas company officials wept at the thought of losing thousands of lighting customers who turned to electricity, when

today there passes through a single meter, in any one of the great industrial plants, more gas than was registered in a multitude of little meters serving the house-lighting load of those old days,—and payment comes in a single check, in place of in thousands of small cash payments, with the requisite bookkeeping and accounting cost.

This article deals with the use of gas as a househeating fuel; a second article will discuss the apparently paradoxical use of gas for household refrigeration as well as for the other comparatively recent applications, in the home. Househeating with gas, both natural and manufactured, is attracting the attention of the architect and heating engineer largely through a concerted and nation-wide educational campaign on the part of the organized manufacturers of gas, retailers of natural gas, and the manufacturers of gas-heating equipment. These activities were stimulated, if not initiated, by the tremendously rapid increase in the use of oil as a domestic fuel during the last three or four years. Several far-seeing executives of gas companies, in as many scattered cities, have quietly been working out the problem for the last ten or more years, and many of the



A Gas-fired Heating Plant with Automatic Control of the Steam Circulated, and Automatically Controlled Gas-heated Domestic Hot Water Supply

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essential factors have been definitely established. The nation-wide campaign for this market has only started within the present year, and the next ten years undoubtedly will see an enormous growth in the ranks of gas users.

Broadly speaking, there are two kinds of gas fuels and two methods of using either. Natural gas, used in the gas areas and in large population centers to which it is piped, contains from 1000 B.t.u. to 1100 B.t.u. per cubic foot, and sells for from 35 to 60 cents per 1000 cubic feet. Manufactured gas is fairly well standardized at 535 B.t.u. per cubic foot, and costs, as a domestic fuel, from 70 cents to \$1. Thus it will be seen that the home owner who has natural gas available at the average cost, pays 50 cents per 1,000,000 B.t.u., in contrast to the user of manufactured gas, who has to pay, on the average, \$1.50 for the same quantity of heat. Either kind of gas can be burned in a boiler or furnace designed and built especially for the purpose, or a special type of gas burner can be installed in any furnace or boiler designed for coal,-this latter being termed a "conversion" installation. Quite naturally, conversion installations originated in the natural-gas areas, in the early days, when this fuel sold approximately for "a quarter" per thousand. Efficiency was not thought of, and the wastage seems criminal. Even today, in some of these sections, gas street lights are used and allowed to burn all day,-it is cheaper than paying for the labor of lighting and extinguishing!



Cut Section Showing Construction of Boiler Designed for Gas or Oil. Copper Tube Elements Removable

From the technical standpoint, there are three interesting features of the gas-fired boiler or furnace. Gas is a hydro-carbon, with a large proportion of its contents hydrogen in both free and combined states. The natural consequence of combustion is the combination of this hydrogen with oxygen to form water vapor, in volume about equal to the volume of the gas. Approximately 10 per cent of the heat energy in the gas is represented in this transformation, and this cannot be utilized unless the flue gases are cooled to their dew point,-about 130° Fahr. On account of the large amount of water formed by this condensation, it is usually desirable to keep the fine gases well above this temperature. Conventional combustion practice has been to mix the necessary air for combustion with the gas prior to initiating combustion, producing the characteristic blue flame of the Bunsen burner. Gas burned for illumination, on the other hand, is emitted from a small hole in a burner, and the flame is filled with minute particles of free carbon, heated to incandescence before the oxygen of the surrounding air has an opportunity to combine with it; it is the luminosity of these particles that gives to this flame its high emission of radiant heat. The Bunsen flame, however, produced by gas burners, emits but little radiant heat. As a consequence, in boilers and furnaces designed for gas firing, little or no attempt is made to absorb heat energy radiated by the flame; rather, there is provided a comparatively large amount of flue surfaces, with



Even a Small House, such as this, may be Heated Economically with Gas where Rates are Favorable



This Gas Boiler, in the Small House Illustrated, is about a Foot Square

water on the opposite side in boilers and air in furnaces, for heat transfer from the hot products of combustion. It is this combustion characteristic that has dominated boiler design.

The third feature of the gas-fired boiler lies in the fact that combustion is best promoted when there is virtually no draft. Therefore, when a gas-fired boiler is attached to a chimney, a "draft-breaker" is inserted in the flue pipe, between the boiler and the chimney. This consists of a double-cone-shaped shell of sheet metal suspended in the axis of the smoke pipe, where a section of the pipe, 6 to 10 inches long, has been removed. A "skirt" is fixed to the upper part of the break. Hot gases flowing up the smoke pipe are carried around the double cone and up the chimney by virtue of the draft in the latter. Air is drawn in around the opening, nullifying the effect of the chimney pull on the boiler. If there should be a "back-draft," or downward movement in the chimney, it would be diverted by the cone and would pass out around the opening and not interfere with the functioning of the burner in the boiler. Thus a fixed draft, equal only to the flue action of the boiler itself, is maintained, regardless of fluctuations in the chimney due to combustion or to atmospheric effects. It is obvious that absolute and relatively high efficiencies can be maintained



This Typical Large Residence where Winters are often Severe is Heated Advantageously by Gas-fired Boilers

where gas automatically is fired at a fixed fuel rate, with a non-fluctuating draft, and with all vital conditions controllable for optimum operation. A uniform seasonal operating efficiency of from 80 to 85 per cent is well within reason, as against from 60 to 65 per cent in an oil-fired boiler and from 35 to 50 per cent where coal is hand-fired. It is for this reason, chiefly, that comparatively high-cost fuel can be used universally, especially where insulation is installed, and other controlling factors in minimizing heat loss from the building are favorable.

Conversion installations are not looked upon with especial favor by gas companies where manufactured gas is to be burned, chiefly because of prejudice based on the woefully inefficient makeshift installations which were common years ago in the natural gas fields. In the New York area, for instance, it probably would be difficult to induce a gas company to make a service connection to such a plant. However, in Baltimore, hundreds of gas burners have been installed in boilers and furnaces with very satisfactory results, many of these having a record of ten or more years of service. The reason lies in the careful study that was made when the house-heating load was first considered. The technique was developed until these conversion installations, as now put in, are almost equal in efficiency to a plant using



The Heating Plant and Domestic Hot Water Plant of the Residence Illustrated



Boiler Originally Using Coal Now Converted for the Use of Gas Fuel

a specific gas-fired boiler. To secure satisfactory results when burning gas in a boiler designed originally for coal, it is necessary to simulate, as far as may be possible, the combustion characteristics of coal. To this end a ring-shaped burner is set on the grates, so that the flame is close to the walls of the combustion chamber. A barrel-shaped form of fire brick is then built up on the grate, almost to the top of the combustion chamber, leaving an annular space for the gas flame. The idea is to heat this mass of brick both by the limited radiation from the inside surface of the flame and by convection, so that the radiation from it will act on the walls of the combustion chamber in a way very like that of a bed of red hot coal. If a rectangular boiler is to be equipped to burn gas, the burner follows the walls, and the fire-brick form also is rectangular. The material increase in efficiency when this plan is carefully followed can easily be demonstrated by running a test before and after putting in the bricking.

Realizing the vast number of house-heating plants of the coal-burning type now in use, and the possibilities for conversion, much experimental work is being done along this line, and it is within reason to say that developments recently brought to a head will make possible conversion installations that will equal, if not surpass, the best gas-fired boilers now available. A boiler or furnace using gas as a domestic fuel can probably be brought as near to perfection, on an efficiency basis, as can any energy-transforming device, and on account of the enormous potential annual consumption, this phase of the matter is occupying the minds of many executives, engineers and research workers. Curiously, the absolute efficiency of a boiler is not an exact criterion of its

usefulness in the home. For instance, in determining boiler efficiency the heat radiated from the boiler jacket is charged against the boiler as a loss. This is because it represents heat not available at the boiler outlet, in water or steam. At the same time this heat is manifestly useful, in that it warms the basement, especially the ceiling, which is under the living rooms. Cold floors are not desirable, so the heat marked up as wasted by the boiler does serve a useful purpose. By the same token, at least a portion of the heat in the flue gases is utilized in heating the house, particularly if the chimney is inside. It is only necessary to take the temperatures of the flue gas at the bottom and top of the chimney to determine the useful effect of this so-called waste heat. In a certain research study, where a warm-air furnace was used, the net efficiency of the furnace, as computed, was only slightly over 30 per cent. Yet the net heat lost to the house was less than 40 per cent, and the real efficiency of the heating plant, as rated by the heat actually utilized in the house, was more than twice the calculated furnace efficiency. Taking these things into account, it is not unlikely that gas heating can be accomplished with an efficiency above 90 per cent.

Much of the confusion that has grown up in regard to the rating of coal-fired boilers has, happily, been eliminated in the consideration of gas-fired units. The American Gas Association, realizing the



Diagram of a Typical "Conversion" Installation here Described

October, 1928

importance of logical and uniform capacity designations to those responsible for making rating recommendations and selection, as well as to owners, has brought about a logical and uniform scheme of rating, whereby products of manufacturers are tested in the Association's laboratory, and rated in B.t.u. available at the boiler outlet. This procedure removes one of the variables which the architect, heating engineer and contractor are least qualified to determine, and greatly simplifies the selection of a boiler for any purpose.

Two interesting considerations now make gas a desirable fuel for larger and better types of houses. Warm-air heating has, in the past, been used almost entirely for the smaller and cheaper houses, especially those built for speculative purposes. The everyday variety of warm-air installation admittedly has been "cheap,"-little more than a glorified stove with a tin can around it. Many furnace manufacturers were content with this class of market, and little progress was made in a half-century, so far as warmair engineering was concerned. Less than four years ago leaders in that industry, and prime movers in the National Warm Air Heating and Ventilating Association, decided that some real engineering would be a good thing to stimulate development. So a research residence was built at Urbana, Ill., and since its completion it has been constantly in use as a field laboratory, under the direction of Professor



Diagram of the "Draft Breaker" Described on Page 586



A Large Gas-fired Boiler Installation Using Two Boilers for Flexibility

A. C. Willard, of the University of Illinois, assisted by a notable staff of research engineers. Professor Willard has turned out to be the modern Moses of this industry, and more real progress has resulted from the efforts of the director and his staff in three years than was made in the quarter-century preceding. For another influence of vital importance to the development of gas heating we must look to the electric refrigerator, the washing machine and the oil burner. Each of these devices utilizes a small electric motor, usually from 1/10 to 1/4 horse power.

With these two thoughts in mind, let us turn back to a consideration of the possibilities of the gas-fired warm-air furnace. In the first place, warm air is an ideal heating medium because, where it is used directly, and not with steam or water as an interposed medium, it can be properly humidified,-and it is definitely established that proper humidity is an essential to optimum comfort. Not only that, but the proper humidity will keep furniture together for many years, whereas, in a dry atmosphere, it will quickly fall apart. On the other hand warm air, as it has been used in the past, was not a satisfactory heating medium, for the simple reason that its movement to the rooms of a house was dependent upon the natural rise of warm air and the tendency of cold air to settle; such plants were called "gravity" systems. The trouble was that, against infiltration from a cold winter wind, the warm air would not rise to the rooms on the windward side of the house; these rooms "never could be heated." So the desirable features of warm air were more than nullified by the fact that it wouldn't go where it was wanted. Enter, then, the idea of using a little fractional horse-power motor. The motor has been proved



Gas-fired Warm Air Furnace, Showing a Type Frequently Installed on the Pacific Coast

reliable by the washing machine, the refrigerator and the oil burner. It would run six to ten or 12 hours a day for an insignificant sum. What could be more simple than to place a fan in the supply duct of the furnace, and to force the flow of air, regardless of infiltration or whatnot? This scheme has been so far developed that residences having as many as 20 rooms and 24 registers have been well heated in the coldest sections of the country. In other words, the market of today for warm-air furnaces is not limited to small houses nor to homes of low cost.

Now introduce gas as the fuel to be burned in one of these modern warm-air furnaces with positive air circulation. This fuel is delivered into the house only as used; considered in this way, it has no appreciable weight. The gas-fired furnace can be built extremely light in weight. It does not, as does the coal-fired boiler, require a 30-foot to 50-foot chimney. Rather, it wants a zero draft. Why should we not, in view of these figurative fingers all pointing the same way, put the gas-fired warm-air heating plant in the attic where it will occupy practically waste space, eliminating the basement altogether, or making it a considerable addition to the livable portion of the house? The objection that



Warm Air Furnace "Conversion" Installation of a Type often used when Natural Gas is Available

"warm air will not flow downward" is silenced by the positive delivery of warm air, by the blower, to any part of the house, up or down. In the summer time a gas-fired refrigerator can be utilized to cool the air that is being circulated through the house. The entire conception is simple, although somewhat striking, merely because it hasn't yet been done.

This, perhaps, is the ultimate in gas "heating." It is not a "pipe dream," because the essentials have been conceived and put into practice by one of the foremost engineers specializing in the field of conditioned air. For over a year nearly a hundred "unit air-conditioning plants" have been in operation in as many homes. The unit for a ten-room house is little larger than an office desk. It is gas-fired, automatically controlled as to heat supply, provides a definite circulation of air that is humidified to just the proper degree, and, in the summer, provides the house with cooled air, dehumidified.

The more general use of gas as a fuel for domestic heating may depend to some extent on the increase in the amount of gas devoted to this use which, in turn, may bring about a lowered price which will enable the owner of a modest home, located within a reasonable range of centers of population, to heat his house with gas economically and automatically.

NEW TREATMENT OF MONOLITHIC EXTERIORS

BY

JOSEPH B. MASON

SURPRISING number of somewhat imposing buildings, including a representative allotment of churches, theaters, lodge buildings, court houses and other public and semi-public structures. have been designed within the last two years in what, for lack of a better term, has been called the "monolithic" style. Possibly it would be more illuminating to say that they have been designed as monolithic structures in which both the architectural and structural requirements have been met with concrete. In these buildings the columns, floors and walls are cast as a unit, the forms being built so as to include practically all of the architectural details and trim as the work progresses. Such buildings are characterized by solid walls, clean cut lines, tall pilasters which carry the eye from the ground to the sky-line, and interesting relief work, which for the most part is cast in place. They have colorful exteriors, achieved through use of stucco and through varied methods of surface treatment of the concrete walls and columns. A technique has been developed to secure attractive surfaces in the monolithic concrete which warrants especial attention. Whether we approve of the design or not, we cannot help feeling keen interest in the new methods employed.

In reinforced concrete the architect has a medium which flows and may be moulded, and through which form appears in gracefully unfolding stages until the final mass stands revealed. The nature of the work demands special care in concrete mixing, since concrete serves as both the structural and facing material. The fact that the concrete is to be exposed to the elements makes it important that unusual care and attention be paid in making and placing it. Contractors should bid on the concrete at a price that will permit this especially careful attention. It is apparent that the old time 1:2:4 concrete mix does not possess the qualities necessary for all this class of work. No rigid mix can wisely be used for many different purposes. The fact that better concrete and concrete that can be adapted to given purposes is being made has had much to do with the development of the monolithic type. Today architects and engineers may demand and obtain concrete that will fulfill their requirements, both structural and architectural, with assurance that it will withstand the elements at least as successfully as any other material to be had within the economic limit of his design. Intelligent and constructive research has checked and re-checked theories of concrete design so thoroughly that concrete can now be made to a definite specification.

Concrete for the exposed walls and columns of the monolithic structure must be of a uniform composition throughout the entire exposed area. Size

and grating of the fine and course aggregates should be consistent throughout, so that the class of concrete may be uniform. A water-cement ratio of 6 to 6¹/₂ gallons of water to one sack of cement will produce concrete that will resist weathering and prevent the obsorbing of moisture in the walls. Consistency and workability are very important qualities, which must be watched. Concrete should be of such a consistency that it will go into all of the corners of the forms without excessive spading. On the other hand, the mix should not be so wet that after the concrete has been in the forms for 10 or 15 minutes water will rise to the surface. Too liquid a mix will cause the cement paste to work to the surface of the forms, so that when the concrete is exposed, a fatty face with an unpleasant, almost polished, surface of pure cement results. Each batch of concrete should have the aggregate and water measured very carefully, so that the density of every batch will be the same.

In the forming of mouldings, projecting bands, recesses, fluting, etc., it must be constantly borne in mind that everything must be designed for the perfect flow of material. It is important that the concrete be evenly distributed along the form so as not to flow by gravity from the point of discharge to any far point in the wall. The forms should be filled evenly and the concrete, where possible, placed in one continuous operation. Any break in the placing should be made at definite lines along the bottoms of window openings. Inequality of surface and elimination of form markings are not desirable.

In the order of present popularity, the principal methods of treating the concrete exteriors of monolithic buildings are: first, stucco; second, surfaces with exposed form marks; third, grinding and rubbing; fourth, special applied finishes. I shall take these up in this order. Stucco exteriors in pure whites, creams and varied colors have been used with success not only on the Pacific coast, where this method of treatment has been widely practiced, but also in other parts of the country. In order to secure a firm bond between the stucco and the monolithic surface, all dirt, grease, oil or other similar matter must be removed. When two- or three-coat stuccoes are employed, it is usually advisable to roughen the surfaces of the concrete before application. This may be done most easily by brushing the surface with wire brushes before the concrete has fully hardened. A special preparation is now obtainable which may be spread on the interior surfaces of forms and which will retard the hardening of the cement mortar at the surface. It may then be easily roughened by brushing. A good bond is also dependent upon good suction. A concrete



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Portland Cement Plaster on Monolithic Walls. Doorway Ornament of Pre-cast Stone John Galen Howard & Associates, Architects

saturated with water will have practically no suction; pure or dry concrete will probably have too much.

A single coat of stucco which improves the coarse appearance of the surface of the concrete but which does not completely obscure the form marks is used very often and with considerable success. A mixture made in the proportion of 1 cubic foot of Portland cement to 2 cubic feet of sand has proved very satisfactory when just sufficient water has been added to make a mortar of creamy consistency. This mixture is dashed on the concrete surface with a stiff brush and allowed to harden without trowel-Two- and three-coat stuccoes are used to ing. achieve surface effect beyond the possibilities of the single-coat. Various trowel effects are possible, or the exterior stucco coat may be marked off in the pattern of stones. Some of the most unique effects have been achieved by combing stuccoed surfaces with a stiff wire brush. An interesting effect is obtained by combing alternate blocks at right angles to the horizontal. Commercial Portland cement stuccoes containing, where color is used, thoroughly tested mineral pigment, are recommended. The colors of stuccoes can be controlled very closely.

Probably the most interesting, because of the boldness of the experiment, has been the practice of leaving the monolithic surfaces just as they come from the forms, with no further surface treatment. Without entering into the merits of this procedure, it is sufficient to say that it has been used to produce a number of striking and interesting structures and is worthy of consideration. Surfaces that are to be left as they come from the forms must of course be detailed carefully. Good quality lumber and boards of uniform width, well finished, must be specified for the forms. Careful study should be made to determine the proper widths of form boards to be used. Wide boards tend to make the



Monolithic Concrete with Cast Stone and Colored Stucco Exterior George Applegarth, Architect
structure look heavy and clumsy, while narrow boards warp the design. The form boards must be leveled and carried entirely around the building at the proper elevation, and joints should be so broken that they will not be conspicuous.

Some surface treatment with a portable grinding outfit or carborundum wheel is often made. The grinding should not remove all of the form marks, but should merely even the surface, giving it a more pleasing appearance without destroying the textural effect. The extent to which grinding or rubbing of the hardened concrete surface is carried forward will depend upon the effect desired. Many structures which have proved very attractive received only slight rubbing with a carborundum stone after application of a cement wash. Again, to achieve the desired effect, more intensive rubbing or grinding of the entire surface is often carried out. Bush hammering and other air-tooling treatments of concrete surfaces are in general use over panels and small border areas. Concrete of good quality may be tooled with success, and this provides an interesting variation in the surface treatment. Exposed aggregate surfaces offer interesting possibilities. A surface material made up of specially colored aggregates is applied either as stucco or by casting and applying to the surface of the wall. After this facing material has been applied and allowed to harden, the aggregates are exposed by washing with diluted muriatic acid. This method produces concrete that is very hard and durable and yet permits the carrying out of even the most minute details.



Monolithic Concrete with Rough Concrete Finish F. Pierpont & Walter S. Davis, Architects

One of the advantages of using the monolithic concrete type is that decorations or embellishments can be cast as integral parts of the walls. Reverse plaster or wooden moulds are built into the forms as they are erected, and are filled with the concrete that is used in the rest of the structure.



Reinforced Concrete Walls with Light Buff Stucco Exterior Bertram Grosvenor Goodhue, Architect; Carleton Monroe Winslow, Associated



Monolithic Concrete with White Portland Cement Stucco Exterior Derrick Hubert, Architect



Portland Cement Stucco and Cast Stone Trim and Ornament L. L. Dongan, Architect





Brush Coat of Cream Colored Stucco Trimmed with Cast Light Chocolate Colored Stucco Exterior over Reinforced Concrete Allison & Allison, Architects Curlett & Beelman, Architects

ARCHITECTURAL USE OF LIME

BY

J. J. HURLEY CONSTRUCTION ENGINEER

I T is well known that modern structures require lime in some form or another, and for certain purposes for which no other material is "just as good." Lime putty is probably the "stickiest" and "slipperiest" cementitious material known. For this reason lime putty sticks where it it put, and as many would say, "it puts very easily." Every variety of lime has its architectural use, but the number of kinds of lime that may be used for each architectural purpose is very small.

First of all, just what is lime? It is the product obtained by heating limestone to its dissociation temperature (1600° to 2100° Fahr.) under such conditions that the carbon dioxide and other volatile matter are expelled. Lime consists primarily of calcium oxide, but may contain magnesium oxide, which in some limes may range in amounts as high as 45 per cent. Small amounts of alumina, ferric oxide and silica, and traces of other impurities are frequently present. The suitability of lime for any particular use depends on its chemical composition and its physical properties. It is here that the architect is forced to depend on established and reputable lime manufacturers to guide him in specifying the kind of lime for the purpose in mind.

History. Lime was probably the first cementitious binder used by man. The technique and practice of its use have been developed by centuries of experiment and observation. The fact that many architectural gems have come down to us from ancient days, and that they have resisted the ravages of the elements for centuries, bears eloquent testimony to lime's lasting qualities and integrity. Lime was first used because of the fact that it hardens from a soft, smooth, easily handled paste into a dense, hard mass. Brick, stone or other building units laid in it are bound together into monolithic, durable structures. The structural details and natural roughness of the construction units can be masked by spreading lime mortar over them in the form of plaster, thus giving a pleasing and hygienic surface.

Any lime manufacturer of recognized standing can be depended upon not to recommend the lime he makes to be used for a purpose for which it is not suitable. It is especially important that the instructions issued by the manufacturer regarding the slaking of the lime he manufactures be followed and emphasized by the architect in his specifications. With some lime it is necessary in slaking it to pour the water on the lime. With other lime, of different chemical and physical composition, it is necessary to put the water in the box and to dump the lime into the water. All of this is necessary in order to obtain the best results, and it is obvious that the architect cannot be expected to know these things unless he has had long experience with the particular brands of lime used in any special given instance. Specifications. Unless it is wished to confine the kind of brand of lime used to one special make, it is suggested that these short specifications be used: "The lime (quicklime or hydrated lime) shall meet the current standard specifications of the American Society for Testing Materials and shall be used in accordance with the manufacturer's printed instructions. The brand of lime shall be approved by the architect." Modern methods have been applied to the manufacture of lime by the more progressive lime manufacturers. They have been quick to make use of the valuable research work done by the United States Bureau of Standards. The Bureau is the authority for the statement "that any good lump lime pulverized and passed through a 50-mesh screen can be guaranteed not to pit or pop." This is the reason why at least one of the largest lime manufacturers in the country advertises that one of his brands is "guaranteed not to pit" when used for plastering. Pulverized lime has many advantages for the architect, when guaranteed by a reputable manufacturer. When made as directed by the United States Bureau of Standards, the architect does not have to wait for the lime putty to age for from two to eight weeks, as is necessary with lump quicklime putty, or hydrated lime. Putty made from pulverized quicklime so manufactured may be used with perfect safety as soon as it is cold.

The modern manufacturing process of making lime is in accord with exact chemical science in which experienced chemists are regularly employed, and in which mechanical engineers, civil engineers, and geologists are also on the regular payrolls. The modern lime plant is a most interesting place. Everywhere one sees motors, conveyors made of steel pans for handling hot lime, labor-saving devices of all kinds, electrical recording pyrometers for keeping track of the heat of the kilns; modern automatic gas producers; automatic coal-handling machinery for handling coal from cars or barges; barrel plants where wood barrels are turned out complete, almost without human hands touching them; electrical, steam, and gasolene locomotives and all-steel cars for hauling both limerock and the finished product to where they are needed,-and in fact all of the upto-the-minute appliances of big business.

Hydrated Lime. This lime is a very important architectural material, and it is demanding its increasing place in the architect's mind. Hydrated lime is quicklime with its chemical appetite for water satisfied. It is produced in this way. The lump quicklime to be hydrated is crushed, and then conveyed mechanically to the machine known as the "hydrator." This supplies the quicklime with the proper amount of water to convert it into hydrated



Portion of a Large Lime Quarry

lime of the required chemical and physical properties. Three types of hydrators are used, differing in detail, but all providing for mechanically mixing the quicklime with the necessary water and for conserving the heat of the chemical reaction in sufficient degree to effectively hydrate the quicklime without "burning." The hydrated lime is discharged from the hydrator as a dry white powder. The modern mill uses air-separation units, conveying machinery where air currents carry the hydrated lime to the bins, devices which measure exactly the predetermined amount of water for every pound of quicklime, and last but not least, careful laboratory tests of every batch so as to be sure that the hydrated lime meets the current standard specifications of the American Society for Testing Materials before it is shipped. Hydrated lime and pulverized quicklime are the lime manufacturers' answer to the incessant modern demand for speed.

Kinds of Lime and Hydrated Lime. The "trade," meaning manufacturers, dealers, masons and plasterers, divide lime into these classes:

(1) Common or masons' lime (quicklime), which is usually lump lime, but may be pulverized, and is run-of-kiln lime without any selection. This is the type of lime that is generally used for masonry of a less important nature, bearing light loads, for rough plastering, and for stucco work.

(2) Finishing lime (quicklime) is the best selected lump or pulverized lime made by the manufacturer. It contains a minimum of core and other foreign matter, and is used for the best class of masonry, all grades of plastering, and stucco work. It is more plastic than common lime.

(3) Masons' hydrated lime may be used for scratch and brown coat plastering, for stucco, for masonry mortars, and as an admixture to Portland cement concrete.

(4) Finishing hydrated lime may be used for any purpose for which masons' hydrated lime may be used, and in addition, it may be used as an ingredient for the final or white coat of plaster. Finishing hydrated lime will have a plasticity figure of 200 or more on the Emley plasticmeter, all as outlined in the American Society for Testing Materials Tentative Methods of Sampling, Inspection, Packing and Marking of Lime Products. The Federal Specifications Board has Master Specifications covering lime of all kinds, both quicklime and hydrated lime, which are essentially the same as the "Standards" published by the American Society for Testing Materials. There are 38 varieties of limestone listed by Knibbs, which run from alabaster, through chalk and marble to travertine. Marble is perhaps the purest high calcium limestone that we know today.

Modern Stucco. The architect is much interested today in stucco. The economy of its construction, its durability of surface, fire resistance, low maintenance cost, its use in improvement and repair of unsightly or old surfaces, and the pleasing artistic effects possible with stucco, all find favor with the architect, and with his client as well. The term "stucco," which was formerly used in referring to ornamental plasterwork, whether interior or exterior, is now confined to exterior plastering, either plain or ornamental. Stucco may be defined as a material used in a plastic state to form a hard coating for exterior walls or surfaces. Stucco is a mixture of one or more cementitious materials with sand or other fillers, and with or without other materials such as hair, fiber and coloring matter. Lime stucco is a mixture of properly prepared lime putty or paste, sand and water, with or without the addition of a small percentage of cement. Hair or fiber may be added to assist in forming the "key," depending on the style and character of the background. Coloring matter may be added to obtain the desired tone, although most satisfactory color effects are obtained through the use of selected sands. Different colored (fine or coarse) aggregates may be used for obtaining various effects of colors and surface textures. There are many fine examples of the architectural use of lime stucco in the older states, both of New England and the South, especially in Charleston, S. C., and the missions of California. New Orleans must also be mentioned, as the French influence is most noticeable in the stucco on homes and churches in that fine old city. The economy of lime stucco is due to a number of factors. The ability of lime putty to carry a large amount of sand makes possible a leaner mix, which authorities agree is the best in

stucco work. The high plasticity enables the plasterer to apply lime stucco easily, to spread it with little effort, and to work it thoroughly. Freedom from cracks is one of the special merits of lime stucco. A. H. White, an authority on stucco, says: "Freedom from initial hair cracks can be secured only by using a lean mixture, not richer that 1 part of cementing material to 3 parts of sand by volume." The manner in which lime stucco hardens prevents the formation of cracks. It hardens slowly enough, due to evaporation of the water and recarbonation of the lime, to permit the lath to which it is applied to adjust itself. Where other backing, such as masonry, is used, there is no movement. While the freshly applied stucco expands and contracts with moisture changes, the fully hardened stucco shows little change, since it will consist of porous bodies in greater or less degree. Waterproofing is unnecessary in properly proportioned, mixed and applied lime stucco. Stucco will absorb in rainy weather,but this is not injurious. The density of lime stucco corresponds closely with mortar used for masonry.

Plastering. Plastering involves perhaps the most important architectural use of lime. It is used to shut out drafts, to make for more privacy, and to make dwellings and other structures more sanitary and beautiful. It also affords some protection against fire. There are two kinds of plastering,—good and bad. As everybody seems to be talking about *good* plastering, it seems to be in order to discuss *bad* plastering,—at least some of its most glaring faults.

Plaster Cracks. In a long and varied experience in a number of states, the writer has seldom heard anyone suggest that the lath or structure itself might be responsible for the cracks, although in over 90 per cent of the cases investigated where severe cracking has been the cause of the complaint, the defects of the structure have been the real reason for the trouble. It must not be supposed that lime plaster does not have defects and cracks which are the fault of the plaster or the way the plaster is applied, for it does. There are map cracks, shrinkage cracks, check cracks, fire cracks, and crazing. There are also the "pitting" and "popping" that, despite the best efforts of the manufacturers and all other persons interested in plastering, will put in their appearance occasionally when unguaranteed lime in lump form is used. All of the defects that can be charged to the plaster can be dismissed from the mind of the architect if a reliable, well established, and experienced plastering contractor does the work, and if a lime that is guaranteed by the manufacturer not to pit or pop is used.

Efflorescence. This defect, sometimes called "blotches," is most difficult to avoid. Sometimes areas of considerable size have the appearance of being wet. They dry out after a while, but they come back intermittently over a long period of time. These blotches are caused by certain salts which are soluble and hygroscopic. As the mixing water evaporates, these salts are brought to the surface and



A Modern Vertical Lime Kiln

deposited. Their hygroscopic property causes them to absorb water from the air, thus keeping the plaster damp. Calcium chloride is one of these salts, and this substance is readily formed by interaction between lime and common salt. This is one reason why sea water or beach sand should not be used for plastering. This is also a reason for not using calcium chloride in the mortar for plastering to reduce the danger of freezing.

The peeling or blistering of paint is almost always due to the presence of water in the plaster. If plaster is painted before it is absolutely dry, trouble may be expected. Lime or any other type of plaster should not be painted in less than three months from the time the finished plaster is applied, and then only if the plaster is dry. Paint sometimes "burns" when applied over plaster. Free lime, oxide or hydroxide, will destroy linseed oil, causing the paint film to become brittle. One may expect to find free lime in all green (damp, or wet, newly applied) plasters, whether they be lime, gypsum or cement. If it is not desirable to wait for the free lime to become inert through carbonation, a priming coat may be used. This coat should be prepared by dissolving three pounds of zinc sulphate in a gallon of water. The zinc sulphate reacts with the lime to produce compounds which have no effect on oil. Cold water paint may be used without taking this precaution. All architects want good plastering, because plaster is about two-thirds of the area visible in the usual

room. The plaster should make and continue to give a good impression over a long term of years. This is not possible if the architect permits, for any reason, inferior work. One-coat plaster work is to be especially condemned.

Two-coat Plaster. Two-coat lime plaster on wood or metal lath, when properly done, will give satisfaction. This is especially true if the under coat is put on in two parts and brought out to grounds and well darbied and straightened, and then floated down properly with a wooden float after the plaster has stiffened, but before it is dry. This floating operation is very important, for it fills up all the shrinkage cracks and leaves a mechanically roughened surface for the finish or "skim" coat. The so-called "Boston skim coat," when applied by an experienced plasterer, is a most satisfactory finish over doubled-up, two-coat lime plaster. Boston skim is made of clean, sharp sand and lime putty in about equal parts and troweled to a smooth, hard surface.

Three-coat Work. This represents the proper use of lime plaster, the first or scratch coat being applied and allowed to become absolutely dry before the second or brown boat is applied. The brown coat is also allowed to dry before the finish coat is applied. All this is true, no matter to what kind of lath or masonry backing the plaster is applied. Plastering often seems to be a good detail on which to save money in cutting the cost of a structure, but for the architect's peace of mind, it would be much better to save on some other item, for nothing comes under the observation of owners and tenants quite as constantly as plaster.

The American Institute of Architects in collaboration with the National Lime Association has prepared standard specifications for lime plaster, copies of which can be had by an architect if he will apply to any lime manufacturer, or to the National Lime Association, at Washington. The United States Bureau of Standards is responsible for the statement that in the presence of moisture (and all plaster is subject to exposure to moisture at one time or another), lime plaster preserves metal lath from rusting. This is so because lime has an alkaline reaction. On the other hand, there are some so-called "patent plasters" to be had that have an acid reaction.

Mortar for Brick and Other Masonry. The function of mortar in laying up brick, stone, tile, etc., is twofold. It must provide a smooth bed upon which the building units may be easily laid, and it



A Modern Horizontal Revolving Drum Lime Burning Kiln

must bind them together into a permanent mass. From the architect's point of view, it is necessary, in addition, to prevent the entrance of rain, wind, and cold through the spaces between the building units, which must be entirely filled with mortar. It is necessary that the mortar develop a safe compressive strength to resist the load on the lowest mortar bed, and also develop sufficient cohesive and adhesive strength to properly hold the building units in their places while the mortar is attaining its initial strength. The mortar must also finally pass the tests of durability and density. In all these qualities lime mortar or "1:1:6" mortar (made of 1 part by volume of Portland cement, 1 part by volume of lime putty, and 6 parts by volume of sand) properly used, meets the requirements.

Strength of Lime Mortar. The tests of Prof. McGregor, at Columbia University, will serve as an illustration of the strength of varying mixes of mortar from straight Portland cement to straight lime for the cementitious portion and 3 parts of sand, by volume. The graph included here tells the story, and while the cost figures given do not pretend to be accurate for all portions of the country, they are relatively correct, as a substitution of local prices will show. It will be noted in this graph that the greatest compressive strength is obtained by using 70 per cent of Portland cement and 30 per cent of lime putty. The graph also shows that 50 per cent of Portland cement and 50 per cent of lime putty give almost as great strength as the strongest combination shown; that is, that it gives well over 3,000 pounds per square inch.

Costs. It is impossible to give actual costs on mortar for the whole country, but it is easy to point out that lime putty is the cheapest per cubic foot of any cementitious material used for mortar.

Watertight concrete is concrete through which water cannot pass. "Waterproofed" concrete is concrete to the surface of which some treatment has been applied which may or may not prove permanent, to prevent the entrance of water. Hydrated lime is used in making concrete more "watertight." Because quicklime must be made into putty before it can be used in concrete, and because lime putty does not lend itself well to easily mixing with dry Portland cement, sand and other aggregate, hydrated lime is today universally used and is recommended.



SIMPLIFIED PRACTICE ACHIEVEMENTS IN THE BUILDING AND CONTRUCTION FIELD

BY

RAY M. HUDSON

ASSISTANT DIRECTOR COMMERCIAL STANDARDS GROUP, BUREAU OF STANDARDS

HE high standards of living enjoyed by the American people are the results of steadily mounting per capita productivity. Further advances in these standards must be brought about by improving methods and processes, through the elimination of waste in materials and motion in our production and distribution system. Just as 20 years ago we undertook nation-wide conservation of our natural resources, so today we must even more vigorously sustain this campaign for a better utilization of our industrial resources and effort. Wastes in commerce and industry fall into a number of classes. While they are of immediate importance to manufacturing concerns, the business community, and construction engineers, the interests of the general public are involved to an important degree.

In 1921, when the "Hoover Committee on the Elimination of Waste in Industry," made a survey of conditions in six of our major industries, it found that the building industry stood in fourth place, with 53 per cent waste. Thirty-four per cent was chargeable to management. One of the major causes was lack of simplification and standardization in materials, methods, machinery, and so on. When it is remembered that five billion dollars are spent annually in construction, some conception may be gained of the extent to which this loss reduces the country's income. Manufacturers and business men are forced to look into their businesses more intensively than ever before for opportunities to cut down costs and yet maintain for themselves a fair profit. They are finding that a prolific source of waste is using too much variety. A surprising proportion of this variety is made up of slight dimensional differences, of models and types which are not markedly dissimilar, but which were originated in an effort to be "just a little different."

The Department of Commerce, through the Division of Simplified Practice, is assisting the building and construction industry to check this waste, through the reduction of unnecessary variety in sizes and dimensions and other immaterial differences in everyday commodities. This coöperation on the part of the government involves nothing regulatory nor inquisitorial. The service is to help such industrial groups as are interested in reducing waste to get the facts as to waste and to put their corrective actions into practice. Safeguards have been set up to protect the fullest development of individual initiative and inventon, as well as to care for the changing trends of business. This is done by providing that the simplified practice recommendations, developed under the auspices of the Division of Simplified Practice, shall be subject to review at the end of such a period as may be fixed by the industry. The re-survey is conducted by a standing committee representative of all factors in the industry, or through another general conference of producers, distributors and organized users. Acceptance by manufacturers, distributors and organized users, representing 80 per cent of the total volume of the industry, is necessary before a program can be published as part of the Elimination of Waste series of the Department of Commerce.

These percentages of reduction in variety have been startling, especially in the application of simplified practice in the building and construction field:

	Simplified	Reduc	ctions	Per-
Pra	actice Report Items	From-	To-	centage
1	Vitrified Paving Brick	66	5	92
3	Metal Lath	125	24	81
7	Rough and Smooth Face Brick	75	2	97
	Common Brick	44	1	98
8	Range Boilers	130	13	90
12 13	Hollow Building Tile Structural Slates for Plumbing	36	20	44
	and Sanitary Purposes	827	138	83
14	Roofing Slates (descriptive terms,			
	thickness and sizes)	98	48	51
16	Lumber — Standard Nomenclature Grades and Sizes for Softwood Lumber			
18	Builders' Hardware (items)	60.19	5130	26
10	finishes)	100	20	71
21	Brass Lavatory and Sink Trans	1114	76	03
25	Hot Water Storage Tanks	120	14	88
26	Steel Reinforcing Bars: Cross-	120		00
	sectional Areas	32	11	66
20	Sheet Steel	1810	261	85
20	Faves Trough and Conductor Pine	21	16	24
32	Concrete Building Units (length	-21	10	44
54	width and height of blocks, tile,	1		
	and brick)	115	14	88
38	Sand Lime Brick (length; width;			
	height)	14	3	79
13	Paint and Varnish Brushes	480	143	70

Certainly a major contribution to the stability and prosperity of American business is reflected in the savings which industry has gained from simplification. Industrial leaders estimate that these amount in value to more than \$500,000,000 a year.

Elimination of 60 per cent of variety in sizes of softwood yard lumber is estimated to have reduced extent of inventories formerly carried by four billion board-feet, thus releasing some \$200,000,000 of relatively idle capital. Strict adherence to this lumber simplification assures the home builders of the country the production and distribution of standard dimension lumber supported by the united interests of the industry. During the past year, the lumber simplification program was given even greater impetus through the development of grade marking for cut lumber, on the part of many companies.

FIRE RESISTANCE OF BUILDING MATERIALS AND CONSTRUCTION

S. H. INGBERG

SENIOR ENGINEER, BUREAU OF STANDARDS, WASHINGTON

THE fire-resistance activities of the Bureau of Standards have been concerned mainly with research into the fire-resistive properties of materials and members entering into the construction of buildings, the fire hazard of materials constituting the contents of buildings, the severity of fires that can occur with given amounts of combustible building contents, and the protection afforded by devices such as insulated record containers.

Fire-resistance, if in the form of materials incorporated into the building itself, has the advantage of being independent of the human element, upon which fire-prevention of many other kinds must depend. It loses little in effectiveness with age, remaining practically unchanged as long as the structure serves the purpose for which it was built. While general fire-prevention efforts and firedetective and fire-prevention devices are of value, the building itself must remain as the chief factor in taking care of the margin of danger due to carelessness, ignorance and crime that cannot otherwise be further reduced. Consistent and continuing reduction in life and property loss from fire can be safely premised only on achieving greater fire-resistance of exterior and interior building members, details and finishes, a large gain in which is possible with proper application and combinations of materials now used.

The standard fire test consists in subjecting the material, construction or device to a furnace fire, the intensity of which is regulated so that given average temperatures obtain in the furnace chamber at stated times after the fire is started. By means of this control approximately the same fire exposure can be obtained at different times and in different laboratories. The other requirements will vary with the type of construction or device being tested. Thus, columns are required to support a load approximating what they would carry in a building; floor constructions and bearing walls are similarly required to support loads and also to afford resistance to flame and temperature penetration to an extent that will prevent ignition of materials in contact with the unexposed sides of the walls; incombustible finishes must serve similarly in preventing ignition of the material or construction protected; and insulated containers must preserve their contents. The fire-resistance of the material, construction or device tested is measured by the number of hours and minutes during which these requirements are met in the fire test. Ability to withstand erosion from hose streams, as applied in extinguishing fire, is also required for walls, floors and partitions.

Fire Tests of Building Columns. The initial series of tests undertaken on the basis outlined was



Deck of Prepared Roofing Shingles after Firebrand Tests with Air Currents at Ordinary Temperatures



The Unexposed Side of a Theater Proscenium Curtain Shortly after the Other Side was Exposed to Fire



Typical Failure of Unprotected Steel Column after 11 to 21 Minutes of Fire Exposure

of columns, one series, comprising over 100 tests, being conducted in coöperation with the Associated Factory Mutual and the Underwriters' Laboratories. Typical rolled steel, cast iron, concrete and timber columns were tested unprotected, partly protected and also completely encased in concrete, hollow tile, gypsum block, brick and plaster on metal lath, applied in different thicknesses. The effect of the protection in increasing the fire-resistance of the columns is evident from the fact that unprotected steel columns failed under load in the tests after from 11 to 21 minutes of fire exposure; columns partly protected by filling the interior or reëntrant portions with concrete but with the flanges exposed to fire withstood the test for periods of between 48 minutes and 1 hour, 24 minutes; and columns encased in concrete 2 inches in thickness outside of the metal developed fire-resistance of periods ranging from 1 hour, 47 minutes, to nearly 8 hours. A wide range in effectiveness was found with materials of a given class and applied in the same thickness due to differences in the amount of cracking and similar fire effects sustained. This is evidenced by the range in effectiveness found for 2-inch concrete protection already cited. Similar differences were found for burnt clay products applied as column protection. The results of these tests have been published by the Underwriters' Laboratories, Chicago, as a joint report entitled "Fire Tests of Building Columns," and also by the Bureau of Standards as "Technologic Paper No. 184." The tests deal with a building detail of the greatest importance from the standpoint of maintaining the structural integrity of the building during a fire, and the results are of interest to all concerned with the design or construction.

Fire Tests of Concrete Columns. The other series of column tests was conducted at the former Pittsburgh laboratory of the Bureau of Standards and comprised fire tests of about 60 typical reinforced concrete columns with strength tests of companion columns at room temperatures. Here also a wide range in fire resistance of columns, similar in all respects except for the sand, stone or pebbles used in making the concrete, was noted. Thus columns 18 inches in outside diameter with $1\frac{1}{2}$ inches of concrete over the reinforcing steel failed under working load after from 3 to 4 hours of fire exposure when the concrete was made with siliceous (quartz, chert, granite) sand and pebbles, while with concrete made with broken limestone, trap rock, blast furnace slag or calcareous pebbles, the columns withstood the 4-hour fire test under working load and at its end under loads from $2\frac{1}{2}$ to $3\frac{1}{2}$ times that applied during the test. The difference in performance was determined as due to the mineral composition of the aggregates used, quartz, chert and granite inducing early spalling of the concrete when exposed to fire, while concrete made with limestone, calcareous gravel, trap rock and slag showed few effects of this kind even from very severe fires. It was further shown that a large improvement with the former type of con-

crete can be effected by placing metal mesh in the outer portion of the column to prevent large cracks and dislodgment of cracked portions. Covering or replacing the outer concrete with plaster was also found effective in increasing the fire resistance of the column. The results of these tests have been published by the Bureau of Standards in "Technologic Paper No. 272," entitled "Fire Resistance of Concrete Columns."

Brick Walls. While fire walls of brick have been long recognized as increasing the fire safety of individual buildings as well as decreasing the community hazard from spreading fires, no quantitative measurement of the protection afforded had been made until fire tests of walls, comparable in size to that of a wall panel in a building, were made by the Bureau of Standards. As subjected to the standard fire test, fire resistance periods from about 1 hour for the 4-inch partition to 9 hours or more for solid walls 12 inches thick were developed. Several types of hollow brick walls made by setting a portion or all of the bricks in the wall on edge were also tested, and while the resistances developed were not as high as for solid walls, they indicated adequacy for a considerable range of fire conditions, provided proper wall thicknesses are used. Articles giving summaries of results have been published in several outside journals, and pending publication by the Bureau of Standards, "Letter Circular No. 228," giving results for clay and shale bricks and "No. 229" for concrete and sand lime bricks have been prepared and are available on request.

Hollow Tile Walls. These hollow units of burnt clay vary in size from a unit filling the same space in the wall as two bricks to that of a 12-inch cube. The effects of the fire and the temperature transmission through the wall differ considerably from what obtains for the relatively smaller and solid brick units. The rapid increase in the use of hollow tile as a wall material prompted inquiry as to its fire-resistive properties, and the Bureau was requested to undertake tests of typical wall constructions. The first series consisted of fire exposure tests under load of piers built of tile of typical designs made from representative clays. A wide difference in fire effects was noted, ascribable mainly to differences in the mineral composition of the clay and to a less extent to the design of the unit. A further series of tests of small walls was undertaken to ascertain the effect of certain changes in raw material, manufacturing details and design. In this as in other portions of the work, coöperation with the industry was had through the Hollow Building Tile Association. The final series consisted of about 170 fire tests and fire and water tests of typical hollow tile wall constructions, 8 to 16 inches in thickness, tested (1) bare, (2) plastered or stuccoed, (3) furred and plastered, or (4) faced with brick. Depending on the shape of the unit and the clay from which it was made, fire resistance of from 11/2 to 3 hours obtained for unplastered 8-inch walls,



Steel Columns Protected by 2 Inches of Concrete Withstood Fire Test for Periods up to Almost 8 Hours from 3 to 6 hours for 12-inch walls, and from 4 to 12 hours for 16-inch walls. Tile with the greatest number of cells or webs through the wall thickness was found to give the highest fireresistance. Plaster was found to add 1 hour or more to these periods and also to decrease the fire damage. Plaster applied on split furring gave protection to the load-bearing portion of the wall to such an extent that very little damage resulted from fires of from 4 to 6 hours' duration.

The final report, giving results of all tests made, has been submitted for publication as a Bureau of Standards "Technologic Paper." It is believed that the fire-resistance of this relatively new type of wall construction has been ascertained and defined in all essential respects by these tests.

Theater Proscenium Curtains. Many disastrous fires in theaters have shown the need for a dependable movable partition or curtain for closing the opening between the stage and the auditorium in case a fire originates on the stage. The devices used vary from single-ply asbestos cloth curtains to ponderous steel-framed constructions faced with metal sheets and asbestos boards and weighing, for an ordinary opening, ten tons or more. A number of operation and fire tests were made of the different types in the Bureau's large wall furnace. The heavy constructions, properly installed, were found to be satisfactory from the operation standpoint and to keep back smoke and glow from an intense fire on the stage side for periods of $\frac{1}{2}$ hour. The single asbestos cloth curtains hung between a top and a bottom pipe batten were found to be unreliable in

securing closure of the opening, since drafts such as might be caused by a fire or by ventilating fans caused them to bulge and fail to come down, being held by the friction with the proscenium wall. An improved type of asbestos cloth curtain, consisting of wire-reinforced cloth applied on each side of a pipe or structural steel framework, was also tested. This can be hung so that it will be reliable in operation, and in the fire test it was found to prevent smoke and glow from showing on the auditorium side for 15 minutes. This affords time for exit from the auditorium, with a considerable margin of safety. Pending publication of the results, "Letter Circular No. 137" has been prepared and can be obtained on request. It gives a summary of results, recommended specifications for proscenium curtains, and suggestions for improving existing installations.

Fire Tests of Roofing Materials. In efforts to decrease the community fire hazard, most municipalities impose restrictions on the kind of roofing materials permitted within city limits or in certain portions thereof. The scope of such restrictive measures has occasioned much dispute, and at the request of organizations representing producers and users of roofing materials, a comprehensive series of tests of the fire-resistance of all prepared roofing materials in ordinary use was undertaken and was completed during the present year. This has included tests of new and weathered wood shingles, and asphalt prepared roll roofing and shingles, slate, asbestos, metal and tile roofings. Tests have also been made of painted and chemically treated wood shingles, both new and after exposure to the weather



Interior of Small House Simulating Office Occupancy, before Fire Test

for periods of up to 12 years. Specimens of weathered wood shingle roofs covered with asphalt prepared roll roofing and shingles or with paint coatings have also been tested. For the combustible roofings, the fire-resistance of the weathered roofings was generally considerably below that of the newly applied materials, although some forms of asphalt roofings showed little decrease in fire-resistance after weather exposures of up to 12 years. Results of the tests also emphasize the general superiority from the fire-resistance standpoint of incombustible roofing materials, such as slate, cementasbestos, clay and concrete tile, and metal. The results of the tests are being prepared for publication in the Bureau of Standards technologic series. Copies of a preliminary report, giving the results of tests with new roofings, have been supplied to the officials of a number of cities who requested them in connection with the adoption of roofing ordinances.

Strength of Materials at High Temperatures. In connection with fire tests of building construction, it is often important to know the strength and elastic properties of the constituent materials at the pertaining temperatures. An equipment with which good temperature uniformity and control are obtainable has been in use during the past three years. Tests with structural steel and cast iron have been completed. A paper ("Compressive Strength and Deformation of Structural Steel and Cast Iron Shapes at Temperatures up to 950°C," Proceedings of American Society for Testing Materials, Vol. 26, Part II, pp. 33-51, 1926) giving results with structural shapes has been published. To this there was added a series of tests for obtaining information on effect of length, which has also been completed.

Severity of Building Fires. In order that protection requirements, such as those for structural members, wall openings and record containers, be placed on a definite basis, it is necessary to be able to make reliable estimates of the severity of fires that can arise with typical constructions and occupancies involving given amounts of combustible materials per unit of floor area. This severity would have to be interpreted as equivalent to so many hours of the standard fire test, the fire-resistance of the protections, constructions and devices to be used being measured by this standard.

Since the data obtained from actual fires are inconclusive as it concerns temperatures developed and the length of time they prevailed, some burningout tests have been conducted in one-story, fireresistive buildings erected for the purpose, one being 15 by 29 feet and another 30 by 60 feet in plan. These buildings were fitted with old furniture and records to represent light, commercial and record storage occupancies, the weight of the combustible contents ranging from 13 to 55 pounds per square foot. Further extension of this work to other typical occupancies is contemplated in order that the effect of any difference due to the character of the combustible materials involved may be had. The results so far obtained indicate the possibility of establishing by this means a basis for applying materials, constructions and devices as resistance against fire with as great a degree of safety and economy as they are being applied for other structural purposes.



View During a Fire Intensity Duration Test of Small House Shown Opposite

ADVERTISING ARCHITECTURAL SERVICE

BY M. NIRDLINGER

THE architectural members of the Architects' Council of the Chamber of Commerce of Pittsburgh recognized the necessity of acquainting the building public with the advantages derived from an architect's services. The question confronting us was how these messages could best be presented.

After many weeks of discussion, it was decided to first determine the extent to which the local architects would financially support an advertising campaign. To ascertain this it was necessary to make a general canvass among the architects. This was accomplished, and results showed a generous response which assured us of the success of the undertaking. After careful consideration of several mediums, the committee decided on newspaper advertising. We entered into a contract with a local morning paper for display advertising on Thursday of each week.

Notwithstanding the limited space possible in the first year's campaign, we succeeded in interesting the public, and received many favorable comments which proved the wisdom of our activity. We traced many direct and indirect advantages to the profession from this concerted action. Architects discontinued some of their private advertising that was without merit, and the saving was far greater than their share of our mass advertising. Due to our activity, we are receiving most friendly coöperation from the daily press. We are brought into closer contact with one another, this being most helpful in creating good fellowship. We are now recognized as business men instead of dreamers, especially by the business men of our city. This in itself removes a long recognized barrier that has stood between the practical business man and the professional man. We are showing our fellow citizen the folly of trying to secure good architecture without an architect. We are also convincing him that he cannot obtain reproduction of gems he has found in the larger cities unless he permits us the same liberty and freedom that were given the architect in the larger city. We are convincing our fellow citizen also that the service of a local architect is his best investment. It is not our intention to try to reach the men or corporations associated with important structures, since they are as a rule our clients already; but it is the small man and the small estate, corporation, etc., preparing to build.



Two of the Advertisements used by the Pittsburgh Architects (Size as published in newspapers, approximately 4 by 6 inches)

AN OPPORTUNITY FOR ARCHITECTS THE REVISION OF THE NEW YORK TENEMENT HOUSE LAW

BY

ARTHUR C. HOLDEN, ARCHITECT

I T has been said that opportunity does not go around wearing a label. Some even contend there is no such thing as opportunity at all, but that opportunity is a way of looking at things. The man of genius will see an opportunity in an apparently usual situation, whereas the ordinary man would pass it by. There are many men in the architectural profession who have genius, though some of them are handicapped by preconceived notions of what an architect should do and how an architect should act. A kind of self-consciousness is a handicap to genius.

There is an opportunity now which lies open to the architectural profession. The Tenement House Law of New York is up for revision. Happily, under the American constitutional system, when one state takes a step in advance, it is possible for other states to go further. Two winters ago the legislature created a Temporary Commission to Examine and Revise the Tenement House Law. Last January the Commission brought in its first report. The architects announced that since they had not had time to study the proposed law, they could not take a position either favoring or opposing it. Several months of controversy followed, and the legislature adjourned without taking action other than to enlarge the Commission and to continue it for another year. A new report will be brought in to the next legislature. Last summer was spent in further investigation by sub-committees and in conferences with civic, social and technical bodies.

The present Tenement House Law has been amended 150 times since its passage in 1901. It is due for a thoroughgoing revision. Its original passage was made necessary by the shocking revelations of the comprehensive report of the Tenement House Commission of 1900. It was the social service organizations, not the architects, who sponsored the legislation. The law was designed to restrain unscrupulous promoters from putting up buildings which were unsafe from the point of view of egress in case of fire and unhealthy because of the lack of proper light and ventilation or because of insufficient provision of sanitary equipment. The immediate purpose of the law was to protect the poorest class of people and to prevent their exploitation by overcrowding in inadequate and unsanitary quarters. The Tenement House Law is, in consequence, a law replete with "prohibitions and minimum requirements."

Since the time of the law's passage New York has doubled in population and assessed realty values have increased amazingly,—from \$3,357,224,369 in 1900 to \$14,738,806,010 in 1928,—exclusive of the Borough of Richmond. The value of the dollar has been cut in half, and methods of building have been

revolutionized. We have just begun to look upon housing as an industry requiring very nice balancing of the art of design, the science of construction, and the economics of housing finance. At the time the present Commission was called into being, economic pressure was working havoc with the enforcement of the law. In all classes of dwellings methods for evading the law had become so well defined that they were reflected in property values. The old definition of a tenement house as a "building occupied by three or more families, living independently of each other and doing their own cooking," exempted from the requirements of the law any building in which theoretically not more than two families did their own cooking, no matter how many families lived in the building. On expensive land it was possible to run a towering skyscraper with practically no courts to provide light and air, if only it were called an "apartment hotel" and if the suites were provided with "pantries" instead of "kitchens." Where there existed old fashioned residences in which it was no longer economical for a single family to live, they could be converted into "studio apartments" with inadequate safeguards against fire, provided that no more than two bona fide kitchens were put in the same house. Where the price of land appeared cheap, it was possible to build frame houses within 3 feet of each other and to move large sections of the population into jerry-built districts unequipped with sewers.

In all of the great mass of home building in the United States during the past ten years,-taking it from top to bottom, good, bad and indifferent,what sort of a role has the architect played? How great has been his influence upon housing construction? Has the architect been a follower or a leader? Of course there are different kinds of architects. A great deal of work is done by a class of men who might be dubbed "archytecks." They make drawings largely for the purpose of "filing" with the various building departments. Their plans show certain essential details, such as the thicknesses of foundation walls, the locations of the houses with respect to building and lot lines, and the plumbing sections. These men also perform the valuable service of getting plans "passed through the department," a labor which requires a great deal of waiting in outer offices, and which the average builder is quite willing to have someone else perform for him. The so-called "high brow" architects are very slightly interested in this class of work. They generally look down upon men whom they call "commercial architects," whose business is drawing out to 1/4-inch scale the apartment plans that have been worked out by the real



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Typical two-family, semi-detached houses, with courts between, which are not under the jurisdiction of the Tenement House Law. They represent good construction except for the poor lighting in the narrow side courts, which are garage driveways

estate men, and then designing elevations to fit. The latter work under great pressure, and their worry in life is very similar to that which plagues the high brow architect and the "archyteck,"—namely, "where the next commission is to come from."

What architects lack is point of view. I have always felt that conventions of the Institute should be held in a giant Zeppelin, and that not only the high brows but all architects should attend. During the reading of the report of the Board of Directors, the airship should be taken on a tour of the United States to let the architects see at first hand the conditions in architecture throughout the nation. Looking down from above, they would see tremendous building activity here and there. Below them there would also lie all the buildings erected in the country since the coming of the Mayflower,-such at least as have survived the ravages of fire, the elements, and the eternal process of rebuilding. I'm sure that the consensus of opinion of such a convention would be that the vast majority of the buildings designed to house the human family were unworthy.

I do not believe that it would be necessary to hold very many aërial conventions before the idea would become firmly planted in the minds of the delegates that there is absolutely no reason in the world why architects should not influence all of the building in the country instead of a very small part of it. There would be a ringing battlecry set up that architects must assume the leadership, that architects must "show how it could be done." From the vantage point of aërial perspective, one can see over mountains and barriers. One learns that some of those things that have appeared to set definite limits to architectural accomplishment can be circumvented. A look at the whole problem in perspective gives the architect a better conception of his task. He learns what it is that has been hampering him. For example, when the architect sees that there is preparation for the revision of any code which regulates building, he recognizes the opportunity to free himself



Rapid depreciation, carrying costs, and economic pressure have forced the subdivision of these frame buildings into apartment suites which are not supposed to contain kitchens. These are typical of conversions made in spite of the Tenement House Law

from outworn prohibitions and to protect himself against sub-standard competition.

The over-intensive use of land is one of the evils that, unchecked, threatens to lower the standard of public health and decency. Proper sanitary protection and adequate provision for escape in case of fire are no less essential. The architect is constantly told that he must build economically; that he must not sentimentalize, and that he must keep his design close to the minimum standards of light and air, sanitation and safety allowed by law. The reason given is familiar enough to him. "One cannot afford to do better, because construction costs are so high." But construction costs, as the architect has learned, are not the only costs in producing a building. He has to reckon with the cost of land, which includes the cost of expensive improvements. He has to reckon also with the cost of financing and promotion, which, including sales costs, ranges from 25 cents to over 40 cents on the dollar of cost of the finished housing product. From the vantage point of aërial perspective, the architect would see that by accepting the cost of land and the cost of financing as factors which he is unable to control, he has been compelled with every increase of these costs to either reduce the amount of money available for construction or to crowd his building upon less land than is desirable. Confronted with this dilemma, the architect, assisted by his brother the engineer, has created the skyscraper. By reaching into the upper air above its neighbors, the skyscraper has increased the usable area of the ground on which it stands from 6 to 12 fold, and then to even 20, 30 and 40 fold. The genius of the American architect has been acclaimed around the world. The skyscraper movement, beginning with commercial types, inevitably spread to residential buildings. There is an essential difference, however, in the application. The commercial skyscraper, situated at the mart or business center, maintains its desirability and rentability to a much greater degree than does the residential



Illustration of a typical non-fireproof tenement. On such low value lands it is uneconomical and wasteful to build so intensively. Original rents can be obtained only because of borrowed light and air. The buildings are bound to depreciate when the neighborhood becomes built up



High class apartments built in exclusive residential section originally developed with frame houses on 60-foot lots. The economic unit for the new development is two lots or 120 feet, yet owners insist upon the right to build just as intensively on a 60-foot lot

skyscraper after the neighborhood around it has become built up with similar structures so as to shut off light and air. Business operations can be conducted by artificial light, but so far no one has come forward to urge that homes in which children are brought up are desirable without direct sunlight.

Today in our experience with the 6-story, barrackslike apartments, and, even with the larger 9- and 15story fireproof buildings, we are experiencing the same tendency to depreciation after the light is shut off as was experienced with the original 6-story, dumb-bell flats erected under the law of 1879. Of course the modern building has not sunk to the low standards of sanitation and health that brought the older buildings into discredit, but the depreciation takes place none the less, and the community pays.

From the architectural observation balloon, skyscrapers,-and in particular residential skyscrapers, -are self-evidently desirable when they are placed alternately with low buildings separating them. It would of course be impossible and inequitable at law to restrict skyscrapers by law to alternate plots of ground. Therefore, the first report of the Commission offered to the legislature in January, 1928, recommended the creation of lot line courts at least 10 feet wide to begin at a point not higher above the street than the width of the street plus 5 feet. This recommendation was the greatest step in advance ever offered for the protection of high value properties against blanketing by abutting lot-line walls. Its provisions were equivalent to a proviso that no skyscraper walls could be carried up nearer to one another than 20 feet, and that in the intervening space no building could be built to a height exceeding the width of the street by more than 5 feet or to a greater depth than 60 feet from the building line. There was a great deal of complaint about this provision on the ground that it worked hardship upon owners of high value property. Such complaint was based on misconception. The Tenement House Law of 1901 limited all walls including lot-line walls to one and one-half times the width of the street. The original recommendations of the Commission permitted greater heights, but required the building to set back away from the property lines so as to protect adjacent property.

Architects are perfectly familiar with the conditions which the skyscraper creates. They know exactly what should be done to make the skyscraper more desirable and to protect it from abuse. Architects are equipped more than any other group to speak for the public good and to say what should and what should not be done. Here is their opportunity to say what good standards should be. If the architects fail in this, and if the advice which they give now is shortsighted, let no architect complain in the future that he can't do better work, that he has to meet the low standards of commercialism. Rapid obsolescence and depreciation are the direct result of low standards, and the architect has had sufficient experience with these to know that the penalty which they exact is high rates of finance, over-rapid amortization, high discounts and more cash in financing and for land, and less cash for construction proper. The architect should be the champion of the people in this. He will find them willing followers, once they realize that to follow him means ultimately securing a more stable building industry and more building for the same rent. Landlords are trained in the rule of thumb, they are not analysts; most of them do not realize what the disorganized state of the housing industry means to them. By following the architects instead of the land peddlers, they can assure themselves more stability of income, for the buildings which they get for the same money will be of higher standards, not subject to such rapid obsolescence and depreciation as at present, and therefore a better and safer investment.

The illustrations given here show some of the common types of houses that have been erected since the war. In the recodification of the law the end sought should be reasonable. In certain fields the abuses



A typical row of recently built frame dwellings. They represent an uneconomic type of construction where full assessment for street opening, paving and sewer will make necessary the ultimate replacement of such housing by a more intensive development

have been greater than in others; the purpose should always be stabilization of income and desirability from the tenants' point of view.

In trying to be reasonable, it is necessary to take variations in land values into consideration. Some city land is of such high value that it demands a skyscraper type of development with all apartments reached by modern, high speed elevators. Mediumpriced land, on the other hand, is susceptible to development with lower buildings of the walk-up, nonfireproof type. Cheap land should involve some approximation of rural or suburban conditions. From the point of view of theory, lower-value land does make it possible to design with wider courts and better conditions of light and air; but from the point of view of law, a really desirable standard of court sizes cannot be set, because such standards might be unreasonably restrictive to higher-value property. As a result, where good standards might easily be possible, competition operates to bring all standards down to the level of the most unscrupulous. The first report of the Commission sought to get around this difficulty by setting two standards for court sizes and for bulk of building,-one for high-value and one for low-value lots. Apparently it was a tactical mistake, for this one feature of the report brought opposition from those who claimed to speak for the owners of land. Schooled to think that a permanent "Bull" market for real estate is an economic necessity, they viewed with alarm any restriction at all upon land which would limit its potential development to something less than the limits already attained by other land.

Such a view actually retards improvement, for it begins by discounting possible improvements. The assumption that the land itself will continually increase in value amounts to saying that whatever improvements are made to the land, these improvements must grow rapidly less in value, and that the land will ultimately increase sufficiently in value to offset this rapid depreciation. This is a dangerous philos-



A 3-foot court between frame buildings. An entirely uneconomic system of planning, as the narrowness of the court destroys all usefulness except for the ventilation of bathrooms or stairs. There are types identical with this being built today

ophy. It ignores the consideration that the basic value of land is derived from the stable income that comes from the land. Any law which in this scientific day and age allows the uneconomical, and unreasonable over-development of land, puts a premium on plunder. The critics of the Commission's proposal to grade the restrictions imposed upon land according to the value of the land, brought in no proposal for a more equitable method. Perhaps, since it is the fools and the "suckers" who continually pay the price of over-rapid depreciation in the form of needlessly high rents, it is outside the province of the law to protect them !

The Commission was also criticized for recommending that all classes of residential buildings should be included under the Dwellings Law. A great deal of misleading information was circulated in order to stir up opposition. Individual owners were told that their homes would be made the subject of tenement inspection in regard to sanitation and cleanliness. It raised incredible alarm. What was really intended was to make it impossible to evade the law on the mere pretense that the building was of a type which did not come within the province of the law. Only by a law which recognizes all types is it possible to encourage the better types, and to put under curb the less desirable types only in cases where abuses have arisen. Whenever a law is drafted in terms that are comprehensive, it is bound to arouse opposition. Such a law cannot be passed (nor could it be enforced, if it were passed) unless it is thoroughly understood. Above all others, the architects are they who should lead in the education of the public. If the architects stand for better types in housing, they will find their leadership irresistible, and the public will give them unqualified support.

SANITARY DESIGN IN MODERN BUILDINGS - COLD WATER SUPPLY

BY

HAROLD L. ALT

HE assurance of a continued water supply at proper pressure is the most important consideration in designing sanitary equipment. While there are many comparatively small installations depending entirely on direct city pressure, the larger buildings almost invariably utilize house tanks. This is because the water reserved in the house tank is usually sufficient to carry over any temporary cut-off of the street supply, and because the use of the tank also insures a constant water pressure on the plumbing fixtures without fluctuation, such as often occurs in the city mains. It will therefore be assumed in this article that a house tank is contemplated. When the tank is made a combined house and fire tank, the capacity is often about 5,000 gallons, which allows a fire reserve of 3,000 gallons and another 2,000 gallons on top of this for building service. These two quantities are prevented from interfering with each other by taking the fire connection off of the bottom of the tank (or from the side near the bottom), and the building supply off the side of the tank three-fifths of the distance up from the bottom of the tank to the water line, as shown in Fig. 1. A 5,000 gallon tank must contain about 700 cubic feet of water, and the sides must carry up about 12 inches above the water line. Thus the dimensions of a 5,000 gallon tank could be 10 feet long by 10 feet wide by 8 feet high. The building supply opening would be on the side three-fifths of 7 feet or 4 feet, 2 inches above the bottom. With the tank full, there is available for fire use the entire contents, but with the tank drained down to the level of the building outlet,-below which it cannot go unless leaving through the fire outlet at the bottom,-there are still 3,000 gallons left for fire service. The piping in such an installation is frequently arranged as shown in Fig. 2. Of course if the fire tank is kept separate from the house tank, the building service would be taken from the bottom of the tank. In some cases the demands of the authorities for water storage are much greater. For instance, in a theater they may insist on 5,000 gallons reserve for sprinklers, 5,000 gallons more for fire standpipes, with whatever amount is desired for house service added to this (usually 2,000 to 3,000 gallons more.) This makes the combined tank capacity between 12,000 and 13,000 gallons.

House tanks must rest on substantial supporting walls or columns, since the weight of such tanks when filled is about 5 tons for each 1,000 gallons. House tanks are usually constructed of steel and are square or rectangular in shape. A middle partition is desirable with duplicate valved pipe connections to each side so that one-half of the tank may be cleaned, painted or repaired without dis-

turbing the water in the other half. A curb angle about 3 x 3 x 3% inch is run around the top to stiffen the edges, and vertical angles about $2 \ge 2 \ge \frac{1}{4}$ inch or $2\frac{1}{2} \ge 2\frac{1}{2} \ge \frac{1}{4}$ inch are used to prevent the sides from bulging. The middle partition ties the two sides together and must be stiffened against pressure in either direction. Under the tank 12-inch to 18inch I-beams are placed on edge to permit access for painting and repairs. These beams often rest in a drip pan of steel about 1/8 inch thick, the pan projecting 6 inches outside of the tank all around and turned about 3 inches around the edge. A 2inch drain is run from the drip pan and connected to the tank overflow pipe so that any condensation occurring on the sides of the tank will run down into the drip pan. The pan is supported in turn on a second set of I-beams which are arranged to come directly under the upper tier of beams. A typical steel house tank is illustrated in Fig. 3.

In order to fill the house tank three different sets of conditions must be considered: (a) whether the normal street pressure is sufficient to fill the tank at all times without the use of a pump; (b) whether the city pressure is sufficient to fill the house tank only part of the time, and at other times is inadequate to raise the water into the tank; (c) whether the city pressure seldom, if ever, is sufficient to raise water into the house tank. In the first case, all that is required is a float valve on the tank to shut off the water whenever the tank is full and to open up the supply line whenever the water level in the tank begins to drop. In the second instance, a pump must be used to keep the tank filled during times of low street pressure. This pump should be of centrifugal type so as to allow the water to flow through it up to the tank whenever the street pressure is sufficient; there must be a float control in the tank which will start and stop the motor on the pump whenever the water line fluctuates, and there must be a ball cock on the discharge into the tank so that the street pressure will not overflow the tank continuously whenever it is high enough to force water into the tank. In the third case, any type of pump with float control from the tank will fulfill the needs.

For buildings over 150 feet in height it is advisable to use a system of water supply with two pressures, so that the water pressure in the lower part will not greatly exceed 50 pounds per square inch. A house tank may be installed somewhat above the middle story to supply the lower portion, and a second tank on the roof to supply the upper stories. These tanks may be filled: (a) by using two house pumps, one for each tank; (b) by using one house pump and pumping all the water to the upper tank with a pipe from the upper tank to the lower con-

Fig. 2. House Tank,





Fig. 1. House Tank, Showing Supply, Overflow and Fire Connections

trolled by a float valve in the lower tank; (c) by using one house pump to deliver all the water into the lower tank and a booster pump to raise the water for the upper tank from the lower tank level. These three methods will be clearly understood by referring to Figs. 4, 5 and 6. The first method has the objection of requiring four pumps,-two to do the work and two to serve as emergency pumps in case of breakdowns. Owing to the difference in heads on the pumps, it is hardly practical to attempt to use only one pump as a standby. This method does have the advantage of economy in operation, as the water pumped to each level is only the water actually required at that level. In the second method only two pumps are required,-one being a standby,-but all the water required on the lower level must be pumped to the higher level first, and this means a much greater power consumption than in the first scheme. As a substitute for this, the lower tank may be omitted and a pressure-reducing valve placed in the line so as to cut the pressure down to the same pressure as would be obtained with the use of the lower tank. This is illustrated in Fig. 7. The



Fig. 3. Typical House Tank Construction

Employed

Showing Connections Frequently

third method also involves use of four pumps, and has the disadvantage of having the pumps far apart. It is seldom used, possibly on account of this drawback.

The Downfeed Cold Water System. With a house tank in the building, this is the most economical method of water distribution. An overhead main is run on or above the ceiling of the top floor, usually in the furred space under the roof, and all cold water lines branch off this main and drop down the side walls or in any other position where they may be required. Branches from this main may be made from a tee turned in any direction, but the most desirable method is shown in Fig. 8. When the construction of the building is such that it does not permit the running of an overhead main, an upfeed system must be employed with the large supply pipe in the basement, and this is the usual method employed in buildings on direct pressure when the water connection from the street enters the basement. Where two pressure systems are in use, an overhead, downfeed system may be used for the upper portion and an upfeed system for the lower portion. This will eliminate horizontal piping and mains in the middle story of the building.

Pipe Sizing. The determining of the necessary cold water pipe sizes for a large installation is a matter of judgment, experience and calculation. Unless some mathematical basis is used, one error may lead to another and seriously affect the whole work. One way to check the diameter of the cold water supply pipe, either main or branch, at any particular point, is to determine the number of fixtures to be supplied and then to take each fixture or group of fixtures and determine what the average load on the line would be. In order to do this, certain factors must be assumed for each fixture according to the size. Thus, fixtures may be divided roughly in this way:

Factor (a) Those with ½" connections (lavatories and sinks)...
(b) Those with ¾" connection (sinks, slop sinks, baths). 4
(c) Those with ¾" to 1" connection (urinal flush valves). 9
(d) Those with 1" or 1¼" connection (w. c. connections) 24

THE ARCHITECTURAL FORUM



Fig. 4

The sum of all the factors on the line may then be used to determine the pipe size if this sum is first multiplied by a percentage of use based on the percentage of fixtures likely to be turned on at one and the same time.

The various sizes of pipe are also rated in corresponding factors, these being :

Size of Pip	06														Factor
Inches															Allowed
1/2						-									6
3/4															11
,1															17
11/4															30
11/2															40









2		5
21/2		5
3		3
31/2		3
4		ł
5)
6)
8	1000)
10	1600)

To apply this system it is still necessary to size the first few fixtures on the branch by judgment, and then to use the factors for determining the sizes of main branches, risers, or supplies. For example, assume five toilet rooms on a riser, each toilet having







Fig. 8. Method of Connecting Branches of Downfeed System

five flush valve water closets, three flush tank urinals, five lavatories, and one slop sink; what would be the size of the branch to the toilet and what would be the size of the riser?

			Equiv.	Percentag	es Net
Fixture N	umber	Factor	Factor	of Use	Factor
F. v. water closets.	. 5	24	120	40	48
F. t. urinals	. 3	1	3	33	1
Lavatories	. 5	5	25	60	15
Slop sink	. 1	4	4	0	0
					-
Total			152		64

The size of pipe having a higher factor rating than the net factor as computed is 2-inch pipe. It will be noted that the "percentages of use" are based on two water closets out of five being flushed together (or 2/5, which is 40 per cent); one urinal out of three (or 1/3, which is 33 1/3 per cent); three lavatories out of 5 (or 3/5, which is 60 per cent); and that the slop sink is neglected because it is not generally in use when other fixtures are.

Since the branch to the toilet must be 2-inch pipe, the riser size to the top toilet (assuming an upfeed system) must also be 2-inch pipe. But after taking in the second toilet, the riser will begin to have a more equalized load, due to the larger number of fixtures. With a single fixture the size of pipe would have to be based on a "percentage of use" of 100, owing to the fact that when the fixture is turned on it is running at the rate of 100 per cent. But with 1000 fixtures the average use runs only about 33 1/3 per cent because all the fixtures are never turned on at the same instant. As a result of this, the "percentage of use" will constantly recede from 100 and will continuously approach 331/3, and, sometimes, be as low as 25 as the number of fixtures is increased. After two toilets are connected to the riser, a total of 26 fixtures is being considered, and this average "percentage of use" should approach the general average of 331/3 by reducing the "percentage of use" to, say, 40. Then the total sum of equivalent factors (taken at 100 per cent) must be multiplied by 40 to find out the net factor for each toilet and thus multiplied by 2 for two toilets, thus :--

Total equivalent factors,—top toilet.....152 Multiplying by a percentage of 40 per cent equals:

Net factor for each toilet	60
Net factor for two toilets	
Size of pipe for this factor	3 inches
With three toilets the percent	age of use could be
educed to say 38% giving	

152 x 3 x 38% = 173 factor

which requires $3\frac{1}{2}$ -inch pipe, and with four toilets and 35% use the result is

 $152 \ge 5 \ge 33 \frac{1}{3}\%$ or 253 net factor which also requires 4-inch pipe.

Pneumatic Tank Systems. While pneumatic tanks are seldom used for large buildings, they are sometimes installed in smaller structures and have several advantages. They may be buried with only the heads projecting through the foundation walls, or they may be set in the basements and do not introduce heavy loads at the tops of the buildings. They will give better pressures on the top floor than when a house tank is used unless the house tank is set at a considerable distance above the highest story. They have some serious disadvantages. One of these is a fluctuating pressure on the water line; that is to say when the tank is "pumped up" the pressure is high, and when the tank is "down" or close to the point where refilling must commence, the pressure is low. The less the pressure variation is made, the smaller will be the amount of available water or "storage capacity." The pressure in the tank is due to the air compressed above the water. This air generally occupies about one third of the total tank, as illustrated in Fig. 9, so that this portion of a pneumatic tank can never be used for storage of water and is lost as far as water supply is concerned. But the remaining two thirds, which is filled with water, is seldom all available because before all the water is withdrawn from the pneumatic tank the air has expanded to a point where the air pressure has fallen too low. To overcome this some pneumatic tank manufacturers put an initial air pressure of about 20 pounds, as shown in Fig. 9, on the tank before the water is pumped in. The water is pumped in against this initial air pressure, and the entire amount of water may be withdrawn from the tank before the water pressure (due to the air) falls to 20 pounds. The difficulty encountered in this procedure is that with an initial air pressure of 20 pounds, the quantity of water which may be pumped into the tank without producing excessive pressures is also reduced. In ordinary practice it is customary to decide how much pressure fluctuation it will be safe to permit on the system, and to base the pneumatic tank design on this amount. If it is assumed that 1000 gallons available water storage is desired and that a maximum pressure fluctuation of 20 pounds is permissible, the problem gets down to determining what size of tank will have the air pressure drop 20 pounds when 1000 gallons are withdrawn from it. The size of the tank and

the initial pressure can be easily calculated by the engineer of the tank manufacturer, assuming that the 20 pounds variation will occur between 60 pounds maximum and 40 pounds minimum.

Air Cushions. Every good water supply system has provision made to overcome water hammer and noise in the piping. This danger is minimized and in many cases entirely overcome by (a) employing ample pipe sizes to prevent excessive velocities in the pipes; (b) limiting the maximum pressure under which the water system operates; (c) the judicious and adequate providing of air cushions to absorb the shock of the moving water column when the flow is suddenly stopped. The impact caused by the sudden stoppage of a moving column of water is increased by increasing the velocity, by lengthening the run, by increasing the pressure, or by reducing the pipe size. An air cushion placed at the top of the riser (in a downfeed system) allows the column of water in the riser to shoot up (or down) into the air cushion, which acts to take the impact and bring the pressure to normal. Similar cushions at the end of each branch pipe, formed by turning up the end of the branch a distance of from 12 inches to 18 inches, produce similar results in the branches, and small diameter cushions just back of each fixture are frequently used in first class work. Fig. 10 illustrates a typical pipe installation with the air cushions properly placed.

There are those who argue that air cushions are an unjustified expense because they become waterlogged in time and in that condition are no better than if the pipe were "dead ended" in the first place. It is quite true that the water will gradually absorb the air from a cold water air-cushion, making it useless. The air can be replaced by draining the line and then turning the water on again. Water logging does not occur on the hot water line air cushions, as the hot water constantly gives off air and automatically keeps the air cushion properly filled. There has not been offered a better or more practical solution to the water hammer problem than the use of air cushions. Air cushions are usually installed on the branch from the street to protect the meter from damage when the street pressure may be shut off and then turned on again. Another place where a cushion is particularly desirable is on the discharge side of a pressure-reducing valve to prevent noise from opening and closing of the valve.

Valving of Lines. There are three matters to be kept in view when deciding on locations of valves: (a) to locate valves so that various sections of piping may be closed off for repairs or other purposes; (b) to put in as few valves as possible, and to use one valve for as many purposes as possible; (c) to locate all valves in accessible places, so that they may be manipulated without too much difficulty. It is the general practice to place a stop valve on each fixture, particularly when the fixtures are in large groups in first class work. Stop valves are located



Fig. 9. Pressure and Water Conditions in a Pneumatic Tank

under lavatories, in the vertical supplies to bath tubs, and in the flush valves for water closets and urinals. Slop sinks are usually arranged with valves on the supplies somewhere in the slop closet, or the valves may be omitted on this fixture altogether. Sinks may be valved under the fixture or,—as these fixtures are usually set singly,—on the branch to the fixture. A valve is generally employed on the branch from the riser and is located close to the riser. This valve controls the branch to the toilet room and, consequently, all fixtures on that branch. In cases when the fixture branch only has a few fixtures, such as in the bathrooms of apartment houses or

hotels, it is permissible to omit the fixture valves to save on installation costs. Lavatory stop valves have an advantage in making it possible to regulate the flow from the lavatory faucets to prevent splashing.

The riser itself is usually valved where it leaves the main. This permits cutting off any particular riser in which trouble may develop without affecting any other riser. Frequently the main itself is valved at the various principal branches, but this is often omitted and may be considered as desirable but not absolutely necessary. Of course each piece of apparatus must be valved, and pumps should be valved on both suction and discharge sides, as well as having a check valve placed on the discharge between the stop valve and the pump. Water meters are valved on both sides and are sometimes provided with bypasses. The house tank is valved; the cold water to the hot water heater and the water supply to the boiler are both valved and provided with checks. Wherever a check valve is used, it is highly desirable to have a valve on each side so as to permit opening and examining the check at any time. All valves used on water lines should be of the gate type, owing to the almost negligible amount of resistance which they interpose in the line in comparison to globe valves. Customary practice employs all brass gate valves of from 1/2- to 2-inch size, and iron body valves, bronze mounted on sizes 21/2 inches and over; they are usually of the screw type up to 4 or 6 inches, but are flanged in larger sizes.

Material of Cold Water Pipes. Cold water piping in the best work, and where character of the local water supplied permits, may be made of brass pipe, iron pipe size, or of red brass or red metal. Brass pipe usually contains about 65 per cent copper, while red brass or red metal runs to 85 and sometimes to 88 per cent of copper. There are some localities where the use of brass and red brass pipe is not practical, owing to the characteristics of the local water, and this matter should be carefully investigated. If cost is a consideration, galvanized genuine wrought iron pipe is used with excellent results. Added first cost reduction may be effected by substituting the spellerized pipe on sizes 4 inches and smaller. Above 4-inch pipe, either genuine wrought iron or steel may be used, the steel being somewhat less in price. The all-steel piping is the cheapest, where water analysis permits, and it will answer the purpose for many years. Fittings for cold water pipe are nearly always made of galvanized cast malleable iron, beaded pattern, screwed, up to 6 or 8 inches, and then flanged in larger sizes.

Underground Lines. Where water pipe is run underground and the size is 4-inch or over, regular cast iron water pipe is used, and it is not unusual to raise underground lines of lesser sizes to sizes where cast iron water pipe with calked lead and oakum joints can be employed.

Draw-offs and Drains. It is good practice to provide drains at all low points in the piping system and on risers just beyond the riser stop valve. These drains are nearly always 3⁄4-inch size, with valves having hose threads so that a hose can be coupled on and run to floor drains or pails. To aid in this draining out, it is desirable to pitch all cold water lines back toward the riser, and the riser branches back toward the main, and the main back toward the meter, so that any line may be properly drained.



Fig. 10. Typical Air Cushion and Proper Placing of Air Cushions

THE ARCHITECT AS CONSTRUCTOR

PART III—OPERATING A CONSTRUCTION ORGANIZATION

BY

WILFRED W. BEACH

I N preceding articles on this subject, in THE ARCHITECTURAL FORUM for May and August the author discussed the possibility and feasibility of members of the architectural profession attempting to circumvent an apparently increasing tendency of general contractors and constructing engineers to include in their proffered services the functions of the architect. Obviously, the services of an architect are essential to the success of a building, if it be of any consequence. Whether or not the services of the general contractor are likewise, may be considered open to question. If either is to survive to the exclusion of the other, it would seem probable that the individual who creates is most likely to be he who will carry on. But we are facing no such extremity.

The pertinent thing we are presumably facing is the loss of particular commissions to contractors who "furnish plans." If there be owners who prefer this sort of service,-who are convinced that the method is fundamentally sound,-why should it not be the duty of the architect to accommodate them, especially if the architect can convince himself that both client and the architect as builder are to profit considerably thereby? We have therefore shown how it is possible for the architect to acquire new business of this character, and have set forth a contract form to cover an agreement with such a client (THE ARCHITECTURAL FORUM, August, 1928, Part II). The signing of the first of such contracts by the architect should be indicative of his fixed intent to add field construction to the functions of his office. The departure is too comprehensive to be invoked for a single operation, there to deliberately stop. To be sure, he is burning no bridges by the innovation. So long as he guarantees no costs, he is in no way jeopardizing his status as an ethical architect, nor is he necessarily setting himself at loggerheads with the better class of contractors. They may not approve of his entering their fenced preserves, but they will still (most of them) continue to bid on his work when invited, knowing that he will not ask them to waste time figuring on work which is not intended to be let. In other words, one can be both architect and cost-plus builder without encountering insurmountable obstacles.

Having secured the contract, one proceeds to organize the project while working drawings are being completed. One must determine what work is to be sublet and what is to be executed with one's own forces, and must prepare specifications accordingly. It will be found that the duties of the office man in charge of contracts and construction have

increased many fold, and that he must be prepared to meet them, whether he be the architect himself or an employe. It may be found advisable to bring in a construction manager from outside if no one in the organization has special fitness for the tasks confronting the office. On the other hand, an architect with inclinations in that direction can readily augment his knowledge of the subject by reference to any one of several up-to-date books on construction methods and management. As work increases, one will add departments of purchasing, expediting, accounting etc., always holding down the overhead to its efficient minimum.

The trades most generally handled through foremen are concrete work, masonry, carpentry, lathing, plastering and painting. General excavating had best be sublet, as a rule, because of the special equipment needed and because men in that line generally know what to do with excavated material. Such a contract should not include the necessary hand-digging of pits and trenches, which can better be handled by common labor under the general foreman or a "straw boss." Piling and deep foundation work, with its necessary shoring, should also be sublet to experienced concerns equipped to do such special work. But by the time the constructing architect is ready to execute large work and heavy construction, he will have gained the necessary preliminary experience and will have found that each commission presents its own problems, beginning with the excavating and continuing through the last detail of the decorating and equipping.

Bids are taken and contracts awarded on the items first needed, as rapidly as drawings and specifications can be issued to bidders. In addition to asking bids of local concerns, if the work be outside a large city, one makes careful canvass of all others available, getting, if possible, three or more bids on each subcontract and material list. The preparation of the latter is, of course, new procedure for the architect. A builder does not hand a set of prints and specifications to a material supply house as he does to a plumber or other subcontractor. Instead, he prepares itemized schedules of lumber, brick and the like, and gets prices accordingly. Contrary to general opinion, there are no standard fixed prices of building materials. There are "list prices" and "quoted prices" and "customary prices,"-and there are also the "prices that are necessary to get the business." Hence the perspicacious purchasing agent. He is quite likely to find that some of the owner's "friends" in the building supply business have had their eyes on this particular project for some time, and have perhaps been avidly anticipating their profits. In this, as in all other lines of commerce, there are two distinct classes, each intent upon doing the "right thing." But to one, it means the right thing for the customer, and to the other the right thing for the dealer. To the latter, a legitimate profit means whatever he can get. The purchasing agent must be able to discriminate, as it is up to him to adequately protect the owner against those of his neighbors who are out to gouge him. Furthermore, they would like to be able to show their regular customers that they exacted toll from the outsider. The owner will give his builder a list of those from whom he wants prices,-he may even secure some of the prices himself,-but he should be explicit as to which if any he wishes to have specially favored. Frequently, the association or connection between owner and purveyor is so close that the former especially welcomes the intervention of a purchasing entity to shoulder all responsibility. The construction architect has no axes to grind but can distribute his favors exactly as he and the owner decide is best for the project. They may decide that the ownership of stock or a position on the board of a company does not warrant buying from the incumbent at fat prices, as a local builder might have to do.

As has been intimated, no one individual is more vital to the success of the undertaking than the general foreman. It is to be assumed that he will be chosen with the utmost discrimination. If new to the organization, he will be brought into the office and made thoroughly familiar with its general practice and with the intended procedure in his particular work. He will take time to familiarize himself with the drawings and specifications, material lists and subcontracts. If he is being merely moved from job to job, he can do this in the field. Nevertheless, it is well to give him time between assignments to come into the home office and be checked up,—to get acquainted with his co-workers. It makes *esprit de corps*.

In any event, it is essential that the home office shall have prepared a detailed set of instructions to superintendents or general foremen (as they may be Oral advice lacks uniformity, adequacy called). and force,-leaves too much to the judgment of the individual. He has abundant opportunity to exercise his initiative, even after complying with all home office "red tape." After digesting his instructions, his experience will tell him what is mandatory as well as where he is supposed to "use his head." But, for regular procedure, he should be placed in a position to know what is expected of him without having to ask. If he is the right type of man, he will appreciate printed instructions, even though his previous employers have had nothing of the kind, and any advice may irk him somewhat. Some of the best foremen will put all their energy into pushing the work ahead rapidly and capably but, when it comes to keeping their records and correspondence in shape, they will be beautifully "balled up." They are simply not office men. Foremen of that type should, if

big enough, be used on larger work where one or more clerks can be assigned to assist in the time keeping, petty purchasing, receiving, storekeeping, expediting, cost accounting (distributing), and correspondence. It is up to the construction manager to determine how much of such "overhead" the work requires. It is easier to provide too much than not enough. There should be no one in the job office whose time is not fully employed,-crowded. Nothing so demoralizes a field organization as lack of employment. If clerks haven't enough to do to keep them busy, their spare time should be given to such manual labor as can be assigned them. If their white collars are inclined to wilt too much in arduous toil, they may as well get out of the building game before they have wasted too much time at it. This applies to foremen as well. The working foreman who forgets to watch his men while he is working with them may be a poorer investment than he who does nothing but oversee them. The most valuable type is the man who can do both efficiently. Foremen's time goes on whether the work does or not. When interruptions occur and men must be laid off, the good foreman allows nothing to slacken, but pitches in at whatever he can do to lessen the expense of the lull, whether it be for a day or a fortnight.

The drawing up of a set of instructions for the guidance of general foremen should deal with fixed office practice as applicable to the average project. Special conditions demand specific rulings, and no attempt need be made to provide for such exceptions in a formal guide. The instructions included here have been in practical use for some time, being revised as was proved necessary by experience.

1. The General Foreman's Responsibilities. The general foreman will act as the representative of the building company on the job and will have entire charge of it under instructions from the home office. He will lay out all the work and superintend all construction and be solely responsible. He will *personally* sign all payrolls, reports, and correspondence.

2. Drawings and Specifications. The general foreman will be supplied with as many copies of prints and specifications as may be necessary for his own use and for the use of subcontractors and foremen; he must keep careful record of them, and see that they are not mishandled or mislaid.

3. Issues and Revisions. Preliminary prints are sometimes issued for the purpose of starting excavating or foundations before working drawings are completed. When these or later prints are superseded by revised issues, the general foreman shall make careful note of all changes and their effect, if any, on the work already done or laid out, and shall have a distinct understanding with the home office regarding it. He shall also observe due caution that superseded prints are marked "Void" and not left accessible, where they might be subject to misuse.

4. *Checking.* As soon as prints and specifications are received, the general foreman shall carefully review and compare them and check all features in a

general way. He shall then notify the home office that this has been done, calling attention to errors or discrepancies, if any have been noted. This is important and must not be delayed; it may affect later work.

5. Job Program. As soon as the construction manager has assigned a general foreman to a project, they will confer and outline a job program, by means of which will be determined the sequence for ordering all materials, dates when they should be ready, and the degree of advancement of the whole work at each fortnightly interval. It shall thereafter be the duty of the general foreman to live up to this program or to show reason for each specific lapse.

6. General Purchasing. General purchasing is done through the home office, each order in triplicate;—one to the vendor, one to the general foreman, and one to the home office file. If the owner so requests, a copy is sent him also.

7. Material Lists. The general foreman (or such other person as designated by the home office,) will prepare accurate lists of all materials for the work, except such as are included in subcontracts. If not prepared by the general foreman, they must be checked by him and either approved or criticised before being requisitioned. Lists must cover exact materials specified, or else adequate reason be given for variation. They must also state the use of each article listed, the time it is needed at site, how it is to be delivered, and whether quantities given are net or whether allowance is made for waste and shrinkage.

8. Requisitions and Expediting. As soon as possible after a project is assigned, program arranged, material listed and checked, the general foreman shall begin requisitioning the home office for material and shall continue doing so in proper time and due sequence until all has been taken care of. Each requisition shall be accompanied by approved material lists, if needed, the number of the purchase order, if one has been issued, and such information as the general foreman has to offer as to the best available source of supply, proper price, etc. He is expected to make all requisitions well ahead of time needed (which shall be stated on requisitions), and to follow up requisitions, not permitting the home office to lose sight of his necessities. Slackness in this particular is much worse than over-insistence. Whereas the general foreman is giving his whole attention to his particular work, he should bear in mind that it is only one of several in the home office, and hence his is the greater responsibility. If he foresees delay in receipt of anything, he should use his best efforts to expedite it or, if beyond his ability to do so, he should ask the home office for special assistance.

9. Job Purchase Orders. The general foreman (or the purchasing agent assigned) will make such purchases from local dealers as have been previously arranged for by the construction manager. For all such purchases (except items of less cost than \$1, bought out of petty cash) a job purchase order must

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Fac-simile of Purchase Order Blank (Original size 8½ by 11 inches) be written beforehand in quadruplicate. If it is a cash item, one copy goes to job file and three to home office, each receipted by vendor (in place of an invoice). For items to be charged, the original of the four copies shall be given to vendor. Only such charge accounts should be opened as seem absolutely necessary, favoring such dealers as the owner prefers or as make best prices consistent with quality, and as give best service. All job purchase orders must be numbered consecutively, from No. 1 up, and each number accounted for to the home office, even though canceled, in which latter case, the reason for cancelation should be given. Wherever possible, purchase prices should be given on orders.

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In all purchasing, note particularly that needs should be studied and lists made of all required materials which can be obtained from a single vendor, and competitive prices secured where possible; then the list should be ordered all at once,—enough, but not too much.

Single rush orders of small items mean added costs, additional bookkeeping and possible delays.

Telephone orders should be used only for emergency, and should be followed at once by job purchase orders confirming.

Cash should never be paid for any item to a vendor with whom there exists a charge account.

No general foreman or other employe should open a charge account away from home. They shall pay cash and their credit will not be recommended.

10. Construction Forces. One of the first duties of a general foreman upon arriving at a job will be to examine the local labor situation and report upon it in detail to the home office, advising what can be counted upon, what preferences are expressed by the owner, and any other suggestions of value. He will confer with the construction manager on the subject from time to time and will follow his instructions, employing always the best men available, at rates determined, getting best values at all times. In general, skilled labor should never be employed for work that can be done more economically by common labor. Workmen will be paid only for time actually employed, unless other special provision is approved by the home office. Over-time is only to be used when expressly pre-arranged for or in actual emergency. Foremen are to be employed only when the number of men in any trade warrants. The work done by themselves, as well as by the men under them, should be kept at maximum, just the same as if directly overseen by the general foreman. A week's work will consist of 44 to 60 hours' regular time, depending upon the season and the project's requirements, of which all employes are to be kept informed. Holidays will be observed, except in emergencies (approved by home office), and no pay allowed for them, unless pre-arranged. Pay for transportation or other unusual expenses must also be pre-arranged.

11. Subcontracts. When expedient, subcontracts will be let for specific work. The general foreman will be provided with copies of all such contracts and specifications governing them and will act as inspector of all work included therein; he will see that ample notice is given each subcontractor ahead of time such work is needed (particularly for members to be built into walls and concrete), that all provisions of such contracts are properly fulfilled, that the work is properly correlated with that of others,

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and that amounts of partial payments demanded are office if any bonds are necessary. In general, subproper and duly proportionate. Prior to the letting of such contracts, either by the home office direct or by the general foreman under order from the home office, it is essential to know (1) the general reputation of the party whose bid it is proposed to accept; (2) his equipment and other fitness for the work; (3) the attitude of his employes toward the architect's organization and its probable effect; and (4) the name of his liability insurance company and number of his policy, if the contract is to include labor at the job.

12. Permits and Ordinances. Before beginning a given project, the general foreman must familiarize himself with local and state ordinances and laws relating to the work and shall take out and pay for such permits as may be required, notifying the home contractors for plumbing, wiring and the like will secure their own permits, but the general foreman must see that those who do such work are properly licensed. Great care must be taken as to street and alley obstructions and occupancy of adjoining property.

13. Insurance, Accidents, Etc. The owner will carry fire insurance on work and equipment, and the company will maintain workmen's compensation insurance, but the general foreman will be expected to do all in his power to prevent fire and accidents, maintaining temporary fences and barricades, danger signs, "No Smoking" notices, red lights and other means of warning employes and the public. He must personally inspect all equipment, hoists, ladders, scaffolding, shoring and other possible sources of danger, known capacities, and see to and

make everything safe. He will be supplied with a "first aid kit" and must make himself and at least one other man familiar with its use, as well as seeing that it is kept properly filled. Telephone numbers of doctor, hospital, ambulance service, police and fire department must be prominently displayed in the office. All accidents must be reported promptly to the proper authorities and in detail to the home office, giving cause, result, treatment, present status, attending physician and means adopted to prevent the recurrence of accidents. Try to prevent the first accident as well as the next. Do not permit men to ride on material hoists.

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14. Temporary Buildings. Such temporary structures as are directed by the construction manager, built as he instructs, are to be located to the best advantage and constructed as soon as possible after the arrival of the general foremen, who shall bear in mind their possible use in cold weather and also their value and disposition at completion of the work.

15. Daily Construction Reports. Daily construction reports are to be made out in duplicate, the original sent to the home office (mailed on day it records), and duplicates kept in proper sequence in job file. When so directed, a third carbon copy must be provided for the owner. Each detail of required information must be clearly given, and the progress of work from day to day given in percentages on in manner directed by the construction manager. No letter, other than that on the daily report, to the home office is necessary.

16. Job Correspondence. In general, all correspondence relating to a job will be handled by the home office, with copies to the general foreman of such letters as are needed in job file. The general foreman will hold to a minimum all correspondence with outsiders, thus avoiding duplicating the work of others. Emergency matters having to do with expediting, corrections, etc., should be handled promptly by mail, telephone or telegraph, with copy to the home office in each case. All correspondence regarding shop drawings, also their checking, will be handled by the home office, but copies will be sent the general foreman for approval or record. These and all other correspondence records shall be carefully filed. All mail for the work will be directed to the company, for which purpose the general foreman shall promptly provide a street address or will rent a post office box, if preferable.

17. Telephone and Telegraph Service. On day of arrival at a job, the general foreman will call at the local telegraph and telephone offices and make arrangements for prompt service, both day and night. If a job phone is to be installed, the contract should be made at once in the name of the company, so that it can be put in as soon as the office is ready. Unless confirmation is made by job purchase order, all telephone calls of importance must be recorded in duplicate on "Telephone Record" blanks, one copy to home office and one to job file. A third copy must be made of messages of sufficient importance and sent to other party to the conversation for confirmation. Such confirmation may be a deciding factor in some important matter.

18. Changes from the work as laid out by drawings and specifications are always a fruitful source of error and expense and are to be avoided as much as possible. The general foreman must never suggest a change to the owner nor allow another employe to do so. Advice and constructive criticism are always welcomed, but the home office will take care of all business dealings with the owner. The general foreman is sent out to construct the building in accordance with drawings and specifica-

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tions and has no authority to make any change whatever without first consulting the construction manager or home office. The home office must receive immediate notification in event of any dispute with or expression of dissatisfaction on the part of the owner, and that portion of the work affected shall not proceed until a decision (permanent or temporary) has been made.

In the same way these important subjects are taken up in order and specific instructions given :

- 19. Extra Work Orders
- 20. Payrolls
- 21. Funds for Payrolls and Incidentals
- 22. Hauling
- 23. Returnable Items
- 24. Transferred Items
- 25. Weekly Cash Reports
- 26. Tool Reports
- 27. Equipment Reports
- 28. Weekly Material Reports
- 29. Cost Accounting
- 30. Cost Schedule.

In General. The loyalty of the home office to the interests of the owner is its first consideration, but the success of its building methods depends largely upon the loyalty of employes to the home office. The first sign of dissatisfaction on the part of the owner is generally found to be due to gossip of disappointed local competitors or of their employes or some one who has been discharged. This should be watched and defeated if possible, the home office being always kept informed. The owner must be shown a whole-hearted attention to his interests that is thoroughly convincing. The general foreman should also keep the home office fully informed as to all other matters relating to the work in hand and regarding any other items of building activity or prospects in the vicinity in which the home office might be interested. While the particular work in hand is supposed to demand all of the general foreman's time (including overtime when necessary) regardless of regular hours, it is assumed also that he will be alive to what is going on around him,-that he possesses something better than a "one-track mind." He will be expected to so conduct himself and his affairs as to obtain these results when the work is completed: A. A first quality structure, as set forth in drawings and specifications. B. Completion according to time schedule or better. C. Closure or complete adjustment of all unsettled matters and accounts preparatory to the final billing. D. A written acceptance by the owner, to be obtained by the construction manager, indicating entire satisfaction.

The foregoing instructions, although apparently somewhat lengthy, will by no means be found adequate for all work. Much still devolves upon the construction manager in the way of advice, and still more upon the experience and initiative of the general foreman himself. In this article, we are dealing only with the duties of purchasing and supervising. Auditing and accounting require the services of an expert bookkeeper. Hence, with proper care in building up his field organization, it should be apparent that the high class architect is at least as well qualified to engage in actual building as is the general contractor to undertake to do his client's planning.

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A MONTHLY REVIEW OF COSTS AND CONDITIONS

'HE usual summer slump in both the volume of new construction and the amount of contemplated work took place during July and August, although not in sufficient measure to prevent the first seven months of the year from establishing a new record for the total amount of construction. According to the figures of the F. W. Dodge Corporation, the building and engineering contracts awarded during July in the 37 states east of the Rockies amounted to \$583,432,400. This represents about 91 per cent of the entire country, and the figure was the highest July contract total on record. It was 9 per cent ahead of the July, 1927 total, but was a drop of 10 per cent from the total for June of this year. Two districts made new high totals for the month of July, -the Middle Atlantic States and the Central Western States (which enjoyed the highest monthly totals ever made in these territories, while the New England and the Southeastern States exceeded the volume of construction over July, 1927. In New York state and northern New Jersey, in the Pittsburgh district, the Northwest, and in Texas there was a decline as compared with July, 1927 figures; and only in the Central Western, the Northwestern and in the Southeastern States, did July totals exceed the figures recorded for the preceding month of this year.

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The distribution of building construction by types showed \$228,734,800 or 39 per cent of the total for residential construction: \$137,074,700 or 23 per cent for public works and utilities; \$95,696,800 or 16 per cent for commercial buildings; \$36,926,400 or 6 per cent for educational projects; and \$31,399,800 or 5 per cent for industrial projects. A decided drop in new work contemplated took place during July, the total for the month being \$647,682,700, which is a loss of 37 per cent from the amount reported in June, 1928, and a drop of 7 per cent below the amount reported for July of last year. In August construction contracts to the amount of \$516,970,200 were awarded in the Eastern States, which is about 11 per cent below the July figure and 6 per cent below the figure for August, 1927. The New England States and the Northwest were the only two districts showing increases over their July, 1928 records, and the Central West, Northwest, and Southeastern States were the districts which showed increases over their records for August of last year. The total amount of new building and engineering work started since the first of the year amounts to \$4,545,-270,100, an increase of 6 per cent over that of 1927.



THESE various important factors of change in the building situation are recorded in the chart given here: (1) Building materials and labor costs under national averages. (2) Commodity Index. Index figure determined by the United States Department of Labor. (3) Money Value of Contemplated Construction. Value of building for which plans have been filed based on reports of the United States Chamber of Commerce, F. W. Dodge Corp., and Engineering News-Record (4) Money Value of New Construction. Total valuation of all contracts actually let. The dollar scale is at the left of the chart in millions. (5) Square Foot Area of New Construction. The measured volume of new buildings. The square foot measure is at the right of the chart. The variation of distances between the value and volume lines represents a square foot cost which is determined, first by the trend of building costs, and second, by the quality of construction

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141 THE ARCHITECTURAL FORUM tober, 1928 WARNY COLD HO NEW Diagram shows New Clow "Triumph" mixing valve. Cold water valve at right OFF opens first; the water enters at B. Hot water valve follows; the water enters at A. Cold water valve shuts off before the hot water is full on. Note how water presses with the closing of this valve-not against it. Note also phosphor bronze springs which help closing The New Clow "Triumph" of both valves. e new Clow "Triumph" Shower Mixing Valve Closes with ater pressure not against it. Moreover, phosphore a proeat ater pressure in both and cold valves further insure ause weat closing each time. Water cannot trickle, to cause a seats. sears. I be sears are renewable. They are not threaded, but I be the sears are renewable. They are not threaded, but thread B moves them. No wrench is needed. the Clow Mixing Walve is just one of the new "Triumph" he Clow fixtures. Write us for further information on this ne of "15 year tested" ne of "15 year tested" a seats. JAMES B. CLOW & SONS, 201-299 N. Talman Avenue, CHICAGO Sales offices in principal cities PREFERRED FOR EXACTING PLUMBING SINCE 1878

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4th

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The publications listed in these columns are the most important of those issued by leading manufacturers identified with the building industry. They may be had without charge, unless otherwise noted, by applying on your business stationery to The Architectural Forum, 383 Madison Ave., New York, or the manufacturer direct, in which case kindly mention this publication.

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BASEMENT WINDOWS

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 A. P. W. Paper Co., Albany, N. Y. Onliwon for Fine Buildings. Folder, 8 pp. 3¼ x 6 in. Illustrated. Deals with toilet paper fittings of metal and porcelain. Architects' File Card. 8¼ x 11 in. Illustrated. Filing card on toilet paper and paper towel cabinets.
 A Towel Built for Its Job. Booklet, 8 pp. 4¼ x 95% in. Illustrated. Paper Towel System and Cabinets.
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 Incor Cement. Brochure, 12 pp., 8½ x 11 ins. Illustrated. Data on a perfected, early strength Portland cement.
 Kosmos Portland Cement Company, Louisville, Ky.
 Kosmotar for Enduring Masonry. Folder, 6 pp., 3½ x 6½ in. Data on strength and working qualities of Kosmortar.
 Kosmotar, the Mortar for Cold Weather. Folder, 4 pp., 3½ x 6½ in. Data on strength and working qualities of Kosmortar.
 Kosmotar, the Mortar for Cold Weather. Folder, 4 pp., 3½ x 6½ in. Tells why Kosmortar should be used in cold weather.
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 Concrete Paving Construction in Hot Weather. Booklet, 11 pp. 6 x 9 ins. Illustrated.
 North American Cement Corporation, 285 Madison Ave., New York. The Cal Boon. Brochure. 32 p. 6 x 9 ins. Illustrated. Use of Cal in Portland Cement mixtures.
 Pennsylvania-Dixie Cement Corp'n, 131 East 46th St., New York. Celluloid Computing Scale for Concrete and Lumber, 4½ x 2½ ins. Useful for securing accurate computations of aggregates and cement; also for measuring lumber of different sizes.

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 Town and Country Houses of Concrete Masonry. Booklet, 19 pp., 8½ x 11 ins. Illustrated.
 Facts About Concrete Building Tile. Brochure, 16 pp., 8½ x 11 ins. Illustrated.
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 Economic Value of Admixtures. Booklet, 32 pp., 6% x 9% ins. Reprint of papers by J. C. Pearson and Frank A. Hitchcock before 1924 American Concrete Institute.
 Concrete Surface Corporation, 342 Madison Ave., New York. Bonding Surfaces on Concrete. Booklet, 12 pp., 8 x 11 in., illustrated. Deals with an important detail of building.
 Kosmos Portland Cement Company, Louisville, Ky. High Early Strength Concrete, Using Standard Kosmos Portland Cement. Folder, 1 p., 8% x 11 in. Complete data on securing high strength concrete in short time.

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- CAMPS Ramp Buildings Corporation, 21 East 40th St., New York. Building Garages for Profitable Operation. Booklet. 8½ x 11 in. 16 pp. Illustrated. Discusses the need for modern mid-city parking garages, and describes the d'Humy Motoramp system of design, on the basis of its superior space economy and fea-tures of operating convenience. Gives cost analyses of garages of different sizes, and calculates probable earnings. Garage Design Data. Series of informal bulletins issued in loose-leaf form, with monthly supplements.

REFRIGERATION

- The Fulton Sylphon Company, Knoxville, Tenn. Temperature Control of Refrigeration Systems. Booklet, 8 pp., 8½ x 11 ins. Illustrated. Deals with cold storage, chilling of ater, etc.
- REINFORCED CONCRETE-See also Construction, Concrete Genfire Steel Company, Youngstown, Ohio. Self-Sentering Handbook. 8½ 11 in. 36 pp. Illustrated. Methods and specifications on reinforced concrete floors, roofs and floors with a combined form and reinforced material.
 - Truscon Steel Company, Youngstown, Ohio. Shearing Stresses in Reinforced Concrete Beams. Booklet, 8% x 11 in. 12 pp.
- North Western Expanded Metal Company, Chicago, Ill. Designing Data. Book. 6 x 9 in. 96 pp. Illustrated. C the use of Econo Expanded Metal for various types of Covers f rein-
- forced concrete construction. Longspan 34-inch Rib Lath. Folder 4 pp., 83/2 x 11 in. Illustrated. Deals with a new type of V-rit expanded metal.

ROOFING

- Barber Asphalt Co., Philadelphia, Pa. Specifications, Genasco Standard Trinidad Lake Asphalt Built-up Roofing. Booklet. 8 x 10% in. Gives specifications for use of several valuable roofing and waterproofing materials.
 - he Barrett Company, 40 Rector St., New York City. Architects' and Engineers' Built-up Roofing Reference Series; Volume IV Roof Drainage System. Brochure. 63 pp. 8% x 11½ ins. Gives complete data and specifications for many details of roofing.
 - Bird & Son, Inc., E. Walpole, Mass. Bird's Roofs. Folder, 16 pp., 3½ x 6 ins. Illustrated. Data of roofing materials.

 - hilip Carey Co., Lockland, Cincinnati, Ohio. Architects Specifications for Carey Built-up Roofing. Booklet. 8 x 1034 in. 24 pp. Illustrated. Complete data to aid in speci-fying the different types of built-up roofing to suit the kind of roof construction to be covered. Carey Built-up Roofing for Modern School Buildings. Booklet. 8 x 1034 in. 32 pp. Illustrated. A study of school buildings of a number of different kinds and the roofing materials adapted for each. Philip Carey Architects
 - for each.

- Heinz Roofing Tile Co., 1925 West Third Avenue, Denver. Plymouth-Shingle Tile with Sprocket Hips. Leaflet, 8½ x 11 ins. Illustrated. Shows use of English shingle tile with special hips. Italian Promenade Floor Tile. Folder, 2 pp., 8½ x 11 in. Illus-trated. Floor tiling adapted from that of Davanzati Palace. Mission Tile. Leaflet, 8½ x 11 ins. Illustrated. Tile such as are used in Italy and southern California. Georgian Tile. Leaflet, 8½ x 11 ins. Illustrated. Tiling as used in old English and French farmhouses.
- Ludowici-Celadon Company, 104 So. Michigan Ave., Chicago, Ill. "Ancient" Tapered Mission Tiles. Leaflet. 8½ x 11 in. 4 pp. Illustrated. For architects who desire something out of the ordinary, this leaflet has been prepared. Describes briefly the "Ancient" Tapered Mission Tiles, hand-made with full corners and designed to be applied with irregular exposures.
- Structural Gypsum Corporation, Linden, N. J. Relative Effectiveness of Various Types of Roofing Construction in Preventing Condensation of the Under Surface. Folder, 4 pp. 8½ x 11 ins. Important data on the subject. Gypsteel Pre-cast Fireproof Roofs. Booklet, 48 pp., 8½ x 11 ins. Illustrated. Information regarding a valuable type of roofing.
- J. S. Gypsum Co., Chicago. Pyrobar Roof Construction. Booklet. 8 x 11 in. 48 pp. Illus-trated. Gives valuable data on the use of tile in roof con-struction. Sheetrock Pyrofill Roof Construction. Folder. 8½ x 11 in. Illus-trated. Covers use of roof surfacing which is poured in place.

SEWAGE DISPOSAL

Kewanee Private Utilities, 442 Franklin St., Kewanee, Ill. Specification Sheets. 73/4 x 103/4 in. 40 pp. Illustrated. Detailed drawings and specifications covering water supply and sewage disposal systems.

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American Brass Co., The, Waterbury, Conn. Facts for Architects About Screening. Illustrated folder, 9½ x 11¾ in., giving actual samples of metal screen cloth and data on fly screens and screen doors.

Athey Company, 6015 West 65th St., Chicago, III. The Athey Perennial Window Shade. An accordion pleated win-dow shade, made from translucent Herringbone woven Coutil cloth, which raises from the bottom and lowers from the top. It eliminates awnings, affords ventilation, can be dry-cleaned and will wear indefinitely.

- Drange Screen Co., Maplewood, N. J.
 Orsco Aluminum Screens. Booklet, 8 pp., 8 x 11 ins. Illustrated.
 Data on a valuable line of screens.
 Orsco Screens and Other Products. Brochure, 20 pp., 8 x 11 ins. Illustrated.
 Door and window screens and other hardware.

SHADE CLOTH AND ROLLERS Columbia Mills, Inc., 225 Fifth Avenue, New York. Window Shade Data Book. Folder, 28 pp., 8½ x 11 ins. Illustrated.

SHELVING-STEEL

- David Lupton's Sons Company, Philadelphia. Pa. Lupton Steel Shelving. Catalog E. Illustrated brochure, pp., 8% x 11 in. Deals with steel cabinets, shelving, ra-doors, partitions, etc. 40 racks,

SKYLIGHTS

- Albert Grauer & Co., 1408 Seventeenth St., Detroit, Mich. Grauer Wire Glass Skylights. Folder, 4 pp., 8½ x 11 in. trated. Data on an important line of wire glass lights. Illus-
- The Effectiveness of Sidewalk Lights. Folder, 4 pp., 8½ x 11 in. Illustrated. Sidewalk or vault lights. Let in the Light-The Light That's Free. Folder, 4 pp., 8½ x 11 in. Illustrated. Data on securing good lighting.

SOUND DEADENER

Cabot, Inc., Samuel, Boston, Mass. Cabot's Deadening Quilt. Brochure 7½ x 10½ ins., 28 pp. Illus-trated. Gives complete data regarding a well-known protec-tection against sound.

STAIRWAYS

Woodbridge Ornamental Iron Co., 1515 Altgeld St., Chicago. Presteel Tested for Strength-stairways, catalog, 92 pp., 8½ x 11 ins. Illustrated. Important data on stairways.

STEEL PRODUCTS FOR BUILDING

- Bethlehem Steel Company, Bethlehem, Pa. Steel Joists and Stanchions. Booklet, 72 pp., 4 x 63/4 ins. Data for steel for dwellings, apartment houses, etc.
- Genfire Steel Company, Youngstown, Ohio. Herringbone Metal Lath Handbook. 8½ x 11 in. 32 p trated. Standard specifications for Cement Stucco on here. 32 pp. Illus-on Herring-

Rigid Metal Lath and interior plastering. Fireproofing Handbook. 8½ x 11 ins. 32 pp. Illustrated. De-scribes the full line of products manufactured by the Genfire Steel Company.

Vestinghouse Electric & Mfg. Co., East Pittsburgh, Pa. The Arc Welding of Structural Steel. Brochure, 32 pp., 8½ x 11 ins. Illustrated. Deals with an important structural process.

STONE, BUILDING

Indiana Limestone Company, Bedford, Ind.

- Volume 3, Series A-3. Standard Specifications for Cut Indiana Limestone work, 3½ x 11 in. 56 pp. Containing specifications and supplementary data relating to the best methods of speci-fying and using this stone for all building purposes.
- 'ol. 1. Series B. Indiana Limestone Library. 6 x 9 in. 36 pp. Illustrated. Giving general information regarding Indiana Limestone, its physical characteristics, etc. Vol. 1.
- 701. 4. Series B. Booklet. New Edition. 8½ x 11 in. 64 pp. Illustrated. Indiana Limestone as used in Banks. Vol
- Volume 5. Series B. Indiana Limestone Library. Portfolio. 1136 x 834 in. Illustrated. Describes and illustrates the use of stone for small houses with floor plans of each.
- Volume 6, Series B-Indiana Limestone School and College Build-ings. 8½ x 11 in., 80 pages, illustrated.
- Volume 12, Series B-Distinctive Homes of Indiana Limestone. 81/2 x 11 in., 48 pages, illustrated.
- Old Gothic Random Ashlar. 81/2 x 11 in., 16 pages, illustrated.

STORE FRONTS

Brasco Manufacturing Co., 5025-35 South Wabash Avenue, Chicago,

- Catalog No. 31. Series 500. All-Copper Construction. Illus-trated brochure. 20 pp. 81/2 x 11 ins. Deals with store fronts of a high class.
- Brasco Copper Store Front. Catalog No. 32. Series 202. Brasco Standard Construction. Illustrated brochure. 16 pp. 8½ x 11 ins. Complete data on an important type of building. Detail Sheets. Set of seven sheets; printed on tracing paper, showing full sized details and suggestions for store front de-signing, enclosed in envelope suitable for filing. Folds to 8½ x 11 ins.

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- Davis Solid Architectural Bronze Sash. Set of five sheets, printed on tracing paper, giving full sized details and sugges-tions for designing of special bronze store front construction, enclosed in envelope suitable for filing. Folds to 2½ x 11 ins.
- The Kawneer Company, Niles, Mich. Store Front Suggestions. Booklet, 96 pp., 6 x 8½ ins. Illus-trated. Shows different types of Kawneer Solid Copper Store trated. ronts.
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 Catalog K, 1927 Edition. Booklet, 32 pp., 8½ x 11 ins. Illustrated. Details of Kawneer Copper Store Fronts.
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 Kawneer Construction in Solid Bronze or Copper. Booklet, 64 pp., 8½ x 11 ins. Illustrated. Complete data on the subject.

- Introducing Extruded Bronze Store Front Construction. Folder, 4 pp., 8½ x 11 ins. Illustrated. Contains full sized details of metal store fronts.
- Zouri Drawn Metals Company, Chicago Heights, Ill. Zouri Safety Key-Set Store Front Construction. Catalog. 8½ of 10½ in. 60 pp. Illustrated. Complete information with detailed sheets and installation instructions convenient for architects sheet files.
- International Store Front Construction. Catalog. 8½ x 10 in. 70 pp. Illustrated. Complete information with detailed sheets and installation instructions convenient for architects' files.

TERRA COTTA

- EARA COTTA National Terra Cotta Society, 19 West 44th St., New York, N. Y. Standard Specifications for the Manufacture, Furnishing and Setting of Terra Cotta. Brochure. 8½ x 11 in. 12 pp. Com-plete Specification, Glossary of Terms Relating to Terra Cotta and Short Form Specification for incorporating in Architects' Specification.
- Specification. Specification. Revised Edition. Permanently bound volume 9½ x 12½ in., containing a treatise upon the basic principles of color in architectural design, illustrating early European and modern American examples. Excellent illustra-Color in volume in color tions
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TILE. HOLLOW

- National Fire Proofing Co., 250 Federal St., Pittsburgh, Pa. Standard Wall Construction Bulletin 174. 8½ x 11 in. 32 pp. Illustrated. A treatise on the subject of hollow tile wall con-
- Standard Fireproofing Bulletin 171, 8½ x 11 ins., 32 pp. Illus-trated. A treatise on the subject of hollow tile as used for floors, girder, column and beam covering and similar construc-
- Natco Double Shell Load Bearing Tile Bulletin, 81/2 x 11 ins., 6 pp. Illustrated.
- pp. Illustrated. Natco Unibacker Tile Bulletin, 8½ x 11 ins. 4 pp. Illustrated. Natco Header Backer Tile Bulletin, 8½ x 11 ins., 4 pp. Illustrated. Natcoflor Bulletin, 8½ x 11 in. 6 pp. Illustrated. Natcoflor Face Tile for the Up-to-Date Farm Bulletin, 8½ x 11 ins.

TILES

Kraftile Company, 55 New Montgomery St., San Francisco. High Fired Faience Tile. Booklet. 32 pp. 8½ x 11 ins. Illustrated. Presents a fine line of tiles for different purposes.

Unites States Quarry Tile Co., Parkersburg, W. Va. Quarry Tiles for Floors. Booklet, 119 pp., 8½ x 11 ins. Illus-trated. General catalog. Details of patterns and trim for floors. Portfolio of Floor Designs. 9¼ x 12¼ ins. Illustrated in lors. Patterns of quarry tiles for floors. Art colors.

VALVES

Crane Co., 836 S. Michigan Ave., Chicago, Ill. No. 51. General Catalog. Illustrated. Describes the complete line of the Crane Co.

- A. Dunham Co., 450 East Ohio St., Chicago. The Dunham Packless Radiator Valve Brochure, 12 pp., 8 x 11. Illustrated. Data on an important type of valve.
- nkins Bros., 80 White St., New York. The Valve Behind a Good Heating System. Booklet 4½ x 7½ in. 16 pp. Color plates. Description of Jenkins Radiator Valves for steam and hot water, and brass valves used as boiler connections
- Jenkins Valves for Plumbing Service. Booklet. 4% x 7% in. 16 pp. Illustrated. Description of Jenkins Brass Globe, Angle Check and Gate Valves commonly used in home plumbing, and Iron Body Valves used for larger plumbing installations.

VENETIAN BLINDS

Burlington Venetian Blind Co., Burlington, Vt. Venetian Blinds. Booklet, 7 in. x 10 in., 24 pages. Illustrated Describes the "Burlington" Venetian blinds, method of opera tion, advantages of installation to obtain perfect control o light in the room. Illustrated. tober, 1928

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- Globe Ventilator Company, 205 River St., Troy, N. Y.
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- Genfire Steel Company, Youngstown, Ohio. Waterproofing Handbook. Booklet. 8½ x 11 in. 80 pp. I trated. Thoroughly covers subject of waterproofing conc wood and steel preservatives, dustproofing and hardening crete floors, and accelerating the setting of concrete. distribution. Tilusconcrete,
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- Sonneborn Sons, Inc., L., 116 Fifth Ave., New York, N. Y. Pamphlet. 334 x 834 in. 8 pp. Explanation of waterproofing principles. Specifications for waterproofing walls, floors, swim-ming pools and treatment of concrete, stucco and mortar.
- och Brothers, 110 East 42nd St., New York City. Specifications for Dampproofing, Waterproofing, Enameling and Technical Painting. Complete and authoritative directions for use of an important line of materials.
- use of an important line of materials. The Vortex Mfg. Co., 1978 West 77th St., Cleveland, Ohio. Par-Lock Specification "Form D" for waterproofing surfaces to be finished with Portland cement or tile. Par-Lock Specification "Forms E and G" membrane waterproof-ing of basements, tunnels, swimming pools, tanks to resist hydrostatic pressure. Par-Lock Waterproofing. Specification Forms D. E. F and G. Sheets 8½ x 11 ins. Data on combinations of gun-applied asphalt and cotton or felt membrane, built up to suit require-ments.
- ments.
- Par-Lock Method of Bonding Plaster to Structural Surfaces. Folder, 6 pp., 8½ x 11 ins. Official Bulletin of Approved Products,-Investigating Committees of Architects and Engincers.

WEATHER STRIPS

- Athey Company, 6035 West 65th St., Chicago. The Only Weatherstrip with a Cloth to Metal Contact. Booklet, 16 pp., 8½ x 11 ins. Illustrated. Data on an important type of weather stripping.

WINDOWS

- The Kawneer Company, Niles, Mich.
 Kawneer Solid Nickel Silver Windows. In casement and weighthung types and in drop-down transom type. Portfolio, 12 pp., 9 x 11½ ins. Illustrated, and with demonstrator.
 David Lupton's Sons Company, Philadelphia, Pa.
 Lupton Pivoted Sash, Catalog 12-A. Booklet, 48 pp. 856 x 11 in. Illustrates and describes windows suitable for manufacturing buildings.
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WINDOWS, CASEMENT

Crittall Casement Window Co., 10951 Hearn Ave., Detroit, Mich. Catalog No. 22. 9 x 12 in. 76 pp. Illustrated. Photographs of actual work accompanied by scale details for casements and composite steel windows for banks, office buildings, hospitals and residences.

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 Hope & Sons, Henry, 103 Park Ave., New York, N. Y. Catalog. 12¼ x 18½ in. 30 pp. Illustrated. Full size details of outward and inward opening casements.
 The Kawneer Company, Niles, Mich.
 Kawneer Solid Nickel Silver Windows. In casement and weighthung types and in drop-down transom type. Portfolio, 12 pp., 9 x 11½ ins. Illustrated, and with demonstrator.
 David Lupton's Sons Company, Philadelphia, Pa.
 Lupton Casement of CopperSteel. Catalog C-217. Booklet, 20 pp., 8% x 11 in. Illustrated brochure on casements, particularly for residences.
 Lupton Heavy Casements. Detail Sheet No. 101, 4 pp., 8½ x 11 ins. Details and specifications only.
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 Genfire Steel Company, Youngstown, Ohio.
 Architectural Details, Steel Pivoted, Commercial and Architectural Projected Windows. 8½ x 11 ins. 24 pp. A. I. A. File No. 16E. Specification and construction details.
 David Lupton's Sons Company, Philadelphia, Pa.
 A Rain-shed and Ventilator of Glass and Steel. Pamphlet, 4 pp. 85% x 11 in. Deals with Pond Continuous Sash, Sawtooth Roofs, etc.

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WOOD-See also Millwork

- American Walnut Mfrs. Association, 618 So. Michigan Blvd., Chi-cago, Ill.
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- Better Built Homes. Vols. XV-XVIII, incl. Booklet. 9 x 12 in. 40 pp. Illustrated. Designs for houses of five to eight rooms, respectively, in several authentic types, by Trowbridge & Ackerman, architects, for the Curtis Companies. National Lumber Mfrs. Assn., Washington.
- Airplane Hangar Construction. Booklet, 24 pp., 8½ x 11 ins. Use of lumber for hangars.
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ARCHITECTURAL ENGINEERING AND BUSINESS



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237-30



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A brick wall without clay wall coping is like a house without a roof







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THE ARCHITECTURAL FORUM

The Chanin Building, New York

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Petro's simplicity has so increased dependability that less than two calls per burner per year is the average. Petro's air principle permits of the use of any residence oil, heavy or light, thick or thin. The Underwriters' Laboratories

list all six Petros as standard. Petro Burners are listed to burn the cheapest fuel oil available for residence use. Efficiency is so high that Petro Oil OIL FROM

ATOMIZING CUP

Heat commonly costs less than hard coal. Complete satisfaction is absolutely guaranteed by every Petro dealer.

LOAT CHAMBER

Petro domestic oil burners range in capacity from ³/₄ gal. per hour to 45 gal., or any radiation up to 18,000 sq. ft. rad. Industrial models range from 50 h.p. to 1000 h.p. boilers, using 12-16 gravity oil.

Your local distributor or dealer has been selected with the greatest care. His financial resources, organization and experience, backed by the integrity of Petro's unique board of directors assure you continued oil heating service of the highest type. Petro is an oil burner you may recommend or specify for use

in any type of home from the very smallest to the largest estate. Write today for detailed engineering

detailed engineering data on the complete Petro line.



Petro's Board of Directors

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Part Two



196

What A Difference Real Comfort Makes

THE world is experiencing a new age," said Henry Ford recently—"the industrial and comfortable age."

A thousand and one influences are educating the average American to a keener sense of leisure and comfort in the home, with a minimum of responsibility and care.

It is the privilege, as well as the function, of the architect to specify these extra hours of comfort. Today he includes automatic oil heat as one of the first and most important accessories of This is the Emblem modern living satisfaction. No other Oil Heating Institute convenience offers such complete freedom from drudgery.

To facilitate your selection of equipment which may be depended upon to function effectively the Oil Heating Institute has been organized.

Its province is to provide you and your clients with complete and unbiased informaclients with complete and unbiased informa-tion regarding this new day convenience. sands of home owners For this purpose it makes available to you a comprehensive booklet, "Installing Oil Heat," written by an architect for architects. This emblem protects You will find a desirable addition to your you, and it will be pro-reference library. The coupon will bring it by the Oil Heating In-stitute. to you.

The Oil Heating Institute is prepared to furnish special information on the heating of churches, theatres. hotels, apartment houses and office buildings, and on the various heat treating processes of industry.



.... For better industrial heating take a lesson from your lighting



Makers of the famous VENUS Pencils



It is the symbol of satisfactory public service in oil heating.

who are members of the Oil Heating Institute are permitted to use it. These manufacturers have earned their mem-bership through the enthusiasm of thou-sands of home owners whomthey have provid-ed with efficient and dependable oil heat.

Only the manufacturers stitute

MUTUAL BENEFIT LIFE INSURANCE BUILDING, NEWARK EQUIPPED WITH THE JOHNSON SYSTEM OF HEAT CONTROL JOHN H. AND WM. C. ELY. . . . ARCHITECTS

THE strong endorsement of Johnson Heat Control is the constantly growing vast number and variety of Johnson System installations — at the suggestion of the architect. The profession may assume a skeptical attitude toward automatic heat control: however, the contrary obtains after the architect's first Johnson System installation. Johnson Heat Control enjoys significant recognition and prestige as a result of forty-three years of unwavering service and architects' repeated expericnce with its efficiency.

The Johnson System Is Of Permanent, All-Metal Construction: And Is The All Perfect Graduated Intermediate System of Regulation

JOHNSON SERVICE COMPANY MILWAUKEE WISCONSIN BRANCHES IN ALL PRINCIPAL CITIES



Imagine a heating unit that forces heated air where you want it, when you want it and as much as you want—that eliminates cold corners, and heat pockets from large industrial areas—a unit that can be used for ventilating as well as heating! Imagine a heating unit that can be shut off all night and thrown open in the morning to heat a large area comfortably in less than 30 minutes—a heating unit that occupies the minimum of floor space and is so simple and accessible that it can be taken apart and assembled by anyone with only a few ordinary tools! Imagine a heating unit that will operate year after year with practically no attention whatever; that can be regulated to keep comfortabl working conditions regardless of outside weathe conditions; that puts waste heat to work and reduce expense in every manner known to scientific heat ing! Such a unit is the new Sirocco Unit Heater

Companion to the World Famous Venturafin Unit Heater

Built by the makers of the Venturafin Unit Heate —the Sirocco Unit is of high velocity type fo floor and ceiling applications, high or low pressure installations. It fills a decided need for adequate heating equipment in large industrial buildings

Illustrated below is the 4-18 F. Sirocco Unit Heater for industrial heating and ventilating. When the Sirocco Unit is used to ventilate as well as heat, one air intake opening at the lower part of the unit is connected up with the wall box and fresh, invigorating air is drawn from out-of-doors whence it passes over the heating coils to be correctly tempered and forced out into working areas. A mixing damper and control lever regulate the amount of outdoor air taken into the unit.



Photo above (right) shows floor stand type installation of Si rocco Un it Heater—the new modern method of industrial heating and ventilating. warehouses, gymnasiums and other structures o large areas where forced heat at high velocity is desirable or necessary.

New Advantages and Economies

The Sirocco Unit Heater offers many important advantages for heating and ventilating large areas. It has a lower tip speed than any other unit o



tober, 1928

UNIT HEATER ing and Ventilating

ivalent capacity, which assures more quiet and isfactory operation. It is scientifically designed reduce waste heat to a minimum and to actually "waste heat" to work. It is built as only nerican Blower, with its vast resources, years xperience and complete facilities, builds heating I ventilating equipment. It is the most accesle unit heater on the market. It distributes at more evenly and over a larger area through use of specially designed Evase type discharge vls. It ventilates as it heats—or can be used either heating or ventilating alone. Made in enty-eight sizes and capacities to fit every need. Ventilating Units for schools, offices and public buildings; and Venturafin units for general industrial applications (stores, factories, garages and shops) to the Sirocco Unit Heater for large industrial areas where forced heat at a high velocity is advisable or necessary.

Send for Complete Information

Every user, buyer or dealer of heating equipment, as well as architects and engineers, should have complete information on the Sirocco Unit Heater. Fill out and mailthe coupon today and we will send it to you free of charge and without obligation.



e addition of the high velocity Sirocco Unit ater gives us a complete line of unit heaters aging in types from the Universal Heating and

ERICAN BLOWER CORP., DETROIT, MICHIGAN NADIAN SIROCCO CO., LTD., WINDSOR, ONTARIO ANCH OFFICES IN ALL PRINCIPAL CITIES

COUPON

Il Address

Above is shown a ceiling type installation of the Sirocco Unit Heater—the position of the unit does notin any way interfere with its efficiency.

Above shows the accessibility of the Sirocco Unit Heater—by removing two locking nuts, the heating element slides out like a desk drawer—by removing a few bolts the entire fan assembly can belittedfrom the unit with shaft and bearings intact. All Sirocco units have there features.

(796)

am interested	in t	the	Sirocco	Unit	Heater	for	industrial	heating	and	ventilating
as applied to the subjects checked on right.										

Factory
 Factory
 Warehouse
 Shop
 Gymnasium
 Garage of large area

OIL HEATING INSTITUTE, 420 Madison Avenue, New York. "Installing Oil Heat." Booklets concerning use of oil.

Particularly useful to architects and engineers are the valuable publications being issued used by this associaton of manufacturers of oil-burning equipment and oil companies. The titles of some of them are: "Are Oil Heaters Perfected?"; "Does It Pay to Install an Oil Heater?"; "Making Better Use of the Basement"; "What About the Supply of Fuel Oil?". The particular booklet being noticed here, which deals with the subject from the architects' point of view, is a carefully prepared study, giving data regarding different types of oil-burning mechanism. The brochure is fully illustrated, and it explains the matter well.

ATLAS WHITE PORTLAND CEMENT COMPANY. 25 Broadway, New York. "Houses of Stucco."

The interest which attaches to any building coated with stucco is of course that given by use of appropriate and attractive texture and color. That this is true has been proved again and again when a structure ordinary and commonplace if not actually ugly and dreary has undergone a course of treatment and has come forth clad in a dress of stucco which by having wholly transformed its appearance has prolonged indefinitely its life and usefulness. There is probably no firm manufacturing building materials which issues publications more practical and useful than the Atlas White Portland Cement Company. Its booklets and brochures have been reviewed many times upon these pages of THE FORUM because it has been long felt that they carry to architects and builders information which might not be had from any other source. This particular brochure deals with the color and texture which wise use of Atlas White in stucco may give. In addition to presenting illustrations in color of surfaces so treated and giving the plainest possible directions as to how to secure the textures and colors, the brochure illustrates a large number of buildings,—residences, garages, apartment houses, etc.,—which have been so treated.

THE UNITED STATES GYPSUM COMPANY, Chicago. "Sabinite." A brochure on its use.

There are not many departments of research which have yielded more practical and valuable results than have the researches which have to do with acoustics.—a term which, since it concerns the control of sound, might, perhaps, withsince it concerns the control of sound, might, pernaps, while out stretching its meaning unduly, be taken to mean the *prevention* of the transmission of sound as well as the improving of the *hearing* of sound. This brochure on the use of the material known as "Sabinite" deals with this important subject. It confines itself to two of the three major phases of the general problem. The first two are important subject. It commes itself to two of the time time major phases of the general problem. The first two are treated here; the third is to be treated separately in a subsequent publication. These three problems are: (1) Audience Rooms,—treatment of audience rooms in order to provide proper hearing conditions for both speech and music. (2) Noise Absorption—the absorption of noise music. (2) Noise Absorption,—the absorption of noise created in and about hotels, office buildings, banks, hospitals, restaurants, railroad stations, etc.; to quiet such structures and make them more generally useful to people occupying them. (3) Sound Insulation,-the treatment of any room, partition or floor to prevent the transmission of noise from that room to abutting rooms, in short, sound *insulation*, as compared to sound *absorption*. While it is true that sound absorbents are useful in preventing transmission of noise, they are not completely efficient in this regard, and are The in no sense offered to the public as sound insulators. problems are distinctly different, and consequently are treated separately. The first two of these problems owe their theoretical solution almost wholly to the work of one man, the late Wallace C. Sabine, Professor of Physics in Harvard University. In 1895 he began 25 years of inten-sive, careful scientific research in a field that had hitherto been the playground of guess work and opinion. This work made Professor Sabine the founder of what is today an important branch of engineering science, the control of sound.

METAL DOOR & TRIM CO., La Porte, Ind. "Hollow Metal Construction; Details and Specifications."

The attention of designers as well as of those more particularly interested in specifications and building might well be given to this publication. It deals fully with the fine line of doors and trim of different kinds, mouldings, hardware, etc., which the firm manufactures, and it illustrates their use by means of cross-sections and other diagrams. An impressive list of important structures in which metal doors and trim made by this firm are used is given, together with the names of their architects, and a large part of the 188 pages is devoted to illustrating some of the important buildings in which installations of metal have been made.

INTERNATIONAL NICKEL COMPANY, INC., New York. "Planning Ahead for Monel Metal." Some data on its use.

The dictionaries describe monel metal as "an alloy of nickel, copper and iron which possesses great elasticity and high tensile strength." Useful for many purposes, it is particularly so for the manufacture of utensils which are used in cooking and in the preparation of food products, and thus the material finds extensive use in hotels, restaurants, hospitals, and elsewhere where cooking must be done on a more or less extensive scale. The ingenuity of metallurgists and manufacturers, and the use which they have made of advertising have created in the public mind what might be called a "consciousness" of what monel is and what it is for, and in this large booklet there is given an excellent idea of what this advertising has been and still is. The large size of the booklet's pages makes possible a presentation of countless advertisements which have appeared in magazines of general circulation; in class journals; publications devoted to the restaurant, hotel, hospital and laundry interests; and journals dealing with the manufacture of textiles and other materials. Owing to the wide extent covered by its subject matter, the booklet possesses great interest and value for architects, engineers and builders.

MACOUSTIC ENGINEERING CO., INC., Cleveland, Ohio. "Macoustic Sound Control." Important data on the subject.

Architectural designers, no less than those interested in the structural side of architecture, may well have their attention brought to this publication. This company "de-votes its facilities exclusively to the manufacture of acoustic material and to the conducting of a highly specialized engineering service directed solely to the solution of acoustical problems. In 1895 a building was constructed on the Harvard campus, and upon its completion the acoustics were found to be so poor as to actually interfere with the use of the structure. This raised considerable comment among the professors of Harvad University, because this building This raised considerable comment among been intentionally designed after the manner of another had building in Cambridge that was almost acoustically per-fect. The Department of Physics was asked to determine what caused the difference in the two structures. After certain experiments had been made, it was discovered that the cushions on the seats of the earlier building contributed to its ideal acoustical conditions. Out of this discovery grew original data and basic formulæ which are universally used today in predetermining the acoustical quality of any type of interior and the correction of any acoustical faults that exist. The Macoustic Engineering Company, Inc., was organized in 1921 by a group of technical men who realize the need for a high grade acoustic material and authoritative data on acoustical problems. After extensive research and the study of acoustics, these engineers developed Macoustic,—a fireproof, vermin-proof material that pro-duces built-in sound control and goes on like plaster. The experience and data accumulated through years of scientific and practical experiments in acoustics are placed at the disposal of the architect, without charge." The booklet goes fully into the use of Macoustic and its possibilities in various ways, and it presents illustrations in half-tone of a number of important buildings in which it has been used.

FUEL ECONOMY goes with HEATING EFFICIENCY

in ELECTROL

N the basis of the amount of heat obtained for every dollar pent for fuel, Electrol Automatic Dil Heat costs less than the equivlent amount of heat supplied by ny other automatic heating equipnent, or by any other fuel, except oft coal.

The advanced principles and deign employed in Electrol result in naximum heating efficiency, with imple capacity for the largest nomes and buildings.

uel economy and heating effitiency are combined in Electrol.

Quiet... All-Electric... Entirely Automatic, Electrol is as fine as engineering skill and exceptionally trong financial resources can produce. t is the oil burner with *The Master Control* which watches over every phase of the burner's operation, day and night, like aliving sentinel always at the furnace door.



A Blue Book of Electrol Owners would read like the social register of America. Electrol is heating some of the country's finest homes.



KNOW ELECTROL BY THE HOMES IT HEATS Home of H. B. Stanz, Jr., Whitefish Bay, Wisconsin. Heated by Electrol Model TJ in a hot air furnace.

Electrol's positive, automatic electric ignition eliminates the need for a gas pilot light. Mechanical fuel atomization, with the scientific mixing of the correct amount of air, produces intense heat with the minimum consumption of fuel. The oil and air supply are controlled separately,—an important part in producing best results.

Correct Installation is Part of the Purchase

When you specify Electrol Automatic Oil Heat you know that the burner will be correctly installed. The Electrol dealer makes an intelligent and

> conscientious survey of the heating requirements and advises candidly regarding

the possibilities with Electrol. All installations are made by men who have been thoroughly trained at the factory in the correct methods of fitting Electrol to each type of heating plant.

Complete Oil Heating Service Wherever Electrol is sold you will find a complete oil heating service, backed by a sound, large and growing manufacturing organization. Purchase of Electrol can be financed along with the financing of the new building.

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The OIL BURNER with The Master Control Listed as Standard by the Underwriters' Laboratories, and bears their label. Member of the Oil Heating Institute

ELECTROL.

WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY. "Catalog of Electrical Supplies, 1928-1930."

The use of electricity for a great variety of purposes means, of course, provision of countless details of electrical equipment. This publication, one of quite a number issued by the Westinghouse firm, is a cloth-bound volume of almost 1,200 pages, fully illustrated. It presents a complete listing of the supply apparatus and appliances manufactured by the Westinghouse Electric & Manufacturing Company and obtainable through its district offices and agentjobbers. A brief presentation of the company's industrial motors and controllers, power and marine equipment, large switchboards and oil circuit-breakers and railway apparatus is also included; complete information on any of this apparatus will be furnished upon request. For the convenience of users of the catalog, a very complete cross-index is given.

ORANGE SCREEN CO., Maplewood, N. J. "Orsco Screens and Other Products." Important data on several materials.

The study which has been given to the metal screens used for various purposes has resulted in their production in high quality at no great cost. This brochure deals with the screens and with certain other products made by the Orange Screen Company, the screens used at windows and doors as protection against flies and other insects, and the "one-way vision screens" often used in banking rooms and ground floor offices to secure privacy. These screens are fully described and illustrated. They are to be had in great variety for windows of different kinds, the double-hung type, casements, pivoted windows, etc., and the booklet deals also with "Orsco" methods of construction, "Interlocking Drum-Tile Moulding," "Corner Construction," "Mortise and Tenon Corner," "Astragal Joint" and with the "Orsco Kiln-Drying Process," "Orsco Rustless Wire," and with the hardware of many kinds used upon screens.

JOHNS-MANVILLE CORPORATION, NEW YORK. "Sound Absorbing Treatment in Banks and Offices."

In the planning of banking quarters, one of the problems which must be solved has to do with the prevention of noise,—or rather in most instances with the *absorption* of noise. It is possible to enter one bank and have one's ears saluted by the din of typewriters, adding machines and other useful and necessary devices, while in another bank there may reign the quiet which is always associated with dignity,—one of the chief qualities or characteristics which a bank is expected to possess. The difference is likely to be due to use in the latter instance of certain materials in walls and ceiling which absorb the sound. "Once pro-duced in a confined room such as a business office or bank. this energy will continue to exist until it is absorbed by the boundary surfaces of the room, the walls, floor and ceiling, or is transmitted to the space beyond. An entirely negligible amount is absorbed in the viscosity of the air itself. It spreads in the form of a spherical wave from its source in all directions, and its loudness or intensity diminishes as the square of the distance from its source. These are simple laws of physics. When this noise or energy is produced in a business office or bank in which the boundary walls, floor and ceiling are composed of almost perfect reflectors of sound, it is evident that by far the major portion of the energy produced by whatever source, such as talking, telephone bells, typewriters, adding machines, bookkeeping machines, or other office mechanical devices, must go through a considerable process of multiple reflection, from walls to ceiling, ceiling to floor, floor to walls and ceiling again, many times, before the energy or noise has been wholly dissipated." This brochure dwells upon the use of "Akoustikos," an acoustic felt composed of asbestos fiber and hair. "When this material is installed strategically upon the principal reflecting surface of a bank or office, usually the ceiling, it is in effect a blotting paper for sound, absorbing the major portion of the sound energy immediately over its source, and in this way successfully eliminating most of the energy accumulation due to continued reflection."

OAK FLOORING BUREAU, Hearst Building, Chicago. "The Story of Oak Floors." Their value in building.

Today, as in all ages of building, many materials are used for flooring, and yet were it possible to take account, it might well be found that the vast majority of the floors throughout the world are of wood, and were one able to determine the variety of wood, it would probably be found that most of the better class floors are of oak,—a wood held in high favor in all ages and in all countries where it it grown. This brochure deals with the merits, as a flooring material, of this most excellent wood. It dwells upon many of the qualities of oak, such as its beauty, durability, cleanliness and economy for flooring structures of several kinds, and it considers its use in schools, hospitals, public buildings, and residence structures of a number of sorts. This well written booklet should be in every specification file.

MOSAIC TILE COMPANY, Zanesville, Ohio. "Mosaic Tiles in Colors." Their excellence for several purposes.

In this brochure there is given an idea of what may be done with Mosaic tiling when it is intelligently used. Everyone is familiar of course with tiling when used for dadoes or even for facing entire walls in bathrooms, but this has generally involved use of the white tile which are undoubtedly highly sanitary and easily cleaned but sadly lacking in character which might be considered either architectural or decorative. This booklet, however, presents illustrations in color of several bathrooms having floors, walls and even ceilings in excellent color combinations, and several illustrations show kitchens so arranged. Another page shows the interior of a restaurant fitted with tile of a particularly rich and beautiful arangement of tan, red and dull blue, while still another illustration is of a bank where the working out in mosaic tile of even the banking screen suggests the adaptability of the material.

Ralph C. Flewelling announces his removal from 423 Camden Drive to the Beverly Arcade Building, Beverly Hills, Cal. The publications of manufacturers are desired.

J. de Forest Griffin announces his removal from Chehalis, Wash., to 222 No. Western Avenue, Los Angeles. He desires the catalogs and other publications of manufacturers.

Announcement is made of the change of the firm name of Morison & Wallace to that of Miller & Wallace, Inc., Architects and Engineers, with offices at 222 West Adams Street, Chicago.

Credit for the designing of the house of James A. Trowbridge, Esq., Noroton, Conn., shown in Plates 51 and 52 of THE FORUM for September, should have been given Electus D. Litchfield and Pliny Rogers, not to Mr. Litchfield alone.

VAN RENSSELAER P. SAXE, C.E.

Consulting Engineer

STRUCTURAL STEEL CONCRETE CONSTRUCTION

Knickerbocker Building

Baltimore

Tex Rickard says: "LAPIDOLITH did what you claimed. The floors improve under traffic."

MADISON SQUARE GARDEN CORPORATION 49 AND SOT STREETS-EIGHTH AVENUE NEW YORK May 24, 1925. L. Sonneborn Sons, Ind; 114 Fifth Ave New York N Y

> This is the third year since you applied your Lapidolith Hardener and Dustprosfer to all the cement floors of the New Madison Square Garden, New York City.

Lapidolith did what you claimed and as a result the floors are hard and smooth showing no signs of wearing or dusting, but improve under traffie. Yours truly.

Madison Square Garden Corporation

1 Gro L. Rusfaul President

O.L.RICKARDIL

EN million people, it is estimated, have swarmed into Madison Square Garden since its opening three years ago.

203

Twentymillion feet! Pounding, kicking, scuffing the Garden's concrete floors.

What a test for Lapidolith-Sonneborn's Concrete Floor Hardener that protects these floors.

Tex Rickard knows how to pick the winners. When he found that the untreated concrete floors at the Garden gave off clouds of concrete dust, he picked Lapidolith to harden, wearproof and dustproof them.

Just how effectively Lapidolith hardened the 250,000 square feet of concrete is shown in the letter at the left. Lapidolith did its work because of its quick absorption at night without interfering with the operation of the Garden.

If you visit Madison Square Garden, look at the floors. They are hard as flint. The areas subjected to the heaviest traffic are like polished marble. And there is no concrete dust.

And, as Mr. Rickard says, "They improve under traffic."

L. SONNEBORN SONS, Inc. 114 Fifth Avenue, New York City

BONNEDORISON ON THE OUPON TOO AVEN TONE

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Auto the interest you

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tober, 1928

An open letter from the president of C. A. Dunham Co.

DUR National business has become International. Under corporate powers vested in several companies, the latest of these is the A. DUNHAM COMPANY, LTD., of indon, England.

There are at present more than eighty offices in the nited States, Canada and Great Britain, and in adion thereto, there are several agencies in other parts the World. This forms an active background for Dunham Differential Vacuum Heating System.

An Organization of Specialists

In each office there are from one to ten members one or more of whom have engineering training, alifying them to advise on the proper application this new heating method.

Certain well defined territory boundaries surround ch company office, and all installations are the ed responsibility of the managing engineer in rose territory these systems may be located.

Such local tie-ups between the company's organition and the Architect's engineer to design the ating, and subsequently with the heating conctor in the installation, is insurance of satisfaction the owner.

This is a brief picture of the merchandising end the Dunham organization.

It represents the contact point thru which our ssage of helpful service is demonstrated;—only its proper functioning, can the years of rich exrience be turned into channels of everlasting profit the recipient of Better Heating. The reputation d the combined intelligence of the men who are ck of this work cannot be questioned; each has a staining conviction of his responsibility in helping make this system possible for a general use.

Its Value Has Been Proved

There is no mistake about the value of heating ildings with low temperature steam which may be ried to meet the needed output to balance the heat

> U. S. Patent No. 1644114. Additional patents in the United States, Canada and Foreign Countries now pending.

A. DUNHAM CO 450 EAST OHIO STREET loss. Mr. Apple, Superintendent of the Barlum Tower, Detroit, states that the season's cost of heating that forty-story building with this system, was \$0.292 per square foot of radiation. The season started September 12, 1927, and ended June 5, 1928; it was a green building and had all the usual handicaps of foreign matter to clear, which invariably attends the first year of any installation. Steam costs were \$1.00 per 1000 pounds.

Our own building heating costs dropped from \$0.199 the first season to \$0.169 the second season's operation per square foot of radiation, and in each case this record was for the entire period between October 1st and May 31st using oil as the fuel.

Chicago apartment buildings show greater savings the second season than for the first, with a radiation operating cost per square foot as low as \$0.212 for the full heating period just passed using coal as fuel.

We have records on file of installations in and between Quebec, Canada, and Dallas, Texas; between Rhode Island and Oregon, each reflecting variables in fuel conditions and weather changes. Reports from every installation which was in operation during any portion of the winter, have been uniformly satisfactory and with fuel saving established beyond our most sanguine expectations.

A Most Important Development

Our own engineers, who have been so closely identified with me in this development, admittedly agree that for useful results wherever artificial heat is needed, this system numbers with the most important developments of the present day.

A mere statement that the Differential System properly installed and operated can accomplish the remarkable fuel saving claims, sounds bombastic without the evidence, but it is true—we have the evidence and the proof that the Dunham Differential System will save 25% (or more) of fuel over the standard vacuum return line system in general use today.

C.a. Dunham

Dunham Building CHICAGO, ILLINOIS



Modern Buildings Need this Modern Radiator

Typical of the fine buildings installing modern McQuay Radiators, is this New York City Apartment at 201 East 35th Street.

Gronenberg & Leuchtag, Architects. Barron-Hubert Co., Heating Contractors.

Its Beauty Attracts Tenants ---it Cuts Operating Costs

Complete circulation of the heated air—so essential to economical heating—is provided by the McQuay Cabinet Radiator (a complete radiator, not just a cover). For, heated air is impelled out into the room with sufficient velocity to distribute it evenly throughout. A humidifying pan inside the cabinet, provides the moisture needed for healthy, effective heating.

A Complete Radiator



Not Just a Cover

Part T

RADIATOR

Actually, because of the adequate circulation, and the greater heating effectiveness of moistened air—the temperature of a McQuay may be kept many degrees below that of old-style radiators. The fuel saving is considerable.

The copper heating unit—a distinctive McQuay achievement—is immune from rust and corrosion, will not "clog" and is practically indestructible.

Also: Concealed Radiators and Unit Heaters to meet any contingency

MOUAY RADIATOR CORPORATION

General Sales Office: Pure Oil Bldg., Chicago New York: 2148 Graybar Bldg. Boston: 164 Federal St. Newark, N. J.: J. F. McLaughlin Co., 738 Broad St., Cleveland: 291 E. 149th St.

