THE ARCHITECTURAL FORUM
IN TWO PARTS
ENGINEERING & BUSINESS
PART TWO
JANUARY 1928
The Twin Cities recognize the superior features of Richards-Wilcox elevator door hardware as evidenced by this large group of buildings all R-W equipped.

R-W Unit Control Insures Elevator Door Efficiency and Safety

Perfect service and safety come from unit installation of Richards-Wilcox hangers, closers, checks and interlocks—mechanical, electro-mechanical or electric. Unit installation provides unit control—and one responsibility covers all.

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Largest and most complete line of door hardware made
Three motor-driven Jennings Vacuum Heating Pumps, with automatic control. Installed in the building (shown below) of the Department of Finance, Tokyo, Japan.

You find Jennings Pumps everywhere!

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Engineers the world over recognize in the Jennings Heating Pump unusual simplicity of design, and dependability in operation which promote substantial economies in power, as well as in maintenance.

Jennings Pumps are built to make good. And thousands of installations everywhere prove that they do.

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12 Wilson Road

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Here is a perfected roller bed—
with many unusual advantages!

First of all, the “Warwick” is a real bed that appeals alike to owners, to architects and to tenants. It is comfortable, convenient, easily handled—giving added capacity to any plan and added comfort to the tenant.

The “Warwick” is a perfectly balanced bed that will remain at any angle without falling. Its rollers are large, silent, easy-going. Its design is graceful and dignified. The “Warwick” fits into almost any closet, requiring no special construction.

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The “Warwick” Roller Bed is a member of the famous line of Space Saving Conveniences produced by the “White” Door Bed Company. These conveniences provide greater comfort for the user, reduce building costs and make every foot of floor space yield a return. A catalog of “White” Equipment will be sent upon request, fully illustrated and containing many floor plans.

The “WARWICK” Roller Bed
Retaining ground compression is one important advantage of the reinforced steel shell left on every RAYMOND PILE.

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The compression set up by driving the core and shell is an important factor in the load-carrying capacity of Raymond tapering piles. Leaving every reinforced steel shell in the ground serves to retain this pressure, and at the same time protects the "green" concrete against it. If you're doubtful—the interior of every driven shell can be inspected before concrete is poured into it.

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STEEL Riveted

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But the best time of all to scrap a cheap, uneconomical boiler is before the idea of buying it has materialized into action.

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KEWANEE BOILER COMPANY

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STEEL HEATING BOILERS RADIATORS WATER HEATERS TANKS AND WATER HEATING GARBAGE BURNERS
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—the architect who was designing her lovely home responded, "STEELHART."

It was quite natural that a man of his seasoned experience and skill should specify this Expanded Metal base and reinforcing for so important a piece of work. For he backed his personal judgment with scientific facts which prove that STEELHART supplies the essential steel reinforcing in the exact form in which its strength can best be welded to that of the stucco. Such a union assures the durability which should go hand in hand with beauty.

Incidentally, Corrine Griffith's "dream home" is but one of the many notably fine residences whose permanence and safety have been increased by the use of STEELHART.

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Illustration at right shows Milcor BULL NOSE "Expansion" Corner Bead No. 10 (Pat'd: June 11, 1922) ... the latest addition to the famous "Expansion" Line of Corner Beads, Castings, Base Schedules, etc. Stay-Rib Metal Lath No. 1 is shown in the wall.

Write for the 80-page "Milcor Manual" and our new Bulletin on "Reinforcing Rib Lath"—no charge.

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PALMER HOUSE, CHICAGO
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Similar Castle built-in equipment is available, mounted either with Monel metal panels as shown, or recessed directly behind tile walls.

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Heating engineers and contractors know from experience that they can build prestige and make profits with Milvaco equipment.

One manufacturer—one guarantee, means satisfaction to all.

For 27 years the Milwaukee Valve Company has also been specializing in the manufacture of the unexcelled line of "Milwaukee" standard brass valves, packed type radiator valves, gate, globe, angle, check valves, etc.

Write for complete information

MILWAUKEE VALVE CO.
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OFFICES IN ALL PRINCIPAL CITIES
Cleveland Terminal Tower
equipped with 11,000 sq. ft. of **VENTO**

The preference for VENTO cast iron blast heaters indicated by the famous architects and engineers who planned this great project, is a reflection of the good will which VENTO heaters have won through twenty-five years of successful heating and ventilating.

Cleveland Terminal engineers recognized, of course, the familiar advantages of VENTO cored-surface design and the staggered assemblage, with the resultant high rate of heat transfer. (These features cause the most intimate contact of air with heating surfaces.)

They know also that VENTO heaters respond easily and accurately to automatic control—that they are convenient to assemble and invariably effect material saving of space—that VENTO tempering coils do not freeze up in the worst blizzards—and that thermal shock causes no fracture of metal after many years of use.

Architects and Engineers taking alternate figures find the net installed cost of VENTO to be less than other types of heaters. This should eliminate concern as there has never been any record of VENTO failure in over a quarter of a century.

Our Engineers' Data Book and other illustrated literature on ventilation should be in the hands of Architects, Engineers and Contractors for public buildings and factories. These books are sent free on request.
York installation at the Hotel Statler, Boston, Mass. Here, provision is made for the manufacture and storage of raw water ice, filtering and distributing chilled drinking water throughout the house, and maintaining correct low temperatures in all the food storages.

All inclusive "YORK" refrigeration—for the new STATLER, Boston

The benefits of precedent and years of experience in designing, building and installing all inclusive systems of refrigeration for every type commercial and industrial project are at your disposal.

To effectually and economically lay-out a refrigerating system embracing such applications as ice manufacture, drinking water cooling, food storage, etc.—all of which are required in the modern hotel—the services of refrigerating engineers are necessary.

York specializes in installations contemplating either carbon dioxide or ammonia refrigerating systems.
Emergency Lighting
that fits any
Building Plan

An Exide-equipped Emergency Lighting
System is simple . . . easy to install . . .
adaptable to any requirements

You know the vital necessity of lighting protection in any building where the public assembles. Continuous light is imperative in the Hospital, School, Auditorium and many other public buildings. It is for just such needs that Exide-equipped emergency lighting is designed.

Flexible protection
This emergency lighting fits any building plan. It is adaptable to the rooms that must be protected against light failure.

Whether you are installing lighting protection for an entire theatre, or simply for the operating rooms of a hospital—an Exide-equipped system is ready to do as large or as small a job as necessary.

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The best thing about such a system is its unfailing reliability. The reliability that is an outstanding feature of Exide Batteries. If the main current fails, the lights automatically switch to the battery, and the lights burn as brightly as ever.

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Another big feature of an Exide-equipped system is its simplicity. There is no complicated mechanism to get out of order. No expert care is needed. You can see for yourself how this reduces upkeep.

Free technical service
For a more detailed description of emergency lighting, see page 2876 of Sweet’s Architectural Catalogue—section C.

One of our engineers is ready to consult with you—to make helpful suggestions. This entails no obligation at all. Many architects have found that this technical service saves them much bother. A letter will bring an Exide engineer promptly.

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia
Exide Batteries of Canada, Limited, Toronto
LIGHT —

Brings Inspiration!

TRY this yourself,—work on some of your knotty executive problems in a dimly lighted office. See how you fail to solve them. See how you quickly reach the “Oh, what’s the use” stage. You don’t know what’s wrong, but you haven’t got your punch.

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Well-lighted working space for shop or office is a business investment of absolutely first importance. Good skylights increase your top-efficiency space.

Grauer Transparent Roofing for offices and shops (specified by many leading architects) assures trouble-proof lighting through decades—leak-proof, fire-proof, burglary-proof. Grauer Sidewalk Lights give the same service to your basements,—greatly increasing the income, with just as little upkeep trouble or expense.

Let us tell you more about it in our “Skylight Bulletin” and “Sidewalk Light” Bulletin.
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YOU never see any but a steel boiler in a power plant, in an ocean liner, in a locomotive. Where the highest efficiency, strength and safety are required, steel alone will serve.

For many reasons well recognized by engineers and architects, steel heating boilers, as a class are the most economical, reliable and efficient heating boilers manufactured.

HEATING BOILERS DIVISION
The American Boiler Manufacturers Association

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The Higgin Way makes completely satisfied clients

HIGGIN resources, Higgin efficiency and Higgin craftsmanship make possible many advanced features of design and construction which assure better screening results and increased user satisfaction. A few of the special Higgin features are illustrated and described at the right. . . . Our large screen and weatherstrip business requires that we have experienced and trained representatives in the principal cities the year 'round. There is, therefore, an Higgin expert near you who will come to your office at your call and help you plan screen and weatherstrip details. Write the factory direct if you do not know his name and address. . . . Higgin Screen and Weatherstrip Drafting Room details sent on request. Note this new file number for Screens — A. I. A. No. 35-P-1. The Higgin Mfg. Co., General Offices, Newport, Ky. Branches at Kansas City, Mo., and Toronto, Ont., Canada.

HIGGIN
ALL METAL
Window Screens

Screens that last longest cost least
Higgin Screens Last

The Higgin hinge consists of a fixed pin at one corner and a small, inconspicuous trigger lever operating a spring pivot at the other. When hinges are in place, pivot is entirely concealed. No unsightly butt hinges. Screen can be removed with one easy motion.

Higgin trigger latch, the most common of latch fasteners for hinged type screens. The striker is of the rectangular beveled type. Keepers come in sizes to meet all requirements.

Ring spring pull lock with flat keeper, often used in connection with metal trim so that round keeper holes may be provided. Easy to operate, yet positive in action.
Great A. & P. Bakeries are equipped with BLOXONEND FLOORS

11 Eleven A. & P. Bakeries in various parts of the country have been floored with BLOXONEND because RESULTS have proved it pays!

In the bakery shown above, more than 38 tons of dough are moved over the FLOORS each day. BLOXONEND was installed four years ago. Today it is like new and so smooth that one man handles with ease loaded troughs weighing 1400 lbs. A saving in man-power, time and equipment—floor repairs eliminated.

Your industrial client would also be enthusiastic about the DURABILITY, LASTING SMOOTHNESS and RESILIENCY of Bloxonend.

Write for sample and specifications

CARTER BLOXONEND FLOORING COMPANY
Kansas City, Mo.

Branch offices in large cities—see Sweet's.

BLOXONEND Lays Smooth FLOORING Stays Smooth
To prevent mortar from varying in strength and quality, I specify Kosmortar

REALIZING that his major problem is getting his specifications carried out, the architect says, "Let us eliminate all chance; let us do away with the human element; let us specify a mason's cement which we know has the strength, beauty and working qualities we want"... and he specifies Kosmortar.

Men who know building and its requirements realize the value of uniformity. They know that if they rely on the cement mixer to prepare mortar it generally will not be uniform. Workmen are not created so dependable. As one architect has put it: "If I were to specify a mortar of 90% cement with a 10% admixture of lime, I'd just as likely get a mortar having 10% cement and 90% lime. When I specify Kosmortar I know the proper cement content will be in the mortar; the mixer has only to put in the right proportions of sand and water."

Kosmortar guarantees a uniformly strong and secure bond. It is a saver of time, a speeder-up of the mason's task, a source of money-saving for every building job. It is unsurpassed for workability; virtually pushes the trowel on its path; cuts clean; never works short and can be used in the narrowest joints. It is a soft-toned buff color—appearing as though it were colored—blending beautifully with any brickwork and mixing with all mortar colors.

The possibilities of unique design through the use of Ingalls Trusses are almost as varied as the different types of buildings. For skyscraper, garage, church, school, or residence, the Ingalls Truss is better. It gives greater strength while reducing the weight, not only of the floors, but of supporting structures.

For balconies, as in theatres or loggias, this light weight, easily installed truss presents an easy solution of difficult problems. It has even been used successfully in curved designs for overhanging balconies.

Safe, sound-proof and fire-proof, positively anchored, and adaptable for reinforced concrete or steel framed buildings with equal facility, the Ingalls Truss fills a long known need in a manner thoroughly satisfactory both to the architect and the contractor—for with all its other advantages goes an impressive cost reduction.

For complete engineering data and descriptive information, write us at once.

The INGALLS Steel Products CO.
Main Office and Plants, Birmingham, Ala.
"Value" as a Sign of the "Quality" Job

leadership could not long be maintained without a definite delivery of value on every job by the panelboards themselves. Architects eventually get all building products made their way for without architectural favor there would scarcely be a market. leadership means more than just being better than competitors.

Panelboards have anticipated architectural desires and requirements—they are developed years beyond the bare necessities of the present and therefore not only deliver an extra margin of service at no extra cost but are "The Sign of a Better Job."

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Genasco protection for The Stevens!

Nothing was left undone to make The Stevens, Chicago, the “world’s greatest hotel.” On top of it you find a Genasco Standard Trinidad Built-up Roof, affording all the protection of nature’s own unequaled waterproofer, Trinidad Native-Lake Asphalt—famous as a street paving material for over a half-century.

The layers of thoroughly saturated tough, long-fibred rag felts, bound together by Trinidad Lake Roofing Asphalt, make a roof which resists wear and weather and water in a way that has never been equaled by manufactured compounds. And it also resists corrosion caused by industrial fumes.

Because of its long life and low cost of maintenance, Genasco Standard Trinidad Built-up Roofing is used extensively on hotels, office and manufacturing buildings, hospitals, schools, and other public buildings, and is specified by leading architects everywhere.

Write us for full information about Genasco Standard Trinidad Built-up Roofing.

The Barber Asphalt Company
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A shingle of extra size, extra weight, and unusual rigidity—outstanding in thickness and dependability. Six colors, conservative yet distinctively rich—offering a wide opportunity to express good taste as well as individuality.

So that you may see the superiority which Ruberoid Massive Units have over ordinary asphalt shingles we will be glad to send you samples upon request.

The RUBEROID Co.
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This thermostatic wood deadens sound in world's finest co-operative apartments

HERE is a combined sound-deadening, insulating and building material which is bringing new and greater comfort to thousands of families throughout America.

Its use as a sound deadener in the world's finest co-operative apartments is alone impressive evidence of its unequalled merit.

Yet this is only one example of the superior service assured by Masonite, the thermostatic wood. It is also providing an ideal plaster base, good, strong sheathing, and permanent insulation in homes of every type and of every size.

Send for reports of tests made by Robert W. Hunt, Riverbank Laboratory and Armour Institute. These prove Masonite superior for strength, acoustics and heat insulation.

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Dept. 618, 111 W. Washington Street, Chicago, Illinois
Mills: Laurel, Mississippi

Masonite
MANUFACTURED LUMBER FOR
STRUCTURAL INSULATION

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These Beautiful Cabinets
Cut Down Waste

The Onliwon system offers the utmost in toilet paper service at low cost, for four basic reasons:

- **Beautiful cabinets**—carefully built, never out of order. Easy to refill, reducing servicing time.
- **Finer paper**—soft, yet firm and absorbent. Fewer sheets suffice.
- **Economy**—two interfolded sheets served at one time. No waste. Reducing greatly the actual amount of paper used.
- **Nationwide service**—through our warehouses and distributors, permits prompt delivery.

THE cost of installing heating apparatus of any kind is before long exceeded by the cost of its operation. The cost of heating a building of any type by any sort of apparatus, in fact, is such that the selection of equipment may well engage the attention of both architect and client. This volume is a closely detailed study of the advantages of using oil as fuel. That these advantages are fully appreciated by the public is abundantly proved by the large number of heating installations which during the last few years have been modeled to permit the burning of oil, the advantages being sufficiently numerous to outweigh in the minds of home owners the fact that there are some other fuels which cost considerably less.

Prepared especially for use by the heating and ventilating engineer, the heating contractor, architects, those engaged in the oil-burning industry, and for the user and potential user of oil-burning equipment, this volume contains 32 chapters covering the subject in all its phases. The treatment is such as to adapt it to the non-technical reader as well as to the man with an engineering background. There are two chapters on “Oil Fuels,” with definitions, characteristics and specifications of fuels, sources, preparation and distribution, covered briefly but in sufficient detail to provide essential information on the subject. A chapter on combustion is devoted to theory, and another to practical considerations. Incorporated in the latter are a number of flame illustrations from photographs, taken especially for this volume and representing the flame characteristics of different types of burners. Two chapters are devoted to boilers for use with oil burners, one dealing in particular with the newer types that have been designed especially for use with oil.

Covering subjects that are of considerable interest to the owner is the chapter on “Warm Air Furnaces for Use With Oil Burners,” in which the requirements of this form of house heating are discussed. There are four chapters devoted specifically and entirely to oil burners, one chapter dealing with types and characteristics, a second with atmospheric draft burners, and two chapters devoted to the modern mechanical draft machines. A novel

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

The great utility of concrete as a material for building lends importance 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 fireproofness protects life and property; its strength and safety are increased by its monolithic nature; and its permanence is proved by long use.”

The text of this work dwells in detail 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 are illustrations of buildings in England, France, Belgium and Germany, as well as many of structures in the United States.

Text and 100 Plates; 8½ 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
method of treatment features these chapters in which the salient parts of nearly 30 of the leading oil burners are described and illustrated. “The Control of Oil Burners” is described in detail, with the modern methods of interlocking such controls with boiler, stack and other safety devices. The chapter on “Efficiency” clears up a great many misleading ideas about oil burner performance and makes it clear that several kinds of “efficiency” may be discussed profitably in selecting heating equipment.

A valuable contribution to the oil burner industry is the Iso-Oil-Consumption Chart, the use of which is described in a chapter on that subject. By means of this chart, it is possible accurately to compute the amount of oil fuel required in any building anywhere in the United States, and the work says that the many reports testifying to the accuracy of figures derived from it that have been received indicate that, as its use spreads, it is bound to the accuracy of figures derived from it that have been received indicate that, as its use spreads, it is bound to be a useful contribution to the heating industry. There is an interesting chapter on the value of house insulation, one on the checking of radiation, and another on checking the heating plant installation. For the benefit of the prospective oil burner purchaser, there is a chapter on “Buying an Oil Burner,” and a companion chapter on “Selling Oil Burners” which gives interesting and valuable information to the man on the opposite end of the contract. The servicing of oil burners, one of the important problems confronting the oil burner manufacturer, is replete with data and new ideas which are valuable.


**Acoustics of Buildings**

Including

**Acoustics of Auditoriums and Soundproofing of Rooms**

By F. R. Watson

Professor of Experimental Physics, University of Illinois

This book covers the entire subject of Acoustics of Buildings. It describes briefly the action of sound in buildings, and, in accordance with the present knowledge of the subject, gives detailed illustrations of guidance in the acoustic design of new buildings and in the correction of acoustic defects. In this volume, mathematical formulæ and theory have been minimized, but the results of experimental tests are set forth in considerable detail. Formulæ which are needed for calculating acoustic effects are illustrated by numerical examples and curves. The publication of this book was made necessary because of the repeated requests made by architects and builders for help in the correction of acoustic difficulties found in many buildings. Information is also needed about the construction necessary to avoid these defects in new buildings. As the scientific publications on the subject deal with special topics in more or less general terms, an extensive study is required before practical applications can be made with any degree of confidence. The existing knowledge of the acoustics of buildings is incomplete in many respects, with the result that a number of misleading ideas have grown up to explain the phenomena. The book is divided into two main divisions, ‘Acoustics of Auditoriums’ and ‘Soundproofing of Rooms.’

152 pages; 6 by 9 inches; 72 figures. Cloth, $3 Postpaid

ROGERS & MANSON COMPANY
383 Madison Avenue, New York
AIDING THE SPECIFICATION WRITER

It is difficult for the specification writer today to follow the old plan of including all iron and steel items in one specification.

The American Institute of Steel Construction offers expert aid through its Code of Standard Practice. This Code classifies all items and clearly defines all terms and obligations. It simplifies. It greatly reduces the chance of misunderstandings.

The Code is being used constantly by architects. Write (without incurring any obligation) for the Institute's publications. We will also send full information about our Department of Architectural Relations and a copy of the important fact-book, "STEEL NEVER FAILS."

AMERICAN INSTITUTE OF STEEL CONSTRUCTION, INC.
The co-operative non-profit service organization of the structural steel industry of the United States and Canada. Correspondence is invited. 263 Madison Avenue, New York City.

Steel Insures Strength and Security
necessarily complex and involved, for it engages the attention not only of the architects and engineers who prescribe the use of elevators, of the contractors and workmen who install them and the operators and owners who use them, but likewise of the maintenance and repair men whose ministrations are frequently necessary for their proper upkeep. All these different points of view are considered in this recent volume by the Assistant Editor of Power; it is a critical study into all the different details connected with electrically-operated elevators, and in its 25 chapters every possible matter having a bearing on the subject is dwelt upon and in countless instances fully illustrated. It is a work which should be thoughtfully studied by all those interested in electrically-operated elevators, and especially by those members of architects' and engineers' staffs who are responsible for the selecting and installing of particular types of elevators.


PUBLICATIONS dealing with architecture and building and with the financing of large operations make frequent mention of the fact that those in charge of savings banks, insurance companies, and other institutions which make loans are paying more and more attention to the designing and planning of buildings which they finance as well as to the quality of the materials which enter into the structures and the equipment which fits them for their several purposes. It can readily be seen, of course, that the control of this highly important detail is in the hands of the specification writers in the offices of the architects who design and supervise construction of these buildings, but there has never been any very definite move toward what might be called the "systematizing" of specifications. Each office has been a law to itself, and the same specifications have been used over and over again, sometimes being wholly unchanged for years. The trend in the past few years has been into use a great number of new materials and details of equipment, many of great value, marketed by energetic sales forces, but with which even astute specification writers have not always been familiar.

This volume, the most recent of the practical and useful works issued by the Pencil Points Press, Inc., presents the specifications prepared in the office of York & Sawyer, New York, for a large hospital in Pennsylvania. "The publication of this volume is, frankly, an experiment. For a great many years it has been evident that the specification documents produced in most architects' offices have fallen far short of perfection; in fact, there seems to be a very general opinion to the effect that on the average the specifications have not been as well prepared as the drawings, and that the resulting difficulties, both on the work and often in subsequent law suits, have caused annoyance, waste of time, and loss of money. "Many attempts have been made to prepare a comprehensive book telling all about the subject. Most of these works have never been carried beyond the stage of discussion. No adequate book on specification writing has as yet been produced, and so far as is known no progress is being made toward the production of such a work. In order that some substantial advancement may be made, there are now issued, as a contribution to the art of specification writing, the actual specifications for various types of buildings that have been produced in leading architectural offices. It would seem that in this way opportunities for comparison and study will be open to those who prepare the specification documents which should lead eventually to a gradual improvement in specification writing. It is not expected that the specifications here presented, from the office of Messrs. York & Sawyer, will be found available for adoption as a whole, but certain parts may very well be found useful by others preparing the specifications for a hospital of any kind. "Messrs. York & Sawyer, in permitting the publication of this specification, which they do not claim is possessed of any particular merit, are showing a commendable spirit of cooperation. They expect that this specification will be criticized and are perfectly willing to be subjected to such criticism for the good of all concerned. They will have the opportunity to examine the specifications of other architects as they are published from time to time in this series, from which they expect to improve their own specifications." The work has constructive value, and its importance should procure for it wide use.


THERE are not many materials entering into building which are more useful than plaster. It performs, in fact, many functions, for in one form it supplies the facing for exterior walls, in another form it coats or lines interior partitions, while in still another of its many and varied forms it ceases to be merely practical and useful and appears in the marvelously beautiful work the producing of which has engaged the attention of architects from antiquity down to the present. This is a fourth edition of a work which appeared originally some 30 years ago and which ever since has been recognized as a text book on the subject. It deals with the subject of plastering in all its aspects, for though a great part of its 345 pages is occupied with a consideration of the decorative use of plaster, a large part is likewise devoted to explaining use of the ingredients of which plaster is composed, the tools, implements and processes used in its working, and the means by which there are secured those effects or results which might appear to be so simple, but which the trained plasterer knows are had only when great patience is exercised along with infinite skill guided by excellent taste. The work covers the subject plainly and fully.


BUILDERS and contractors have been known to complain of the lack of care or perhaps the lack of practical knowledge with which building plans are drawn and building specifications written. Sometimes this is due to lack of adequate training in the technical schools, and those responsible for the training of architectural draftsmen and those who construct buildings might well exercise considerable care in choosing the text books which students use as a basis for study. While written, as its title would seem to indicate, chiefly for the guidance of architects and builders, this work might be
On selecting a protective paint

The importance of protecting metal surfaces against rust and corrosion is generally recognized. There are prevalent, however, many different ideas about protective paints and their respective merits.

The intelligent selection of a protective paint for steel requires three facts:

First, a knowledge of the pigment and vehicle used.

Second, a knowledge of the service records made by the paint and representative satisfied users.

Third, a knowledge of the manufacturer’s reputation and facilities.

With this knowledge, it is usually easy to determine whether or not a particular paint will meet the requirements of a specified service.

In future issues of this magazine we will show the importance of the physical properties of protective paint pigments, and especially the difference in graphite pigments.

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Write for Color Card and Booklet 224-B.
studied with profit by students or by anyone concerned with correct building. The author, an architect as well as an instructor in architectural drawing at the William L. Dickinson High School, Jersey City, writes with his experience as an architect and as a teacher in view, and this work is in brief compass a complete treatise on building, dealing as it does with the actual carrying out of construction, from excavating to the installing of the wooden mouldings which often form part of interior finish or decoration. The volume is one of three which make up a recently published series, and their text as well as their carefully drawn plate illustrations gives them a highly practical value to both builders and architects.


The complexity which has been reached by the modern theater places a heavy burden upon architecture. What is sometimes called the "legitimate drama" was simple indeed during Shakespeare's day, when its demands were often met within the courtyard of an inn, and not unduly exacting when the drama was freed of its chains at the time of the Restoration. But for generations, and perhaps particularly in America, the drama has been growing more and more complicated, more and more dependent upon accessories, "properties," and all the other adjuncts which today seem to be very nearly as important as the spoken lines, and to which adroit stage managers and resourceful purveyors of theatrical fare are paying more and more attention. To add to this there has grown up, especially during the past decade, the vast industry engaged in producing and marketing the motion picture, to serve which there have been built hundreds if not thousands of theaters. The demands of the motion picture are simple, to be sure, compared to those made by the drama proper, but none the less there must be devised a theater representing a different type.

Architecture's services have therefore been drafted into the service of the stage just as they have been enlisted by "Big Business,"—with this difference, that while the requirements of the business world are more or less static, those of the stage are in a state of such constant change that what appears to be the final, ultimate word in theaters today may be thought to be hopelessly obsolete and out of date tomorrow, try as an architect may to so plan and construct that any change required may be made without completely tearing the building to pieces. Keeping abreast of improvement is difficult. Achievements of one day are outmoded the next.

Recent achievements in planning, designing, and building theaters are recorded in this helpful and constructive volume. Theaters large and small, and theaters devoted to the exhibiting of motion pictures as well as those designed for the use of various forms of drama are included; views of exteriors and interiors are given; and in most if not all instances plans and sometimes sections are presented. Following a foreword by S. F. Rothafel ("Roxy" of the screen world), there is given a written survey of the American theater as it exists today. Every detail of designing and planning is dwelt upon,—entrances and circulation areas; auditorium, the stage with its complicated equipment and details of lighting; the equipment of the house itself; the projection room; and all the other details which go to the making of a well planned theater. As was just said, the modern theater might be said to be constantly in a transition stage;—but this volume records its present high water mark, and as such a record it merits the attention of architects and indeed of anyone connected in any way with the theater.


TEXT books used in schools of architectural drawing and building construction quite naturally have considerable influence on the students who study them, and the training of students has its effect upon the service which they render in actual practice. Mr. Halstead, in addition to being an architect is an instructor in architectural drawing at the William L. Dickinson High School, Jersey City, and this work, as well as two other volumes which make up a series of three recently published, has been prepared with his classroom experience as a background. The scope of the work is rather larger than its title might lead one to expect, since in addition to dealing with the correct designing of windows, doors, cornices, water tables, stairs, etc., it treats of plumbing systems and the proper method of framing buildings. All this is discussed in text which is written with admirable plainness and illustrated in 114 carefully prepared plates. The volume, as well as the others of the series, is well deserving of study by draftsmen and specification writers, and indeed by anyone to whom proper designing is important. It covers its subject well.


It seems to have taken modern architects and engineers a long time to fully grasp the structural possibilities of concrete and even longer to understand the proper way of designing structures for which concrete is used. For many years it seems to have been supposed that the value of the material lay wholly in its strength, and buildings and bridges constructed of concrete, while leaving little to be desired in the way of strength and utility often fell lamentably short of realizing certain other possibilities which concrete offered to those who would use it with care and thought; and yet there are still many buildings in the world,—structures left by antiquity to the modern world,—in which concrete is well handled as regards design as well as structure. This volume, prepared in England but illustrated with half-tones showing structures in other countries of Europe as well as in America, shows skillful handling of concrete, while the structural possibilities are described and illustrated in cuts of buildings of many kinds, much of the work being highly architectural, while much would seem to classify under the heading of engineering rather than of architecture. It would be difficult to decide whether the discussion of concrete on the score of design or in the matter of construction is the more important. Both aspects, however, are well covered, thus giving the volume a value to those interested in both. Several illustrations show concrete so used that the "form marks," generally regarded as disfiguring it, seem to possess a decorative character which has some value.

Any book reviewed may be obtained at published price from The Architectural Forum.
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The American Laundry Machinery Company has recently completed a desk-file of valuable information pertaining to laundry practice in schools, hotels, clubs and institutions. Write for your folder of this interesting material.
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Published Monthly by ROGERS & MANSON COMPANY 383 Madison Avenue, New York
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OFFICES ARE EASIER TO RENT WHEN EQUIPPED WITH ATHEY WEATHERSTRIPS OR WINDOW SHADES
CONSTRUCTION, IN PROGRESS, AND COMPLETE

FROM A CAMERA STUDY BY P. A. NYHOLM

The Architectural Forum
In recent years the public has taken a very real and constantly increasing interest in the conservation of heat in homes. This has been due in large part to the increase in the cost of fuel for heating, to the gradual adoption of use of oil and gas-fired heaters, and to the extensive advertising campaigns of various manufacturers of insulating materials as well as to a desire for more comfortable housing. The industrial engineer has long been familiar with the savings due to efficient insulation. The almost universal custom of insulating steam pipes, boilers, furnaces, ovens, kilns, refrigerators and cold storage warehouses shows how fully this is appreciated. Perhaps it is not quite so well understood that insulation can usually be used to advantage wherever a loss of heat occurs through the walls of any enclosure.

In the case of residences, practically all of the fuel used in the heating system serves to replace the heat lost through the walls, roof, windows and doors. Proper insulation will minimize the loss of heat through the walls and roof, but of course it will not affect the loss from the windows, and weather strips or, better still, both double windows and weather-strips, should be provided. In a discussion of insulation for houses, it is always well to bear in mind the fact that windows and doors are sources of great heat loss and, consequently, that the greater the percentage area of the windows and doors the smaller will be the effect of wall and roof insulation in the saving of fuel. For example, the heat loss from a particular residence might be such that 45 per cent of the total loss is through the doors and windows, while 55 per cent is lost through the walls and roof. If excellent insulation is applied throughout, the heat loss through the walls and roof might be reduced by one-half. The total heat loss from the house, however, will not be reduced 50 per cent but only 50 per cent of the 55 per cent lost through the walls and roof, or 27.5 per cent.

In return for an investment in insulation, one can fairly assume that one will receive these advantages, the relative extent of which depends upon the type and thickness of the insulating material and also upon the relative area of windows and doors as compared with the walls and roof:

1. Saving in fuel cost of from 10 to 40 per cent.
2. Saving in size of heating system.
3. More uniform temperature distribution, with elimination of drafts.
4. A cooler house in warm weather, and particularly in the upper story.
5. Possibility of using the more expensive, but more reliable or convenient fuels, such as gas or oil, with less difference in cost.

Types of Insulation. The insulating materials generally used for house insulation may be roughly divided into four classes,—rigid boards, flexible sheets, cast, and loose materials. The rigid board type of insulation is in most common use today and is represented by such materials as cork board, fiber board, mineral or rock wool boards, and plaster boards. Cork board is made by compressing granules of pure cork into moulds and baking at a moderate temperature. No binder is required, as the natural gums of the cork itself serve this purpose. This material is generally furnished in blocks 1 foot wide, 3 feet long, and from 1 to 4 inches thick, the usual thickness for house insulation being from 1½ to 2 inches. Mineral or rock wool boards are made from slag or rock wool, felted and pressed, with or without binder, into blocks similar in dimensions to those of cork board. The fiber insulating boards are made by compressing wood, bagasse (sugar cane fiber) or other vegetable fibers, with or without binder, into large sheets approximately 4 feet wide, 8 feet long, and about ½-inch in thickness, one or two layers being commonly used in walls of dwelling houses. Wall boards of gypsum between two layers of heavy paper are also made, for insulating purposes, in large sheets similar to the fiber boards. Plaster can be applied directly to cork or fiber, thus saving some expenditure for wood or metal lath. In the case of frame houses, the insulating boards are usually applied on the inside of the studs, but they can be applied to the outside as well, if there is suitable protection from the weather. For brick, stone, tile or concrete walls, the insulating boards are applied on the inside, usually with the aid of furring strips.

The flexible types of insulation are represented by sheets made of fibrous materials, such as cattle hair, waste flax, eel grass, etc., covered with paper
but fuel cost will be reduced and if 2-inch thickness is applied, the cost is likely to run as high as 5 per cent of the cost of the dwelling, small. Where insulating material of good quality and laths, the additional cost of insulation will be very thin insulating boards replace the sheathing and laths, the additional cost of insulation will be very small. Where insulating material of good quality and of 2-inch thickness is applied, the cost is likely to run as high as 5 per cent of the cost of the dwelling, but fuel cost will be reduced and comfort increased.

Factors Determining Choice of Insulation. Some of the factors that would aid in choosing insulation are: cost of material; cost of application; weight; thickness; strength; fire resistance; vermin resistance; thermal conductivity; effect of moisture and water; permanence; decay or deterioration; settling; ability to take plaster coat; etc.

The cost of insulating materials varies so much with the different types, different localities, and with the different methods of application, that it would be of little value to attempt to give cost data. Where thin insulating boards replace the sheathing and laths, the additional cost of insulation will be very small. Where insulating material of good quality and of 2-inch thickness is applied, the cost is likely to run as high as 5 per cent of the cost of the dwelling, but fuel cost will be reduced and comfort increased.

### Properties of Insulating Materials

<table>
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<tr>
<th>Type of Insulation</th>
<th>Weight in lbs.</th>
<th>Thermal Conductivity</th>
<th>Fire Resistance</th>
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<tr>
<td>Cork</td>
<td>10</td>
<td>0.30</td>
<td>Slow-burning</td>
</tr>
<tr>
<td>Mineral and rock wood boards</td>
<td>12-20</td>
<td>0.3-0.5</td>
<td>Non-combustible</td>
</tr>
<tr>
<td>Fiber boards</td>
<td>12-20</td>
<td>0.3-0.5</td>
<td>Slow-burning</td>
</tr>
<tr>
<td>Plaster boards</td>
<td>30-60</td>
<td>0.8-1.5</td>
<td>Non-combustible</td>
</tr>
<tr>
<td>Flexible Eel grass between paper</td>
<td>5-8</td>
<td>0.25-0.30</td>
<td>Slow-burning</td>
</tr>
<tr>
<td>Cattle hair and flax fiber between paper or cloth</td>
<td>8-15</td>
<td>0.3-0.4</td>
<td>Slow-burning</td>
</tr>
<tr>
<td>Cast Cellular gypsum</td>
<td>12-30</td>
<td>0.4-0.9</td>
<td>Non-combustible</td>
</tr>
</tbody>
</table>

### Calculation of Heat Losses.

The effectiveness of any material used as an insulator to prevent the passage of heat depends upon a peculiar characteristic property of the material itself. Just as iron is heavy, strong and tough, and glass is heavy and brittle, and wood is light and tough, so are they possessed of another quality which unfortunately has no name quite as expressive as weight or strength or hardness, but which we call "thermal conductivity."

In a general way, materials which are soft, light, porous and fluffy are good heat insulators, and we

### TABLE OF HEAT

<table>
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<th>TYPE OF INSULATION</th>
<th>Tile or slate on wood sheathing</th>
<th>Shingles, sheathing and studding</th>
<th>Shingles, sheathing on stud, lath &amp; plaster</th>
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<tr>
<td>No insulation</td>
<td>0.82</td>
<td>0.35</td>
<td>0.30</td>
</tr>
<tr>
<td>Cork board</td>
<td>0.22</td>
<td>0.16</td>
<td>0.15</td>
</tr>
<tr>
<td></td>
<td>Saving 73%</td>
<td>Saving 54%</td>
<td>Saving 50%</td>
</tr>
<tr>
<td></td>
<td>0.13</td>
<td>0.10</td>
<td>0.10</td>
</tr>
<tr>
<td></td>
<td>Saving 84%</td>
<td>Saving 72%</td>
<td>Saving 67%</td>
</tr>
<tr>
<td>Fiber boards</td>
<td>0.40</td>
<td>0.24</td>
<td>0.22</td>
</tr>
<tr>
<td></td>
<td>0.27</td>
<td>0.19</td>
<td>0.17</td>
</tr>
<tr>
<td></td>
<td>Saving 51%</td>
<td>Saving 31%</td>
<td>Saving 27%</td>
</tr>
<tr>
<td></td>
<td>0.16</td>
<td>0.13</td>
<td>0.12</td>
</tr>
<tr>
<td></td>
<td>Saving 81%</td>
<td>Saving 63%</td>
<td>Saving 60%</td>
</tr>
<tr>
<td></td>
<td>0.42</td>
<td>0.24</td>
<td>0.22</td>
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<tr>
<td></td>
<td>0.31</td>
<td>0.20</td>
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<td>0.23</td>
<td>0.16</td>
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<tr>
<td></td>
<td>Saving 49%</td>
<td>Saving 31%</td>
<td>Saving 27%</td>
</tr>
<tr>
<td></td>
<td>0.35</td>
<td>Saving 53%</td>
<td>Saving 50%</td>
</tr>
<tr>
<td>Cattle hair or flux</td>
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<td>0.23</td>
<td>0.21</td>
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<tr>
<td></td>
<td>0.59</td>
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<td>Plaster boards</td>
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<td>0.16</td>
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</tr>
<tr>
<td></td>
<td>0.16</td>
<td>0.13</td>
<td>0.12</td>
</tr>
</tbody>
</table>

Rate of Heat Transmission Expressed in B.t.u., per Hour, per Sq. To.
Coefficient of Thermal Conductivity "K" Expressed in B.t.u., per Hour, per Sq. To.
say that they have a low thermal conductivity, or that they are poor heat conductors. Materials that are dense and heavy are usually good conductors of heat, and have what we call high thermal conductivity. The numerical index of this property is commercially called the coefficient of thermal conductivity, and it is not unusual to speak of a material as having a coefficient of thermal conductivity of 0.3, whereas common red brick has a coefficient of thermal conductivity of 5.0. Stating it even more precisely, we might say that a certain material 1 inch thick and 1 foot square has such a characteristic thermal conductivity that it would transmit 0.3 of a heat unit (British thermal unit) per hour, when the two surfaces of the sheet were 1°Fahr. apart in temperature. In the same way we might say that a layer of brick of similar dimensions would transmit 5.0 heat units per hour. It will be seen that this matter of conductivity is a characteristic of the material like light weight or color, and that it has nothing to do with the manner in which the material is used. It must be noted, however, that if heat travels through a sheet of insulating material, it must come from somewhere on one side and go somewhere on the other, and in entering and escaping from the sheet it encounters a resistance which in some cases is quite as important in delaying the passage of heat as is the conductivity of the material itself. This characteristic resistance of entry and exit depends to a great extent upon what kinds of things are in contact with both sides of the insulating sheet. If there is air upon both sides, the resistance of entry and exit may be considerable. If the sheet is enclosed with other material of the same sort, the resistance is very small. It will be seen, therefore, that it is by no means a simple matter to compute the rate at which heat will pass through a wall of insulating material unless we know with considerable precision its nature, its thickness, and the nature of the adjacent materials.

It is to be regretted that a good deal of confusion has arisen about this matter, and that although most of the materials have been carefully tested, and there are published figures available showing the characteristic coefficient of thermal conductivity, there is also a large amount of published matter in which the coefficient of thermal conductivity and the resistance to entry and exit of the heat from the surface are somewhat confused. Much of the data obtained by using the so-called “box method” of testing materials are difficult to use intelligently because of the failure of many of the early experimenters to distinguish between the resistance offered by the material to heat traveling through it and the resistance to entry and exit of the heat under the peculiar circumstances of the particular test quoted. Recently the Insulation Advisory Committee of the National Better Business Bureau has adopted standard methods of testing in regard to insulating materials. The “plate method” is without doubt the most precise means of measuring thermal conductivity, but the “box method” is open to considerable objection when used to compare insulating materials for dwellings. Box test data, giving “air to air” transmission values, are only applicable in these cases:

1. When the wall is composed only of insulating material, and box tests are made on the same

TRANSMISSION RATES.

<table>
<thead>
<tr>
<th>Clapboard, sheathing, stud, lath &amp; plaster</th>
<th>Clapboard, paper, stud, lath &amp; plaster</th>
<th>8&quot; brick, furring, lath &amp; plaster</th>
<th>4&quot; tile, stucco &amp; plaster</th>
<th>Stucco, stud, lath &amp; plaster</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.28</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>0.15</td>
<td>Saving: 46%</td>
<td>0.15</td>
<td>Saving: 52%</td>
<td>0.14</td>
</tr>
<tr>
<td>0.10</td>
<td>64%</td>
<td>0.10</td>
<td>68%</td>
<td>0.10</td>
</tr>
<tr>
<td>0.21</td>
<td>25%</td>
<td>0.22</td>
<td>29%</td>
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</tr>
<tr>
<td>0.16</td>
<td>43%</td>
<td>0.18</td>
<td>43%</td>
<td>0.16</td>
</tr>
<tr>
<td>0.12</td>
<td>57%</td>
<td>0.12</td>
<td>61%</td>
<td>0.12</td>
</tr>
<tr>
<td>0.21</td>
<td>25%</td>
<td>0.23</td>
<td>26%</td>
<td>0.20</td>
</tr>
<tr>
<td>0.18</td>
<td>36%</td>
<td>0.19</td>
<td>39%</td>
<td>0.18</td>
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<tr>
<td>0.15</td>
<td>46%</td>
<td>0.16</td>
<td>49%</td>
<td>0.15</td>
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<tr>
<td>0.20</td>
<td>29%</td>
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<tr>
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<td>11%</td>
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<td>49%</td>
<td>0.15</td>
</tr>
<tr>
<td>0.12</td>
<td>57%</td>
<td>0.12</td>
<td>61%</td>
<td>0.12</td>
</tr>
<tr>
<td>0.12</td>
<td>57%</td>
<td>0.12</td>
<td>61%</td>
<td>0.12</td>
</tr>
</tbody>
</table>

Flt. per 1°Fahr. Temperature Difference Between the Air on Each Side
Flt. per Inch Thickness, per 1°Fahr. Temperature Difference Between the Surfaces
thicknesses of the various insulating materials.

2. When an insulating sheet is placed in the middle of a large air space.

Both of these conditions are rarely found in actual practice. In every case the relative value of a poor insulator and a good insulator will be closer on an overall or “air to air” basis than when compared by the coefficients of thermal conductivity as found by the “plate method.” If it is desirable to find the rate of heat transmission through a built-up section of insulated wall, such as clapboards, paper, sheathing, studs, cork and plaster, the “box method” is an excellent means to adopt, but I feel certain, after 17 years of almost constant experiment with both methods, that the “box method” is of very little aid to the architect as a means of determining the relative insulating value of different materials unless all the special conditions connected with the test are known. It is my opinion that one should compare relative insulating values of materials by comparing their coefficients of thermal conductivity rather than overall or “air to air” transmission values.

The effectiveness of an air space as an insulator is frequently over-estimated, especially in the case of a well insulated wall or roof. It is doubtless true that minute air spaces, properly confined, help to make excellent insulating materials, but the large air spaces found in wall and roof construction are of minor importance as regards resistance to heat flow when compared to an inch or more of a good quality of insulation.

A few typical cases will illustrate the methods used in calculating the rate of heat transfer through insulated walls and roofs. There are many tables available which will give one an idea of the rate of heat loss through uninsulated walls, and from these the loss through an uninsulated wall of a certain type can be determined.

For example, the rate of heat loss from an 8-inch brick wall with furring, lath and plaster is found to be 0.27 B.t.u., per hour, per square foot, per 1°Fahr. temperature difference between the air on the two sides. If it is desired to find the effect of three different kinds of rigid insulation, applied between the brick and the plaster, one would first determine the thickness and the coefficient of thermal conductivity of the three types from tables or from reliable data submitted by the manufacturer. The data furnished might be thus expressed:

<table>
<thead>
<tr>
<th>Thickness</th>
<th>Thermal Conductivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample A</td>
<td>0.5 inch 0.30</td>
</tr>
<tr>
<td>Sample B</td>
<td>0.5 “ 0.60</td>
</tr>
<tr>
<td>Sample C</td>
<td>2.0 “ 0.30</td>
</tr>
</tbody>
</table>

Let H represent the rate of heat transfer through the uninsulated wall.

\[ H' = \frac{1}{\frac{1}{H} + \frac{L}{K}} \]

Thus with sample A

\[ H' = \frac{1}{\frac{1}{0.27} + \frac{0.5}{0.30}} = 0.19 \]

which represents a saving of heat loss through the wall of 30 per cent.

Similarly, sample B indicates a heat loss of 0.22 with a saving of 19 per cent, and sample C shows a heat loss of 0.096 with a saving of 63 per cent.

These savings apply to the wall, and if it is assumed that the same saving can be made by insulating the roof, and also that the loss through the windows and doors in this particular case is 45 per cent of the total loss, the actual saving of fuel would be for the three materials:

- Sample A 0.30 x 0.55=17 per cent fuel saving.
- Sample B 0.19 x 0.55=10 per cent fuel saving.
- Sample C 0.63 x 0.55=35 per cent fuel saving.

The table included here has been assembled in order to indicate the order of magnitude of the heat loss from some typical walls and roofs when insulated by various types of materials of different thicknesses. The values for the coefficient of thermal conductivity (K) given for the different types of insulation are the average values from a great many samples submitted to the Laboratory of Heat Measurements during the past few years. The percentage of heat saved is also tabulated, and it only applies to wall or roof as the case may be and does not indicate the total percentage of heat saved for the entire building. The values taken for the heat loss through walls and roofs of uninsulated construction are average values assembled from published tables, and are necessarily somewhat uncertain, due to widely different conditions of exposure and the human factor in construction. It should always be kept in mind that as the conditions become worse, the effect of insulation is greater.

**Summary.** There is no longer any real excuse for not insulating a new dwelling. There is always a tendency for one to under-insulate, and I have yet to find a residence that has been over-insulated from an economic standpoint. If the percentage area of the windows and doors is not above the average, and if at the same time they are suitably protected from excessive loss of heat, I would recommend insulation that is equivalent to 2 inches of a material having a coefficient of thermal conductivity of 0.30, on the walls and roof of a dwelling where fuel prices correspond to those found in New England.
THE PROPER USE OF LACQUER

The proved success of what is popularly known as “lacquer finish” on automobiles has created a tremendous interest in a wider application of these almost instantaneously drying materials. Research has been so stimulated among the finishing manufacturers that developments have crowded the market to the point of confusion. People became so enthusiastic about their new automobile finish that they visualized its universal application in finishing, and have so tried it. The consequence has been varying degrees of success and failure, but there has been clearly demonstrated the need for much study, development and modification of products to meet specific conditions.

Use of lacquer is decidedly not a “cure-all.” Outstanding is the different performance of lacquer on a wood surface and on a metal surface. A nationally known railroad adopted lacquer for its finish. Its officials are satisfied, to date, with results on the metal parts of their steel cars, but they have been obliged to return to use of old methods on their wooden cars.

Lacquers are being specified more and more by architects, as they become familiar with the material and the causes of success or of failure in previous work. The failures have been due largely to a lack of understanding of the proper use of lacquer materials. There seems to be a need for an unprejudiced synopsis of the whole problem of the use of lacquer materials from the architect’s point of view. In order to understand the essential elements of lacquer and its uses it would seem advisable to take up the subject in this order:

A. The Advantages to be Derived from the Proper Use of Lacquer.
B. The Disadvantages of Lacquer.
C. What Lacquer Really Is.
D. Considerations of the Use of Lacquer for Various Portions of the Architectural Finish.
E. The Application of Lacquer.
F. The Cost of Lacquer.

A. The Advantages to be Derived from the Proper Use of Lacquer. It will be observed that the words “proper use” have been chosen, and with reason. The advantages to be derived from the use of the material are predicated on the specifying of the proper grade and composition of the lacquer, on the proper preparation of the surfaces to receive the lacquer, and on the proper application on these surfaces. The most distinct advantage of lacquer over other finishes is its quick-drying property. Where speed is necessary, lacquer can be used to great advantage. It is possible to apply several coats of lacquer in one day, a process that would require a week, in all probability, if paint and varnish were used.

Speeding up the finishing work by using lacquer may result in the saving of a large amount of money in rentals and interest charges. In hotel work this is particularly true, as a room can be completely refinished in one day and be ready for occupancy the next, which would be obviously impossible with the older types of finishes. The same is true of hospital rooms or wards, as refinishing with lacquer allows the least possible interruption of service. Other advantages are the smoothness on metal surfaces which lacquer naturally assumes, due to its tendency to shrink when drying. It produces a very hard and tough surface that does not mar or scratch easily, and which is readily cleaned with little effort. It does not pick up the dirt or take the “grinding in” that varnish finishes usually do, and it will imitate a wax finish without the dust-collecting tendency of the latter. Lacquer can be made more transparent than any of the usual finishes and has a distinct advantage in producing a hard, clear, waterproof film.

B. The Disadvantages of Lacquer. From the architect’s point of view, probably the greatest disadvantage at present is that lacquer requires different handling, and different specifications and compositions for its various uses, and it therefore requires his careful study to insure its proper use. It also demands very careful preparation of the surface to which it is to be applied and an understanding consideration of the nature and condition of this surface to receive the finish. It is more exacting in its requirements than paint or varnish. The failures of lacquer have probably been due to choosing the wrong type of lacquer for the specific purpose, to a lack of care in the preparation of the surface, or to unskilled application of the lacquer. The properties of lacquer that are not to its advantage are its lack of elasticity, its relatively poor adhesion, its relatively small covering power, and the relatively thin film which it deposits. These disadvantages are due largely to the strong solvents which lacquer contains and its comparatively low solid content, as well as to the physical characteristics of its basic material. The solvents of lacquer will often attack oil and spirit stains, and with some lacquers only water stain is unaffected. It is not possible to obtain with lacquer the high luster of various varnishes and oil enamels. A disadvantage at present in the use of lacquer is the difficulty of obtaining artisans skilled in its application. The usual journeyman painter must unlearn a good deal of his paint and varnish technique in order to apply lacquer quickly and easily.

C. What Lacquer Is. The term lacquer has come to take on a new and rather definite meaning in architectural work. Lacquer as formerly understood was associated with the finishes on Chinese, Japanese and Hindu cabinet work and furniture. It was also applied to finishing materials such as shellac and spirit varnishes. There are now “flexible lacquers,” of comparatively recent development, which are fast-evaporating solutions of a solid ingredient which has good building properties and retains flexibility. This ingredient may be a pre-oxidized varnish, involving a special processing of a resin and oil combination, or it may be a synthetic plastic material. In either
case, the solid is compatible with nitro-cellulose, and most of these lacquers contain some nitro-cellulose as a hardener.

The term “lacquer” in the rest of this article will be limited to the nitro-cellulose base lacquer, or pyroxylin lacquer. The rather formidable word, nitro-cellulose, is merely a chemically descriptive term for the basic material of lacquers; nitrogen is combined with cellulose to form this material. The cellulose is of the same chemical nature as starch, and for the manufacture of lacquer short-fiber cotton is usually used as the cellulose content. The “cotton linters,” as the short-fiber cotton is called, is that portion of the cotton left after the long fiber has been removed for the manufacture of cloth. The nitrogen is obtained from nitric acid in a process in which sulphuric acid is used to take up the water formed in the reaction of the cellulose and the nitric acid. At the completion of the elaborate process, which involves several other steps, including dehydration, the nitro-cellulose has the same appearance as bleached cotton linters. To this basic nitro-cellulose material are added solvents, gums, plasticisers, and perhaps pigments, in various proportions and of various kinds, depending on the type or purpose of the grade of lacquer being manufactured. The similarity between lacquer and varnish has been easily removed by comparing the main ingredients of each:

<table>
<thead>
<tr>
<th>Lacquer</th>
<th>Varnish</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitro-cellulose (pyroxylin)</td>
<td>Linseed Oil</td>
</tr>
<tr>
<td>Gum</td>
<td>Gum</td>
</tr>
<tr>
<td>Solvents</td>
<td>Turpentine</td>
</tr>
<tr>
<td>Pigment</td>
<td>Pigment</td>
</tr>
</tbody>
</table>

The great difference is in the characteristics of the basic materials,—the pyroxylin dries hard in a short time as the volatile solvent evaporates, whereas the varnish merely “sets” as the turpentine evaporates, and the hardening is gradual as the oil oxidizes through its contact with air. The latter is therefore a two-stage process involving considerable time, the former a quick, one-stage hardening. Lacquer has not the film-building quality to the same extent as varnish, since it contains a relatively high percentage of volatile material, from about 70 per cent to 80 per cent, and a good varnish contains approximately 55 per cent. The resulting films naturally correspond to the non-volatile content which remains on hardening, and this explains why the film from a single application of lacquer is about half as thick as that from varnish.

One outstanding difference between a high content nitro-cellulose film and varnish film is that the former dries to a hard film of great tensile strength, whereas the latter dries to a more plastic, yielding film. When a lacquer film is freshly applied, a certain quantity of slow-evaporating solvents is retained in the film. These emerge gradually over a period of time, causing the film to contract or tighten. A fresh varnish film absorbs oxygen from the air with a consequent increase in weight and volume, and continues to do so throughout its “life.” We might say that the two films are opposite in their nature,—the lacquer always contracting and the varnish always expanding. This is an important consideration, as will be seen later.

D. Architectural Uses of Lacquer. The various considerations and conditions which the architect should understand in order that lacquer may be properly used will be mentioned here in this order:

1. Preparation of Surfaces Generally.
2. Use of Lacquer on Wood.
3. Use of Lacquer on Metal.

1. The preparation of the surface for lacquer finishing is an extremely important factor, a factor which in many cases determines the success or failure of the work. The surface must be absolutely dry and free from wax, grease, mineral oils, dust and dirt. The importance of this may be realized when one considers that a small piece of paraffin, if dropped into several gallons of lacquer, would ruin it by retarding its drying. Lacquer should never be used over old wax finishes nor over surfaces that have been cleaned with a paint remover or varnish remover which contains any wax.

2. Use of Lacquer on Wood. Lacquer makes a desirable finish for wood trim because of its hardness and its ability to stand considerable abuse without marking. The contracting tendency of lacquer has considerable effect on the appearance of the finish and its physical characteristics. When used over an unfilled open-grained wood it tends to emphasize this character of the wood as it does not fill the grain as varnish does. Lacquer lacks the filling and smoothing qualities of varnish. It will emphasize rather than correct the roughness or openness of the wood.

Close-grained woods do not offer the problem presented by open-grained woods, unless the latter are to receive an “open” or “un-filled” finish. If the wood is to be filled, it is an unfortunate circumstance that colored fillers, particularly those used on mahogany and walnut finishes, are likely to give serious difficulty. There is a tendency for the slow solvents in lacquer to settle in the pores, and over a period bleach out the coloring matter from around the pigment filler and eventually give the pores an unsightly gray or perished appearance. With many fillers this action will be pronounced in a few hours, while with others the effect, though gradual, is none the less eventually displeasing. This “graying” can be prevented only by the application of a coat of shellac or a special quick-drying insulating coat before lacquering; but if either of these methods is employed, the lacquer film is rendered tender. The alternative for this would be the specifying of a cotton base material which would do the staining and filling in a single operation. Such products are on the market, and being usable with lacquers, they produce satisfactory finishes. The drawback is their having a somewhat limited range of suitable and unaffected staining colors.
The question of stains and fillers to be used with lacquer is most important. An oil stain or spirit stain should not be used under lacquer, unless a lacquer has been thoroughly tested over the particular stain. The manufacturer should be consulted in regard to the best type of stain or filler to be used in connection with his product for the particular purpose in hand. Shellac underneath lacquer destroys its toughness and makes it tender in direct proportion to the film thickness of the shellac. It would be wrong to say that shellac should never be used under lacquer; but if it is necessary, it should be as thin a coat as possible, consistent with the particular case.

Wood expands and contracts only across the grain, and not with the grain to any extent. When wood is exposed to temperature changes, the film which is anchored to it contracts and expands in all directions, whereas the surface of the wood to which it is attached moves only in one direction. This is why “temperature” or “cold cracks” of varnish and lacquer films are always at right angles to the grain of the wood. The greatest difficulty with wood is its absorption of moisture. During a year, the moisture content of wood will vary by many per cent. It is always thirstige for moisture, and during humid periods soaks up all it can get. This results in a pronounced “swelling.” The movement is across the grain of the wood. It is this pressure which causes what are known as “humidity cracks” in lacquer and varnish films, and is why such fractures always run directly with the grain of the wood. Because of their great strength, lacquer films are quite resistant to cold checking, but are very likely to fail under the far more compelling and cumulative forms of moisture swelling of wood; in fact, “humidity checking” on wood surfaces may be considered one of lacquer’s greatest drawbacks. Varnish films are more yielding and plastic, and even should they fail, they often close up, as far as the eye can see, when the wood returns to a normal state. Lacquer’s failures remain visible to the eye.

Exterior Woodwork. Most forms of present-day lacquer are absolutely unsuited for use on exterior woodwork or on wood surfaces exposed to moisture. The lack of flexibility of the nitro-cellulose lacquers is an inherent characteristic. All wood exposed to moisture and atmospheric changes swells and shrinks; the lacquer is not elastic enough to expand and contract with the wood, and the consequence is that the lacquer is liable to crack and peel or scale.

Floors. Due to its hardness, durability, resistance to wear and abrasive marks, good lacquer seems to be well adapted for the finishing of floors. The hardness of the finish is resistant to the constant “grinding in” of dirt to which the floor is subjected. The floor may be given a finish approximating a wax finish but which will be much easier to keep clean, as the dust remains free on the surface rather than becoming embedded in the finish.

Walls. Although walls offer the largest amount of surface to be finished in a building, they are not always best adapted to take lacquer. It is essential that plaster walls be thoroughly dried out and “cured” before applying lacquer. That means that it is practically impossible to use lacquer on the plaster walls of new buildings to speed up such finishing. However, it can be used to advantage where speed is a requisite in refinishing walls such as those of hotel or hospital rooms so that they may be occupied without delay. Lead and oil finishes for walls may turn yellow as they age and oxidize; lacquer has no such tendency. Compared to wall paints, lacquer is perhaps more expensive because of its thinner film and poorer “covering” power. A priming coat is always desirable when lacquer is to be used on walls. Whether this primer should be of an oil base material or a special lacquer type depends on the type of lacquer to be finally used. In any case the primer must harden thoroughly before the application of the finish.

3. Use of Lacquer on Metals. Most architectural metalwork is primed at the factory before being set in place for the finishing in the building. The nature of the priming coat should be known before the correct lacquer can be specified for the finish. In any event, the surface must be clean. If lacquer is to be used on bare metal, it should be practically chemically clean to insure a good finish. If the metal is too smooth or polished there is a tendency of the lacquer to peel, due to its contracting nature and consequent lack of adhesion. It is often considered best to give metal surfaces a coat of a good oil base primer and to allow this to harden thoroughly before the lacquer is applied, especially if the lacquer is to be applied by a hand brush.

E. Application of Lacquer Materials. From a standpoint of application, lacquer is supplied in two forms,—brushing lacquer and spraying lacquer. Brushing lacquer can be applied either by hand or spray brush; spraying lacquer only by spray brush. The principal point of difference is a lack of latitude in formulation with brushing lacquer ingredients, and consequent limitations for some conditions to which a spraying lacquer may be solely adapted. It is necessary to incorporate more than double the amount of pigment in brushing lacquer than in spraying lacquer in order to secure proper “hiding” and “covering” power, and this is not always desirable. Spraying is the ideal method of applying lacquer, not only because of the speed, but because heavy protective coatings can be applied evenly. From a professional standpoint, the only reason for the use of brushing lacquer on large surfaces is the opposition of labor to the use of the spray. Brushing lacquers are more costly than spraying lacquers and often have to be formulated from the standpoint of expediency, in order to have them practical for application. Brushing lacquer must contain cotton solvents, and obviously these solvents will act on preceding coats. This fact necessitates a change in brushing methods by the painter.
Those who acquire the knack can get excellent results, and the speed of application possible reduces labor costs markedly. The successful application of a good brushing lacquer is a simple matter of spreading it on level and correcting any sags at once. Unlike oil-base materials, good brushing lacquer is self-leveling. Many of the failures with good brushing lacquer are due entirely to the mechanic who will insist on making slow and hard work out of what should be fast, easy work. He will brush out, and cross and cross and back as he has always done with oil-base materials, and get into trouble through the softening of the under coats. When brushing lacquer is specified, the proficiency of the painter who is to use it should be determined. Even an excellent brushing lacquer can cause much trouble in the hands of an unintelligent mechanic.

F. The Cost of Lacquer. An arbitrary statement would be that material costs of lacquer are 25 per cent higher than oil-base materials. On the average, lacquer finishing requires at least twice as much lacquer as varnish to give the same "building." To offset this there are the possibilities of faster application, with either brushing or spraying lacquers, with resultant reduction of the high labor cost factor. Another important possible saving is in the time generally lost in rigging up for the painting in a room with drop cloths, etc., and the subsequent labor in removing them to another room, while the room already painted is drying. Using lacquer, a painter can often stay on the work until it is finished. There is also the sometimes appreciable expense for final touch-ups and clean-ups, made necessary by careless workmen marring or handling wet surfaces. Such defects can be speedily and effectively handled with lacquer, while often involving considerable labor with varnish and paint materials. The element of "time work" is another point. Bad weather may handicap the completion of varnishing and painting, whereas lacquers can be adjusted to meet the most severe conditions.

In Conclusion. The object of this article will have been attained if the architect has obtained a clearer understanding of pyroxylin lacquer, its composition, its advantages, and disadvantages, and some of the prerequisite conditions essential to its successful use. In every case when the use of lacquer is contemplated it is most advisable for the architect to consult the technical experts of the manufacturers and ascertain from their experience the proper use of the material in order that the conditions necessary for its success shall be fulfilled. It is best, if possible, to provide the manufacturer of the lacquer with a sample of the material to be lacquered so that he will know the exact conditions to be met. Success is insured by this method used by a large automobile concern which subjects samples to a 300 hour test under ultra-violet rays and alternate wetting and drying.
STRUCTURAL STEEL FOR ORDINARY USE

BY
FRANK W. SKINNER

ONE of the most recent developments of the ordinary uses of steel is in connection with dwelling houses. During the past three years a considerable number of steel-framed dwellings have been constructed. Two types of frame have been developed, one similar in many respects to the ordinary stud and joist construction of wood, and the other with a skeleton frame analogous to that of a skyscraper. Some of these designs have been patented. Construction framing should follow the lines of simplicity and have a framing member only where a definite load is to be supported. This limitation is rapidly becoming recognized, and new designs of steel frames are becoming more simple and direct than their predecessors. The weight of steel involved is being reduced without affecting in any essential the necessary strength of the structure.

The greatest advantages of the dwelling house steel frame include the elimination of shrinking, warping, decaying, and sudden failure under excess loads. It is incombustible and adds nothing to the fire hazard. It must, however, be protected from temperatures exceeding 600° Fahr. and from moisture. Such a frame can be so designed by competent engineers as to resist cyclones and earthquakes. When combined with suitable floors, walls, roofs, stairs and partitions, it becomes an essential part of an incombustible house. The designing of the steel frame is properly the work of the structural engineer, and that of the floors, walls, roof and partitions is the work of the architect. That designs have not been uniformly satisfactory is no fault of the steel as such, but has often been because of a lack of proper coordination of the various parts. Some designers of these houses have given too much attention to the steelwork in devising a complicated scheme without giving sufficient attention to the other quite as important elements of the structure.

In this connection, it may be well to mention some communities built up of very costly, inflammable dwellings on which the owners cannot procure fire insurance. If brick houses have incombustible floors, partitions, roofs, stairs and interior doors, a fire could be confined to its place of origin without damage to the other rooms. This can be accomplished by the use of structural steel joists, girders, rafters and partition studs. Too little attention has been given to the use of steel for this purpose. The steel-framed designs so far made have been for medium-priced homes rather than for mansions. Steel is, however, appropriate for nearly all classes of dwellings, and its cost is not excessive compared with that of first grade materials which it displaces. Fire-resisting floor, partition and roof construction is procurable in a great many forms with which the architect is familiar. Because of competition between the producers of the various materials used, the cost of incombustible construction does not exceed that of any other first class construction. Much time and experimentation have been given to and money expended in developing steel-framed dwellings. They are a well demonstrated possibility, and the promise is that their use will increase rapidly.

Structural steel is one of the most important of the materials used in the construction industry, of which buildings constitute the major portion of the $6,000,000,000 annual cost. In fact, it was the making of structural steel as a commercial commodity that gave the construction industry an impetus that has not yet shown any signs of losing its force. Improvement in building materials and methods of construction shows no signs of abatement, and through it all structural steel holds its unique position of unlimited adaptability within the construction field. Steel has also maintained its place as the standard for comparison of structural materials for certain major uses, because of four characteristics: (1) It is the only commercially available material, except certain kinds of wood, that has large and reliable resistance to tension and compression stresses. It also has high resistance to flexure and shear, thus providing unapproached universal strength of the greatest practical and economic value. (2) It has the greatest strength for a given measure of weight. (3) It has the greatest strength for a given volume. (4) Its quality is uniform. This cannot be said of other materials, and it is not to their discredit, since they all have certain characteristics that make them very valuable.

All structural materials have their natural limitations of strength and durability, and in selecting them these limitations should be considered. The safe strength limitations of structural steel are given in the various handbooks published by the manufacturers. These data are in the form of tables which are easily understood and are sufficient for ordinary use in connection with standard connection details and bearing plates. Intricacies of designing are found in skyscrapers, involving wind stresses and in specially loaded structures, which require the expert consideration of structural engineers. Other limitations of steel concern the property of durability.

Structural steel will corrode when exposed to moist air and water. To prevent corrosion, protective coatings of paint are applied, and these paints must have certain qualities to be effective. There are few if any protections for steel that are equal or superior to the best paints when they are adequately maintained, as many other coverings are absorptive and permit the access of water to the steel. It should be remembered that, except some granites and burnt clay products, all other struc-
Steel Frame for Six-Room House, Port Washington, N. Y.
John England, Jr., Architect

Structural materials suffer from the destructive attacks of water and oxygen, especially in combination with frost. Frost does not seriously affect properly designed steel. The strength of steel is affected by high temperatures. Steel is practically incombustible, but at temperatures exceeding 1000° Fah., it loses its strength. In order to protect structural steel from the destructive effects of high temperatures, various protective encasements known as fire-proofing have been invented. The use of these fire-proofing coverings is regulated by building codes. No structural material, except certain burnley products, is immune from the action of high temperatures.

The adaptability of structural steel is practically unlimited. This is recognized in the design of important structures such as skyscrapers, commercial and industrial buildings, and bridges. Notwithstanding this knowledge, we are too likely to overlook the advantages of structural steel for ordinary uses. Structural steel can be adapted to a multitude of specific uses with the greatest facility. It is manufactured in the shape of I-beams, H-beams, channel beams, angles and other convenient shapes. Each of these shapes is made in a wide range of sizes and weights, providing for almost every strength requirement. When the strength limitation of any single action is exceeded, a compound shape is made by assembling and riveting simple sections and plates. Many of the standard shapes are suitable as manufactured for use as beams and girders without any special fabrication except very simple and inexpensive shopwork to make them ready for columns and other purposes. I-beams and H-beams are used as single pieces of any required length, available as rolled, with no shopwork, or with only minimum punching and riveting for connections. When the loads and dimensions are determined, these units may be selected safely, by inspection, from the tables, and can be easily erected by any intelligent builder with a derrick, bolts and wrenches.

For ordinary small building construction, field connections need not be riveted but can be securely bolted, insuring safe and rapid erection. Beams should be connected to other beams, girders or columns by bolts or rivets through standard connection angles attached to their webs, and generally they should not be seated on the top or bottom flanges of other beams or girders. Where they take bearing on or in walls, they should lie seated on standard-size flat plates large enough to distribute their loads safely over the masonry. If the ends of the beams or girders rest on masonry walls, one or both ends should be anchored to them by vertical bolts passing through bearing plates or, as is more commonly done, with U-bar anchors. Columns carrying heavy loads should have special bearings distributing their loads over the masonry piers, usually by a set of short I-beams bolted together and embedded in concrete. Light columns, such as are composed of single H-beams or their equivalent, have angle
Steel frames, House of Frank G. Clark, Baton Rouge, La.

The angle flanges were riveted to their lower ends and seated on loose thick plates accurately bedded at the proper elevations on the pier and connected to it with vertical anchor bolts passing through the angle flanges. In selecting long beams and girders, great care should be taken that their deflection is not too great, irrespective of their actual strength. Too much deflection, even when there is no danger of failure, will crack the plaster and masonry, damage decorations and derange delicate machinery. It is also likely to increase existing vibration. Steel should be hoisted with rope-slings—never with chains—carefully adjusted so that they support the centers of gravity and cannot slip, or with hooks and clamps securely fixed in position; and it should be supported by them until at least half of all of the open holes in their field connections are filled with bolts, the remainder being put in and screwed tight as quickly as possible. After all connection bolts have been adjusted a second time to test their continued tightness, their nuts should be securely locked in place by cutting into the engaged threads with a pointed chisel. This secures them against accidental loosening, but they can be released by a powerful wrench without serious injury to the bolts. Care should be taken to have connection bolts of the correct lengths, so as to project from ¼- to ¾-inch beyond the tightened nuts to make them secure.

Steel columns must be kept perfectly plumb, and if there are spliced joints between column sections, they must have perfect bearings throughout. Until the entire framework is completely assembled and permanently bolted or riveted together, great care must be taken to keep it braced or guyed to prevent swaying or buckling and to make it all act together, so that no portion can fail alone. Beams and girders must have effective permanent lateral bracing. Planks, cement, bricks, tiles and other heavy material should never be stored on a floor supported by steel beams and girders until that portion of the floor and framework is entirely completed and all field connections fully bolted or riveted; even then care should be taken that the load does not exceed the capacity of the floor. Buildings before completion should be thoroughly X-braced or guyed against possible high winds, which have wrecked them before the walls, floors and roofs, which add greatly to their stability, were completed. During erection, derricks, hoisting engines and other heavy equipment should never be placed on steel beams or girders excepting under proper authority and inspection. Ropes and tackles should not be connected to the steel framework without permission. Special care must be taken to avoid improper connections of guy lines to members of the steel framework. It must be remembered that the safe strengths of the angle iron connections given in the handbooks are based on the use of rivets. Bolts are naturally less strong, as they do not fit as closely, and the load is not as likely to be evenly distributed on all of the
bolts. Care must be exercised in computing the probable loads to be supported by the steelwork, and if there is any probability that they may be exceeded, additional bolts must be provided. These are considerations in bolted steel construction.

Steel should not be accepted unless it is clean and free from rust. Steel enclosed in masonry or concrete should be thoroughly "parged," that is, covered with a thick coating of rich cement mortar, around which the mortar or concrete of the walls is well flushed as the masonry is built. If the brick or concrete encasement is exposed to the weather or water, the steel must be thoroughly protected by a non-oil paint, as concrete and bricks admit the passage of water. All concave, enclosed, or horizontal surfaces should be permanently drained, and all pockets and narrow clearances likely to collect or retain dirt or any form of moisture should be, if practical, filled solid with cement mortar, or otherwise frequently inspected, cleaned and repainted.

If any combustible material is used in construction or is stored or installed in buildings, the structural steel should be thoroughly fireproofed with a solid casing of concrete in contact with its surface and not enclosing an air space around the steel. If columns or other members are enclosed in brick, terra cotta or tile, the spaces between the steel and the casing should be filled solid with mortar. If the interior of the building does not contain combustible contents and is kept dry and warm, and if there is no smoke, steam, acid or liquid in contact with the steel, it may need no protection other than the ordinary ornamental painting. If the steel is likely to be exposed to smoke, acid fumes, cooking fumes, steam, drippings from wet ashes, or from brine or other sources of moisture, it should be accessible for observation, cleaning and protection, and in these cases it should not be enclosed permanently but should be thoroughly painted and frequently inspected. As long as the paint remains uninjured and effective, the steel will be in good condition.

Great improvements in steel making and in rolling mill practice have now made it possible to obtain standard I-beam and H-beam sections with depths of from 3 to 30 inches, flange widths of from 2½ to 16 inches, and weights of from 6 to 300 pounds per linear foot, thus making very desirable one-piece sections for columns, beams, girders, purlins, and lintels for all but extremely heavy service. They can be rolled of almost any length and can be shipped in carload lengths up to 60 feet, or more in special cases. Special I-beams with thin webs and flanges are now available for very light roof and floor construction. For one-story lengths, where loads can be applied directly on top, steel pipes are frequently very satisfactory and economical as columns, and should have faced ends and caps or screwed top and bottom bearing flanges.

There are several excellent types of patented steel roofs, floors and ceilings, the details of which have been carefully worked out, that can be commercially obtained. There are also several firms that manufacture standard, interchangeable framework for steel buildings that can be quickly delivered and erected. They are useful chiefly for industrial shops and warehouses, or for garages and the like. Steel windows, doors, frames and sash are also available, and their use is desirable.
PRINCIPLES OF ECONOMICAL PLUMBING LAYOUTS

BY

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IN using the word "economical" in the title, we may consider its meaning from two conflicting points of view. We may mean in one instance the notion of economy in first cost and in another instance economy of maintenance. It is usual to find that the materials which would reduce the first cost are those which have the shortest life and which increase maintenance and repair costs, even to the extent of necessitating extensive replacements. There is an adage, "the best is always the cheapest," to which I heartily subscribe. On the other hand, "moderation in everything," is equally applicable. It would be obviously unwise to specify the best and most lasting materials for a temporary structure, but it seems to me no less wise to specify materials the life of which is known to be less than the expected life of the building. If this latter course is pursued, it will be found that the replacement costs, especially labor costs, will considerably exceed that of a first class installation at the beginning.

In striving for economy in the plumbing expense of a project there is often a temptation to choose a cheap contractor. While such a choice may result in lowering installation cost, it often has the effect of raising the maintenance, repair and replacement costs. Eternal vigilance on the part of the architect in supervision is the price he must pay for selecting the so-called "cheap" contractor. The plumbing is often concealed as quickly as possible under these circumstances, and the quality of both the material and of the workmanship must be carefully watched. There is a natural and very human tendency on the part of the contractor to save himself expense in order to increase his profit, and this may work to the detriment of the quality of his work. It is well to be suspicious of a bid from a plumbing contractor that is much lower than that of others bidding on this work. It is probable that he has made a mistake in estimating, or that he has discovered loopholes or loose phraseology in the specifications, of which he intends to take every advantage. It seems that there is greater economy in the long run when only a few plumbing contractors, whose reliability and integrity are assured, are allowed to bid on the work. It must be remembered that in most instances "you get what you pay for," and that you cannot expect high class work at a cheap price. "One cannot make a silk purse of a sow's ear," and no matter how willing the plumbing contractor may be to live up to his contract, he cannot produce good work unless he uses good materials and employs skilled men in making the installation.

There are two factors to be considered in planning the plumbing layout to make it economical. The first factor is that of simple, direct arrangement of pipes and fixtures so that the smallest possible amount of material will be required to function properly. The second is that of the proper choice of materials to obviate the necessity of repairs and replacement, to say nothing of the annoyance and dissatisfaction caused by a plumbing system out of order. It is often possible to so plan the plumbing system using the best materials that there will be no greater initial cost to the owner than for a poorly planned system using the cheapest material. The saving in the quantity of material by proper planning will often make up the difference in cost over an improperly designed system using low quality materials. The architect's problem is therefore more one of economy in length of pipe and simplicity in arrangement than one of choosing the material of lowest first cost. The latter procedure will in almost every instance make the plumbing system expensive rather than economical in the long run. It has been the practice in many offices to indicate the locations of fixtures on the plans without due regard for economy of installation costs. In many instances the plan indications have not been accompanied by plumbing sections or diagrams, and the plumbing contractor has been left to his own devices in installing the system,—and the devices are many and devious, as architects and their clients have learned to their sorrow. The disregard of structural requirements on the part of some plumbing mechanics must be seen to be appreciated. If the architect took the time to make a plumbing section of the proposed installation of fixtures as indicated on his plans, the deficiency or efficiency of the arrangement would be quickly and clearly demonstrated. It is probable that changes could be made in the locations of fixtures that would reduce the amount of pipe required. In this connection it is always wise to employ an expert as consultant if expert engineering services are not available in the architect's own office. In many instances the savings made in following the rearrangements suggested by the consulting engineer have more than paid for his service as well as produced a salutary effect on the client by giving him a more efficient plumbing installation. A plumbing layout or a plumbing section should form a necessary part of every set of working drawings emanating from an architect's office. The care with which this plumbing layout is made, and the intelligence and knowledge used in its making, determine the economy of the installation. Even in small house work, the best price can be obtained from plumbing contractors by including a plumbing section so that each bidder will know exactly what will be required of him, to say nothing of having a more definite assurance that
the plumbing installation will be really efficient.

It is my object to point out in this article several economies possible in planning plumbing systems. The first principle of economy in planning a plumbing layout is that of simplicity. Naturally, the simpler the system the fewer the parts to get out of order, the greater the ease of installation, and the greater the accessibility for repair or cleaning should the necessity arise. Simplicity can be attained in the plumbing system only by making an accurate plumbing section and revising it to eliminate every joint and offset possible. Directness may be considered a corollary of simplicity. By an analysis of the plumbing section, all unnecessary turns and changes in direction of the pipes can be eliminated.

The architect must realize that each joint in the plumbing section means a corresponding amount of labor cost,—the labor of cutting the pipe, the labor of installing the pipe,—and the cost of making the joints,—as well as the cost of the necessary fittings.

It is necessary in designing an economical plumbing system to make all horizontal runs as short as possible. This not only decreases the cost but actually makes the system more efficient. It has been found best to locate water closets close to soil-stacks and if possible to group the other fixtures near them. The fixtures should be so located as to obviate the possibility of their freezing. As a rule this can be done by making sure that no plumbing lines are run in the outside walls or outside ceilings where they will be exposed to large temperature changes. If it is absolutely necessary that they be in such places, it is poor economy to try to save a few dollars by omitting insulating covering from the pipes. The head of the tub and the lavatory should be close together, and both of these near the water risers and the stack, otherwise there is a needless amount of piping. This can easily be accomplished by thoughtful planning. The United States Department of Commerce Bureau of Standards has carried on an extensive investigation of the possibilities of improving the plumbing systems of small dwellings and has published the results in a booklet called "Recommended Minimum Requirements for Plumbing in Dwellings and Similar Buildings," which may be obtained for 35 cents from the Superintendent of Documents, Government Printing Office, Washington. The investigation was conducted by making actual installations of plumbing fixtures, using various systems and various arrangements. In this way very real and practical results were obtained. The results of these tests indicate very strongly that these features, among others, are essential to an efficient, economical plumbing system:

1. Simplicity of design.
2. Grouping fixtures about the stack.
3. Short horizontal runs.
4. The provision of adequate water supply.
5. The provision of proper back-venting.

To the architect in search of concrete examples of efficient and economical arrangements of fixtures and pipes, this booklet gives diagrams and instructive explanations. Some of the diagrams are not as well drawn as might be desired, but the architect will find in them very definite arrangements, and illustrations embodying the correct principles of economical plumbing. It must be borne in mind that in every case the local plumbing code or ordnance must be consulted to make sure that it is not violated by a plumbing layout derived from this source. Many such codes are not based on scientific investigation or the best current practice, but they must be complied with, nevertheless. One code may prohibit the main house-trap because of its system of sewage, and the code of another locality may make the inclusion of the house-trap mandatory. For the sake of economy it is best to consult the local code to make sure that the plumbing system will not have to be altered later, at considerable expense, to make it conform to the local building law.

The choice of materials naturally plays a most important part in the initial cost of the installation. In every case the pipe materials must be chosen with due regard for the chemical content of the local water supply. Some water has little effect on piping, and the cheapest materials may last for the entire life of the building. On the other hand, where chemicals are used in purifying the water or where there is a large natural destructive chemical content, the most non-corrosive metals should be used. The comparative prices of pipes of various materials form an important consideration. Genuine wrought iron pipe costs approximately twice as much as steel pipe, but may be also about twice as lasting, depending on its use and the water it carries. Brass pipe of good quality costs almost twice as much as wrought iron pipe, but it lasts practically indefinitely with average use. Brass pipe made of 85 per cent copper and 15 per cent zinc costs about four times as much as galvanized steel. Usually the horizontal runs of the hot water supply system are the first to cause trouble due to deterioration. For this reason it is advisable to use pipe of the best material as hot water pipes. It is important that the fixtures used with brass pipe be of a kind that will not be conducive to electrolysis, which may cause comparatively rapid disintegration.

In selecting the material for the various pipes it should not be assumed that because one material may cost only half as much as another the installation cost will be half. The cost of installation in an ordinary dwelling may be divided approximately:

1. Cost of pipe and fittings, 30 per cent.
2. Cost of fixtures, 35 per cent.
3. Cost of labor, 35 per cent.

In large work the percentages of cost run about:

1. Cost of pipe and fittings, 26 per cent.
2. Accessories (pumps, tanks, etc.), 11 per cent.
3. Fixtures, 26 per cent.
4. Labor, 37 per cent.

It is relatively easy to find a place for the water supply piping in the average house, because of the
small sizes of the pipes. It should not be installed in an outside wall unless absolutely necessary, and then only when thoroughly frost-proofed. In many cases it is possible to change the location of fixtures to avoid this or to make the connection to the fixtures up through the floor. Water piping should be installed so that it will drain from a few points, preferably one. This is a convenience to the house owner and also a protection, in that he can drain the piping so that it will not freeze and cause damage in case of a lack of heat in the house. It is a convenience, but not a necessity, to install a hot water circulating pipe making the system “circulating”; that is, a continuous pipe in which the water circulates from the hot water heater or tank to all fixtures and back to the heater. This will allow hot water to flow from the hot water faucet immediately instead of having to wait a half-minute or so after the water is turned on. The extra expense of this pipe is small, as it runs alongside of the other water piping. If this is installed, the hot water piping throughout should be covered with insulation, as the heat loss from an uncovered pipe would mean a considerable operating expense. Where economy is the primary consideration, the “circulating” hot water system should not be specified, as it is more expensive in both first cost and maintenance.

**Materials.** In specifying pipes of various materials it is well to keep in mind several points in addition to those which have already been mentioned. **Cast iron pipe** is practically indestructible as far as wearing qualities are concerned. It is therefore used for soil, waste and vent lines. It is absolutely essential that it be used underground inside of the building walls, as it is practically always gas-tight. **Glazed tile pipe** does not corrode and is satisfactory to use outside of the house for the house-sewer when there are no trees near it. It is the least expensive of all pipe materials. Tree roots in seeking moisture often find their way through the joints in the pipe or cracks in the tile, and once inside they grow and may finally clog the pipe entirely. The pipe then must be dug up, cleaned out and relaid, or new pipe put in. At additional expense the house sewer can be made of another material where there are trees, and thus avoid this trouble.

**Steel pipe,** galvanized, is universally used throughout plumbing systems. Its life under adverse conditions may be shorter than pipe of other materials. Steel pipe is used extensively in tall buildings because of comparatively light weight and since, as with any pipe with a threaded joint, expansion joints are easily taken care of. It is used largely because of its low price also. Copper-bearing steel pipe is
better than the ordinary and is much used because it approaches wrought iron in wearing quality and is cheaper than genuine wrought iron. Where the chemical content of the water is favorable, steel pipe has a very long life. In Schenectady, N. Y., for instance, they use steel pipe almost entirely, and its life seems to be as long as that of any other kind of pipe.

Galvanized wrought iron is used for waste and vent connections. It is also used for water piping to a great extent. In the vicinity of New York galvanized wrought iron is used to a greater extent in the plumbing in small houses than any other pipe, although brass pipe for hot water is being installed in the better grade of houses. Galvanized wrought iron is considered under ordinary circumstances very satisfactory for cold water in this section of the country.

Brass pipe is used extensively on hot water, and in the better class, more elaborate houses, on cold water. It is well to use brass pipe when possible for the hot water, as it does not corrode or produce rusty water after a few years as iron and steel pipes are likely to do. Brass pipe costs more than iron or steel, but the length of time it serves before repairs are necessary probably compensates for the difference in cost.

Copper. In some localities, such as Pittsburgh, the water is so corrosive that it is practically necessary to use copper pipe if length of service is a consideration. Naturally the cost of this installation is too great for an average house, but it is certainly worth the money invested in localities where the water supply is of this nature.

Lead water piping was used extensively until cities and towns started to treat water with chemicals. These chemicals have had a very bad effect on the lead, and as lead is expensive in the finished work compared with other materials, it is not used so extensively. Lead has advantages in that a good plumber can tap the piping for new connections without much trouble in case alterations are to be made.

Fixtures are usually selected by the owner, and like other things the price has an enormous range. There are certain features on which the architect can advise the owner in his selection. There are several points that must be kept in mind in choosing the types of traps for various purposes. The ordinary “P” or “S” trap should be used for lavatories, sinks and tubs, both bath and laundry. The “drum” traps have the advantages of being easily but not thoroughly cleaned out and being readily accessible, but their great disadvantages are their liability to stoppage due to the permanent interior portion and the possibility of gas leakage through the clean-out. Their use is prohibited in many cities,—New York for instance. The use of “non-syphoning” traps to eliminate the necessity of back-venting is questionable. The so-called “non-syphoning” traps may be objectionable because they may syphon out, be noisy, gurgle, and because they do not allow proper ventilation of the system. The cost of the “non-syphoning” traps is greater than the cost of the ordinary “S” trap or “P” trap. It will be found that a great number of building departments do not allow the use of all types of “non-syphoning” traps. It is my opinion that the simple system of back-venting gives a more satisfactory and efficient result than a system in which the venting is taken care of only by the soil-stack itself, except in the case of very small work.

In designing a large installation, such as that for a hospital or office building, it is essential to have the advice or services of an expert to insure economy as well as efficiency. In the preliminary planning of the building the sketch plans should be carefully checked to see that these several conditions are met:

1. That the stacks should run from basement to roof in as straight a vertical line as possible. This can be accomplished by a vertical pipe shaft in which all the stacks are placed. Doors should be provided to this pipe shaft in which all the stacks are run. Doors should be provided to this pipe shaft on each floor.

2. Where possible, bathrooms should be located on each side of the stack rather than on one side only.

3. The proper planning and placing of the fixtures in each bath should be such that short lengths of pipe will be used. This page shows a plan for hotel baths. It will be noted that the length of run of horizontal soil or waste pipes is about as short as possible.
THE introduction of this new Engineering and Business Section of THE ARCHITECTURAL FORUM forms a definite recognition of fundamental changes which have taken place in the practice of architecture. It is a forecast of a time rapidly approaching when the architect will assume an unusually powerful position in the economic scheme of this country. It is quite apparent that with the passing of the next few years, architectural offices, large and small, will be rendering for their clients a vastly enlarged service, which will include in far greater degree than ever before the protection of the clients' investments. In fact, if the signs of the day are read correctly, many architects will go much further. They will direct the attention of clients to logical investments in the building field and actually promote new projects, even as a few have already done, with no sacrifice of ethics or loss of good standing.

Architects must learn to work more closely with other advisory experts who influence the investment and the administration of the building dollar. The interests and functions of the banker, building manager and real estate broker are becoming more closely coordinated with those of the architect. When institutional or educational buildings are to be designed, the architect will more frankly seek the advice of those experienced in such administration. The importance of insurance rating bureaus and building code experts will be more clearly understood; the opinions and demands of loaning institutions will be more definitely determined before the planning of new buildings is undertaken. In other words, it is quite probable that for every new building, before the designer's pencil touches paper, there will be established a functional plan. This functional plan will be an exact determination of space arrangements and the inadequacy of specifications. Of course, the architect might take the attitude that this is none of his business, and that his function is to plan the building exactly in accordance with the wishes of his client; but it is obvious that the value of his service is tremendously increased when it takes on the function of protecting the investment made by his client.

When we review the waste of the past,—when we note in thousands of existing buildings not only great waste of space but the setting up of high overhead costs and often rapid depreciation,—it becomes apparent that someone must give greater thought to this economic side of building production. It may be unfair to directly charge the architectural profession with the responsibility of creating inefficient space arrangements and the inadequacy of specifications; it may well be that the architect has carried out his instructions, which have often included the space arrangements and the inadequacy of specifications. Of course, experienced accountants will testify that many business failures have been primarily due to improper planning and unwise building specifications. Of course, the architect might take the attitude that this is none of his business, and that his function is to plan the building exactly in accordance with the wishes of his client; but it is obvious that the value of his service is tremendously increased when it takes on the function of protecting the investment made by his client.

Regardless of where the blame may lie, the facts are ever-present, testified to by real estate managers, mortgage companies and the business world in general. Other factors of this field, such as building managers, mortgage bond houses and large mortgage companies, have already taken the lead in the improvement of plans and specifications. Today, the architect faces the problem of being a leader in this field or of carrying out instructions which to a greater and greater degree will come to him through his clients. Far better it will be if the architect can be a leader in eliminating waste and in insuring the success of building investments. This does not mean that he must be "all things to all men," but it does mean that he must have a much broader understanding of the various problems which are involved with every building operation, even those of a residential type. It means that he should recognize the value of consulting service for problems which lie outside the scope of his own function but well within the scope of his understanding and appreciation. Perhaps the most interesting manner in which to
present forceful proof of this contention will be to consider briefly the economic needs of building projects of various established types and to indicate how certain architects have actually been of great assistance to owners. Accompanying this article is a chart which is quite elemental in its nature, but which serves to suggest logical relationships for the architect in connection with various types of buildings. Considering these various building types in the order in which they are presented, we find that the architect who is carrying out an office building project should establish relations with the financing institution or individual who is providing the building loan and permanent mortgage. Perhaps his first contact will be in the development of the sketch plans which the owner wishes to present with his mortgage application. If the architect is brought into such interviews, he can contribute materially by explaining details of the proposed plan and specifications, and in many instances this means a considerable difference in the amount of financing which the owner may obtain. Before proceeding beyond the sketch plan stage, the building manager should be appointed, and the architect should work closely with him to gain the greatest efficiency of space under the local rental market conditions. He should work with the building manager on the matter of specifications, particularly as to mechanical equipment, finished surfaces, etc., which contribute their quota of overhead and maintenance cost. If the project is large, special consultants may be required for elevators, service areas and other special parts of the building. The insurance engineer is of importance, because if the plans are examined under the local fire underwriter's code, it will be found in almost every case that suggestions can be made which will reduce insurance rates and fire hazards.

The tabulation shows various suggested contacts of this nature for other types of buildings which cannot be analyzed in detail here. It is interesting to note, however, that even in the field of small dwellings this business viewpoint has its direct and important application. Certainly it becomes more important as the size of the dwelling investment increases. There is, of course, the contact with the bank, building loan association, or other source of mortgage money. The architect can prepare for the owner preliminary plans and specifications which will actually help him to get as much as 25 per cent more in the way of a mortgage loan than the owner could probably obtain through a general application.

The owner can be advised to avoid eccentricities in plan or general design which would tend to decrease the ultimate sales value and sales market for the property. Convincing proof of this suggestion may be found by visiting any real estate auction sale where suburban houses and country estates are offered on the auctioneer's block. Time after time it will be seen that attractive but conservatively designed houses bring much higher prices than those which are exceedingly unusual in character or waste-ful in plan. It is true that the owner who is putting up the money is justified in having what he wants in the way of a house. He may consider it as he would any other luxury, but the rapid changes in business conditions today indicate that sooner or later every house will have to meet the test of appraisal value and of salability. It may be that the owner will wish to dispose of the house in order to build one larger; it may be that unexpected business reverses will force its disposal; it may be that the house will become an important part of his ultimate estate. In any event, it will be offered for sale some time, and if the architect can recommend a degree of conservatism and efficiency in the plan, such service will surely be appreciated and never resented.

In his contacts with the advisers and specialists referred to in the accompanying tabulation, the architect will gain much more benefit than merely the interpretation or solution of a particular problem. Frequent contact with men whose work has a bearing upon the architect's problems must necessarily broaden his own point of view and gradually equip him to render an increasingly valuable economic service to his client. A broad knowledge of banking, building management, insurance engineering, real estate values, and the more highly specialized fields served by various consultants is of particular importance to the architect who is working on large scale operations, but it is none the less desirable and valuable to the architect who purposely confines himself to a limited field or to small buildings. Through contact with successful bankers, the architect will soon acquire a general knowledge of the sort of loans banks desire to make; of the limits that are imposed upon banks by law as to the ratio which the loans may bear to the total investment; and something of the rates and discounts prevailing on loans of various types from time to time. The architect will learn how applications for loans are prepared and how the banker analyzes and examines them with a view to determining the desirability of the loans applied for; and through this knowledge he will be equipped to advise his client intelligently with respect to the data required to assure success in a loan application. Through the banker may also be obtained a valuable knowledge of how to set up a complete financial program covering the investment, fixed charges, operating expenses, and income. To be sure, the banker may not know how many of these elements are actually developed,—that, in fact, is within the province of other specialists in many cases,—but at least he will know how these facts must be presented and how they must relate to one another in order that the proposed project may be assured of financial success for its promoters.

Architects often overlook,—or purposely avoid through lack of sufficient knowledge of how to carry on the work,—opportunities for the promotion of building enterprises, particularly those which require the organization of some form of syndicate to provide the equity financing. Here again the archi-
### SCHEDULE OF PROFESSIONAL AND ADVISORY RELATIONSHIPS

For the Business Administration of Architectural Projects

In this chart are indicated the sources through which the architect should obtain outside counsel during the development of various types of building projects in order that he may render a more complete and satisfactory service to his clients, with particular reference to the economic aspects of his buildings.

_A_ indicates cooperation mandatory.  _B_ indicates cooperation advisable.

<table>
<thead>
<tr>
<th>Type of Building Project</th>
<th><em>BANKER</em></th>
<th><em>BUILDING MANAGER</em></th>
<th><em>SPECIAL CONSULTANTS</em></th>
<th><em>INSURANCE ENGINEER</em></th>
<th><em>REALTOR</em></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OFFICE BUILDINGS</strong></td>
<td><em>A.</em> For senior financing; checking layout and specifications</td>
<td><em>A.</em> Checking plans for income and operating economies</td>
<td><em>B.</em> For maximum rentable space, elevators, service areas</td>
<td><em>A.</em> To obtain lowest fire and liability rates</td>
<td><em>A.</em> For space demand and most salable features</td>
</tr>
<tr>
<td><strong>APARTMENTS</strong></td>
<td><em>A.</em> For senior financing; checking layout and revenue</td>
<td><em>B.</em> Checking plans for service and maintenance features</td>
<td><em>A.</em> Service features, room sizes and layout</td>
<td><em>A.</em> To obtain lowest fire and liability rates</td>
<td><em>A.</em> For space demand, size and number of rooms, renting features</td>
</tr>
<tr>
<td><strong>HOTELS</strong></td>
<td><em>A.</em> For senior financing; checking costs and revenue</td>
<td><em>A.</em> Checking plans and equipment with hotel manager</td>
<td><em>A.</em> Room and service features, etc.</td>
<td><em>A.</em> To obtain lowest fire and liability rates</td>
<td><em>A.</em> For subrental demand and income</td>
</tr>
<tr>
<td><strong>DWELLINGS</strong></td>
<td><em>B.</em> For mortgage or building loans</td>
<td><em>A.</em> To obtain lowest fire and liability rates</td>
<td><em>A.</em> For large dwellings</td>
<td><em>B.</em> For sale value, local demand</td>
<td></td>
</tr>
<tr>
<td><strong>INDUSTRIAL</strong></td>
<td><em>B.</em> Occasionally for first mortgage or temporary loans</td>
<td><em>A.</em> For process layout, material handling, etc.</td>
<td><em>A.</em> To obtain lowest fire and liability rates</td>
<td><em>B.</em> Occasionally for housing facilities, etc.</td>
<td></td>
</tr>
<tr>
<td><strong>HOSPITALS</strong></td>
<td><em>A.</em> Checking plans, etc., with managing directors</td>
<td><em>A.</em> For correct layout and equipment</td>
<td><em>B.</em> To obtain favorable insurance rates</td>
<td></td>
<td></td>
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<tr>
<td><strong>INSTITUTIONS</strong></td>
<td><em>A.</em> Checking plans, etc., with managing directors</td>
<td><em>A.</em> For correct layout and service and maintenance features</td>
<td><em>B.</em> To obtain favorable insurance rates</td>
<td></td>
<td></td>
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<tr>
<td><strong>SCHOOLS</strong></td>
<td><em>A.</em> Checking plans, etc., with managing directors</td>
<td><em>B.</em> For special features, material handling, etc.</td>
<td><em>B.</em> To obtain favorable insurance rates</td>
<td></td>
<td></td>
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<tr>
<td><strong>BANKS</strong></td>
<td><em>B.</em> For service and maintenance features</td>
<td><em>A.</em> For vault design, banking equipment; protective systems</td>
<td><em>A.</em> To obtain lowest fire, hold-up, robbery, and liability rates</td>
<td><em>B.</em> For rental features when rental space is included</td>
<td></td>
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<tr>
<td><strong>PUBLIC BUILDINGS</strong></td>
<td><em>B.</em> For service and maintenance features</td>
<td><em>B.</em> For special features, mechanical equipment</td>
<td><em>A.</em> To obtain favorable insurance rates</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CLUB AND FRATERNAL</strong></td>
<td><em>B.</em> Occasionally for mortgages and temporary loans</td>
<td><em>B.</em> For mechanical equipment, swimming pools, etc.</td>
<td><em>A.</em> To obtain favorable insurance rates</td>
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<tr>
<td><strong>RELIGIOUS</strong></td>
<td><em>B.</em> To obtain favorable insurance rates</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>STORES AND SHOWROOMS</strong></td>
<td><em>A.</em> Senior financing; checking revenue</td>
<td><em>A.</em> For service and maintenance features</td>
<td><em>A.</em> To obtain lowest fire and liability rates</td>
<td><em>B.</em> For rental values, traffic courts, space demand</td>
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</tbody>
</table>

1. **BANKER**: This refers to the source of mortgage funds, including mortgage bond houses and investment companies
2. **BUILDING MANAGER**: Includes the professional building managers of office buildings and the managing directors or other persons in charge of the operation of institutional buildings
3. **SPECIAL CONSULTANTS**: Includes all special consultants and advisers specializing in various types of buildings or equipment
4. **INSURANCE ENGINEER**: This refers to the trained experts available through insurance companies for checking buildings with respect to insurance requirements
5. **REALTOR**: This connotes the experienced local real estate broker or agent
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tect's contact with bankers will put him in a position to find out from experienced men not only how these things are done, but where he may go to find individuals who might be interested.

The building manager is another mine of information to the architect. From him there can be acquired a general knowledge of the service requirements of various types of businesses. The proper use of various materials and equipment items, particularly with respect to their cost of maintenance and operation, and of the means of developing proper space efficiency. The building manager is concerned with the problem of selling or leasing the space which the architect designs. Naturally, he must acquire a practical knowledge of what is salable or rentable, and this knowledge should be a part of the architect's own equipment. But the manager goes further than that. He must operate the building, and he soon acquires a very sound knowledge of the relative values of wall finishes, types of floors, types of heating systems, elevators, and all manner of other appurtenances for office buildings, apartments, hotels and other structures which come under his hand. Through friendly contact with successful building managers, the architect may acquire much practical knowledge which will improve his own work and increase his value as an adviser to his clients. Likewise, the various special consultants, to whom the architect should go upon occasion for the solution of specific problems in connection with a building type of unusual character, have much information of a general character which the architect should add to enlarge his own mental equipment.

An examination of the accompanying chart will show that the insurance engineer is an adviser who should be consulted by the architect on practically every type of building operation. Only in the case of dwellings is the insurance engineer's contact omitted from the tabulation, and even here there are occasions when insurance requirements should be taken into consideration by the designer, especially when large and costly dwellings have been commissioned, or where garages are incorporated in the houses. The services of insurance engineers are offered without cost to the architect or owner by the great insurance companies of the country which maintain staffs of specialists trained to understand and interpret insurance ratings in terms of building design and materials. The architect may submit without charge his preliminary studies to the insurance companies and have them advise him of the probable insurance rate that would be applied to the building upon completion. They will also freely indicate what things could be done to so reduce hazards in the building as to result in a markedly lower insurance premium. Very often the insurance engineer's recommendations can be adopted without additional cost to the owner and thereby save an annual charge which in time might substantially reduce profits. These engineers are practical men in most instances, and frequent contact with them will soon give the architect a sufficient working knowledge of insurance companies and rating bureaus to enable him to plan his buildings in the first place in accordance with modern recommended practice, and to advise his own client when a building is first proposed what he should do to secure the best rates. Of course, the realtor has much information of value to the practicing architect who is frequently engaged on buildings of an investment or speculative nature. The practicing real estate broker is a source of much information regarding land values and their prevailing trends, rental demand in various sections, the prices paid for space, and the salability of buildings of all types. The architect who has a sound basic knowledge of these matters can talk to his investor-client in his own language and show an appreciation of the investor's problem that would be most convincing evidence of the architect's capacity to design a building which will serve the intended purpose and assure maximum return.

Thus it is that architects gain a two-fold advantage in maintaining broad contacts with other representatives of the business world. For the sake of their clients' interests, they should maintain these contacts so that individual operations may be developed under the guidance of men whose work enables them to direct various aspects of a building project toward a successful conclusion; and for his own sake, the architect should continue to maintain these contacts that he may increase his capacity to serve.

The statement is often made that architects are not well paid for their work, and except for very well established organizations, this statement is generally true. Accepting the fact, let us seek the reasons, of which there are two. In the first place, so much of the architect's work is carried out behind his own walls and so few of the vast number of details are understood or appreciated by the client, that his work does not seem difficult or complicated, and his compensation appears to the client to be ample, even though it may be very small. The second fact is that the architect is frequently not taken seriously from a business viewpoint. He is not expected to have the degree of common sense that is required when a lawyer is retained or when a physician is called in. Let this condition be once cured,—let the client develop respect for the architect's desire and ability to protect his investment,—and the whole matter assumes a different aspect. Proper fees will be paid willingly and promptly, and the architect will gain his rightful place and business relationship.

The best way for an architect to gain at least a reasonable degree of knowledge pertaining to the business aspects of a building project is through an interchange of experience and facts relative to its economic problems. With this thought in mind, it is planned that this department of The Architectural Forum will be given over to a presentation of extremely practical information, including very little theory and consisting for the most part of facts gathered from experience of architects and business men.
WHILE statistics are not always wholly reliable, they do serve to chart definite trends, and the data given here are presented to reflect the growth and development of cooperative housing in the east side residential section of New York during the seven-year period from 1922 to 1928 inclusive. No attempt has been made to compile statistics for the period prior to 1922, nor statistics for the entire city.

Since the stock of a cooperative apartment corporation is based upon the equity (the difference between the mortgage and the total sales price), it is common practice in this city to speak in terms of equity values. However, in determining a true comparison, the over-all values should be considered in a study of these tables. It is interesting to note the constant growth in the number of projects in the east side residential area from three in 1922 to 17 projected for completion in 1928, with corresponding over-all values of $3,550,000 in 1922 and $34,068,500 in 1928. Between 1922 and 1924 there was a slight decrease in the over-all value per room, the minimum for the entire period being $5,000 reached in the latter year. Since 1924 the over-all value per room has increased steadily to an average of $9,030 in 1927 and $9,017 in 1928. Naturally, there has been a corresponding increase in the average equity per room, although, due to slight fluctuations in the ratio of mortgages to total values, a comparison of equity values is not as accurate as a comparison of over-all values. The average equity per room was lowest in 1922, when it was $2,095, and it reached a maximum in 1927 of $5,059. The increase in the average value per room, whether contrasted with the total value or the equity value, is approximately 100 per cent, and such a startling increase in so short a period of time is worthy of much study. While this increase may be attributed in a large measure to advancing land costs, there are other contributing factors which should be taken into consideration in the planning of future projects, and which will be referred to later.

Indicative of stabilization in the financing of cooperative apartment buildings, it is interesting to note that the ratio of mortgage indebtedness to total over-all prices of land and buildings has remained fairly constant, at approximately 50 per cent. This is due in a large measure to insistence by prominent real estate agents identified with the cooperative movement that the financing of these projects be standardized on a conservative basis. It has come to be almost a cardinal principle in the financing of east side cooperative projects to secure only institutional loans in such conservative amounts as to merit minimum interest rates and minimum amortization. This policy has had the effect of winning the confidence of conservative mortgage institutions, such as life insurance companies, title insurance companies, and savings banks, which now lend freely, but at the same time conservatively, on cooperative buildings.

Contrary to a popular misconception, high amortization of mortgages is not necessarily indicative of conservative mortgage practice, but in most instances it should be taken as a clear signal that the amount of the mortgage is excessive. Due to the high character of the lending institutions identified with the financing of cooperative apartments in New York, the promoter can rest assured that a mortgage loan granted by one of these institutions and carrying low amortization, or even no amortization, presupposes an increment rather than a depreciation in the value of the land and building at the date of maturity. In the interest of economy in operation, as well as of conservatism in financing, I favor the low mortgage with correspondingly low interest rate and low amortization, as opposed to the practice advocated in some other cities of mortgaging heavily with high interest rates and liberal amortization. Advocates of the latter method point to the low equities made possible by high mortgages, but my answer is that under that plan every stockholder-tenant is penalized by the excessive cost of financing, and is deprived of the opportunity of securing the economy that he would enjoy under the plan which I advocate. It is admitted that under the low mortgage plan the purchaser of an apartment is called upon to pay a larger amount of cash, but the saving to him in interest and amortization payments, together with the feeling of security in the knowledge that his building is conservatively financed, offsets the disadvantage of having to expend a greater amount of cash in acquiring his apartment. Moreover, it is nearly always possible for a purchaser to arrange terms for payment for his apartment which limit expense and risk incident to such financing to the individual affected without imposing additional expense upon the other tenant-owners. I have stressed the item of mortgage financing for three reasons,—first, in the interest of conservatism; second, because of its effect upon economy of operation; and third, and most important of all under existing conditions, because of its effect on the initial cost of the project. Due to soaring land values, with which it seems hardly conceivable that rents can keep pace, the promoters of cooperative apartments are called upon to use every means at their disposal of reducing the cost of construction. The cost of financing is an important item and worthy of consideration in planning a cooperative building. It has much to do with its success.

To bring out more fully the meaning of my reference to the relation of rental values to land costs, a word may be in order. It was common practice but
a few years ago to show an investment return to the cooperative purchaser of from 12 to 15 per cent,—that is to say, the proprietary rental of a given apartment when deducted from the commercial rental value of a similar apartment produced a saving sufficient to represent a yield on the investment of from 12 to 15 per cent. While rental values have become fairly stabilized in the well developed residential areas, such as upper Park and Fifth Avenues and the principal side streets between Fifth and Lexington Avenues, the land values in these areas continue to advance, and instead of an average investment return, such as was just referred to, we now find it difficult to produce a return of more than 10 per cent in these areas. However, since economy is but one of the numerous advantages of cooperative ownership, it does not necessarily follow that a project showing slight economy to purchasers is without merit. It does require that the promoters give more attention than ever to such factors as location, plan, equipment and construction. This condition has also led to the development of new residential areas where lower land costs permit of the delivery of apartments showing satisfactory economy, and notable among these sections may be cited the Sutton Place district.

A distinct factor in the present situation is the great increase in the value of land in the narrow side streets, where the heights of housekeeping apartment buildings are limited by law to one and one-half times the width of a street. The relation of land values to rental values in these narrow side streets is such that it is increasingly difficult to show any economy in a cooperative building of nine stories. This has had the effect of automatically removing most of the plotage on these side streets from the cooperative market, forcing promoters to the avenues and the few wide streets. The demand for plots that will permit the construction of 15-story buildings has had a decided influence upon increase in land values on such streets and avenues as are eligible.

We are forced by this condition to divide cooperative projects into two classes,—one, where the element of economy or saving in rent is ignored and elements of location, exclusiveness, excellence of plan, etc., are stressed; the other, where location is subordinated to economy. As characteristic of the two types, there are now under construction two buildings that may serve to illustrate the comparison. One is 960 Fifth Avenue, where Anthony Campagna, the well known builder of cooperative apartments, is sparing no expense in producing one of the most luxurious apartment buildings ever designed, with an ideal location in the very heart of the Fifth Avenue residential district, on the site of the former Clark mansion. Mr. Campagna is boldly expressing his confidence in the taste of New York's scions of wealth by offering individually planned apartment homes, ranging in size from 13 rooms with five baths to 19 rooms with nine baths, with ceiling heights up to 17 feet, and with living rooms as large as 22 x 40 feet at prices ranging from $130,000 to $310,000.

An interesting feature of this building is its having a section for rental, having a separate entrance on 77th Street, and containing about 50 housekeeping suites. The income from this section will be applied to the cost of operating the entire building, resulting in an estimated reduction of the proprietary rental of the owners' apartments to 5 per cent, or less than 2 per cent.

A plan the other, where location is subordinated to economy. As characteristic of the two types, there are now under construction two buildings that may serve to illustrate the comparison. One is 960 Fifth Avenue, where Anthony Campagna, the well known builder of cooperative apartments, is sparing no expense in producing one of the most luxurious apartment buildings ever designed, with an ideal location in the very heart of the Fifth Avenue residential district, on the site of the former Clark mansion. Mr. Campagna is boldly expressing his confidence in the taste of New York's scions of wealth by offering individually planned apartment homes, ranging in size from 13 rooms with five baths to 19 rooms with nine baths, with ceiling heights up to 17 feet, and with living rooms as large as 22 x 40 feet at prices ranging from $130,000 to $310,000. An interesting feature of this building is its having a section for rental, having a separate entrance on 77th Street, and containing about 50 housekeeping suites. The income from this section will be applied to the cost of operating the entire building, resulting in an estimated reduction of the proprietary rental of the owners' apartments to 5 per cent, or less than 2 per cent.
as against the 1928 general average equity value of $4,874. This price was made possible by low-priced land, opposite the park, where the law permits the construction of a 15-story building. Moreover, due to the unusual depth of the plot, the architects, Van Wart & Wein, were able to design an economical building that covers only 57 per cent of the plot area, providing unusual light and air to all apartments.

For the benefit of those who do not wish to disturb invested capital or who, for any other reason, desire to purchase their apartments from income, a plan has been devised providing for a series of time payments over a period of five years. The method has become the accepted and general practice in the purchase of private houses. Through its use, the purchaser may now acquire an apartment in this building by paying a small portion of the purchase price between the date of purchase and the beginning of occupancy, and then pay the remainder of the amount, like rent, over a period of five years, during which time he may live in the apartment and enjoy its economies and other advantages. Simply stated, the time payment plan provides that anyone buying on January 1, 1928 would pay in cash 30 per cent of the term price of the apartment, the remaining 70 per cent by a note bearing interest at the rate of 6 per cent on the unpaid balance from April 1, 1928, and payable in monthly amounts over a period of five years, the first payment with accrued interest being due and payable October 1, 1928. The note will be secured by the stock and lease pertaining to the suite selected, no other security being required.

To enable the reader to visualize the advantages of the plan, this example sets forth the full details:
Thereafter the total estimated average monthly payment during the five-year period, amounts to $245.82, made up of:

- Monthly payment of principal .......... $128.33
- Average monthly interest (varying with the amount of note outstanding) ...... 19.57
- Estimated monthly maintenance ........ 97.92

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
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<tbody>
<tr>
<td>Monthly payment of principal</td>
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This plan assures the early purchaser of a choice of space and the opportunity of arranging it (within structural limitations) to conform to his own desires, with the further advantage of deferring payments as indicated. Since payments of principal and interest do not begin until October 1, 1928, the purchaser is relieved of the possible burden of making monthly payments while paying rent elsewhere.

Another factor entering into the growing costs and the difficulty of establishing liberal savings to tenant-owners is the commendable improvement in the standards of design, construction and equipment demanded by the present-day purchasers of apartments. Wood-burning fireplaces, adequate closet space, mechanical refrigeration, spacious room sizes, ample baths, well planned kitchens and pantries, and adequate accommodations for servants, are some of the features that are regarded as almost standard in the cooperative apartments of today. Of great interest to the buying public should be another innovation recently introduced by the promoters of cooperative apartments in New York. This is the employment of a supervising architect, engaged with the approval of the agent, to represent the interests of the tenant-owners or not, it is highly desirable that the attorney selected by the promoters to handle the legal matters pertaining to the plan of organization, forms of contracts, proprietary leases, and the agreements for purchase of stock, the certificate of incorporation and by-laws of the apartment corporation, the builders' agreement, the agreement with the managing agent and all other legal papers in which the tenant-owners have an interest.

Whether an independent attorney is engaged to represent the interests of the tenant-owners or not, it is highly desirable that the attorney selected by the promoters to handle the legal matters pertaining to the plan of organization, forms of contracts, proprietary leases, etc., be experienced in this work. In fact the legal aspect of cooperative apartment house development and organization is highly technical and calls for the services of specialists in this particular field. It is not sufficient that the plan of organization be limited to the individual project; it must be considered as a part of an important and growing industry, and consideration must be given to the effect upon this industry that might result in a future controversy, occasioned by an improperly framed plan of organization or proprietary leases. This imposes upon the promoters of these projects the distinct obligation of placing their legal affairs only in the hands of attorneys thoroughly conversant by experience with the ramifications of cooperative housing. While these matters may not directly affect the interests of the promoters, they are of vital importance to the tenant-owners, and it is most important that the certificate of incorporation, the plan of organization, supplementary contracts, proprietary leases and other documents be drawn with a view to protecting the tenant-owners to the fullest possible extent.

The scarcity of plottage and the high land values already alluded to have been influential in the introduction of the leasehold cooperative apartment, where the land is leased for a long term of years, usually for 21 years, with three renewals. Notable among cooperative apartment buildings constructed on leased property may be mentioned 280-290 Park Avenue, 300 Park Avenue, 810 Fifth Avenue, and 775 Park Avenue. As an offset to the obvious objec-
tion that the ownership of the building passes from the control of the tenant-owners at the termination of the lease, it has been found expedient to establish a sinking fund, the amount of which, when invested semi-annually and compounded during the period of the lease, will be sufficient to reimburse the tenant-owners for the amounts originally expended by them in the purchase of their apartments. The amount required to be invested semi-annually in order to accomplish this purpose is surprisingly small, and in relation to the total operating expense, when distributed to the respective tenant-owners, becomes almost negligible. The objections to the leasehold type of apartments result largely from a state of mind, and it is believed that as the public becomes better acquainted with this plan the present objections will disappear. In fact, some well informed real estate men see in the leasehold cooperative a means of making available plotage now withheld from the market. Some owners of desirable plotage refuse to sell, but might be content to make long term leases at reasonable figures where the income is as assured as it is in such an instance.

A comparison of the merits of the 100 per cent cooperative plan and the group ownership or partial cooperative plan would require too much space to justify its inclusion herein. Each plan has distinct advantages, and each offers some disadvantages by comparison with the other. Generally speaking, it may be said that the 100 per cent plan is more conservative in that loss from vacancies is eliminated, whereas in the group ownership plan vacancies of the rented apartments may occur, thereby affecting the proprietary rentals of the owner-tenants. On the other hand, a successful group ownership building with no vacancies results in a substantial reduction in the proprietary rentals of the owner-tenants.

In the promotion and financing of cooperative apartments, whether under the 100 per cent plan or the group ownership plan, the help of a wholly trustworthy firm of real estate brokers, with broad experience, is of the utmost value. Such a firm knows land and rental values, and is in a position to advise with the promoters and to safeguard their interests.
CAN THE ARCHITECT SERVE THE SPECULATIVE BUILDER?

BY

GEORGE F. ROOT, 3rd

HAD this question been asked as recently as a decade back, the answer given by the great majority of those who were engaged in erecting residences for selling would have been a sharp negative. Builders were for "cutting costs" in this kind of enterprise in every respect. They felt that if they could produce a structure containing a given number of rooms, almost regardless of arrangement or shape, using visible materials and colors which would catch the public's eye, and could get this effect with the cheapest materials which would hold together for a year or two after completion, then a quick sale with good profit would result. It usually did result. So, the builder would reason, why go to the costly and unnecessary extent of consulting an architect? The prospective buyer, a layman, knew little or nothing of architectural design, either external or internal, nothing of good plan, good circulation and the taking advantage of land contours, exposures and outlooks; nor was he even particularly interested, if the house was of a size to shelter his family, and if the visible construction made the thing look like a "good buy." Thus we saw row upon row, everywhere, of contractor-designed residences of quite horrible aspect, inside and out,—things from which architects and designers could not but turn a bruised eye,—houses sold, occupied, and containing numberless contented residents; and we saw hundreds of contractors, encouraged by the ready selling market, grow prosperous from the undiscriminating public taste. Why, indeed, go to any high-faluting architect with his talk of "proportion" and "harmony" and "style"? The builder could get out his carpenter's pencil and square and a piece of building paper and produce a drawing which would be adequate for translation into a salable house.

Nineteen twenty-eight will not he the millennium in this regard. There are still being erected residences without harmony of form or arrangement, laid out without expert guidance, but unquestionably the builders who sell have begun to feel the existence of a new and different condition. The fact is that the public has begun to discriminate. The tremendous volume of residential work which has been designed by architects for private clients during the last 20 years, and the ever-increasing merit of this design, have more than merely begun to impress those who would "rather buy than build." The average intelligent layman is beginning to compare. He is shown by the enthusiastic agent a new house which can be bought. Consciousiy or not, he forms a comparison between it and the houses of his friends who have "had architects." He sometimes goes wrong and accepts that which is not architecture; but his percentage of bad choices is diminishing at an accelerating rate. Even now, more often than
not, the buyer knows, by having seen good residence design, whether the offering shows trained conception and sound structure; he is more discriminating.

Not only does he perceive better than formerly whether he is getting full value intrinsically and aesthetically only at the time of inspection. The consideration of the resale value, should he ever wish to move away or capitalize his holding for any reason, enters into his decision and often determines it; for the better the design, the more it will bring in a later transaction. And there are now not infrequent cases, some completely authenticated, where a prospective buyer asks to be allowed to consult the architect before making up his mind as to a purchase in order to be informed as to the future possibilities of harmonious and practicable addition to the house; and when this is found to be entirely feasible, as is usually the case with an architecturally designed house, the deal is that much likelier to be made. Back in the recent dark ages of American speculative building the seller, if asked by his prospect, "Who designed this house?" could expand the notion in his presence! and get his desired effect. Now that seller is demonstrably better off if he can point to a reputable architect by name as having done the work. For his prospect realizes that services so peculiarly special as those of residence designing are better performed by specialists who concentrate on and make a life work of it.

This is by no means mere theory. The writer has watched it work in particular instances. In the case of one high class suburban acreage which was subdivided four years ago and sold in large measure to builders, he has watched the results in the development of perhaps two dozen residences erected for sale, with the land included, at prices ranging from $25,000 to as high as $75,000. In certain instances the hit-or-miss house has found its buyer promptly. But in an impressive majority of cases it has been the dwelling built from an architect's plans before a spadeful of earth was turned. Say upon completion, — say upon completion. But in an impressive majority of cases it has been the dwelling built from an architect's pencil which has proved to be the "hot cake." The $75,000 property referred to, architecturally designed, was sold at the asking price before the architects were out of it. It has not been rare that the architectural house has got its man before the foundation has been completed, while there have been a number of houses sold from the architect's plans before a spadeful of earth was turned. Say that economic conditions have been right, the lots desirable, and the selling market good. Yes, but no more so for the one kind of house than for the other. When one house stands stark and empty for two years, while its neighbor is "gone" before completion, it is evident that something is operating in the mind of the buying public. The writer believes that it can be only a newly acquired and ever-increasing discrimination and architectural savoir.

But there is that architect's fee!—some builders still complain. The idea of paying 8 or 10 per cent of the cost of the work, as they hear of private clients paying, seems a lot to take off their profit. They are wrong about that in two ways. They do not realize that when designing for a builder, by being relieved, first, of the time necessary for detailed supervision of construction, and second, of the responsibility to the client for the exact following of a detailed specification, the architect can reduce his fee considerably from what he must charge a layman client. Therefore the architect can supply preliminary sketches, general working drawings, outline specifications, and full detail drawings, with perhaps an occasional visit to the work (which is in the architect's own interest anyway) for a sum which should be, and has been, regained by the builder thrice over in the added market value of his finished project. The architect's fee has rightly earned its place in the builder's budget.

An instance is brought to mind of a builder who had been doing his own designing with only moderate success. One of his backers prevailed upon him to consult John Doe Smith, architect, regarding the house he was then contemplating. The builder had drawn his tentative plan, and brought it to Mr. Smith for examination and suggestion. The latter found the layout meritorious in a number of respects, but lacking otherwise that savoir referred to here. For instance, one had to cross both the pantry and the long dimension of the kitchen in order to reach the cellar stairs. Now it seems beyond dispute that the householder would only slightly prefer to avoid walking the nautical plank than to run the gauntlet of a servant-filled cuisine while in the discharge of his heating or fermenting or other cellar routine. The stairs were re-located so as to be reached from either the service or the master portion of the house. Again, the master bathroom was arranged so as to be reached from either the service or the master bedroom. It was a simple matter for the architect to rearrange it so that this bathroom possessed only one door (always preferable to two) but with access from each bedroom through a small private vestibule. Many other interior suggestions, as well as an entire re-study of the exterior were made. Not only made, but accepted with amazing alacrity by the builder. Though not wishing to have this paragraph read like a testimonial to the results of three applications of, say, "Tonex," since which no substitute has been accepted, the writer has observed that this builder has done no more work without architectural service, and that his success in the locality is being for the first time widely remarked.

The architect serves the speculative builder, moreover, in other ways than in giving the latter's product beauty of aspect and propriety of plan. He is ready to be consulted as to proper placing of the building on the lot, keeping back from the street or away from undesirable side or rear line conditions; to counsel appropriate planting, walks, and in some cases garden layouts, all features which can attract
Editor's Note. An Excellently Designed House that was Sold before Completion
George F. Root, 3rd, Architect

or repel a buyer; he can lead the builder away from unsightly fireplaces and mantels and give him a "selling point" in their stead; he is often familiar with the newest trends in even such prosaic equipment as ranges, plumbing fixtures, tiling and the like; above all, in a word, he can become indispensable in getting the most for the builder with the least expenditure.

There is another aspect to this question which is broader than that of the architect's value to the individual speculatively-built dwelling. In the case of the subdivided acreage referred to here, the plots were sold to different individuals, each with his own idea of what should be built on his piece. Now that the development is largely completed, we find a curi-
Editor's Note. A Colonial House that Found a Ready Purchaser Because of Its Design
George F. Root, 3rd, Architect

ously mixed appearance in the locality as a whole. In many instances we see individual units which are well conceived and executed as to house design, planting, and general aspect. Next door there may be also a successful result. But between them there is no harmony of relationship, no team work. Colonial, Spanish, English, alternating irregularly down the street, a series of well designed houses, perhaps, but entirely unrelated, with no common thread to pull them together into a harmonious and unified whole. Thus we lose in this country, through the fact that our best design bases itself on the various styles of the past and through the fact that the selection of style is generally at the layman owner's op-

Editor's Note. In the Same Development as the Others, Its Design Has Retarded the Sale of This House
A Good Architect Could Have Aided the Builder
tion, that harmony of community design which we find so charming in the countryside of England and France and Italy, where in each country the style is indigenous to the locality. This loss is, of course, unavoidable in the case of most American community developments, where properties are sold to unrelated individuals. Here team work is about impossible, and the most we can hope for, unless one architect or group of associated architects can be retained by the various plot buyers and allowed to work on a group of properties, is a heterogeneous aspect when development has been completed.

But there are scores of instances where an individual builder or a syndicate of speculators purchases a considerable number of adjoining plots, even an extensive acreage, and it is here that the architect can serve not merely the unit but the whole. A decision as to the general architectural style can be reached between architect and client, and the architect can go to work relating his units to one another as regards both style and plan. He can put service wings and garage drives of adjoining units together, keeping main living rooms in their proper relation, each to its neighbor. He hasn’t that doubtful fear that on an undeveloped lot adjoining a service yard and garage entrance will be the main features of his living room view, or that the clothes yard which he is placing for his client is going to bring the ill will of whoever builds next door. He can produce a community of residences, the charm and therefore the selling price of each of which will be enhanced, not diminished, by the presence of its neighbor. How was this happy result achieved? The developer, from the start, has made certain to employ trained architects to carry it on. Not one but successive architects, each in sympathy with the last, each carrying on under this most intelligent developer’s direction. One does not find many Chestnut Hills, harmonious, varied, charming, triumphs of the side-by-side efforts of developer and architect.

But this branch of the architect’s usefulness to the speculator can sometimes go even one step further afield. Where the purchasers of acreage secure sufficient land to require planning of new streets to subdivide it, skill is required to get the most out of the possibilities for development. Too often we have seen the old “checkerboard” layout, stiffly rectangular blocks formed by stiffly straight streets,—no curves to give good perspectives, no interest in the conception,—just monotonous square intersections, acre after acre. Something better than this can be devised, no matter how flat and treeless the ground, and the architect can devise it. The writer is reminded of a suburb of New York which was given its first real development about 25 years ago. The original developers had the good sense, in its very inception, to form a street layout for many hundred acres which embraced scarcely a straight road. This plan has been followed; and the absence of regularity of streets is regarded by its residents as one of the chief charms of the village. It is perhaps not of frequent occurrence, but when large acreage is purchased for development, as well as when one house is contemplated, the architect can serve his builder-client to the latter’s advantage,—yes, monetary advantage,—even from the start of the operation.
BUILDING ACTIVITY IN 1928 TO CONTINUE ON THE SAME SCALE AS IN 1927

BY C. STANLEY TAYLOR

In attempting to establish a forecast of building activity for the year 1928, we face a paradoxical condition. On the one hand we have casually expressed opinions indicating less building activity than in 1927; on the other hand, we have the actual evidence of work under way on architects' boards or seriously contemplated for 1928 which indicates that building will continue at least in the same volume if it does not reach even greater totals than last year. The figures presented in the forecast tabulation included here have been developed in the same manner that the Research Department of The Architectural Forum has used in carrying out successful forecasts for six consecutive years. Confidential reports were received from almost 2,000 architects, covering the amount of work on their boards or under serious consideration for this year, and from these figures through a series of weighting factors, the forecast figures given here were established.

1928 PREDICTION BY DISTRICTS IN 19 BUILDING CLASSIFICATIONS

<table>
<thead>
<tr>
<th>BUILDING TYPES</th>
<th>N. EASTERN STATES</th>
<th>N. ATLANTIC STATES</th>
<th>S. EASTERN STATES</th>
<th>S. WESTERN STATES</th>
<th>MIDDLE STATES</th>
<th>WESTERN STATES</th>
<th>U.S.A.</th>
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<td>Automotive</td>
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<td>*Dwellings</td>
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<td>49,400,000</td>
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<td>163,413,000</td>
<td>82,666,000</td>
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<td>Stores</td>
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<td>8,086,000</td>
<td>39,763,000</td>
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<td>Theaters (All Types)</td>
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<td>43,114,000</td>
<td>4,167,000</td>
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<td><strong>Total Value of New Buildings</strong></td>
<td><strong>$311,068,000</strong></td>
<td><strong>$1,735,994,000</strong></td>
<td><strong>$170,140,000</strong></td>
<td><strong>$362,046,000</strong></td>
<td><strong>$1,757,321,000</strong></td>
<td><strong>$619,297,000</strong></td>
<td><strong>$4,955,266,000</strong></td>
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</tbody>
</table>

New Construction Under Architect's Specifications (Not Including Public Works and Utilities) .................................................................................................................. $4,955,266,000

*Small Dwellings Not Designed by Architects Estimated about 80% of total ............................................................................................................................... 789,168,000

Industrial Buildings Not Designed by Architects Estimated 50% of total .......................................................................................................................... 260,816,000

**TOTAL ESTIMATED EXPENDITURE FOR NEW BUILDINGS IN 1928** .......................................................................................................................... $5,605,128,000

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reaction of the human mind which refuses to believe
that good conditions can last so long. This is sub-
stantiated by the fact that most of those who are
pessimists about building activity are also pessimistic
about national prosperity. Of course, if general busi-
ness conditions become straitened and the confidence
of the public is shaken, building activity will be
materially influenced. The volume of building con-
struction, and particularly the volume of contem-
plated construction as expressed by plan filing, is
not a barometer of business conditions, as it is so
often called. It is a mirror of business conditions,
and it does not primarily affect prosperity in one way
or another, but is in itself an effect of our general
business situation. In prosperous times we build in
huge volume to meet not only the various necessary
requirements for space but also to meet the require-
ments of a standard of commercial and domestic
housing in keeping with ability to pay for greater
comfort and utility—an ever-improving standard.

With these thoughts in mind, is it not reasonable
to believe that there may be a basic explanation for
the evident paradox of contrary opinions as to build-
ing activity? Perhaps we have not been passing
through a real “boom.” Perhaps the continued
building activity which, as an examination of the chart
on the next page will show, has been going on in increasing volume since 1924, is primarily
based on greatly increased building requirements
coupled with prosperous conditions which have pro-
vided the means for this great investment. After
all, the population of this country during the past
ten years has been increased by many millions, for
whom shelter of all kinds must be provided. The
tremendous volume of existing construction which
has been added to annually must of necessity require
greater activity each year to take care of obsolescence
and replacements. The fire losses grow greater an-
ually, in spite of efforts to curb them, but it may be
noted that they do not grow larger in proportion to
the total number of buildings. They grow larger be-
cause the total area of risks has been greatly increased.

A COMPARISON OF PUBLIC DEMAND FOR NEW BUILD-
INGS AS SHOWN IN 1927 AND 1928

The figures given here apply to projects as re-
ported by architects and represent the percentage
of the valuation of each building type as compared
with the total value of projects for the district.

NORTHEASTERN STATES

<table>
<thead>
<tr>
<th>Type of Building</th>
<th>Requirements for New Buildings by Percentages</th>
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</thead>
<tbody>
<tr>
<td>1927</td>
<td>1928</td>
</tr>
<tr>
<td>Automotive</td>
<td>2.5</td>
</tr>
<tr>
<td>Banks</td>
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<tr>
<td>Apartments</td>
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<td>Clubs, Fraternal, etc.</td>
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<tr>
<td>Dwellings (under $20,000)</td>
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<tr>
<td>Dwellings ($20,000 to $50,000)</td>
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<td>Dwellings (over $50,000)</td>
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<td>Hospitals</td>
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<td>Industrial</td>
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<td>Office Buildings</td>
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<td>Welfare, Y.M.C.A., etc.</td>
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Here the building situation is shown at a glance. The various index lines are explained on the chart. This informa-
tion is developed from reports of the United States Department of Commerce, the F. W. Dodge Corporation, and

The Engineering News-Record
### NORTH ATLANTIC STATES

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<th>Change</th>
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<td>3.3</td>
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<td>Community and Memorial</td>
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<td>Schools</td>
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<tr>
<td>Stores</td>
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<td>2.4</td>
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<td></td>
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### SOUTHWESTERN STATES

<table>
<thead>
<tr>
<th>Type of Building</th>
<th>Requirements for New Buildings by Percentages</th>
<th>1927</th>
<th>1928</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automotive</td>
<td></td>
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<td>Public Buildings</td>
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</tr>
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<tr>
<td>Stores</td>
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### SOUTHEASTERN STATES

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<th>1928</th>
<th>Change</th>
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<td>+0.5</td>
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<tr>
<td>Public Buildings</td>
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<td>4.</td>
<td>4.9</td>
<td>+0.9</td>
</tr>
<tr>
<td>Schools</td>
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<tr>
<td>Stores</td>
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### MIDDLE STATES

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<th>Change</th>
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<td>Automotive</td>
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<td>3.8</td>
<td>+0.6</td>
</tr>
<tr>
<td>Banks</td>
<td></td>
<td>2.6</td>
<td>1.9</td>
<td>−0.7</td>
</tr>
<tr>
<td>Apartments</td>
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<td>10.</td>
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<td>Clubs, Fraternal, etc.</td>
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<tr>
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<td>3.7</td>
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<tr>
<td>Churches</td>
<td></td>
<td>6.1</td>
<td>6.</td>
<td>+0.1</td>
</tr>
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<td>Dwellings ($20,000 to $50,000)</td>
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<td>5.1</td>
<td>+1.1</td>
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<tr>
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<td>4.7</td>
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</tr>
<tr>
<td>Hotels</td>
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<td>11.4</td>
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<tr>
<td>Hospitals</td>
<td></td>
<td>5.</td>
<td>5.1</td>
<td>+0.1</td>
</tr>
<tr>
<td>Industrial</td>
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<td>4.2</td>
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<tr>
<td>Office Buildings</td>
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<td>5.8</td>
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<tr>
<td>Public Buildings</td>
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<td>Schools</td>
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<td>21.6</td>
<td>21.6</td>
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<td>Stores</td>
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</tr>
<tr>
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<td>2.</td>
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Four Years of Church Building

### Western States

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<th>1928</th>
<th>Change</th>
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<td>3.</td>
<td>-</td>
<td>-6</td>
</tr>
<tr>
<td>Banks</td>
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<td>Apartments</td>
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<td>-</td>
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<td>3.9</td>
<td>-</td>
<td>-0.4</td>
</tr>
<tr>
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<td>2.3</td>
<td>-</td>
<td>-4</td>
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<td>-</td>
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<td>Dwellings ($20,000 to $50,000)</td>
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<td>4.</td>
<td>+</td>
<td>+1.7</td>
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<tr>
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<td>+0.8</td>
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<td>6.9</td>
<td>-</td>
<td>-4.4</td>
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<td>3.9</td>
<td>6.3</td>
<td>+</td>
<td>+2.4</td>
</tr>
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<td>Industrial</td>
<td>2.9</td>
<td>3.7</td>
<td>+</td>
<td>+0.8</td>
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<td>-</td>
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<td>+0.4</td>
</tr>
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### National Percentages, U.S.A.

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<th>Type of Building</th>
<th>Requirements for New Buildings by Percentages</th>
<th>1927</th>
<th>1928</th>
<th>Change</th>
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<tbody>
<tr>
<td>Automotive</td>
<td>2.8</td>
<td>3.9</td>
<td>+</td>
<td>+1.1</td>
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<td>Banks</td>
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</tr>
<tr>
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<td>Churches</td>
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<td>+0.5</td>
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<td>Hospitals</td>
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Four Years of Commercial Building
### Four Years of Residential Building (Including Dwellings, Hotels and Apartment Buildings)

<table>
<thead>
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<th></th>
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<th>1925</th>
<th>1926</th>
<th>1927</th>
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<tr>
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<td>252</td>
<td>240</td>
<td>228</td>
<td>216</td>
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<td>1927</td>
<td>84</td>
<td>72</td>
<td>60</td>
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</table>

#### RELATIVE CURVE SHOWING FLUCTUATION IN BUILDING COSTS

- **1924**
- **1925**
- **1926**
- **1927**
FOUR YEARS OF HOSPITAL AND INSTITUTION BUILDING

FOUR YEARS OF INDUSTRIAL BUILDING

FOUR YEARS OF CLUB AND FRATERNAL BUILDING
HAUSING—THE RESPONSIBILITY OF THE BUILDING INDUSTRY

BY

JOHN TAYLOR BOYD, JR.

A YMAR EMBURY II has done real service to architects and to the building industry in joining, in The Forum for October, those who are calling public attention to the housing problem. One may disagree with him in some respects, but there is certainly no exaggeration in his gloomy picture of the failure of the building industry to master the situation. One may regret, however, that Mr. Embury did not mention the success of the huge housing operation of the Metropolitan Life Insurance Company as casting a bright ray of hope across the dark scene. For architects and their fellows in the building industry, the most pertinent fact is that they are responsible for the failure and for the disastrous effects which may react upon them if they do not repair this failure, and as promptly as possible. I propose here to point out the extent of the failure of the building industry in housing, and its possible consequences. In so doing I shall confine myself to the economic and architectural side of housing, and shall avoid the sociological aspect. Not that the sociological aspect is not important. It is important, and in the design of an actual housing operation, the bearing of the sociological side on the architectural design must be clear to the architect employed. On the other hand, in a general discussion of housing, I believe that architects, builders and real estate men will do well not to stray too far into the sociological field, for it has many pitfalls, and is far removed from our usual experiences. In fact, I have seen a gathering of real estate managers, who were called together to discuss the management side of housing, become so tangled in sociology that they could not think intelligently of their own part in the problem. It was as if a group of architects, called together to offer general suggestions on hospital architecture, attempted to decide problems of medicine; they would no longer be acting as architects, but as laymen.

In confining ourselves to our own part in housing, the first essential is to realize that the building industry is one of the basic industries of the nation, and that it is responsible for providing a clear majority of the American people with sound homes, of standards suited to American habits of living, and that it is the function of the architects to design the houses which the building industry constructs. If we architects do not understand that we have this task before us, there is little point in our discussing housing as an architectural matter. But if, on the other hand, the building industry does see that providing housing is its work,—just as it is the task of every basic industry in the American economic organization to supply the need for its particular product among a majority at least of the population,—then architects and builders will understand that the failure in the housing field is put up to them to make good. And I believe that the building industry will make good the failure. I have enough confidence in my own profession and in the industry of which it is a part to feel sure of that. Having devoted myself to housing extensively since the war, I have practical reasons for my belief, but even if I had not, even if in every respect the situation seemed hopeless, I would still think that the men in the building industry had it in them to do the work. For otherwise the wise would be to mark out the building industry as different from all other basic industries, incapable of playing its part in American economy. The automobile industry has succeeded in providing nearly every American family with a car. Ten years ago that would have seemed too absurd to be taken seriously, and only five years ago the “saturation point” in automobile manufacture was a familiar topic. Shall it be said that the building industry cannot supply the American people with homes?

First comes the “scope of the work,” as the specification reads. The problem is nation-wide throughout industry. Exceptions are confined chiefly to a few favored localities where construction costs and site costs which are well below average go hand in hand with high wages. More specifically, practically all the housing, of any type whatsoever, constructed since the war, I have practical reasons for my belief, but even if I had not, even if in every respect the situation seemed hopeless, I would still think that the men in the building industry had it in them to do the work. For otherwise the wise would be to mark out the building industry as different from all other basic industries, incapable of playing its part in American economy. The automobile industry has succeeded in providing nearly every American family with a car. Ten years ago that would have seemed too absurd to be taken seriously, and only five years ago the “saturation point” in automobile manufacture was a familiar topic. Shall it be said that the building industry cannot supply the American people with homes?

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sociology—was considered. Of course, the facts and figures had been shown to various experts who had not differed from them. I did not picture in the columns of The Wall Street Journal the consequences to the building industry of failure. It may do no harm, however, to point them out here!

Of course, as everyone knows, the neglected majority of the population which the building industry fails to provide for does not go without homes. It still depends on the supply of old houses. These houses are obsolete, sub-standard in countless instances, and are in use, in a terrible state of depreciation, long after their normal "economic" life is ended. They are the slums which form blighted areas in our towns and cities, causing grave social and civic problems. All this, again, is well known, but what the building industry overlooks is the evil consequence to itself. The custom of using houses beyond the term of their economic lives clogs the real estate market with second-hand goods, slows down the normal rate of replacement, and impedes the efficient flow of building products from manufacturer to consumer. I use, of course, the example of the motor industry, whose extraordinary efficiency in supplying a good automobile to practically every family in the country, and whose huge profits made in the operation, should be models for the building industry. The point is, that if the motor industry has trouble with its "used-car" problem, it is nothing compared to the dilemma of the building industry with the "used-house" failure. Yet does the building industry really know that it has such a problem as the "used-house" on its hands?

But there are other evil effects on the building industry of its failure in housing. These may be more remote, perhaps, but they should arrive in due time. When one of the half-dozen or so of the basic industries of the United States fails to supply the public's needs, sooner or later the public brings that industry to book. The experience may not be pleasant,—for the industry. Need one do more than refer to a number of episodes in recent industrial history, namely, the difficulties of the railroads, banks and the industries of food products, coal, petroleum, and some others? There is something in the recent growth of "commission government" in this country which may concern the building industry in particular. The Interstate Commerce Commission, the Federal Reserve Act, the Federal Trade Commission, and various other utilities, commissions, boards, etc., along with the various legislative acts which govern their work of supervision. Are all these government administrative bodies opposed by the businesses which they regulate? And were not practically all of them so opposed when they were first established? There is significance in these developments, particularly in respect to the 1926 New York State Housing Act.

The New York State Housing Act, designed to secure high-standard, low-cost housing, is the first of its kind. I believe that the building industry has nothing to fear from this law and others like it which may follow it in other states,—provided that the building industry cooperates. More of that later. But I do suggest that if the building industry does nothing to retrieve its failure to supply a basic need of the nation, building and real estate may suffer from many a government regulation and exaction which are harmful. Indeed, there are certain signs of public antagonism, stimulated by experts and influential citizens who have no connection with the building industry and who entertain little sympathy with it, but who are thoroughly informed as to its deficiencies. Thus the good will of the public for an industry,—that invaluable asset,—is being lost to building. The millions of dollars spent in advertising are not properly backed up in delivering the goods; probably the advertising of construction products would bring greater results if houses for everybody were produced as motor cars are produced. By contrast, the public loves the efficient motor industry, and will do anything for it, even to getting itself killed and maimed by thousands each year in order to provide room on the streets for the motor cars.

In this connection I think that Mr. Embury is unduly alarmed when he writes of "state aid." Indeed, he uses the term so loosely that I cannot quite grasp what he means. Strictly speaking, there is in the New York State Housing Act "state cooperation," but no "state aid" in the form of government subvention, no more than in the Federal Reserve Act, which Wall Street looks upon as one of the props of the financial universe. Possibly Mr. Embury refers to tax-exemption. Now, tax-exemption is an incident in housing, not a major feature. Besides, the tax-exemption provision in the New York law is carefully safeguarded. It rests with the municipality, and in New York the exemption is allowed for the purposes of replacing obsolete housing properties. Also, the exemption applies only to the new buildings to be erected on the sites, not to an entire housing investment. Consequently, its effect is to maintain the rate of taxes which were formerly paid on the site. But, in any case, whatever we think of the principle, there is nothing radical about it. It is sound American practice to grant a government subsidy in order to start a new essential industry when private enterprise has failed. What else were the federal grants of land to the railroads, given after the Civil War, made for the purpose of opening up the Far West? Since the World War the government has demonstrated the economic need of using the inland rivers for transportation by operating a large line, under Mr. Hoover's active sponsoring. Similarly, the government organized the air mail lines which are now being turned over to private companies. Lastly, there is the tariff, mother of many a lusty infant industry. Many of these steps, although supported in conservative circles, are more radical than the New York Housing Act. But if they are un-American,
then President Coolidge is the prophet of Lenin!

The principle to be deduced from these precedents appears to be that government may be expected to interfere in the American economic organization in order to establish a new industry or to reorganize an industry which is failing to live up to its responsibilities in cooperating with our industrial system, but that the government is ready to step out as soon as private enterprise in the industry is ready to function. I have steadily opposed the idea of "government housing," which is rife in housing circles, but I am not blind as to what is likely to happen if our industry remains inefficient in the housing field. A significant instance in this connection is the recent vote amending the New York State constitution, facilitating a municipality's use of land condemned for a public improvement (such as a traffic street widening) for housing. Actually, the amendment is a technical detail involving necessary legal powers in city planning. The question as to whether this power will be wisely used can be settled only in the future as specific projects are undertaken. But the point of the matter is that the people thought they were voting to order the slums cleared. Political placards urged votes "For Decent Housing," and newspapers carried headlines of "Slum Clearance Amendments." The amendment was carried by a large majority, reaching about 7 to 2 in this city. Such a vote is a temptation to a demagogue who sees an opportunity for making political capital. Housing is in politics now and is likely to stay. Let us take warning. If the building and real estate interests feel obliged to leave initiative in housing to the government, at least let them be ready to take housing back from the government as soon as possible.

I trust, if the building industry can view housing in this light as a practical economic opportunity and responsibility, which it owes to American industry, instead of as a strange sociological problem which can never be solved, that it will act to retrieve its failure. It is a mistake to view the problem in terms of history, quoting the example of ancient Rome and of most other great cities before and since, and ending by dismissing housing as hopeless. Our rival, the motor industry, made no such mistake. Fortunately for it, it deals with a product which has no history. Henry Ford, in fact, has declared that he does not believe in history! There was no precedent based on the experience of the Romans with motor cars to confuse Mr. Ford with notions that "it could not be done." Doubtless this freedom aided Mr. Ford in conceiving his crazy idea that practically every American family could own a decent automobile. Although he did not believe in history, he did in magic, and he was right!

Now, as a practical matter, what is the outlook for a solution of the housing problem today? Fortunately, I believe it correct to say that real progress has been made, both in estimating the extent of the work and in the experience which has been gained in actual housing operations—although, as I have already suggested, it would make no difference in the responsibility resting on the building industry if there were nothing hopeful to report in progress made. In the first place, there is the Metropolitan Life Insurance Company's housing in Queens, now entering its fifth year of successful operation. It rents for $9 a room a month with the aid of the first tax-exemption awarded in New York, or without benefit of exemption at the rate of about $10.50 a room a month, including steam heat, hot water and dumbwaiter service. The Metropolitan housing returns over 8 per cent net to the insurance company, for interest and amortization on—let this be emphasized—a 100 per cent equity. There are several other housing operations in New York, notably those of the Standard Oil and of the Rockefellers. They were built on a smaller scale than the Metropolitan, with the idea of demonstrating certain principles of housing technique rather than of attaining the low Metropolitan costs. Nevertheless, these other housing groups rent for considerably less than the market in their neighborhoods. These building are facts which the most prejudiced person cannot brush away. It seems reasonable to think that the solution of the housing problem depends in large measure on continuing to produce building groups like those of the Metropolitan Life Insurance Company and the others. This being true, it devolves on the building industry to show why it does not cooperate in this object. This appears to be the gist of the problem.

Why are not more housing operations like the Metropolitan groups built? "Because the speculative builder cannot make enough money out of it" is the answer. That may be the answer why the work is not undertaken, but it is no reason why the building industry should continue to throw up the task. If the work is too much for the speculative builder, let someone else be found to tackle it. Indeed, it is only fair to say that the methods of the speculative builder automatically rule him out of the picture. His methods were developed for another kind of houses,—the homes of the upper third of the population, the owners of the Rolls-Royces and the Buicks. They are impossible for Fords, and it is Fords we are now concerned with. The methods of the speculative builder for handling low-priced housing have been given the most thorough technical and scientific study as to their adaptability to housing, and nearly everyone who has studied housing is agreed on that point. The possible exception is the heads of the National Housing Association, who apparently differ in this view only to the extent of saying that the speculative builder should be depended on for housing, but they seem unable to advise him how he is to do the work. The fact is that the methods of the speculative builder are obsolete in a basic industry. The whole trend of American economic organization is in another direction. It lies toward huge-scale opera-
tions, efficiency, and a narrow margin of profit, but—and here is the point—super profits, based on the elimination as far as possible of highly speculative risks. The fact is, that the same methods which are pursued by the speculative builder, if applied in other basic industries, would presently wreck the whole economic structure of the country.

Consequently it would seem as if a different type of organization, different particularly on the financial side, were needed in order to produce sufficient large-scale housing operations of the type of the Metropolitan Life Insurance Company and kindred enterprises—and much better operations as practice brings improvement—and thus end the housing problem for all but that extremely small number of people who cannot support themselves and who should rightfully be objects of charity. The New York State Housing Act was designed to facilitate this new type of housing corporation. And, be it noted, the law is just as helpful—and probably just as necessary—in the case of housing projected on the outskirts of cities, or in new industrial communities under a policy of decentralization, as it is in the congested areas in the hearts of great cities.

For, generally speaking, the speculator is as unable to supply sound housing for even the middle third of the population on the outskirts of the city as he is at its center. This fact should not be overlooked, and I believe that Mr. Embury is in error in asserting that high wages in the building industry are the cause of the housing problem. I have taken part in countless calculations during the past year, as one of the consulting architects of the New York State Housing Board—long, accurate, painstaking studies—and know that the results of these researches bore out what had been fairly evident to housing architects—that is, that high wages are not the cause of failure, except to a very limited degree. Of course, a reduction in wages would affect rentals, but not nearly so much as would the abolition of speculative finance. The Metropolitan's housing was built at the present wage level.—in fact, the construction operation was shut down for nearly a year because it could not afford to pay the wage bonuses then demanded. This delay increased the carrying charges. This leads me to agree with those architects who believe that capital and management in the building industry are in need of far greater improvement in methods than is labor.

Exhaustive research into land values, and into costs of various types of building construction, with reference to room sizes and specifications, studies of financial possibilities, including the tax factor and large scale operations with the amount of extra income to be derived from retail stores,—this the new Housing Board of New York found necessary before it could place before private building corporations the proper inducement to proceed to construct housing under the law. This research showed that there was a remarkable lack of accurate knowledge on certain phases of the subject. That criticism sometimes heard of the State Housing Board, namely that in a year it has "done no building," only indicates a superficial acquaintance with the matter on the part of the cynics. We must be patient. In my own opinion, further research may be necessary, and may show that the law requires further amendment in certain of its provisions. This should not be wondered at, since the law is the first of its kind, and is necessarily experimental.

These are some of the vital facts in the housing problem today. Of course, there is much more to the story, which is one of amazing complexity, and never ends. But out of the welter of facts and conflicting views there stand out clearly the responsibility of the building industry and its duty to pursue the success of the first experimental housing groups. This means action, and action based on thorough knowledge. Knowledge can come only from scientific research, coupled with actual experience. Not only in housing but in other types of buildings, one vital need of the construction industry is scientific research into the economics of building design. We can hardly hope to play our part in the complex, technical, swiftly changing, industrial life of today unless we devote much more attention to research. Warnings have been issued by leaders in industry on the need of research. Examples have been given of huge American industries which have been ruined by changes which were never even thought of until they arrived. Scientific research would have discovered the possibility of these changes and found means to avert them or to cope with them, and so preserved the industry.

But, whatever be the solution, I hope that I have made clear my purpose of showing that the building industry will be held responsible for the failure in housing. Responsible business, financial and government authorities, as well as the public, will ask the building industry, why, if it is one of the nation's basic industries, it cannot do its part as the other basic industries do theirs, and supply efficiently the demand of a clear majority of the nation's 120,000,000 consumers. Either the building industry must tackle the task of providing housing seriously or else show, far more convincingly than it has ever done, that there is something inherent in its field, and different from other basic industries, which prevents it from following the modern economic trend. In either case the building industry faces the biggest task it has ever tackled. For the building industry, housing is not primarily philanthropy or sociology,—it is pure business.

In the providing of housing the architect must be active. The problem of design is uppermost in any angle of housing, and, in a long experience, I have seen almost no statistical study or research worth the paper it was written on which did not depend, in essentials, on an architect's counsel. Technically, the solution of housing depends on a scientific perfection of the "chemistry" of buildings, groups of buildings, and site areas, and is thus architectural in design.
DRAWINGS, specifications and contracts for a building are the tangible and concrete expressions of the development of an idea used to produce the structure desired in accordance with the building, business and legal practices of the community within which the building will be constructed. In the course of the development of the idea by the architect, it is interesting to note that the drawings in their various stages of development are prepared first. After the drawings are completed, the specifications are compiled. After an agreement is reached, based upon the drawings and specifications, the contracts are prepared. The contract is the written agreement to perform all of the work defined by the drawings and specifications, which when executed will legally compel one of the parties to complete all of the work shown on the drawings and covered in the specifications in return for the remuneration agreed upon.

**Definition of Drawings.** The drawings are prepared to illustrate those portions of the idea which it is impractical to convey by the use of the written word. Specifications are prepared to convey those portions of the idea which it is impractical to convey by the use of the drawings. Usage has within reasonable limits defined the function of each. The drawings should clearly and accurately indicate:

(a) The architectural and engineering design.
(b) The plan, sizes and dimensions of each portion and unit of the work.
(c) Designation of each portion, so as to allow reference to it.
(d) A symbolic sign illustrating the extent to which each of the building materials will be used (cross hatching, etc.).
(e) Notes:—These should be used carefully and sparingly and only as necessary to simplify the preparation of certain portions of the specifications and to clarify portions of the drawings which cannot otherwise be indicated. Notes can very easily be used to an extent where they are likely to contradict the specifications.

**Definition of the Specifications.** Specifications are designed to convey in writing that portion of the idea which it is impractical to convey by means of the drawings. The drawings and specifications complement each other. It is for this reason that the exact function of the specifications should be defined. The specifications should describe the organization, material and workmanship required from each and every unit, with a full understanding of the function of each, and in such a manner that in combination with the drawings, these several results will be obtained:

(a) An accurately detailed presentation of what is wanted.
(b) An instrument forming an accurate basis from which estimates can be obtained on each and every unit and forming a means of establishing a trade agreement.
(c) A document which, in combination with an executed contract, will legally compel the production of what was agreed upon.

The specifications should be designed keeping in mind that these different individuals are very much interested in each portion:

(a) **Supervisor of Construction.** This official is the "policeman" on the work. It is his duty to interpret and enforce all of the provisions of the specifications. He, therefore, should be backed with a definite, complete description of what is required, not be subject to contradiction, and be forceful enough to support his decisions. The descriptions should be clear and accurate enough to prevent the necessity of having recourse to interpretations.

(b) **Estimator.** This individual desires a document accurately subdivided, with each trade inclusive, and prepared with an understanding of the market, and the trade and labor organizations in the community, to allow him to obtain accurate estimates for any portion of the work.

(c) **Materialman.** This functionary desires standard grading rules of materials and methods of construction, so that he can quote upon exactly what is wanted. The specification should be prepared so that special and unusual materials, difficult to obtain, are not required.

(d) **Contractor.** For success in his work he requires a safe, strong and sure basis, upon which to execute his various sub-contracts without fear of the necessity of paying extra for items in other portions of the specifications which should have been included under the proper trade designation.

(e) **Draftsman.** It is necessary that he have enough detail, definite data and names of materials, to intelligently check shop drawings and to prepare details.

**The Precedence in Authority.** The Supreme Court has ruled that where the contract documents contradict one another, the contract is impossible of execution and is, therefore, null and void. It is for this reason that contradictions between plans and specifications should be avoided and that one of the documents should take precedence over the other. The drawings are prepared first, after which specifications are compiled; then the trade agreement is made, and
of precedence, the contract taking precedence over the specifications, and the specifications taking precedence over the drawings. A statement to this effect should be included in the specifications and contracts.

**Specification English.** The question of the use of English should be carefully considered in the preparation of specifications, as the proper use of the moods and tenses, sentence construction, diction and grammar, should be such as to convey exactly the meaning intended. The American Institute of Architects uses the simple future tense of the imperative mood consistently. I believe this adaptation is correct, as it is undoubtedly the intention that the contractor shall furnish "such and such" materials or labor, for which the owner will pay "such and such sums of money," and will bind each other accordingly.

**Division of Trades.** Specialization with the building trades is highly developed and penetrates into each and every trade to an extent not dreamed of a generation ago. The list of trade sections of the New York Building Congress includes 56 different divisions, many of which are sub-divided within themselves, so that it is possible for 100 different subcontractors to be employed on one operation. The Building Trades Employers' Association of New York issues a handbook which lists the various awards made in jurisdictional disputes between the different labor unions. This handbook is a valuable guide to the scope of work performed by each trade, and it forms the basis for the inclusion of the materials and labor in their proper trade divisions. It is the architect's duty to evolve an efficient working plan, utilizing the various sub-divided trades as they are now organized to function. The only way by which this can be satisfactorily accomplished is by means of the specifications. First, by means of the General Conditions, the entire organization, method of control, scope of work and system of constructing the particular building are covered, after which the amount of work expected from the general contractor is clearly defined. Then the scope and class of work and quality of materials for each separate trade or trade division are clearly defined, without omission or overlapping. The trade divisions are listed in the sequence in which each individual trade performs its work upon the building. The list of trade sections of the New York Building Congress furnishes an ideal means of trade divisions for the particular building are covered, after which the desirable character, contacts, training and experience. These men are able to lead one "back stage" to obtain a "close up" of the inside workings of the various trade, labor and material organizations which is invaluable. The contacts so developed create, in effect, an advisory board on the different phases of building construction which will enable one to obtain authoritative, reliable and valuable data on any subject. Salesmen who are merely "order takers" and "lip salesmen" are a nuisance, and no time should be wasted on them.

Another source of information, and one that is developing rapidly, is formed by the various material and trade associations, such as the Copper & Brass Research Association; the Portland Cement Association; the Common Brick Manufacturers' Association; American Face Brick Association; National Lumber Manufacturers' Association; American Institute of Steel Construction; the National Association of Ornamental Iron & Bronze Manufacturers; etc. These associations are created to develop and extend the use of the products or trades they represent, and are in a position to furnish accurate, scientific and common-sense data on all questions relating to their trades or products. The Bureau of Standards of the Department of Commerce has touched on many questions affecting the specification writer. For instance, their pamphlet No. 123 covering the physical and chemical tests of the commercial marble of the United States; the circular No.
# NEW YORK BUILDING CONGRESS

**List of Trade Sections for Specifications**

1. **SPECIAL CONDITIONS:** (Conditions, not actual work).
2. **MISCELLANEOUS WORK:** (Items of actual work to be done).
3. **DEMOLITION:**
4. **EXCAVATION:** Filling, Grading.
5. **PILING:**
6. **SHORING:** Sheet Piling, Underpinning.
7. **FOUNTATIONS:**
8. **STRUCTURAL STEEL:**
9. **WATERPROOFING BY PLASTIC COATING:**
10. **WATERPROOFING BY BITUMINOUS MEMBRANE:**
11. **MASONRY AND CONCRETE MATERIALS:** Cement and other basic materials, Integral Waterproofing.
12. **MASONRY WORK:** Mortar, Brickwork, Rough Stone Masonry, Structural Terra Cotta, Gypsum Blocks.
13. **MASS AND REINFORCED CONCRETE:**
14. **CONCRETE ARCHES AND FIREPROOFING:** Reinforced Concrete Stairs, Hangers.
15. **CUT STONE WORK:** (Granite and Bluestone should generally be separate).
16. **IMITATION CUT STONE:** Stone Models, Carving.
17. **ARCHITECTURAL TERRA COTTA:**
18. **ROOFING AND SHEET METAL:** Skylights and their Glass.
19. **VAULT LIGHTS:**
20. **ARCHITECTURAL IRON:**
21. **ARCHITECTURAL BRONZE:**
22. **CEMENT FINISH:**
23. **SPECIAL PAVING:** Asphalt, Wood Block, Stone.
24. **SPECIAL FLOORS:** Cork, Rubber, Mastic, Magnesite, Linoleum.
25. **METAL FURRING AND LATHING:** Metal Beads.
26. **PLASTERING:** Keene Cement, Stucco, Sgraffito, Wood Lathing.
27. **ACOUSTIC TREATMENT:**
28. **INTERIOR MARBLE AND SLATE:** Structural Glass.
29. **IMITATION MARBLE:**
30. **TERRAZZO:** Marble Mosaic.
31. **TILE:**
32. **CARPENTRY:** Framing, Millwork, Screens, Weather Strips, Rough Hardware.
33. **SPECIAL WINDOWS:** Rolled Metal, Hollow Metal, Patented Operation.
34. **HOLLOW METAL DOORS AND TRIM:**
35. **METAL COVERED DOORS AND TRIM:**
36. **SPECIAL DOORS:** Revolving, Balanced, Folding, Rolling Shutters.
37. **SHOW WINDOWS:**
38. **HARDWARE:** Wall coverings.
39. **DECORATIONS:**
40. **PLUMBING:** Gas Fitting, Fire Lines.
41. **SPRINKLER SYSTEM:**
42. **VACUUM CLEANING SYSTEM:**
43. **REFRIGERATION SYSTEM:**
44. **WATER SUPPLY SYSTEM:**
45. **SEWAGE DISPOSAL SYSTEM:**
46. **HEATING AND VENTILATING:** Temperature Control.
47. **POWER PLANT:** Coal and Ash Handling, Cranes, Engines, Dynamos.
48. **ELECTRIC WIRING:** Signal Systems, Bells, Telephones.
49. **LIGHTING FIXTURES:**
50. **FIRE ALARM SYSTEM:**
51. **CLOCK SYSTEM:**
52. **ELEVATORS:** Power Dumbwaiters, Elevator Accessories.
53. **ESCALATORS:**
54. **MECHANICAL CONVEYORS:** Pneumatic Tubes, Chutes.
55. **EQUIPMENT:** (Semi-independent: This list may be extended indefinitely):
56. **KITCHEN, LAUNDRY AND GARAGE FITTINGS, SAFES AND VAULTS,** Furnishings, Tower Clocks, Chimes, Bells, Greenhouses, Landscape Work.
151 on "Wall Plaster, Its Ingredients, Preparation & Properties," and the booklet on the "Minimum Requirements for Small House Construction," are useful, and the information contained is gathered from the most authoritative sources. When catalogs are received they are quickly appraised and turned over to the catalog file. Those having desirable specification data are culled out, and the specification data extracted and filed in a separate system.

**Filing Specification Data.** A satisfactory method of filing basic specification data is by the use of stiff covered loose-leaf binders, 8½ x 11 inches, with 1½-inch rings. These binders contain numbered indices using the corresponding numbers that the New York Building Congress utilizes for its trade sections, or the divisions determined by a similar local body. The printed form of the New York Building Congress forms the index for these bindings in this case. A copy of this printed form is shown on page 139. When desirable specification data are obtained, the trade designation is obtained from the index, and the data filed under the number assigned to it. This system allows the gradual accumulation and selection of important data, so that a complete reference library in loose-leaf form is acquired. These volumes are numbered and kept in a standard bookcase for constant reference and form in no sense a catalog file but contain basic specification data that are constantly referred to in the preparation of specifications.

**Systems of Compiling Specifications.** To eliminate the repetition of mistakes which occur in copying one specification from another, and the inclusion of data which would not apply to another, the "master specification" was developed. These specifications also are designed to simplify the compiling of new specifications and to standardize the general construction practices of an organization. It will readily be seen that where an office works from a master specification, the various supervisors, detailers and contractors' estimators become familiar with the type and class of work specified. This knowledge will not only speed up and simplify work, but will eliminate a good many errors. The interpretation of the specifications gradually becomes standardized, and the various contractors can tell from past decisions what to expect. The advantages of a master specification are its being:

(a) A check to prevent omissions.
(b) A source of ready reference.
(c) Means of recording the best experience.
(d) A place where corrections can be made and repetitions of errors avoided.
(e) A source whereby constant improvements can be made, keeping abreast of the times.

There are various methods used in compiling specifications. The three outstanding methods are:

(a) **Use of Old Specifications.** This method consists of the use of an old specification of a similar work as a basis. Starting with the "General Conditions," the paragraphs that apply to the new work are cut out and pasted in their proper sequence on a standard yellow pad. Where a paragraph does not apply, insertions in longhand are made directly on the pad so that a complete specification is had on yellow paper, consisting of paragraphs pasted on the paper, with insertions in longhand. These are then turned over to the stenographer who makes a rough copy, using double or triple spacing to allow inser-

### SERVICE CONNECTIONS:

**Service Conduits and Feeders:**

The Electrical Contractor shall install the lighting (x) and power (x) conduits and feeders from service cutouts in building to point of service connections on__________, the conduit to be extended up the__________ not less than 15 feet and__________ to terminate in an approved waterproof conduit drop loop bushing as required by the Service Company. The feeders shall be as specified under "Wiring" and sufficient length of cable shall be left at each end as required.

(x) indicates possible omissions.

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**ELECTRICAL WORK - THREE-Z**

Sample Card from a Card Index Master Specification

(Actual card is 5 x 8 inches)
that is from five to ten years old. The mistakes and accumulating unnecessary data. Clauses are often compiled as a "dummy specification," using double or triple spacing for ease in making corrections. The "dummy" is used for carefully checking and correcting the work, and after this is completed it is turned over to the stenographer for final copying. The cards are then sorted. This is generally done by the stenographer who inserts the paragraphs in the proper spaces. The “dummy specification” is completely discarded, the final copies being made at once, and portions re-written where necessary.

Those sections which are not susceptible of standardization are copied directly from an old specification, with the necessary new paragraphs dictated to make them apply. In many cases complete trade sections have to be dictated. With care, the subject matter can be segregated so that certain paragraphs will be standard and will not change. The subject matter which does change can be segregated on one or more pages, making it necessary to re-type only these pages. I believe this to be an ideal system, as the master specifications are being continually checked up and revised, so that there eventually is developed a master specification which fits one’s particular practice and method of doing business. This system allows a gradual and continual development, cuts down typing expense at least 40 per cent, and forms a standard from which everybody in the organization works. Of course in all practices there will be operations for which this standard cannot be used. In that case, recourse is had to the old method of cutting and pasting the specifications; but wherever possible this is done by using the paragraphs from the standards rather than from an obsolete specification.

Specification Schedules. Where a building operation is very complicated, and where individual treatment of different rooms and spaces throughout the building is such as to make descriptive matter difficult, schedules are used. These schedules simplify the preparation of specifications and drawings. The system is generally operated in this way: Schedules are made of all doors and door openings. Each door or door opening is numbered on the plans, and each room or space in the building is also numbered, the corresponding numbers appearing on the schedule. The schedule of door openings lists this information: 1. Size of Door, then, in order the type and kind of:—2. Door Buck; 3. Door Frame; 4. Door; 5. Trim; 6. Plinth; 7. Door Saddles; 8. Glass; 9. Transom; 10. Hardware. The schedule of finishes, lists: 1. Flooring, then, in order, the type and kind of:—2. Walls; 3. Base; 4. Ceilings; 5. Wainscots; 6. Chair Rails; 7. Picture Mouldings; 8. Number of special detail drawings.

The specifications applying to the use of the materials covered in the schedules could very easily be standardized, as no description of where the different materials occur is necessary, since the schedules determine exactly where use of all of the finishes occurs. This system simplifies the preparation of the drawings that make it unnecessary to mark the
finishes on the plans. It also makes it unnecessary to note on the drawings any data in connection with the doors. The schedules are prepared first, and after the schedules are compiled the specifications are prepared. Portions of two such mimeographed sheets of yellow paper clipped together are prepared. Portions of two such mimeographed consumed in making corrections, for whenever an necessary to use a very thin onion-skin paper, and if this number by typing the specification twice, using necessary to use a very thin onion-skin paper, and if this number by typing the specification twice, using pert specification writer, I believe the “snake” divides all of the notations into their proper trade forms of insurance against “extras.” It containing an accurate specification, and its use is one of “snake” is one of the most important means of ob­certain portions, so that a complete series of notes the progress of the work, notes referring to each trade indexed for the proper trade sub-division. During the progress of the work, notes referring to each trade are jotted down in their proper trade divisions. Sketches also are made where necessary, illustrating certain portions, so that a complete series of notes referring to each trade is covered on this pad. The “snake” is one of the most important means of obtaining an accurate specification, and its use is one of the best forms of insurance against “extras.” It divides all of the notations into their proper trade headings and places them before one at the desired time and in the correct sequence. Even for the expert specification writer, I believe the “snake” important, and it should always be used before compiling the specifications.

Reproduction. The generally accepted methods of reproducing specifications are:

(a) Carbon Copies. Where only 15 or 16 sets of a specification are required, it is practical to obtain this number by typing the specification twice, using seven carbons for each typing. By this method it is necessary to use a very thin onion-skin paper, and if the typist is not accurate, a great deal of time is consumed in making corrections, for whenever an error is made it takes considerable time to correct each carbon copy. Of course, the last two or three carbons will be rather indistinct, and the carbon copies are easily smudged in handling. There is very little expense in doing the work by this method.

(b) Blue Printing. When upwards of 30 sets of specifications are required for each work, the most economical and satisfactory method is to use the blue-printing system. Blue-prints can be obtained for about 4 cents a sheet. They form a perfect record of the original specification, and cannot be tampered with. A blue-print specification can generally be obtained on comparatively short notice.

(c) Gelatine Process. On short specifications, where a small number of copies, perhaps 30 or 40, are required, this process would be feasible either for reproducing the specification within the architect’s office or by a public shop, although in the smaller cities there are seldom any letter shops which employ this process. With this process, the original is typed on a typewriter through a specially inked ribbon, use of which is a part of the process. The master copy is made this way and is then transferred to the flat bed of the machine. The surface of the machine must be sponged before taking off each copy, and each sheet of paper must be laid in exact position, and then a roller is run over the sheet, after which it is allowed to stand for an instant, and then the sheet is taken up and another put in its place.

(d) Type Printing. It is too expensive to print a specification with type where only 50 or 75 copies are required. If they were to be printed, type about the size of newspaper type could be used, and two sheets, of single-spaced copy could be condensed into one. The cost of printing 50 or 75 sets of these specifications would be approximately $4 a page of the printed copy, which would equal $2 per

<table>
<thead>
<tr>
<th>SUBJECT OF DOOR OPENINGS</th>
<th>COURT HOUSE SHEET NO. 1</th>
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<tbody>
<tr>
<td><strong>Page of Specification</strong></td>
<td>75 40 74 61 76 61 78 62 50 80</td>
</tr>
<tr>
<td><strong>OPERATION</strong></td>
<td>50 60 51 61 63 60 51 90</td>
</tr>
<tr>
<td><strong>FIRST FLOOR PLAN</strong></td>
<td>50 60 51 61 63 60 51 90</td>
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<tr>
<th>Location</th>
<th>No.</th>
<th>Size</th>
<th>BUCK</th>
<th>FRANK</th>
<th>THIM</th>
<th>DOOR</th>
<th>PLINTH</th>
<th>SAD-</th>
<th>TRA-</th>
<th>DOOR</th>
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<tr>
<td>Court 107</td>
<td>150</td>
<td>3' x 7'</td>
<td>X</td>
<td>X</td>
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<td>Jury 108</td>
<td>151</td>
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<td>Clerk 109</td>
<td>152</td>
<td>3' x 7'</td>
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<tr>
<td>Vault 2110</td>
<td>153</td>
<td>3' x 7'</td>
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<tr>
<td>Corridor 154</td>
<td>6' x 8'</td>
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<td>Rotunda 155</td>
<td>7' x10'</td>
<td>X</td>
<td>X</td>
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Portion of a Specification Schedule; Door Openings

(Actual schedule is standard letter size)
page of the typewritten copy. It would ordinarily require one week to turn out a set of 200 pages. On re-runs for additional copies, the cost of printing would be about 50 cents a page. The disadvantage of printing is that cost is excessive and almost prohibitive when fewer than 50 copies are needed.

(e) Mimeographing. The use of the mimeograph process is a feasible method of duplicating the architect’s specifications in the architect’s own office, when 15 or more copies are required. In order for the architect to handle this work within his own office, it would either require additional employees or considerable overtime work. To mimeograph specifications within the architect’s office would also require supervision to insure that the process was used correctly. To have specifications mimeographed by a public mimeographing shop, the cost becomes more of a factor. When between 30 and 40 sets are required, the cost of mimeographing would approximate the cost of blue-printing. Below 30 sets, the cost of mimeographing would exceed that of blue-printing. Below 30 sets, the cost of mimeographing would exceed that of blue-printing, but the finished mimeographed sheets would have certain advantages over blue-printing which would be of value. The mimeographed set would be more compact and more readable. The chief advantages of blue-printing would be absolute accuracy, whereas, with mimeographing the accuracy is dependent upon the condition which does the work. Of course the stencil may be typed in the architect’s office to insure accuracy. The typist who types the stencil must be accurate, and their checkers must catch such mistakes as are made. With blue-printing there is also the advantage that a few complete sets can be obtained in a very short time after the blueprint has received the copy, whereas, with mimeographing, no sets can be obtained until the entire work is completed. When a stencil is once put on a mimeograph machine, the entire number of copies must be run off. When these specifications are sent to a mimeograph shop, approximately a day to every 100 pages of copy must be allowed. For instance, on a 200-page specification, the architect can expect to receive the completed sets two days after the mimeographer has received the original. When more than 40 sets are required, the saving in cost by using the mimeograph process increases in direct ratio to the number of sets required, since it costs very little to run 25 additional copies when a stencil is once put on a machine, whereas, the cost of each individual blue-print remains constant.

Summary. Too much system can be used in compiling specifications. The method should come naturally, for if forced into an ironbound system, the specification writer is likely to concentrate on the method and not on the subject. The methods outlined here should be used with great caution and judgment, as they often will not apply to unusual work. No substitute exists for a thorough knowledge of the subject, and no standard will take the place of an experienced specification writer. Specifications have been referred to jokingly as “the best sellers.” Considering the number of people and the organizations affected by good specifications, it should not be difficult to realize the creditable publicity which will accrue as a result of having them. Among the most important assets of a specification writer are common sense and ability not to be swayed too much either way, nor to take sides too strongly. He should keep a perfect balance and attempt to get the proper perspective so as to obtain a proper view of the whole project. It is well to remember that behind the materials stand the organizations that produce

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them, so that when one selects a material one selects the company which will manufacture and install the material. It is for this reason that it is wise to make contacts with responsible companies and specify their products outright, without "or equal." By this method a skeleton organization will be "built up," which will strive to supply the material specified. The morale of the entire building operation will be affected, and a good building will result despite the whims of the general contractor. "Or equal" has a legitimate use, particularly when one is specifying raw materials covered by standard grading rules, because anyone interfering with competitive business is running counter to the business trend.

The materials that enter into a building may be classified generally under two headings,—raw materials, and manufactured materials. Raw materials in general comprise those products created by nature and used in the condition in which they are taken from nature. These materials are generally wood; stone; and such basic manufactured material as steel, copper, cement, lead, tin, etc., which are included under this heading for the reason that their quality is stabilized and standardized, due to the resources, equipment and finances backing them. Manufactured materials are generally paints; varnishes; waterproofing compounds; pitches; magnesite, mastic, rubber tile and similar floor coverings; chemical floor hardeners; cement products; electric clock systems; telephones; fire alarms; heating specialties; ventilating fans; thermostatic heat control; elevators, etc.

When specifying raw materials there is little need for looking behind the product, as the specification writer should be thoroughly familiar with them, and his training should qualify him to pass on these materials. He should know their grades, physical properties, adaptability, limitations, and costs. When specifying manufactured materials a different condition exists, as the specification writer must depend in large measure on the character and standing of the company behind the product, as these materials are generally as good "as the man who makes them." The human element enters into the quality of these materials to such an extent that the standing of the company behind the product is an all-important question to decide; the quality of the material itself very often depends entirely on this decision. The specification writer must learn what trade-marks mean.

Facsimile of a Portion of the "Snake" Used by the Author

The original is a yellow pad 8½ x 11 inches; indexes corresponding to Trade Sections are cut at the left. The architect can make his notes directly on the "snake" and can correct them before the specification writer compiles the specification. The method saves time and makes it unnecessary to read the entire specification.
JOHN PARKINSON is my friend, and the friendship is of long standing,—over 30 years in fact. We both came to Los Angeles in 1893, he as a practicing architect and I as a draftsman. John Parkinson left England for Canada when he was about 20 years of age, and from there drifted to Napa, in California. After a short sojourn in Napa, he went to Seattle. He stayed in Seattle for a few years and made quite a success, not only as an architect but as a financier. However, as with all other booms, Seattle's day of reckoning arrived. He therefore decided to try Los Angeles, and when he came with his wife and two small children, he had a capital of $50. He designed the first structure having a steel frame in southern California, and has designed some of the largest and most important buildings here. He has a happy faculty of making good and lasting friends. He is a student, traveler, engineer, and architect. He is known far and wide for his sterling integrity and unflinching fairness in the execution of his business. John Parkinson has two aberrations, one being that he thinks he can play pool, the other being that he has the hope of becoming a golf champion. He has been actively identified with a good many civic activities. For a number of years, he was a member of the Municipal Art Commission, and he is still a member of the State Architectural Examining and Licensing Board. His son, Donald B. Parkinson, is a member of the firm, and they make a splendid team, one with his ripe experience, and the other with the enthusiasm of youth.—JOHN C. AUSTIN

IN March, 1894 I opened an office in Los Angeles. Its equipment comprised a drawing table, T-square, etc., a set of instruments of 14 years service, and about ten yards of brown detail paper whose surface was untouched but alert. Minus commissions, prospects or capital, with pencil in hand, I stood behind the table, when in through the open door quietly walked John C. Austin, seeking work. I liked his looks,—a square face; firm mouth and good jaw; gray, intelligent eyes in which a twinkle hovered,—a man to hold his ground and fight fair, asking nothing but opportunity, and, I was to learn, a man of wit, courage and staying qualities, then about 25 years of age.

In 1894 he opened an office, and since then many of the prominent school buildings of southern California, among them the Los Angeles High, many office buildings, hotels, hospitals and churches, are of his work. He has a positive genius for handling church, school and hospital boards, and unfailingly inspires and retains the confidence of his patrons. He is a prominent member of the Chamber of Commerce; has served as president of the Jonathan Club and of the Los Angeles Chapter of the American Institute of Architects. At the present time Mr. Austin is associate architect of the Los Angeles City Hall, to date the city's most notable building. As an architect, a man, and for his record, he has my admiration and esteem, and I have valued his friendship always, since as a lonesome English lad, 33 years ago, he asked me for work.—JOHN PARKINSON
TIME SAVING IN THE OFFICE
BY
E. R. DUCKERING
OF THE OFFICE OF WILLIAM LAWRENCE BOTTOMLEY, ARCHITECT

The title may suggest an attempt to squeeze a few more lines and erasures from a man trying to puzzle out a thumb-nail sketch of the entire results of a conference between his employer and the client. However, the writer is only offering a hint or two that may release a few drafting hours which are spent in unnecessary waiting and interruptions due to lack of readily accessible information.

A commission usually starts with an indefinite collection of data presented in such odd forms as illustrations scribbled on a hotel paper napkin, the obvious results of a luncheon hour conference, or even on a paper bag or the flap of an old envelope. Very often a client will rush in a batch of magazine clippings carefully selected by him to fit into your idea of just what his house should be. Few draftsmen take these clippings seriously, and soon they are tucked up on a table leg where the janitor can pick them off easily. Later on the client remembers these precious documents and demands their immediate return. No draftsman can remember ever having seen them, and the architect is forced to appease his client as best he can. This is a serious reflection upon the nervous tension which exists while the office boy is frantically trying to recollect where he last saw the drawing that is demanded. A legal size manila envelope affords a practical place to store all these bits of information. The envelope presents a neat appearance, and a collection of such envelopes can be filed in alphabetical order or kept in a tracing drawer. The vertical file is most satisfactory because it keeps all the envelopes together. Mental peace of the force makes for a smooth continuance of work. A telephone call or discussion within earshot naturally tends to distract anyone who is in a mood for concentration. Arguments invariably disrupt the work of a man who is checking a set of figures. It is apparent that a drafting room free from searching parties, contractors seeking suitable reasons for extras, and others endeavoring to have drawings put into their own language is a place in which those who do feel inclined to concentrate can do so. It is not intended to condemn practical joking; for jokes do not constitute the lasting barrier to thought that an uneasy mental atmosphere engenders.

A great deal of time is spent in making details that cover either a large number of conditions or else a very few. Most offices give each drawing a number and a title that is fairly descriptive of what it is supposed to include. Rarely can one determine from the title all that the drawing covers. A very simple method for saving extra drawing and permitting the contractor to choose the correct detail with the minimum amount of effort is to put on the working drawings the number of the detail covering that particular section or condition. Certainly a drawing or sheet number is as easy to read as are quantities of notes, such as "see F. S. D." or any reference to another sheet. The existence of the number alone is sufficient to explain whether or not the condition is covered in a scale detail or a full-size, or perhaps in both. If a condition requiring a detail has no number, it has been detailed. Every drawing number should be recorded on the office copy of a set of working drawings as it is made. This forms a check on the progress of the detailing, and any person can soon establish the status of the work. Many contractors use this system of numbering on work as it is in progress, and it is quite as advantageous to a drafting room in saving hours of time spent looking for the number of the drawing covering a certain condition. Windows and doors have their numbers to make them easy to list and locate, and application of the same principle can be made to a uniform listing of drawings for anyone to read. A drafting room's set of estimate drawings will serve as a tell-tale record of exactly what the contractor figured on. This should be kept meticulously. When the results of several extensive erasures have cleared the ground for new ideas and corrections on the tracings, the original records will still be intact. Such records are often worthwhile if a lawsuit is threatened.
ARCHITECTURAL LAW
THE STANDARDIZING OF BUILDING CODES

BY RUDOLPH P. MILLER
Consulting Engineer; Author of New York Building Code

WITH a growing consciousness in the public mind in recent years of increasing health hazards due to the housing shortage caused by the World War, and the greater fire hazards, frequently involving loss of life, due to greater congestion incident to a rapid development of urban districts, there has come a realization of the need of better regulation of building construction in the interest of public safety, health and general welfare. Over 100 municipalities of 10,000 or more inhabitants are at the present time revising their existing building codes, and more than a score of others report that they have such work in contemplation. The great activity in the zoning movement developed within a decade has, no doubt, greatly stimulated interest in better planning and construction of buildings, these two means of regulation being so intimately related that they really should be dealt with as one matter.

Every municipality, certainly when it has become an aggregation of 5,000 inhabitants or has become an active industrial center of even lesser population, should exercise some control over the erection of structures within its boundaries. The right of the individual to protection against deprivation of light and air by an unnecessarily full development of his neighbor’s property, and against the fire hazard created by the unwarrantable use of combustible materials in construction, to mention only the two chief dangers arising from intensive development of land, should be properly safeguarded. But what of existing building codes? Is there any need of changing these? If they are ten or more years old, it can be safely asserted that they are in the main obsolete or, at any rate, inadequate. In recent years there has been extensive research, not only in connection with the development of new materials for building, but also with respect to the physical properties of old, well tried materials. The growing use of the former has forced a re-study of the latter to avoid complete replacement. Then, too, improvements calling for recognition have been made in methods of construction; better planning has been more or less retarded because of restricted requirements; greater differentiation in specific provisions seems desirable for varying conditions of occupancy. The chances are that any building code more than ten years old makes no provision for these developments.

The Old Code as a Specification
The old codes have been referred to as inadequate. That is not to be understood as meaning that they are not sufficiently detailed. The probabilities are that with respect to the matters dealt with, they go too much into detail. Their requirements generally are in the nature of specifications. If adhered to they leave no way open for a different, even if a perfectly safe, way of accomplishing the desired result. This tendency to make specifications of the codes still prevails. Existing codes are being amended to provide for use of new materials and new forms of construction by adding detailed descriptions of the materials and elaborate instructions for their use. As a result, such codes are becoming encyclopedias of building construction as practiced at the time of their adoption in the particular localities to which they apply. There are building officials who are advocating this type of a building code. They look to it as a rude nescus in which they expect to find the exact answer to each question as it presents itself. When the code fails to provide for a given condition, it means to them a prohibition of that proposition. So, too, there are architects who desire this type of building code. To them it serves as a text book from which they draw material for specifications and even the basis of their designs.

But the specification type of code has marked disadvantages, the chief of which is that it hampers development. With all requirements specific in their nature, practically fixing all details of plan and construction, little freedom and no incentive are left the designer to improve on the standards that are the result of the fixed requirements. Use of new materials or modes of construction is discouraged. Revisions and amendments can, of course, be made, but when these involve legislative action, the time lost will frequently cause the abandonment of the intended improvement or deprive an intending user of a new material or benefit of an economy that might be effected. The specification code also tends to creating indifference on the part of the architect, contractor and administrative official. With everything prescribed, or rather assumed to be prescribed, there seems to be no need for use of special intelligence in the application of the statutory provisions.

The Real Purpose of Codes
It is not contended that all the provisions of a building code can be general in character, but restraint should be as limited as is possible consistent with the protection necessary for the public. So far as practicable, depending on the facilities for accomplishment, the code should prescribe conditions of safety to be secured without fixing a specific method by which they are to be had. This is quite possible in those matters where quality of materials is standardized or where construction practices are well established. The quality of practically all of our building materials is fixed by standard specifications prepared with great care after thorough research by committees of national scope and competent personnel, such as the committees of the American Society for Testing Materials and the National Fire Protection Association. Construction practices too have received general recognition;
among them is the specification for steel construction promulgated by the American Institute of Steel Construction. There is therefore no real necessity for incorporating in a code these details that are so well known. The futility of endeavoring to include such detailed requirements for construction was illustrated once in some litigation over a brick wall. From its external appearance the wall appeared to be a good piece of masonry. The bricks were laid to line, with carefully struck, broken joints, and it complied in other respects with the details specified for brick masonry in the code. The interior of the wall, on the other hand, as described by a trustworthy observer who saw the work being constructed, consisted of bats with unfilled joints of mortar laid bone dry on an excessively hot summer day; and none of these details were dealt with in the code. The outcome was that, inasmuch as the specific requirements of the code had been complied with, and as the defects reported were not provided for in the code, and as the completed work had a satisfactory appearance, the wall was a lawful structure and there was no cause for complaint. Had the code simply called for good and acceptable workmanship in accordance with well established practice, it is almost certain that the court would have based its judgment on the testimony of qualified witnesses as to what constitutes good practice and would have found the wall deficient; and the owner of the wall would have had the redress to which he was entitled.

There are, however, many matters in connection with building construction that affect the public safety with regard to which there is either no recognized, established practice or regarding which there are still honest differences of opinion as to the safe limits of specifications, so that it is necessary to deal with these in more or less detail. Such, for instance, is the matter of interior stairways; how many must be provided?—where shall they be located?—what shall be their width?—how shall the treads and risers be proportioned?—when and how shall landings be introduced?—shall winders be permitted?—shall the stairways be enclosed, and with what construction?—how shall the enclosures be lighted?—to what points shall the stairs lead and exit?—what about handrails and other details, which are many?

**Administration of the Code**

One circumstance which will determine in a measure whether the code provisions may be general in their nature, indicating the purposes to be attained, or detailed and specific in character, is the means provided by the municipality for administering the statute. If, as may be the case in the smaller communities, limited financial resources preclude the employment of a properly qualified technical man, or one having a sufficiently long and varied experience in the building construction industry, there perhaps it is better to prescribe in detail all that is essential for safe building. But this sort of administration is suitable only where a few, old, well known materials are in use, where the buildings do not exceed two or three stories in height, and where there are not likely to be occupancies hazardous to life or property. It is rather difficult in these progressive days to conceive of any municipality that is content to restrict its development in this way.

For the proper governmental supervision of the building activities of any locality, the official charged with the administration should be informed on the nature and physical properties of building materials; he should be acquainted with current acceptable practice in the use of those materials; he must be capable of judging of the character of workmanship; he should be versed in the principles that underlie adequate lighting and ventilation of buildings; he must know the essentials of fire prevention; and he must understand the principles underlying planning adequate exit facilities. These things he must have mastered to the extent that he can speak with authority and will apply them with good judgment and reasonableness. In some municipalities the building official is also charged with the enforcement of statutes governing elevators, plumbing, electrical equipment, and smoke abatement. It is not expected that the official should be an expert in all these matters, but it does imply a knowledge of at least general principles of installation and operation. Such an official can be and should be clothed with the necessary authority to supply by regulations the detailed requirements which are not appropriately embodied in the code and which, if included, unnecessarily load up the statute with provisions that are likely soon to become obsolete, and which, depending on legislative action, are difficult to alter. If this appears to give considerable power to the official, let it be pointed out that authority goes with responsibility, and that there is no real responsibility where there is no authority. However small or insignificant the municipality in which he serves, the official should be clothed with a good measure of authority and responsibility anyhow, or else a low salaried clerk could fill the post quite as well. No matter how detailed the code may be, the official, unless he is a mere figure head, must to some extent exercise his own judgment in deciding whether a building operation conforms to the code, for it is practically impossible to meet every contingency in the code. If then the official has the qualifications, he may be trusted to pass on all the essentials for the accomplishment of the purposes to be attained.

The code itself should indicate the intent of the regulations that are authorized, should fix the manner of their promulgation, and should provide safeguards against arbitrariness in their adoption. To be legally valid, regulations must be limited to provisions for carrying out the intent of the statutory mandates; they cannot be in the nature of additional requirements. The intention might be appropriately expressed in the code so that, as far as practicable, the generally recognized standard specifications for
materials and rules of practice in construction as established by national technical organizations shall be accepted as, or at least used as the basis for, the authorized regulations. Such standards have already been referred to. It is not well to cite these by name in the code, as is sometimes done, as that may lead to confusion in the interpretation of the code. Formal public announcement that the promulgation of regulations respecting certain designated matters is contemplated should be required, and, if requested, an opportunity for a public discussion of the proposed regulations should be afforded before they become effective. Changes in the regulations should be made when necessary or desirable to keep them abreast of the times and to give to the public the benefits of improvements that may develop or of economies that may be effected in construction.

No Uniformity of Building Codes

At various times the question has been raised as to whether it is not possible to draft a building code that can be of uniform application. A satisfactory answer is difficult. It depends on many things. A reading of the various reports issued by the Building Code Committee of the U. S. Department of Commerce, a committee formed "in response to a generally expressed public demand for greater uniformity and economy in building code requirements," will show that complete uniformity is hardly attainable. Local conditions cannot be ignored in the preparation of a code, and these sometimes vary considerably with different localities. This same committee found, for example, that a standard of quality for brick that was reasonable in one section of the country would condemn as unfit a brick that has been in use for many years with a good service record in another section. Brick in various parts vary in strength. It would be manifestly unfair to fix the minimum wall thicknesses in accordance with the weakest product, thereby perhaps depriving those using a stronger grade of the economies to be had without sacrifice of safety in the use of thinner walls. Nor would it seem just to demand of the builders in regions where high winds have not been known that they build their structures, at increased costs, to meet the conditions of localities where violent storms are of frequent occurrence. Policy may dictate a different procedure or responsibility in the protection that should be given a neighbor's land or structure when excavation for a new building is undertaken in one or another territory. As already intimated, the facilities for enforcing the code would warrant varied requirements. J. E. Mackie, who as secretary of the Pacific Coast Building Officials' Conference was intimately in touch with the commendable effort to formulate the "Uniform Building Code of the Pacific Coast," in an address spoke of the difficulties encountered and referred to the opposition "in some quarters because of certain classification of occupancies, provisions of types of construction, and departure from present accepted practice." His further statement that "perhaps no common basis can be arrived at in the case of the two former" gives another ground for doubt of the possibility of uniformity, due to some local policy.

Uniformity in Arrangement Desirable

There is one respect in which uniformity in codes is desirable, in the interest of convenience to the users,—namely, in the arrangement. Architects and contractors, many of whom are engaged in building in various places, would save much time and annoyance if, in consulting the codes of those various places, they could find the several provisions arranged in somewhat the same order. Two methods suggest themselves. They are thus described in the report of the U. S. Building Code Committee on "Arrangement of Building Codes." "The first takes up each major class of occupancy, as for example, office buildings, tenements, small dwellings, factories, etc., and gives in separate chapters a full statement of code provisions applying to each, even though this involves considerable repetition. Certain general matters, such as allowable working stresses, the quality and testing of materials, administration, etc., are treated in separate chapters without reference to occupancy. The second method classifies buildings by type of construction and gives the fundamental structural features of each type. Occupancies also are classified, and the general construction type necessary for each occupancy class is specified. This is followed by chapters giving the detailed requirements for each construction type and for other essential features, such as quality of materials, means of egress, etc., from which the requirements for each building may be selected."

It is by no means easy to decide which of these methods is the more meritorious. Each has marked advantages. As an example of use of the first method, the building code of Flint, Mich., may be cited. The second method has been followed in the building code of Flint, Mich. After due consideration of suggestions and criticisms from scores of architects, engineers, buildings officials, and others, the committee has recommended an arrangement based on the second method. For the details, the report itself, published by the Government Printing Office, at Washington, should be consulted.

Physical Make-up for Convenient Use

A few words on the structure or make-up of a building code would perhaps not be amiss. Such an ordinance is necessarily a voluminous instrument, especially when it embraces, as it should, all matters relating to the construction, alterations, repairing, removal, location, equipment, occupancy and use of buildings, including most of the provisions that are embodied in housing and zoning laws. With so many matters to cover, in an effort to make its pro-
visions readily available, an extensive subdivision of the text is desirable. Long paragraphs and involved sentences should as far as possible be avoided. Ease of consultation should be kept constantly in mind. In this connection a comprehensive index, though not a part of the legislative statute, is highly desirable when the code is printed for distribution. Similarly, annotations and cross references at appropriate points in the printed copy add much to its usefulness. The building law frequently constitutes a part of a code of ordinances. As such it is properly designated a "chapter" of such a code. This chapter should be divided into major parts called "articles," numbered serially, each dealing with a general, broad subject, such as "1. Administration"; "7, Means of Egress"; "9, Construction"; "14, Elevators"; taken from the recommended arrangement of the U. S. Building Code Committee. In "sections," into which articles are divided, the leading items of the code are treated, as "Reinforced Concrete" under "Construction"; "Allowable Working Stresses" under "Materials, Loads and Stresses"; "Courts," under "Light and Ventilation"; "Permits," under "Administration." Each section should have a title as indicated, and the sections should be numbered serially from the beginning throughout the code, though not continuously; that is in the first article the section numbers will perhaps run to 7, then in the next article the section numbers should begin with 10, leaving the intermediate numbers for possible future additions, and so with other articles, in this way avoiding a general renumbering or the awkward expedient of a number and a letter (16A for instance) for the section. In some codes the section numbers start anew in each article. This makes it necessary in citing a section to mention the article number as well; it also makes it more difficult to locate the section when consulting the code. As far as may be desirable, for greater ease in finding particular provisions, the sections may be further divided into numbered sub-sections, and these again into lettered paragraphs, this making for convenience.

Conflicting Local Codes and Laws

A historical inquiry would show that the present more or less elaborate building laws have developed from the so-called "fire limits ordinances" that it was found necessary to enact many years ago, as the fire hazard increased with the more intensive development of land in the heart of a municipality. These fire limits ordinances were, in fact, our first zoning ordinances. They fixed districts within which, in the interest of public safety, no further building of frame structures would be permitted, in this way controlling to some extent the construction of buildings. In some cases these restrictions are embodied in separate ordinances, but as they deal with building construction, they logically are part of the building code. It has been the custom in the past to incorporate in the ordinances long, detailed descriptions of the boundaries of the fire limits. This necessitates lengthy amendments when changes are made. The practice in zoning ordinances of referring to maps has never been questioned. The same medium could be employed to advantage in fixing fire limits. At the same time, provision might well be made for the extension according to certain definite principles, perhaps at stated periods, of such limits with the expansion of the congested areas, through public announcement by the administrative official. In many cities zoning ordinances have been adopted since the enactment or latest revision of the building code. The draftsmen of zoning ordinances have generally paid no attention to the existing ordinances affecting buildings and have fixed restrictions of height and limitations of area that are in conflict with provisions of the older statutes. To dispel confusion, revision is needed. This more likely would be avoided if the zoning ordinance were made part of the building code; it certainly would be a convenience to those designing buildings. What has been said as to the desirability of making the requirements of zoning ordinances part of the building code applies to housing laws with greater force. Their provisions for open spaces do not generally accord with provisions of either the building code or the zoning ordinance. What the proper minimum requirements for open spaces in the interest of public health and safety should be, is no doubt subject to debate, but it does not tend to hold the respect of the layman for the law when there are conflicting requirements of which he is uncertain as to the law he must observe. Nor does it increase his regard to find that there is somewhere a provision that, in the case of conflict, the severest requirement must apply, yet this is sometimes the case.

One of the most important features of a building code, one that, until the recent past, has been generally neglected, has to do with means of egress. Thousands of lives have been sacrificed because adequate exit facilities were wanting. Although much thoughtful study has been given the subject, especially by the Committee on Building Exits Code under the sponsorship of the National Fire Protection Association, a generally accepted practice has not been established, and for this reason rather detailed specifications are necessary in the building code.

The Need for Building Codes

To many persons, to engineers more particularly, a building code suggests only a set of rules governing the strength, stability and construction of buildings. But in respect to these matters rules of good practice are probably better established and more faithfully followed than rules regarding other matters dealt with in a building code. If it were not for the existence of irresponsible architects, incompetency engineers and unscrupulous builders, who unfortunately are permitted to ply their trade, very little provision in this connection would be needed.
A BUSINESS COURSE IN AN ARCHITECTURAL SCHOOL?

BY

WILLIAM A. BORING

PROFESSOR OF ARCHITECTURE, COLUMBIA UNIVERSITY

I AM asked if a business course is essential to the curriculum of a model school of architecture. A business training is useful and necessary for every man who has to make a living, who has to attend to his banking, to his investments, and to whatever he undertakes; it is not confined to practicing architects nor, on the other hand, should it be conspicuously left out of an architect's education. An engineer, a lawyer, a doctor, should know how to attend to business, but they are not supposed to learn this in college during the four or six short years they have to study their chosen professions. It is well known that no man is permitted to practice architecture under the registration laws until he has had two years' experience under a preceptor after graduation, and during that time he is supposed to learn those things which relate to the conduct of business and to avoid the errors revealed by the questionnaire on page 152.

Now every architect must keep some kind of accounts, but a young architect who starts in with the idea that he should use double-entry bookkeeping and put down all of his own time and the salaries of his men and overhead, and figure that out according to each commission, will never get far in good designing. Such work is done in most good offices by bookkeepers, as there are more important things for the architect to do in the practice of his profession. There are larger questions than those mentioned that really are much more important, such as giving the client the required data as to size and scope of a building operation measured by the cost; telling him the truth about his estimates, including an allowance for extras; representing in drawings the amount of good and complete buildings which the money will buy; shielding him from irresponsible contractors who will get him into trouble; avoiding sub-contractors of poor credit, who have liens filed against them. He must learn to make for the contractor honest working drawings which will carry the facts so that he will not make mistakes in estimates or construction. These things should be taught in the schools.

Specifications are taught to explain clearly in plain language what is intended to be in the building without copying the phraseology of someone else. General unnecessary inclusive clauses are not a part of the specifications, as he is taught. It is customary if a man is absorbed in design and cannot give the proper attention to the business side of his practice for him to secure a partner or an assistant who can very well attend to all the routine work, which is not difficult to accomplish with good, honest work and application. This leaves to the man who is especially fitted by endowment and education, as every good architect should be, entire charge of the creative side of the practice of architecture. In a man's early practice he can find time for ample study of works on legal questions which will guide him safely with regard to his responsibility and the nature of contracts. He can also study all kinds of technical advice on banking and bookkeeping and the laws of the land with regard to building and liens. It is not difficult for him to get any of the information which is suggested in Mr. Embury's questionnaire, by simply applying his mind to it in his off hours.

In schools of architecture the main thing is to give a man a thorough knowledge of architecture itself. Then after he knows how to design, to construct, and to draw out a building, he is given a high ideal of his duty to the profession, to his client, and to the contractor. He is taught that he must be first of all a man of honor, and must take no chances whatever in handling his client's affairs, which must always be done with diligence and accuracy. Of course an architect who cannot control others, who has no power to delegate work, who tries to do everything himself and is his own bookkeeper to boot, is going to run upon the rocks. An architect does not have to take a business course in order to handle his practice successfully. Schools of architecture must teach design, first and foremost. In order to teach design they must give sound training in drawing, practical construction, and the theory of writing specifications and making working drawings. A certain amount of time should be spent in the study of buildings under construction, the general theory of contracts, and the best methods of carrying on a building operation.

The schools of architecture exist to teach men things that they cannot learn so well or so quickly in any other way. They teach them, above all things, how to design good architecture; that the foundation must hold, and the roof keep out water; the chimney must draw, and honest supervision must be exercised. They advise him that he should work under a preceptor at least two and a half years to acquire practice, just as a young doctor does his hospital work before he goes into practice for himself. It is during these years of apprenticeship in a good office that he should learn the practical and business side of the profession. It has never seemed to me either advisable or necessary to put into the already crowded curriculum of his course the subjects of business and practice. Architecture is essentially a fine art, and the schools are right in treating the subject as such and in training their students to design.
Editor's Note:—As the business side of an architect's practice has become more and more important and voluminous during the past 15 years, the question is often raised as to the propriety of including in the curriculum of the modern architectural school a course on business practice as pertaining to the architectural profession. The deans of our numerous schools of architecture seem to take the stand that there is no time or opportunity for the inclusion of such a course in the curriculum of their schools. Many maintain that such a course has no place in an architectural school.

There is no doubt about the value in obtaining the varying points of view of leading architects and educators on any mooted subject pertaining to the profession. It is interesting, therefore, to obtain opinions on a subject such as this, however diverse and opposed they may be. It was for the purpose of obtaining such differing opinions that The Architectural Forum requested both Mr. Boring and Mr. Embury to give an expression of their opinion as to whether a business course should be included in architectural schools. The brief article by Mr. Boring, who takes the negative point of view, precedes this amusing questionnaire by Aymar Embury II. Mr. Embury believes that the questions, answered correctly, prove his contention that architectural schools should include a business course.

Put down your answers to Mr. Embury's "Ask Me Another" and determine for yourself whether he is justified in taking the affirmative side in this debate.

1. Should an architect keep books?
2. Do you know how to keep books?
3. Where did you learn?
4. Is your a good method?
5. How do you know?
6. If an architect is paid by a note, can be discounted?
7. Can a contractor discount a note?
8. If a contractor is paid by note and the note is not met, should your certificate show the amount as unpaid?
9. If an owner gives an order for additional work direct to the contractor, should its cost be included in your certificate as extra work?
10. Are you responsible for its proper execution?
11. Can you charge a commission on it?
12. Do your draftsmen keep time cards?
13. What do you do with the time cards?
14. Are your traveling expenses charged to the commissions?
15. Are your telephone calls charged to the commissions?
16. Do you charge overhead?
17. Do you know what your overhead is?
18. How do you know?
19. What is overhead?
20. How do you proportion it to your commissions?
21. If a draftsman does jury duty, is his salary paid?
22. To what account is this charged?
23. Do you know how to write a contract?
24. Is a verbal contract binding?
25. Can you alter a contract once made?
26. Can a written contract be altered verbally?
27. When is an extra binding on the client?
28. Can you order an extra verbally?
29. Can the cost of an extra be collected from you?
30. Why?
31. Have you a contract with your client?
32. If a client comes into your office and orders sketches, does he have to pay for them?
33. What is a mechanic's lien?
34. Who can file one?
35. Can a lien be filed by a contractor?
36. By a mechanic working for a sub-contractor?
37. What is a sub-contractor?
38. Can the architect order changes in the work of a sub-contractor?
39. How?
40. Can an architect file a mechanic's lien in New York? In New Jersey? In Texas?
41. If he can, when can it be filed?
42. Should a general contract be filed with the county clerk?
43. Why?
44. Must you have a license to practice architecture?
45. Can you make drawings without a license?
46. Can you superintend without a license?
47. How do you know?
48. Suppose that you are building a house with three sub-contractors and the work of one of them is damaged by some undetermined party,—who pays for the damage?
49. Should you be paid for changes in sketches?
50. Should you be paid for changes in drawings?
51. When does a sketch become a working drawing?
52. What is "substantial completion"?
53. If a client is damaged by some undetermined party,—who pays for the damage?
54. Where can you learn about these things?
55. How did you find out where you could learn about these things?
56. Would you have saved money if you had known about these things before you began practice?
57. Could your instructors in college have told you where to find out?
58. Could they have told you what was important?
59. Would it have taken them long to do it?
60. Should they have done it?
61. Could they have done it in one hour a week for one term?
62. Is such a business course desirable?
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Miller Hotel Co., Fort Des Moines, Iowa
First National Bank Building, Detroit, Mich.
General Motors, Remy Electric Division, Anderson, Ind.
And Many Others

No Help Wanted—

to keep the swimming pool water safe for the bathers at the LaFontaine Hotel in Huntington, Indiana.

A battery of two R-U-V Sterilizers does this—automatically and economically—without chemical dosing and without constant attention.

Every drop of water entering this pool must pass through powerful ultra violet rays, produced by a mercury vapor quartz lamp in each sterilizer.

These rays, like concentrated sunlight, kill the disease-bearing germs which may be in the water when it reaches the sterilizers. The water flows into the pool—purer than the government requirements for pure drinking water.

Our engineers are ready to submit a layout to meet your particular problem for a swimming pool installation, for a drinking water system, or for any purpose where safe, pure water is needed.
What Do Little Boys

Jumping ropes, skates, balls,

CHILDREN—to whom a lost ball is a tragedy, a new
doll the utmost joy—have few thoughts for such dull
things as water closets.

Children don't realize that the water closet is the most im-
portant sanitation factor—or that an
unflushed closet can cause terrific dam-
age to health and efficiency.

The Clow Automatic removes—entire-
ly—the unflushed closet menace. For,
after every use, it flushes automatically.

Mr. Architect:

With Clow Automatics, the
toilet room is always clean-
smelling. The back wall
which conceals the closed
top tank, also permits an
effective, simple system of
ventilation. Our new Clow
Automatic booklet is filled
from cover to cover with
interesting facts and pictures
on plumbing for schools and
industrial plants. Send for
it today.
dolls, games—or water closets?

With it, careless children cannot cause insanitary closet conditions.

And, though used many, many times a day, for many, many years—the Clow Automatic never forgets.

With but two moving parts, the Clow-Madden valve is simpler than any other closet valve. It has no intricate parts to wear out and break.

Our Clow Automatic booklet "talks" to you with the knowledge of an expert hygiene engineer. It tells how your school can be sure of a clean toilet room. Send for it today.

201-299 N. Talman Ave., Chicago

AUTOMATIC
FORGETS

Forty-Eight Styles, Heights and Types to Meet Your Requirements
The Unit Frame Construction

Of the Westinghouse CL Carbon Circuit-Breaker

Gives The Breaker Greater Rigidity

CAN you think of a more substantial means of building your home than by first constructing a solid foundation upon which to build the superstructure? It is the only method that assures durability.

Similarly, an exclusive feature of Westinghouse CL breakers is the solid one-piece frame—a foundation cast as a unit. Heavy current cannot twist such a frame to throw moving parts out of line, introducing abnormal friction and disturbing adjustment.

It Holds Its Factory Adjustment intact, as made by workmen skilled by long experience in carbon breaker adjustment.

A breaker, not of solid one-piece construction, loses the factory adjustment on being transferred from the shipping template to its final position.

Open Construction. Main contact and operating parts are accessible. The illustration speaks for itself—toggles, tripping arm and, more important, the lower stationary contact, are all out in the open, easy to inspect, clean, or repair.

Westinghouse
Part Two

ENGINEERING AND BUSINESS

CEMENT—Continued


Kosmont Portland Cement Company, Louisville, Ky.
Kosmortar for Endurine Masonry. Folder, 6 pp., 9 x 11 ins. Illustrated. Data on strength and working qualities of Kosmortar.
Kosmortar, the Mortar for Cold Weather. Folder, 4 pp., 9 x 11 ins. Tells why Kosmortar should be used in cold weather.

Louisville Cement Co., 310 Guthrie St., Louisville, Ky.
BRIXMERT for Perfect Mortar. Self-filling handbook, 85 x 11 ins. 16 pp. Illustrated. Contains complete technical description of BRIXMERT for brick, tile and stone masonry, specifications, data and tests.

Pennsylvania Brick Company, 131 East 46th St., New York.
Celluloid Computing Scale for Concrete and Lumber, 4 x 8 1/2 in. Useful for securing accurate computations of aggregates and cement; also for measuring number of different sizes.

CONCRETE BUILDING MATERIALS

Celso Products Co., 123 South Hope St., Los Angeles.
Better Concrete; Engineering Service Bulletin X-325. Booklet, 10 pp., 8 x 11 ins. Illustrated. On use of Celso to secure workability in concrete, to prevent segregation and to secure water-tightness.


Concrete Surface Corporation, 163 Madison Ave., New York.
Bonding Surfaces on Concrete. Booklet, 12 pp., 8 x 11 ins. Illustrated. Deals with an important detail of building.

Dawetall Anchor Slot Co., 240 West Ohio St., Chicago.
Dowel Masonry Anchoring System. Booklet, 12 pp., 8 x 11 ins. Illustrated. Data on a system of anchoring masonry to concrete.

National Building Units Corporation, 1600 Arch St., Philadelphia.

Sound Absorption of Cinder Concrete Building Units. Bulletin, 6 pp., 4 x 11 ins. Illustrated. Results of tests of absorption and transmission through sound Straub building blocks.

Philadelphia, Cinder Concrete Building Units. Brochure, 16 pp., 8 x 11 ins. Illustrated. Full data on an important building material.

Kosmont Portland Cement Company, Louisville, Ky.
High Early Strength Concrete, Using Standard Portland Cement. Folder, 1 p., 8 x 11 ins. Illustrated. Complete data on securing high strength concrete in short time.

Solvy Process Co., Syracuse, N. Y.
Solvy Calcium Chloride in Concrete Construction. Brochure, 22 pp., 7 x 10 ins. Illustrated. Deals with an important ingredient for concrete.

CONCRETE COLOURINGS

A. A. Chorn Company, Long Island City, N. Y.
Keramic Catalogue. Booklet, 85 x 11 ins. Illustrated. A magnificent brochure, illustrated in color, describing a valuable line of specialties for use with concrete floors—colorings, hardeners, waterproofing, etc.


CONSTRUCTION, FIREPROOF

Peter Hollers Co., Cleveland, Ohio.
Color Mix. Booklet, 18 pp., 8 x 11 ins. Illustrated. Valuable data on concrete hardener, waterproofer and dustproofer in permanent colors.


Northwestern Expanded Metal Co., 1240 Old Colony Building, Chicago, III.
Northwestern Expanded Metal Products. Booklet, 85 x 10 1/4 ins. 16 pp. Fully illustrated, and describes different products of this company, such as Knob-norn metal lath, 20th Century Corrugated, Plastic-Saw and Longspan lath channels, etc.

A. J. Sample Book. Bound volume, 85 x 11 ins., contains actual samples of several materials and complete data regarding their use.

DAMPPROOFING

Philip Carey Co., Lockland, Cincinnati, Ohio.
Architect's Specifications for Carey Built-Up Roofing. Booklet, 8 x 10 1/2 ins. 24 pp. Illustrated. Complete data to aid in specifying the different types of built-up roofing to suit the kind of roof construction to be covered.

Carey Built-Up Roofing for Modern School Building Construction. Booklet, 8 x 10 1/4 ins. 12 pp. Illustrated. A study of school buildings of a number of different kinds and the roofing materials adapted for each.

Genfire Steel Company, Youngstown, Ohio.

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.

AOCUSTICS

The Colson Co., Chicago.
Acousti-Celotex. 11 pp., 9 x 11 ins. Illustrated. Brochure on a valuable material for facings, walls and ceilings.

Specifications and details for installation of Acoustic-Colson, 21 pp., 9 x 11 ins. Illustrated. Instructions for the installation of Acoustic-Colson.

R. Gianatinco, Inc., 40 Court St., Boston.
Acoustic-Plaster. Brochure, 6 pp., 9 x 12 1/2 ins. Important data on a valuable material.

Johns-Manville Co., 40 Court St., New York, N. Y.

Building Acoustics, churches, schools, office buildings and other places.

U. S. Gypsum Co., 205 W. Monroe St., Chicago, Ill.

ASH HOISTS—ELECTRIC AND HAND POWER

Gillis & Gobouk, 335 West Broadway, New York, N. Y.
General specifications, 20 pp., 9 x 11 ins. 20 pp. Fully illustrated. Contains specifications in two forms (with manufacturers' name and without). Detailed 16 in. scale for each, telescopic model and special material-handling section.


BASEMENT WALKWAYS

Genfire Steel Company, Youngstown, Ohio.
Folder, 6 pp., 8 x 11 ins. Describes Genfire Steel Feeler Walkway, 6 x 6 ins. Details on steel windows.

Truscon Copper, Youngstown, Ohio.
Truscon Copper-Steel Basement Walkways. Booklet, 8 pp., 8 x 11 ins. Illustrated. Describes Special Acoustics installation details. Specifications and construction details.

BATHROOM FITTINGS

A. A. Chorn Company, Long Island City, N. Y.
Onlflow for Fine Buildings. Folder, 8 pp., 3 1/4 x 6 ins. Illustrated. A circular on the subject of metal and porcelain.

Architects' File Card. 8 x 11 ins. Illustrated. Filing card on metal and porcelain installations.


Cabinets and Fixtures. Booklet, 21 pp., 5 x 7 1/2 ins. Illustrated. Catalog and price list of fixtures and cabinets.

Marman-Malco, 316 West Lake St., Chicago.
Marman-Malco Bathroom Cabinets for Homes, Apartments, etc. General Catalog, 20 pp., 8 x 10 1/4 ins. Illustrated. Describes Architectural Design.


Building Acoustics, churches, schools, hospitals, office buildings and other places.

Cement Carney Company, The, Marquette, Minn.
What is Carney Cement? Booklet, 8 1/2 x 11 ins. Illustrated. Opinions of well-known architects and builders of Carney Cement used for masonry.
SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—Continued from page 183

DAMPPROOFING—Continued
A. C. Herr Company, Long Island City, N. Y. Catalog No. 238-1, 115 ins. Contains data on elevators. Catalog and pamphlets, 8'/s x 11 ins. Illustrated. Contains data on elevator types and features.


Doors and Trim, Metal
The Mendel & Wyckoff Company, Waterbury, Conn. Anaconda Architectural Bronze Extruded Shapes, Brochure, 5'/s x 7'/s. Contains full information regarding three sizes of bronze extrusions. Illustrations and descriptions. Contains information on Sections A, B and C, 8'/s x 11 ins. Includes data on architectural bronze extrusions. Illustrated.


Richardson Hardware Company, Detroit, Mich. Fire-Doors and Hardware, Booklet, 8'/s x 11 ins. Illustrates complete details, with general and corrosion resistant fire doors, complete with automatic closers, track hangers and all the latest safety equipment—all approved and labeled by Underwriters Laboratories.

Sudmiller Machine Works, 151 West 15th St., New York. Catalog and Service Sheets. Standard specifications, plans and prices for various types, etc. 6'/s x 9'/s ins. Illustrated. Contains valuable data on excellent waterproofing and dampproofing materials. 16 pp., 8'/s x 11 ins. Contains data on paving, masonry, doors, complete with automatic closers, track hangers and all the latest safety equipment—all approved and labeled by Underwriters Laboratories.

Electrical Equipment
Frank Adam Electric Company, St. Louis, Mo. Catalog No. 222, Panellboards—Steel Cabinets, 7'/s x 10'/s ins. 64 pp. Illustrates and describes sectionally built panelboards, and gives data on their use.


The House of a Hundred Comforts." Booklet, 40 pp., 8'/s x 10'/s ins. Illustrated. Describes and illustrates methods and materials used, with descriptions and results of tests. Contains data on excellent waterproofing and dampproofing materials. 16 pp., 8'/s x 11 ins. Contains data on safety and insurance for buildings.

FLOOR HARDENERS (Chemical)

Sonneborn Sons, Inc., L., 116 Fifth Ave., New York, N. Y. Lapidolith, the liquid chemical hardener. Complete sets of specifications for the four types of concrete floors are used, with descriptions and results of tests. Illustrated.

Floors—Structural
Truscon Co., Youngstown, Ohio. Truscon Lockable, Booklet, 8'/s x 11 ins. 8 pp. Illustrations of material and showing methods of application. Listed in form book. Illustrated.

Truscon Floytect Construction. Booklet, 8'/s x 11 ins. 16 pp. Illustrates complete floor systems under concrete. Contains data on excellent waterproofing and dampproofing materials. 16 pp., 8'/s x 11 ins. Contains data on paving, masonry, doors, complete with automatic closers, track hangers and all the latest safety equipment—all approved and labeled by Underwriters Laboratories. Illustrated.

FLOORING
Armstrong Cork & Insulation Co., Pittsburgh, Pa. Armstrong's Cork Tile Floors. Brochure, 7'/s x 10'/s ins. 30 pp. Illustrated. Describes various uses of cork in building, etc. 18'/s x 11 ins. Contains data on excellent waterproofing and dampproofing materials. Contains data on paving, masonry, doors, complete with automatic closers, track hangers and all the latest safety equipment—all approved and labeled by Underwriters Laboratories.


Barber Asphalt Co., Philadelphia. Specifications for Applying Ganoa Asphalt Mastic Booklet, 8'/s x 10'/s in. Directions for using Asphalt Mastic for flooring.

Blachow Cork & Wood Co., Kansas City, Mo. Blachow's Cork Composition Floor Covering. Booklet, 16 pp., 8'/s x 11 ins. Illustrated. Valuable work on an important subject.

Blachow's Cork Composition Flooring. Brochure, 17 pp., 8'/s x 11 ins. Illustrated. Describes uses and adaptability of Blachow Cork Composition to commercial and industrial buildings. Contains data on paving, masonry, doors, complete with automatic closers, track hangers and all the latest safety equipment—all approved and labeled by Underwriters Laboratories. Illustrated.

Bonded Floors Company, Inc., 1421 Chestnut St., Philadelphia, Pa. A survey of linoleums, with full color inserts showing standard colors and designs. Each book describes a resilient floor material as follows:

Battleship Linoleum. Describes and explains the advantages and uses of this durable, economical material.

Marbleized Cork Composition Tile. Complete information on composition-marbleized tile and many artistic effects obtainable with it.

Treadtile (Cork Composition) Tile. Shows a variety of colors and patterns of this adaptable cork composition flooring. Contains data on paving, masonry, doors, complete with automatic closers, track hangers and all the latest safety equipment—all approved and labeled by Underwriters Laboratories. Illustrated.

Natural Cork Tile. Description and color plates of this superior, resilient floor covering. Illustrated.

Practical working specifications for installing battleship linoleum, cork composition tile and cork tile.

The Architectural Record, January, 1928.
The Jennings Sewage Ejector is different. So much so that it marks a distinct advance in pneumatic equipment of this kind for handling sewage and other heavy liquids.

You will find this ejector simple in operation. There are no complicated mechanisms likely to get out of order. No intricate air valves, no inaccessible parts.

Supplied in standard sizes having capacities up to 1500 g.p.m. For heads up to 50ft., Bulletin No. 67 is the one to write for.

NASH ENGINEERING COMPANY

12 WILSON ROAD
SO. NORWALK, CONN.

Jennings Pumps
SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—Continued from page 184

FLOORING—Continued


Art. Portrait of Floor Designs. 9 1/4 x 12 1/4 ins. Illustrated in colors. Describes the many types of patterns of old-fashioned hardwood floor designs.


Zenithero Corp., Inc., 399 Fraternity Avenue, Newark, N. J. Zenithero Floors. Booklet, 14 pp., 8 1/2 x 11 ins. Illustrated. Priced for interior, 8 1/2 x 11 ins. 8 1/2 x 11 ins.


FURNITURE


Concealed Bed Corporations, 354 x 6 ins. Deals with an excellent line of builders' hardware.


McKinney Mfg. Co., 41 East 42nd St., New York, N. Y. P. & F. Corbin, Toledo, Ohio. Described in 8 1/2 x 11 ins. 8 1/2 x 11 ins. Illustrated. Describes a central all-on-one-floor heating plant with radiators for small residences, stores, and offices.


Excelso Products Corporation, 201 Clinton St., Buffalo, N. Y. Sylphon Fireproof Radiator Valves, Bulletin 104. 8 1/2 x 11 ins. Illustrated. Describes a central heating apparatus of this kind.

Locks and Builders' Hardware. Bound Volume. 534 pp. 9 x 12 ins. Illustrated. Deals with the quality of Kensington furniture, with plan of co-operation among specialties used in heating.

U. S. Gypsum Co., 399 Fraternity Avenue, Newark, N. J. Goodall Heating System. Bulletin 120. Brochure, 12 pp., 8 x 11 ins. Illustrated. Discusses the new Excelso method of generating domestic hot water in domestic heating boilers. (Fireproof Coil eliminated.)

The Fulton Thermal System Company, Knoxville, Tenn. Sylphon Temperature Regulators. Illustrated brochures, 8 1/2 x 11 ins., dealing with general architectural and industrial applications; also specifically with applications of special instruments.

Illinois Engineering Co., Racine Ave., at 21st St., Chicago, Ill. Heating and Ventilating Utilities. A binder containing a large number of valuable publications, each 8 1/4 x 11 ins., on these subjects. Important data on heating.

Sargent Locks and Hardware. Bound volume. 354 pp., 9 1/2 x 12 ins. Illustrated. Describes a large number of publications, each 8 1/4 x 11 ins., on these subjects.

Sargent Locks and Hardware. Complete catalog of Sargent line of hardware.

HARDWARE—Continued

Sargent & Company, New Haven, Conn. Details to Which Standard Hardware Can Be Applied. Booklet. 6 x 9 in. 9 x 11 ins. Illustrated. Treats in detail of 12 types of doors and windows to which hardware can be applied.

Sargent Locks and Hardware. Complete catalog of Sargent line of hardware.

HEATING EQUIPMENT

American Blower Co., 6004 Russell St., Detroit. Heaters and Furnaces. Contains a large number of valuable publications, each 8 1/2 x 11 ins., on these subjects. Important data on heating.


Ideal Water Tube Heaters. Catalog 746 x 10 5/16 ins. 32 pp. Illustrated in 4 colors. A complete catalog of Sargent line of hardware.


Kewanee Boiler Co., Kewanee, Ill. Kewanee on the Job. Catalog, 8 1/2 x 11 ins. 80 pp. Illustrated. Shows installations of Kewanee boilers, water heaters, radiators, etc.

Catalog No. 26. 6 x 9 ins. Illustrated. Describes Kewanee power boilers and smokeless tubular boilers with specifications.


Moon Oil Burner Corp., Rhoades, 13 Devoted to Jennings Hytor Air Line Vacuum Heating Pumps, electrically driven, and supplied in standard sizes up to 1,000,000 B. T. U.'s. Bulletin 104. 8 1/2 x 11 ins. Illustrated. Describes the many types of heating pumps, sizes up to 70,000 square feet equivalent direct radiation. Bulletin No. 28. Illustrated. Jennings Hytor Air Line Vacuum Heating Pumps. Size M, for equivalent direct radiation up to 5,000 square feet.

Lifelong, dependable, automatic damper control with resultant economies—whether the system be hot water, steam or vapor,—that's the reason Sylphon Damper Regulators are found as standard equipment on most of the leading makes of boilers.

Sylphon Damper Regulators can also be quickly and easily installed on old heating boilers, with the same degree of heating satisfaction and economy of fuel consumption.

The smooth, continuous operation of dampers, sensitive to the slightest change of temperature, is guaranteed by the exclusively patented diaphragm of every Sylphon Regulator—the Sylphon Bellows. This Bellows is recognized by engineers as the most durable, sensitive expansion unit known.

Ask for Bulletin FDR-8

**The Fulton Sylphon Company**

*Originators and Patentees of the Sylphon Bellows*

Knoxville, Tennessee, U.S.A.

HEATING EQUIPMENT—Continued

The Thatcher Company, 39 St. Francis St., Newark, N. J.

Rochester. N. Y.

The International Nickel Company, 545 N. Michigan Ave., Chicago, Ill.

The Hidden Comfort of Costly Homes. Booklet. 8% x 11 ins. 22 pp. Illustrated.

Colton's Merchants, 645 N. Michigan Ave., Chicago, Ill.

Trane Bellows Packless Valves...

Johns-Manville Corp., Madison Ave. & 47th St., New York, N. Y.

Truscon Steel Company, Youngstown, Ohio.

Truscon Steel Joists. booklet, 8% x 11 ins. 26 pp. Illustrated with typical buildings and showing details of construction.

JOISTS

Catalog No. 4, Booklet, 32 pp., 8% x 11 ins. Illustrated. Gives details of truss construction with loading tables and specifications.

Truscum Steel Co., Youngstown, Ohio.

Truscon Steel Joists. Booklet, 8% x 11 ins. 26 pp. Illustrated with typical buildings and showing details of construction.

Some Thoughts on Furnishing a Hotel. Booklet.

The Hidden Comfort of Costly Homes. Booklet. 8% x 11 ins. 22 pp. Illustrated.

Some Thoughts About Hospital Food Service Equipment. Bonk

Some Thoughts on Furnishing a Hotel. Booklet.

The Thatcher Company, 39 St. Francis St., Newark, N. J.

The International Nickel Company, 545 N. Michigan Ave., Chicago, Ill.

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Truscon Steel Company, Youngstown, Ohio.

Truscon Steel Joists. Booklet, 8% x 11 ins. 26 pp. Illustrated with typical buildings and showing details of construction.

Some Thoughts on Furnishing a Hotel. Booklet.
Proper Insulation---
The vital factor in a circulating drinking water system

In designing a drinking water system, the largest single factor, and the most uncertain, is the "line loss," or the heat taken up from the air by the lines. As a margin of safety, extra refrigeration is figured for it.

Armstrong's Cork Covering has this advantage as insulation, that it gives you a definite constant, and permanent value for the line loss factor on which to base your calculations. There will be no variation in insulating value, and therefore no "margin of safety" to be included in excess refrigerating capacity. Insulation with Armstrong's Cork Covering results in economy in both first cost and operating cost as well.

Armstrong's Cork Covering means economy in maintenance cost, too, for it is nonabsorbent of moisture and not subject to progressive loss of efficiency or structural deterioration. There will be no sweating of lines insulated with Armstrong's Cork Covering; they can be enclosed in chases without risk of damage to walls and ceilings from condensation and drip.

A handbook of data on the design and operation of refrigerated drinking water systems has been published especially for architects and engineers. It is based on twenty years of research by Armstrong Engineers. A copy will be sent free on request.

Address Armstrong Cork & Insulation Company, 132 Twenty-Fourth Street, Pittsburgh, Pa.
LAUNDRY MACHINERY

LIBRARY EQUIPMENT

Library Bureau Division, Remington Rand, N. Tomawanda, N. Y. Like Stepping into a Story. Booklet, 24 pp. 9 x 12 ins. Illustrated. Contains equipment of Los Angeles Public Library.

LIGHTING EQUIPMENT

Glosdon-Tindall Glass Co. (Celestallite Division), 200 Fifth Avenue, New York. Next to Daylight Brochure, 19 pp. 4 x 8'/4 ins. Illustrated. Deals with a valuable type of lighting fixture.

Celestallite Circular, 40 pp. 295 x 6 ins. "What Nature does to the Sun, Celestallite does to the Mazda lamp." Attractive Units in Celestallite. Folder, 12 pp., 3'/4 x 6'/4 ins. Illustrated. Decorates Celestallite Units. It has been imitated. Folder, 4 pp., 20 x 13 ins. Data on an important detail of lighting equipment.


Forge Craft (Catalog No. 16). Booklet. 16 pp., 8'/4 x 6 in. Convincing Proof. Illustrated.

Curtier Mailing Company, Rochester, N. Y. Curtis Mail Mailing Model F. Booklet. 4 x 9'/4 ins. 8 pp. Illustrated.

MAIL CHUTES

Telesco Partition. Catalog. 247 Park Ave., New York City. Cut through the country by storm. Every architect should have one on file. Partitions of three different types. Baskets also described, with all work of the same quality. Incomplete details of all items of Curtis woodwork, for the use of architects.

MAIL CHUTES
Whitsett & Ackerman, architects for the Curtis Companies. Catalog 252, 8'/4 x 23/4 ins. 20 pp. Illustrated. Complete details of all items of Curtis woodwork, for the use of architects.

MANTELS

MARMAL
The Georgia Marble Company, Tate, Ga. New York Office, 1328 Broadway. Why Georgia Marble is Better. Booklet. 3'/4 x 6 ins. Illustrated. Analysis, physical qualities, comparison of absorption with granite, opinions of authorities, etc. Convincing Proof. 3'/4 x 6 ins. 8 pp. Classified list of buildings and memorials in which Georgia Marble has been used, with names of Architects and Sculptors.

METALS


MILL WORK—See also Wood
Curtis Companies Service Bureau, Clinton, Iowa. Architectural interior and exterior woodworking. Standardized Book, 9 x 15'/4 ins. 240 pp. Illustrated. This is an Architectural Edition of the complete catalog of Curtis Woodwork, as designed by Trottridge & Ackerman. Contains many color plates.

Better Built Homes. Volts. XV-XVIII incl. Booklet. 9 x 12 ins. 40 pp. Illustrated. Designs for houses of five to eight rooms, complete in several architectural types, by Trottridge & Ackerman, architects for the Curtis Companies.

Curtis Woodwork Catalog, 1952, 8'/4 x 11'/4 ins. 20 pp. Illustrated. Complete details of all items of Curtis woodwork, for the use of architects.

Hartmann-Sanders Company, 2315 Elston Ave., Chicago, Ill. Complete specification and installation of partitions, concrete floors, and 100 catalogues. The Pergola Catalog. 7'/4 x 10 ins. 64 pp. Illustrated. Complete details of the Pergola line of partitions, concrete floors, and 100 catalogues. The Catalo,


Rodgers Lumber & Veneer Co., Cleveland. Booklet, 8'/4 x 5'/4 ins. Illustrated. Price list of doors for various types of buildings.


Rodgers Door Company. Booklet, 15 pp. 8'/4 x 11 ins. Illustrated work on doors for hotel and apartment buildings.

MORTAR COLORS
Clinton Metallic Paint Co., Clinton, N. Y. Clinton Mortar Color. Folder. 8'/4 x 11 ins. 4 pp. Illustrated in color, gives full information concerning Clinton Mortar Colors, with specific instructions for the concrete industry. Color Card. 6'/4 x 3'/4 ins. Illustrated in color the ten shades in which Clinton Mortar Colors are manufactured.

Scribner new in Stucco, Folder, 9'/4 x 11 ins. An interesting folder on the use of coloring matter for stucco-coated walls.

PAINTS, STAINS, VARNISHES AND WOOD FINISHES
Cable St., Charleston, S. C. Cabot's Creosote Stains. Booklet. 4 x 8'/4 ins. 16 pp. Illustrated.


A. C. Horn Company, Long Island City, N. Y. Ceramic Catalog. Booklet. 26 pp., 8'/4 x 11 ins. A magnificent brochure illustrated in color, describing a valuable line of specifications for use with concrete floors-colorings, hardeners, waterproofing, etc.


How to Use Telexed. Booklet, 8'/4 x 6 ins. 12 pp. Illustrated. Describes various methods and techniques for finishing.

Cinch Ancealing Specialties. Booklet. 6 x 3'/4 ins. 20 pp. Illustrated. Describes all the various lines of products used in finishing and varnishing interior and exterior wood, plaster, and metal work.

The Ripolin Company, Cleveland, Ohio. Ripolin Specifications. Book, 8 x 10'/4 ins. 12 pp. Complete specifications and general instructions for the application of Ripolin, the original Holland enamel paint, for both interior and exterior surfaces. Why Ripolin Has an International Reputation. 8 x 10'/4 ins. 24 pp. Designed for the architect's files to illustrate the many varied uses of Ripolin Enamel Paint in all parts of the world. Produced in an endless variety of colors and qualities.


PARTITIONS
Circle A Products Corporation, New York, N. Y. Circle A Partitions Sectional and Expansion Parts. Booklet. 8'/4 x 11'/4 ins. 32 pp. Full data regarding an important line of partitions, along with complete Specifications Instructions for partitions of three different types.

Hollow Standard Partition Co., E. F., Cleveland, Ohio. Hollow Steel Standard Partitions. Various folders, 8'/4 x 11 ins. Illustrated. Give full data on different types of steel parti­tions, together with details, elevations and specifications.

Improved Office Partition Corporation, 23 Grand St., Elmhurst, L. I. Telesco Partition. Catalog. 34 pp. 8'/4 x 11 ins. Illustrated. Shows typical affairs laid out with Telesco partitions, cuts of various telesco units in various positions and text the need and methods of modern mill painting. Gilden Specification Book. 8 x 10'/4 ins. Complete instructions, with cut drawings, showing how easily Telesco Partition can be erected.
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(See telephone books for addresses)

FOR LESS NOISE—BETTER HEARING
SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—Continued from page 190

PARTITIONS—Continued
Ramp Buildings Corporation, 21 East 40th St., New York,
Bullington Grages for 10 ins. 12 pp. Illustrated. Describes complete line of track and hangers for all styles of sliding and flush office partitions.
U. S. Gypsum Co., Chicago.

PIPE
American Brass Company, Waterbury, Conn.
Bulletin B-2. Brass Pipe for Water Service. 8'/2 x 11 ins. 20 pp. Contains a complete schedule of weights and sizes (L.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.
Cement Lined Pipe Company, Lynn, Mass.
Clow & Sons, James B., 534 S. Franklin St., Chicago, Ill.
Catalog "A.", 4 x 10'/2 ins. 200 pp. Illustrated. Shows a full line of steam, gas and water works supplies.
Cohoes Rolling Mill Company, Cohoes, N. Y.
Duriron Company, Inc., Dayton, Ohio.
Designing Data. Book. 6 x 9 ins. Illustrated. Shows complete line of stainless steel pipe. Includes illustrations of many important operations in the manufacture of pipe.
Duriron Company, Middletown, Ohio.
Modern Welded Pipe. Book of 88 pp. 8'/2 x 11 ins., profusely illustrated. For architects and engineers, showing important operations in the manufacture of pipe.

PLUMBING EQUIPMENT
Catalog S. W. 1 Booklet. 95 pp., 7'/2 x 10'/2 ins. Illustrated. Data on cast-iron and cast-lead pipe, valves, and sanitary wares.
Clow & Sons, James B., 534 S. Franklin St., Chicago, Ill.
Catalog "M." 9'/2 x 12 ins. 184 pp. Illustrated. Shows complete line of plumbing fixtures for Schools, Railroads and Industrial Plants.

Concrete Company, 436 S. Michigan Ave., Chicago, Ill.

Duriron Company, Dayton, Ohio.
Duriron Acid, Alkali and Rust-Proof Drain Pipe and Fittings, Booklet. 5'/2 x 8'/2 ins. 20 pp. Full details regarding a valuable form of piping.

Eljer Company, Fort City Pa.
Complete Catalog. 19'/2 x 8'/2 ins. 304 pp. Illustrated. Describes fully the complete Eljer line of standardized vitreous china plumbing fixtures, with diagrams, weights and measurements. Standardized Sixteen Circular. 36 x 8'/2 ins. Illustrated. Describes Eljer Sixteen Circular line of plumbing fixtures for schools, hotels, commercial establishments, etc.

Impperial Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill.
Warlow Patent Flush Valves, Douyet Water Closets, Liquor Soap Fixtures, etc. 8'/2 x 11 ins. 126 pp., loose-leaf catalog, showing roughings-in measurements, etc.

Maddock's Sons Company, Thomas, Trenton, N. J.
Cathay catalog ins. 242 pp. Illustrated. Complete data on vitreous china plumbing fixtures with brief history of San-i-White and San-i-Black lines.

Speakerman Company, Wilmington, Del.

Ramps
Ramp Buildings Corporation, 21 East 40th St., New York.
Building Grages for Low Cost Profitable Operation. Booklet. 8'/2 x 11 ins. 16 pp. Illustrated. Discusses the need for modern mid-city, parking garages, and describes the d'Humr Motoroom system of design, on the basis of its superior space economy and features of operating convenience. Covering applications of garages of different sizes, and calculates probable earnings.


The Transit Co., LaCrosse, Wis.
Trans Small Centrifugal Pumps. Booklet. 4'/2 x 8 ins. 16 pp. Complete data on an important type of pump.

Refrigeration
The Fulton Syphon Company, Knoxville, Tenn.
Temperature Control of Refrigeration Systems. Booklet. 8'/2 x 11 ins. Illustrated. Deals with cold storage, chilling of fruit and water, etc.

Reinforcing Concrete—See also Construction, Concrete
Grampier Steel Company, Youngstown, Ohio.
Selection of Hands, Booklet. 8'/2 x 11 ins. 36 pp. Illustrated. Methods and specifications on reinforced concrete floors, roofs and walls. Describes the use of concrete in the construction of prominent buildings of all types, containing "National" Bulletin No. 2. Corrosion of Hot Water Pipe. 8'/2 x 11 ins. 20 pp. Illustrated. Discusses various causes of corrosion, and details are given of the development and operation of systems for eliminating or retarding corrosion in hot water supply lines.

"National" Bulletin No. 23, "National" Pipe in Large Buildings. 8'/2 x 11 ins. 88 pp. This bulletin contains 254 illustrations of the buildings, containing "National" Pipe, and considerable engineering data of value to architects, engineers, contractors, and owners of plants.


Roofing

Cement Lined Pipe for Corrosive Waters. Booklet, 2'/2 ins., 6x9 ins. Illustrated. Discusses the merits of high-grade roofing tin plates and the advantages of the copper-steel alloy. The Testimony of a Decade. Booklet. 8'/2 x 11 ins., 40 pp., with Graphic Chart and Illustrations showing losses to various Iron Sheet Roofing at various altitudes and atmospheric corrosions.


The Barrett Company, 40 Rector St., New York City.

Philip Carey Co., Lockland, Cincinnati, Ohio.
Architect's Specifications for Carey-Built-up Roofing. Booklet. 8'/2 x 10'/2 ins. 24 pp. Illustrated. Complete data to aid in specifying the different types of built-up roofing to suit the kind of roof construction to be covered.

Carr Built-up Roofing for Modern School Buildings. Booklet. 8'/2 x 10'/2 ins. 37 pp. Illustrated. A study of school buildings of a number of different kinds and the roofing materials adapted for each.

Heim Roofing Tile Co., 1750 Champa St., Denver.
Plymouth Shingle Tile with Spotted H cakes. Booklet. 8'/2 x 11 ins. Illustrated. Shows use of Shingle tile with special hips. Italian Promenade Floor Tile. Folder. 5'/2 x 8'/2 ins. Illustrated. Floor tiling adapted from that of Davanzati Palace. Mission Tile. Leafllet. 8'/2 x 11 ins. Illustrated. The tile such as are used in Italy and in southern California. Georgia Tile. Leafllet. 8'/2 x 11 ins. Illustrated. Tiled as used in old English and French farmhouses.

"Ancient" Tapered Mission Tiles. Leafllet. 8'/2 x 11 ins. 4 pp. Illustrated. For architects who desire something out of the ordinary, this leafllet has been prepared. Describes briefly the "Ancient" Tapered Mission Tiles, handmade with full corners and designed to be applied with irregular exposures.

Milwaukee Corrugating Co., Milwaukee, Wis.

Ruberie Co., The (formerly the Standard Paint Co.), 95 Madison Ave., New York, N. Y.
Instructions for Laying Built-up Roofs. Booklet. 8'/2 x 11 ins. Illustrated.

Ruberie Facts. Worth Knowing. Booklet. 20 pp., 6 x 9 ins. Illustrated. Useful data on roofing.

Ruberie Asbestos Slates. Folder. Illustrated. Information and specifications for using asbestos slates.

U. S. Gypsum Co., Chicago.

Sheetrock Pyroflex Roof Construction. Folder. 8'/2 x 11 ins. Illustrated. Covers use of roof surfacing which is poured in place.

EASH CHAIN
Smith & Egge Mfg. Co., The, Bridgeport, Conn.
Chain Catalog. 8'/2 x 11 ins. 36 pp. Illustrated. Covers complete line of chains.

SEWAGE DISPOSAL
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Kewane Private Utilties Co., 442 Franklin St., Kewanee, Ill.
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SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—Continued from page 192

SWIMMING POOL EQUIPMENT & STERILIZATION

Water Sterilization by Means of Ultra Violet Rays, Booklet. 8 x 11 ins. 8 pp. Illustrated. Data regarding equipment for purifying water.
Swimming Pool Sterilization, Booklet. 8 x 11 ins. 24 pp. Illustrated. Details of equipment for sterilizing swimming pools.
Wallace & Tiernan Company, Newark, N. J.
The Water Treatment Plant, 1927 Edition. Specification No. 55. 8 x 11 ins. 8 pp. Illustrated. A useful booklet dealing with the proper use of water and the importance of the chlorination process in sterilization.
Manual Central Solution Feed Chlorinator, Type M, S. F. Folder. 8 x 11 ins. Illustrated. Valuable for swimming pool equipment.

TERRA COTTA

National Terra Cotta Company, 19 West 44th St., New York, N. Y.
Color in Architecture. Revised Edition. Permanently bound. 8 x 11 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. 8 x 11 ins. 32 pp. Illustrating 42 examples of school architecture with article upon school building design. Specifying the type of material used for floors, girder, column and beam covering and similar constructions.
Naeco Double Shell Lube Bearing Tile Bulletin. 8 x 11 ins. 6 pp. Illustrated. A treatise on the subject of hollow tile wall construction.
Standard Fireproofing Bulletin 171. 8 x 11 ins. 32 pp. Illustrated. A treatise on the subject of the types of pipes used for heating, piping and other purposes. Better Banks. 8 x 11 ins. 32 pp. Illustrating many banking buildings in terra cotta and its value in its use in bank design by Alfred C. Bossom, Architect.

TILE, HOLLOW

Standard Wall Construction Bulletin 174. 8 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. Illustrated. A treatise on the subject of the types of pipes used for heating, piping and other purposes. Better Banks. 8 x 11 ins. 32 pp. Illustrating many banking buildings in terra cotta and its value in its use in bank design by Alfred C. Bossom, Architect.

TILES


VALVES

Crane Co., 236 S. Michigan Ave., Chicago, Ill.
No. 720, 1926. 15 pp. Illustrated. Describes the complete line of the Crane Co.

C. A. Dodge & Co., 450 East Ohio St., Chicago.

Illinois Engineering Co., Racine Ave., at 22nd St., Chicago, Ill.
Jenkins Manual, 8 x 11 ins. 40 pp. Illustrated. A useful brochure dealing with the Jenkins Radiator Valve.

Van Zile Ventilating Corp., 205 River St., Troy, N. Y.
Venetian Blinds. Booklet. 4 x 9 ins. 12 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., 54 N. Wabash Ave., Chicago, Ill.

VENTILATION

American Blower Co., Detroit, Mich.
American Blower Co., Detroit, Mich.

Van Zile Ventilation Corp., 205 East 42nd St., New York, N. Y.
The Ventador Booklet. 6 x 9 ins. 16 pp. Illustrated. Description of the product and its value in the Ventador for Hotels, Clubs, Offices, etc.
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SELECTED LIST OF MANUFACTURERS' PUBLICATIONS

Continued from page 194

WALLS, INTERIOR

Zenithem Co., Inc., 390 Frelinghuysen Ave., Newark, N. J.
Zenithem Walls. Booklet, 28 pp., 8 1/2 x 11 ins. Illustrated. Deals with fine treatment for interior walls.

Folder of Architectural and Decorative Ornaments Achieved with Zenithem. Stock baseboards, moldings, etc.

WATERPROOFING

Carey Company, The, Lockland, Cincinnati, Ohio.
Waterproofing Specification Book. 8 1/2 x 11 ins. 52 pp.

Genfire Steel Company, Youngstown, Ohio.

A. C. Horn Company, Long Island City, N. Y.
Waterproofing. Folder, 7 1/2 x 11 1/2 ins. Contains folders giving data on excellent waterproofing and damp-proofing materials.

Master Builders Company, Cleveland, Ohio.
Waterproofing and Damp-proofing and Allied Products. Sheets in loose index file, 9 x 12 ins. Valuable data on different types of materials for protection against dampness.

Waterproofing and Damp-proofing File. 36 pp. Complete descriptive and detailed specifications for materials used in building with concrete.

Rubired Co., The, 95 Madison Ave., New York City.
Imperithor. Circular. 8 1/2 x 11 ins. 4 pp. Illustrated. An integral water-proofing compound for concrete, stucco, cement, mortar, etc.

Summers & Co., Ltd., 95 Madison Ave., New York City.
Application of Waterproofing Materials. Circular. 8 1/2 x 11 ins.

Summers Sons, Inc., 116 Fifth Ave., New York, N. Y.
Pamphlet. 8 1/2 x 11 ins. 8 pp. Explanation of waterproofing principles. Specifications for waterproofing walls, floors, swimming pools and treatment of concrete, stucco and mortar.

Toch Brothers, 110 East 43d St., New York City.
Specifications for Damp-proofing, Water-proofing, 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 F" membrane waterproofing of basements, tunnels, swimming pools, tanks to resist hydrostatic pressure. Par-Lock Waterproofing. Specification Forms D, E, F and G. Sheets, 8 1/2 x 11 ins. Data on combinations of gun-applied asphalt and cotton or felt membrane, built up to suit requirement.

Par-Lock Method of Bonding Plaster to Structural Surfaces. Folder, 6 pp., 8 1/2 x 11 ins. Official Bulletin of Approved Products—Investigating Committees of Architects and Engineers.

WEATHER STRIPS

Atlhoy Company, 6035 West 65th St., Chicago.
The Only Weatherstrip with a Cloth to Metal Contact. Booklet, 20 pp., 8 1/2 x 11 ins. Illustrated. Data on an important type of weather stripping.

Chamberlin Metal Weather Strip Company, 1644 Lafayette Boulevard, Detroit, Mich.
Chamberlin Metal Weather Strip Details, 1925 edition. Catalog, 8 1/2 x 11 ins. 48 pp. Complete specifications and full-sized details. With or without 9 x 13 1/2 ins. folder conforming to A. I. A. filing system. May also be used in loose leaf form. Excluding Cold and Dust with Chamberlin for 32 years. Booklet, 5 1/2 x 7 1/4 ins. 16 pp. Illustrated. Completely and interestingly describes application of Chamberlin equipment.

Chamberlin Details for Wood Sash and Doors. 50 pp., 8 1/2 x 11 ins. Data and diagrams relating to weather-tight doors and windows.

Specifications for Calking with Chamberlin Plaster-Calk. Folder, 4 pp., 8 1/2 x 11 ins. How Rain, Dust and Cold Are Kept Out. Folder, 10 pp., 8 1/2 x 7 1/4 ins. Weatherstripping for Residences.

The Higgin Manufacturing Co., Newport, Ky.
Higgin All-Metal Weather Strips. Booklet, 6 x 9 ins. 21 pp. Illustrated in colors. Describes various types of Higgin Weather Strips for sealing windows and doors against cold and dust.

WINDOWS

Detroit Steel Products Co., Detroit, Mich.

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Curtis Companies Service Bureau, Clinton, Iowa. Better Built Homes. Vol. XVIII, inc. Booklet. 9 x 12 ins. 65 pp. Illustrated. Designs for houses of five to eight rooms, respectively, in several authentic types, by Trowbridge & Adragna, architects, for the Curtis Companies. |

Long-Bell Lumber Co., Kansas City, Mo. The Perfect Floor. Booklet. 8½ x 11¼ ins. 16 pp. Illustrated. Valuable for the data given on the use of wood for floors. |


Experiences in Home Building. Booklet, 6 x 9 ins. 16 pp. Records the testimony of a number of builders and contractors as to the value of certain materials. |

The Post Everlasting. Booklet, 8 x 11¼ ins. 32 pp. Illustrated. Describes the production of posts and their use in various ways. |

American Walnut. Booklet. 7 x 9 ins. 40 pp. Illustrated. Designs for houses of five to eight rooms, respectively, in several authentic types, by Trowbridge & Adragna, architects, for the Curtis Companies. |


"Where to Use Douglas Fir in Your Farm." Brochure, 32 pp., 6 x 9 ins. Data on use of this wood for farm buildings. |

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—Continued from page 196
William Ochse, President of the San Antonio Drug Company, stated in "The Magazine of Business" that a few years ago his firm had 181 employees as against 136 today, while their business has increased fifty per cent.

He explains this by saying that they have adopted modern factory, or "Progressive Assembly" methods. He says, "We have eliminated a lot of leg work and substituted head work for it."

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DETROIT, 2211 First National Bldg.
KANSAS CITY, MO, 2003 East 16th St.
MINNEAPOLIS, 200 Builders Exchange.
NEWARK, N. J.

NEW YORK CITY, 36 Church Street.
PHILADELPHIA, 1790 Walnut Street.
PITTSBURGH, 207 Fulton Bldg.
SCRANTON, PENNA.

ST. LOUIS, 015 Chemical Bldg.
TORONTO, 2250 Bloor Street, West

TRENTON, 328 Broad St. Bank Bldg.
YOUNGSTOWN, 303 City Bank Bldg.
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Part Two

ENGINEERING AND BUSINESS

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where kitchenettes have easy-to-clean Monel Metal sinks and drainboards

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The Rewards a Fee Cannot Cover

The comfort, contentment and convenience you plan into a home never lose their thrill to the owner — nor to the architect, either, whose heart is in his work. There is no reward like it — nothing parallel to it — in any other profession.

The Kernerator is one of those outstanding conveniences which complements the architect who suggested it and proves a never-ending joy to those it serves. It substitutes instant, right-at-hand, convenience for the old time drudgery of carrying out the garbage. And, what is also mighty important:

**It Costs Nothing to Operate**
**— Uses No Fuel**

The Kernerator is a brick combustion chamber, built into the base of the regular chimney, with a separate flue, having hopper doors located in or near the kitchen. All waste — not only garbage, but tin cans, bottles, papers, all discarded trash — is dropped through the handy hopper door. Falling to the brick combustion chamber, an occasional lighting burns everything but metallic objects and such non-combustibles, which are flame-sterilized for removal with the ashes. No fuel of any kind is used — the waste itself is fuel for its own destruction.

See Sweet's, write for Kernerator catalogs in ready-to-file A. I. A. Folder 35J41 or phone your local Kernerator representative. Offices in 89 cities.

KERNER INCINERATOR COMPANY, 715 East Water St., MILWAUKEE, Wis.

**KERNERATOR**
THE CHIMNEY-FED INCINERATOR

Garbage and Waste Disposal without Leaving the Kitchen
Manufacturers' Handling Problems
the Key to Successful Architectural Plans

Manufacturers have an ever present problem of devising ways and means for effecting new savings in production costs. In this, built-in equipment is an important item.

For example, in old buildings, and even in new ones where old handling methods are employed, production costs are usually higher than they should be.

The modern architect can well afford to take heed of this. Where he is called upon to submit plans for new buildings, he should give thorough consideration to the manufacturers' handling problems.

Successful architects have a full knowledge of industrial operation. They recognize the important part material handling plays in production costs. These architects, in their plans, show the manufacturers the greatest production saving possibilities. By gaining the confidence of the manufacturers, earned through intimacy with handling problems and originality in planning, the possibility of competition is eliminated.

Facts and figures compiled by this Company plainly and convincingly show the material handling advantages and production economies effected by various manufacturers who have included Standard Conveying Systems in their building plans.

We will be glad to cooperate with architects and furnish them with such data as will help them to gain a new and comprehensive insight into the manufacturers' handling problems.
Here is a typical Titusville Scotch Oil Boiler installation in the warehouse and offices of the National Grocery in Jersey City.

Note the neat, compact appearance—an advantage made possible by the close-knit design of Titusville Scotch Type Boilers.

They save one-third of the floor space ordinarily required, consume a great deal less oil and are so efficient that only one boiler has been required to heat the entire building.

It is just such performance advantages as these that have established a country wide preference for Titusville Boilers.
The Kny-Scheerer Products Are Built for Enduring Service

38 Years of Experience Are Back of Kny-Scheerer Products
Permit Our Engineering Department to Assist in Your Problems

Recessed Sterilizers, St. Mary's Hospital, E. St. Louis
J. W. Kennedy, St. Louis, Mo., Architect

Recessed Cabinets, St. Mary's Hospital

Illustrated Specifications for Sterilizers A.I.A. No. 35-K free on application

The KNY-SCHEERER CORPORATION of AMERICA
10 to 14 West 25th Street, at Broadway
New York City, U. S. A.
America’s Largest Manufacturers of Hospital Equipment

DRAPER SCHOOL
County of Schenectady
E. G. Atkinson, Schenectady, Arch.

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“GLOBE” Ventilators

Schools have been a splendid proving ground for “GLOBE” Ventilators. They have given such efficient service in this field that many architects who have been identified with school planning have come to consider “GLOBE” Ventilators as the standard school ventilation.

Low first cost—efficient—no upkeep

GLOBE VENTILATOR COMPANY
TROY, NEW YORK

Department F
Your clients will ask you

Is oil heating expensive?

Many Quiet May owners tell us that they are able to make a decided saving by heating with oil. There is nothing mysterious about this. It is perfectly reasonable because the Quiet May operates only when the temperature of the house falls below 68° or 70°. In other words, oil is burned only when heat is needed.

With coal, on the other hand, the fire burns all the time, and coal is used up even though the house does not need heat.

As an architect you will also want to know more about the company that manufactures the Quiet May. Any bank or commercial rating company can tell you about the standing of the May Oil Burner Corporation. And we ourselves shall be glad to supply you with a list of Quiet May dealers and Quiet May owners whenever you are interested.

MAY OIL BURNER CORPORATION, Baltimore, Md.

QUIET MAY

AUTOMATIC OIL BURNER
HOT WATER—PLENTY OF IT ALWAYS.

Here is a new-type water heater adaptable to every kind of building. It requires no extra fire. It burns no gas. It utilizes waste heat from the steam heating plant. Its cost to operate is trifling. It provides a plentiful, continuous hot water supply. It is compact, simple, inexpensive to install. It has been endorsed by leading heating engineers. It has already proved itself in thousands of homes and buildings.

It can be connected to any type of steam heating plant. Whether the fire is high, low or banked, it gives hot water without stint. It is guaranteed in all detail by its makers.

That, in a few words, is Taco, the automatic fuel-less water-heater. For large homes, apartment houses and other buildings with hot water tanks of 200 gallons or more, the Taco Semi-Indirect. For homes of three bathrooms or less, the Taco Domestic. Sizes to fit all requirements.

Let us send you complete specification data.

THERMAL APPLIANCE COMPANY
342 Madison Avenue New York City

Makers of
TACO
Automatic Fuel-less Water Heaters

SASH CHAINS

"RED METAL" (Solid Bronze)
"GIANT METAL" (Phosphor Bronze)
AND STEEL SASH CHAINS

Have been specified by discriminating architects for over 45 years.

THE OLDEST AND BEST SASH CHAIN ON THE MARKET

THE SMITH & EGGE MFG. CO.
BRIDGEPORT, CONN.

ORIGINATORS OF SASH CHAINS

THE HERMAN NELSON CORPORATION
MOline, ILLINOIS

The Herman Nelson hiJet Unit Heater

Leak-proof, rust-proof, indestructible. Lower installation cost, smaller pipe lines, no reducing valves necessary. Never requires service. Freezing cannot harm it. Operating steam pressure from 1 to 150 lbs. Can be suspended from pipe lines or moved from place to place. Long range heat distribution. The ideal heating unit for Factories • Mills • Railroad Shops • Roundhouses Warehouses • Garages • Gymnasiums • Auditoriums

Write for your copy of the Herman Nelson hiJet Unit Heater catalogue
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by
JOHNSON AUTOMATIC OIL BURNERS

2130 Lincoln Park West, one of Chicago's finest new apartment hotels. Designed by Oman & Lilienthal, Architects, for the Lincoln Park West Bldg Corp. Heated by the clean, benevolent warmth generated by Johnson Automatic Rotary Oil Burners.

That Johnson Oil Burners should be selected for these splendid new apartment homes is acknowledgment of the efficiency and dependability of the Johnson Burner — declared by engineers "the most scientifically constructed oil burner on the market".

23 Years in the Making

Developed through 23 years in the manufacture of oil burning equipment exclusively, Johnson Oil Burners merit recommendation for buildings large or small.

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The Johnson Rotary Automatic is approved by Underwriters' laboratories and New York Board of Standards and Appeals.

S. T. JOHNSON CO.
OIL BURNERS

Main Office and Factory: 943 Arlington Ave., Oakland, Calif.
Factory Branch Offices: San Francisco, Sacramento, Philadelphia
Distributors and Dealers throughout the United States and in Foreign Countries
What is “standard” in Radiator Furniture?

Trico Art Metal specifications may guide you

To establish a standard for radiator furniture—in view of the attention to this phase of interior furnishing—the following description of Trico (art metal) equipment should be of assistance:

**TOP:** The top is the most important piece in a unit. It stands the worst wear. Trico (art metal) tops are made of 14 gauge furniture steel. A lighter gauge is not practical. These Trico tops are sufficiently solid to act as window seats and to last a lifetime under this severe treatment.

**GRILLE:** 16 gauge frame—20 gauge panel. Warping or buckling is definitely eliminated by reinforced construction. Styles are cane, woven cane, rod grille, the new German patterns, etc. None of these patterns are exclusive to any manufacturer and selection is the customer’s privilege.

**JOINING:** All parts of Trico (art metal) equipment are electrically spot welded. Solder will not last, nuts and bolts come loose. Electric spot welding, while more expensive, is absolutely essential to serviceable furniture.

**WATER PAN:** Humidified heat, as we are beginning to learn, is a vital health requirement. The Trico water pan beneath the top is entirely one piece with rounded corners and no seams (or solder) for possible leakage. Rustproof. The pan also acts as a catchpan for radiator dirt, keeping smudge off walls and draperies. Pan is filled through a trap door, so that the top need not be lifted off (a Trico feature). Radiator furniture without a humidifying pan is, we believe, a poor makeshift.

**PRIMER COAT:** The important first coat on the raw metal that acts as a binder between the steel and the finish. The Trico primer coat is the result of a special process developed through years of experimenting.

**FINISH:**
- DeLuxe (complete enclosure) — Eight coats of baked on enamel to match any sample of wood, marble, inlay work, or decorative color scheme. Finished by hand.
- Artcraft (enclosure or open type cover) — Six coats of baked on enamel. Choice of fourteen wood grain and plain color finishes. Finished by hand.
- Tricover (open type cover) — Four coats of baked on enamel. Choice of fourteen wood grain and plain color finishes. Finished by hand.

Equipment like this cannot be had “knocked down” or at “cut prices.” It is, however, sold on convenient terms, and there is sufficient range in Trico equipment for every kind of job. Covers as low as $20. As the oldest and largest manufacturers of substantial radiator furniture, we are always pleased to discuss with architects our experience in this industry.

**Trico, Inc.**

1732 North Kolmar Ave., Chicago

MAKERS OF TRICO ART METAL RADIATOR FURNITURE
Prominent members of your profession are recommending Electrol for some of the country’s finest residences. This one is typical. George Mahan, Jr., of Memphis, is the architect.

The type of homes heated by Electrol reflects the fineness of its engineering. Automatic supervision of every phase of the burner’s operation is provided by a special feature—The Master Control.

Here is oil heat at its best. All-Electric and Entirely Automatic. Quiet—and dependable beyond question. Three models cover every requirement, for residences and buildings of all types and sizes. Write for the Electrol regulation A. I. A. folder containing oil heating information you will be glad to have.

ELECTROL INC. of Missouri, 179 Dorcas St., St. Louis, U. S. A.
ANOTHER
CAPITOL STEP
FORWARD

Standardized
Radiator Ratings

All who are concerned with heating specification and installation will welcome this announcement as enthusiastically as they received Capitol Guaranteed Heating.

They know of the greater radiating surface and heating efficiency of the Capitol Radiator. They have seen its refined beauty.

Now to these superiorities has been added another great advantage—Standardized Ratings! Without changing Capitol Radiators one iota, the ratings have been reduced in the interest of standardization, offering extra value never before equalled in the heating industry.

At a single stroke the confusion and cost of refiguring radiation from varying listed ratings has been abolished.

Capitol Radiators can now be figured and installed on standard specifications, without revision.

Write for the 1928 catalog of Capitol Radiators with the new standardized ratings.

UNITED STATES RADIATOR CORPORATION—DETROIT, MICHIGAN

Guaranteed Heating
WITH
Capitol Boilers
AND RADIATORS
The Dunham Differential Vacuum Heating System

Sub-Atmospheric Steam is Like a Giant Rubber Band

SUB-ATMOSPHERIC steam, as used in the Dunham Differential Vacuum Heating System, is like a giant rubber band. It stretches out during the warmer months of the heating season and flows at a low temperature through the radiators and pipings at pressures less than atmosphere, providing an input of heat sufficient to compensate for heat losses from the building.

Reference to the illustration makes clear the remarkable "stretching quality" of sub-atmospheric steam. One property of steam is that as the vacuum at which the steam is produced is increased the volume occupied by a pound of steam rapidly increases. Figure 1 shows a radiator whose relative surface is 1.0, filled with steam at 2 pounds gauge pressure. The temperature of the steam within this radiator is 219.8 degrees. Figure 2 shows the relative heating surface of a radiator filled with steam when the boiler pressure is 7.4 inches of vacuum, having a temperature of 198.3 degrees. Similarly, figures 3 and 4 show corresponding increases in the relative heating surface when filled at correspondingly reduced pressures and temperatures.

Until the advent of the Dunham Differential Vacuum Heating System steam at less than atmospheric pressure was not available in any ordinary steam heating system (operating at atmospheric pressures or higher). Consequently, during 95% of the heating season buildings were overheated, uncomfortable and unhealthy.

You should learn more about this remarkable Dunham invention which makes it possible for steam to be stretched in mild weather to fill radiators with low temperature steam. Bulletins giving information on performance in typical installations, both large and small, will be sent you on request.

C. A. DUNHAM CO., Dunham Building
450 East Ohio Street, CHICAGO,

Over seventy branch and local sales offices in the United States, Canada and the United Kingdom; bring Dunham Heating Service as close to you as your telephone. Consult your telephone directory for the address of our office in your city. An engineer will counsel with you on any project.

U. S. Patent No. 1644114. Additional patents in the United States, Canada and Foreign Countries, now pending.
### VENTURAFIN Heating Units

VENTURAFIN Heating Units have more than 5 times the efficiency of an equivalent amount of radiators, wall coils, etc.

A Venturafin Unit for a given capacity occupies only ¼ of the space and weighs only ½ as much as the necessary amount of direct radiation for the same capacity. Consequently Venturafin is easier and cheaper to install and handle.

There is a Venturafin Unit for practically every heating need—stores, offices, garages, salesrooms, lodge halls, auditoriums, factories, shops, etc.

Thousands of Venturafin Units are daily establishing new records of heating economy and heating efficiency.

*Mail this coupon today for all the facts*

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**Table: Dimensions, Weight, and Capacity**

<table>
<thead>
<tr>
<th>UNIT</th>
<th>DIMENSIONS</th>
<th>WEIGHT</th>
<th>CAPACITY IN CUBIC FEET OF HEATED AIR PER MINUTE</th>
<th>SQUARE FEET OF DIRECT RAD. REQUIRED TO GIVE SAME CAPACITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Venturafin No. 2A</td>
<td>22¾&quot; high 14½&quot; wide 12½&quot; deep</td>
<td>60 lbs.</td>
<td>450 cu. ft. per minute</td>
<td>125 square feet</td>
</tr>
<tr>
<td>Venturafin No. 2B</td>
<td>22¾&quot; high 14½&quot; wide 12½&quot; deep</td>
<td>70 lbs.</td>
<td>675 cu. ft. per minute</td>
<td>165 square feet</td>
</tr>
<tr>
<td>Venturafin No. 2C</td>
<td>22¾&quot; high 14½&quot; wide 12½&quot; deep</td>
<td>80 lbs.</td>
<td>900 cu. ft. per minute</td>
<td>200 square feet</td>
</tr>
<tr>
<td>Venturafin No. 4</td>
<td>29&quot; high 32&quot; wide 10½&quot; deep</td>
<td>359 lbs.</td>
<td>2000 cu. ft. per minute</td>
<td>500 square feet</td>
</tr>
<tr>
<td>Venturafin No. 7</td>
<td>58&quot; high 56½&quot; wide 13½&quot; deep</td>
<td>1100 lbs.</td>
<td>8000 cu. ft. per minute</td>
<td>2000 square feet</td>
</tr>
</tbody>
</table>

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**COUPON**

AMERICAN BLOWER CO.
6000 Russell St.
DETROIT, MICH.

Send details relative to the application of the Venturafin Method of Unit Heating to

Name: ___________________________

Firm: ___________________________

Address: _________________________

City & State: _____________________
Equivalent direct radiation 16,900 sq. ft.
Heated by two No. 3-105 Spencer Steel Tubular Heaters, capacity 10,500 sq. ft. each.

Two No. 3-105 Spencers are heating the Longfellow School, Pensauken, a duplicate of the Roosevelt School.

"A SIZE AND TYPE FOR EVERY HEATING REQUIREMENT"

Spencer
steam, vapor or hot water
Heaters
burn No. 1 Buckwheat Coal

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Division of Lycoming Manufacturing Company

STEAM CAPACITIES: Cast Iron Sectional from 600 feet to 3,200 feet. Steel Tubular from 2,000 feet to 16,000 feet
REVIEWS OF MANUFACTURERS' PUBLICATIONS

FEDERAL CEMENT TILE COMPANY, Chicago. "The Ideal Retaining Wall." A useful work on its construction.

Retaining walls are of course frequently required for railroad cuts and embankments, for bridge abutments and wing walls, for shore protection, bulkheads and piers, and for a great variety of work more or less similar. A retaining wall must naturally possess considerable strength, since it is usually without support on one side while obliged to withstand considerable force or pressure from the other. This folder describes and illustrates the Federal Concrete Cribbing Units now being widely used for constructing such walls. Nothing could be simpler than the method used, the face of the wall being built up of concrete units, while to supply lateral strength concrete headers are used where either side or support on one side is available.

WESTINGHOUSE ELECTRIC & MANUFACTURING CO., East Pittsburgh. "Variable-Voltage Control for Elevators."

Since tall buildings would be wholly impossible were they not equipped with elevator service, the supplying of this service becomes a matter of the first economic importance. The makers of elevators and of the different accessories which render them almost perfection are performing a valuable service by constantly placing before architects and engineers data on various forms of development. Here, for example, is a reprint of an article by Edgar M. Bounton, Associate A. I. E. E., which appeared originally in the Journal of the A. I. E. E. The requirements of elevator service are enumerated, showing the greater difficulty of application of a-c motors where these requirements are not met. A complete variable-voltage system is submitted as a solution to this problem. The apparatus used is described, and the results are then analyzed. High elevator car speeds can be used, wherever a-c or d-c power supply is available. The accelerating characteristics, speed, regulation and speed control, are described. The efficiency of the complete equipment and its power consumption are compared with other systems. The different safety features utilized are described. The author explains the variable-voltage system.

GENERAL FIREPROOFING BUILDINGS PRODUCTS, Youngstown, Ohio. "Herringbone Rigid Metal Lath of ARMCO Ingot Iron." Important data on the material.

Use of metal lathing has had an amazing effect on modern building of more than one type. It has been one of the prime causes for the present extensive use of stucco, used externally for country and suburban houses, large and small, while its use within, though perhaps less noticeable, is made of it, has extended by leaps and bounds. Use of metal lath adds to any wall, outside or in, strength, rigidity and stability, which were unknown before it was placed upon the market. It supplies the best possible ground for plastering. This brochure or booklet presents a study of the advantages of using lath fabricated of "ARMCO Ingot Iron." Although this large firm, manufacturing different sorts of fittings, giving their sizes, etc., data of considerable value. The brochure reviews the advantages to be looked for when "Celite" is used in concrete mixtures for highways, bridges, dams, tunnels, reservoirs and buildings, and it reproduces letters from a number of architects, engineers, and contractors who have specified the material or used it in work in the field.

THE SYKES METAL LATH CO., Niles, O. "Sykes Metal Lath." A work on the advantages of using metal lath.

The use of steel in modern building is by no means confined to steel columns and beams. A number of other uses of the numerous steel products manufactured and marketed by the Sykes Metal Lath Co.—dampers, thimbles, chutes, doors, ash and other details in addition to the metal lathing and the beads, channels, etc., which are so often used in building walls and ceilings. The brochure says that use of metal lathing costs only about $50 more than use of wood for the average residence, while against this small cost there must be credited the advantages of use of metal.


Webster Vacuum and Modulation Systems of Steam Heating are basic systems of steam circulation embodying both the parts and fittings which are required when underlining refinement and development. The Webster Drip Trap, which is described in this bulletin, is the most recent development. A heavy duty trap, produced to meet a specific need and offered as an element bringing Webster Systems of Steam Heating to a still higher standard, it is described in this bulletin. The trap has been the subject of thorough laboratory and field tests and has been installed in many Webster Systems. It has met with complete success, being received with enthusiasm by engineers and the trade. Several factors have contributed to the development of the Webster Drip Trap. It meets the need for a trap capable of handling large volumes of condensation and air, and at the same time being compact and light in weight so that it may be readily mounted right in the pipe line without other support. By its use the necessity for installing cooling legs is decreased. The success of the trap cannot be measured for a heavy-duty float-type trap is met, while the advantages of the thermostatic element and ease of installation remain.


"Celite" is described as being "a special grade of diatomaceous silica of exceptional purity." It is being widely used both in America and abroad in the production of concrete for use in various ways. This brochure is devoted to making known the results of experiments carried on by Messrs. Pearson and Hitchcock of the United States Bureau of Standards who investigated the benefits of methods to increase the workability of concrete mixes. The brochure reviews the advantages to be looked for when "Celite" is used in concrete mixtures for highways, bridges, dams, tunnels, reservoirs and buildings, and it reproduces letters from a number of architects, engineers, and contractors who have specified the material or used it in work in the field.


This large firm, manufacturing all sorts of heating equipment, has behind it a number of subsidiary concerns which possess and operate their own iron fields, coal mines, blast furnaces, and foundries wherein there are produced all the parts and fittings which are required when underlining the apparatus of heating apparatus are made. This particular brochure, one of quite a number of publications issued by the Central Radiator Co., deals with seven specific items of the firm's output: Lansdale Round Sectional Boilers; Lansdale Radiators; Molby Magazine—Feed Boilers; Domestic Water heaters; Specials and Accessories. Each of these four items is illustrated and described at length, all requisite dimensions are given, and the descriptions include all the data which an architect or an engineer would probably be interested in. Conditions under which the apparatus is in question. Pages 22 and 23 list and price a great number of fittings, giving their sizes, etc., data of considerable value. The brochure should be in the files of every office.
Genuine Wrought Iron Pipe is more than a description. The word genuine in connection with Iron Pipe means that the manufacture is based upon the original and only known process that insures the material against corrosion and rust.

Cohoes Genuine Wrought Iron Pipe has never deviated from the formula of the founder. When Cohoes pipe is installed—architects, contractors, plumbing engineers—know that silently but surely Cohoes will do its work more efficiently for the life of the building.

Our Hand Book of Pipe facts is an authoritative manual on every subject of Genuine Wrought Iron Pipe. Sizes, lengths, weights, tests—all cataloged handily for your reference. We'll be glad to send you a copy.
REVIEW AND ANNOUNCEMENTS

NATIONAL BUILDING UNITS CORPORATION, Philadelphia. "Cinder Concrete Building Units."

There are several qualities which must be possessed by a thoroughly practical material for masonry walls,—it must be strong and permanent, fire-resistive, and not merely fireproof, combustible, but retaining its strength and stability when exposed to intense heat or to sudden and repeated applications of cold water; it must also possess resistance to dampness, and provide adequate insulation against noise and heat. All these necessary qualifications are had by the Cinder Concrete Building Units, complete data regarding which are contained in this brochure. The booklet fully illustrates the approved methods of using the material.

WESTINGHOUSE ELECTRIC & MANUFACTURING CO. Dealer Catalog 45. "Westinghouse Electric Fans."

Fans are useful for countless purposes, not only for cooling the air but also for promoting good ventilation by forcing fresh air into areas which would otherwise be without it. The line of fans produced by the Westinghouse firm is divided in direction of supply fans for every imaginable purpose, and this booklet describes and illustrates the different kinds,—whirling fans, desk and bracket fans, ex-haust fans, railway car fans, and other types,—and gives data which could hardly fail to be of value to anyone interested in fans for any use. Noisy fans are of course objectionable, and the Westinghouse engineers have worked unceasingly to make Westinghouse fans silent in operation.

ROME WIRE COMPANY, Rome, N. Y. "Insulated Electrical Wires and Cables." Valuable information on their use.

 Constantly increasing use of electricity as a medium for supplying light, heat and power has brought with it, quite logically, a corresponding increase in use of the wires or cables which act as conductors of this energy. The manufacture of such cables and wires has in fact grown to a vast business, the action of which is not likely to be realized until one examines the catalog of a firm engaged in their manufacture. Such, for example, is the present publication. The brochure is replete with data valuable to architects, engineers and contractors; it covers the smaller and lighter types of wires of different kinds, used for lamps, telephones, etc., the heavier varieties, used for countless purposes, and finally the very heavy grades such as are more accurately termed "cables." One particularly interesting part of this booklet is devoted to dealing with the subject of "cables," or measurements, giving a review of their history. The fact that there were formerly in use a number of gauges led to confusion, but common practice, the brochure says, is eliminating use of most of the gauges and is assigning defined fields to others, making for convenience.

MIDWEST AIR FILTERS, INC., Bradford, Pa. "Midwest Air Filters; Detail Sheets." Useful to architects.

Although they are being widely used, the mechanism of air-cleaning systems is not always fully understood by architects or builders. One helpful paragraph of this valuable booklet says regarding the air-purifying apparatus made by this firm: "Each Midwest Filter Cell contains a series of specially shaped and perforated metal filter sheets and a series of knitted mats of flat copper ribbon, so arranged that dusty air, in passing through the cell, is forced to change its direction innumerable times. With each change in direction dust particles are impinged against the sticky surfaces of the filter media, all of which are coated with a non-inflammable viscous fluid (Viscosine). The filter media are arranged with progressively increasing density from the front to the rear of the cell. In the front, space is thus provided for the accumulation of large amounts of dust. At the center, the filter sheets are closer together, and in the rear the knitted metal mats are still closer together, so that the finer dust particles which pass through the front sheets are impinged and caught due to the greater number of turns the air must make in passing through the denser portion of the filter medium. Viscosine storage reservoirs are provided, from which Viscosine is drawn by capillary action when the dry dust accumulates in the cell.

THE TRANE COMPANY, La Crosse, Wis. "How to Select and Install Trane Concealed Heaters."

There has been invented and placed upon the market a means of using without radiation heating system that would ordinarily require radiators, pipe coils or similar heat-diffusing apparatus. This is the Trane Concealed Heater, as described and illustrated in this brochure. This heater is made by placing spaced copper fins or sheets upon a copper tube. Steam or hot water passes through the tube, heating it and its fins. Air, reaching the spaced fins, is heated and passed off into the room. Any heating system is designed in exactly the same way for Concealed Heaters as it would be for cast iron radiation, although, of course, roughing-in dimensions must be considered. Capacities of Concealed Heaters are given here in square feet of direct radiation.

Wanted—Chief draftsman with experience in leading offices in either Chicago or New York on commercial and office buildings. Box L, THE ARCHITECTURAL FORUM.

Wendell P. Miller, consulting engineer, and Octave Ammon, associate architect, announce their removal from 403 East Broad Street to 85 East Gay Street, Columbus, O. as in its services.

Malcolm H. White announces his removal from Charleston, W. Va., to Wilmington, Pa. He desires the catalogs, other publications and samples issued by manufacturers.

David Podoloff makes announcement of his removal from 152 West 72nd Street, New York, to 47 Mamaronck Avenue, White Plains, N. Y. He desires publications and samples of manufacturers and data regarding equipment.

WESTINGHOUSE ELECTRIC & MANUFACTURING CO., Mansfield, O. "Electric Range Book for Architects."

The years that have passed since electric cookery was first attempted have brought the electric range through experimental stages until today, meals are being prepared quickly, economically and efficiently on electric ranges. The electric range has been received enthusiastically by cooking authorities and dietitians. It has been adopted in cooking and domestic science schools, as well as in public, high and normal schools, universities and colleges. The 350,000 electric ranges in use tell of the universal welcome with which this appliance is being received. Electric heat offers many advantages for cooking. Perhaps the first of these is its dependability and ease of regulation which puts an end to guess work. The electric range is economical. The insulated oven conserves heat and operates partially as a fireless cooker. Food is saved, too, for evaporation is not so rapid in the electric range as in ranges of other types. In actual fuel costs the electric range compares favorably with ranges of other types. Almost everywhere electric service companies set a low rate for the users of electric ranges. Convenience is another appeal of the electric ranges. The Westinghouse Range, the range with the clock, operates automatically. The housewife places the food in the oven, sets the clock and leaves. The clock turns on the current at the proper time, and the cooking begins. At meal time the food will be cooked just the way it should be. This brochure lists, illustrates and describes the different types of electric ranges offered by the Westinghouse Company. It also contains plans and illustrations of model installations, particularly useful to architects in the planning of kitchens.

Van Rensselar P. Saxe, C.E. Consulting Engineer

STRUCTURAL STEEL
CONCRETE CONSTRUCTION
Knickerbocker Building
Baltimore
The concrete floors of this power plant will last for years
protects them!

THE concrete floors of the great power plant at Sterlington, La., (Ford, Bacon & Davis, Engineers) might as well be flint, as far as wear and dust are concerned. Lapidolith has made them permanently wear-proof and dust-proof.

Architects prefer this original concrete floor hardener because they are certain of its service. For twenty years Lapidolith has been protecting thousands of floors against grinding wear.

The cost per gallon may be higher, but the cost per year of service is lower than that of any other hardener.

There is another safeguard besides the uniform quality of Lapidolith. That safeguard is the Sonneborn policy of insuring satisfactory results. The Sonneborn Policy is that the architect must always be satisfied. Sonneborn always makes good.

In your city are many Lapidolith-treated floors to which we will gladly refer you. Ask for such a list and see some of these floors for yourself.

L. SONNEBORN SONS, Inc.
114 Fifth Avenue
New York
The **ILLINOIS** Return Trap

*PATENTED*

The Original Return Trap embodying the features of self-contained mechanism—no external working parts to be tampered with or injured—no stuffing boxes or packed joints—insuring continuous satisfactory operation.

The Illinois Return Trap is a vitally necessary part of every Illinois Vapor System and embodies the improvements and refinements suggested by over 15 years of operation.

The **proven** advantages of Illinois Vapor Systems are:

—operation below atmospheric steam pressure—at vacuum vapor pressures.
—operation four-fifths of the time with banked fires.
—easy control of room temperatures.
—durability of apparatus.
—noiseless operation.

**mild weather,** avoiding overheating common to ordinary steam jobs.
—all the heat you want in winter weather by adjusting firing periods.

Write for Vapor Details Bulletin 22

**ILLINOIS ENGINEERING COMPANY**

ROBT. L. GIFFORD, PRES.  INCORPORATED 1900
BRANCHES AND REPRESENTATIVES IN 40 CITIES
CHICAGO
Three Points to Remember

The important fact about Eljer designs is that they so successfully embody the finest features of all fixtures, making them available in one complete line.

Eljer finish means a glaze as pure as crystal and smooth as glass, one on which the Government Red Ink Test can’t leave a mark, guaranteed against cracking or crazing.

Eljer service responds with promptness, speed and accuracy every day, not merely when goods are needed on the job at once. Design, Finish, Service—no wonder Eljer has been making a sensational record this past year.

Correcto No. 720

First, it is off the floor—leaving the floor clear for cleaning. There are wide side wing shields insuring privacy—also eliminating the necessity of costly marble partitions. The integral trap has an accessible cleanout above the floor and saves the cost of a trap with its additional pipe, fittings and labor. The integral flushing rim gives even distribution of water and eliminates the corrosion found on metal spreaders.

Further, it is genuine vitreous china and ordinary acids or cleaning preparations do not affect its clean white glaze.

Among the large installations where the Correcto has been selected and installed are such buildings as the Union League Club, Chicago; Philadelphia Country Club, Philadelphia; Cleveland Union Terminal Tower, Cleveland; Minneapolis Public Library, Minneapolis; Macabees Building, Detroit; Subway Stations, New York City, etc.

Auburn No. 597

How to crowd so many features into one fixture—that is the Eljer secret. The Auburn Noiseless Syphon Jet Wall-Hung Bowl is an example. In addition to its many points of merit such as long rim opening, deep seal, large water surface and clean-cut graceful lines, it is exceptionally quiet in operation.

There is no longer any need for using a noisy wall-hung bowl.

Where quiet is essential as in Hospitals, Apartment Houses, Hotels, Residences, etc., the Auburn is the solution.

The Eljer catalog gives details. Start the New Year with a note to Eljer asking for a nice new copy for your personal use. The Eljer Company, Ford City, Pa. Plants at Ford City, Pa., and Cameron, W. Va.
EFFECTIVE JANUARY 1, 1928, the business formerly known as the Young Pump Company becomes an integral part of the C. A. Dunham Company, and the Young Centrifugal Vacuum Pump is henceforth a consolidated unit with the Dunham Vacuum Pump, the latter being a laboratory development of many years' effort.

The Dunham Vacuum Pump (exhibited at the recent Power Show in New York), under which name the combined unit will be known, contains the principle and general form of the Young Pump together with all its many advantages well known to users. Added to this, from the Dunham Research, is the large displacement capacity, a marked increase in water capacity and the ability to draw an unusually high vacuum simultaneously with the discharge to the boiler, in keeping with the needs of improved heating practice.

Nineteen Hundred and Twenty-eight marks the twenty-fifth anniversary of the C. A. Dunham Company. At one end of this quarter century span will be found the invention which revolutionized heating in 1903—the Dunham Thermostatic Radiator Trap. At the other end, the equally revolutionary Dunham Differential Vacuum Heating System which, through the use of Sub-Atmospheric Steam, solves the Nation's problem of Overheating.

Through these changes, and by reason of this important consolidation, it now becomes possible to still further extend the scope of service rendered to the Nation's heating, by that most remarkable achievement of the decade—means for successfully circulating steam at sub-atmospheric temperatures and at widely varying pressures.

We feel that this, our twenty-fifth anniversary year, will mark the beginning of even a greater period of fulfillment than has the quarter century now brought to a close, and to this end we pledge all the efforts and resources of a well trained organization whose lives and interests are a part of this enterprise.
LACQUER

ITS ADVANTAGES AND LIMITATIONS

The growing interest in the use of lacquer in buildings is prompted by its decorative and economic possibilities.

Architects considering the use of lacquer are cautioned to inform themselves of its limitations. For certain purposes and under certain conditions lacquer is to be greatly desired, but there are also cases where the use of lacquer is to be strictly avoided. No blanket rule can be given. Each application must be considered on its individual merits.

For this reason we invite inquiry on your part as to the nature of lacquers and the proper methods covering their application.

As evidence that we may be able to be of considerable assistance to you, we submit the following qualifications: We are the oldest and original manufacturer of pyroxylin (nitro-cellulose), lacquers in the world (Est. 1884). We sell to thousands of manufacturers in many industries throughout the world. We know something about architectural finishing with lacquers, having developed several products which are now widely used in this field.

When you write, be sure to state exactly the type of finish you desire and the nature of the surface you intend to finish—also if you want us to finish a sample of the material for you, kindly send three samples. If you want one of our representatives to call, a request from you will have prompt attention. We will be pleased to meet you and you will not be subject to any high pressure salesmanship.

THE ZAPON COMPANY
STAMFORD, CONN.

CHICAGO OAKLAND LOS ANGELES
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