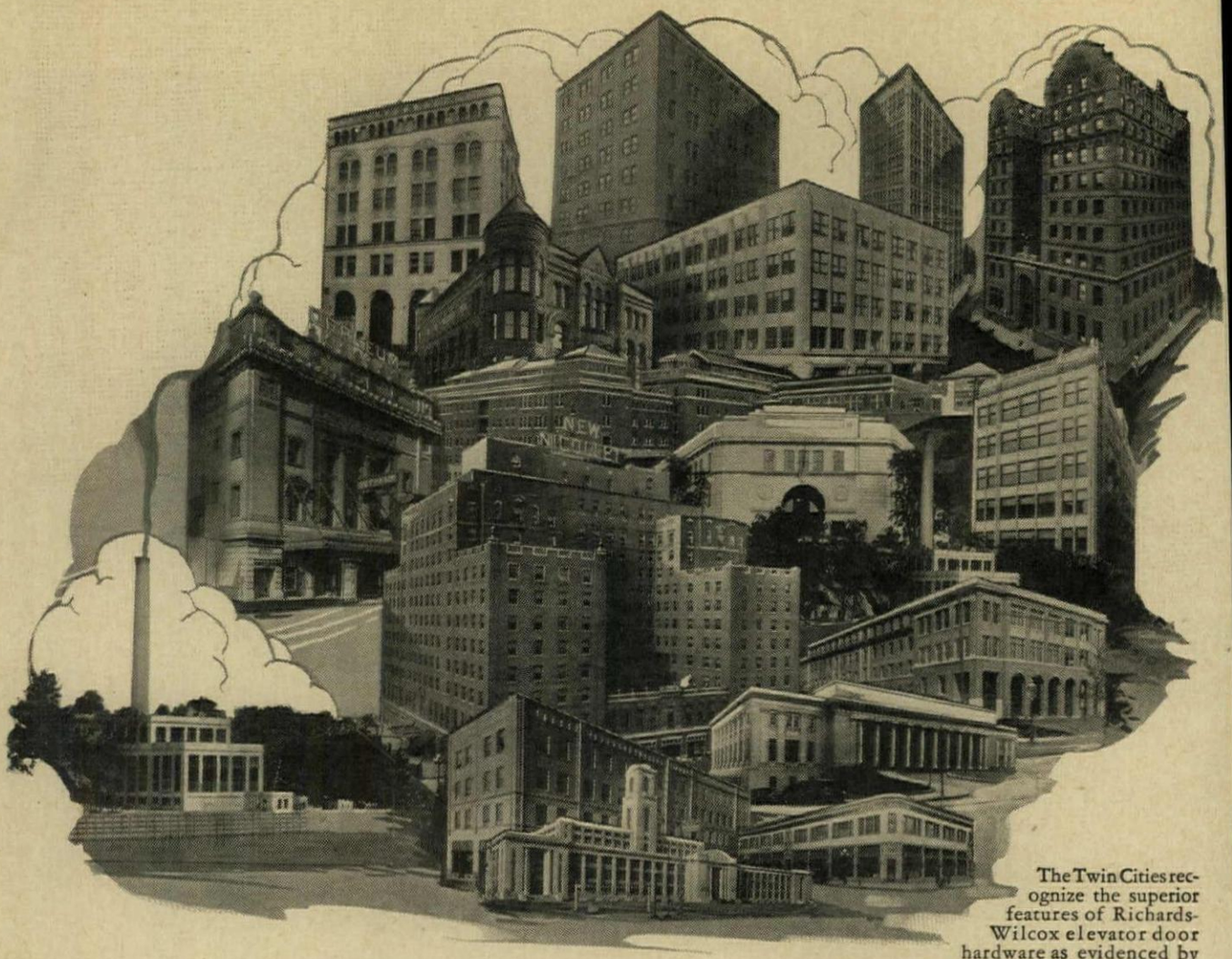
THE ARCHITECTURAL FORUM

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
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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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Richards-Wilcox Mfg. Co.

"A Hanger for any Door that Slides."

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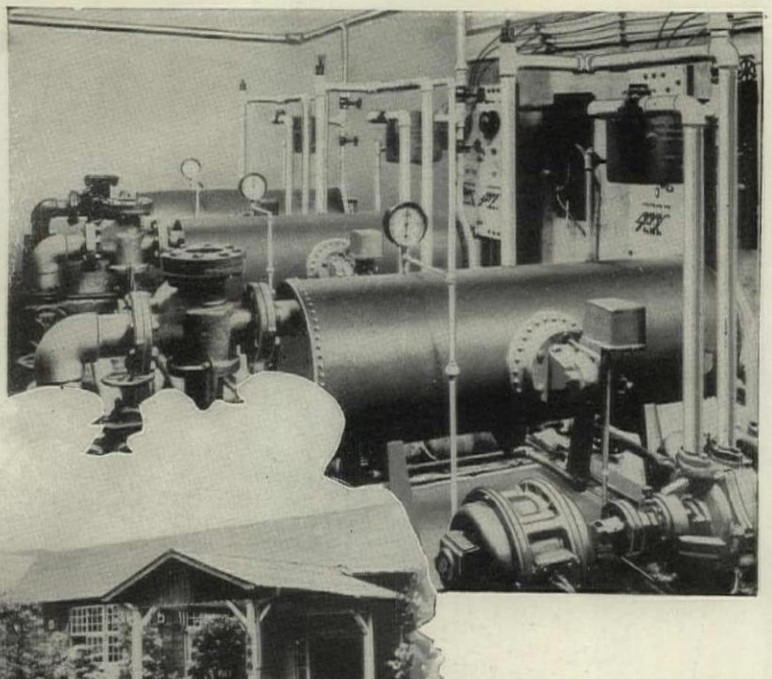
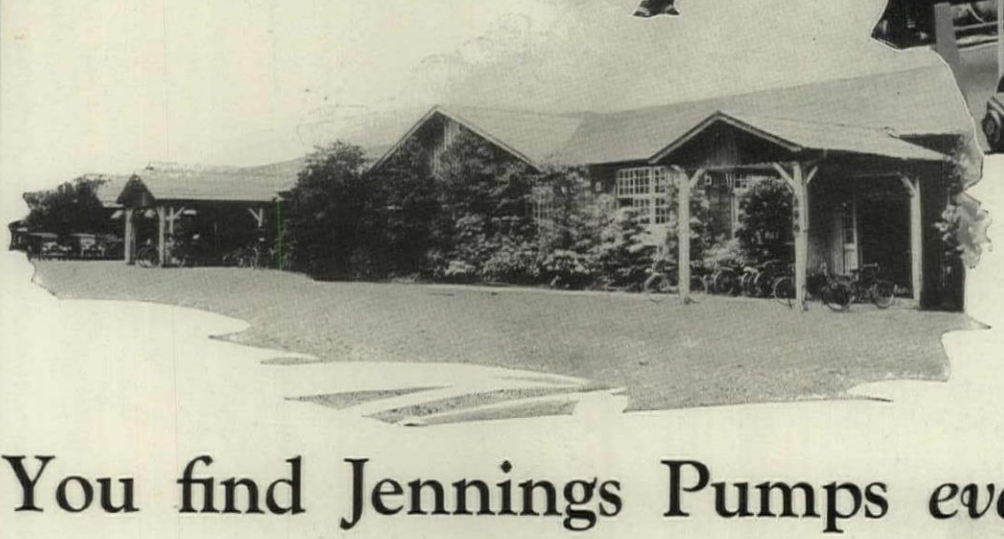
Largest and most complete line of door hardware made



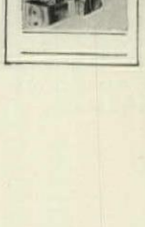
Three motor-driven Jennings Vacuum Heating Pumps, with automatic control. Installed in the building (shown below) of the Department of Finance, Tokio, Japan.



You find Jennings Pumps *everywhere!*

BULLETIN 67, SEWAGE EJECTOR, *for automatically raising sewage and drainage from basements below street sewer levels.*

BULLETIN 25, VACUUM PUMPS *for small return line jobs, of less than 5,000 sq. ft. equivalent direct radiation.*



BULLETIN 63, CONDENSATION PUMPS, *for gravity installations, particularly where radiators are set below the boiler waterline level.*

Here they are in Japan, installed in the government building of the Department of Finance, Tokio.

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 maintainance.

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

NASH ENGINEERING COMPANY

12 Wilson Road **So. Norwalk, Conn.**

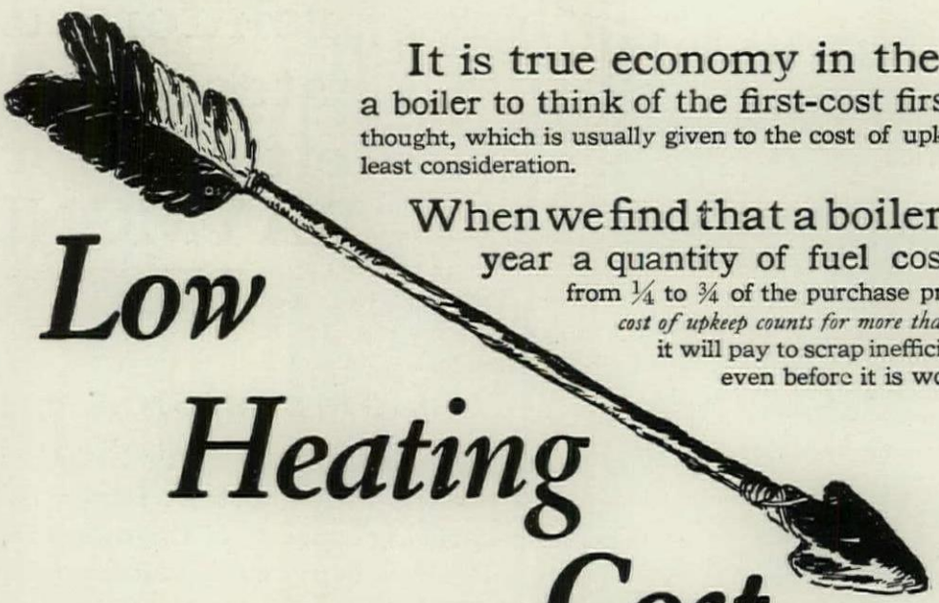
UNITED STATES: Atlanta, Birmingham, Boston, Buffalo, Chattanooga, Chicago, Cleveland, Dallas, Denver, Detroit, Indianapolis, Kansas City, Los Angeles, Louisville, Memphis, Miami, Minneapolis, New Orleans, New York, Omaha, Philadelphia, Pittsburgh, Portland, Richmond, St. Louis, Salt Lake City, San Francisco, Seattle, Washington, D. C. CANADA: Montreal, Toronto and Vancouver. EUROPE: London, England, Norman Engineering Co. Brussels, Belgium, and Amsterdam, Holland, Louis Reijners & Co., Oslo, Norway, and Stockholm, Sweden, Lorentze & Wettre.

Jennings Pumps

KEWANEE

STEEL Riveted

BOILERS



Low Heating Cost

It is true economy in the purchase of a boiler to think of the first-cost first. But the last thought, which is usually given to the cost of upkeep, must not be the least consideration.

When we find that a boiler burns every year a quantity of fuel costing anywhere from ¼ to ¾ of the purchase price, then we know the *cost of upkeep counts for more than the first cost.* Actually it will pay to scrap inefficient heating equipment even before it is worn out.

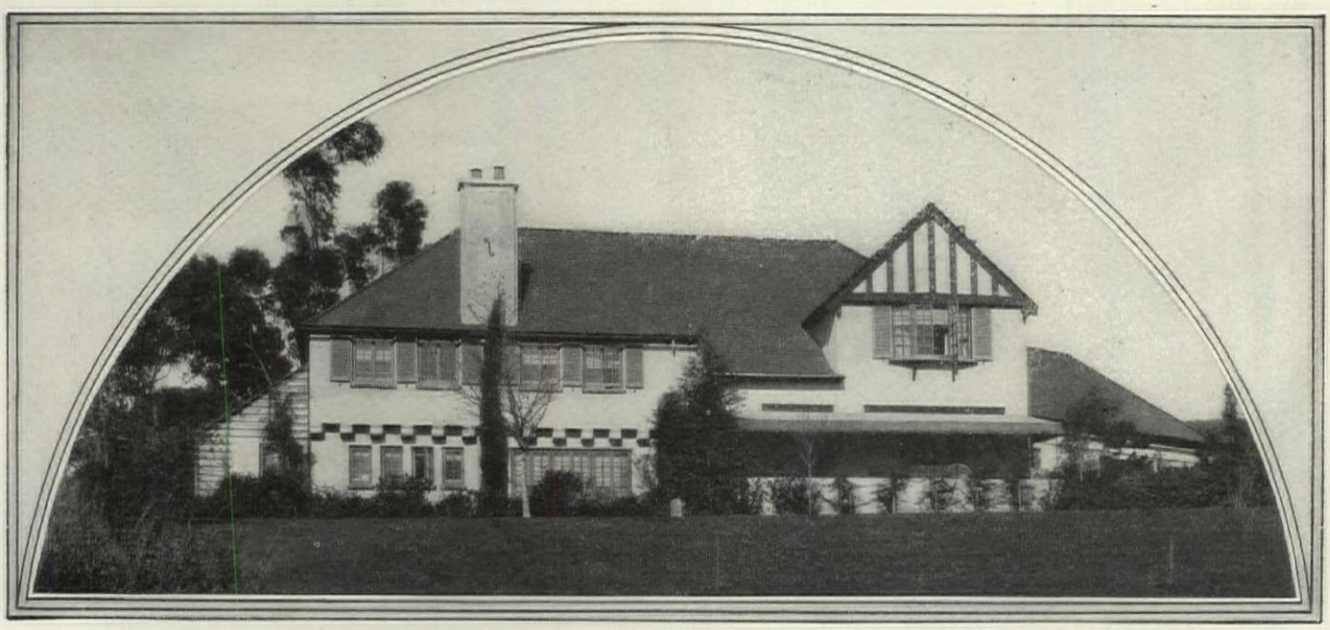
But the best time of all to scrap a cheap, uneconomical boiler is before the idea of buying it has materialized into action.

In order to figure on the least cost of heating a building, it is necessary that the first cost of the boiler be sufficient to include sound riveted construction, with the best quality of steel. And then, if the name KEWANEE is on the boiler you may be sure of all those features of design which will guarantee economy of upkeep in operation throughout the life of the building.

KEWANEE BOILER COMPANY

Kewanee, Illinois — *Branches in Most Leading Cities*

STEEL HEATING BOILERS RADIATORS WATER HEATERS TANKS AND WATER HEATING GARBAGE BURNERS



When Corrine Griffith Said "Stucco"

—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.

YOU are invited to ask for Specifications and samples of STEELHART—the Expanded Metal Reinforcing and base for stucco.

NORTH WESTERN EXPANDED METAL CO.

1234 Old Colony Bldg., CHICAGO

HOTEL SCHROEDER — MILWAUKEE

Holabird & Roche, Architects — W. W. Oeflein, Inc., Contractors
Ernst Jahn & Sons Lathing & Plastering Corp., Plastering Contractors.

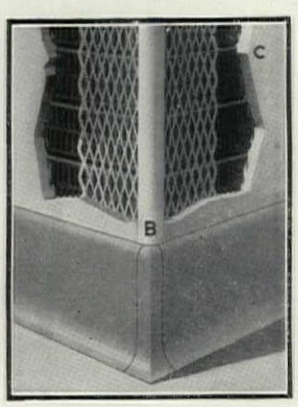
THROUGHOUT Milwaukee's fine new 25-story Hotel Schroeder—the finest hotel in the Northwest . . . cost to exceed $3,500,000.00 — Milcor Products are embodied. Milcor Stay-Rib and Netmesh Metal Lath, Milcor Steel Channels and Furring, Milcor famous "Expansion" Corner Bead No. 1, BULL NOSE "Expansion" Corner Bead No. 10, and other Milcor Sheet Metal Products were specified to insure fire-safety, permanent beauty and protection against undue depreciation.

MILWAUKEE CORRUGATING COMPANY, *Milwaukee, Wis.*
Chicago, Ill. Kansas City, Mo. La Crosse, Wis. Boston Mass.

MILCOR
METAL LATH for SAFETY

Illustration at right shows Milcor BULL NOSE "Expansion" Corner Bead No. 10 (Pat'd. June 13, 1922) . . . the latest addition to the famous "Expansion" Line of Corner Beads, Casings, Base Screeds, 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.



Other Famous Hotels
Embodying MILCOR Products

ROOSEVELT HOTEL, NEW YORK CITY
Geo. B. Post & Sons, Architects.
Williamson & Adams, "Expansion" Bead Erectors.

BAKER HOTEL, DALLAS, TEXAS
with 2" Solid Partitions plastered on Milcor Netmesh Metal Lath; Corner Beads and other Milcor Products.

THE BENJAMIN FRANKLIN, PHILADELPHIA
Horace Trumbauer, Architect.

THE MAYFLOWER, WASHINGTON, D. C.
Robert F. Bersford, Architect; Warren & Wetmore, Associate Architects.

PALMER HOUSE, CHICAGO
Holabird & Roche, Architects.

MILWAUKEE CORRUGATING CO.,
Milwaukee, Wisconsin

Please send "The Milcor Manual" and Bulletin on "Reinforcing Rib Lath" . . . without cost or obligation to:—

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Address.....

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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.

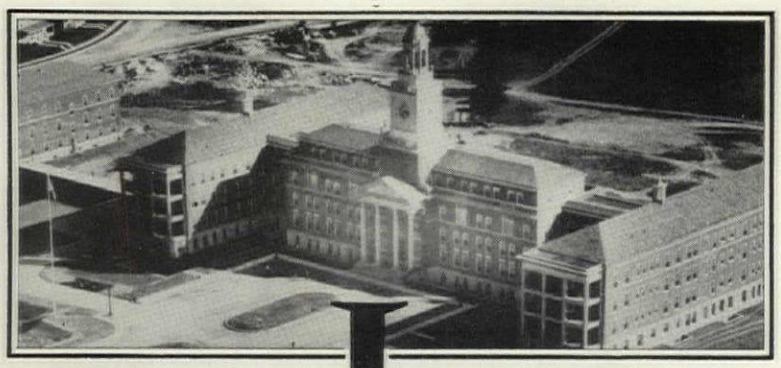
York specializes in installations contemplating either carbon dioxide or ammonia refrigerating systems.

YORK

ICE MACHINERY CORPORATION

YORK PENNA

YORK REFRIGERATION



Reading Hospital, West Reading, Pa., equipped for emergency lighting with Exide Batteries.

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.

Positive protection

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.

Simplicity—low upkeep

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.

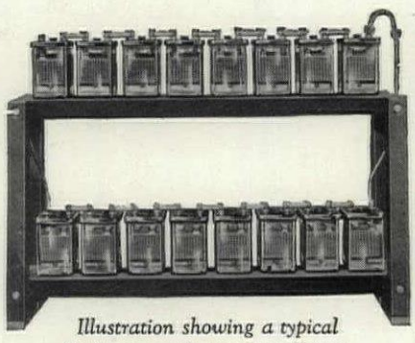
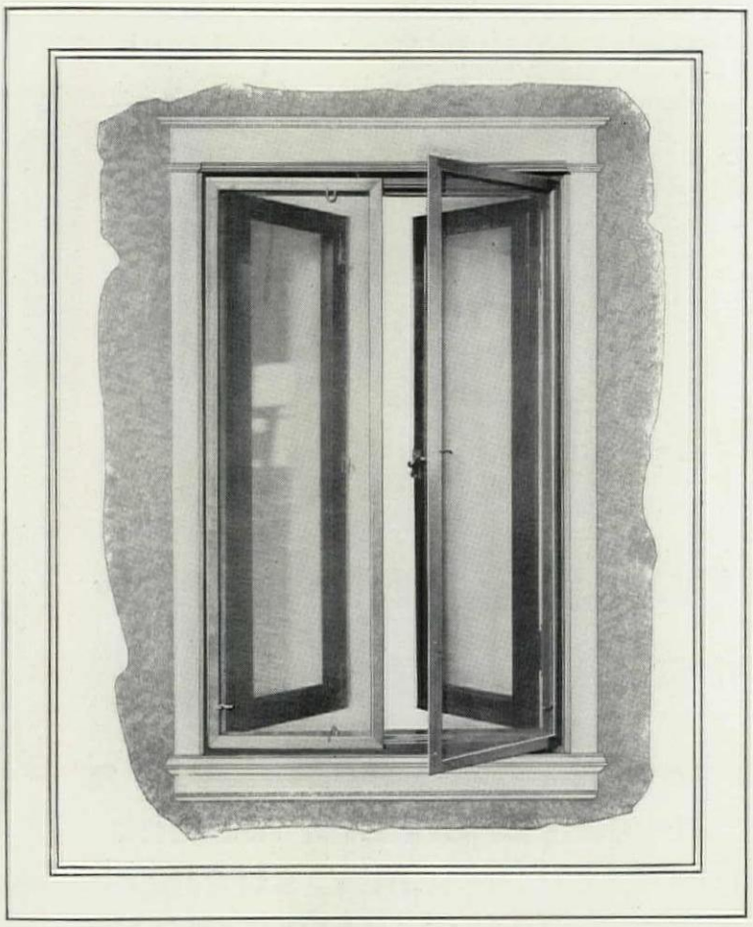


Illustration showing a typical Exide storage battery installation.

Exide
BATTERIES

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia

Exide Batteries of Canada, Limited, Toronto



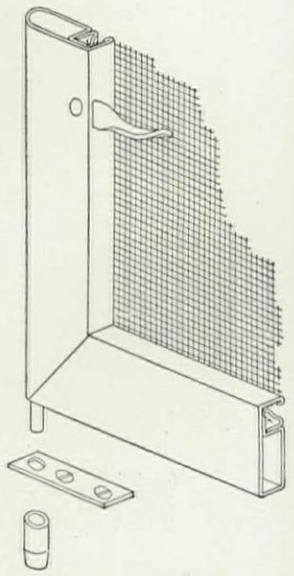
The Higgin Way makes completely satisfied clients

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, a 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.

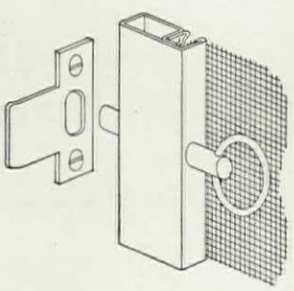
Detail for Screens!

HIGGIN
ALL METAL
Window Screens

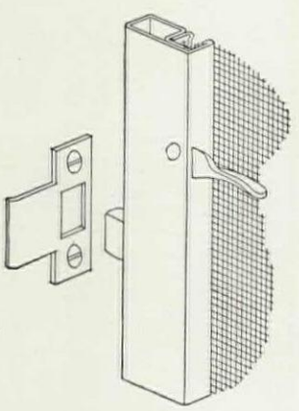
Screens that last longest cost least
Higgin Screens Last



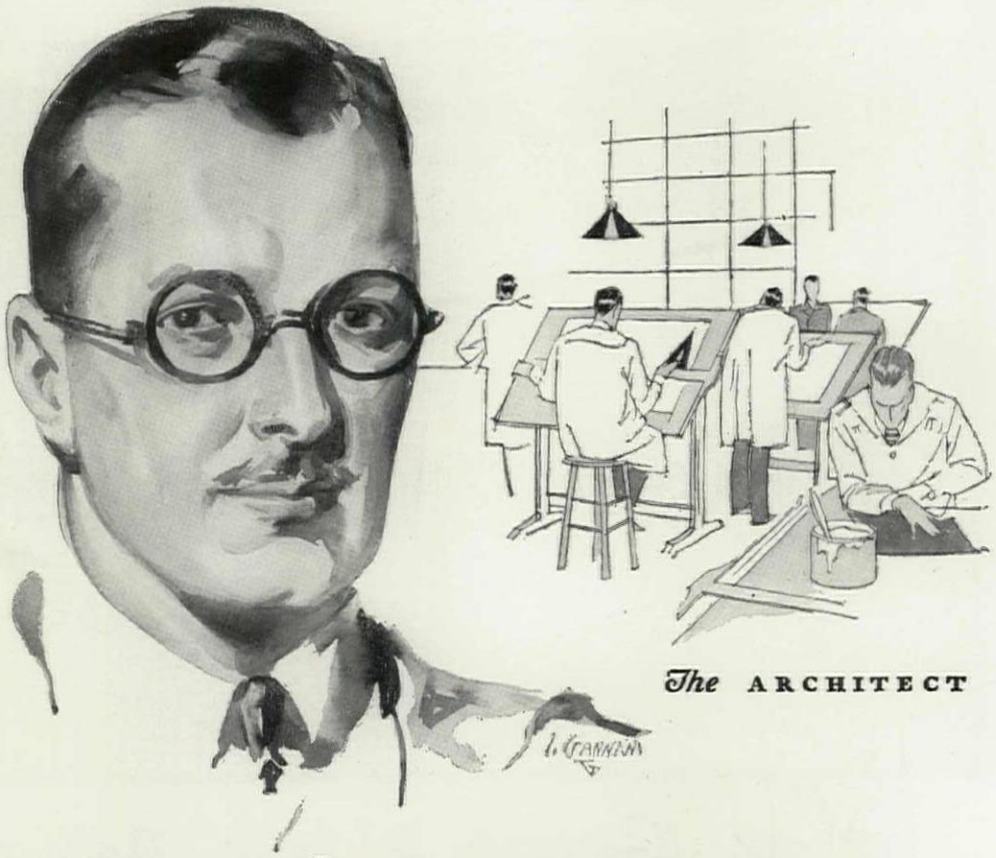
The Higgin hinge consists of a fixed pin at one corner and a small, inconspicuous trigger lever operating a spring pivot at the other. When hinges are in place, pivot is entirely concealed. No unsightly butt hinges. Screen can be removed with one easy motion.



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.



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.



The ARCHITECT

"To prevent mortar from varying in *strength* and *quality*, I specify *Kosmortar*"

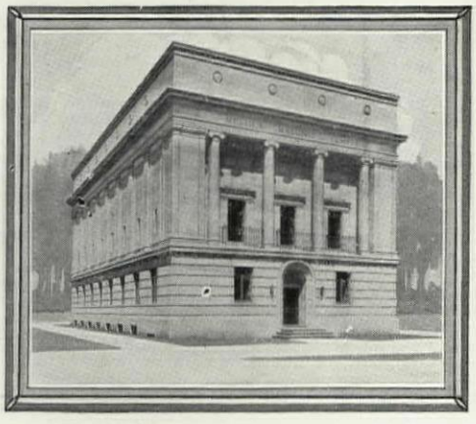
REALIZING that his major problem is getting his specifications carried out, the architect says, "Let us eliminate all chance; let us do away with the human element; let us specify a mason's cement which we *know* has the strength, beauty and working qualities we want" . . and he specifies Kosmortar.

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.

For detailed information write Kosmos Portland Cement Company, *Incorporated*, Kosmosdale, Ky., Sales Office, Louisville, Ky. *Also Makers of Kosmos Portland Cement.*

Messick Masonic Temple, Shelbyville, Ind.; Donald Graham, *Arch.*; Indianapolis, Ind.; Leslie Colvin, *Contr.*, Indianapolis, Ind.



KOSMORTAR

A MASON'S CEMENT—*EASY TO SPREAD*

Keep heat where it belongs
~ outdoors in summer, indoors in winter

900 Michigan Avenue, North

Chicago's supreme achievement in co-operative apartment buildings. All rooms are outside rooms, some of them looking down on the swift-flowing life and color of upper Michigan Avenue, others giving on the great inner court with its fountain, flagstoned walks, and masses of evergreens. Each apartment is decorated in harmony with the color scheme of its owner. As the last word in quiet comfort, Masonite, the thermostatic wood, has been used under floors to deaden sound.

J. B. French Company
Builder
30 N. Michigan Ave., Chicago

Ralph A. Bond Company, Inc.
Special Woodwork and Floor Installations
720 Michigan Ave., N., Chicago

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 unequaled 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.

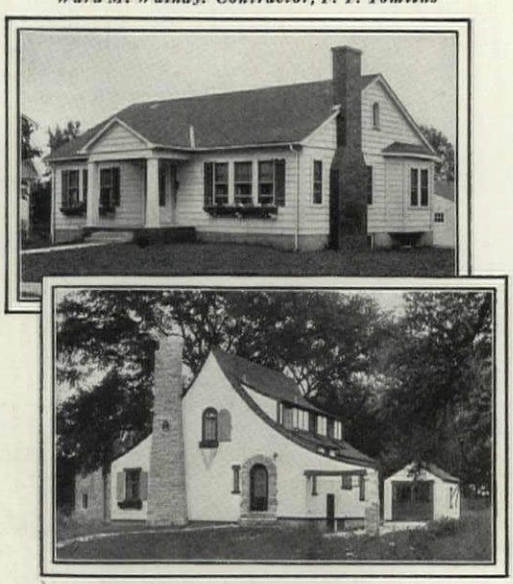
Send for reports of tests made by Robert W. Hunt, Riverbank Laboratory and Armour Institute. These prove Masonite superior for strength. acoustics and heat insulation.

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

Masonite
MANUFACTURED LUMBER FOR
STRUCTURAL INSULATION

~ and assures homes of every type and of every size permanent insulation!

Masonite used as a plaster base throughout. Owner, Ward M. Walhay. Contractor, F. T. Tomlins



Another one of the many attractive Masonite homes in Chicago and its suburbs. Owner, L. W. Exley. Built by F. T. Tomlins

BOOK DEPARTMENT

THE INCREASING USE OF OIL AS FUEL

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 remodeled 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 amospheric draft burners, and two chapters devoted to the modern mechanical draft machines. A novel

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 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.

HOUSE HEATING WITH OIL FUEL. Third Edition. By P. E. Fansler, 354 pp., 6½ x 9¾. ins. Price $4. Heating and Ventilating Magazine Co., 1123 Broadway, New York.

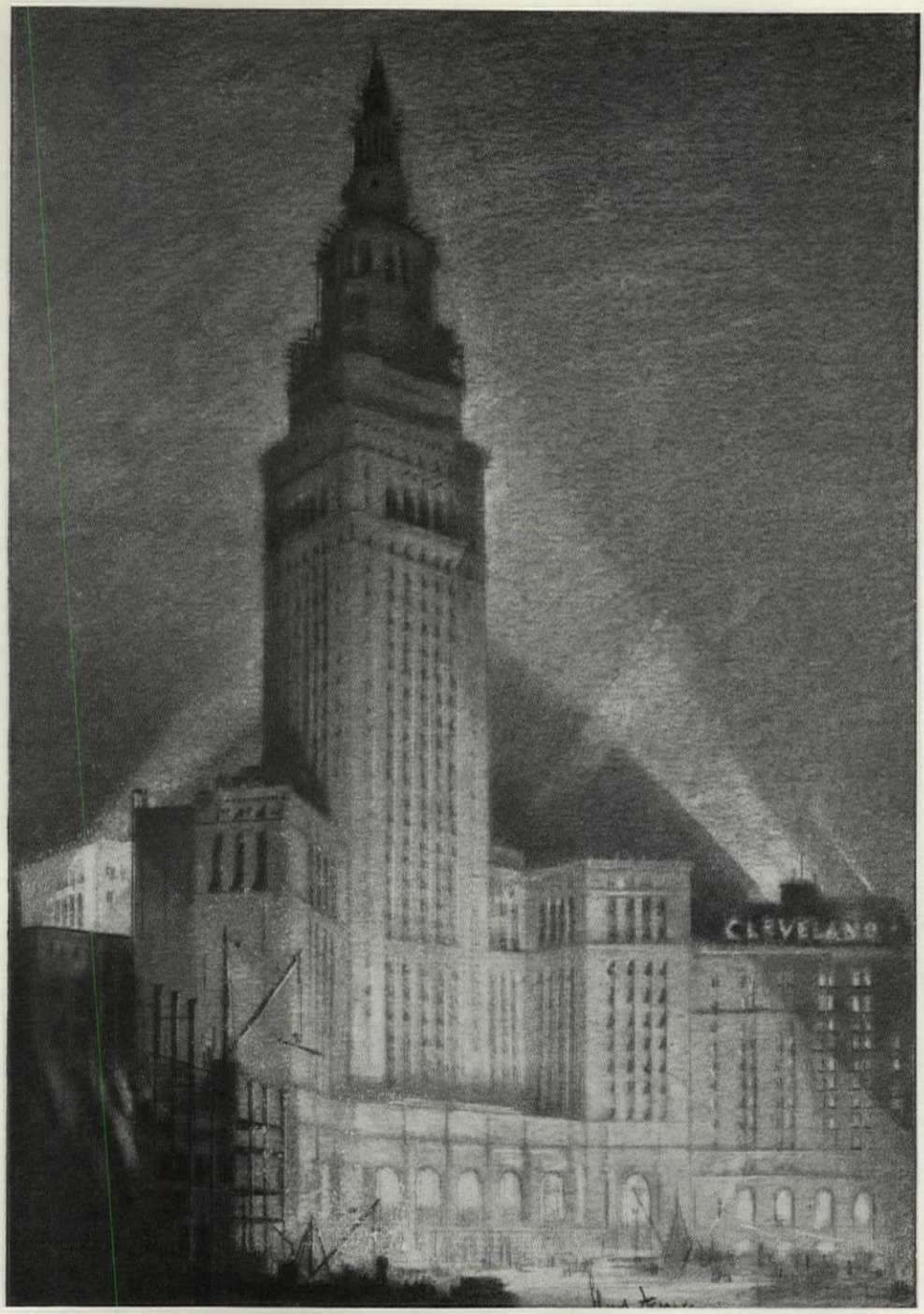
THEORY AND ELEMENTS OF ARCHITECTURE. Volume 1, Part 1. By Robert Atkinson and Hope Bagenal. 402 pp., 7¼ x 9¾ ins. Price $10. Robert M. McBride & Co., New York.

PROPER understanding of architecture means knowledge of its history and achievements as well as familiarity with actual building and all that construction includes. There are, of course, many excellent histories of architecture as well as many works which deal with architecture's theory and practice, but the subject is inexhaustible, and since each writer approaches the matter differently and discusses it from his own standpoint, there is abundant opportunity for the expression of as many points of view as there are authors. The world welcomes these many expressions, which develop understanding of a subject so complex and many-sided.

This volume is the first of a series by two well-known English writers and architects, Mr. Atkinson being also Director of Education in the Architectural Association, and Mr. Bagenal the Librarian of the Architectural Association. They discuss, very helpfully indeed, the history of design and construction and, particularly in various chapters, such subjects as: Climate and Building Materials; Building Stones; Walls and Wall Surfaces; Roofs; Doors and Windows; and Applications of Principles.

ELECTRIC ELEVATORS; THEIR DESIGN, CONSTRUCTION, OPERATION AND MAINTENANCE. By F. A. Annett. 477 pp., 6 x 9 ins. Price $5. McGraw-Hill Book Company, Inc.

THE extensive use of elevators in structures of nearly all kinds and the fact that they are being operated by means of various kinds of power, present, of course, a wide field for the study of elevators. The subject is



A reproduction of this rendering by Hugh Ferriss, suitable for framing, will be mailed free of cost to any architect

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. 285 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.

SPECIFICATIONS FOR A HOSPITAL, Erected at West Chester, Pa. 488 pp., 8½ x 11 ins. Price $6. The Pencil Points Press, Inc., 419 Fourth Avenue, New York.

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. Then too, during the past few years there have come 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 coöperation. 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.

PLASTERING PLAIN AND DECORATIVE. By William Millar. New Edition, Edited and Amplified by George P. Bankart. 345 pp., 7½ x 10 ins. Price $15. Dodd, Mead & Co., New York.

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.

ARCHITECTS' AND BUILDERS' REFERENCE BOOK. By Frank Halstead. 193 pp., 7¾ x 11 ins. $3 Net. John Wiley & Sons, Inc., 440 Fourth Avenue, New York.

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:

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***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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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.

AMERICAN THEATERS OF TODAY. By R. W. Sexton and B. F. Betts. 175 pp. 9¼ x 12½ ins. Price $12.50 Net. The Architectural Book Publishing Co., New York.

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.

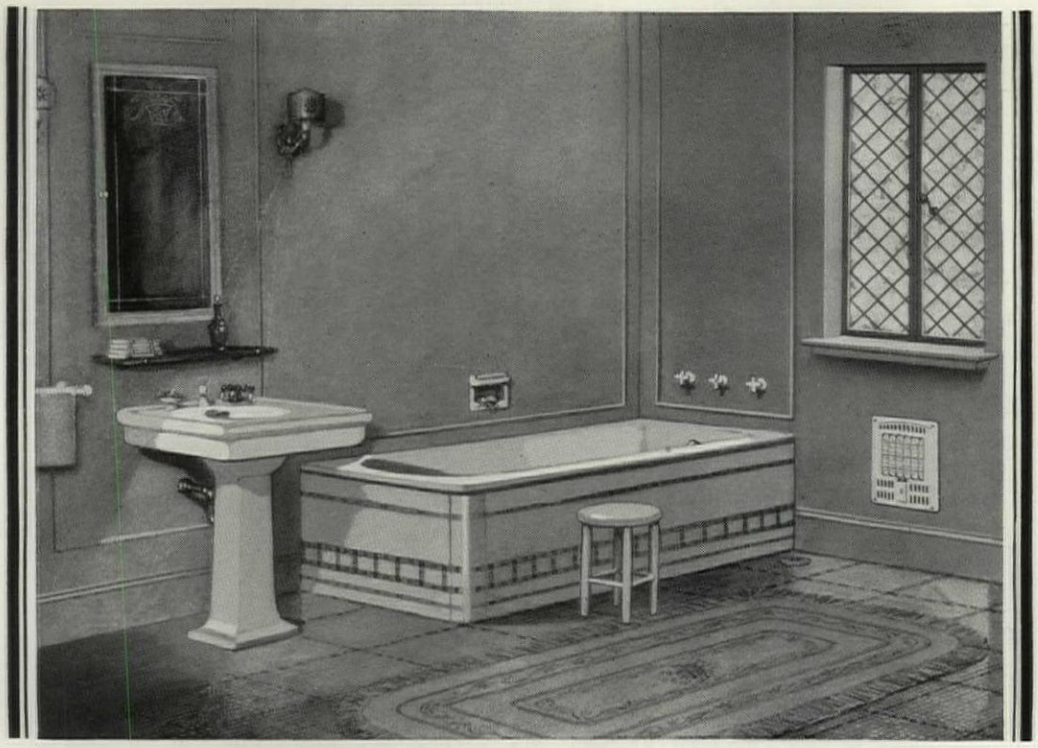
Recent achievements in planning, designing, and building theaters are recorded in this helpful and constructive volume. Theaters large and small, and theaters devoted to the exhibiting of motion pictures as well as those designed for the use of various forms of drama are included; views of exteriors 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.

ARCHITECTURAL DETAILS. By Frank Halstead. 284 pp., 7¾ x 11 ins. Price $3.50 Net. John Wiley & Sons, Inc., New York.

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.

ARCHITECTURAL DESIGN IN CONCRETE. By T. P. Bennett. Text and 100 Plates 8½ x 11 inches. Price $10. Oxford University Press, 35 West 32nd Street, New York.

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 halftones 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.



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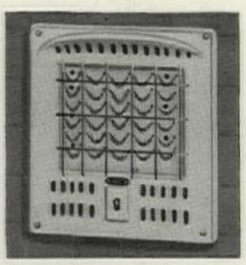

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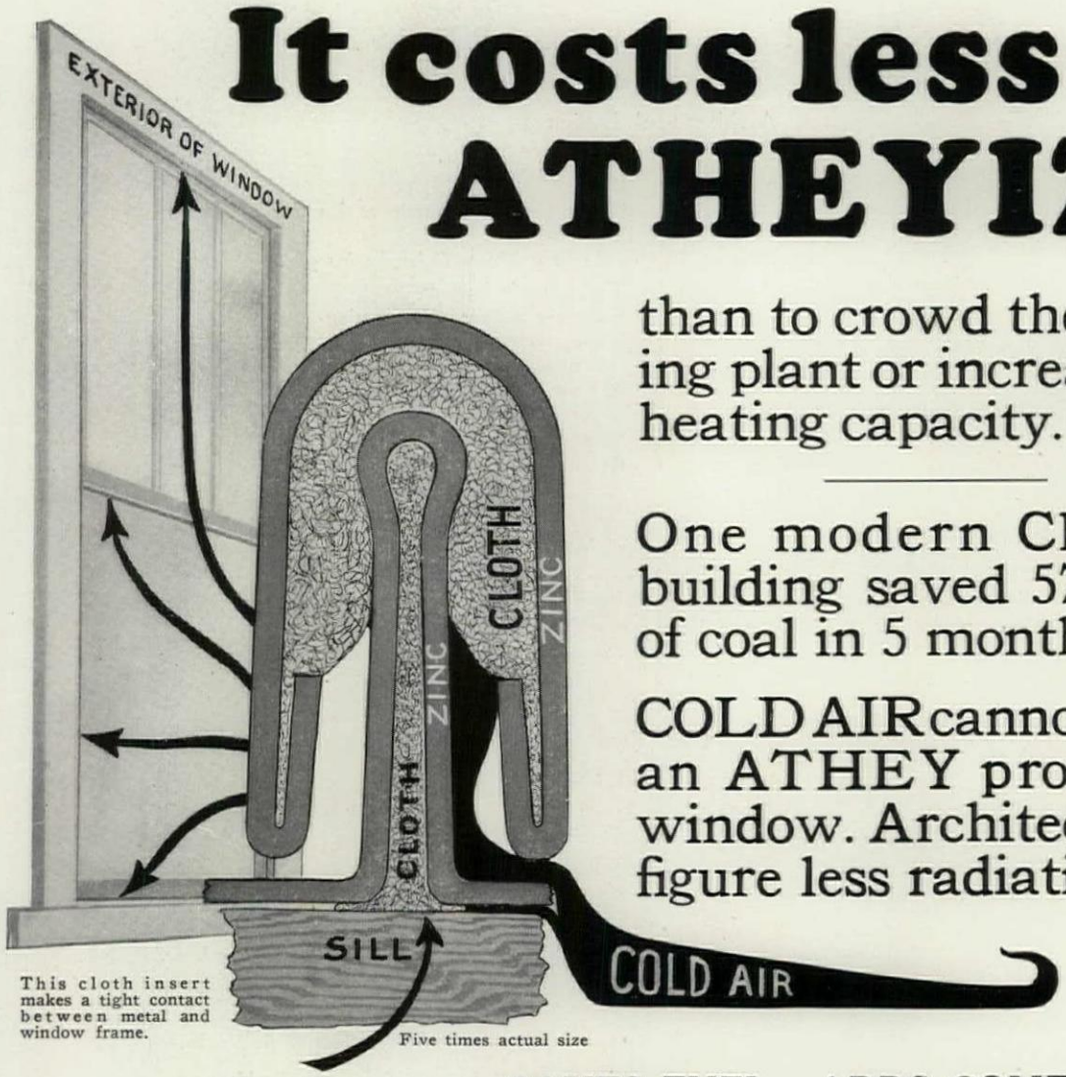

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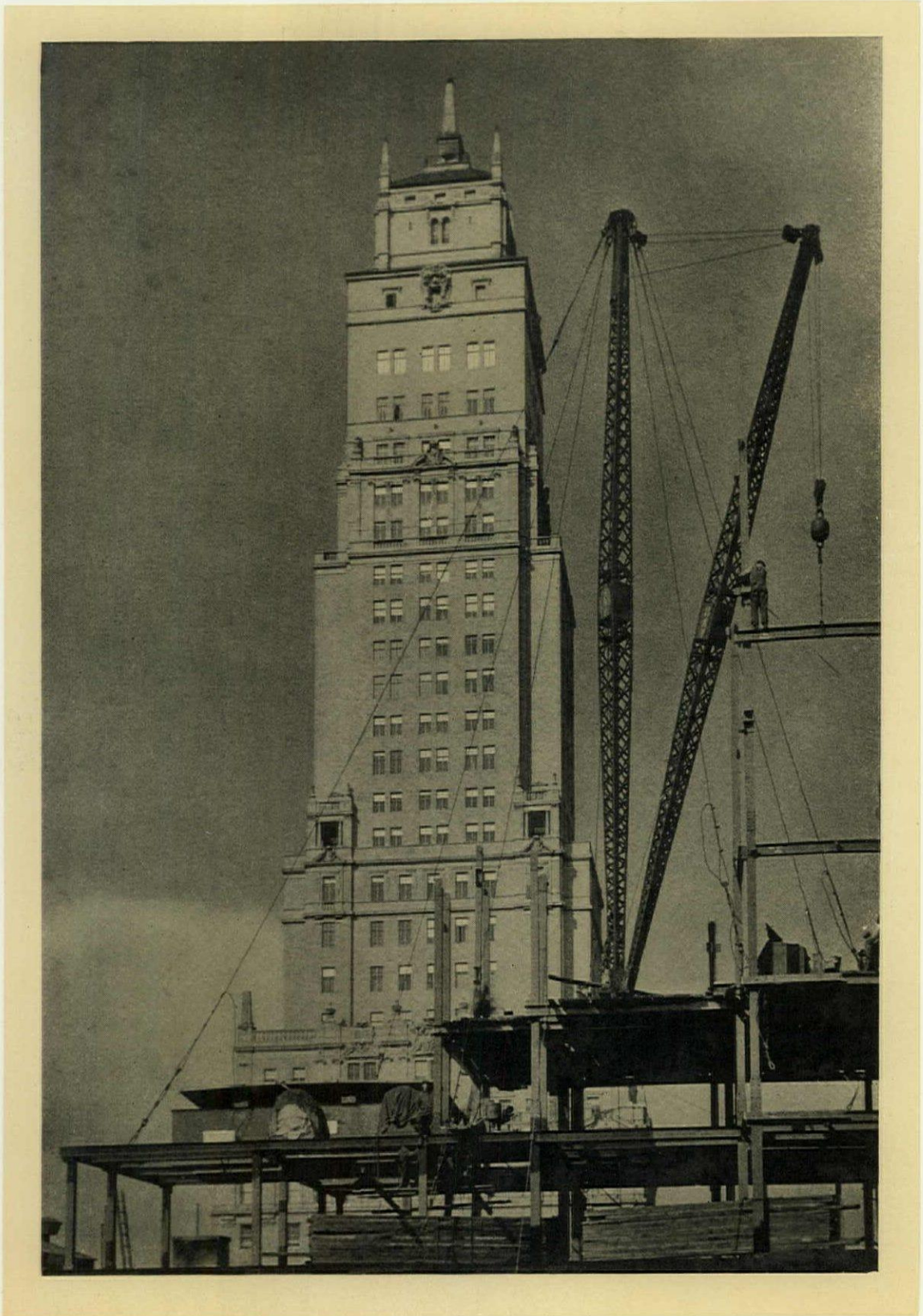

CONSTRUCTION, IN PROGRESS, AND COMPLETE

FROM A CAMERA STUDY BY P. A. NYHOLM

The Architectural Forum

THE
ARCHITECTURAL
FORUM

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JANUARY 1928

INSULATION FOR RESIDENCES

BY
GORDON B. WILKES
ASSOCIATE PROFESSOR OF INDUSTRIAL PHYSICS, MASSACHUSETTS INSTITUTE OF TECHNOLOGY

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

or cloth. These are used as fillers between the studs in frame houses and may be applied to walls of brick, tile, stone or concrete with the aid of furring strips. Material of this type is frequently furnished in rolls, 1 yard wide and from ⅜-inch to 1 inch in thickness. There is a gypsum preparation, which when mixed with water can be poured in place, and after setting it gives a cast cellular gypsum insulation. This is between 2 and 4 inches thick as commonly installed. There are also on the market a number of materials that can be used in the form of loose powder or fibers, especially as a filler between the studs of a frame dwelling, or between attic floor joists. Typical materials are sawdust, cork dust, diatomaceous earth, mineral and rock wool, and eel grass.

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

Type of Insulation	*Weight in lbs. cu. ft.*	*Thermal Conductivity*	*Fire Resistance*
Rigid			
Cork	10	0.30	Slow-burning
Mineral and rock wool boards	12-20	0.3-0.5	Non-combustible
Fiber boards	12-20	0.3-0.5	Slow-burning
Plaster boards	30-60	0.8-1.5	Non-combustible
Flexible			
Eel grass between paper	5-8	0.25-0.30	Slow-burning
Cattle hair and flax fiber between paper or cloth	8-15	0.3-0.4	Slow-burning
Cast			
Cellular gypsum	12-30	0.4-0.9	Non-combustible
Loose			
Diatomaceous earth	10-30	0.3-0.5	Non-combustible
Mineral and rock wool	12-30	0.3-0.5	Non-combustible
Eel grass	5-8	0.2-0.4	Slow-burning

The coefficient of thermal conductivity in this table is expressed in B.t.u., per hour, per sq. ft., per *inch* of *thickness*, per 1°Fahr., temperature difference between the *surfaces*.

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

TYPE OF INSULATION			ROOFS					
			Tile or slate on wood sheathing		Shingles, sheathing and studding		Shingles, sheathing stud, lath & plaster	
No insulation			0.82		0.35		0.30	
	Thickness	K.		Saving		Saving		Saving
Cork board.....	1″	0.3	0.22	73%	0.16	54%	0.15	50%
	2″	0.3	0.13	84%	0.10	72%	0.10	67%
Fiber boards.....	0.5″	0.4	0.40	51%	0.24	31%	0.22	27%
	1″	0.4	0.27	67%	0.19	46%	0.17	43%
Rock wool boards	2″	0.4	0.16	81%	0.13	63%	0.12	60%
Eel grass in paper	0.3″	0.25	0.42	49%	0.24	31%	0.22	27%
	0.5″	0.25	0.31	62%	0.20	43%	0.19	37%
	0.8″	0.25	0.23	72%	0.16	54%	0.15	50%
Cattle hair or flax	0.5″	0.35	0.39	53%	0.23	34%	0.21	30%
Plaster boards....	0.5″	1.0	0.59	28%	0.29	17%	0.26	13%
Cellular gypsum...	2″	0.7	0.41	50%	0.17	52%	0.16	47%
Mineral wool loose	2″	0.4	0.16	81%	0.13	63%	0.12	60%
Diatomaceous earth	2″	0.4	0.16	81%	0.13	63%	0.12	60%

Rate of Heat Transmission Expressed in B.t.u., per Hour, per Sq.
Coefficient of Thermal Conductivity "K" Expressed in B.t.u., per Hour, per Sq.

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 have 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.

WALLS									
Clapboard, sheathing, stud, lath & plaster		Clapboard, paper, stud, lath & plaster		8″ brick, furring, lath & plaster		4″ tile, stucco & plaster		Stucco, stud, lath & plaster	
0.28		0.31		0.27		0.40		0.45	
	Saving.		Saving.		Saving.		Saving.		Saving.
0.15	46%	0.15	52%	0.14	48%	0.17	58%	0.18	60%
0.10	64%	0.10	68%	0.10	63%	0.11	73%	0.11	76%
0.21	25%	0.22	29%	0.20	26%	0.26	35%	0.29	36%
0.16	43%	0.18	43%	0.16	41%	0.20	50%	0.21	53%
0.12	57%	0.12	61%	0.12	56%	0.13	68%	0.14	69%
0.21	25%	0.23	26%	0.20	26%	0.27	33%	0.29	36%
0.18	36%	0.19	39%	0.18	33%	0.22	45%	0.24	47%
0.15	46%	0.16	49%	0.15	45%	0.18	55%	0.19	58%
0.20	29%	0.22	29%	0.20	26%	0.26	35%	0.28	38%
0.25	11%	0,27	13%	0.24	11%	0.33	18%	0.37	18%
0.15	47%	0.16	49%	0.15	45%	0.19	53%	0.20	56%
0.12	57%	0.12	61%	0.12	56%	0.13	68%	0.14	69%
0.12	57%	0.12	61%	0.12	56%	0.13	68%	0.14	69%

Ft., per 1°Fahr. Temperature Difference Between the Air on Each Side
Ft., 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:

	Thickness	Thermal Conductivity
Sample A	0.5 inch	0.30
Sample B	0.5 "	0.60
Sample C	2.0 "	0.30

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

H^1=rate of heat transfer through the insulated wall.

L=equals thickness of the insulating material.

K=thermal conductivity of the insulation.

Then the rate of heat transfer through the insulated wall, expressed in B.t.u. per hour, per square foot, per 1° Fahr. temperature difference between the air on each side would be equal to

$$H^1 = \frac{1}{\frac{1}{H} + \frac{L}{K}}$$

Thus with sample A

$$H^1 = \frac{1}{\frac{1}{0.27} + \frac{0.5}{0.30}} = \frac{1}{3.7 + 1.7} = 0.19$$

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 material 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 handlings, 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 laquers 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 pyroxolin 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, guns, 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 is easily seen by comparing the main ingredients of each:

Lacquer	*Varnish*
Nitro-cellulose (pyroxylin)	Linseed Oil
Gum	Gum
Solvents	Turpentine
Pigment	Pigment

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 thirsty 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.

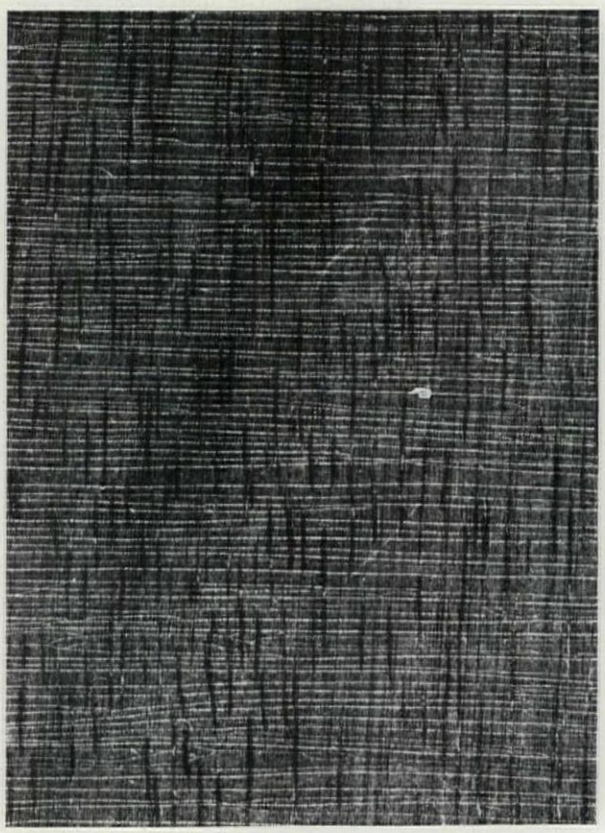
3. *Use of Lacquer on Metals.* Most architectural metalwork is primed at the factory before being set in place for the finishing in the building. The nature of the priming coat should be known before the correct lacquer can be specified for the finish. In any event, the surface must be clean. If lacquer 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.



Cross Checks or Temperature Cracks
This is the most common failure, due to exposure to cold temperature
The cracks are at right angles to the grain of the wood

Old Age or "Crow-foot" Cracks
This is a usual form of crack, due to the film losing its elasticity through age and the strain of wood shrinkage and expansion

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.

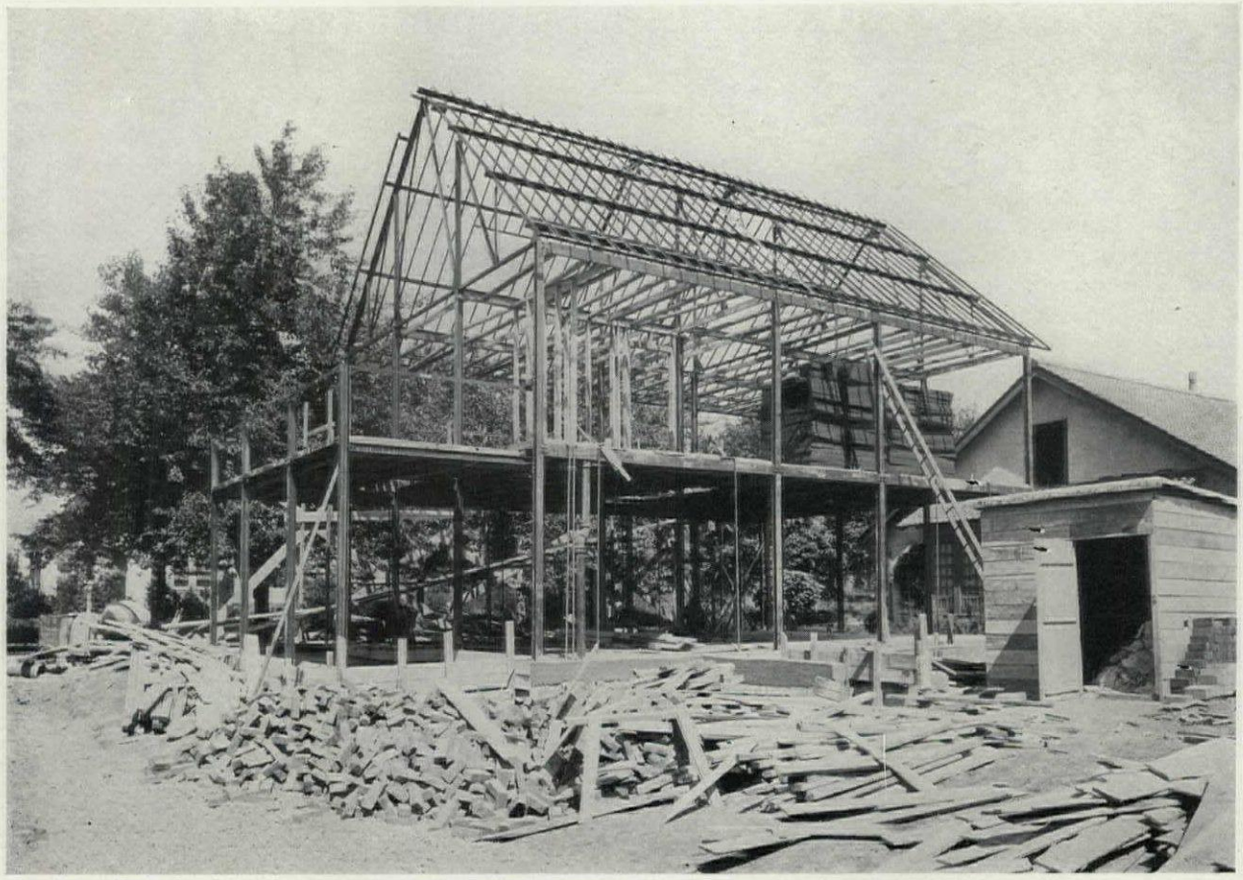
The greatest advantages of the dwelling house steel frame include the elimination of shrinking, warping, decaying, and sudden failure under excess loads. It is incombustible and adds nothing to the fire hazard. It must, however, be protected from temperatures exceeding 600° Fahr. and from moisture. Such 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 coördination 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 sheer, 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

tural 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° Fahr. it loses its strength. In order to protect structural steel from the destructive effects of high temperatures, various protective encasements known as fireproofing have been invented. The use of these fireproofing coverings is regulated by building codes. No structural material, except certain burnt clay 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 be 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 Frame, House of Frank G. Clark, Baton Rouge, La.

flanges 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 ⅛- to ½-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

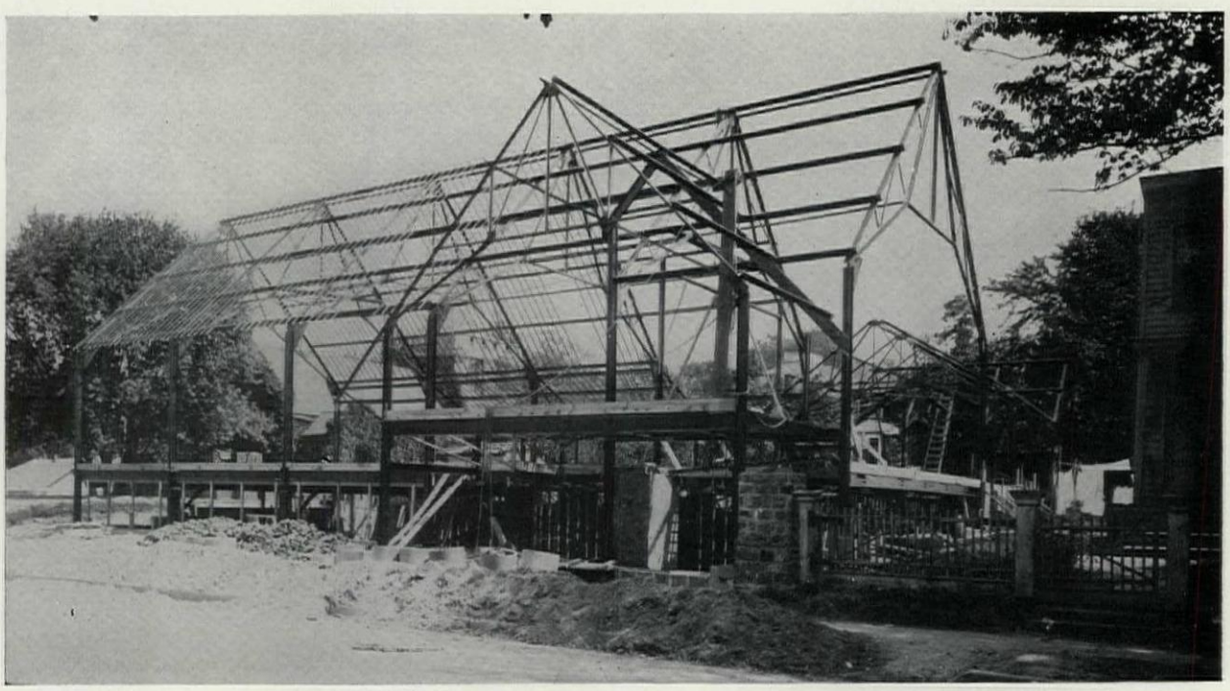
bolts. Care must be exercised in computing the probable loads to be supported by the steelwork, and if there is any probability that they may be exceeded, additional bolts must be provided. These are considerations in bolted steel construction.

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. In all cases the design and maintenance must be such that steel can be kept clean and dry and not corrode.

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 2⅓ 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.



Steel Work, St. Stephen's Church, Port Washington, N. Y.
John England, Jr., Architect

PRINCIPLES OF ECONOMICAL PLUMBING LAYOUTS

BY

MILFORD B. SQUIRE

OF THE OFFICE OF McKIM, MEAD & WHITE

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 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 making necessary 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 ordinance 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 genuine wrought iron, 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

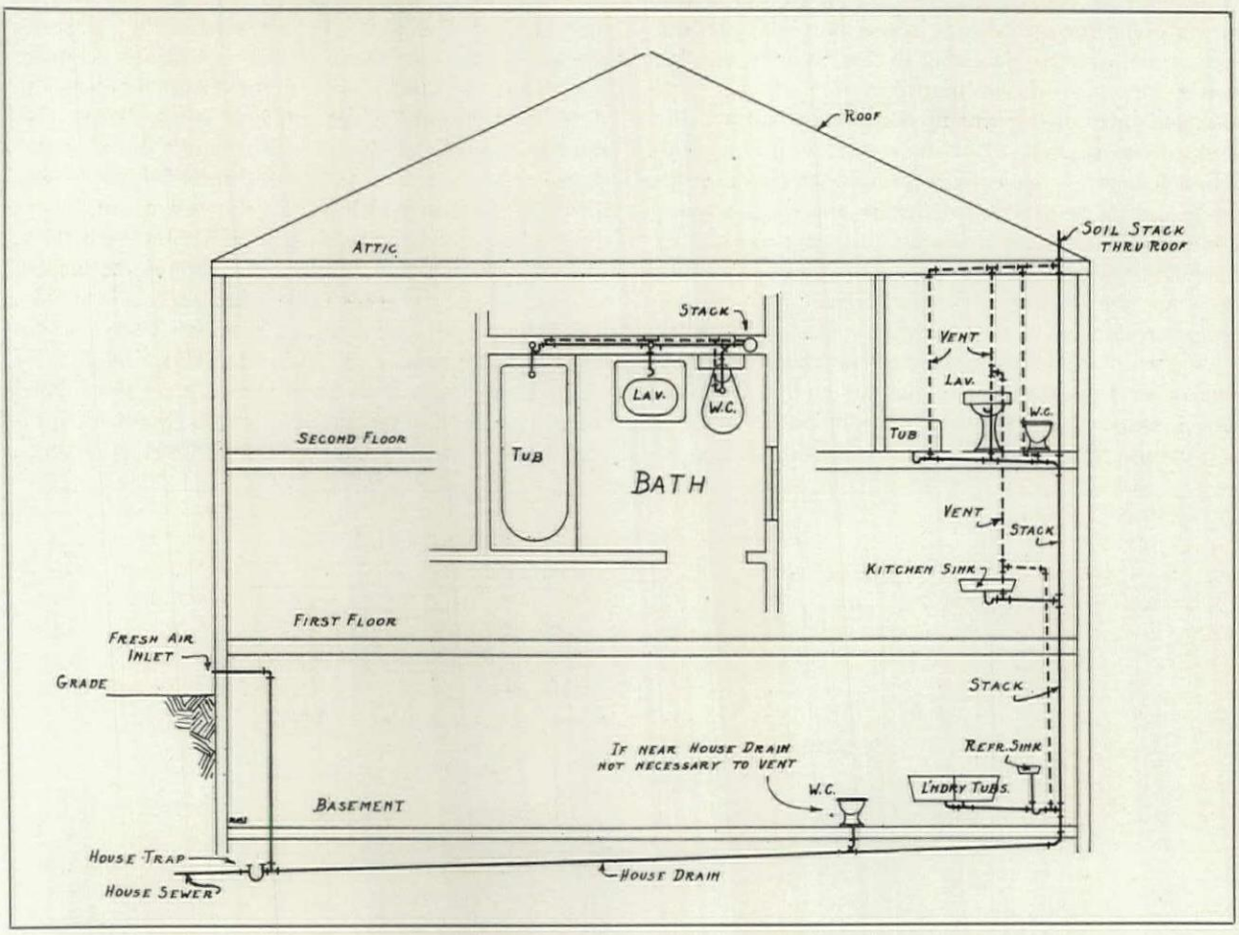
small sizes of the pipes. It should not be installed in an outside wall unless absolutely necessary, and then only when thoroughly frost-proofed. In many cases it is possible to change the location of fixtures to avoid this or to make the connection to the fixtures up through the floor. Water piping 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



Plumbing Diagram for Suburban House

Note: Sizes of all pipes should be indicated on diagram for contractors

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.

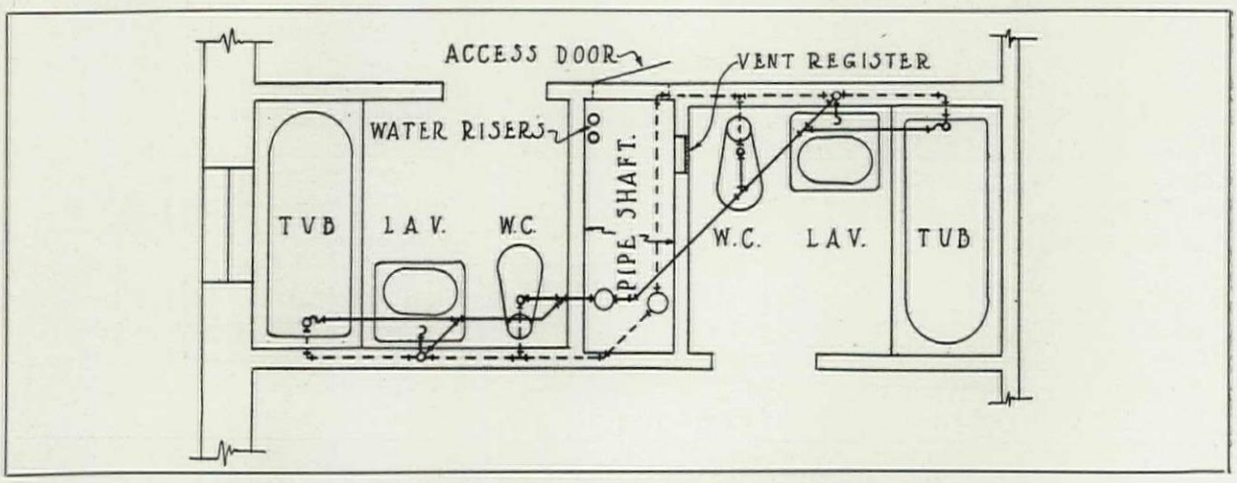
Fixtures are usually selected by the owner, and like other things the price has an enormous range. There are certain features on which the architect can advise the owner in his selection. There are several points that must be kept in mind in choosing the types of traps for various purposes. The ordinary "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.



An Economical Arrangement of Hotel Baths

BUSINESS AND FINANCE

ARCHITECTURAL SERVICE FROM THE BUSINESS POINT OF VIEW

BY

C. STANLEY TAYLOR

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 coördinated 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 requirements carried out in detailed space units. Paralleling this functional plan there will be the preliminary financing and operating schedule necessary to create the investment and insure its soundness. Only when both of these controlling schedules have been established and declared sound by those who will manage the structure or operate the business within it, will the architect begin the correlating of the space units within the perimeter of the building.

It is true that this broadening of architectural service is a radical departure from practice in some offices; but in line with all modern professional service, the requirements of clients are changing. Building investments are being analyzed and administered today in a manner very different from that of but a few years ago. The high cost of modern building construction and the complexity of structures are both acting to enforce this condition. It has become recognized that the original plan and the established maintenance costs of buildings like hotels can absolutely insure success or destroy investment values by so loading the projects with unnecessary overhead costs or restricted incomes that they cannot possibly operate profitably. 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.

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 sacrifice of quality in order to meet the investment limitation. On the other hand, it is common experience, when a building is unsuccessful, to hear the owner charge the architect with its failure.

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 wasteful 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 coöperation mandatory. *B* indicates coöperation advisable.

Type of Building Project	[1] BANKER	[2] BUILDING MANAGER	[3] SPECIAL CONSULTANTS	[4] INSURANCE ENGINEER	[5] REALTOR
OFFICE BUILDINGS	*A.* For senior financing; checking layout and specifications	*A.* Checking plans for income and operating economies	*B.* For maximum rentable space, elevators, service areas	*A.* To obtain lowest fire and liability rates	*A.* For space demand and most salable features
APARTMENTS	*A.* For senior financing; checking layout and revenue	*B.* Checking plans for service and maintenance features		*A.* To obtain lowest fire and liability rates	*A.* For space demand, size and number of rooms, renting features
HOTELS	*A.* For senior financing; checking costs and revenue	*A.* Checking plans and equipment with hotel manager	*A.* Service features, room sizes and layout	*A.* To obtain lowest fire and liability rates	*A.* For subrental demand and income
DWELLINGS	*B.* For mortgage or building loans			*B.* For rates on large dwellings	*B.* For sale value, local demand
INDUSTRIAL	*B.* Occasionally for first mortgage or temporary loans		*A.* For process layouts, material handling, etc.	*A.* To obtain lowest fire and liability rates	*B.* Occasionally for housing facilities, etc.
HOSPITALS		*A.* Checking plans, etc., with managing directors	*A.* For correct layout and equipment	*B.* To obtain favorable insurance rates	
INSTITUTIONS		*A.* Checking plans, etc., with managing directors	*A.* For correct layout, special equipment	*B.* To obtain favorable insurance rates	
SCHOOLS		*A.* Checking plans, etc., with managing directors	*B.* For special features, mechanical equipment	*B.* To obtain favorable insurance rates	
BANKS		*B.* For service and maintenance features.	*A.* For vault design, banking equipment; protective systems	*A.* To obtain lowest fire, hold-up, robbery, and liability rates	*B.* For rental features when rental space is included
PUBLIC BUILDINGS		*B.* For service and maintenance features.	*B.* For special features; mechanical equipment	*A.* To obtain favorable insurance rates	
CLUB AND FRATERNAL	*B.* Occasionally for mortgages and temporary loans	*A.* For service and maintenance features.	*B.* For mechanical equipment, swimming pools, etc.	*A.* To obtain favorable insurance rates	
RELIGIOUS				*B.* To obtain favorable insurance rates	
STORES AND SHOWROOMS	*A.* Senior financing; checking revenue	*A.* For service and maintenance features.	*B.* For show cases, escalators, elevators, etc.; mechanical equipment	*A.* To obtain lowest fire and liability rates	*B.* For rental values, traffic courts, space demand

[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

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 buildings; of 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.

PRESENT STATUS OF COÖPERATIVE APARTMENT PROMOTION AND FINANCE

BY

LOUIS G. KIBBE

ASSISTANT MANAGER, COÖPERATIVE SALES DIVISION, DOUGLAS L. ELLIMAN & CO., INC.

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 coöperative 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 coöperative 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 $3,950,000 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 coöperative 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 coöperative 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 coöperative 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 coöperative 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 coöperative 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 coöperative 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 coöperative 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

	1922	1923	1924	1925	1926	1927	1928
Number of Projects	3	4	14	17	15	14	17
Number of Apartments	95	216	420	496	385	431	532
Average Number Apartments per Project	33	54	30	29	26	31	31
Number of Rooms	639	1,360	3,412	3,406	2,614	2,783	3,773
Average Number Rooms per Project	213	340	244	200	174	198	222
Total Sales Price	$3,950,000	$7,824,500	$17,072,300	$24,314,500	$20,706,300	$25,129,800	$34,068,500
Average Sales Price per Apartment	$41,579	$36,225	$40,650	$49,000	$53,780	$58,300	$64,038
Average Sales Price per Room	$6,180	$5,750	$5,000	$7,135	$7,920	$9,030	$9,017
Total Mortgages	$2,611,000	$4,010,500	$8,227,600	$11,500,000	$10,591,300	$10,879,800	$15,655,000
Average Mortgages per Apartment	$27,485	$18,566	$19,590	$23,185	$30,300	$25,638	$29,464
Average Mortgages per Room	$4,085	$2,945	$2,411	$3,376	$4,462	$3,970	$4,143
Total Equity	$1,339,000	$3,814,000	$8,844,700	$12,814,500	$9,040,000	$11,050,000	$18,413,500
Average Equity per Apartment	$14,094	$17,659	$21,060	$25,815	$23,480	$32,662	$34,574
Average Equity per Room	$2,095	$2,805	$2,589	$3,759	$3,458	$5,059	$4,874

a few years ago to show an investment return to the coöperative 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 coöperative 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 coöperative building of nine stories. This has had the effect of automatically removing most of the plottage on these side streets from the coöperative 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 coöperative 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 coöperative 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 half of the general average in 100 per cent coöperative buildings. The other project alluded to was conceived in the interest of economy, the idea of the promoters being to supply well designed apartments in an accessible location at prices below the market average and with a proprietary rental that would reflect satisfactory economy and saving over commercial rental values. This building is being constructed by Fred T. Ley & Co., Inc., at 333 East 68th Street, opposite St. Catherine's Park, and will be of 15 and 9 stories, having units of four, six and seven rooms at an average equity value of under $2,800 per room

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:

Coöperative Apartment, 960 Fifth Avenue, New York
Warren & Wetmore, Rosario Candela, Associated, Architects
Cross & Cross, Supervising Architects

"B" Apartment,—Second Floor

Term sales price	$11,000
Initial payment on signing purchase agreement (30%)	3,300
	7,700
Balance (70%) represented by a note bearing interest at 6% from April 1, 1928, payable in 60 equal monthly installments, beginning October 1, 1928. (The interest from April 1, 1928 to October 1, 1928, amounting to $231. is payable with the first payment on principal of note)	$7,700

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
	$245.82

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 coöperative apartments of today. Of great interest to the buying public should be another innovation recently introduced by the promoters of coöperative 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. Notwithstanding that over $100,000,000 of the public's money has been handled by the agents and builders of coöperative apartments, largely on faith, and with most satisfactory results, a number of farsighted promoters have felt the need of relief from the delicate responsibility of expending these huge sums in the interest of the apartment purchasers without some form of independent supervision over their stewardship. It is the duty of the supervising architect to review and approve the specifications of the building; to inspect the work of construction, and to render fortnightly reports in duplicate to the agent and the builders; to call attention to departures from the specifications, if any occur; to issue certificates to accompany calls for progress payments by purchasers, certifying that the work performed by the builder is in accordance with the terms of the purchase agreement; and finally, to deliver to the owning tenants a certificate to the effect that the building has been completed in full accord with the contracts and specifications under which the tenant-owners have acquired their respective apartment homes. In addition to these contractual obligations, the supervising architect coöperates with the builder, the architect and the tenant-owners in harmonizing the interests of each and in producing a building of the highest possible standards at the lowest possible costs consistent with the specifications and terms of the plan of organization. In several of the recent coöperative projects an independent lawyer has been engaged to represent the tenant-owners, it being his duty to examine and approve the plan of organization, the 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.

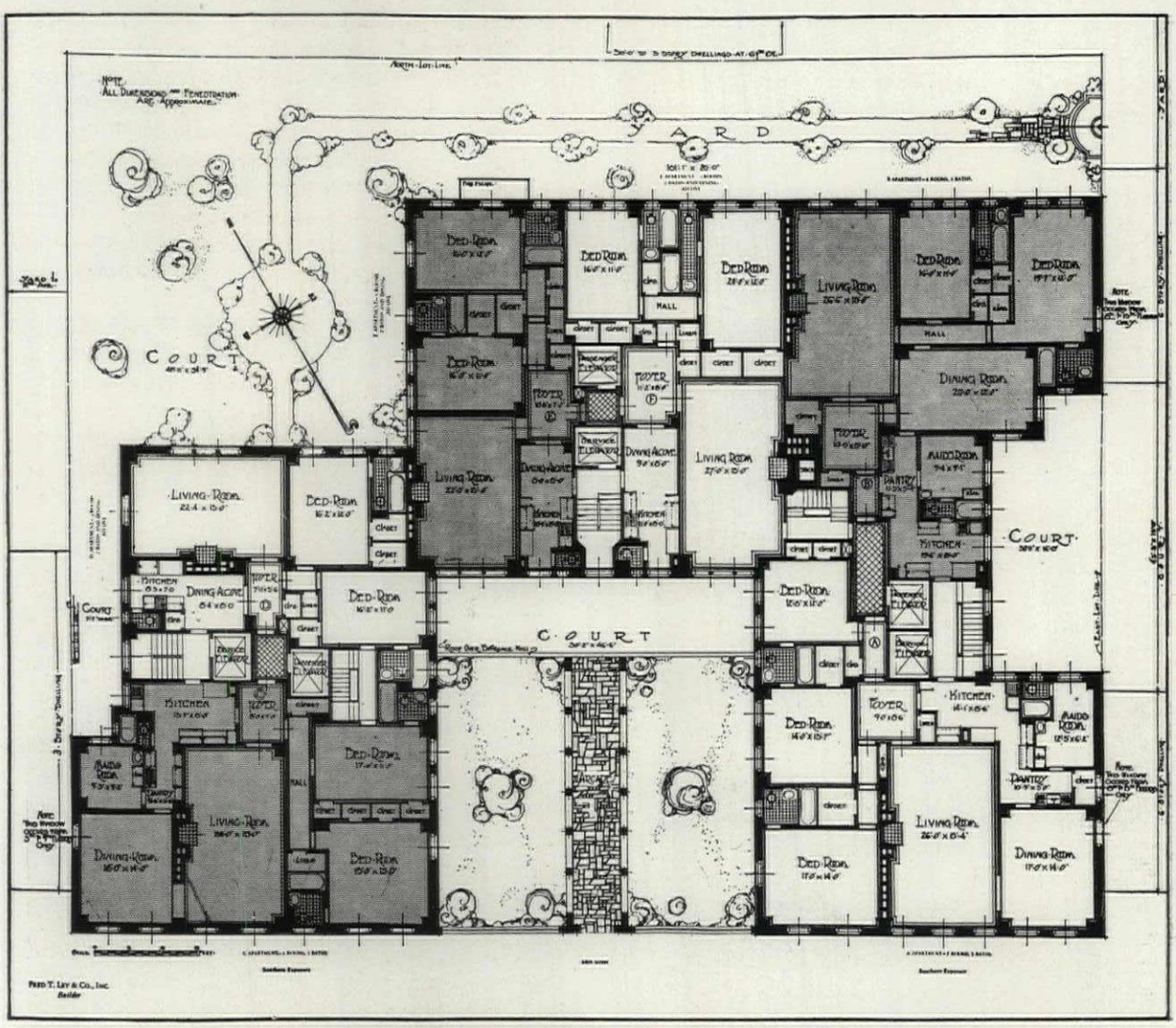
Whether an independent attorney is engaged to represent the interests of the tenant-owners or not, it is highly desirable that the attorney selected by the promoters to handle the legal matters pertaining to the plan of organization, forms of contracts, proprietary leases, etc., be experienced in this work. In fact the legal aspect of coöperative 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 coöperative 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 coöperative apartment, where the land is leased for a long term of years, usually for 21 years, with three renewals. Notable among coöperative 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 coöperative a means of making available plottage now withheld from the market. Some owners of desirable plottage 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 coöperative plan and the group ownership or partial coöperative 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 coöperative 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.



A Typical Floor Plan, 333 East 68th Street, New York
Van Wart & Wein, Architects
Cross & Cross, Supervising Architects

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 highfaluting 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 be 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. Consciously 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

Editor's Note. The Quality of Architectural Design Is Important in Selling an English Stucco House

George F. Root, 3rd, Architect

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 æsthetically 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 chest, thumb the armholes, and throwing modesty aside could reply, "I did; you are at this very moment 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,—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 painters 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.

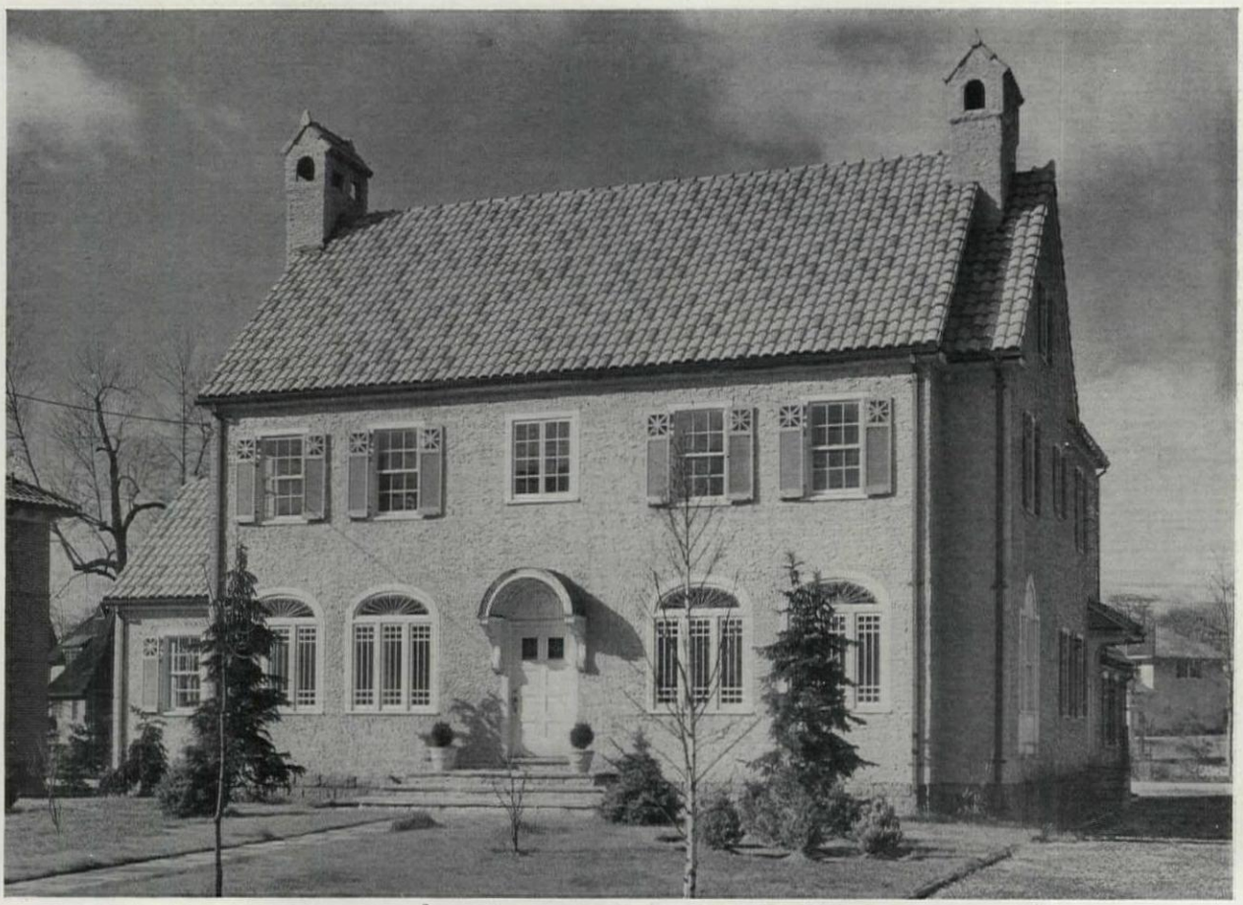
An instance is brought to mind of a builder who had been doing his own designing with only moderate success. One of his backers prevailed upon him to consult John Doe Smith, architect, regarding the house he was then contemplating. The builder had drawn his tentative plan, and brought it to Mr. Smith 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 that it contained two doors, one from each adjoining 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 plot, 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 fof 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. Anachronisms in Design, such as the Peculiar Fenestration, Have Kept this House Vacant
A House Typical of "Contractor Design"

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. An instance of the success of this plan of procedure by the developer may be of interest. There is a large acreage in a Philadelphia suburb, Chestnut Hill, which has been steadily developed by an individual, Dr. George Woodward, during some 20 years. One drives through it now and is quite startlingly impressed with the varied uniformity which pervades this entire district. It is an architecture of stone, easily quarried nearby, which is seen in almost every building; it is the old Germantown style, freely adapted and varied, which greets the driver over the curving streets. Harmony without monotony everywhere. 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.

Architectural Merit Was the Greatest Factor in the Purchase of This House

George F. Root, 3rd, Architect

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. There has been no deviation in the method of developing the forecast, and because this method has produced successful results for so many years, it would seem obvious that no drastic change in its operation could be expected this year unless some unusual series of business conditions had developed suddenly to change the entire economic balance of the country.

If we seek further to analyze this apparently paradoxical situation, wherein many are predicting a sharp falling off of building in the year 1928, although most forecasts are to the contrary, we seem to discover controlling factors of an unusual nature, which after all may offer a simple explanation. It is to be noted that those who are making casual predictions anticipating a considerable decrease in the building volume are located in large centers where there is perhaps an over-built situation which would influence opinion. Perhaps the idea of decreased activity in the building field is a natural

1928 PREDICTION BY DISTRICTS IN 19 BUILDING CLASSIFICATIONS

BUILDING TYPES	N. EASTERN STATES	N. ATLANTIC STATES	S. EASTERN STATES	S. WESTERN STATES	MIDDLE STATES	WESTERN STATES	U.S.A.
Automotive	$16,702,000	$68,716,000	$8,214,000	$17,554,000	$67,605,000	$18,640,000	$197,431,000
Banks	10,674,000	72,693,000	2,278,000	10,202,000	34,300,000	7,247,000	137,394,000
Apartments	10,437,000	347,500,000	13,862,000	22,400,000	186,400,000	72,230,000	652,829,000
Apartment Hotels	572,000	56,787,000	4,970,000	12,935,000	105,987,000	36,267,000	217,518,000
Club, Fraternal, etc.	10,557,000	46,287,000	2,937,000	15,000,000	86,742,000	14,440,000	175,963,000
Community and Memorial	3,146,000	13,400,000	580,000	5,265,000	41,760,000	10,645,000	74,796,000
Churches	19,860,000	48,740,000	12,635,000	20,900,000	71,367,000	37,640,000	211,142,000
*Dwellings (Below $20,000)	19,780,000	76,730,000	8,700,000	16,360,000	49,400,000	26,372,000	197,342,000
Dwellings ($20,000 to $50,000)	11,420,000	69,210,000	7,935,000	12,150,000	37,610,000	24,640,000	162,965,000
Dwellings (Over $50,000)	8,700,000	44,935,000	6,720,000	11,345,000	31,210,000	16,660,000	119,570,000
Hotels	21,487,000	107,272,000	19,950,000	45,175,000	105,200,000	42,917,000	342,001,000
Hospitals	22,724,000	104,210,000	8,715,000	21,320,000	110,114,000	39,200,000	306,283,000
†Industrial	18,215,000	79,362,000	7,100,000	12,222,000	121,000,000	22,917,000	260,816,000
Office Buildings	26,376,000	139,674,000	9,854,000	57,473,000	263,413,000	87,720,000	584,510,000
Public Buildings	24,207,000	122,761,000	4,893,000	17,869,000	132,171,000	28,900,000	330,801,000
Schools	42,371,000	197,613,000	36,827,000	46,282,000	163,413,000	82,666,000	569,172,000
Stores	11,780,000	54,776,000	5,103,000	8,086,000	39,763,000	26,713,000	146,221,000
Theaters (All Types)	21,920,000	43,114,000	4,167,000	3,777,000	71,620,000	17,340,000	161,938,000
Welfare Y.M.C.A., etc.	10,140,000	41,614,000	4,700,000	5,731,000	38,246,000	6,143,000	106,574,000
TOTAL VALUE OF NEW BUILDINGS	$311,068,000	$1,735,394,000	$170,140,000	$362,046,000	$1,757,321,000	$619,297,000	$4,955,266,000

New Construction Under Architect's Specifications — As shown in above tabulation	$4,955,266,000
*Small Dwellings Not Designed by Architects — Estimated about 80% of total	789,368,000
†Industrial Buildings Not Designed by Architects — Estimated 50% of total	260,816,000
Other Buildings Not Designed by Architects — Estimated at 10% of total after deducting above two classifications	499,678,000
TOTAL ESTIMATED EXPENDITURE FOR NEW BUILDINGS IN 1928	$6,505,128,000 (Not Including Public Works and Utilities)

reaction of the human mind which refuses to believe that good conditions can last so long. This is substantiated by the fact that most of those who are pessimists about building activity are also pessimistic about national prosperity. Of course, if general business conditions become straitened and the confidence of the public is shaken, building activity will be materially influenced. The volume of building construction, and particularly the volume of contemplated 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 requirements of a standard of commercial and domestic housing in keeping with ability to pay for greater comfort and utility,—an ever-improving standard.

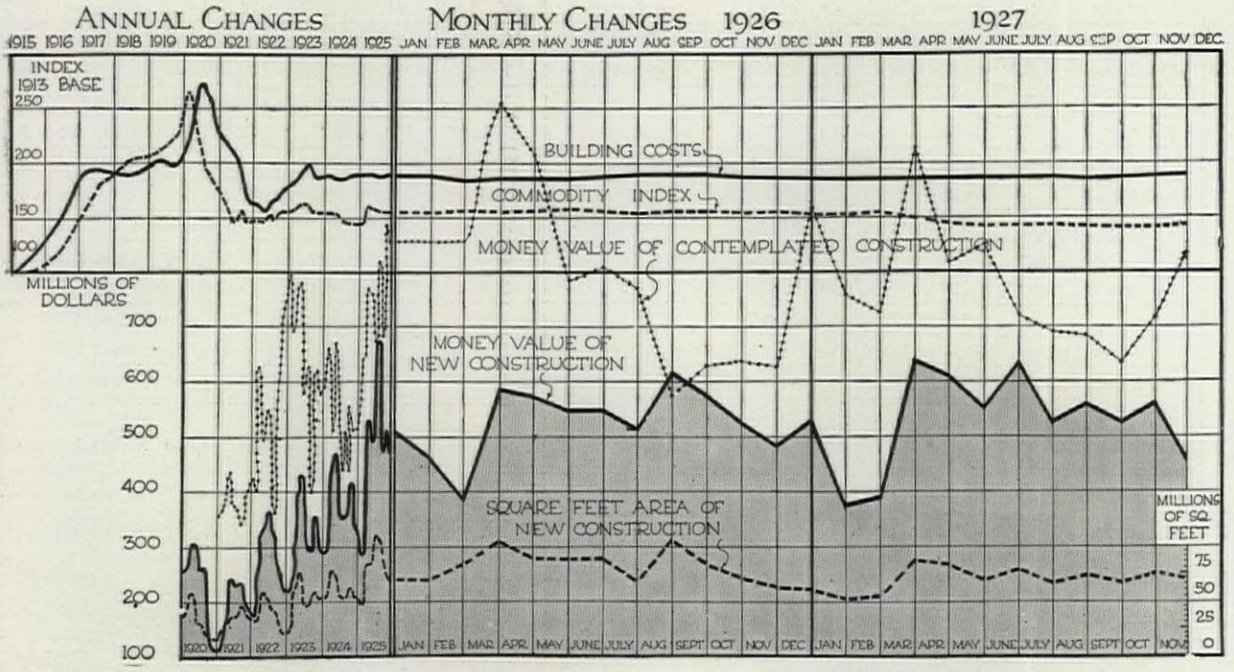
With these thoughts in mind, is it not reasonable to believe that there may be a basic explanation for the evident paradox of contrary opinions as to building activity? Perhaps we have not been passing through a real "boom." Perhaps the continued building activity which, as an examination of the chart 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 provided 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 annually, 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 because the total area of risks has been greatly increased.

A COMPARISON OF PUBLIC DEMAND FOR NEW BUILDINGS AS SHOWN IN 1927 AND 1928

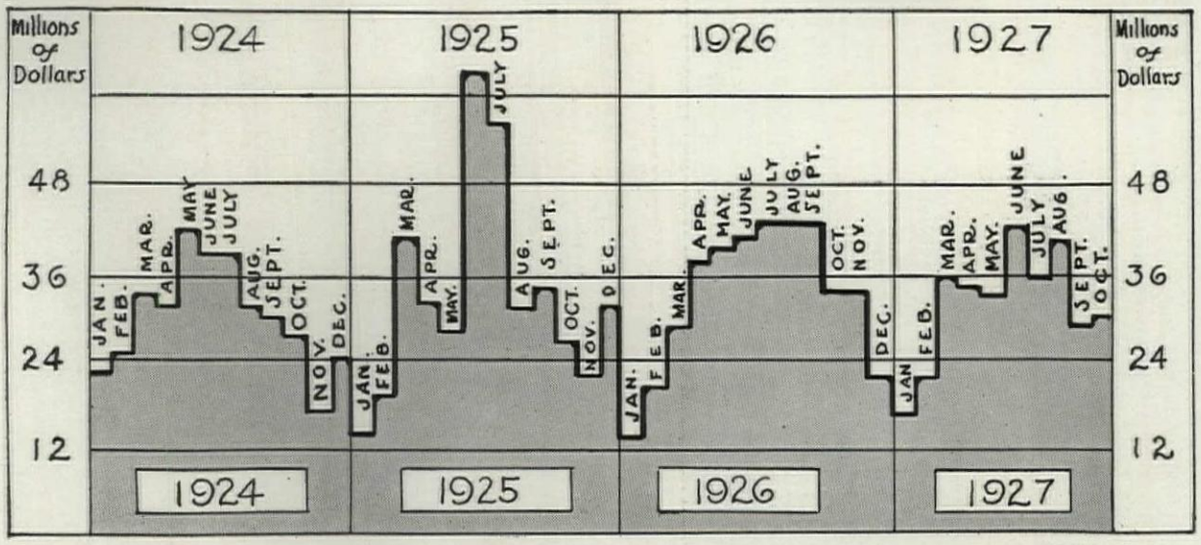
The figures given here apply to projects as reported by architects and represent the percentage of the valuation of each building type as compared with the total value of projects for the district.

NORTHEASTERN STATES

Type of Building	*Requirements for New Buildings by Percentages*		
	1927	*1928*	*Change*
Automotive	2.5	5.4	+2.9
Banks	4.5	3.4	—1.1
Apartments	6.	3.3	—2.7
Apartment Hotels	2.	.2	—1.8
Clubs, Fraternal, etc.	3.	3.4	+ .4
Community and Memorial	1.1	1.	— .1
Churches	10.9	6.4	—4.5
Dwellings (under $20,000)	3.	6.4	+3.4
Dwellings ($20,000 to $50,000)	2.	3.7	+1.7
Dwellings (over $50,000)	2.	2.8	+ .8
Hotels	5.6	6.9	+1.3
Hospitals	4.8	7.3	+2.5
Industrial	11.9	5.8	—6.1
Office Buildings	8.9	8.5	— .4
Public Buildings	8.	7.8	— .2
Schools	15.	13.6	—1.4
Stores	1.4	3.8	+2.4
Theaters	5.4	7.	+1.6
Welfare, Y.M.C.A., etc.	2.	3.3	+1.3



Here the building situation is shown at a glance. The various index lines are explained on the chart. This information is developed from reports of the United States Department of Commerce, the F. W. Dodge Corporation, and *The Engineering News-Record*



Four Years of School and College Building

NORTH ATLANTIC STATES

Type of Building	*Requirements for New Buildings by Percentages* 1927	1928	*Change*
Automotive	2.1	3.9	+1.8
Banks	4.5	4.2	— .3
Apartments	18.5	20.	+1.5
Apartment Hotels	6.6	3.3	—3.3
Clubs, Fraternal, etc	3.5	2.6	— .9
Community and Memorial	1.6	.8	— .8
Churches	5.6	2.9	—2.7
Dwellings (under $20,000)	2.3	4.4	+2.1
Dwellings ($20,000 to $50,000)	2.2	4.	+1.8
Dwellings (over $50,000)	1.9	2.6	+ .7
Hotels	5.2	6.2	+1.
Hospitals	7.1	6.2	—1.1
Industrial	7.5	4.6	—2.9
Office Buildings	10.9	8.	—2.9
Public Buildings	5.7	7.1	+1.4
Schools	8.1	11.4	+3.3
Stores	2.4	3.1	+ .7
Theaters	3.	2.5	— .5
Welfare, Y.M.C.A., etc	1.3	2.4	+1.1

SOUTHWESTERN STATES

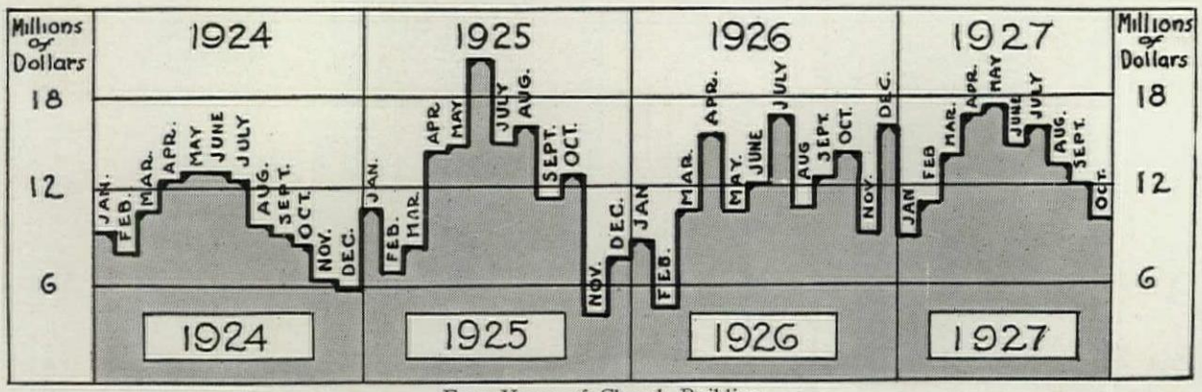
Type of Building	*Requirements for New Buildings by Percentages* 1927	1928	*Change*
Automotive	2.8	4.8	+2.
Banks	2.	2.8	+ .8
Apartments	8.	6.2	—1.8
Apartment Hotels	2.	3.6	+1.6
Clubs, Fraternal, etc	4.	4.1	+ .1
Community and Memorial	5.2	1.5	—3.7
Churches	10.2	5.8	—4.4
Dwellings (under $20,000)	3.5	4.5	+1.
Dwellings ($20,000 to $50,000)	4.	3.4	— .6
Dwellings (over $50,000)	1.5	3.1	+1.6
Hotels	10.8	12.5	+1.7
Hospitals	5.2	5.9	+ .7
Industrial	5.3	3.4	—1.9
Office Buildings	13.7	15.9	+2.2
Public Buildings	2.9	4.9	+2.
Schools	12.5	12.8	+ .3
Stores	2.	2.2	+ .2
Theaters	3.2	1.	—2.2
Welfare, Y.M.C.A., etc	1.2	1.6	+ .4

SOUTHEASTERN STATES

Type of Building	*Requirements for New Buildings by Percentages* 1927	1928	*Change*
Automotive	4.6	4.8	+ .2
Banks	2.3	1.3	—1.
Apartments	8.4	8.2	— .2
Apartment Hotels	3.2	2.9	— .3
Clubs, Fraternal, etc	5.2	1.7	—3.5
Community and Memorial	1.	.3	— .7
Churches	6.9	7.4	+ .5
Dwellings (under $20,000)	4.	5.1	+1.1
Dwellings $20,000 to $50,000)	4.2	4.7	+ .5
Dwellings (over $50,000)	1.1	4.	+2.9
Hotels	15.	11.7	—3.3
Hospitals	5.	5.1	+ .1
Industrial	2.	4.2	+2.2
Office Buildings	5.	5.8	+ .8
Public Buildings	4.	2.9	—1.1
Schools	13.8	21.6	+7.8
Stores	8.	3.	—5.
Theaters	4.	2.5	—1.5
Welfare, Y.M.C.A., etc	2.3	2.8	+ .5

MIDDLE STATES

Type of Building	*Requirements for New Buildings by Percentages* 1927	1928	*Change*
Automotive	3.2	3.8	+ .6
Banks	2.6	1.9	— .7
Apartments	10.	10.	+ .6
Apartment Hotels	3.	6.	+3.
Clubs, Fraternal, etc	5.	4.9	— .1
Community and Memorial	2.	2.4	+ .4
Churches	6.	4.1	—1.9
Dwellings (under $20,000)	2.	2.8	+ .8
Dwellings ($20,000 to $50,000)	2.4	2.1	— .3
Dwellings (over $50,000)	1.1	1.8	+ .7
Hotels	5.7	6.	+ .3
Hospitals	4.9	6.3	+1.4
Industrial	8.6	6.9	—1.7
Office Buildings	16.6	15.	—1.6
Public Buildings	4.	7.5	+3.5
Schools	13.6	9.3	—4.3
Stores	1.6	2.3	+ .7
Theaters	5.8	4.1	—1.7
Welfare, Y.M.C.A., etc	1.9	2.2	+ .3



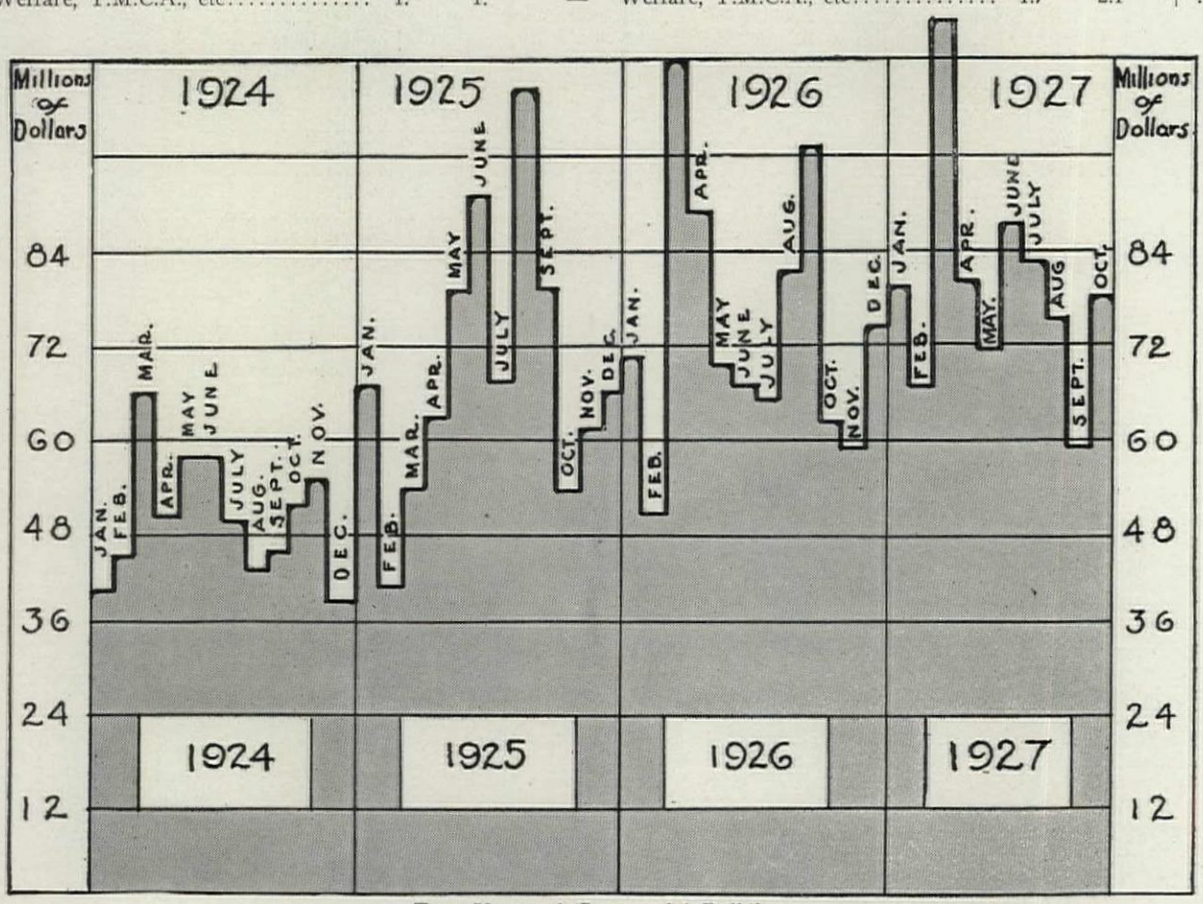
Four Years of Church Building

WESTERN STATES

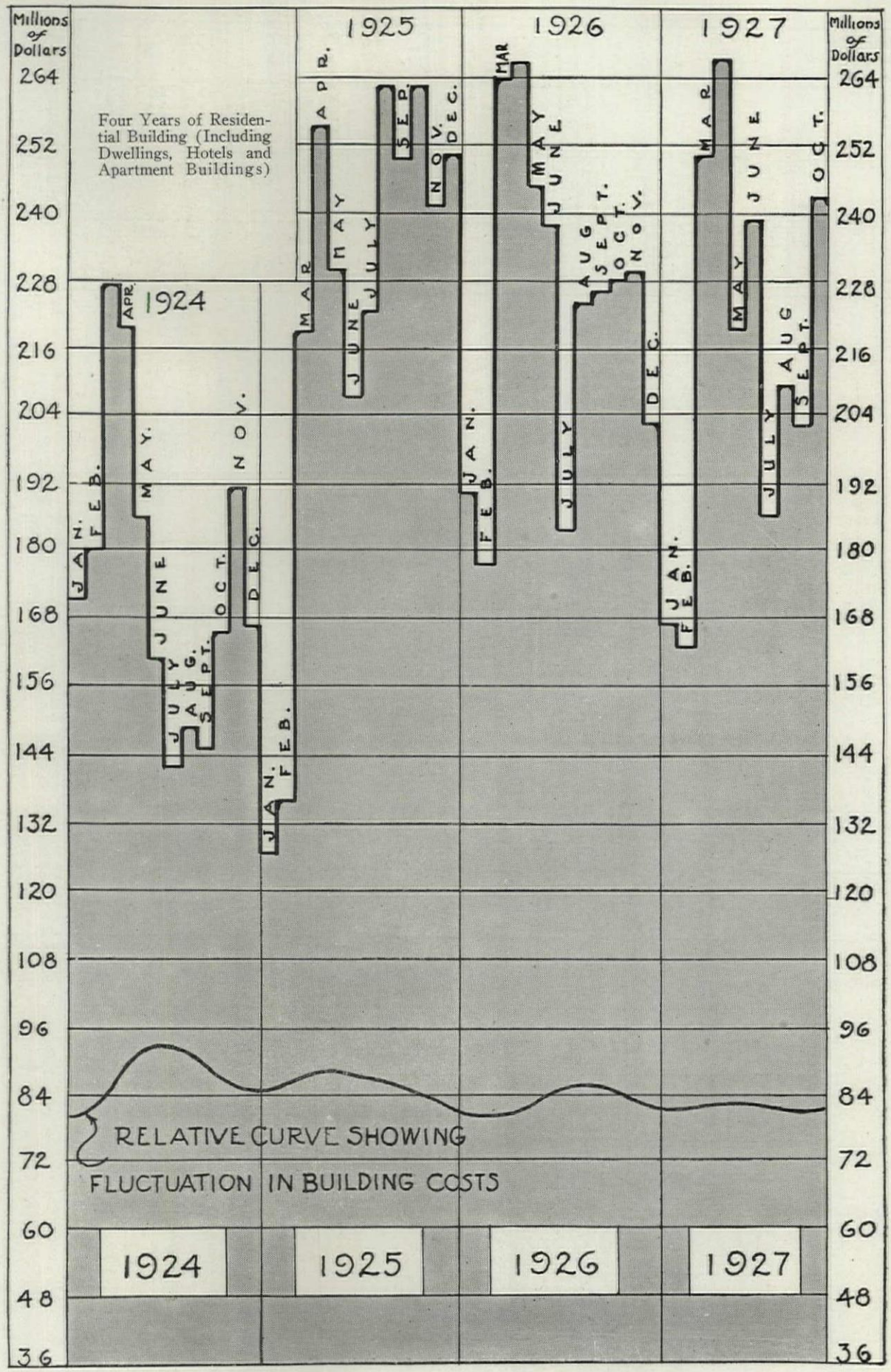
Type of Building	Requirements for New Buildings by Percentages 1927	1928	Change
Automotive	3.6	3.	— .6
Banks	2.	1.2	— .8
Apartments	9.8	11.7	+1.9
Apartment Hotels	4.3	5.9	+1.6
Clubs, Fraternal, etc	6.3	2.3	—4.
Community and Memorial	1.9	1.7	— .2
Churches	6.2	6.1	— .1
Dwellings (under $20,000)	3.	4.3	+1.3
Dwellings ($20,000 to $50,000)	2.3	4.	+1.7
Dwellings (over $50,000)	1.9	2.7	+ .8
Hotels	11.3	6.9	—4.4
Hospitals	3.9	6.3	+2.4
Industrial	2.9	3.7	+ .8
Office Buildings	11.6	14.2	+2.6
Public Buildings	9.6	4.7	—4.9
Schools	13.9	13.3	— .6
Stores	2.1	4.1	+2.
Theaters	2.4	2.8	+ .4
Welfare, Y.M.C.A., etc	1.	1.	—

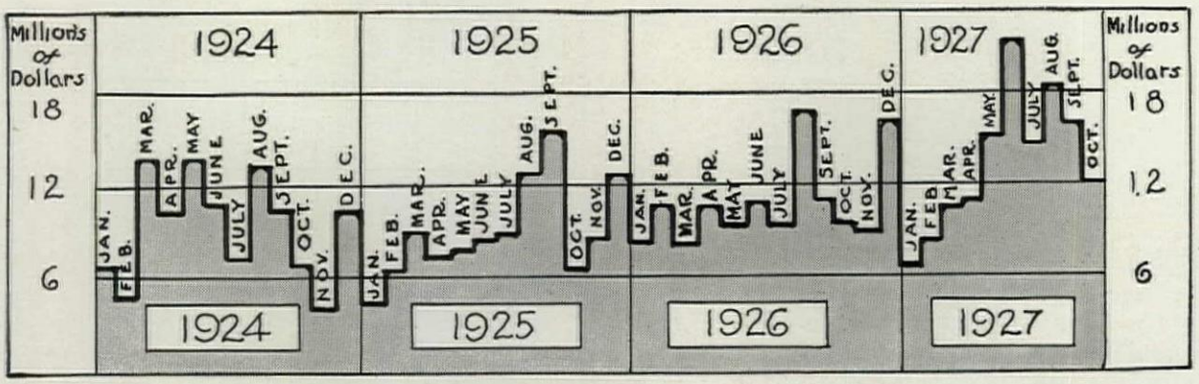
NATIONAL PERCENTAGES, U. S. A.

Type of Building	Requirements for New Buildings by Percentages 1927	1928	Change
Automotive	2.8	3.9	+1.1
Banks	3.3	2.8	— .5
Apartments	12.5	13.2	+ .7
Apartment Hotels	4.3	4.4	+ .1
Clubs, Fraternal, etc	4.3	3.5	— .8
Community and Memorial	2.	1.5	— .5
Churches	6.5	4.3	—2.2
Dwellings (under $20,000)	2.4	4.	+1.6
Dwellings ($20,000 to $50,000)	2.4	3.3	+ .9
Dwellings (over $50,000)	1.9	2.4	+ .5
Hotels	6.9	6.9	—
Hospitals	5.6	6.2	+ .6
Industrial	7.3	5.3	—2.
Office Buildings	12.7	11.8	— .9
Public Buildings	5.6	6.7	+1.1
Schools	11.7	11.5	— .2
Stores	2.2	2.9	+ .7
Theaters	3.9	3.3	— .6
Welfare, Y.M.C.A., etc	1.7	2.1	+ .4

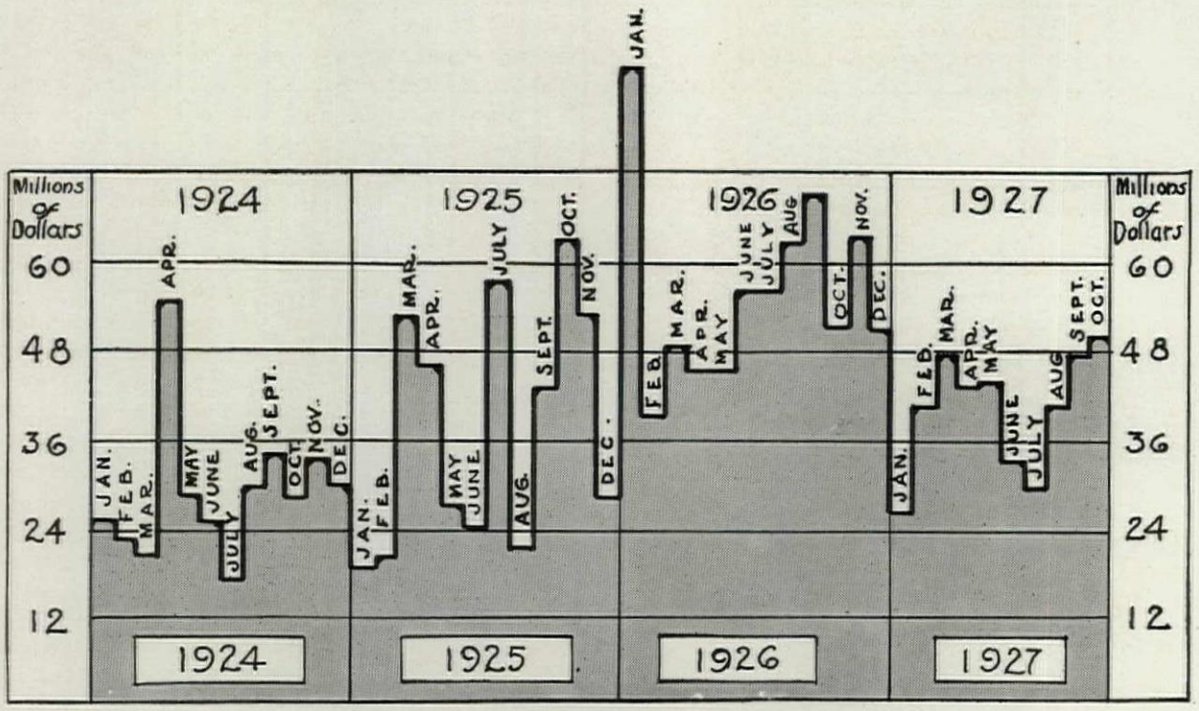


Four Years of Commercial Building

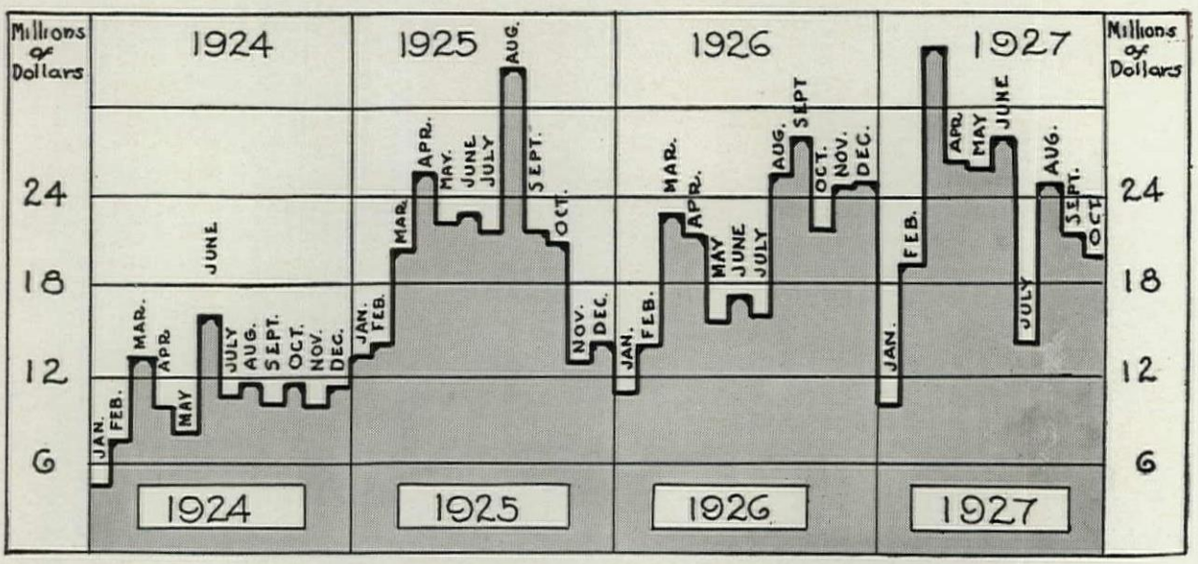

Millions of Dollars
264
252
240
228
216
204
192
180
168
156
144
132
120
108
96
84
72
60
48
36
Four Years of Residential Building (Including Dwellings, Hotels and Apartment Buildings)
1924
1925
1926
1927
JAN. FEB. APR. MAY. JUNE JULY AUG. SEPT. OCT. NOV. DEC. JAN. FEB. MAR APR. MAY JUNE JULY SEP. NOV. DEC. JAN. FEB. MAR MAY JUNE JULY AUG SEPT. OCT. NOV. DEC. JAN. FEB. MAR MAY JUNE JULY AUG SEPT. OCT.
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

HOUSING—THE RESPONSIBILITY OF THE BUILDING INDUSTRY

BY

By JOHN TAYLOR BOYD, JR.

AYMAR 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 to believe otherwise 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 is produced only for the upper economic third of the population. It is the other two thirds,—the majority of the population,—which it is the task of the building industry to reach. Here, in this statement that houses must be built for two-thirds of the population, is the size of the undertaking that awaits the industry in the next few years.

Let us realize what this means to us in the building industry,—an opportunity greater than any previously open to us, or a failure which will be disastrous on an equal scale. If we rise to the opportunity, there will be a huge increase in building, including the construction of other buildings as well as of houses, a great construction period lasting for ten years at least, which will sustain general business prosperity in this country during that time, in so far as general business depends on construction activity for its prosperity. Does this sound visionary? Well, I gave this statement together with many figures to that organ of conservative finance and economics, *The Wall Street Journal*, and the *Journal* printed them on its own editorial authority last June in two half-page articles on housing. In these articles housing economics—not

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, particularly in the founding of 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 coöperates. 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 coöperation," 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 coöperating 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 these of the Metropolitan Life Insurance Company and the others. This being true, it devolves on the building industry to show why it does not coöperate 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—*surer* 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 opoinion, 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.

OFFICE PRACTICE

SIMPLIFYING THE WRITING OF SPECIFICATIONS

BY
CHARLES E. KRAHMER
OF THE OFFICE OF GUILBERT & BETELLE, ARCHITECTS

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 contradition, 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

the contract is prepared and executed. It is for this reason that the procedure is reversed in the matter 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 sub-contractors 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 Metropolitan district, but it may not apply in localities where the trades are not so intensively organized.

Sources of Information. The specification writer is in effect a clearing house for all information affecting building materials and their use. The scope of a modern specification prepared in one of the larger offices is beyond the experience and knowledge of any one person. Therefore, it is of the utmost importance that the specification writer discover and develop reliable, progressive, and authoritative sources of information. They may be roughly divided into these four parts:

(*a*) The individuals comprising the architect's organization.
(*b*) Contractors, sub-contractors, materialmen, material and labor associations.
(*c*) Catalogs and trade magazines.
(*d*) Personal visits to the work to obtain first-hand information.

The most reliable and often the most fertile field of information consists of the personnel of the architect's organization. The specification writer should make the proper contacts, so as to select those whose experience and knowledge are of value. The architectural designers should be familiar with the textural finishes of walls, woods, roofs, types and kinds of brick, stone, slate and wood of the various architectural periods; and should advise him of materials, colors and textures desired for the proper interpretation of the designs. The supervision department forms the "eyes" of the organization, and the specification writer should consult it at all times about the practical use of the materials specified and the subdivision of the trades. A close contact with the supervision department is of the utmost importance, as it is often called upon to interpret the meaning of the specifications. Another source of valuable information is found in the estimators, contractors, sub-contractors, and materialmen visiting the average office. It is wise to interview those who have serious business, and to appraise and classify those having 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).
3. MISCELLANEOUS WORK: (Items of actual work to be done).
5. DEMOLITION:
7. EXCAVATION:
   Filling, Grading.
9. PILING:
11. SHORING:
    Sheet Piling, Underpinning.
13. FOUNDATIONS:
15. STRUCTURAL STEEL:
17. WATERPROOFING BY PLASTIC COATING:
19. WATERPROOFING BY BITUMINOUS MEMBRANE:
21. MASONRY AND CONCRETE MATERIALS:
    Cement and other basic materials, Integral Waterproofing.
23. MASONRY WORK:
    Mortar, Brickwork, Rough Stone Masonry, Structural Terra Cotta, Gypsum Blocks.
25. MASS AND REINFORCED CONCRETE:
27. CONCRETE ARCHES AND FIREPROOFING:
    Reinforced Concrete Stairs, Hangers.
29. CUT STONE WORK: (Granite and Bluestone should generally be separate).
    Stone Models, Carving.
31. IMITATION CUT STONE:
33. ARCHITECTURAL TERRA COTTA:
35. ROOFING AND SHEET METAL:
    Skylights and their Glass.
37. VAULT LIGHTS:
39. ARCHITECTURAL IRON:
41. ARCHITECTURAL BRONZE:
43. CEMENT FINISH:
45. SPECIAL PAVING:
    Asphalt, Wood Block, Stone.
47. SPECIAL FLOORS:
    Cork, Rubber, Mastic, Magnesite, Linoleum.
49. METAL FURRING AND LATHING:
    Metal Beads.
51. PLASTERING:
    Keene Cement, Stucco, Sgraffito, Wood Lathing.
53. ACOUSTIC TREATMENT:
55. INTERIOR MARBLE AND SLATE:
    Structural Glass.
57. IMITATION MARBLE:
59. TERRAZZO:
    Marble Mosaic.
61. TILE:
63. CARPENTRY:
    Framing, Millwork, Screens, Weather Strips, Rough Hardware.
65. SPECIAL WINDOWS:
    Rolled Metal, Hollow Metal, Patented Operation.
67. HOLLOW METAL DOORS AND TRIM:
69. METAL COVERED DOORS AND TRIM:
71. SPECIAL DOORS:
    Revolving, Balanced, Folding, Rolling Shutters.
73. SHOW WINDOWS:
75. HARDWARE:
77. GLAZING:
79. MAIL CHUTE:
81. PAINTING:
    Wall coverings.
83. DECORATIONS:
85. PLUMBING:
    Gas Fitting, Fire Lines.
87. SPRINKLER SYSTEM:
89. VACUUM CLEANING SYSTEM:
91. REFRIGERATION SYSTEM:
93. WATER SUPPLY SYSTEM:
95. SEWAGE DISPOSAL SYSTEM:
97. HEATING AND VENTILATING:
    Temperature Control.
99. POWER PLANT:
    Coal and Ash Handling, Cranes, Engines, Dynamos.
101. ELECTRIC WIRING:
     Signal Systems, Bells, Telephones.
103. LIGHTING FIXTURES:
105. FIRE ALARM SYSTEM:
107. CLOCK SYSTEM:
109. ELEVATORS:
     Power Dumbwaiters, Elevator Accessories.
111. ESCALATORS:
113. MECHANICAL CONVEYORS:
     Pneumatic Tubes, Chutes.
115. EQUIPMENT: (Semi-independent: This list may be extended indefinitely):
     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: ELECTRICAL WORK - THREE-Z

Service Conduits and Feeders:

The Electrical Contractor shall install the lighting (x) and power (x) conduit_ and feeders from service cutouts in building to point of service

(a) connections on_____, the conduit_ to be extended up the

(a) _____ 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.

a-For overhead service specify: side of building.

" underground " " company's pole.

(x) indicates possible omissions.

Sample Card from a Card Index Master Specification
(Actual card is 5 x 8 inches)

tions, additions or changes. This "dummy copy" is then used for checking, and when complete is delivered to the stenographer for final typing. A development of this method is to paste the paragraphs which apply on the pad as just described, and where insertions occur a few notes are made. The subject matter is then dictated directly to the stenographer, who inserts the paragraphs in the proper spaces. Most of the trouble and dissatisfaction with architects' specifications can be traced to use of this method. The reason is, in choosing a specification which parallels that being written, one may be chosen that is from five to ten years old. The mistakes and vague and meaningless paragraphs will be continued, and frequently practices and materials that are out of date and off the market for years will be specified.

(*b*) *Card System.* The card index master specification generally consists of cards about 5 x 8 inches in size, filed in a standard draw file. A sample card is shown on page 140. These cards are filed in rotation according to the trade divisions used in the office in which the specification is being compiled, which should, of course, coincide with the practice in the community in which the work will be done. One subject is assigned to each card, and where the subject is too long for one card, the subject matter is continued on the opposite side, or sometimes two or three cards are used for one subject. The stenographer then copies the cards in their proper rotation, compiling 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 makes the necessary erasures, cleans up the cards, and files them, so that they are ready for use again. The danger in this system is the tendency to put too much in the specification and to become too general in application. There is also danger of accumulating unnecessary data. Clauses are often put in a standard file which are used so rarely that they should be discarded. The file should be kept up to date. When this is done, the system is excellent and will well warrant the trouble and expense of installing and maintaining it.

(*c*) *Standard Sheet.* Realizing the shortcomings and limitations of the use of an old specification and the card index system, there has been developed what might be termed a combination of the two, and where an office specializes in one class of work, it is a simple and economical system to use. The system consists generally of taking those sections of the specifications which are easy to standardize, such as, structural steel, brickwork, reinforced concrete, cut stone, metal furring, lathing, plastering, cement floors, terrazzo floors, interior marble work, tiling, hardware, linoleum, etc., and preparing master specifications for them. These are mimeographed on thin paper similar to specification paper, 100 copies being obtained for each section. The system then followed is to take these sections in their proper sequence and to utilize an old specification of a similar work as a guide, to work from the standard sheets, and compile the new specification as noted under the system for "Old Specifications." It has been found that by this system at least 40 per cent of the typing is eliminated. 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 whereever 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 rooms and spaces throughout the building. 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 schedules are shown on pages 142 and 143.

"Snake." Before the preparation of specifications, a considerable number of notes are made. To keep these notes in order and to have them at the proper time and in sequence, it is customary in some offices to use what is known as a "snake." This consists of a number of sheets of yellow paper clipped together at the top, cut out at the edge and with each sheet 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

SCHEDULE OF DOOR OPENINGS — COURT HOUSE — SHEET NO. 1

SUBJECT			BUCK		FRAME			TRIM		DOOR			PLINTH			SADDLE		TRANSOM			DOOR GLASS			TRANSOM GLASS	
Page of Specification			75	40		74	61	76	61	78	62		50	80		51	81	83			90	91		90	
OPERATION FIRST FLOOR PLAN			WOOD	STEEL		OAK	HOLLOW METAL	OAK	HOLLOW METAL	OAK	HOLLOW METAL		MARBLE	WOOD		MARBLE	WOOD	WOOD	BRONZE		POLISHED PLATE	GROUND GLASS		POLISHED PLATE	
Location	No.	Size																							
Court #107	150	3' x 7'	X			X		X		X				X			X	X			X			X	
Jury #108	151	3' x 7'	X			X		X		X				X			X	X			X			X	
Clork #109	152	3' x 7'	X			X		X		X				X			X	X			X			X	
Vault #110	153	3' x 7'	SPECIAL SEE PAGE # 130																						
Corridor	154	5' x 8'		X			X		X		X		X			X					X				
Rotunda	155	7' x10'		X			X		X		X		X			X									

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 employes 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, 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 concern 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 blue-printer 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

SCHEDULE OF FINISHES — COURT HOUSE — SHEET NO. 2

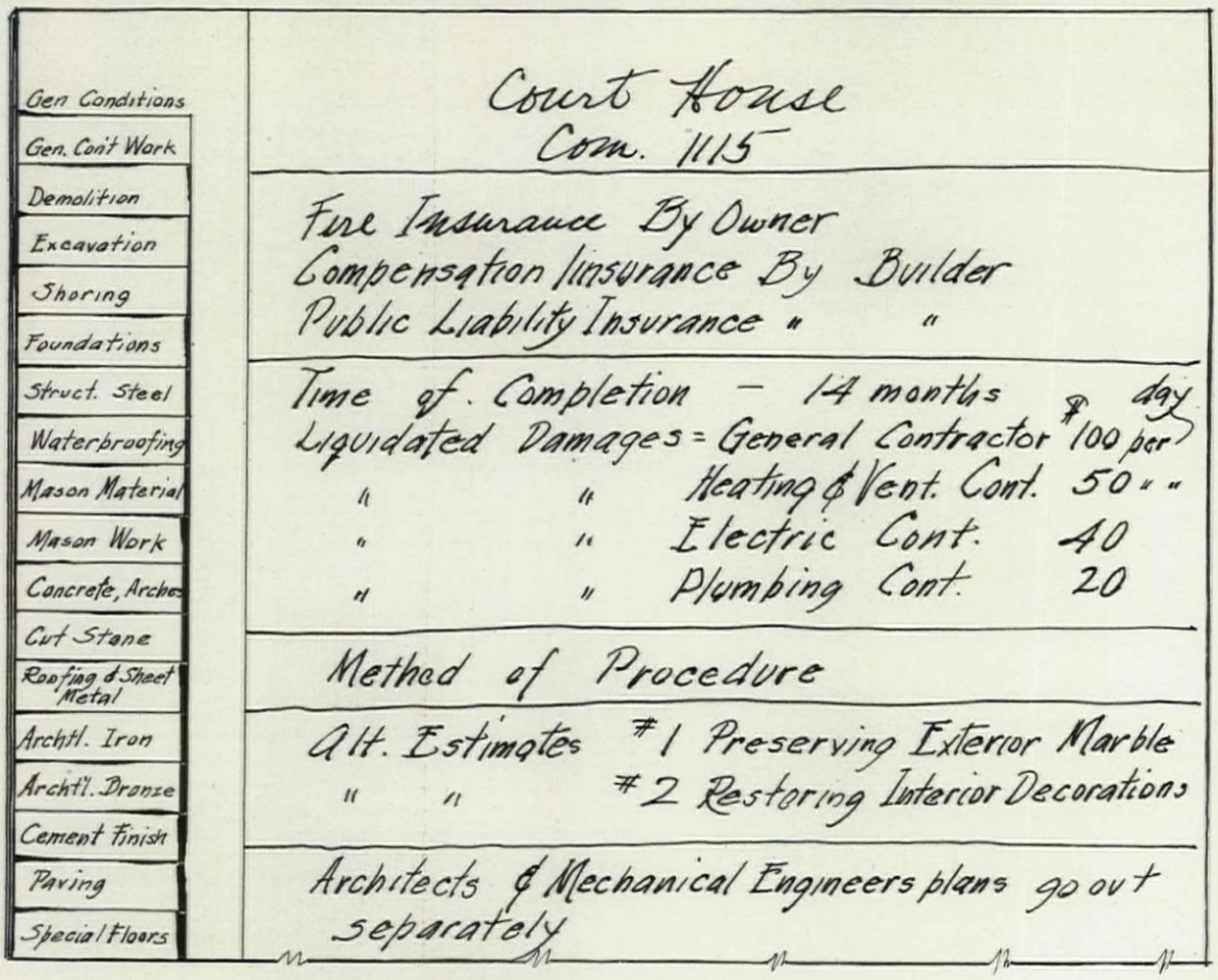
SUBJECT		FLOOR			WALL			CEILING		BASE			WAINSCOT			CHAIR RAIL	PICTURE MOULDING	DET. NO.
Page of Specification		40	60	70	31	41	80	79	80	40	26	90	41	26	92	93	94	
OPERATION FIRST FLOOR PLAN Location		MARBLE	TILE	LINOLEUM TILE	PLASTER	MARBLE	PLASTER CORNICE	METAL FURRED & LATHED	PLASTER	MARBLE	CEMENT	OAK	MARBLE	TILE	OAK	OAK	OAK	
Entrance Hall	#101	X				X	X	X	X	X								20
Toilet	102		X		X			X	X					X				
Passage	103			X	X				X		X							
Office	104			X	X											X		
Judge's Room	105			X	X		X	X	X	X					X		X	20
Court Room	106			X	X		X	X	X	X			X					
Jury Room	107			X	X			X	X	X						X	X	
Stenographers	108			X	X			X	X	X						X	X	
Sheriff's Office	109			X	X		X	X	X	X					X		X	25

Portion of a Specification Schedule; Finishes
(Conforming in size to specification sheets)

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.

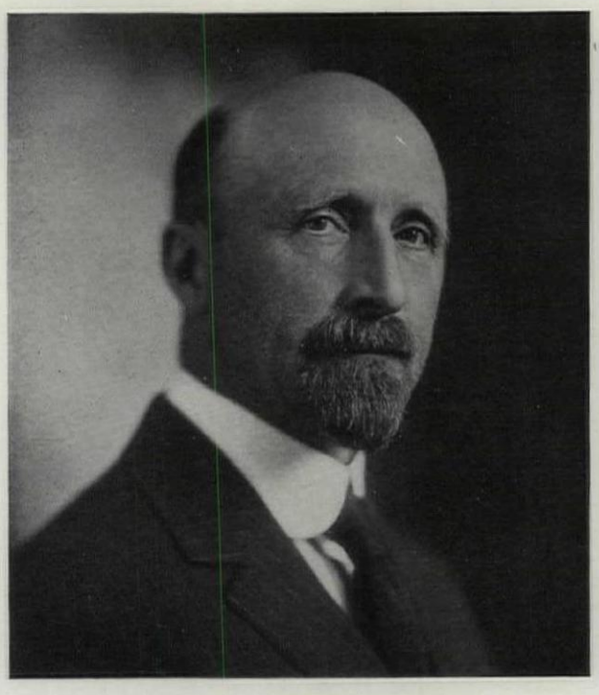


Facsimile of a Portion of the "Snake" Used by the Author

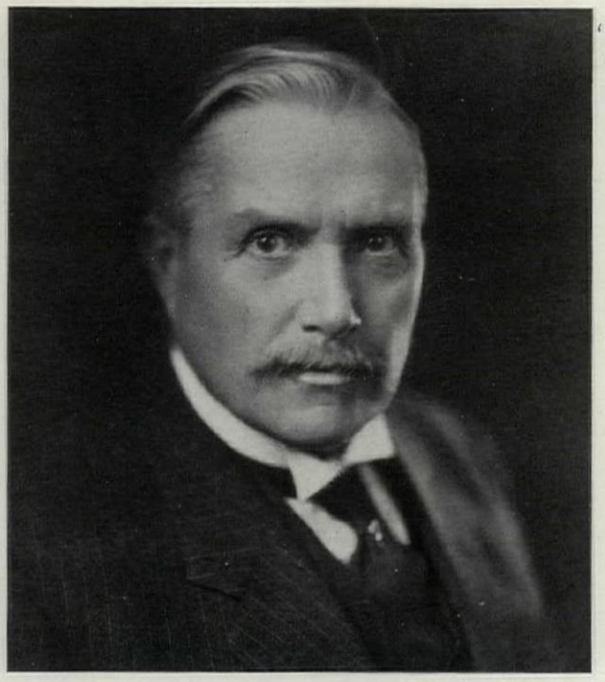
The original is a yellow pad 8½ x 11 inches; indexes corresponding to Trade Sections are cut at the left. The architect can make his notes directly on the "snake" and can correct them before the specification writer compiles the specification. The method saves time and makes it unnecessary to read the entire specification.

ARCHITECTURAL BIOGRAPHIES

JOHN PARKINSON: JOHN C. AUSTIN



John Parkinson



John C. Austin

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 tacked 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 office, and it is easy to avoid by no extra effort. Criticism in the form of sketches by the architect or any chief should be kept where it can be produced readily. An idea of the expense of keeping a person waiting for data can be obtained by figuring the rate per hour and finding the exact cost of the moments wasted in useless hunting. If several officials are kept idle for only a short time, the amount involved is appalling. In one week a serious of these retards will make a sum no one would fail to notice. A draftsman is often called upon to explain the origin of certain parts of his drawing which are only his interpretations of his chief's sketch. The boss calls immediately for the sketch, but it can rarely be found, and the crestfallen draftsman has only to listen to a lengthy description of his talents in interpreting the sketch into so unbelievable a monstrosity. Being unable to produce the original sketch, he has no defensive argument to offer.

To have a system whereby any scrap of information relative to a commission, whether it be note book references, photographs, or clippings, can be readily produced, is a time-saver for all. It will also relieve the air of a certain static in the form of a 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 telltale 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 worth while 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 encyclopædias 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 *vade mecum* 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 medium requirements, 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 Cumberland, Md. 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, incompetent engineers and unscrupulous builders, who unfortunately are permitted to ply their trade, very little provision in this connection would be needed.

THE ARCHITECTS' FORUM

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.

ASK ME ANOTHER

BY
AYMAR EMBURY II

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 yours a good method?
5. How do you know?
6. If an architect is paid by a note, can be discount it?
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 front door lock is unsatisfactory to the client, can he hold up the last payment to the contractor and yourself?
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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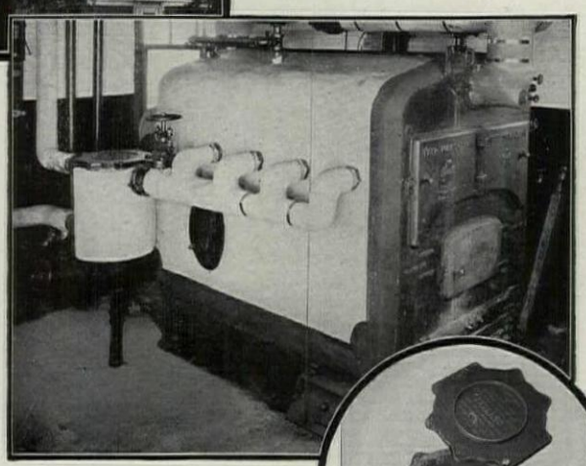

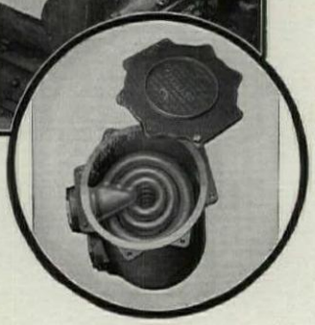

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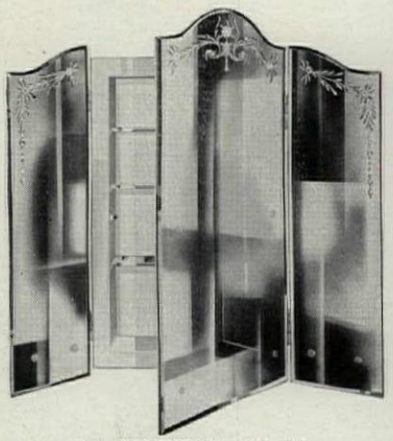

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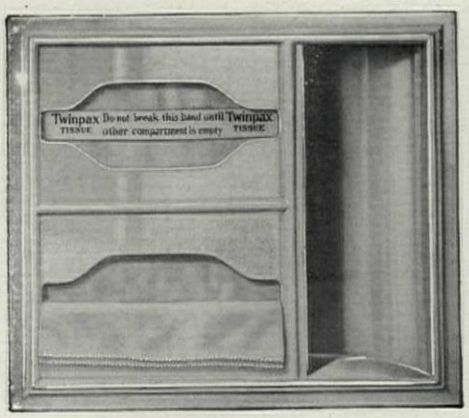

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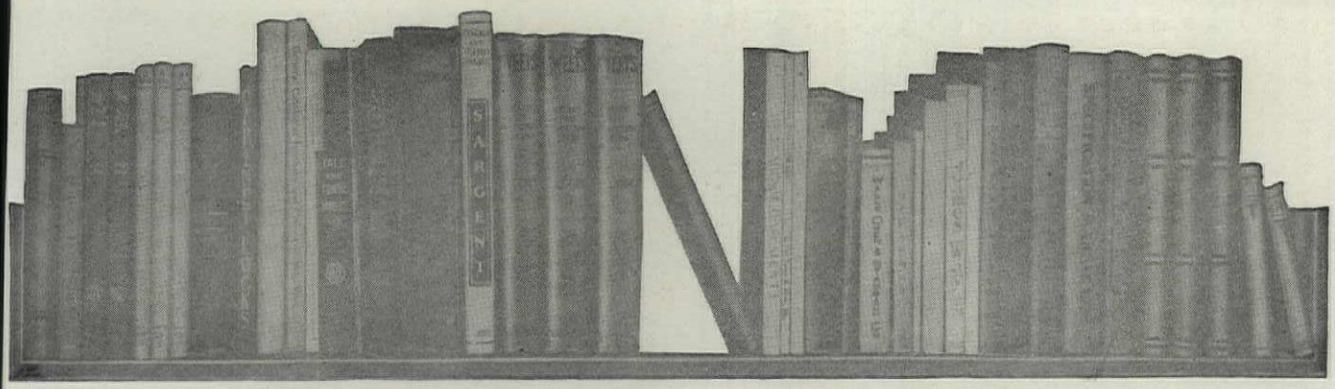

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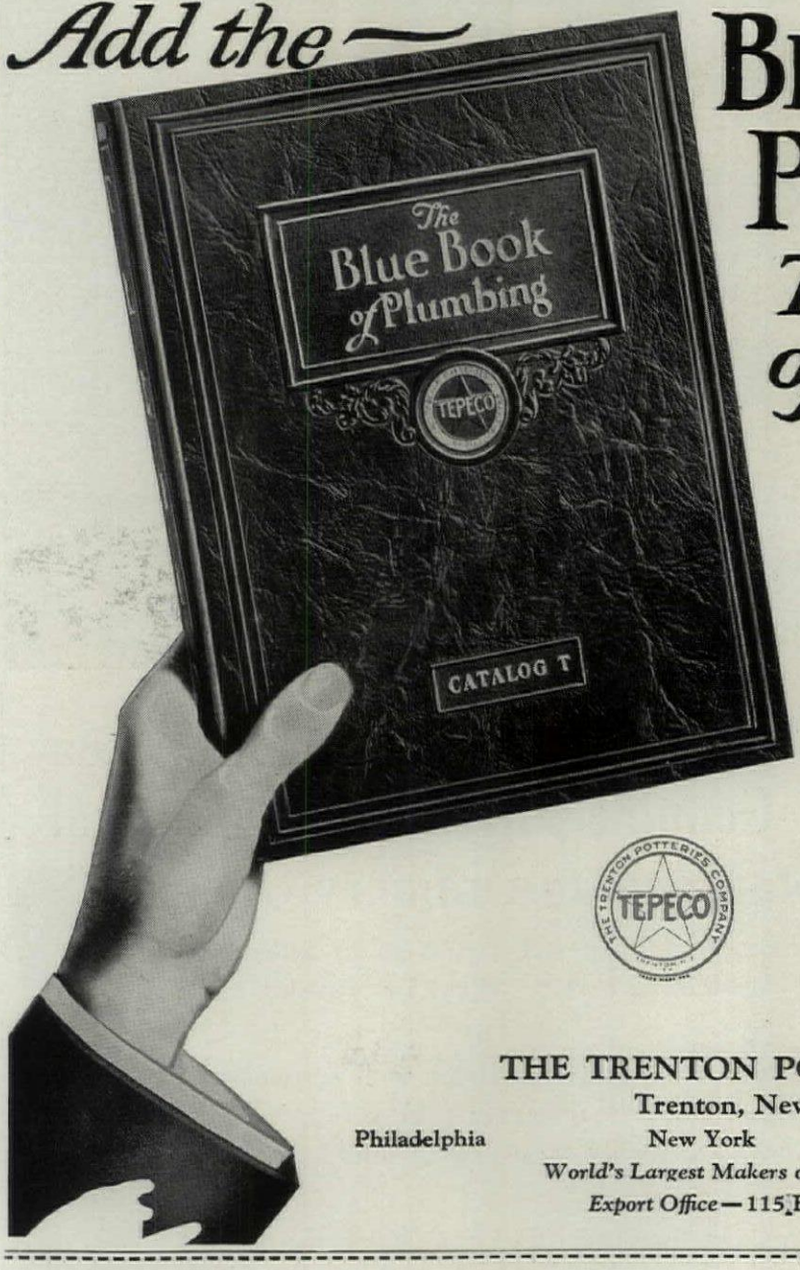

BLUE BOOK *of* PLUMBING

To Your Store of Information

THIS BOOK is a veritable "book of knowledge" of the industry answering many questions about plumbing which you may have had in mind a long time. Every type of worthwhile plumbing fixture is featured. Here you will find the latest sanitary, hygienic and mechanical improvements.

From this book you are able to make selections to beautify every room you plan where plumbing fixtures are required.

Send for this Blue Book of Plumbing—just off the press. Ask for catalogue "T" or use the coupon below.

THE TRENTON POTTERIES COMPANY

Trenton, New Jersey, U. S. A.

Philadelphia **New York** **San Francisco** **Boston**

World's Largest Makers of All-Clay Plumbing Fixtures

Export Office—115 Broad St., New York City

THE TRENTON POTTERIES COMPANY
Trenton, New Jersey, U. S. A.

Gentlemen:

Kindly send me a copy of your catalogue "T" entitled the Blue Book of Plumbing.

Firm .....

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Another Monument to Creative Genius

Massive in size—beautiful in architecture and substantial in material—this great building joins the company of some of America's finest structures. Can one imagine anything but the highest of quality in the mechanical equipment for such a building as this.

Architects and engineers who have a reputation for thoroughness have eliminated much of uncertainty in passing on the specifications for materials here. And when it came to the tubular equipment—the arteries of this housing, the backbone of its mechanical future—"NATIONAL" Pipe was specified for the major pipe tonnage, a tribute to its ability to serve with satisfaction for years and years to come. "NATIONAL" Butt-weld Pipe (sizes ½ to 3-inch) is the only pipe made by the Scale Free Process.

NATIONAL TUBE COMPANY, PITTSBURGH, PA.

Room in the Soho Day Nursery. Here children are living in the real sunlight transmitted by windows of QUARTZ-LITE GLASS.

Quartz-Lite Glass brought health to these Pittsburgh Children

In the heart of the Pittsburgh mill district, the Soho Day Nursery has "opened" its windows to the ultra-violet rays of the sun by glazing the windows with QUARTZ-LITE, the new health glass.

The Director of the nursery writes that the children exposed to the sunlight transmitted by this wonderful health glass are now developing healthy coats of tan and that those suffering from anemia and rickets have already shown amazing signs of improvement in health. QUARTZ-LITE is a beautifully clear, flat glass of brilliant lustre and high quality—the proper specification for a modern building whether it be a home, office building, hospital or industrial plant.

QUARTZ-LITE retails for only 50 cents per square foot. At this remarkably low price it is available for general glazing purposes.

Leading dealers are now handling QUARTZ-LITE GLASS. If your dealer does not carry it, write us direct. We shall be pleased to send you the QUARTZ-LITE booklet and specification sheet free. Write for them today.

Free Booklet

The booklet contains some very interesting information concerning QUARTZ-LITE GLASS *and explains how essential the sun's ultra-violet rays are in maintaining health.*

Quartz-Lite
TRADE MARK

The Ultra-Violet Ray Glass

AMERICAN WINDOW GLASS COMPANY

World's Largest Producer and Pioneer Manufacturers of Machine-Made Window Glass of the finest quality—"The BEST Glass"

PITTSBURGH, PA.

THE STANDARD ROOF OF THE 90's IS STILL STANDARD TODAY

"The building industry, too, saw great changes—changes in ornament, mass, form, detail, material, interior planning.

"But one thing did not change. Architects and builders held fast to the type of roof which during a quarter of a century had proved its superiority.

"This was the well constructed roof of coal tar pitch and felt."

* * *

Building records extending over the last three-quarter's of a century offer the most impressive proof of the durability of pitch and felt built-up roofs. Many of these roofs are still giving weather-tight protection after 40 years or more of service. Logically enough, you find that today many of our finest buildings are protected with The Barrett Specification Roof—a pitch and felt roof.

When you specify a Barrett Specification Roof, a Surety Bond is issued guaranteeing the building owner against repairs or maintenance expense for 10 or 20 years. And back of every one of these Surety Bonds stand these factors:

When a roof is laid all work must be done by an experienced roofer who is approved by The Barrett Company—a Barrett Inspector supervising each step of the job to see that The Barrett Specification is followed every inch of the way.

Directly after the roof is down the Barrett Inspector makes the famous "cut test." And not until this test is made does his O.K. release the Surety Bond.

Two years after the roof is finished the Barrett Inspector again checks up—makes a thorough re-examination of the roof.

Little wonder that Barrett Specification Roofs give dependable service many years after the 20-year guarantee has run out. For complete information about these trouble-free roofs, dictate a brief note to our Built-Up Roof Department.

A Fact Established by Time—

A wearing surface of slag or gravel is essential to right roof construction.

It holds in place and protects the heavy top-coat of pitch — makes possible the use of more than twice the amount of waterproofing material otherwise practical.

A Barrett Specification Roof with its slag (or gravel) surface carries the Underwriters' Class A rating.

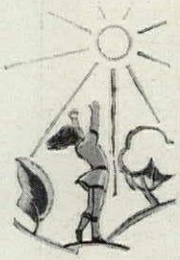
THE BARRETT COMPANY
40 Rector Street, New York City

IN CANADA:
The Barrett Company, Ltd.
5551 St. Hubert Street, Montreal, Quebec, Canada

Barrett Specification Roofs

Windows can now be AVENUES of HEALTH

With Vita Glass you can bring into every structure you design the real vital ultra-violet rays of daylight



BEAUTY and health —your design assures the former; your use of windows glazed with Vita Glass brings inside the house the latter.

What is Vita Glass? Window glass — yes. But much more. Vita Glass admits more light than ordinary window glass. Most important of all, it permits the passage indoors of the life-giving ultra-violet light rays, which have their influence on life outdoors but which cannot pass through ordinary glass. These rays are known to science as the rays in the sun's spectrum between 2900 and 3200 Angstroem Units. They are the rays that tan the skin—those deemed so necessary by medical science for building up resistance to sickness and disease.

Where can Vita Glass be used?

Since its discovery in England by the eminent scientist, Prof. F. E. Lamplough, of Trinity College, Cambridge, Vita Glass has been under constant observation by scientists. The Council on Physical Therapy of the American Medical Association and the Bureau of Standards in Washington have tested and proved its qualities for use wherever ordinary window glass is used —wherever human beings spend their daylight hours indoors.

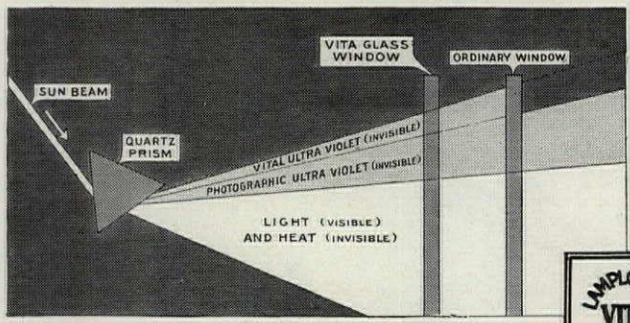


Diagram showing how Vita Glass pane permits the invisible, health-giving ultra-violet rays to pass through while ordinary glass absorbs and stops their passage.

LAMPLOUGH VITA-GLASS

*TR. MK. REG. U.S. PAT. OFF.

Architects will appreciate the extra service they can give their clients by specifying Vita Glass, especially for sun porches and nurseries. Not only are they designing structures of beauty and utility, but they are also contributing to the longer life and sounder health of the owner and his family by recommending Vita Glass.

Forms of Vita Glass

Vita Glass, whether for replacement of ordinary window glass or for new construction, is cut, handled and installed exactly like ordinary glass. It comes cut to specification in two forms: *Clear*, permitting unobstructed vision to the same extent as ordinary glass; and *Cathedral*, for use wherever obstructed vision is desired.

Every pane of Vita Glass is sold with the guarantee that it will transmit light to the farthest limit of the sun's spectrum; i. e., 2900 Angstroem Units. Each pane bears the trademark label shown here.

Vita Glass is sold on a square-foot basis. The price is slightly higher than that of ordinary window glass. This new glass can be obtained through usual glass channels. We will gladly send further information and data at your request. Address Dept. F. 1, Vitaglass Corporation, 50 E. 42d Street, New York City.

VITA GLASS

When you plaster over *STEELTEX*

You Reinforce..

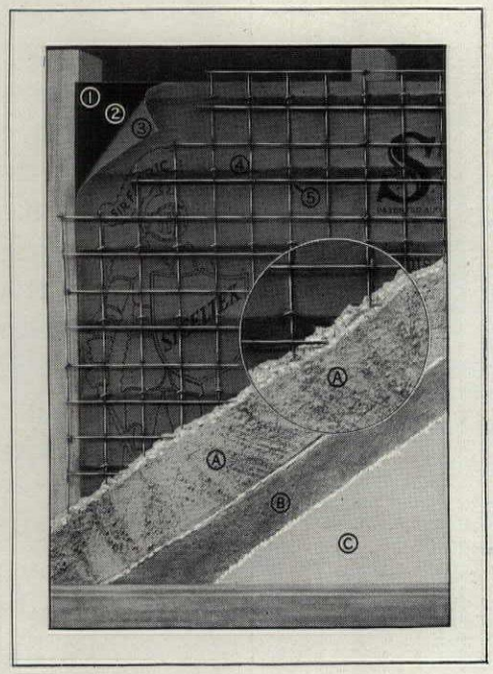
Insulate..Damp-proof..

Sound-deaden..

YOU know the expense, trouble and annoyance caused by plaster cracks. You know the value of insulation, damp-proofing and sound-deadening. Study the illustration and see how STEELTEX—used in place of every type of lath—helps you meet all four problems.

See the plaster reinforced exactly like concrete—with embedded steel! See how walls and ceilings are tight-sealed by a heavy waterproof insulating backing.

The steel network is rust-proofed and electrically welded. It has equal strength against strains from all directions. The backing is specially processed to resist the passage of cold, heat, dampness, and noise.



Section showing STEELTEX and how it is used

① Waterproof backing
② Waterproof compound
③ Second tough backing
④ Furring device
⑤ Rust-proofed steel reinforcing fabric
A Scratch coat of plaster
B Straightening coat
C Finishing coat

Four results when you plaster over STEELTEX but the cost is no greater than for a first-class plaster job over any other material. Send the coupon below and learn the details of this modern method of plastering already used in over 110,000 buildings.

National Steel Fabric Company

DIVISION OF Pittsburgh Steel Co.

601 Union Trust Building, Pittsburgh, Pa.
New York, 726 Liggett Bldg., *Van. 6432*
Atlanta, Ga.; Chicago, Ill.; Cincinnati, O.; Portland, Ore.; Seattle, Wash.; Cleveland, O.; Detroit, Mich.; Los Angeles, Calif.; San Francisco, Calif., San Antonio, Tex.; Philadelphia, Pa.; Pittsburgh, Pa.; St. Louis, Mo.

STEELTEX

REINFORCES . . . INSULATES . . . DAMP-PROOFS . . . DEADENS SOUND

National Steel Fabric Company
601 Union Trust Building,
Pittsburgh, Pa.

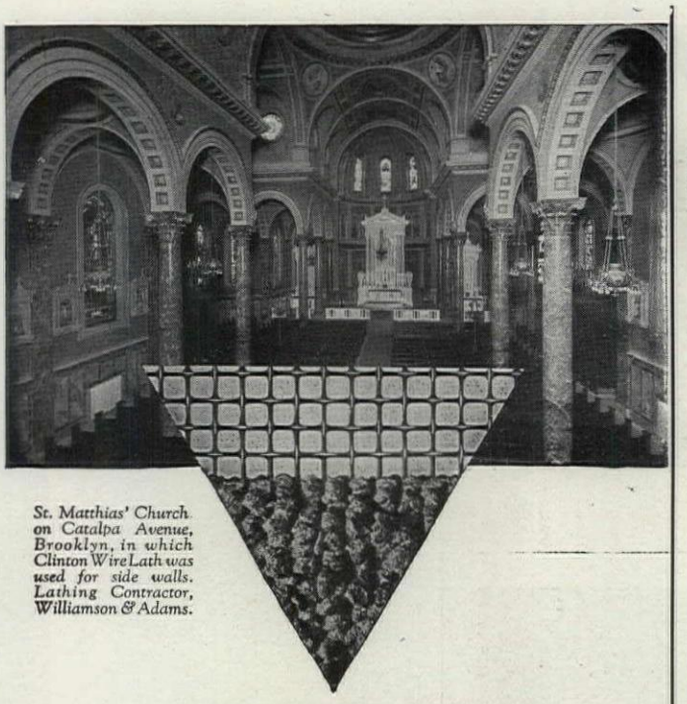
Please send me, without obligation, copy of your booklet, "Reinforced Plaster Construction."

Name_____

Street_____

City_____ State_____

WORLD'S LARGEST MANUFACTURERS OF WELDED STEEL FABRIC



St. Matthias' Church on Catalpa Avenue, Brooklyn, in which Clinton Wire Lath was used for side walls. Lathing Contractor, Williamson & Adams.

CLINTON WIRE LATH

Used in Beautiful St. Matthias' Church

THE best wire lath forms such a very small part of the cost of beautiful buildings, that common sense insists upon its use. This is why nothing but Clinton Wire Lath was used as the foundation for the plaster work in St. Matthias' Church, on Catalpa Avenue, Brooklyn. The New York Telephone Building, the American Wing of the Metropolitan Museum of Art, St. Vincent's Hospital and many other famous structures prove the permanence and beauty that Clinton Wire Lath gives to any plaster or stucco work.

The wires in Clinton Wire Lath are far stronger than sheet steel can possibly be made. They are woven into a close, square mesh which is then dipped in molten zinc. This thoroughly protects them from rust.

The plaster or stucco penetrates this mesh no matter what direction of stroke is used in trowelling. The mortar is gripped in the firmest kind of bond. The horizontal and lateral wires form a double key for the plaster—perfect and continuous.

It is easily handled, quickly put in place. Stock grades furnished in wire gages from No. 18 to No. 21; either plain or with V-stiffeners which act as furring strips.

Write for information and 54-page booklet on Clinton Wire Lath.

WICKWIRE SPENCER STEEL CO.

General Offices: 41 East Forty-second Street, New York
Western Sales Office: 208 South La Salle Street, Chicago

Worcester Buffalo Cleveland Detroit
San Francisco Los Angeles Seattle

Wickwire Spencer Steel Co.
Dept. 1-AF, 41 East 42nd St., New York City

Please send me additional information regarding Clinton Wire Lath.

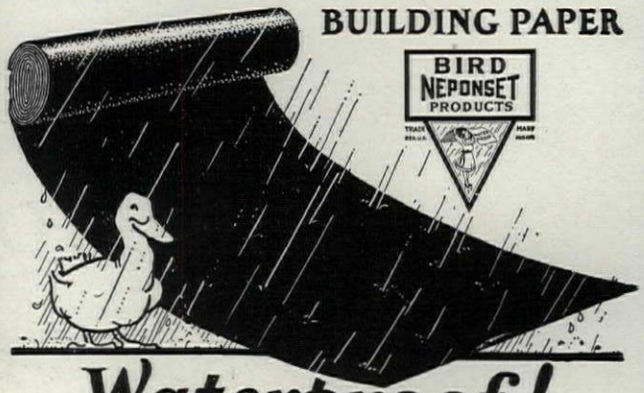
Name.....

Address.....

SAMPLES DISPLAYED WITH ARCHITECTS SAMPLES CORPORATION NEW YORK, N.Y.

WICKWIRE SPENCER PRODUCTS

BIRD'S NEPONSET BLACK BUILDING PAPER



Waterproof!

NEPONSET BLACK is a tough, heavy Waterproof Building Paper that keeps out dampness and drafts. Its glistening, asphalt-coated surface sheds water like a duck's back.

For a permanent barrier against the elements, specify Bird's Neponset Black. Over roof boards and under slate, tile, metal or asphalt shingles it makes a watertight covering. When placed back of stucco and under clapboards or shingles it keeps out drafts and dampness and makes the heating of the house more economical.

Your contractor or builder can get Neponset Black at a moment's notice. It is standard stock with dealers in Bird's Building Products. Refer to Sweet's or write to us for complete specifications.

BIRD & SON, inc.

Established 1795
EAST WALPOLE, MASS.

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1472 West 76 Street
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Building Products, Ltd.
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Manufacturers of

NEPONSET TWIN SHINGLES
PAROID ROOFING
Bird's Asphalt Shingles
Bird's Design Roofing
Bird's Neponset Black Building Paper
Bird's Neponset Rugs
and Floor Coverings

In many of America's finest buildings, of which the Knights of Columbus Building at Brooklyn, New York, is a good example, Wheeling Standard Pipe is being used.

Architects:
Short & Riggs, Brooklyn

"From Mine WHEELING STEEL *to Market"*

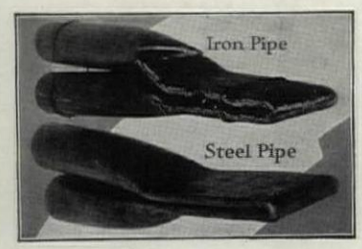
Standard Pipe with a Real Standard of Quality

POSSESSING 30% more tensile strength than iron pipe—50% greater ductility—and being free from hard spots, Wheeling Standard Pipe insures uniformly satisfactory installations. The production exceeds the total tonnage of all iron pipe by thousands of tons per annum.

By accumulating its quality along the route of "Mine to Market" manufacture, Wheeling Standard Pipe provides a real standard for all specifications. It enables you to insure the builder of continued, trouble-free service at a distinct saving in first and last cost.

It gives the pipe fitter the qualities essential to finest workmanship.

Write "Wheeling Standard Pipe" into the specifications.



Flattened, folded back upon itself, and again flattened, Wheeling Steel Pipe demonstrates greater toughness than average use ever requires.

WHEELING STEEL CORPORATION, WHEELING, WEST VIRGINIA

995 Fifth Ave., New York City
Owner—995 Fifth Ave. Corp.
Arch.—Rosrrio Candela, New York City

820 West End Ave. New York City
Owner—225 W. 71st St. Corp.
Arch.—Rosario Candela, New York City

All of the apartment buildings here shown are equipped with McDougall Domestic Science Built-in Kitchen Units

28th St. & Park Ave., S. W. Corner
New York City
Owner—38th St. & Park Ave. Corp.
Arch.—Harry Ives Cobb, Jr.
New York, N. Y.

Your client is certain to be pleased

If your specifications call for McDougall Domestic Science Built-in Units, your client is certain to be pleased with one of the most important of all rooms in any modern home or apartment building.

For McDougall assures the very finest type of beauty, convenience and space economy in the kitchen.

Not forgetting that every McDougall Unit is backed by a service that guarantees absolutely correct installation, and therefore lasting satisfaction.

Let us send specific information as to just how this service can be of direct help to you.

Also let us mail you a copy of our illustrated catalogue. It will be forwarded to you promptly on request.

MCDOUGALL COMPANY
Frankfort, Indiana

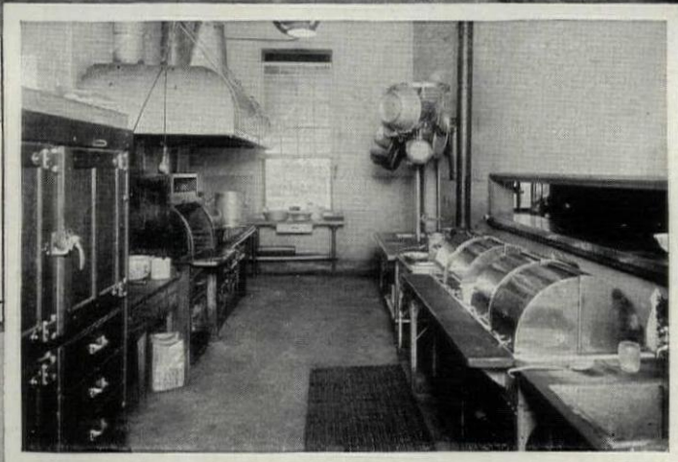
Chicago Office:
McDougall Company, 180 N. Michigan

McDougall
DOMESTIC SCIENCE BUILT-IN
Kitchen Units

New York Office:
Built-in Products Co., 19 W. 44th St.

Park View Hotel, Venice, Florida

A PLEASANT place to enjoy one's meals—and an efficient one in which to prepare and serve them—is this Coffee Shop of the Park View Hotel, Venice, Florida. It is typical of the successful Van installations all over the country.



THE Van Kitchen of the Park View Hotel (above) is a marvel of compactness. Not a foot of floor space wasted—yet everything required for food preparation is provided.

Left, another general view of the Park View Hotel Coffee Shop, showing the large horseshoe counter with service slide in the rear.

An *Advanced* Idea

..and a Profitable *idea for builders*

No other kitchen equipment has this feature

HERE is a new kitchen unit which adds value out of all proportion to its cost, to homes and apartments. The famous Napanee Dinet [patented]. Domestic science tests have proved that this outstanding achievement in kitchen cabinet design lightens kitchen tasks immeasurably. Women everywhere have acclaimed it for the new note it strikes in kitchen organization.

The Dinet is a vanishing breakfast table. It performs. It slides in and out—cutlery drawers moving with it. It is out of sight, yet in a moment it adds tremendous extra table space so necessary in the preparation of a meal. It is priceless for its extra room at a time of preparation for big parties and dinners—providing, for instance, space for salads and desserts till time for serving.

In the larger model it seats four people comfortably. In other models it will seat three people. Condiments, dishes, silver, etc., are right at hand. When not in use, the Dinet is pushed back in place and does not take up a single inch of storage space, nor does it disarrange the other Napanee conveniences in any way. No other cabinet can give all the service of Napanee equipped with a Dinet.

The Napanee Dinet is only one unit in the extensive Napanee line which embraces sizes and styles of kitchen cabinets, butler cabinets, broom closets, dish cupboards, refrigerators, wall cupboards, bases and the like to fit any space and any arrangement of doors and windows.

Our Architectural Service Department will gladly work with you to help you attain the utmost of kitchen efficiency through the proper combination of Napanee units. Send the coupon for full information on this FREE service.

COPPES BROS. & ZOOK, *Nappanee, Indiana*

New York Office 415 Lexington Ave *Detroit Office* General Motors Bldg
Chicago Office: 308 N Michigan Ave., Keehn Bldg.
Agents in All Principal Cities

NAPANEE
DUTCH KITCHENET
Built Like Fine Furniture

OUR GOLDEN ANNIVERSARY YEAR

COPPES BROS. & ZOOK, Nappanee, Indiana AF-1

Gentlemen: Please send me further information regarding styles, sizes and arrangements of Napanee Kitchen Equipment. I am [ ] Architect [ ] Builder [ ] Owner. (Please check square)

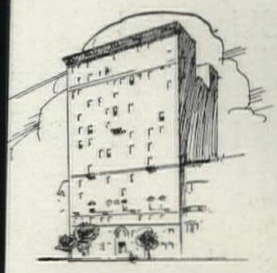
Name_____

Address_____

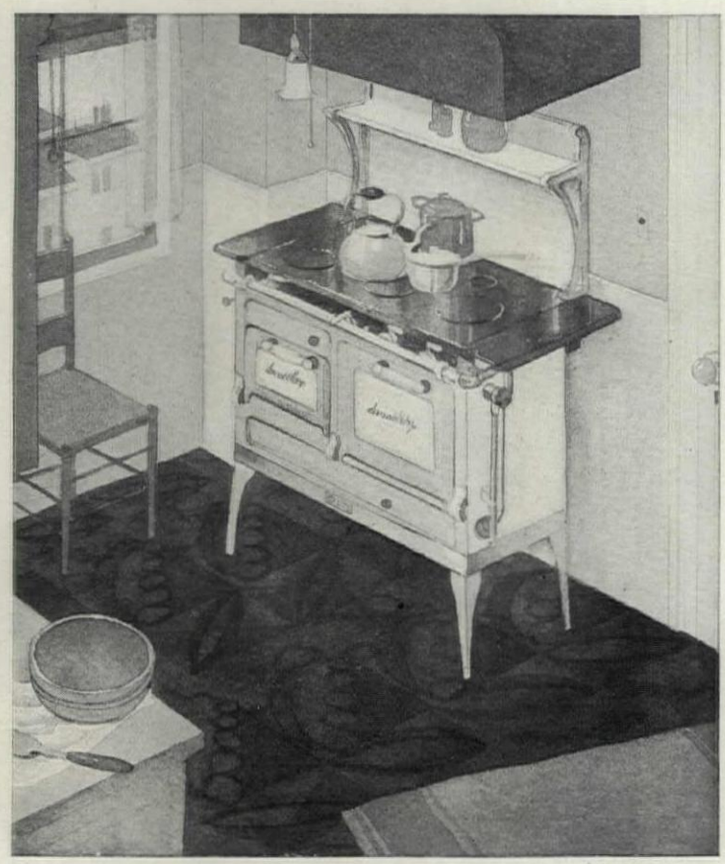
City_____ State_____

PATERNO BROS.

typify the owners who select Smoothtop



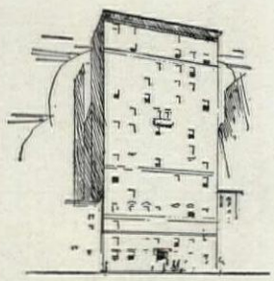
"315 West 106th Street"
Forty-five Smoothtops serve tenants who demand service . . . who get service—because of Smoothtop.



THIRTY years' building experience is behind the planning of "325 West 86th Street" and "315 West 106th Street," New York. Architecturally significant, they symbolize the new growth of smart apartments on the West Side. Their interiors display forcibly the Paterno genius for including every advance in apartment house equipment.

"Take the ninety Smoothtop gas ranges in our kitchens," said John A. Paterno, Vice-Pres. of Paterno Bros., in charge of construction. "Those Smoothtops really facilitate kitchen planning. They save space and allow more light to enter. And, with their smart enamel finish and console lines, they *do* 'dress up' a kitchen.

"Most tenants—both prospective and signed—know Smoothtop. In fact, many insist on it. Considering all this, what choice have we but to *install* Smoothtop?"



"325 West 86th Street"
Light, airy kitchens . . . modern, scientific cooking—because of Smoothtop.

Our Building Service Dept. has collected data of practical help in kitchen planning for architects, builders and owners of apartments or multiple housing projects.

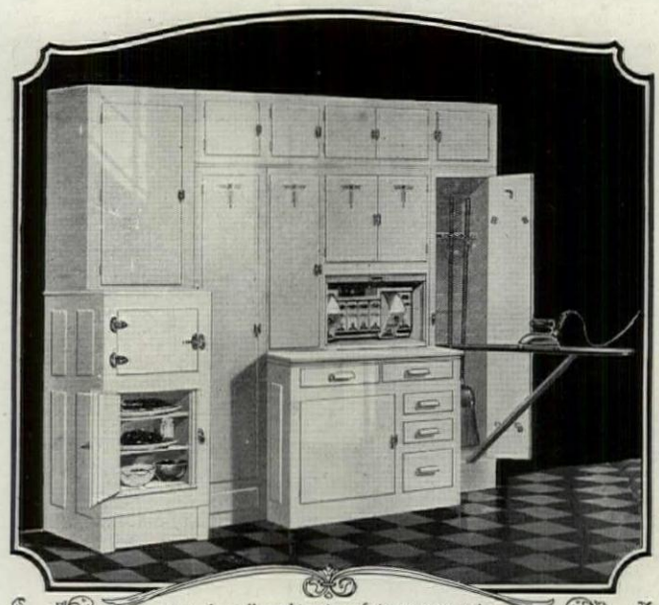
Please feel free to make any inquiry concerning your special problem. Address: Standard Gas Equipment Corp., 18 East 41st Street, New York City.

STANDARD GAS EQUIPMENT CORP., MAKERS OF VULCAN HOTEL RANGES, ORIOLE, ACORN AND

Smoothtop
REG. U.S. PAT. OFF.
GAS RANGES

KITCHEN MAID

STANDARD UNIT SYSTEMS



A single wall combination of six separate units

Color Variety adds new distinction to these charming kitchen units

Alluring new possibilities for effective kitchen planning unfold with the introduction of color in Kitchen Maid Units. Five exclusive finishes to choose from! Dove Gray—Cactus Green—Lama Tan—Travertine Ivory—Shasta White. Each with a tasteful decoration of contrasting color. And, if desired, the interior finish may be of one color—the exterior of another.

Thus, in addition to their exclusive rounded inside corners, smooth doors, concealed hinges and many convenience features, Kitchen Maid Units now offer another important element that will appeal instantly to your clients.

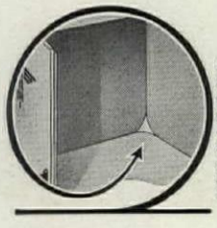
Each unit is complete in itself—may be used single or in a unit combination. Only a few of the many units are shown here. Write for complete catalogue, dimensional drawings and prices.

WASMUTH-ENDICOTT CO., 1801 Snowden St., Andrews, Ind.

"Let the Kitchen Maid Be Your Kitchen Aid"

KITCHEN MAID
STANDARD UNIT SYSTEMS

Representatives in all principal cities
If in Canada, address Branch Office, Waterloo, Ontario



Rounded inside corners and 5 ply smooth door construction—exclusive in Kitchen Maid Units

Broom Closet and Folding Ironing Board Combination.

Left—Compact No. 656—for the modern efficiency kitchen.

ALL WATER SUPPLIES
In This Great Country
Of
WATER CONSUMERS
Are
STEADILY DETERIORATING

Established 1880
B. T. LOOMIS
Originated and Patented
First Mechanical Filter
1880

They Will Never Be Better
EXCEPT? WHY?

Send For Booklet

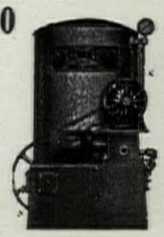
The Loomis-Manning Filter
Distributing Company
1424 South 37th Street, Philadelphia, Pa.

You need this Specification Book

Free This reference book on water supply, electric light and sewage disposal, gives you data and specifications for handling any private utility job from a cottage or bungalow to the largest country hotel, club or estate.
It's free—if requested. If it doesn't answer *all* your problems, KEWANEE engineers the country over are at your service. One of them is near you.

KEWANEE

"Bungalow Model Jr."
Water Supply System
Now $103.00



For the average residence this new Kewanee "Bungalow Model" puts in "city water" comforts at a surprisingly low cost. It has the same high Kewanee quality and "Engineered" Excellence as the other 200 Kewanee systems for water supply, electric lighting and sewage disposal. Automatic and requires only occasional oiling.
Write for the Architect's Specification Book Today
KEWANEE PRIVATE UTILITIES CO.
442 S. Franklin St. **Kewanee, Ill.**

CRODON

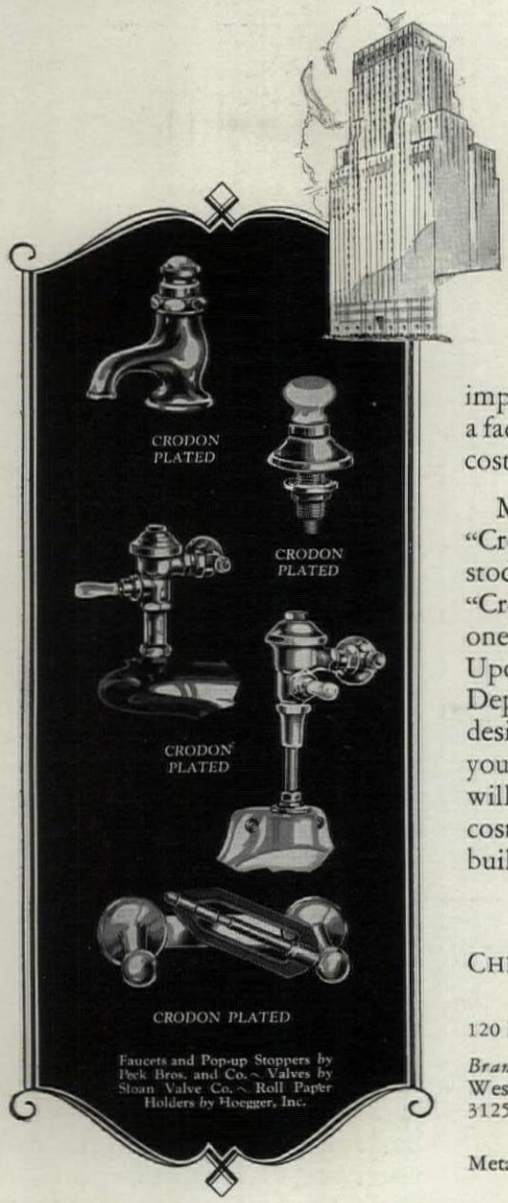
reduces operating costs at the Salmon Tower.

PERMANENTLY mirror-bright plumbing fixtures. That is the "Crodon" contribution to efficient management of the Salmon Tower—one of New York's newest and finest office buildings.

Because they are "Crodon"-plated the hundreds of faucets, valves, pop-up stoppers and other lavatory fittings used throughout the building will not tarnish, corrode or water spot. No need for using polishing cloths, pastes or polishes. Merely an occasional wiping off with a damp cloth to remove dust or grease is all that is required.

Cleaning costs amounting to thousands of dollars yearly are thus saved.

"Crodon" is seven times harder than nickel and resists wear indefinitely. This means additional long service from each fitting and lowered operating costs.



The fact that "Crodon"-plated plumbing fixtures have been installed in many other prominent buildings throughout the country is indicative of the importance of "Crodon" as a factor in reducing operating costs.

Manufacturers carry "Crodon"-plated fittings in stock or can have fittings "Crodon"-plated for you in one of our own plants. Upon request our Service Department will give any desired information or refer you to our licensees, who will provide estimates of the cost of "Crodon" for any building project.

CHROMIUM CORPORATION *of* AMERICA

120 Broadway New York City

Branch Offices and Plants: 4645 West Chicago Ave., Chicago, Ill.—3125 Perkins Ave., Cleveland, O.—*and at* Waterbury, Conn.

Metal and Thermit Corp., *Agents* South San Francisco, Cal.

CRODON

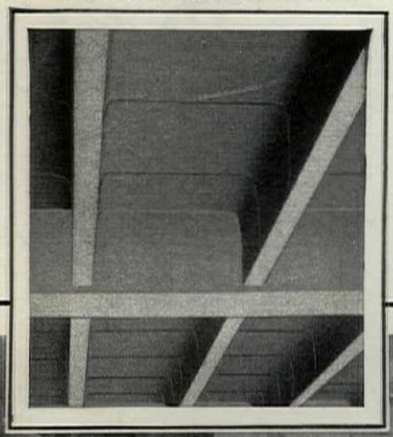
TRADE MARK REG. U. S. PAT. OFF.

THE CHROME PLATE

PERMANENTLY BEAUTIFUL · DOES NOT TARNISH · WEARS INDEFINITELY

Why Architects Specify this Concrete Joist Floor Construction

Note the clean-cut, good-looking joists when Meyer Steelforms are removed.



Meyer Intermediate Steelforms are furnished in 1, 2 and 3 ft. lengths. Standard widths are 20 in. and 30 in. Special widths 10 in. and 15 in.

Note the rigidity of Meyer Steelforms. The heavy 16-gauge sheet steel permits walking and trucking over the forms without bending them. This speeds up work on the job.

THE Meyer Steelform is a pioneer in concrete joist floor construction, representing best fireproof floor construction for buildings with ordinary loads and spans.

Economical: Meyer Steelforms eliminate waste and idle concrete. The extremely simple centering required alone makes considerable savings in labor, lumber and time.

Speed up work: The heavy gauge sheet steel and the stiffening reinforcements allow walking and trucking over forms without danger of bending them.

Our Service: Meyer Steelforms are handled on a rental basis only with the erection and removal by our organization. We are equipped to "follow thru" from the vision of the structure to the finished concrete floor.

Call our nearest office and ask for a representative to show you how Meyer Steelforms can do these things for you. A book on the details of these and other Ceco Products will be sent on request. Write 101 N. 11th St., Omaha.

A Ceco Product

MEYER STEELFORMS

CONCRETE ENGINEERING CO.

GENERAL OFFICES: OMAHA

Offices and Warehouses:

Kansas City Chicago Minneapolis
Milwaukee Detroit St. Louis
Des Moines Oklahoma City Dallas
Houston San Antonio Los Angeles

Some Recent Meyer Steelform Jobs:

De Paul University - - - - - Chicago, Ill.
Hugh Manley School - - - - Chicago, Ill.
Rochester Masonic Temple Rochester, N.Y.
Pittsburger Hotel - - - - Pittsburgh, Pa.
Guyon Apartment - - - - - Chicago, Ill.
Lincoln-Belmont Y. M. C. A. - Chicago, Ill.
Oak Park Field House - - - Oak Park, Ill.
Mayo Clinic - - - - - Rochester, Minn.
Michigan Bell Telephone Co. Detroit, Mich.
Engineers Building - - - - - Chicago, Ill.
Shreveport Medical Arts - Shreveport, La.
Gary State Bank - - - - - - Gary, Ind.
Michigan Ave. Office Bldg. - Chicago, Ill.
South Shore Beach Apartment Chicago, Ill.
Chicago Evening Post - - - - Chicago, Ill.
Fox Theatre - - - - - - - Detroit, Mich.
Pearl Street School - - Kalamazoo, Mich.
Linden Apartment - - Long Beach, Calif.
O'Neill Store - - - - - - - Akron, Ohio
Howell-Thies Hotel - - Dodge City, Kans.
Stuart Building - - - - - Lincoln, Nebr.
High School - - - - - - Green Bay, Wis.
Elms Realty Apartment - Milwaukee, Wis.
Washington Park High School Racine, Wis.

Other Ceco Products

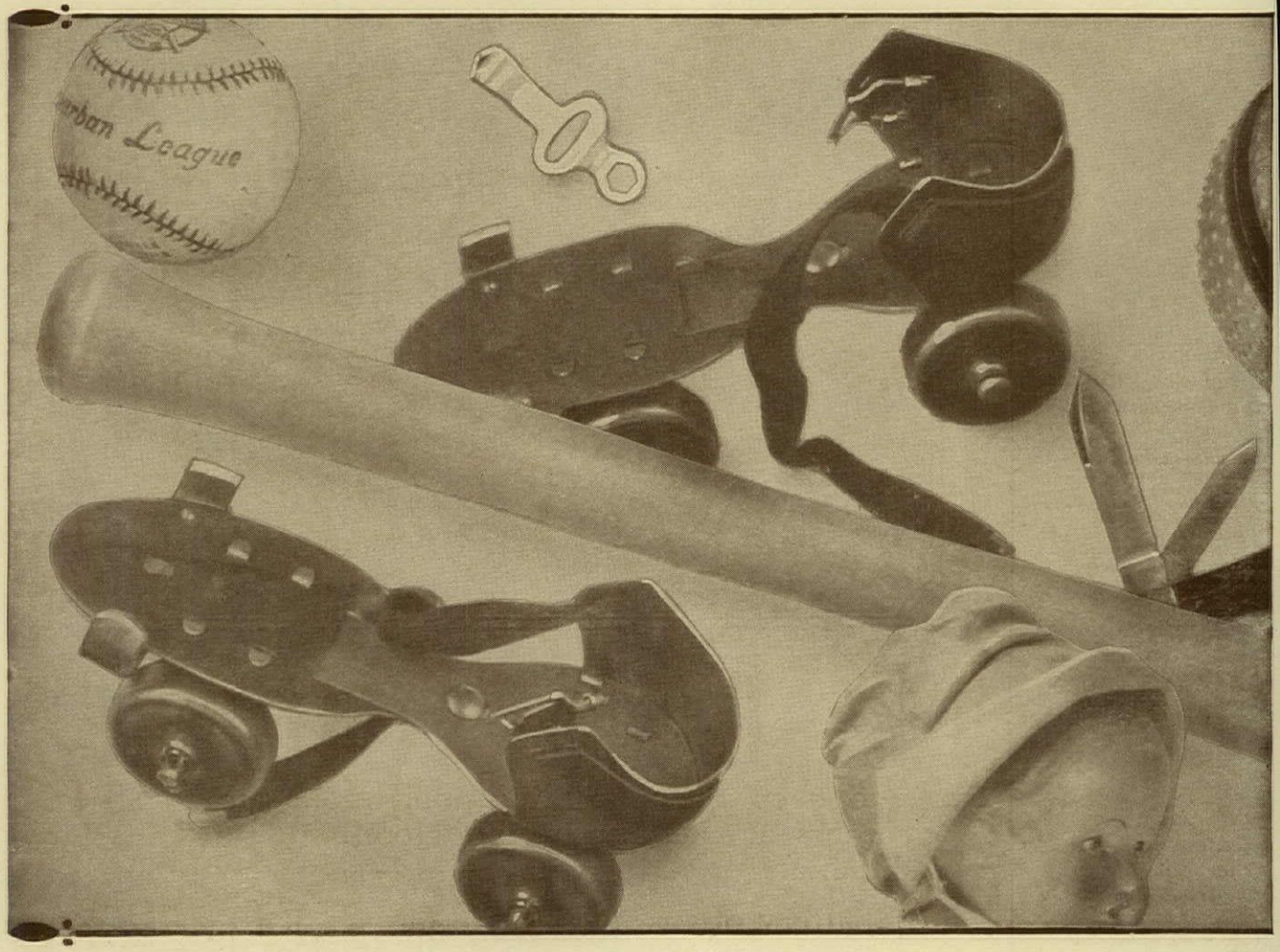
Meyer Adjustable Shores
Meyer Adjustable Column Clamps

Ceco Reinforcing Bars and Bar Chairs
Ceco Triangle Mesh and Welded Fabric
Ceco Column Spirals

Ceco Metal Lath and Hook Hangers
Ceco Hot and Cold Rolled Channels
Ceco Corner, Base Bead and Mouldings

(285) Ceco Metal Weather Strips and Screens

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 important sanitation factor — or that an unflushed closet can cause terrific damage to health and efficiency.

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

The Clow Automatic Closet. This practical wall-hung style allows cleaning of floor underneath. Closed top tank is concealed in utility corridor.

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.

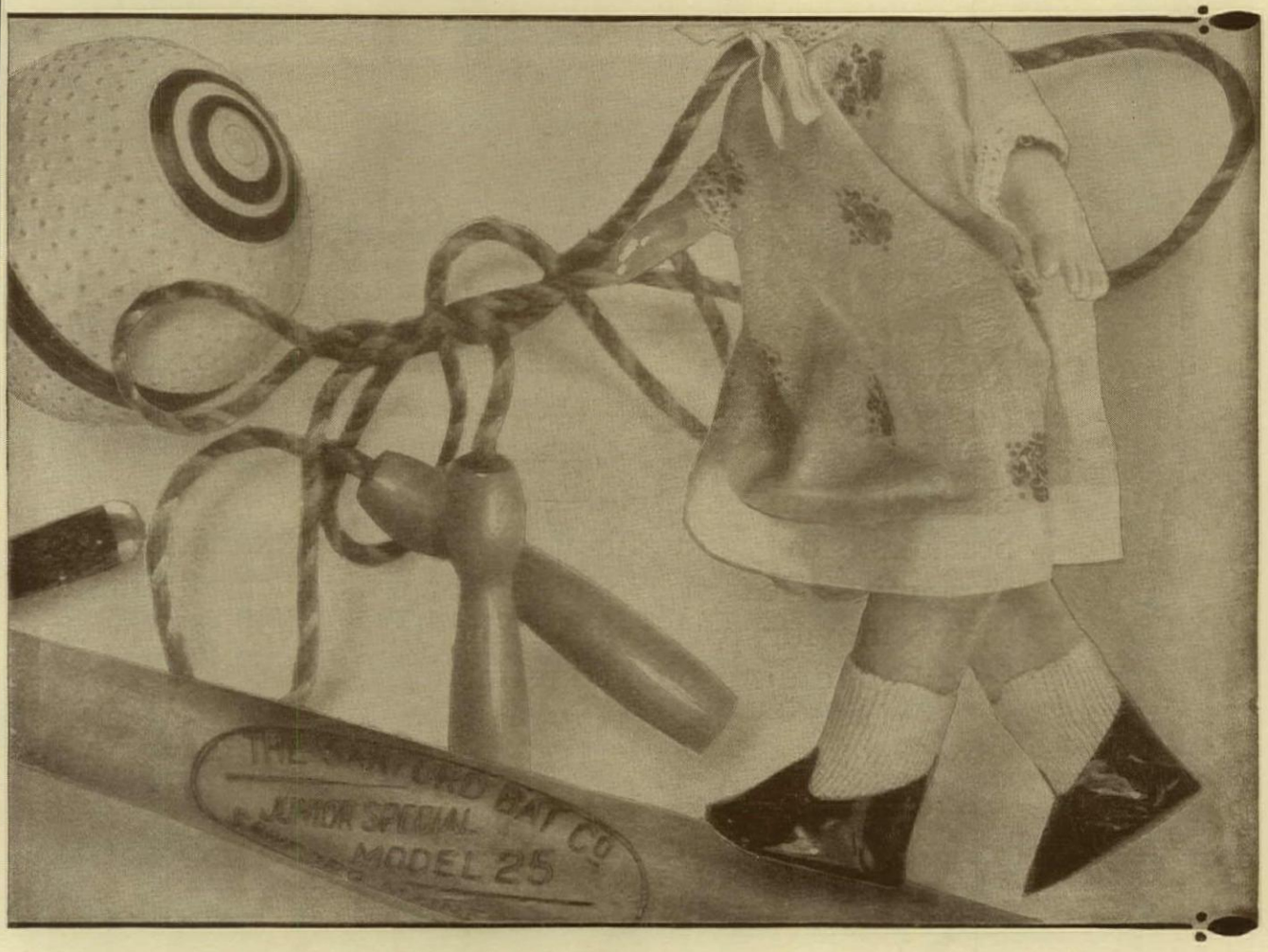
JAMES B. CLOW & SONS

CLOW

NEVER

Forty-Eight Styles, Heights and Types to Meet Your Requirements

and Girls Think Of?



dolls, games — or water closets?

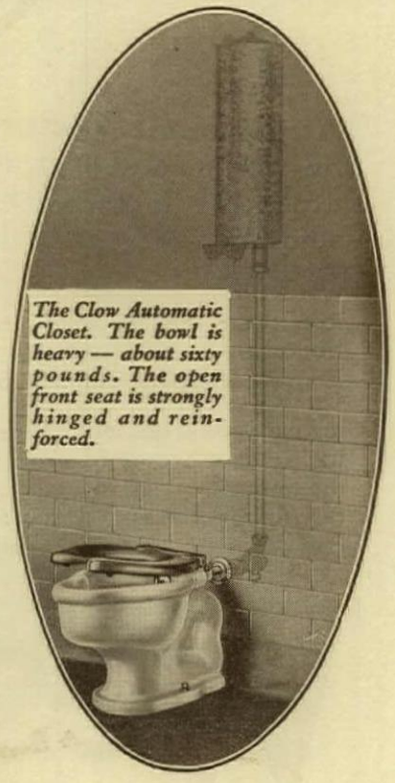
With it, careless children cannot cause insanitary closet conditions.

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



The Clow Automatic Closet. The bowl is heavy — about sixty pounds. The open front seat is strongly hinged and reinforced.

AUTOMATIC

FORGETS

Forty-Eight Styles, Heights and Types to Meet Your Requirements

The Unit Frame Construction

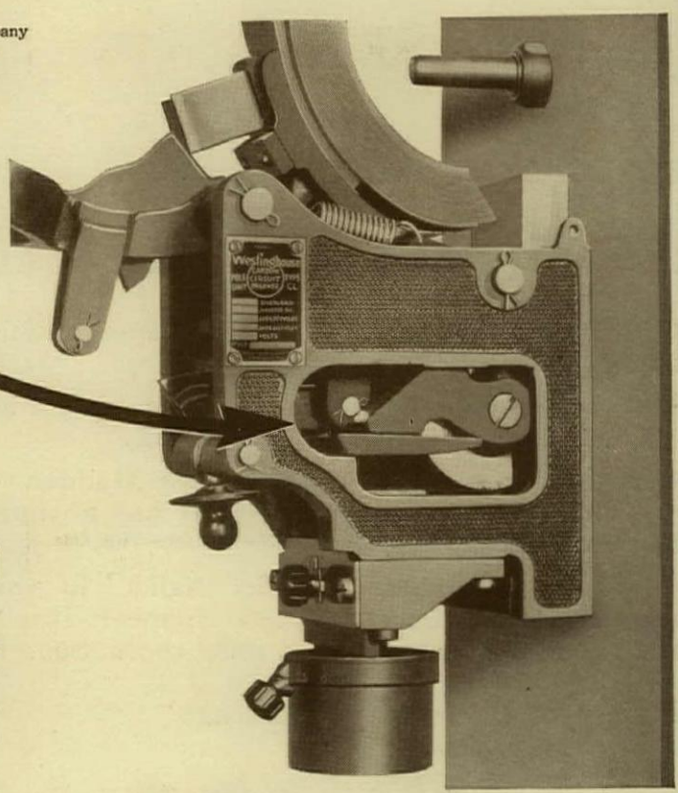
Of the Westinghouse CL Carbon Circuit-Breaker

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.

Westinghouse Electric & Manufacturing Company
East Pittsburgh Pennsylvania
Sales Offices in All Principal Cities of the United States and Foreign Countries



The Unit Frame of Type CL Breakers

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

X94918

Selected List of Manufacturers' Publications

FOR THE SERVICE OF ARCHITECTS, ENGINEERS, DECORATORS, AND CONTRACTORS

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

ACOUSTICS

The Celotex Co., Chicago.
Acousti-Celotex. 16 pp., 8½ x 11 ins. Illustrated brochure on a valuable material for facing walls and ceilings.
Specifications and Details for application and decoration of Acousti-Celotex, 11 pp., 8½ x 11 ins.

R. Guastavino Co., 40 Court St., Boston.
Akoustolith Plaster. Brochure, 6 pp., 10 x 12½ ins. Important data on a valuable material.

Johns-Manville Corp., Madison Ave. & 41st St., New York, N. Y.
Architectural Acoustics. Booklet., 6 x 9 in. 24 pp. Illustrated. Treatise on the correction of architectural acoustics in churches, schools, hospitals, office buildings and other places.

U. S. Gypsum Co., 205 W. Monroe St., Chicago, Ill.
A Scientific Solution of an Old Architectural Problem. Folder 6 pp., 8½ x 11 ins. Describes Sabinite Acoustical Plaster.

ASH HOISTS—ELECTRIC AND HAND POWER

Gillis & Geohegan, 535 West Broadway, New York, N. Y.
General Catalog. 8½ x 11 ins. 20 pp. Fully illustrated. Contains specifications in two forms (with manufacturers' name and without). Detail ¼ in. scale for each telescopic model and special material-handling section.
G. & G. Telescopic Hoist. Brochure, 24 pp., 8½ x 11 ins. Illustrated. Electric and hand power models; watertight sidewalk doors; automatic opening, closing, and locking devices.

BASEMENT WINDOWS

Genfire Steel Company, Youngstown, Ohio.
Architectural Details. Booklet, 62 pp., 8½ x 11 ins. Details on steel windows.

Truscon Steel Co., Youngstown, Ohio.
Truscon Copper-Steel Basement Windows. Booklet, 8 pp., 8½ x 11 ins. Illustrated with installation details. Specifications and construction details.

BATHROOM FITTINGS

A. P. W. Paper Co., Albany, N. Y.
Onliwon for Fine Buildings. Folder, 8 pp., 3¼ x 6 ins. Illustrated. Deals with toilet paper fittings of metal and porcelain.
Architects' File Card. 8½ x 11 ins. Illustrated. Filing card on toilet paper and paper towel cabinets.
A Towel Built for Its Job. Booklet, 8 pp., 4¼ x 9⅝ ins. Illustrated. Paper Towel System and Cabinets.
Cabinets and Fixtures. Booklet, 31 pp., 5¾ x 4¾ ins. Illustrated. Catalog and price list of fixtures and cabinets.

Morton Mfg. Co., 5163 West Lake St., Chicago.
Bathroom Cabinets for Homes, Apartments, etc. General Catalog, 20 pp., 8 x 10¾ ins. Illustrated. Specifications, installation details, etc.
Booklet, 12 pp., 3¼ x 6¼ ins. Illustrated. Deals with four models of bathroom cabinets.

BRICK

Acme Brick Company, Ft. Worth, Tex.
Series No. 1
Architectural designs rendered in Acme Brick. Booklet. 11 x 8½ ins. Illustrated. A series of 48 photogravures showing architectural designs rendered in Acme brick. Illustrations show the various types of buildings erected in the Southwest in recent years. Sent free to architects applying on their office stationery.

American Face Brick Association, 1751 Peoples Life Building, Chicago, Ill.
Brickwork in Italy. 298 pages, size 7½ x 10½ ins., an attractive and useful volume on the history and use of brick in Italy from ancient to modern times, profusely illustrated with 69 line drawings, 300 half-tones, and 20 colored plates with a map of modern and XII century Italy. Bound in linen, will be sent postpaid upon receipt of $6.00. Half Morocco, $7.00.
Industrial Buildings and Housing. Bound Volume, 112 pp. 8½ x 11 ins. Profusely illustrated. Deals with the planning of factories and employes' housing in detail. Suggestions are given for interior arrangements, including restaurants and rest rooms. Price, $2.00.

Common Brick Mfrs. Assn. of America, 2134 Guarantee Title Bldg., Cleveland.
Brick; How to Build and Estimate. Brochure, 96 pp., 8½ x 11 ins. Illustrated. Complete data on use of brick.
The Heart of the Home. Booklet, 24 pp., 8½ x 11 ins. Illustrated. Price 25 cents. Deals with construction of fireplaces and chimneys.
Skintled Brickwork. Brochure, 15 pp., 8½ x 11 ins. Illustrated. Tells how to secure interesting effects with common brick.
Building Economy. Monthly magazine, 22 pp., 8½ x 11 ins. Illustrated. $1 per year, 10 cents a copy. For architects, builders and contractors.

BUILDING, STEEL PRODUCTS FOR

Truscon Steel Company, Youngstown, Ohio.
Truscon Data Book. Catalog. 3½ x 6 in. 128 pp. Illustrated. Contains complete information with illustrations on Truscon reinforcing steel, steel windows, metal lath, standard buildings, concrete inserts, steel joists, pressed stamping and chemical products.

CEMENT

Carney Company, The, Mankato, Minn.
What Twelve Men Said About Carney. Booklet. 8½ x 11 ins. Illustrated. Opinions of well-known architects and builders of Carney Cement used for mortar.

CEMENT—Continued

Cement Gun Company, Inc., Allentown, Pa.
Gunite Bulletins. Sheet 6 x 9 ins. Illustrated. Bulletins on adaptability of "Gunite," a sand and cement product, to construction work.

Kosmos Portland Cement Company, Louisville, Ky.
Kosmortar for Enduring Masonry. Folder, 6 pp., 3½ x 6½ ins. Data on strength and working qualities of Kosmortar.
Kosmortar, the Mortar for Cold Weather. Folder, 4 pp., 3⅝ x 6½ ins. Tells why Kosmortar should be used in cold weather.

Louisville Cement Co., 315 Guthrie St., Louisville, Ky.
BRIXMENT for Perfect Mortar. Self-filing handbook, 8½ x 11 ins. 16 pp. Illustrated. Contains complete technical description of BRIXMENT for brick, tile and stone masonry, specifications, data and tests.

Pennsylvania-Dixie Cement Corp'n, 131 East 46th St., New York.
Celluloid Computing Scale for Concrete and Lumber, 4⅝ x 2½ ins. Useful for securing accurate computations of aggregates and cement; also for measuring lumber of different sizes.

CONCRETE BUILDING MATERIALS

Celite Products Co., 1320 South Hope St., Los Angeles.
Better Concrete; Engineering Service Bulletin X-325. Booklet, 10 pp., 8½ x 11 ins. Illustrated. On use of Celite to secure workability in concrete, to prevent segregation and to secure water-tightness.
Economic Value of Admixtures. Booklet, 32 pp., 6⅛ x 9⅛ ins. Reprint of papers by J. C. Pearson and Frank A. Hitchcock before 1924 American Concrete Institute.

Concrete Surface Corporation, 342 Madison Ave., New York.
Bonding Surfaces on Concrete. Booklet, 12 pp., 8 x 11 ins. Illustrated. Deals with an important detail of building.

Dovetail Anchor Slot Co., 149 West Ohio St., Chicago.
Dovetail Masonry Anchoring System. Fo'der, 4 pp., 8½ x 11 ins. Illustrated. Data on a system of anchoring masonry to concrete.

National Building Units Corporation, 1600 Arch St., Philadelphia.
Durability and Utility of Straub Cinder Building Blocks. Brochure, 14 pp., 8 x 11 ins. Report on this material by Pittsburgh Testing Laboratories.
Sound Absorption of Cinder Concrete Building Units. Booklet, 8 pp., 8 x 11 ins. Illustrated. Results of tests of absorption and transmission of sound through Straub building blocks.
Phi'adelphia. Cinder Concrete Building Units. Brochure, 36 pp., 8¼ x 10¾ ins. Illustrated. Full data on an important building material.

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

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

CONCRETE COLORINGS

A. C. Horn Company, Long Island City, N. Y.
Keramic Catalog. Booklet. 8½ x 11 ins. 26 pp. A magnificent brochure, illustrated in color, describing a valuable line of specialties for use with concrete floors—colorings, hardeners, waterproofing, etc.

The Master Builders Co., 7016 Euclid Ave., Cleveland.
Color Mix, Colored Hardened Concrete Floors (Integral). Brochure. 16 pp. 8½ x 11 ins. Illustrated. Data on coloring for floors.
Dychrome. Concrete Surface Hardener in Colors. Folder. 4 pp. 8 x 11 ins. Illustrated. Data on a new treatment.

CONSTRUCTION, FIREPROOF

Master Builders Co., Cleveland, Ohio.
Color Mix. Booklet, 18 pp., 8½ x 11 ins. Illustrated. Valuable data on concrete hardener, waterproofer and dustproofer in permanent colors.

National Fire Proofing Co., 250 Federal St., Pittsburgh, Pa.
Standard Fire Proofing Bulletin 171. 8½ x 11 ins. 32 pp. Illustrated. A treatise on fireproof floor construction.

Northwestern Expanded Metal Co., 1234 Old Colony Building, Chicago, Ill.
Northwestern Expanded Metal Products. Booklet. 8½ x 10¾ ins. 16 pp. Fully illustrated, and describes different products of this company, such as Kno-burn metal lath, 20th Century Corrugated. Plaster-Sava and Longspan lath channels, etc.
A. I. A. Sample Book. Bound volume, 8½ x 11 ins., contains actual samples of several materials and complete data regarding their use.

DAMPPROOFING

Philip Carey Co., Lockland, Cincinnati, Ohio.
Architects' Specifications for Carey Built-Up Roofing. Booklet. 8 x 10¾ 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 Buildings. Booklet. 8 x 10¾ ins. 32 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.
Waterproofing Handbook. Booklet. 8½ x 11 ins. 72 pp. Illustrated. Thoroughly covers subject of waterproofing concrete, wood and steel preservatives, dusting and hardening concrete floors and accelerating the setting of concrete. Free distribution.

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page 183*

DAMPPROOFING—Continued

A. C. Horn Company, Long Island City, N. Y.
Waterproofiing, 9½ x 11½ in. Folder. Contains folders giving data on excellent waterproofing and dampproofing materials.

The Master Builders Co., 7016 Euclid Ave., Cleveland.
Waterproofing and Dampproofing Specification Manual. Booklet. 18 pp., 8½ x 11 ins. Deals with methods and materials used.
Waterproofing and Dampproofing. File. 36 pp. Complete descriptions and detailed specifications for materials used in building and concrete.

Sonneborn Sons, Inc., L., 116 Fifth Ave., New York.
Specification Sheet, 8½ x 11 ins. Descriptions and specifications of compounds for dampproofing interior and exterior surfaces.

The Vortex Mfg. Co., Cleveland, Ohio.
Par-Lock Specification "Forms A and B" for dampproofing and plaster key over concrete and masonry surfaces.
Par-Lock Specification "Form J" for dampproofing tile wall surfaces that are to be plastered.
Par-Lock Dampproofing. Specification Forms C, F, I and J. Sheets 8½ x 11 ins. Data on gun-applied asphalt dampproofing for floors and walls.

DOORS AND TRIM, METAL

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

The Compound & Pyrono Door Company, St. Joseph, Mich.
Pyrono Handbook for Architects and Contractors. 8½ x 11 ins. 16 pp. Contains full information regarding Pyrono Fireproof Veneered Doors and Trim, with complete details and specifications.
Pyrono details in sheet form for tracing.

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

DUMBWAITERS

Sedgwick Machine Works, 151 West 15th St., New York.
Catalog and Service Sheets. Standard specifications, plans and prices for various types, etc. 4¼ x 8¼ ins. 60 pp. Illustrated.
Catalog and pamphlets, 8½ x 11 ins. Illustrated. Valuable data on dumbwaiters.

ELECTRICAL EQUIPMENT

Frank Adam Electric Company, St. Louis, Mo.
Catalog No. 35—1925. Panelboards—Steel Cabinets. 7¾ x 10½ ins. 64 pp. Illustrates and describes sectionally built panelboards, an important line of steel cabinets and the fittings which go with them.

General Electric Co., Schenectady, N. Y.
"Electrical Specification Data for Architects. Brochure, 36 pp., 8 x 10½ ins. Illustrated. Data regarding G. E. wiring materials and their use.
"The House of a Hundred Comforts." Booklet, 40 pp., 8 x 10½ ins. Illustrated. Dwells on importance of adequate wiring.

Pick & Company, Albert, 208 West Randolph St., Chicago, Ill.
School Cafeterias. Booklet. 9 x 6 ins. Illustrated. The design and equipment of school cafeterias with photographs of installation and plans for standardized outfits.

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
Electric Power for Buildings. Brochure, 14 pp., 8½ x 11 ins. Illustrated. A publication important to architects and engineers.
Variable-Voltage Central Systems as applied to Electric Elevators. Booklet, 13 pp., 8½ x 11 ins. Illustrated. Deals with an important detail of elevator mechanism.
Modern Electrical Equipment for Buildings. Booklet, 8½ x 11 ins. Illustrated. Lists many useful appliances.
Electrical Equipment for Heating and Ventilating Systems. Booklet, 24 pp., 8½ x 11 ins. Illustrated. This is "Motor Application Circular 7379."
Westinghouse Panelboards and Cabinets (Catalog 42-A). Booklet, 32 pp., 8½ x 11 ins. Illustrated. Important data on these details of equipment.
Beauty; Power; Silence; Westinghouse Fans (Dealer Catalog 45). Brochure, 16 pp., 8½ x 11 ins. Illustrated. Valuable information on fans and their uses.
Electric Range Book for Architects (A. I. A. Standard Classification 31 G-4). Booklet, 24 pp., 8½ x 11 ins. Illustrated. Cooking apparatus for buildings of various types.
Westinghouse Commercial Cooking Equipment (Catalog 280). Booklet, 32 pp., 8½ x 11 ins. Illustrated. Equipment for cooking on a large scale.
Electric Appliances (Catalog 44-A). 32 pp., 8½ x 11 ins. Deals with accessories for home use.

ELEVATORS

Otis Elevator Company, 260 Eleventh Ave., New York, N. Y.
Otis Push Button Controlled Elevators. Descrive leaflets. 8½ x 11 ins. Illustrated. Full details of machines, motors and controllers for these types.
Otis Geared and Gearless Traction. Elevators of All Types. Descriptive leaflets. 8½ x 11 ins. Illustrated. Full details of machines, motors and controllers for these types.
Escalators. Booklet. 8½ x 11 ins. 22 pp. Illustrated. Describes use of escalators in subways, department stores, theaters and industrial buildings. Also includes elevators and dock elevators.

Richards-Wilcox Mfg. Co., Aurora, Ill.
Elevators. Booklet. 8½ x 11 ins. 24 pp. Illustrated. Describes complete line of "Ideal" elevator door hardware and checking devices, also automatic safety devices.

Sedgwick Machine Works, 151 West 15th St., New York, N. Y.
Catalog and descriptive pamphlets, 4¼ x 8¼ ins. 70 pp. Illustrated. Descriptive pamphlets on hand power freight elevators, sidewalk elevators, automobile elevators, etc.

ELEVATORS—Continued

Catalog and pamphlets. 8½ x 11 ins. Illustrated. Important data on different types of elevators.

FIREPROOFING—See also Construction, Fireproof

Concrete Engineering Co., Omaha, Nebr.
"Handbook of Fireproof Construction." Booklet, 53 pp., 8½ x 11 ins. Valuable work on methods of fireproofing.

Genfire Steel Company, Youngstown, Ohio.
Fireproofing Handbook, 8½ x 11 ins. 64 pp. Illustrated. Gives methods of construction, specifications, data on Herringbone metal lath, steel tile, Trussit solid partitions, steel, lumber, self-centering formless concrete construction.

North Western Expanded Metal Co., 407 South Dearborn St., Chicago.
A. I. A. Sample Book. Bound volume, 8½ x 11 ins. Contains actual samples of several materials and complete data regarding their use.

FLOOR HARDENERS (CHEMICAL)

Master Builders Co., Cleveland, Ohio.
Concrete Floor Treatment. File, 50 pp. Data on Securing hardened dustproof concrete.
Concrete Floor Treaments—Specification Manual. Booklet, 23 pp. 8½ x 11 ins. Illustrated. Valuable work on an important subject.

Sonneborn Sons, Inc., L., 116 Fifth Ave., New oYrk, N. Y.
Lapidolith, the liquid chemical hardener. Complete sets of specifications for every building type in which concrete floors are used, with descriptions and results of tests.

FLOORS—STRUCTURAL

Truscon Steel Co., Youngstown, Ohio.
Truscon Locktyle. Booklet. 8½ x 11 ins. 8 pp. Illustrations of material and showing methods of application.
Truscon Floretyle Construction. Booklet. 8½ x 11 ins. 16 pp. Illustrations of actual jobs under construction. Lists of properties and information on proper construction. Proper method of handling and tables of safe loads.

FLOORING

Armstrong Cork & Insulation Co., Pittsburgh, Pa.
Armstrong's Cork Tile Floors. Booklet. 7¾ x 10½ ins. 30 pp. An illustrated work on cork flooring.

Armstrong Cork Co. (Linoleum Division), Lancaster, Pa.
Armstrong's Linoleum Floors. Catalog. 8½ x 11 ins. 40 pp. Color plates. A technical treatise on linoleum, including table of gauges and weights and specifications for installing linoleum floors.
Armstrong's Linoleum Pattern Book, 1927. Catalog. 3½ x 6 in. 272 pp. Color Plates. Reproduction in color of all patterns of linoleum and cork carpet in the Armstrong line.
Quality Sample Book. 3½ x 5¾ in. Showing all gauges and thicknesses in the Armstrong line of linoleums.
Linoleum Layer's Handbook. 5 x 7 in. 32 pp. Instructions for linoleum layers and others interested in learning most satisfactory methods of laying and taking care of linoleum.
Enduring Floors of Good Taste. Booklet. 6 x 9 ins. 48 pp. Illustrated in color. Explains use of linoleum for offices, stores, etc., with reproductions in color of suitable patterns, also specifications and instructions for laying.

Barber Asphalt Co., Philadelphia.
Specifications for Applying Genasco Asphalt Mastic. Booklet 8 x 10½ ins. Directions for using Asphalt Mastic for flooring.

Blabon Company, Geo. W., Nicetown, Philadelphia, Pa.
Planning the Color Schemes for Your Home. Brochure illustrated in color; 36 pp., 7½ x 10½ ins. Gives excellent suggestions for use of color in flooring for houses and apartments.
Handy Quality Sample Folder of Linoleums. Gives actual samples of "Battleship Linoleum," cork carpet, "Feltex," etc.
Blabon's Linoleum. Booklet illustrated in color; 128 pp., 3½ x 8½ ins. Gives patterns of a large number of linoleums.
Blabon's Plain Linoleum and Cork Carpet. Gives quality samples, 3 x 6 ins. of various types of floor coverings.

Bonded Floors Company, Inc., 1421 Chestnut St., Philadelphia, Pa.
A series of booklets, with full color inserts showing standard colors and designs. Each booklet describes a resilient floor material as follows:
Battleship Linoleum. Explains the advantages and uses of this durable, economical material.
Marble-ized (Cork Composition) Tile. Complete information on cork-composition marble-ized tile and many artistic effects obtainable with it.
Treadlite (Cork Composition) Tile. Shows a variety of colors and patterns of this adaptable cork composition flooring.
Natural Cork Tile. Description and color plates of this superquiet, resilient floor.
Practical working specifications for installing battleship linoleum, cork composition tile and cork tile.

Carter Bloxonend Flooring Co., Keith & Perry Bldg., Kansas City, Mo.
Bloxonend Flooring. Booklet. 3¼ x 6¼ ins. 20 pp. Illustrated. Describes uses and adaptability of Bloxonend Flooring to concrete, wood or steel construction, and advantages over loose wood blocks.
File Folder. 9⅜ x 11¾ ins. For use in connection with A. I. A. system of filing. Contains detailed information on Bloxonend Flooring in condensed, loose-leaf form for specification writer and drafting room. Literature embodied in folder includes standard Specification Sheet covering the use of Bloxonend in general industrial service and Supplementary Specification Sheet No. 1, which gives detailed description and explanation of an approved method for installing Bloxonend in gymnasiums, armories, drill rooms and similar locations where maximum resiliency is required.

Albert Grauer & Co., 1408 Seventeenth St., Detroit, Mich.
Grauer-Watkins Red Asphalt Flooring. Folder, 4 pp., 8½ x 11 ins. Data on a valuable form of flooring.

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page 184*

FLOORING—Continued

Norton Company, Worcester, Mass.
Filing Folder. 8½ x 11¾ ins. 27 pp. Illustrated with drawings. Specification data for architects.
Large illustrated folder on modern flooring.

U. S. Gypsum Co., Chicago.
Pyrobar Floor Tile. Folder. 8½ x 11 ins. Illustrated. Data on building floors of hollow tile and tables on floor loading.

United States Quarry Tile Co., Parkersburg, W. Va.
Quarry Tiles for Floors. Booklet, 119 pp., 8½ x 11 ins. Illustrated. General catalog. Details of patterns and trim for floors.
Art Portfolio of Floor Designs. 9¼ x 12¼ ins. Illustrated in colors. Patterns of quarry tiles for floors.

U. S. Rubber Co., 1790 Broadway, New York.
Period Adaptations for Modern Floors. Brochure. 8 x 11 ins. 60 pp. Richly illustrated. A valuable work on the use of rubber tile for flooring in interiors of different historic styles.

Zenitherm Co., Inc., 390 Frelinghuysen Avenue, Newark, N. J.
Zenitherm Floors. Booklet, 14 pp., 8½ x 11 ins. Illustrated. Floors for interior and semi-interior use.
Contractors' Handbook. Brochure, 10 pp., 4½ x 6 ins. Complete data for using Zenitherm.

FURNITURE

American Seating Co., 14 E. Jackson Blvd., Chicago, Ill.
Ars Ecclesiastica Booklet. 6 x 9 in. 48 pp. Illustrations of church fitments in carved wood.
Theatre Chairs. Booklet. 6 x 9 in. 48 pp. Illustrations of theater chairs.

Concealed Bed Corporations, 58 East Washington St., Chicago.
Eight-Room Convenience at Six-Room Price. Booklet, 16 pp., 3¼ x 5 ins. Illustrated. Data on concealed beds for home owners.
Save Floor Space. Brochure. 36 pp. 4 x 8¾ ins. Illustrated. Describes Holmes beds, giving measurement data.

Kensington Mfg. Company, Showrooms, 41 West 45th St., New York.
Illustrated booklet indicative of the scope, character and decorative quality of Kensington furniture, with plan of co-operation with architects, sent on request.
Photographs and full description of hand-made furniture in all the period styles, furnished in response to a specific inquiry.

McKinney Mfg. Co., Pittsburgh.
Forethought Furniture Plans. Sheets, 6¼ x 9 ins., drawn to ¼-inch scale. An ingenious device for determining furniture arrangement.

White Door Bed Company, The, 130 North Wells St., Chicago, Ill.
Booklet. 8½ x 11 in. 20 pp. Illustrated. Describes and illustrates the use of "White" Door Bed and other space-saving devices.

GARAGES

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

GLASS CONSTRUCTION

Adamson Flat Glass Co., Clarksburg, W. Va.
Quality and Dependability. Folder, 2 pp., 8½ x 11 ins. Illustrated. Data in the company's product.

Libbey-Owens Sheet Glass Co., Toledo, Ohio.
Flat Glass. Brochure. 11 pp., 5⅛ x7⅝ ins. Illustrated. History of manufacture of flat, clear, sheet glass.

Mississippi Wire Glass Co., 220 Fifth Ave., New York.
Mississippi Wire Glass. Catalog. 3⅞ x 8½ ins. 32 pp. Illustrated. Covers the complete line.

GRILLES

Metalace Corporation, South Boston, Mass.
Metalace Catalog D. Booklet, 32 pp., 8½ x 11 ins. Illustrated. Data on a valuable type of material for grilles, bank screens, radiator enclosures, etc.

Wickwire Spencer Steel Co., Inc., 41 East 42nd St., New York.
Clinton Grilles. Booklet. 9 x 11 ins. 12 pp. A brochure on metal grilles, particularly for use over heating radiators.

HARDWARE

P. & F. Corbin, New Britain, Conn.
Early English and Colonial Hardware. Brochure, 8½ x 11 ins. An important illustrated work on this type of hardware.
Locks and Builders' Hardware. Bound Volume, 486 pp., 8½ x 11 ins. An exhaustive, splendidly prepared volume.

Cutler Mail Chute Company, Rochester, N. Y.
Cutler Mail Chute Model F. Booklet. 4 x 9¼ in. 8 pp. Illustrated.

McKinney Mfg. Co., Pittsburgh.
Forged Iron by McKinney. Booklet, 6 x 9 ins. Illustrated. Deals with an excellent line of builders' hardware.
Forged Lanterns by McKinney. Brochure, 6 x 9 ins. Illustrated. Describes a fine assortment of lanterns for various uses.

Richard-Wilcox Mfg. Co., Aurora, Ill.
Distinctive Garage Door Hardware. Booklet. 8½ x 11 ins. 65 pp. Illustrated. Complete information accompanied by data and illustrations on different kinds of garage door hardware.

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

HARDWARE—Continued

Sargent & Company, New Haven, Conn.
Details to Which Standard Hardware Can Be Applied. Booklet. 6 pp. 9 x 12 ins. Illustrated. Treats with diagrams, portions of doors and windows to which hardware can be applied.
Sargent Locks and Hardware. Bound volume. 534 pp. 9 x 12 ins. Illustrated. Complete catalog of Sargent line of hardware.

HEATING EQUIPMENT

American Blower Co., 6004 Russell St., Detroit.
Heating and Ventilating Utilities. A binder containing a large number of valuable publications, each 8½ x 11 ins., on these important subjects.

American Radiator Company, The, 40 West 40th St., N. Y. C.
Ideal Type "A" Heat Machine. Catalog 7¾ x 10½ ins. 32 pp. Illustrated in 4 colors. A brochure of high-efficiency heating apparatus for residences and commercial buildings.
Ideal Water Tube Boilers. Catalog 7¾ x 10⅝. 32 pp. Illustrated in 4 colors. Data on a complete line of Heating Boilers of the Water Tube type.
Ideal Smokeless Boilers. Catalog 7¾ x 10½ ins. 32 pp. Illustrated in 4 colors. Fully explains a boiler free from the objection of causing smoke.
Ideal Boilers for Oil Burning. Catalog 5½ x8½ in. 36 pp. Illustrated in 4 colors. Describing a line of Heating Boilers especially adapted to use with Oil Burners.
Corto—The Radiator Classic. Brochure 5½ x 8½ in. 16 pp. Illustrated. A brochure on a space-saving radiator of beauty and high efficiency.
Ideal Arcola Radiator Warmth.Brochure 6¼ x 9¼. Illustrated. Describes a central all-on-one-floor heating plant with radiators for small residences, stores, and offices.

James B. Clow & Sons, 534 S. Franklin St., Chicago.
Clow Gasteam Vented Heating System. Brochure, 24 pp., 8½ x 11 ins. Illustrated. Deals with a valuable form of heating equipment for using gas.

C. A. Dunham Company, 450 East Ohio St., Chicago, Ill.
Dunham Radiator Trap. Bulletin 101, 8 x 11 in. 12 pp. Illustrated. Explains working of this detail of heating apparatus.
Dunham Packless Radiator Valves. Bulletin 104. 8 x 11 in. 8 pp. Illustrated. A valuable brochure on valves.
Dunham Return Heating System. Bulletin 109, 8 x 11 ins. Illustrated. Covers the use of heating apparatus of this kind.
Dunham. Vacuum Heating System. Bulletin 110. 8 x 11 ins. 12 pp. Illustrated.
The Dunham Differential Vacuum Heating System. Bulletin 114. Brochure, 8 pp., 8 x 11 ins. Illustrated. Deals with heating for small buildings.
The Dunham Differential Vacuum Heating System. Bulletin 115. Brochure, 12 pp., 8 x 11 ins. Illustrated. Deals with heating for large buildings.

Excelso Products Corporation, 119 Clinton St., Buffalo, N. Y.
Excelso Water Heater. Booklet. 12 pp. 3 x 6 in. Illustrated. Describing the new Excelso method of generating domestic hot water in connection with heating boilers. (Firepot Coil eliminated.)

The Fulton Sylphon Company, Knoxville, Tenn.
Sylphon Temperature Regulators. Illustrated brochures, 8½ x 11 ins., dealing with general architectural and industrial applications; also specifically with applications of special instruments.
Sylphon Heating Specialties. Catalog No. 200, 192 pp., 3½ x 6¾ ins. Important data on heating.

Illinois Engineering Co., Racine Ave., at 21st St., Chicago, Ill.
Vapor Heat Bulletin 21. 8½ x 11 ins. 32 pp. Illustrated. Contains new and original data on Vapor Heating. Rules for computing radiation, pipe sizes, radiator tappings. Steam table showing temperature of steam and vapor at various pressures, also description of Illinois Vapor Specialties.

S. T. Johnson Co., Oakland, Calif.
Bulletin No. 4A. Brochure, 8 pp., 8½ x 11 ins. Illustrated. Data on different kinds of oil-burning apparatus.
Bulletin No. 31. Brochure, 8 pp., 8½ x 11 ins. Illustrated. Deals with Johnson Rotary Burner With Full Automatic Control.

Kewanee Boiler Co., Kewanee, Ill.
Kewanee on the Job. Catalog. 8½ x 11 ins. 80 pp. Illustrated. Showing installations of Kewanee boilers, water heaters, radiators, etc.
Catalog No. 78, 6 x 9 ins. Illustrated. Describes Kewanee Firebox Boilers with specifications and setting plans.
Catalog No. 79. 6 x 9 ins. Illustrated. Describes Kewanee power boilers and smokeless tubular boilers with specifications.

May Oil Burner Corp., Baltimore.
Adventures in Comfort. Booklet, 24 pp., 6 x 9 ins. Illustrated. Non-technical data on oil as fuel.
Taking the Quest out of the Question. Brochure, 16 pp., 6 x 9 ins. Illustrated. For home owners interested in oil as fuel.

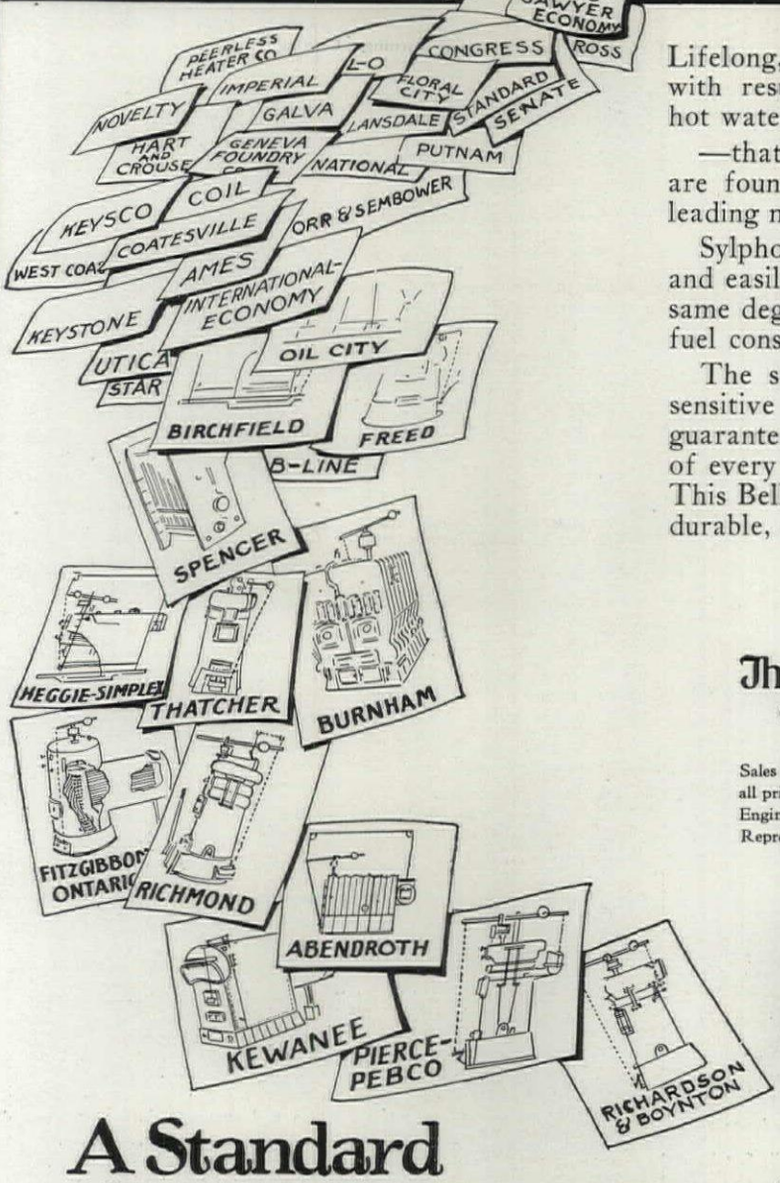
Milwaukee Valve Co., Milwaukee.
MILVACO Vacuum & Vapor Heating System. Nine 4-p. bulletins, 8½ x 11 ins. Illustrated. Important data on heating.
MILVACO Vacuum & Vapor Heating Specialties. Nine 4-p. bulletins, 8½ x 11 ins. Illustrated. Deal with a valuable line of specialties used in heating.

Nash Engineering Company, South Norwalk, Conn.
No. 37. Devoted to Jennings Hytor Return Line Vacuum Heating Pumps, electrically driven, and supplied in standard sizes up to 300,000 square feet equivalent direct radiation.
No. 16. Dealing with Jennings Hytor Air Line Heating Pumps.
No. 17. Describing Jennings Hytor Condensation Pumps, sizes up to 70,000 square feet equivalent direct radiation.
No. 25. Illustrating Jennings Return Line Vacuum Heating Pumps. Size M, for equivalent direct radiation up to 5,000 square feet.

National Radiator Company, Johnstown, Pa.
Aero Radiators; Beauty and Worth. Catalog 34. Booklet 6 x 9 ins., 20 pp., describing and illustrating radiators and accessories.

Sylphon TRADE MARK Damper Regulators

these facts deserve your attention—



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

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Originators and Patentees of the Sylphon Bellows

Knoxville, Tennessee, U.S.A.

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Your Guarantee
THE SYLPHON BELLOWS

A Standard All Along the Line

No. 45-A for hot-water boilers

No. 46 for domestic hot-water supply heaters

No. 22-J for steam boilers

No. 22 for steam boilers

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page 186*

HEATING EQUIPMENT—Continued

The Thatcher Company, 39 St. Francis St., Newark, N. J.
Helpful Hints on Choosing Your Heater. Booklet, 20 pp., 3½ x 6¼ ins. Illustrated. Valuable data on types of heating.
Economical Warmth. Brochure, 8 pp., 3½ x 6¼ ins. Illustrated. Deals with economical heating.

Rome Brass Radiator Corp., 1 East 42nd St., New York.
Steam Heat by Wire. Folder, 8 pp., 4 x 6 ins. Illustrated. Data on an improved electric heater.
Robras Electric Steam Radiator. Folder, 4 pp., 8½ x 11 ins. Illustrated. A means of obtaining supplementary or emergency heating.

Trane Co., The, La Crosse, Wis.
Bulletin 14. 16 pp. 8½ x 10⅝ ins. Covers the complete line of Trane Heating Specialties, including Trane Bellows Traps, and Trane Bellows Packless Valves.
Bulletin 20. 24 pp. 8½ x 10⅝ ins. Explains in detail the operation and construction of Trane Condensation. Vacuum, Booster, Circulating, and similar pumps.

Williams Oil-O-Matic Heating Corp., Bloomington, Ill.
Oil Heating at Its Best. Brochure, 24 pp., 5 x 8 ins. Illustrated. Non-technical description of the advantages of using oil for heating.
Oil Heating and What It Means to the Architect. Booklet, 24 pp., 8½ x 11 ins. Illustrated. Use of oil from an architect's point of view.

HOSPITAL EQUIPMENT

The Frink Co., Inc., 24th St. and Tenth Ave., New York City.
Catalog 426. 7 x 10 ins. 16 pp. A booklet illustrated with photographs and drawings, showing the types of light for use in hospitals, as operating table reflectors, linolite and multilite concentrators, ward reflectors, bed lights and microscopic reflectors, giving sizes and dimensions, explaining their particular fitness for special uses.

The International Nickel Company, 67 Wall St., New York, N. Y.
Hospital Applications of Monel Metal. Booklet. 8½ x 11½ ins. 16 pp. Illustrated. Gives types of equipment in which Monel Metal is used, reasons for its adoption, with sources of such equipment.

The Kny-Scheerer Corporation of America, 119 Seventh Ave., New York.
Hospital Equipment, 16th Edition. 7¼ x 10½ ins. 232 pp. Illustrated. Complete description of Hospital and Surgical Furniture, Hospital Appliances including Operating Tables, Cabinets, Sterilizers for Water, Dressing and Instruments, also Hydrotherapeutic Apparatus.
Surgical Sundries. Second Editions. Booklet. 7⅜ x 10½ ins. 48 pp. Illustrated. A complete line of glassware, enamelware, rubber goods, restraint apparatus, instrument sterilizers, sputum cups, wheel chairs and sick room comforts.
Electro Medical. 25th Edition. Booklet. 7¼ x 10½ ins. 160 pp. Illustrated. A complete line of Albee Bone Sets. Apparatus for AC and DC Cystoscopes, Heat Magnets, Vibrators, Compressors, Electric Light Baths, High Frequency Apparatus and X-Ray Apparatus and Accessories.

The Pick-Barth Companies, Chicago and New York.
Some Thoughts About Hospital Food Service Equipment. Booklet, 21 pp.,,7½ x 9¼ ins. Valuable data on an important subject.

Wilmot Castle Company, Rochester, N. Y.
Sterilizer Equipment for Hospitals. Book, 76 pp., 8½ x 11 ins. Illustrated. Gives important and complete data on sterilization of utensils and water, information on dressings, etc.
Sterilizer Specifications. Brochure, 12 pp., 8½ x 11 ins. Practical specifications for use of architects and contractors.
Architects' Data Sheets. Booklet, 16 pp., 8½ x 11 ins. Illustrated. Information on piping, venting, valving and wiring for hospital sterilizer installations.
Hospital Sterilizing Technique. Five booklets. 8 to 16 pp. 6 x 9 ins. Illustrated. Deals specifically with sterilizing instruments, dressings, utensils, water, and rubber gloves.

HOTEL EQUIPMENT

Pick & Company, Albert, 208 West Randolph St., Chicago, Ill.
Some Thoughts on Furnishing a Hotel. Booklet. 7½ x 9 ins. Data on complete outfitting of hotels.

INSULATING LUMBER

Mason Fibre Co., 111 West Washington St., Chicago, Ill.
Booklet, 12 pp., 8½ x 11 ins. Illustrated. Gives complete specifications for use of insulating lumber and details of construction involving its use.

INSULATION

Armstrong Cork & Insulation Co., Pittsburgh, Pa.
The Insulation of Roofs with Armstrong's Corkboard. Booklet. Illustrated. 7½ x 10½ ins. 32 pp. Discusses means of insulating roofs of manufacturing or commercial structures.
Insulation of Roofs to Prevent Condensation. Illustrated booklet. 7½ x 10½ ins. 36 pp. Gives full data on valuable line of roof insulation.
Filing Folder for Pipe Covering Data. Made in accordance with A. I. A. rules.
"The Cork Lined House Makes a Comfortable Home." 5 x 7 in. 32 pp. Illustrated.
Armstrong's Corkboard. Insulation for Walls and Roofs of Buildings. Booklet, 66 pp., 9½ x 11¾ ins. Illustrates and describes use of insulation for structural purposes.

Cabot, Inc.,. Samuel, Boston, Mass.
Cabot's Insulating Quilt. Booklet. 7½ x 10½ ins. 24 pp. Illustrated. Deals with a valuable type of insulation.

Celite Products Co., 1320 South Hope St., Los Angeles.
The Insulation of Boilers. Booklet, 8 pp., 8½ x 11 ins. Illustrated. On insulating boiler walls, breechings, and stacks to reduce amount of radiation.
Heat Insulating Specifications and Blue Prints. Booklet, 20 pp., 8½ x 11 ms. Illustrated. On approved types of insulation.

Flax-li-num Insulating Company, St. Paul, Minn.
"Heat Insulation for Houses." Booklet, 64 pp., 9¾ x 11¼ ins. Illustrated. Authoritative information on thermal insulation with complete specifications for all types of buildings.

INSULATION—Continued

Philip Carey Co., The, Cincinnati, Ohio.
Carey Asbestos and Magnesia Products. Catalog. 6 x 9 ins. 72 pp. Illustrated.

Celotex Company, The, 645 N. Michigan Ave., Chicago, Ill.
The Hidden Comfort of Costly Homes. Booklet. 8½ x 11 ins.
Celotex Specifications. Booklet. 8½ x 11 ins.

Johns-Manville Corp., Madison Ave. & 41st St., New York, N. Y.
Johns-Manville Service to Industry. Catalog. 8½ x 11 ins. 300 pp. Illustrated. Contains valuable data on all forms of insulation, packings, steam traps, high temperature cements, brake blocks, linings, flooring, roofing, asbestos specialties, waterproofing and dampproofing, also general technical data.
A Representative Installation of the Johns-Manville Underground System of Insulation. Booklet, 20 pp., 8½ x 11 ins.

JOISTS

Bates Expanded Steel Truss Co., East Chicago, Ind.
Catalog No. 4. Booklet, 32 pp., 8½ x 11 ins. Illustrated. Gives details of truss construction with loading tables and specifications.

Truscon Steel Co., Youngstown, Ohio.
Truscon Steel Joists. Booklet. 8½ x 11 ins. 16 pp. Illustrated with typical buildings and showing details of construction. Tables of sizes and safe loads.
Truscon Steel Joist Buildings. Illustrated 32-page brochure attractively illustrated, showing types of buildings equipped with Truscon Steel Joist.
Strip Steel Joist Construction. 14-page booklet, with illustrations. Reprint of paper presented to Building Officials' Conference, Madison, Wis., 1925, by J. J. Calvin, Secretary, Strip Steel Joist Association.

KITCHEN EQUIPMENT

The International Nickel Company, 67 Wall St., New York, N. Y.
Hotels, Restaurants and Cafeteria Applications of Monel Metal. Booklet. 8½ x 11 ins. 32 pp. Illustrated. Gives types of equipment in which Monel Metal is used, with service data and sources of equipment.

McDougall Company, Frankfort, Ind.
Kitchens for Homes and Apartments. Booklet, 32 pp., 8½ x 11 ins. Illustrated. Views and plans of conveniently equipped kitchens.
File Folder. Service sheets and specifications useful in preparing kitchen layouts.
Domestic Science Kitchen Units. Brochure, 8 pp., 8½ x 11 ins. Illustrated. Deals with flexible line of kitchen equipment.

Pick & Company, Albert, 208 W. Randolph St., Chicago, Ill.
School Cafeteria. Portfolio. 17 x 11 ins. 44 pp. Illustrated. An exhaustive study of the problems of school feeding, with copious illustrations and blue prints. Very valuable to the architect.
School Cafeterias. Booklet. 9 x 6 ins. Illustrated. The design and equipment of school cafeterias with photographs of installation and plans for standardized outfits.

LABORATORY EQUIPMENT

Alberene Stone Co., 153 West 23rd Street, New York City.
Booklet 8¾ x 11¼ ins., 26 pp. Stone for laboratory equipment, shower partitions, stair treads, etc.

Duriron Company, Dayton, Ohio.
Duriron Acid, Alkali and Rust-proof Drain Pipe and Fittings. Booklet, 8½ x 11 ins., 20 pp. Full details regarding a valuable form of piping.

LANTERNS

Todhunter, Arthur, 119 E. 57th St., New York.
Hand Wrought Lanterns. Booklet, 5¼ x 6¼ ins. 20 pp. Illustrated in Black and White. With price list. Lanterns appropriate for exterior and interior use, designed from old models and meeting the requirements of modern lighting.

LATH, METAL AND REINFORCING

Genfire Steel Company, Youngstown, Ohio.
Herringbone Metal Lath Handbook. 8½ x 11 ins. 32 pp. Illustrated. Standard specifications for Cement Stucco on Herringbone. Rigid Metal Lath and interior plastering.

Milwaukee Corrugating Co., Milwaukee, Wis.
The Milcor Manual. Booklet, 8½ x 11 ins. 64 pp. Illustrated. Covers Milcor methods and materials, metal lath, corner beads, steel domes, channels, etc.

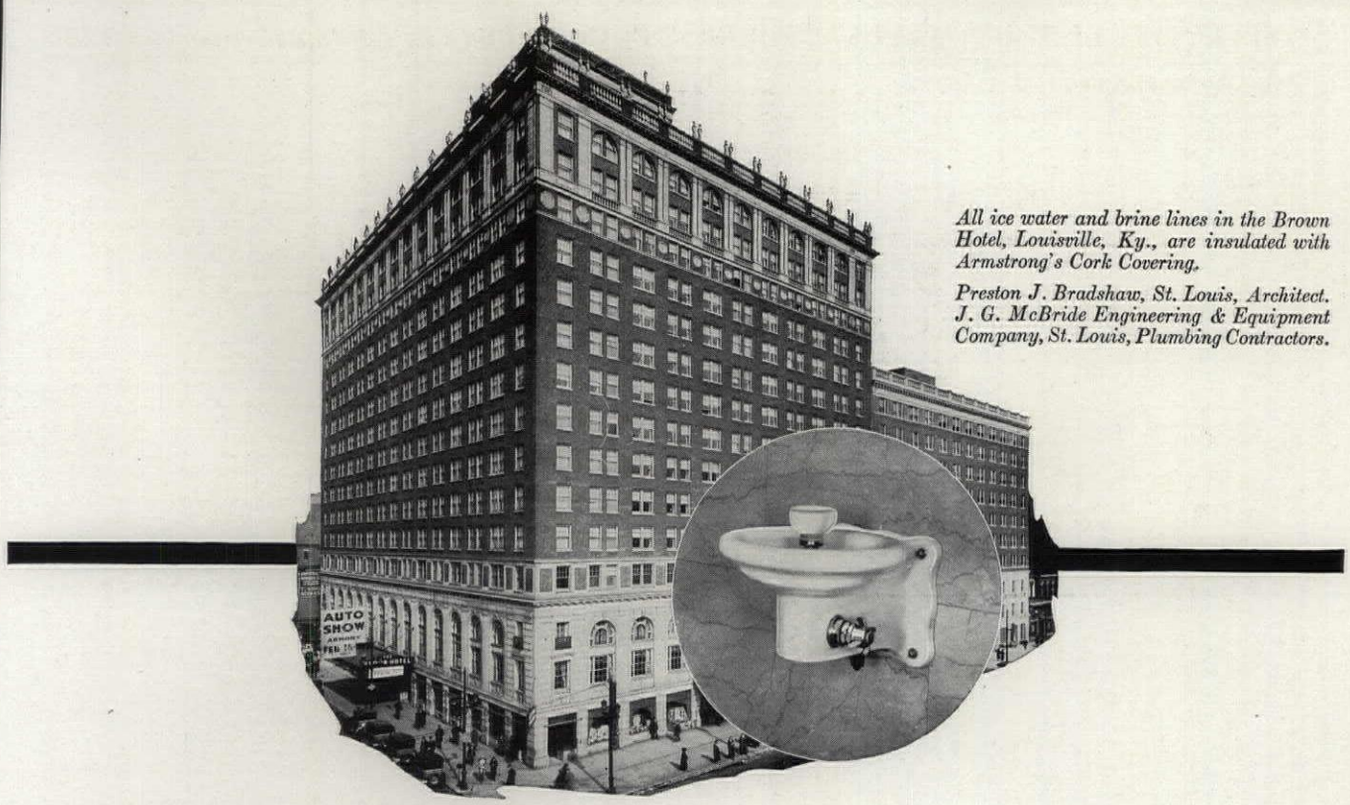
Northwestern Expanded Metal Co., 1234 Old Colony Building, Chicago, Ill.
Northwestern Expanded Metal Products. Booklet, 8½ x 10¾ ins., 20 pp. Fully illustrated, and describes different products of this company, such as Kno-burn metal lath, 20th Century Corrugated. Plasta-saver and longspan lath channels,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

Wickwire Spencer Steel Co., Inc., 41 East 42nd St., New York.
Clinton Wire Lath. Brochure, 9 x 11 ins. 51 pp. A valuable booklet on metal lathing and the proper method of using it.

Truscon Steel Company, Youngstown, Ohio.
Truscon 1-A Metal Lath. 12-page booklet, 8½ x 11 ins., beautifully printed, with illustrations of details of lath and method of application.
Truscon ¾-inch Hy-Rib for Roofs, Floors and Walls. Booklet, ½ x 11 ins., illustrating Truscon ¾-inch Hy-Rib as used in industrial buildings. Plates of typical construction. Progressive steps of construction. Specification and load tables.

LAUNDRY CHUTES

The Pfaudler Company, 217 Cutler Building, Rochester, N. Y.
Pfaudler Glass-Lined Steel Laundry Chutes. Booklet, 5⅛ x 7⅜ ins. 16 pp. Illustrated. A beautifully printed brochure describing in detail with architects' specifications THE PFAUDLER GLASS LINED STEEL LAUNDRY CHUTES. Contains views of installations and list of representative examples.



All ice water and brine lines in the Brown Hotel, Louisville, Ky., are insulated with Armstrong's Cork Covering.

Preston J. Bradshaw, St. Louis, Architect. J. G. McBride Engineering & Equipment Company, St. Louis, Plumbing Contractors.

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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.

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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.

For Cold Lines, Coolers and Tanks.

Armstrong's
NONPAREIL
Cork Covering

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page 188*

LAUNDRY MACHINERY

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

LIBRARY EQUIPMENT

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

LIGHTING EQUIPMENT

The Frink Co., Inc., 24th St. and 10th Ave., New York City.
Catalog 415, 8½ x 11 ins. 46 pp. Photographs and scaled cross-sections. Specialized bank lighting, screen and partition reflectors, double and single desk reflectors and Polaralite Signs.
Gleason-Tiebout Glass Co. (Celestialite Division), 200 Fifth Avenue, New York.
Next to Daylight Brochure, 19 pp., 4 x 8½ ins. Illustrated. Deals with a valuable type of lighting fixture.
Celestialite Circular No. 40. Folder, 4 pp., 3½ x 6 ins. "What Nature does to the Sun, Celestialite does to the Mazda lamp."
Attractive Units in Celestialite. Folder, 12 pp., 3¼ x 6½ ins. Illustrates Decoratd Celestialite Units.
It Has Been Imitated. Folder, 4 pp., 10 x 13 ins. Data on an important detail of lighting equipment.
Guth Company, The Edwin F., 2615 Washington Ave., St. Louis, Mo.
Guth Lighting Equipment (Catalog No. 15). Booklet, 8½ x 11 ins. Fully illustrated, and covering lighting fixtures for buildings of all kinds.
Forge Craft (Catalog No. 16). Booklet, 16 pp., 8½ x 10¾ ins. Brochure dealing specifically with fixtures intended for use in buildings of the so-called "bungalow" type.
Aglite Porcelain Enameled Illuminators. Folder, 4 pp., 8½ x 11 ins. on a new and improved type of lighting.

MAIL CHUTES

Cutler Mail Chute Company, Rochester. N. Y.
Cutler Mail Chute Model F. Booklet. 4 x 9¼ ins. 8 pp. Illustrated.

MANTELS

Arthur Todhunter, 119 E. 157th St., New York, N. Y.
Georgian Mantels. New Booklet. 24 pp., 5¼ x 6¼ ins. A fully illustrated brochure on eighteenth century mantels. Folders give prices of mantels and illustrations and prices of fireplace equipment.

MARBLE

The Georgia Marble Company, Tate, Ga. New York Office, 1328 Broadway.
Why Georgia Marble is Better. Booklet. 3⅜ x 6 ins. Gives analysis, physical qualities, comparison of absorption with granite, opinions of authorities, etc.
Convincing Proof. 3⅜ x 6 in. 8 pp. Classified list of buildings and memorials in which Georgia Marble has been used, with names of Architects and Sculptors.

METALS

American Sheet & Tin Plate Co., Frick Building, Pittsburgh, Pa.
Reference Book. Pocket Ed. 2½ x 4½ ins. 168 pp. Illustrated. Covers the complete line of Sheet and Tin Mill Products.
Apollo and Apollo-Keystone Galvanized Sheets. Catalog. 8½ x 11 ins. 20 pp. Illustrated.
Research on the Corrosion Resistance of Coppen Steel. Booklet. 8½ x 11 ins. 24 pp. Illustrated. Technical information on results of atmospheric corrosion tests of various sheets under actual weather conditions.
The International Nickel Company, 67 Wall St., New York, N. Y.
The Choice of a Metal. Booklet, 6¼ x 3 ins. 166 pp. Illustrated. Monel Metal—its qualities, use and commercial forms, briefly described.

MILL WORK—See also Wood

Curtis Companies Service Bureau, Clinton, Iowa.
Architectural Interior and Exterior Woodwork. Standardized Book. 9 x 11½ ins. 240 pp. Illustrated. This is an Architects' Edition of the complete catalog of Curtis Woodwork, as designed by Trowbridge & Ackerman. Contains many color plates.
Better Built Homes. Vols. XV-XVIII incl. Booklet. 9 x 12 ins 40 pp. Illustrated. Designs for houses of five to eight rooms, respectively, in several authentic types, by Trowbridge & Ackerman, architects for the Curtis Companies.
Curtis Details. Booklet, 19½ x 23½ ins. 20 pp. Illustrated Complete details of all items of Curtis woodwork, for the use of architects.
Hartmann-Sanders Company, 2155 Elston Ave., Chicago, Ill.
Column Catalog, 7½ x 10 in. 48 pp. Illustrated. Contains prices on columns 6 to 36 ins. diameter, various designs and illustrations of columns and installations.
The Pergola Catalog. 7½ x 10 ins. 64 pp. Illustrated. Contains illustrations of pergola lattices, garden furniture in wood and cement, garden accessories.
Roddis Lumber and Veneer Co., Marshfield, Wis.
Roddis Doors. Brochure, 24 pp., 5¼ x 8½ ins. Illustrated price list of doors for various types of buildings.
Roddis Doors, Catalog G. Booklet, 183 pp., 8½ x 11 ins. Completely covers the subject of doors for interior use.
Roddis Doors for Hospitals. Brochure, 15 pp., 8½ x 11 ins. Illustrated work on hospital doors.
Roddis Doors for Hotels. Brochure, 15 pp., 8½ x 11 ins. Illustrated work on doors for hotel and apartment buildings.

MORTAR COLORS

Clinton Metallic Paint Co., Clinton, N. Y.
Clinton Mortar Colors. Folder. 8½ x 11 ins. 4 pp. Illustrated in color, gives full information concerning Clinton Mortar Colors with specific instructions for using them.
Color Card. 6½ x 3¼ ins. Illustrates in color the ten shades in which Clinton Mortar Colors are manufactured.
Something new in Stucco. Folder, 3½ x 6 ins. An interesting folder on the use of coloring matter for stucco-coated walls.

PAINTS, STAINS, VARNISHES AND WOOD FINISHES

Cabot, Inc., Samuel, Boston, Mass.
Cabot's Creosote Stains. Booklet. 4 x 8½ ins. 16 pp. Illustrated.
The Glidden Company, Cleveland, Ohio.
More Daylight. 8 x 10½ ins. 20 pp. Portraying by illustrations and text the need and methods of modern mill painting.
Glidden Specification Book. 8 x 10¼ ins. 12 pp. Complete architectural specifications for Glidden Paints and Varnishes, including Ripolin. Directions for the proper finishing of wood.
A. C. Horn Company, Long Island City, N. Y.
Keramic Catalog. Booklet, 26 pp., 8½ x 11 in. A magnificent brochure illustrated in color, describing a valuable line of specialties for use with concrete floors—colorings, hardeners, waterproofing, etc.
National Lead Company, 111 Broadway, New York, N. Y.
Handy Book on Painting. Book, 5½ x 3¼ in. 100 pp. Gives directions and formulae for painting various surfaces of wood, plaster, metals, etc., both interior and exterior.
Red Lead in Paste Form. Booklet, 6¼ x 3½ in. 16 pp. Illustrated. Directions and formulae for painting metals.
Came Lead. Booklet, 8¾ x 6 in. 12 pp. Illustrated. Describes various styles of lead cames.
Cinch Anchoring Specialties. Booklet. 6 x 3½ ins. 20 pp. Illustrated. Describes complete line of expansion bolts.
Pratt & Lambert, Inc., Buffalo, N. Y.
Specification Manual for Paint, Varnishing and Enameling. Booklet, 38 pp., 7½ x 10⅝ ins. Complete specifications for painting, varnishing and enameling interior and exterior wood, plaster, and metal work.
The Ripolin Company, Cleveland, Ohio.
Rippolin Specifications. Book. 8 x 10¼ ins. 12 pp. Complete specifications and general instructions for the application of Ripolin, the original Holland enamel paint. Also directions for proper finishing of wood, metal, plaster, concrete, brick and other surfaces.
Why Ripolin Has an International Reputation. 8 x 10¾ 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. Profusely illustrated.
Ruberoid Co., The (formerly the Standard Paint Co.), 95 Madison Ave, New York, N. Y.
Preservative Coating. Booklet. 6 x 9 ins. 15 pp. Illustrated. Presents in a concise manner the properties and uses of the Ruberoid Company's various paint preparations.
Sherwin-Williams Company, 601 Canal Rd., Cleveland, Ohio.
Painting Concrete and Stucco Surfaces. Bulletin No. 1. 8½ x 11 ins. 8 pp. Illustrated. A complete treatise with complete specifications on the subject of Painting of Concrete and Stucco Surfaces. Color chips of paint shown in bulletin.
Enamel Finish for Interior and Exterior Surfaces. Bulletin No. 2, 8½ x 11 ins. 12 pp. Illustrated. Thorough discussion, including complete specifications for securing the most satisfactory enamel finish on interior and exterior walls and trim.
Painting and Decorating of Interior Walls. Bulletin No. 3. 8½ x 11 ins. 20 pp. Illustrated. An excellent reference book on Flat Wall Finish, including texture effects, which are taking the country by storm. Every architect should have one on file.
Protective Paints for Metal Surfaces. Bulletin No. 4. 8½ x 11 in. 12 pp. Illustrated. A highly technical subject treated in a simple, understandable manner.
Sonneborn Sons, Inc., L., Dept. 4, 116 Fifth Ave., New York. Paint Specifications. Booklet, 8½ x 10¾ ins. 4 pp.
U. S. Gutta Percha Paint Co., Providence, R. I.
Barreled Sunlight. Booklet, 8½ x 11 in. Data on "Barreled Sunlight" with specifications for its use.
Valentine & Co., 456 Fourth Ave., New York.
How to Use Valspar. Illustrated booklet, 32 pp., 3¾ x 8 ins. Deals with domestic uses for Valspar.
How to Keep Your House Young. Illustrated brochure, 23 pp., 7 x 8½ ins. A useful work on the upkeep of residences.
Zapon Co., The, 247 Park Ave., New York City.
Zapon Architectural Specifications. Booklet, 28 pp., 8½ x 11 ins. Describes odorless brushing and spraying lacquers and lacquer enamels.

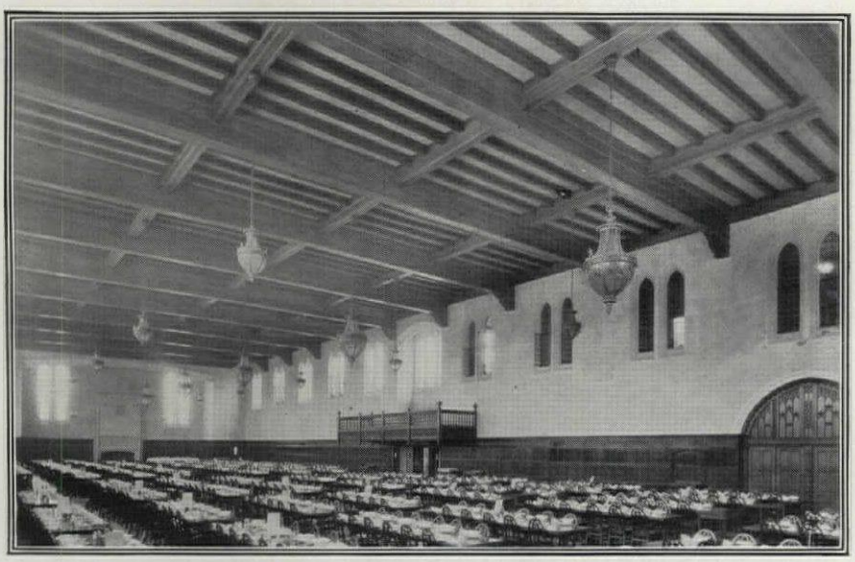
PAPER

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

PARTITIONS

Circle A Products Corporation, New Castle, Ind.
Circle A Partitions Sectional and Movable. Brochure. Illustrated. 8½ x 11¼ ins. 32 pp. Full data regarding an important line of partitions, along with Erection Instructions for partitions of three different types.
Hauserman Company, E. F., Cleveland, Ohio.
Hollow Steel Standard Partitions. Various folders, 8½ x 11 ins. Illustrated. Give full data on different types of steel partitions, together with details, elevations and specifications.
Improved Office Partition Company, 25 Grand St., Elmhurst, L. I.
Telesco Partition. Catalog. 8¼ x 11 ins. 14 pp. Illustrated. Shows typical offices laid out with Telesco partitions, cuts of finished partition units in various woods. Gives specifications and cuts of buildings using Telesco.
Detailed Instructions for erecting Telesco Partitions. Booklet. 24 pp. 8½ x 11 ins. Illustrated. Complete instructions, with cuts and drawings, showing how easily Telesco Partition can be erected.

Install Good Acoustics with a PERMANENT MATERIAL



Dining Room, Notre Dame University, South Bend, Indiana. Here Acousti-Celotex tiles add to the permanency and beauty of the ceiling. Also, the tiles quiet all sounds resulting from the crashing of trays, rattle of dishes and clamor of conversation. Cram & Ferguson, architects; Arc-Con Specialties Company, Acousti-Celotex contractor.

Besides being an efficient sound-absorber, Acousti-Celotex can be decorated in handsome colors and mosaic designs

A NEW building, nowadays, is not regarded as completed until its acoustics are correct. Corrections after completion are more costly, and the experience of tying up a new auditorium while the hearing conditions are made satisfactory always raises the question, "Why didn't my architect provide the necessary sound absorptive material in his specifications?"

Besides improving audition, Acousti-Celotex is bringing relieving quiet into the nerve-worn world of commerce, industry and education. It subdues irritating noises . . . deadens the roar of traffic . . . increases working efficiency.

Acousti-Celotex, type BB, has a sound-absorbing efficiency of 70%—the highest of any material on the market. Small openings drilled *deep* into the tiles act as minute tubes in carrying sounds to the noise-absorbing fibres *inside*.

Because of these deep openings, paint cannot interfere with the sound-absorbing efficiency of Acousti-Celotex. So you can have ceilings worked out in beautiful mosaic designs and striking colors. And since the tiles come in finished, complete units, they are easily installed in any building, new or old.

The Celotex Company will be glad to tell you more about the color effects you can obtain with Pre-decorated Acousti-Celotex. And you will be pleasantly surprised at the cost.

Send plans of your buildings to The Celotex Company and their acoustical engineers will make analyses of them and advise you how to obtain the best hearing conditions.

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CHICAGO, ILL.

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Branch Sales Offices in many principal cities
(See telephone books for addresses)

ACOUSTI-CELOTEX

FOR LESS NOISE — BETTER HEARING

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page 190*

PARTITIONS—Continued

Richards-Wilcox Mfg. Co., Aurora, Ill.
Partitions. Booklet. 7 x 10 ins. 32 pp. Illustrated. Describes complete line of track and hangers for all styles of sliding parallel, accordion and flush door partitions.

U. S. Gypsum Co., Chicago.
Pyrobar Partition and Furring Tile. Booklet. 8½ x 11 ins. 24 pp. Illustrated. Describes use and advantages of hollow tile for inner partitions.

PIPE

American Brass Company, Waterbury, Conn.
Bulletin B-1. Brass Pipe for Water Service. 8½ x 11 ins. 28 pp. Illustrated. Gives schedule of weights and sizes (I.P.S.) of seamless brass and copper pipe, shows typical installations of brass pipe, and gives general discussion of the corrosive effect of water on iron, steel and brass pipe.

American Rolling Mill Company, Middletown, Ohio.
How ARMCO Dredging Products Cut Costs. Booklet, 16 pp., 6 x 9 ins. Data on dredging pipe.

Cement Lined Pipe Company, Lynn, Mass.
Cement Lined Pipe for Corrosive Waters. Booklet, 20 pp., 6 x 9 ins. Illustrated. Data on cement lining to prevent corrosion in pipe.

Clow & Sons, James B., 534 S. Franklin St., Chicago, Ill.
Catalog "A." 4 x 16½ ins. 700 pp. Illustrated. Shows a full line of steam, gas and water works supplies.

Cohoes Rolling Mill Company, Cohoes, N. Y.
Cohoes Pipe Handbook. Booklet, 40 pp., 5 x 7½ ins. Data on wrought iron pipe.

Duriron Company, Inc., Dayton, Ohio.
Duriro Acid, Alkali, Rust-proof Drain Pipe and Fillings. Booklet, 20 pp., 8½ x 11 ins., Illustrated. Important data on a valuable line of pipe.

National Tube Co., Frick Building, Pittsburgh, Pa.
"National" Bulletin No. 2. Corrosion of Hot Water Pipe, 8½ x 11 ins. 24 pp. Illustrated. In this bulletin is summed up the most important research dealing with hot water systems. The text matter consists of seven investigations by authorities on this subject.
"National" Bulletin No. 3. The Protection of Pipe Against Internal Corrosion, 8½ x 11 ins. 20 pp. Illustrated. Discusses various causes of corrosion, and details are given of the deactivating and deaerating systems for eliminating or retarding corrosion in hot water supply lines.
"National" Bulletin No. 25. "National" Pipe in Large Buildings. 8½ x 11 ins. 88 pp. This bulletin contains 254 illustrations of prominent buildings of all types, containing "National" Pipe, and considerable engineering data of value to architects, engineers, etc.
Modern Welded Pipe. Book of 88 pp. 8½ x 11 ins., profusely illustrated with halftone and line engravings of the important operations in the manufacture of pipe.

PLUMBING EQUIPMENT

C. F. Church Mfg. Co., Holyoke, Mass.
Catalog S. W.-3. Booklet, 95 pp., 7¾ x 10½ ins. Illustrated. Data on Sani-White and Sani-Black toilet seats.

Clow & Sons, James B., 534 S. Franklin St., Chicago, Ill.
Catalog "M." 9¼ x 12 ins. 184 pp. Illustrated. Shows complete line of plumbing fixtures for Schools, Railroads and Industrial Plants.

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

Duriron Company, Dayton, Ohio.
Duriron Acid, Alkali and Rust-Proof Drain Pipe and Fittings. Booklet, 8½ x 11 ins., 20 pp. Full details regarding a valuable form of piping.

Eljer Company, Fort City Pa.
Complete Catalog. 3¾ x 6¾ ins. 104 pp. Illustrated. Describes fully the complete Eljer line of standardized vitreous china plumbing fixtures, with diagrams, weights and measurements.
Standardized Sixteen Circular. 3¾ x 6¾ ins. 18 pp. Illustrated.

Imperial Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill.
Watrous Patent Flush Valves, Duojet Water Closets, Liquid Soap Fixtures, etc. 8½ x 11 ins., 136 pp., loose-leaf catalog, showing roughing-in measurements, etc.

Maddock's Sons Company, Thomas, Trenton, N. J.
Catalog "K." 10⅞ x 7⅞ ins. 242 pp. Illustrated. Complete data on vitreous china plumbing fixtures with brief history of Sanitary Pottery.

Speakman Company, Wilmington, Del.
Speakman Showers and Fixtures. Catalog. 4½ x 7½ ins. 250 pp. Illustrated. Catalog of Modern Showers and Brass Plumbing Fixtures, with drawings showing layouts, measurements, etc.
Toned Up in Ten Minutes. Booklet. 7½ x 10½ ins. 16 pp. Illustrated. Modern Showers and Washups for Industrial Plants, showing the sanitary method of washing in running water.

PUMPS

Chicago Pump Company, 2300 Wolfram St., Chicago, Ill.
The Correct Pump to Use. Portfolio containing handy data. Individual bulletins, 8½ x 11 ins., on bilge, sewage, condensation, circulating, house, boiler feed and fire pumps.

Kewanee Private Utilities Co., 442 Franklin St. Kewanee, Ill.
Bulletin E. 7¾ x 10¼ ins. 32 pp. Illustrated. Catalog. Complete descriptions, with all necessary data, on Standard Service Pumps, Indian Brand Pneumatic Tanks, and Complete Water Systems, as installed by Kewanee Private Utilities Co.

RAMPS

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

The Trane Co., LaCrosse, Wis.
Trane Small Centrifugal Pumps. Booklet. 3¾ 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 pp., 8½ x 11 ins. Illustrated. Deals with cold storage, chilling of water, etc.

REINFORCED CONCRETE—See also Construction, Concrete

Genfire Steel Company, Youngstown, Ohio.
Self-Centering Handbook. 8½ x 11 ins. 36 pp. Illustrated. Methods and specifications on reinforced concrete floors, roofs and floors with a combined form and reinforced material.

Truscon Steel Company, Youngstown, Ohio.
Shearing Stresses in Reinforced Concrete Beams. Booklet. 8½ x 11 ins. 12 pp.

North Western Expanded Metal Company, Chicago, Ill.
Designing Data. Book. 6 x 9 ins. 96 pp. Illustrated. Covers the use of Econo Expanded Metal for various types of reinforced concrete construction.
Longspan ¾-inch Rib Lath. Folder 4 pp., 8½ x 11 ins. Illustrated. Deals with a new type of V-rit expanded metal.

ROOFING

American Sheet & Tin Plate Co., Frick Bldg., Pittsburgh, Pa.
Better Buildings. Catalog. 8½ x 11 ins. 32 pp. Describes Corrugated and Formed Sheet Steel Roofing and Siding Products, black, painted and galvanized, with directions for application of various patterns of Sheet Steel Roofing in various types of construction.
Copper—Its Effect Upon Steel for Roofing Tin. Catalog. 8½ x 11 ins. 28 pp. Illustrated. Describes the merits of high-grade roofing tin plates and the advantages of the copper-steel alloy.
The Testimony of a Decade. Booklet. 8½ x 11 ins. 16 pp., with Graphic Chart and illustrations showing losses to various Iron and Steel Sheets for roofing, from atmosphere corrosion.

Barber Asphalt Co., Philadelphia, Pa.
Specifications, Genasco Standard Trinidad Lake Asphalt Built-up Roofing. Booklet. 8 x 10½ ins. Gives specifications for use of several valuable roofing and waterproofing materials.

The Barrett Company, 40 Rector St., New York City.
Architects' and Engineers' Built-up Roofing Reference Series; Volume IV Roof Drainage System. Brochure. 63 pp. 8½ x 11¼ ins. Gives complete data and specifications for many details of roofing.

Philip Carey Co., Lockland, Cincinnati, Ohio.
Architects Specifications for Carey Built-up Roofing. Booklet. 8 x 10¾ 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 Buildings. Booklet. 8 x 10¾ ins. 32 pp. Illustrated. A study of school buildings of a number of different kinds and the roofing materials adapted for each.

Heinz Roofing Tile Co., 1750 Champa St., Denver.
Plymouth-Shingle Tile with Sprocket Hips. Leaflet, 8½ x 11 ins. Illustrated. Shows use of English shingle tile with special hips.
Italian Promenade Floor Tile. Folder, 2 pp., 8 ½ x 11 ins. Illustrated. Floor tiling adapted from that of Davanzati Palace.
Mission Tile. Leaflet, 8½ x 11 ins. Illustrated. Tile such as are used in Italy and southern California.
Georgian Tile. Leaflet, 8½ x 11 ins. Illustrated. Tiling as used in old English and French farmhouses.

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

Milwaukee Corrugating Co., Milwaukee, Wis.
The Milcor Architectural Sheet Metal Guide. Booklet. 8½ x 11 ins. 64 pp. Illustrated. Gives valuable technical sheet metal data.

Ruberoid Co., The (formerly the Standard Paint Co.), 95 Madison Ave., New York, N. Y.
Instructions for Laying Built-up Roofs. Booklet. 8½ x 11 ins. Illustrated.
Ruberoid Facts Worth Knowing. Booklet, 20 pp., 6 x 9 ins. Illustrated. Useful data on roofing.
Ruberoid Asbestos Slates. Folder. Illustrated. Information and specifications for using asbestos slates.

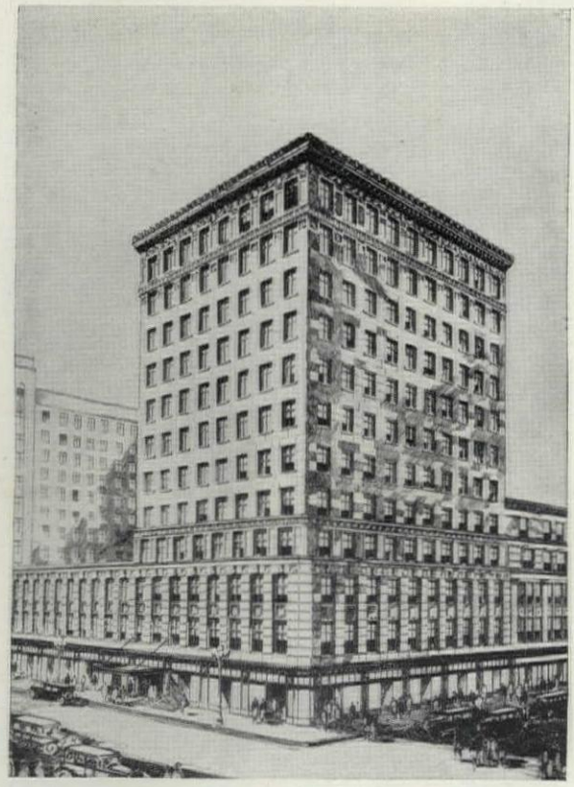
U. S. Gypsum Co., Chicago.
Pyrobar Roof Construction. Booklet. 8 x 11 ins. 48 pp. Illustrated. Gives valuable data on the use of tile in roof construction.
Sheetrock Pyrofill Roof Construction. Folder. 8½ x 11 ins. Illustrated. Covers use of roof surfacing which is poured in place.

SASH CHAIN

Smith & Egge Mfg. Co., The, Bridgeport, Conn.
Chain Catalog. 6 x 8½ ins. 24 pp. Illustrated. Covers complete line of chains.

SEWAGE DISPOSAL

Chicago Pump Co., 2336 Wolfram St., Chicago, Ill.
Flush-Kleen Dry Basin Sewage Ejector. Booklet, 16 pp., 8½ x 11 ins. Illustrations and data on an important detail of equipment.



ROANOKE BUILDING
MINNEAPOLIS, MINNESOTA

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MINNEAPOLIS, MINN.

CONTRACTORS—JAMES LECK COMPANY
MINNEAPOLIS, MINN.

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for Brick and Tile Mortar

Specifications
1 part Carney Cement to 3 or 4 parts sand, depending upon quality of sand.

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page 192*

SCREENS

American Brass Co., The., Waterbury, Conn.
Facts for Architects About Screening. Illustrated folder, 9½ x 11¾ ins., giving actual samples of metal screen cloth and data on fly screens and screen doors.

Athey Company, 6015 West 65th St., Chicago, Ill.
The Athey Perennial Window Shade. An accordion pleated window shade, made from translucent Herringbone woven Coutil cloth, which raises from the bottom and lowers from the top. It eliminates awnings, affords ventilation, can be dry-cleaned and will wear indefinitely.

The Higgin Manufacturing Co., Newport, Ky.
Your Home Screened the Higgin Way. Booklet. 8½ x 11½ ins. 13 pp. Illustrated in colors. Complete description of Higgin Screens, designed to meet every need.

SEWAGE DISPOSAL

Kewanee Private Utilities, 442 Franklin St., Kewanee, Ill.
Specification Sheets. 7¾ x 10¼ ins. 40 pp. Illustrated. Detailed drawings and specifications covering water supply and sewage disposal systems.

SHELVING-STEEL

David Lupton's Sons Company, Philadelphia, Pa.
Lupton Steel Shelving. Catalog D. Illustrated brochure, 40 pp., 8½ x 11 ins. Deals with steel cabinets, shelving, racks, doors, partitions, etc.

SKYLIGHTS

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

SOUND DEADENER

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

STEEL PRODUCTS FOR BUILDING

Genfire Steel Company, Youngstown, Ohio.
Herringbone Metal Lath Handbook. 8½ x 11 ins. 32 pp. Illustrated. Standard specifications for Cement Stucco on Herringbone.
Rigid Metal Lath and interior plastering.

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
The Arc Welding of Structural Steel. Brochure, 32 pp., 8½ x 11 ins. Illustrated. Deals with an important structural process.

STONE, BUILDING

Indiana Limestone Company, Bedford, Ind.
Volume 3, Series A-3. Standard Specifications for Cut Indiana Limestone work, 8½ x 11 ins. 56 pp. Containing specifications and supplementary data relating to the best methods of specifying and using this stone for all building purposes.
Vol. 1. Series B. Indiana Limestone Library. 6 x 9 ins. 36 pp. Illustrated. Giving general information regarding Indiana Limestone, its physical characteristics, etc.
Vol. 4. Series B. Booklet. New Edition. 8½ x 11 ins. 64 pp. Illustrated. Indiana Limestone as used in Banks.
Volume 5. Series B. Indiana Limestone Library. Portfolio. 11⅛ x 8¾ ins. Illustrated. Describes and illustrates the use of stone for small houses with floor plans of each.
Volume 6, Series B—Indiana Limestone School and College Buildings. 8½ x 11 ins., 80 pages, illustrated.
Volume 12, Series B—Distinctive Homes of Indiana Limestons. 8½ x 11 ins., 48 pages, illustrated.
Old Gothic Random Ashlar. 8½ x 11 ins., 16 pages, Illustrated.

STORE FRONTS

Brasco Manufacturing Co., 5025-35 South Wabash Avenue, Chicago. Ill.
Portfolio. 8½ x 11 ins. 32 pp. Illustrated. Selected examples of Brasco Copper Store Fronts suitable for different businesses and varying conditions of locations.
Catalog 28. 8½ x 10¾ ins. 20 pp. Illustrated with plates. Details of Brasco Copper Store front construction. Also showcases, ventilator sashes.
Detail Sheets. Set of five sheets giving details and suggestions for store front designing enclosed in envelope convenient for filing.
Brasco Copper Store Fronts; Series 202, Brasco Standard Construction. Illustrated brochure. 16 pp. 8¼ x 11 ins. Complete data on an important type of building.
Brasco Copper Store Fronts; Series 500, All-Copper Construction. Illustrated brochure. 20 pp. 8½ x 11 ins. Deals with store fronts of a high class.

The Kawneer Company, Niles, Mich.
Store Front Suggestions. Booklet, 96 pp., 6 x 8½ ins. Illustrated. Shows different types of Kawneer Solid Copper Store Fronts.
Catalog K. 1927 Edition. Booklet, 32 pp., 8½ x 11 ins. Illustrated. Details of Kawneer Copper Store Fronts.
Detail Sheets for Use in Tracing. Full-sized details on sheets 17 x 22 ins.

Modern Bronze Store Front Co., Chicago Heights, Ill.
Introducing Extruded Bronze Store Front Construction. Folder, 4 pp., 8½ x 11 ins. Illustrated. Contains full sized details of metal store fronts.

Zouri Drawn Metals Company, Chicago Heights, Ill.
Zouri Safety Key-Set Store Front Construction. Catalog. 8½ x 10½ ins. 60 pp. Illustrated. Complete information with detailed sheets and installation instructions convenient for architects' files.
International Store Front Construction. Catalog. 8½ x 10 ins. 70 pp. Illustrated. Complete information with detailed sheets and installation instructions convenient for architects' files.

SWIMMING POOL EQUIPMENT & STERILIZATION

R. U. V. Company, Inc., 383 Madison Ave., New York City.
Water Sterilization by Means of Ultra Violet Rays. Booklet. 8½ x 11 ins. 16 pp. Full data on a system of purifying water.
Swimming Pool Sterilization. Booklet. 8½ x 11 ins. 24 pp. Describes a method of purifying water in bathing pools.

Wallace & Tiernan Company, Newark, N. J.
The W. & T. Chlorometer, Technical Publication, No. 55. Booklet. 8½ x 11 ins. 8 pp. Illustrated. A useful brochure dealing with the value of pure water and the importance of the chlorination process in sterilization.
W. & T. Chloro-Clock. Folder. 8½ x 11 ins. Illustrated. Mechanism for feeding small quantities of sterilizing solutions.
Manual Central Solution Feed Chlorinator, Type M. S. P. Folder. 8½ x 11 ins. Illustrated. Valuable for swimming pool equipment.

TERRA COTTA

National Terra Cotta Society, 19 West 44th St., New York, N. Y.
Standard Specifications for the Manufacture, Furnishing and Setting of Terra Cotta. Brochure. 8½ x 11 ins. 12 pp. Complete Specification, Glossary of Terms Relating to Terra Cotta and Short Form Specification for incorporating in Architects' Specification.
Color in Architecture. Revised Edition. Permanently bound volume, 9⅛ x 12¼ ins., containing a treatise upon the basic principles of color in architectural design, illustrating early European and modern American examples. Excellent illustrations in color.
Present Day Schools. 8½ x 11 ins. 32 pp. Illustrating 42 examples of school architecture with article upon school building design by James O. Betelle, A. I. A.
Better Banks. 8½ x 11 ins. 32 pp. Illustrating many banking buildings in terra cotta with an article on its use in bank design by Alfred C. Bossom, Architect.

TILE, HOLLOW

National Fire Proofing Co., 250 Federal St., Pittsburgh, Pa.
Standard Wall Construction Bulletin 174. 8½ x 11 ins. 32 pp. Illustrated. A treatise on the subject of hollow tile wall construction.
Standard Fireproofing Bulletin 171. 8½ x 11 ins. 32 pp. Illustrated. A treatise on the subject of hollow tile as used for floors, girder, column and beam covering and similar construction.
Natco Double Shell Load Bearing Tile Bulletin. 8½ x 11 ins. 6 pp. Illustrated.
Natco Uninbacker Tile Bulletin. 8½ x 11 ins. 4 pp. Illustrated.
Natco Header Backer Tile Bulletin. 8½ x 11 ins. 4 pp. Illustrated.
Natcoflor Bulletin. 8½ x 11 ins. 6 pp. Illustrated.
Natco Face Tile for the Up-to-Date. Farm Bulletin. 8½ x 11 ins.

TILES

Unites States Quarry Tile Co., Parkersburg, W. Va.
Quarry Tiles for Floors. Booklet, 119 pp., 8½ x 11 ins. Illustrated. General catalog. Details of patterns and trim for floors.
Art Portfolio of Floor Designs. 9¼ x 12¼ ins. Illustrated in colors. Patterns of quarry tiles for floors.

VALVES

Crane Co., 836 S. Michigan Ave., Chicago, Ill.
No. 51. General Catalog. Illustrated. Describes the complete line of the Crane Co.

C. A. Dunham Co., 450 East Ohio St., Chicago.
The Dunham Packless Radiator Valve Brochure, 12 pp., 8 x 11 ins. Illustrated. Data on an important type of valve.

Illinois Engineering Co., Racine Ave., at 21st St., Chicago, Ill.
Catalog. 8½ x 11 ins. 88 pp. Illustrated.

Jenkins Bros., 80 White St., New York.
The Valve Behind a Good Heating System. Booklet. 4½ x 7¼ ins. 16 pp. Color plates. Description of Jenkins Radiator Valves for steam and hot water, and brass valves used as boiler connections.
Jenkins Valves for Plumbing Service. Booklet. 4½ x 7¼ ins. 16 pp. Illustrated. Description of Jenkins Brass Globe, Angle Check and Gate Valves commonly used in home plumbing, and Iron Body Valves used for larger plumbing installations.

VENETIAN BLINDS

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

VENTILATION

American Blower Co., Detroit, Mich.
American H. S. Fans. Brochure, 28 pp., 8½ x 11 ins. Data on an important line of blowers.

Duriron Company, Dayton, Ohio.
Acid-proof Exhaust Fans. Folder. 8 x 10½ ins. 8 pp. Data regarding fans for ventilation of laboratory fume hoods.
Specification Form for Acid-proof Exhaust Fans. Folder, 8 x 10½ ins.

Globe Ventilator Company, 205 River St., Troy, N. Y.
Globe Ventilators Catalog. 6 x 9 ins. 32 pp. Illustrated profusely. Catalog gives complete data on "Globe" ventilators as to sizes, dimensions, gauges of material and table of capacities. It illustrates many different types of buildings on which "Globe" ventilators are in successful service, showing their adaptability to meet varying requirements.

Van Zile Ventilating Corporation, 155 East 42nd St., New York, N. Y.
The Ventadoor Booklet. 6½ x 3½ ins. 16 pp. Illustrated. Describes and illustrates the use of the Ventadoor for Hotels, Clubs, Offices, etc.

The CORONADO

...from foundation to Carey Roof the last word in apartment building design

"THE Coronado enjoys an ideal location," said Mr. Roy F. France, architect and owner, "and every feature in its design and construction helps to make it one of the most modern apartment hotels in Chicago.

"It is nine stories high and of fireproof construction. The south court provides for a sunken garden, terraces, a fountain, flagstone walks and similar effective landscaping. The exterior design is executed with terra cotta and Colonial red brick. The full-length lounge on the first floor is carried out in Spanish decoration, further developed by rich Spanish furnishings.

"The interior design is especially attractive throughout — the arched plaster openings and vaulted ceilings, for example. Mechanical refrigeration, thermostatic heat control in every room—every modern convenience has been provided."

Mr. France's selection of a Carey Built-up Roof for the Coronado Apartments is a singular tribute to Carey standards. Only the finest felts—asphalts specially refined and blended—go into Carey Built-up Roofs. There is a weather-tight, trouble-free Carey Roof for every building. Write us for information.

Carey BUILT UP ROOFS

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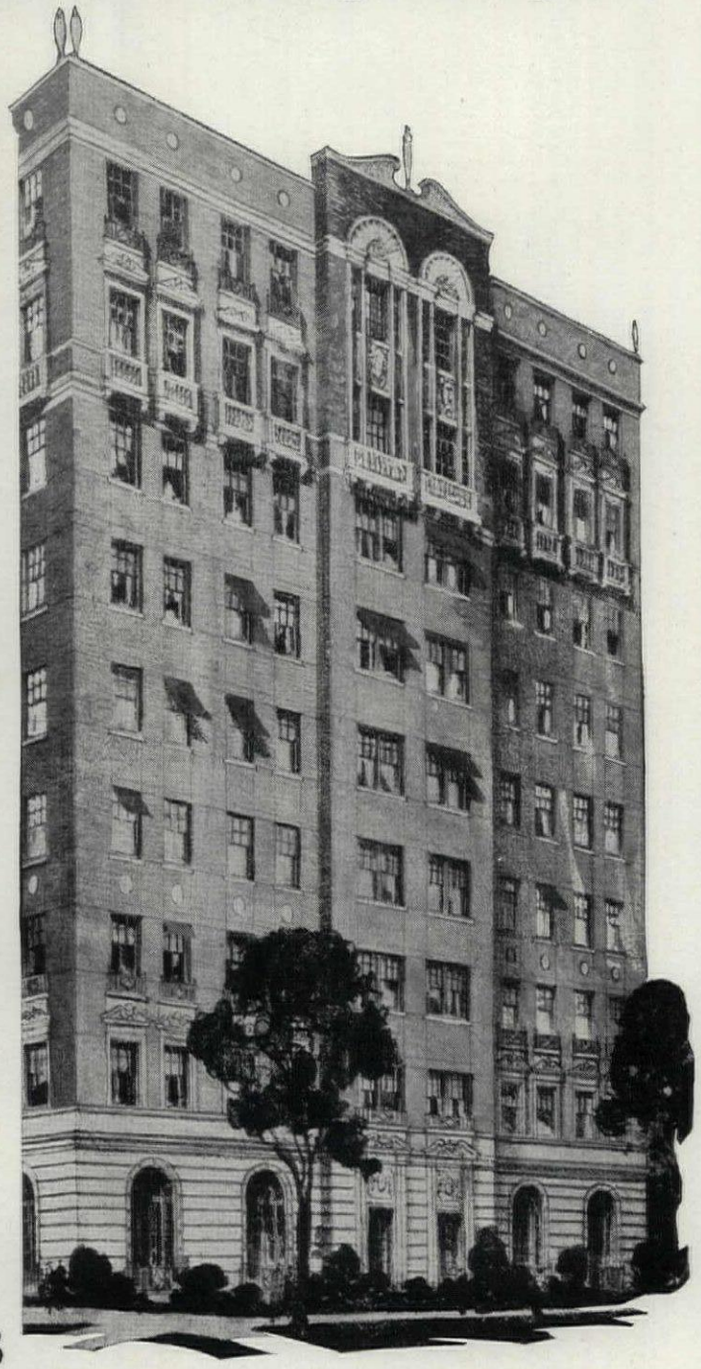


The Coronado Apartments, Winthrop and Rosemont Aves., Chicago. In beauty and completeness, the Coronado represents the very best in apartment building design.

—Roy F. France & Co., Architects, Chicago.

THE PHILIP CAREY COMPANY, *Lockland,* Cincinnati, Ohio

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page 194*

WALLS, INTERIOR

Zenitherm Co., Inc., 390 Frelinghuysen Ave., Newark, N. J.
Zenitherm Walls. Booklet, 23 pp., 8½ x 11 ins. Illustrated. Deals with fine treatment for interior walls.
Folder of Architectural and Decorative Ornaments Achieved with Zenitherm. Stock baseboards, mouldings, etc.

WATERPROOFING

Carey Company, The Philip, Lockland, Cincinnati, Ohio.
Waterproofing Specification Book. 8½ x 11 ins. 52 pp.

Genfire Steel Company, Youngstown, Ohio.
Waterproofing Handbook. Booklet. 8½ x 11 ins. 72 pp. Illustrated. Thoroughly covers subject of waterproofing concrete, wood and steel preservatives, dustproofing and hardening concrete floors, and accelerating the setting of concrete. Free distribution.

A. C. Horn Company, Long Island City, N. Y.
Waterproofing. Folder. 9½ x 11½ ins. Contains folders giving data on excellent waterproofing and dampproofing materials.

Master Builders Company, Cleveland, Ohio.
Waterproofing and Dampproofing and Allied Products. Sheets in loose index file, 9 x 12 in. Valuable data on different types of materials for protection against dampness.
Waterproofing and Dampproofing File, 36 pp. Complete descriptions and detailed specifications for materials used in building with concrete.

Ruberoid Co., The, 95 Madison Ave., New York.
Impervite. Circular. 8½ x 11 ins. 4 pp. Illustrated. An integral water-proofing compound for concrete, stucco, cement, mortar, etc.

Sommers & Co., Ltd., 342 Madison Ave., New York City.
"Permantile Liquid Waterproofing" for making concrete and cement mortar permanently impervious to water. Also circulars on floor treatments and cement colors. Complete data and specifications. Sent upon request to architects using business stationery. Circular size, 8½ x 11 ins.

Sonneborn Sons, Inc., L., 116 Fifth Ave., New York, N. Y.
Pamphlet. 3¾ x 8¾ 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 42d St., New York City.
Specifications for Dampproofing, Waterproofing, Enameling and Technical Painting. Complete and authoritative directions for use of an important line of materials.

The Vortex Mfg. Co., 1978 West 77th St., Cleveland, Ohio.
Par-Lock Specification "Form D" for waterproofing surfaces to be finished with Portland cement or tile.
Par-Lock Specification "Forms E and G" membrane waterproofing of basements, tunnels, swimming pools, tanks to resist hydrostatic pressure.
Par-Lock Waterproofing. Specification Forms D, E. F and G. Sheets, 8½ x 11 ins. Data on combinations of gun-applied asphalt and cotton or felt membrane, built up to suit requirements.
Par-Lock Method of Bonding Plaster to Structural Surfaces. Folder, 6 pp., 8½ x 11 ins. Official Bulletin of Approved Products,—Investigating Committees of Architects and Engineers.

WEATHER STRIPS

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

Chamberlin Metal Weather Strip Company, 1644 Lafayette Boulevard, Detroit, Mich.
Chamberlin Metal Weather Strip Details, 1925 edition. Catalog. 8½ x 11 ins. 48 pp. Complete specifications and full-sized details. With or without 9 x 11¾ 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. 5⅛ x 7⅜ ins. 16 pp. Illustrated. Completely and interestingly illustrates application of Chamberlin equipment.
Chamberlin Details for Wood Sash and Doors. 50 pp., 8½ x 11 ins. Data and diagrams relating to weather-tight doors and windows.
Details and Specifications for Calking with Chamberlin Plaster-Calk. Folder, 4 pp., 8½ x 11 ins.
How Rain, Dust and Cold Are Kept Out. Folder, 10 pp., 5¼ x 7¼ 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.
Blue Book of Steel Windows. Booklet, 128 pp., 8½ x 11 ins. Illustrated. Data on solid rolled steel windows for residential and industrial buildings.

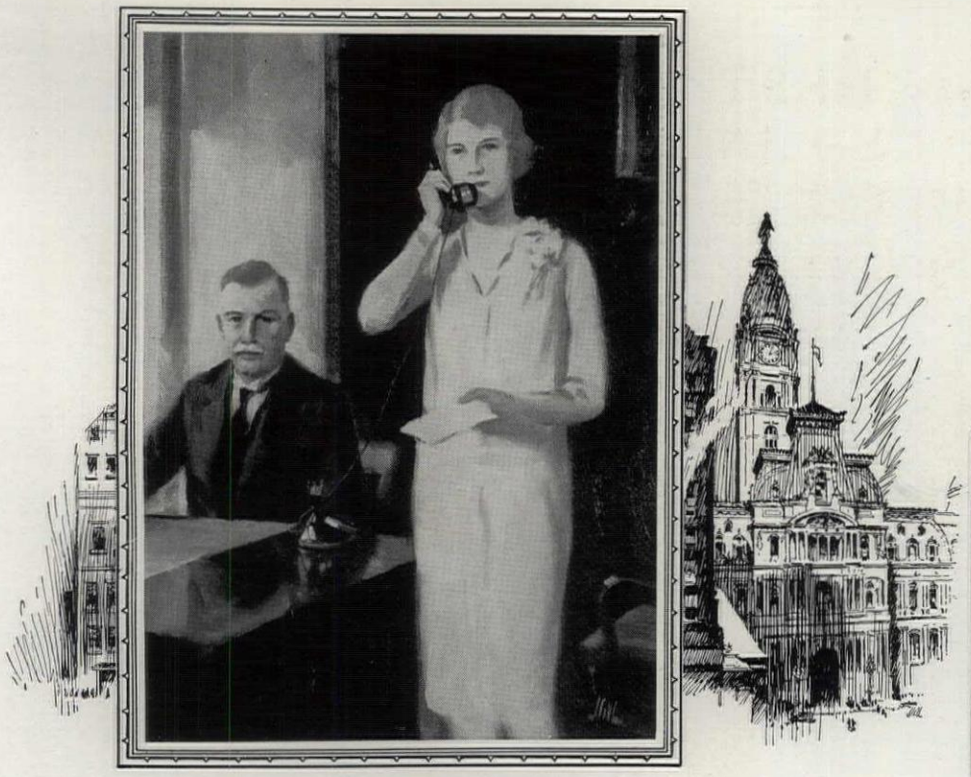
The Kawneer Company, Niles, Mich.
Kawneer Solid Nickel Silver Windows. In casement and weight-hung types and in drop-down transom type. Portfolio, 12 pp., 9 x 11½ ins. Illustrated, and with demonstrator.

David Lupton's Sons Company, Philadelphia, Pa.
Lupton Pivoted Sash. Catalog 12-A. Booklet, 48 pp., 8⅝ x 11 ins. Illustrates and describes windows suitable for manufacturing buildings.

WINDOWS, CASEMENT

Detroit Steel Products Co., Detroit, Mich.
Fenestra Residential Windows. Brochure, 24 pp., 8½ x 11 ins. Illustrated. Rolled steel windows for residences and apartments.

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



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The Monophone fills a rapidly growing need for an instrument with all the compactness and efficiency of the conventional telephone, but with the additional advantage of having the transmitter and receiver in a single easily handled unit. The P-A-X Monophone is especially designed and intended for use with Strowger P-A-X.

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*Curtis Publishing Company
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Department of Public Safety
*Henry Disston & Sons
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*Federal Reserve Bank
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*Free Library of Philadelphia
*General Electric Company
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*Insurance Company of North America
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Link-Belt Company
Lit Brothers
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*Market Street Title & Trust Company
*Mather & Company
*H. K. Mulford Company
*Mutual Life Insurance Co.
*National Bank of North Philadelphia
*Packard Motor Car Company
*Pennsylvania Company
*Philadelphia Inquirer
*Philadelphia National Bank
Philadelphia & Reading Grain Elevator
*Philadelphia Wholesale Drug Company
*Polyclinic Hospital
A. J. Reach Company
Sacred Heart Academy
*Sears, Roebuck & Company
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*Stephen Greene Company
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Lafayette Bldg. • • • Philadelphia, Pa.
107 Sixth Street • • • Pittsburgh, Pa.
611 Olive Street • • • St. Louis, Mo.

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—*Continued from page 196*

WINDOWS, CASEMENT—Continued

Genfire Steel Company, Youngstown, Ohio.
G. F. Steel Standard Casement Windows. Booklet, 16 pp., 8½ x 11 ins. Data and architectural details of casements.

Hope & Sons, Henry, 103 Park Ave., New York, N. Y.
Catalog. 12¼ x 18½ ins. 30 pp. Illustrated. Full size details of outward and inward opening casements.

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

David Lupton's Sons Company, Philadelphia, Pa.
Lupton Casement of CopperSteel. Catalog C-122. Booklet. 16 pp., 8⅝ x 11 ins. Illustrated brochure on casements, particularly for residences.

Richards-Wilcox Mfg. Co., Aurora, Ill.
Casement Window Hardware. Booklet, 24 pp., 8½ x 11 ins. Illustrated. Shows typical installations, detail drawings, construction details, blue-prints if desired. Describes AIR-way Multifold Window Hardware.

Truscon Steel Co., Youngstown, Ohio.
Truscon Steel Casements. Booklet. 8½ x 11 ins. 24 pp. Handsomely printed with illustrations of houses equipped with Truscon Casement Windows. Illustrations of various units and combinations. Specifications, types and sizes and details of construction.
Architectural Details. Booklet. 8½ x 11 ins. 16 pp. Tables of specifications and typical details of different types of construction.
List of Parts for Assembly. Booklet. 8½ x 11 ins. 16 pp. Full lists of parts for different units.

WINDOWS, STEEL AND BRONZE

Detroit Steel Products Co., Detroit, Mich.
Blue Book of Steel Windows. Booklet, 128 pp., 8½ x 11 ins. Illustrated. Data on solid rolled steel windows for industrial and residential buildings.
Fenestra Residential Windows. Brochure, 24 pp., 8½ x 11 ins. Illustrated. Rolled steel windows for residences and apartments.
Fenestra Architectural Windows. Booklet, 24 pp., 8½ x 11 ins. Illustrated. Data on projected and counter-balanced rolled steel windows.

David Lupton's Sons Company, Philadelphia, Pa.
A Rain-shed and Ventilator of Glass and Steel. Pamphlet, 4 pp., 8⅝ x 11 ins. Deals with Pond Continuous Sash. Sawtooth Roofs, etc.
How Windows Can Make Better Homes. Booklet. 3⅞ x 7 ins. 12 pp. An attractive and helpful illustrated publication on use of steel cosements for domestic buildings.

Truscon Steel Company, Youngstown, Ohio.
Truscon Mechanical Operators for Steel Windows. Brochure. 8½ x 11 ins. 65 pp. Complete description of various kinds of installations with drawings of details.
Drafting Room Standards. Book. 8½ x 11 ins. 120 pages of mechanical drawings showing drafting room standards, specifications and construction details of Truscon Steel Windows, Steel Lintels, Steel Doors and Mechanical Operators.
Daylighting and Ventilating Power Houses. 32 pp. Booklet. 8½ x 11 ins. Illustrating the economical application of Truscon Windows in modern power house design.
Truscon Solid Steel Double-Hung Windows. 24 pp. Booklet. 8½ x 11 ins. Containing illustrations of buildings using this type of window. Designs and drawings of mechanical details.
Truscon Donovan Awning Type Steel Windows. 12 pp. Booklet. 8½ x 11 ins. Illustrating typical installation and giving construction details.

WOOD—See also Millwork

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

Curtis Companies Service Bureau, Clinton, Iowa.
Better Built Homes. Vols. XV-XVIII, inc. Booklet. 9 x 12 ins. 40 pp. Illustrated. Designs for houses of five to eight rooms, respectively, in several authentic types, by Trowbridge & Ackerman, architects, for the Curtis Companies.

Long-Bell Lumber Co., Kansas City, Mo.
The Perfect Floor. Booklet. 5¼ x 7¾ ins. 16 pp. Illustrated. Valuable for the data given on the use of wood for floors.
Saving Home Construction Costs. Booklet. 4½ x 7½ ins. 24 pp. Discusses economy and value in domestic building.
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 11 ins. 32 pp. Illustrated. Describes the production of posts and their use in various ways.

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

"We know that our pneumatic tube installation eliminated ten call boys."

Double Door Down Delivery Terminal, Vacuum. 2¼ in and 3 in. sizes. Used either at initial or intermediate stations.

50% *More* Business
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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."

Their pneumatic tube system substitutes one girl, operating a central tube station, for ten call boys who formerly ran from department to department with papers. The tubes enabled them to put into operation a rule that no employee leave his working floor without permission which eliminated running around and permitted the doing of more work by fewer people.

Making use of the air for transportation must be considered more and more by believers in modern methods. May we tell you more about it? Incidentally, we'll send a detailed analysis of this job to any responsible architect who wishes a copy.

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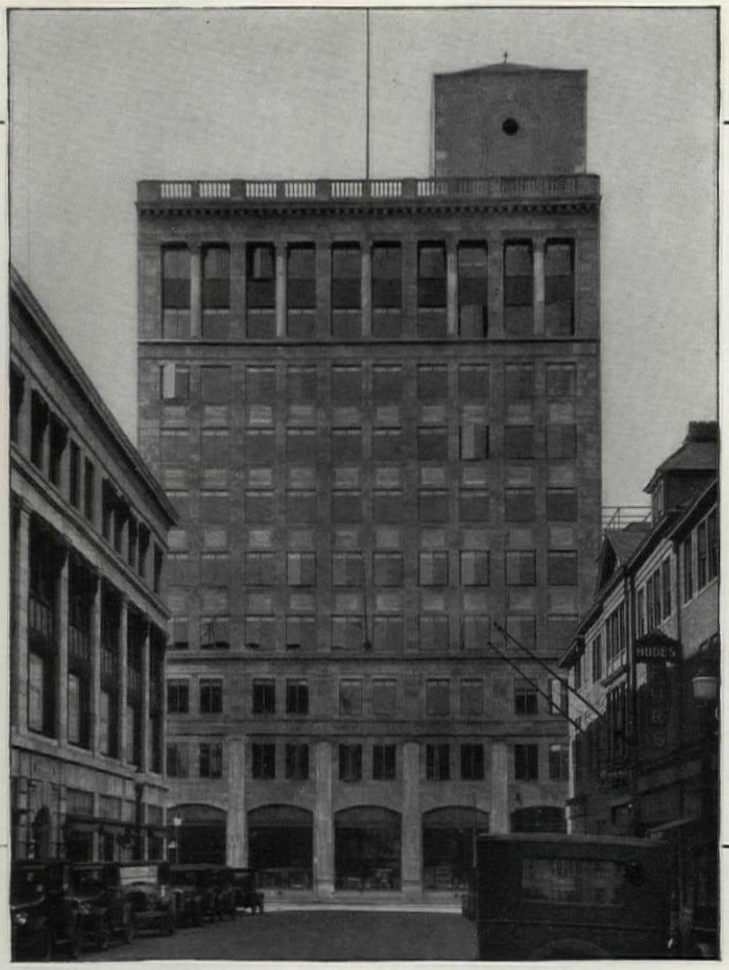

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ROCHESTER, N. Y.

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MINNEAPOLIS, 200 Builders Exchange.
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PHILADELPHIA, 1700 Walnut Street.
PITTSBURGH 207 Fulton Bldg.
SCRANTON, PENNA. Cedar Avenue.
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WILKES-BARRE, PENNA. 904 Second Nat'l Bank Bldg.

PAR-LOCK CORK INSTALLATIONS, United Cork Companies, Lyndhurst, N. J.

P-17

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 compliments 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
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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.

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

No Garbage Cans. Drop all waste here —then *forget it!*

Residence models as low as $95, and the masonry adds but little more when regular chimney is used.

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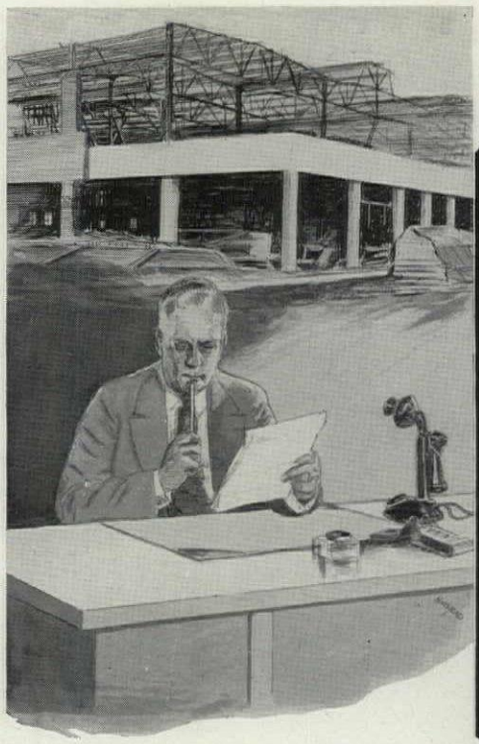

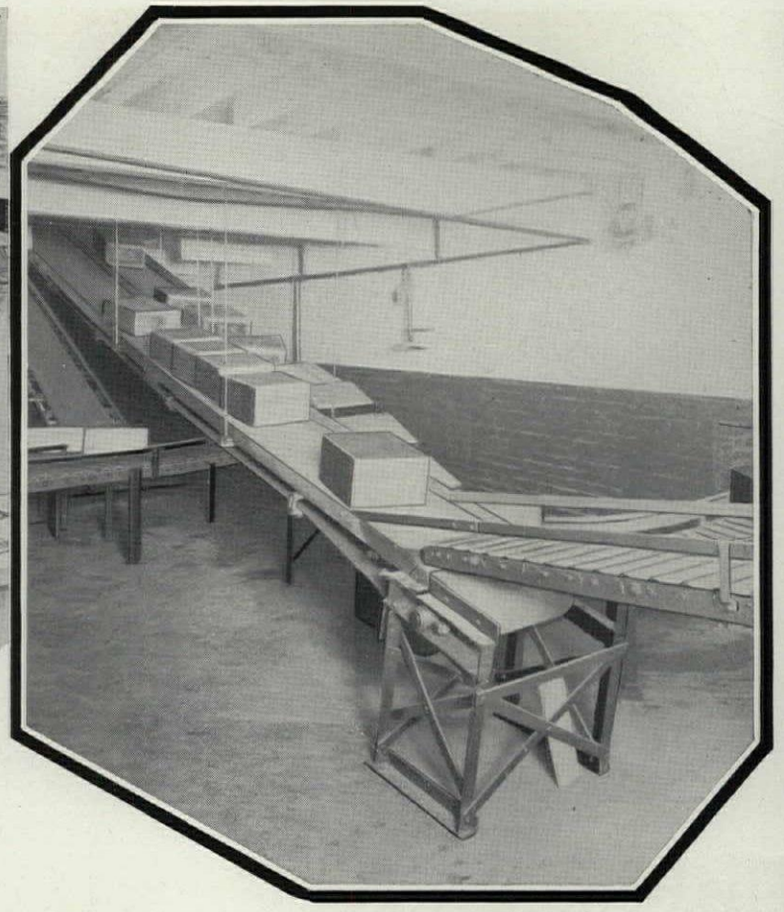

Manufacturers' Handling Problems the Key to Successful Architectural Plans

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 confidences of the manufacturers, earned through intimacy with handling problems and originality in planning, the possibility of competition is eliminated.

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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.

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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.

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MAY OIL BURNER CORPORATION, Baltimore, Md.

QUIET MAY

AUTOMATIC OIL BURNER

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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.

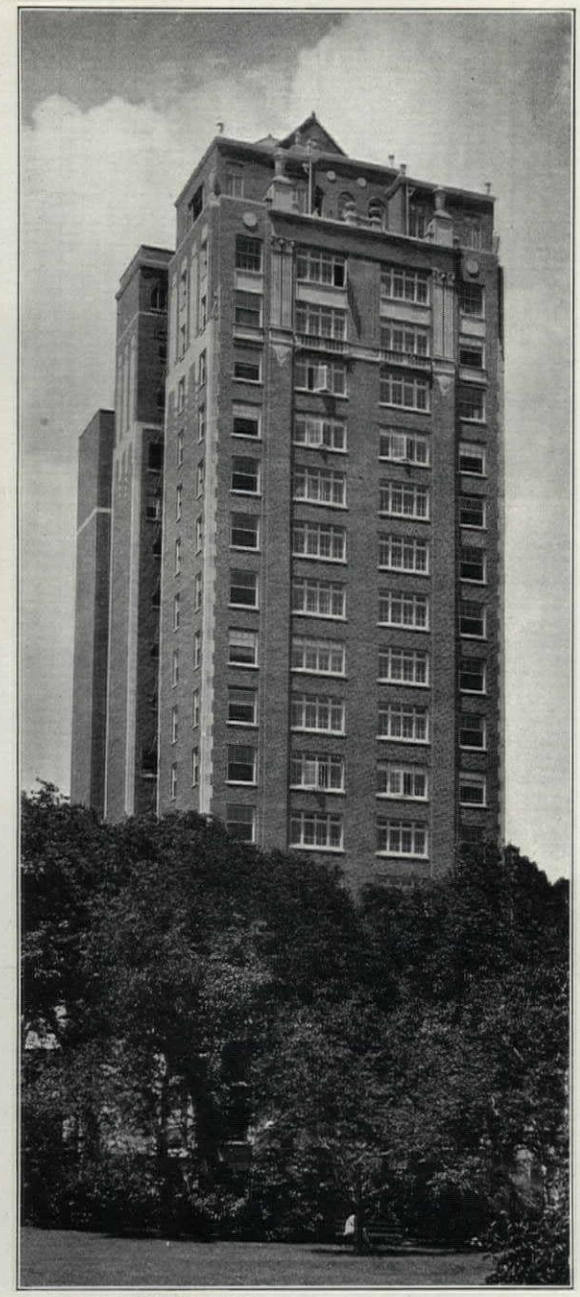
That Johnson Oil Burners should be selected for these splendid new apartment homes is acknowledgment of the efficiency and dependability of the Johnson Burner —declared by engineers *"the most scientifically constructed oil burner on the market"*.

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.

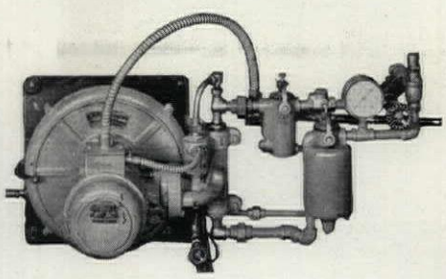
Get a new bulletin describing the Johnson Junior for homes of five to twelve rooms.

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



OMAN & LILIENTHAL, ARCHITECTS

Two No. 4½ Johnson Automatic Rotary Oil Burners heat the new 2130 Lincoln Park West Apartment Hotel in Chicago. Installation by Johnson Oil Burner Co., Chicago.



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528

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 guage 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.

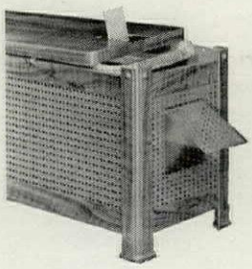
PRIMER COAT: The important first coat on the raw metal that acts as a binder between the steel and the finish. The Trico primer coat is the result of a special process developed through years of experimenting.

FINISH: DeLuxe (complete enclosures)—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.



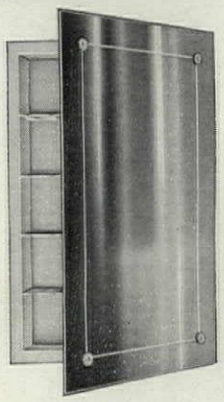
Trico, *Inc.*

1732 North Kolmar Ave., Chicago

MAKERS OF TRICO ART METAL RADIATOR FURNITURE

HESS CABINETS and MIRRORS

Snow-White Steel



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Another De Luxe Style

Beautiful — Distinctive.

The mirror entirely conceals the cabinet.

Suitable for the finest bath room.

Made in six sizes. We make five other popular styles.

See Sweet's Index; or write for illustrated booklet.

HESS WARMING & VENTILATING CO.

Makers of Hess *Welded Steel* Furnaces

1216 S. Western Avenue, Chicago.

VENTADOOR — A VENTILATING PANEL FOR DOORS

VENTADOOR

a Ventilating Panel for Doors

FOR OFFICE BUILDINGS

Ventadoors are used in office buildings as well as hotels and apartments. First cost is reduced and upkeep expense eliminated. . . . Ventadoors provide ventilation with privacy.

VAN ZILE VENTILATING CORPORATION

155 EAST 42nd ST. NEW YORK CITY

NOW ELECTROL BY THE HOMES IT HEATS

Residence of Wm. A. Webster, Memphis.
George Mahan, Jr., Architect.

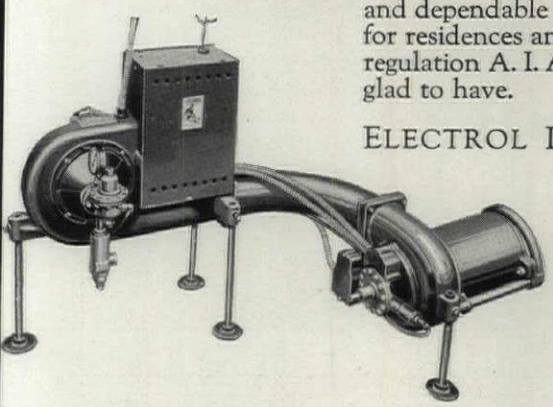
THE MASTER FURNACE MAN HEATS THIS GEORGE MAHAN, JR., RESIDENCE

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.

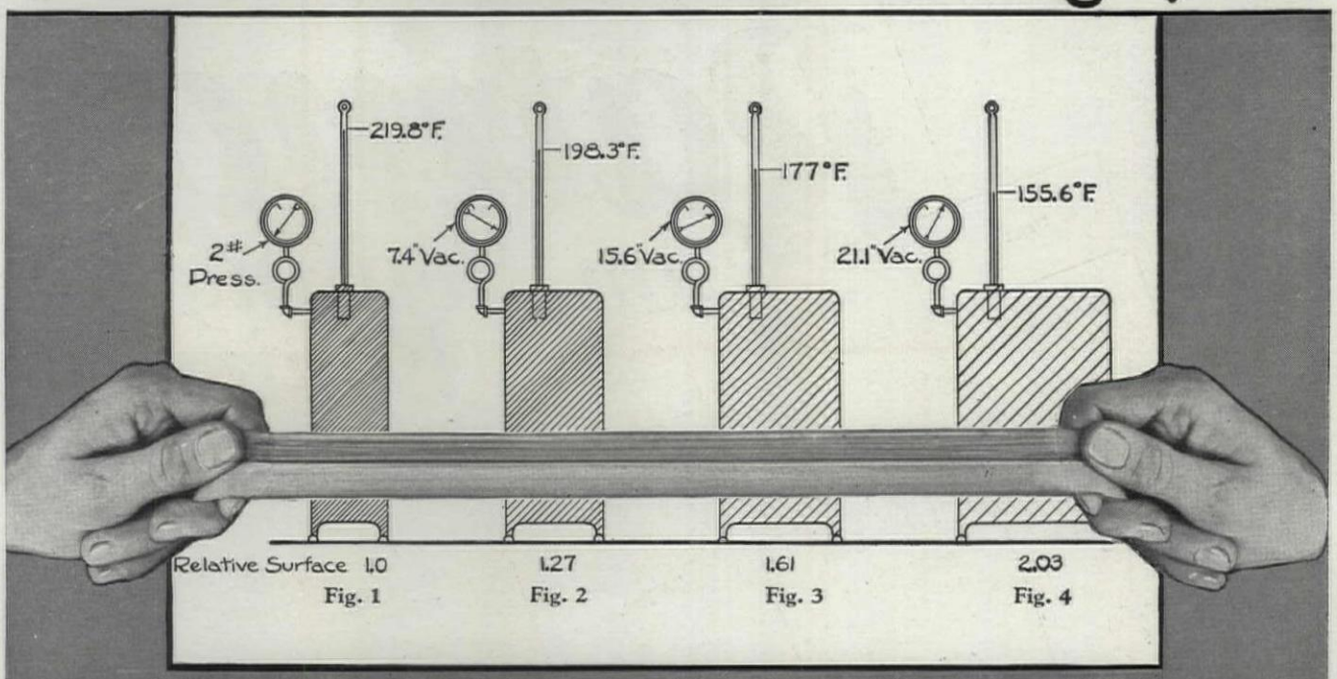


ELECTROL

The OIL BURNER with *The Master Control*

Listed as standard by the Underwriters' Laboratories, and bears their label. Approved by the New York City Board of Standards and Appeals—and by the Commonwealth of Massachusetts Department of Public Safety.

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.

The DUNHAM Difr-enshal-Vacm Heating System. A FIXED DIFFERENTIAL IN PRESSURE — A VARIABLE DEGREE OF VACUUM

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.*

Don't Overlook these Ratings on Heating Equipment

HEAT WITH UNIT HEATERS

UNIT	DIMENSIONS	WEIGHT	CAPACITY IN CUBIC FEET OF HEATED AIR PER MINUTE	SQUARE FEET OF DIRECT RAD. REQUIRED TO GIVE SAME CAPACITY
Venturafin No. 2A	22¾" high 14⅜" wide 12⅞" deep	60 lbs.	450 cu. ft. per minute	125 square feet
Venturafin No. 2B	22¾" high 14⅜" wide 12⅞" deep	70 lbs.	675 cu. ft. per minute	165 square feet
Venturafin No. 2C	22¾" high 14⅜" wide 12⅞" deep	80 lbs.	900 cu. ft. per minute	200 square feet
Venturafin No. 4	29" high 32" wide 10 1/6" deep	350 lbs.	2000 cu. ft. per minute	500 square feet
Venturafin No. 7	58" high 56½" wide 13⅛" deep	1100 lbs.	8000 cu. ft. per minute	2000 square feet

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 $\frac{1}{10}$ 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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DETROIT, MICH.

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

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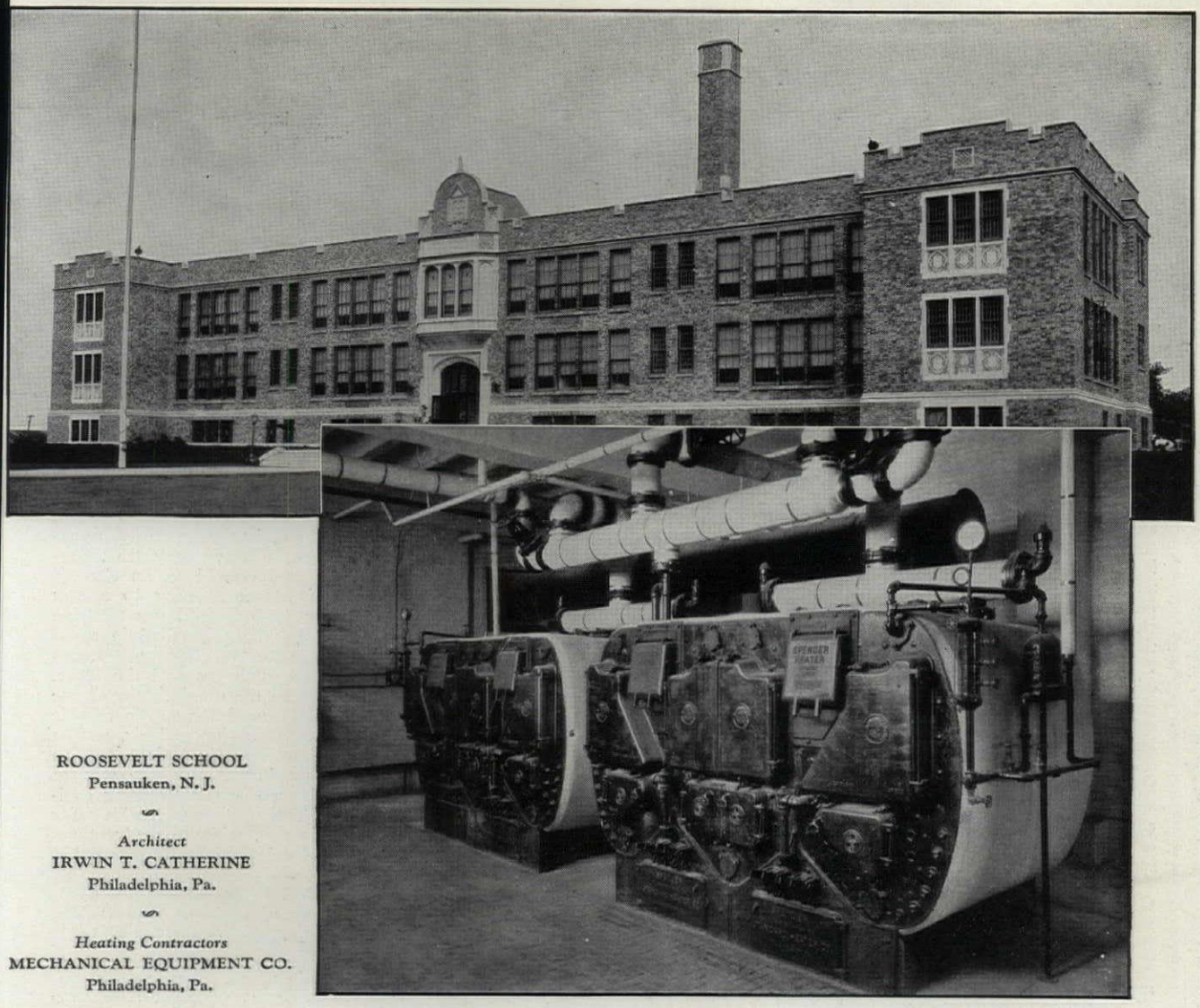
BRANCH OFFICES IN ALL PRINCIPAL CITIES
CANADIAN SIROCCO COMPANY, LIMITED, WINDSOR, ONTARIO

(699)

American Blower

"Sirocco" VENTILATING, HEATING, AIR CONDITIONING, DRYING, MECHANICAL DRAFT Equipment — Since 1881

Manufacturers of all Types of Air-Handling



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Pensauken, N. J.

Architect
IRWIN T. CATHERINE
Philadelphia, Pa.

Heating Contractors
MECHANICAL EQUIPMENT CO.
Philadelphia, Pa.

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

SPENCER HEATER COMPANY *General Offices:* WILLIAMSPORT, PA.

New York City Boston Philadelphia Baltimore Buffalo Rochester Hartford Albany Syracuse Scranton

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, dock construction, bulk headings, 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 extend through the wall, so secured to one another by pins that the construction possesses all of the necessary rigidity.

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 is logically 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. Bouton, Assoc. 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 severe. The 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 where either 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 note 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 because 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 for most purposes metal lath painted or galvanized has proved to be a very durable base for stucco and plaster, conditions sometimes exist where it is desirable to provide maximum resistance to deterioration. Where the climate is unusually moist or affected by a salt atmosphere, as along the sea coast, many architects specify "Herringbone Metal Lath made from ARMCO Ingot Iron." The material is favored by builders for several reasons. First, it is an exceedingly rigid sheet, easily handled and erected by one man without a helper; rigidity is secured by reason of the sloping longitudinal cross ribs. Second, "Herringbone" is a self-furring lath; the sloping reinforcing ribs keep the sheet far enough away from the support to permit the plaster to key behind. Third, the design of the mesh-work is such that plaster waste is reduced to a minimum. The cross strands are so shaped that they do not cut the plaster, but guide it around and behind the lath, the excess being caught and held in place by the shelf-like reinforcing ribs. "Doublemesh Herringbone," a style especially adapted to interior plastering, has an unusually small mesh which greatly increases its plaster-saving properties. All of these features of economy taken in conjunction with the exceptional durability of the basic material make valuable "Herringbone ARMCO Ingot Lath."

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 construction in edifices of many stories. If it were possible to conduct a survey it might indeed be found that the amount of steel so used is less than the amount employed in the form of lathing, corner and base beads, etc. This brochure illustrates and describes the use of the numerous steel products manufactured and marketed by the Sykes Metal Lath Co.—dampers, thimbles, chute doors, ash dumps, 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.

WARREN WEBSTER & CO., Camden, N. J. "Webster Drip Trap, Bulletin 712." A superior item of equipment.

Webster Vacuum and Modulation Systems of Steam Heating are basic systems of steam circulation embodying both equipment and methods which are continuously undergoing refinement and development. The Webster Drip Trap, which is described in this bulletin, is the most recent development in Webster equipment, a heavy duty trap, provided to meet a specific need and offered as an element bringing Webster Systems of Steam Heating to a still higher standard. The Webster Drip Trap has undergone thorough laboratory 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 has been eliminated. The specification calling for a heavy-duty float-type trap is met, while the advantages of the thermostatic element and ease of installation remain.

CELITE PRODUCTS COMPANY, 11 Broadway, New York. "Celite for Concrete." A record of some experiments.

"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.

CENTRAL RADIATOR COMPANY, New York, and Lansdale, Pa. "Catalog Number 26." Heating equipment.

This large firm, manufacturing different 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 installations of heating apparatus are made. This particular brochure, one of quite a number of publications issued by the Central Radiator Co., deals with four specific items of the firm's output: Lansdale Round Sectional Boilers; Lansdale Radiators; Molby Magazine—Feed Boilers; Domestic Water heaters, Specialties 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 require for a correct understanding of the details 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.

REVIEWS 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-resistant, and not merely incombustible, 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 sufficiently varied to supply fans for every imaginable purpose, and this booklet describes and illustrates the different kinds,—whirling fans, desk and bracket fans, exhaust 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 extent 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 wire "gauges" 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 media. 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 radiators any heating system that would ordinarily require radiators, pipe coils or similar heat-diffusing apparatus. This is the Trane Concealed Heater, 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,

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

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 Mamaroneck 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 in thousands of homes 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 kitchenettes.

The concrete floors of this power plant will last for years

LAPIDOLITH TRADE MARK 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**

A few of the many users of LAPIDOLITH

GREAT LAKES TERMINAL WAREHOUSE
Detroit, Michigan
INTERNATIONAL MOTORS CO.
New York City, Albany, N. Y., Allentown, Pa., New Brunswick, N. J.
U. S. POST OFFICE GARAGE
Chicago, Ill.

Some other SONNEBORN Products

LIGNOPHOL—Wood floor preservative prevents floors from splintering or drying out. Gives a hard, smooth sanitary, wood floor.

HYDROCIDE COLORLESS—A waterproofing for exposed exterior walls that does not form a film that can be abraded, but carries waterproofing material into brick, stone or cement, caulking the pores against the elements.

CEMCOAT—A paint that stays white after others turn yellow. Can be washed over endlessly. Adheres to brick or concrete as easily as to wood.

Lapidolith was used on all concrete floors of this power plant of Louisiana Power & Light Co., at Sterington, La., Ford, Bacon & Davis, Engineers.

COUPON

L. SONNEBORN SONS, Inc., 114 Fifth Ave., New York
Please send me, without obligation, demonstration samples and literature on: Lapidolith ...; Lignophol ...; Cemcoat ...; Hydrocide Colorless ... (Check products that interest you.)

Name .....
Address .....
Company .....
Position ..... A. F.-1

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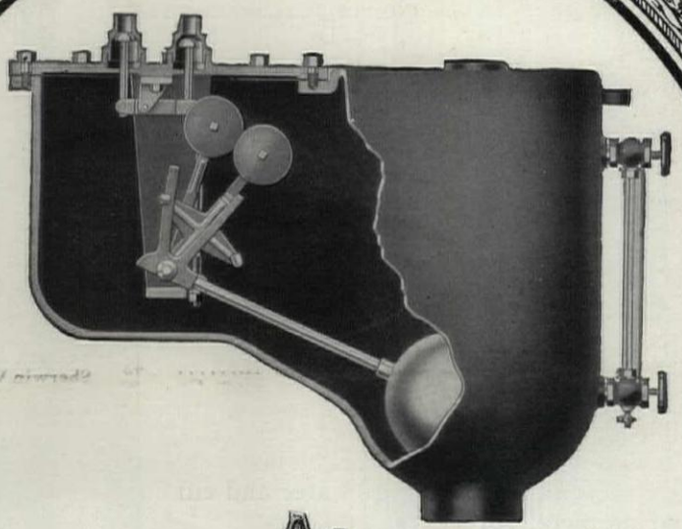
PART 2—Engineering and Business



ILLINOIS
HEATING SYSTEMS

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.

—a moderate, healthful heat during mild weather, avoiding overheating common to ordinary steam jobs.

—all the heat you want in winter weather by adjusting firing periods.

—operation four-fifths of the time with banked fires.

—easy control of room temperatures.

—a remarkable fuel economy.

—durability of apparatus.

—noiseless operation.

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

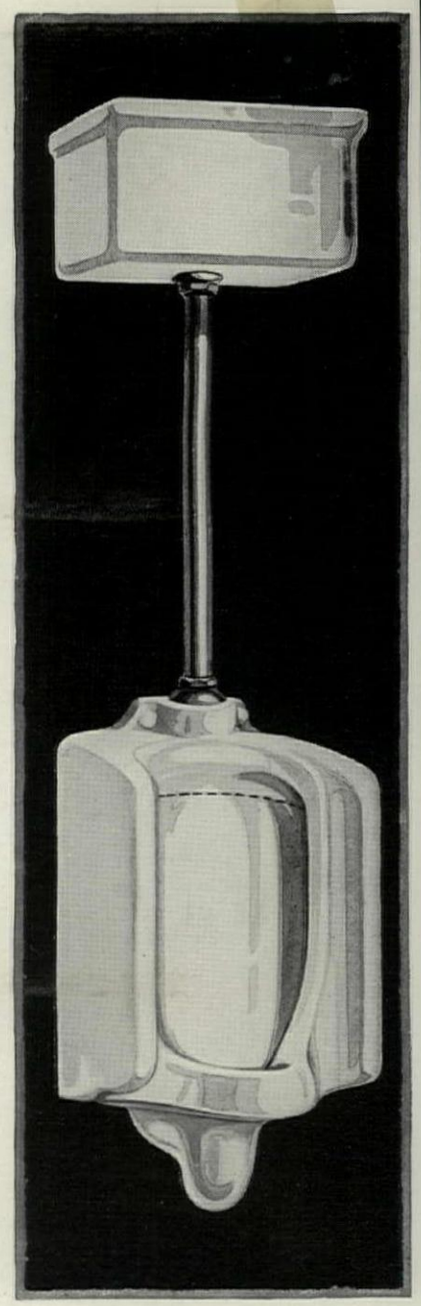
How to crowd so many features into one fixture—that is the Eljer secret. The Auburn Noiseless Syphon Jet Wall-Hung Bowl is an example. In addition to its many points of merit such as long rim opening, deep seal, large water surface and clean-cut graceful lines, it is exceptionally quiet in operation.

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.

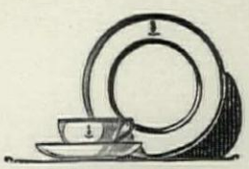
The Eljer catalog gives details. Start the New Year with a note to Eljer asking for a nice new copy for your personal use. The Eljer Company, Ford City, Pa. Plants at Ford City, Pa., and Cameron, W. Va.

Auburn No. 597



Correcto No. 720

Plumbing Fixtures of Eljer China are similar in texture to the finest French Table China—but with the added thoughness necessary to stand rough usage. Acid-proof and rust-proof.



ELJER

VITREOUS CHINA PLUMBING FIXTURES

Announcing Centrifugal Vacuum Pump Merger

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.

The manufacturing plant at Michigan City, Indiana, where Dunham Pumps are now made, will be greatly increased in capacity during 1928. This will give the Dunham Company three large and thoroughly modern plants, one in Marshalltown, Iowa, one in Michigan City, Indiana, and one in Toronto, Canada.

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.

The DUNHAM Difr-enshal-Vacm Heating System.
A FIXED DIFFERENTIAL IN PRESSURE — A VARIABLE DEGREE OF VACUUM

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

C. A. DUNHAM CO.

Dunham Building, 450 E. Ohio St.

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.

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
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