ECEMBER 1935 • WILLIAMSBURG • STORE FRONTS • TIME-SAVER STANDARDS

AMERICAN ARCHITECT

HIGHLIGHTS OF THIS DECEMBER ISSUE

With every modernist and pseudo-modernist justifying his creations with the slogan "Form follows Function," the philosophy of William Lescaze in our first article is clarifying and reassuring. Illustrations show where this philosophy is put in practice. . . . THE BROOKLYN CHILDREN'S MUSEUM is an embodiment of the Lescaze idea as applied to a project of far-reaching educational and social significance. The quiet dignity and simplicity of THE NEW WILBOUR LIBRARY in the Brooklyn Museum is further "proof of the pudding." . . . PRACTICAL PLANNING—A WAY TO GET THINGS DONE indicates a possible solution to the problem of bridging the gap between theoretical master-plans and the difficulties of co-ordinating small individual real estate holdings to the end that a better city may evolve. . . . A breath of Florida sunshine is included in THE HOUSE OF A. W. JOHNSON at Miami Beach by R. T. Pancoast. Here provision for outdoor living is as much a part of the house as its enclosed rooms. . . . THE OFFICE OF F. J. EPPENSTEIN, Chicago architect, exemplifies the richness of wood in its simplest forms. . . . Morris Sanders has made the most of his opportunities for providing the proper atmosphere for the selling of SCHENLEY beverages and has even designed the attractive bottles. . . . The problems of deferred architectural payment are discussed in the LEGAL ARTICLE. . . . WILLIAMSBURG, VIRGINIA, the scene of next year's A.I.A. Convention, has been caught in all its beauty by the camera of F. S. Lincoln, and sixteen pages serve to give the 18th Century atmosphere of this restoration, rich in its architectural and historical associations. . . . The architectural problems of STORE FRONT DESIGN are considered in the light of the merchandising problems as they apply to various types of goods. The design and plan of the store front and show window, its ventilation and lighting are considered in detail as they apply to the solution of merchandising problem. . . . TIME-SAVER STANDARDS this month are devoted to fundamental data relating to geometric and mathematical forms and such things as architectural and electrical symbols which should be standardized throughout the architectural profession.

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Gay indeed is this toy department in the Strawbridge & Clothier Department Store, Philadelphia. The floor consists of 17,000 square feet of Travertine Linotile with black interlining strips. Armstrong's Architects' Service Bureau offers, without charge, complete technical assistance in the design of modern floors.

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Linotile is durable. Its resistance to indentation is great, removing the likelihood of damage by heavy furnishings . . . and making it possible for this floor to take the severe punishment of heavy store traffic, year after year, without showing it.

If you have, or are likely to have, a department store or any other retailer among your clients, it will pay both you and your client to investigate Armstrong's Linotile. It's inexpensive to install, inexpensive to maintain, and it keeps its appearance. For full information, see Sweet's Catalog or write now for file-sized "Armstrong's Linotile Floors." Armstrong Cork Products Company, Building Materials Division, 1201 State St., Lancaster, Pennsylvania.

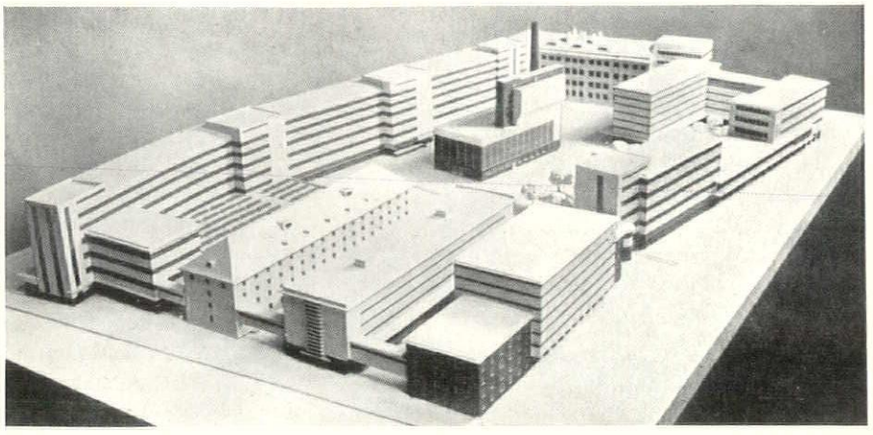
Armstrong's LINOTILE FLOORS

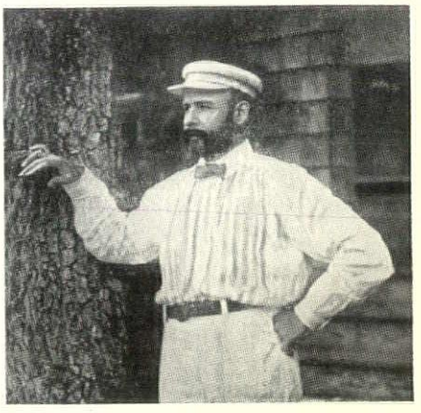
American Architect, published monthly by International Publications, Inc., 572 Madison Avenue, New York, N. Y. $3.00 per year; Canada, $4.00; Foreign, $5.00. Entered as second class matter April 5th, 1926, at the Post Office at New York, N. Y., under the act of March 3rd, 1879. Issue 2640, dated December, 1935.

ARCHITECTURE
ALLIED ARTS

BOOKS

ENGINEERING
BUSINESS





A tobacco factory, Linz, Austria, from "Industrial Architecture." At the right, Louis Sullivan, from the book by Hugh Morrison.

INDUSTRIAL ARCHITECTURE

By C. G. Holme, with an Introduction by L. H. Bucknell. Published by The Studio Publications, Inc., New York. Illustrated; 208 pages; size, 9 x 11½; price $10.00.

THIS book is addressed to the industrialist as well as to the student of architecture. It aims at providing suggestions and indicating practical advantages for industrial planning. There are many indications that efficiency, economy, and smoothness of working are inseparably connected with the carefully thought-out types of construction which may be seen in the 188 illustrations which were collected from all over the world. This architecture forms the background to the lives of many millions of workers. The plates are grouped according to the following classifications: Factories and Warehouses, Power Plants, Tunnel Works, Garages, Research Stations, Markets, Railway Works, Welfare Works, Water Towers. One hundred and thirty-four architects are represented in this volume. The text gives consideration to: The Site, The Process, Internal Services, Materials, Welfare, Welfare Supervision In Factories, Ventilation, Sanitary Accommodations, Dust, Light, Fatigue, Medical Work, Fire Protection. It is a worth while book.

PRACTICAL ACOUSTICS FOR THE CONSTRUCTOR

By C. W. Glover. Published by The Sherwood Press, Cleveland. Cloth bound; 6 x 9; 468 pages; 236 illustrations; price $7.50.

THIS work by an outstanding British acoustic engineer, covers the subject of sound and deals with various special branches of acoustics in a practical and exhaustive manner. Full details of sound resisting construction are included—an important aspect of acoustics which usually is not given adequate consideration. Numerous diagrams, drawings, and photographs lend clarity to the text. Extensive lists of references to publications on acoustics are included. Architects and engineers should find this book of interest.

LOUIS SULLIVAN

By Hugh Morrison. Published by The Museum of Modern Art and W. W. Norton & Co., Inc., New York. Illustrated; 391 pages; size 6½ x 9½; cloth; price $4.00.

LOUIS SULLIVAN was in actual practice not only a great architect but through his ability to integrate romanticism and realism, to attain a synthesis both in theory and practice completely expressive of modern life, he achieved the emancipation of architectural thinking from the dead forms of the past and demonstrated the possibility of development of new forms directly out of the nature of the problem at hand. He was truly a prophet of modern architecture. Lewis Mumford has said of Sullivan, "He was perhaps the first mind in American architecture that had come to know itself with any fullness in relation to its soil, its period, its civilization, and had been able to absorb fully all the many lessons of the century."

Thus does this book on the life and works of Sullivan come to us at an opportune time when American architecture is undergoing the vitalizing influence of the modern school of architects. The author spent five years in study, begun, while attached to the Department of Art in the University of Chicago, and during these five years visited every building designed by Sullivan now in existence. He interviewed and secured the co-operation of living friends and admirers, and has brought forth a volume on the life of this famous architect which is the first, and in all probability, the most accurate account of the life of this great genius. Sullivan's work is adequately illustrated in 100 plates. The book is divided into the following chapters: Youth and Training, Early Works, The Auditorium, Years of Expansion, Giving Form To The Skyscraper, Sullivan Alone, Sullivan's Architectural Theory, A Critical Estimate. This book is a valuable contribution to the historical records of American architecture, a work that is inspiring and filled with interest from beginning to end.

WOOD HANDBOOK

By Geo. W. Trayer, Senior Engineer, Forest Products Laboratory. Published by the Forest Service, U. S. Dept. of Agriculture. Price $0.25.

A HANDBOOK which brings between covers a condensed summary of information on "wood" that has long been lacking. Used for what it is, a compendium of data on wood itself, it answers the principal questions any user could ask about the where, the why, and the how of wood use to secure the best results. Each chapter contains its separate bibliography. The work represents the findings of 25 years of research by the Forest Products Laboratory and authoritative contributions from many sources. A book that architects, engineers, contractors, and lumber dealers should find of interest.

The trend is to "all-electric" buildings . . . homes, factories, offices. And these buildings are entirely dependent upon their wiring systems for the efficient operation of electrical appliances and apparatus.

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The Readers Have a Word to Say

• DESIRABLE INFORMATION IN USEFUL FORM

Editor, AMERICAN ARCHITECT:

I CONGRATULATE you and your colleagues on your excellent publication presentation. The format and material are indeed up-to-date. A few years ago, many of my architectural friends who were looking for greater evidence of modern architecture had a justifiable complaint for most architectural publications. However, I understand that we were in a transitional period. I am sure that we have no complaint with AMERICAN ARCHITECT now.

I consider your Time-Saver Standards excellent and useful material. In them I consider that you have presented desirable information in a very useful form.

By way of criticism I would like to make a strong plea for more pages devoted to work which is being planned. By this I mean more presentations of theoretical and contemplated problems and solutions. Your excellent presentation of Saarinen's work in your October issue is the finest example I can think of. Also the prize-winning solutions for Beaux Arts problems are very significant today.—*C. T. Masterson, General Electric Company, Cleveland.*

• CONVINCE THE PUBLIC

Editor, AMERICAN ARCHITECT:

THANK you very much for the reprints from your October number. It was kind of you to take so much trouble to send them to me and we are very glad indeed to have them.

Here in Philadelphia, a few speculative builders are starting to put up the same old rows of two story houses with party walls and apparently these have a market, but the practice of architecture is at the low water mark.

As I see it, our problem is going to be to convince the public that we have something worth while to sell. I do not think that 1 per cent of the buildings erected in the past three years was designed by architects and I doubt that many people feel that an architect's service adds anything to the intrinsic value of a building project.

Advertising is the only way I see out. Here I find drafting rooms in most realtors' and builders' offices and no charge made for the service. Of course it is not very good service, but the public does not know that. The A.I.A. has not convinced the Administration that a national expression, through the medium of architecture, is worth paying for, so how can we expect the average man to understand.

Again thanking you for your kindness, I am, *Carl A. Ziegler, Architect, Philadelphia, Pa.*

• THE ONLY METHOD

Editor, AMERICAN ARCHITECT:

RELATIVE to Time-Saver Standards as published in your October issue, in our opinion this is the only method by which data can be presented to the architects, in order that they can be located readily. We would like to collect all the information possible in such condensed form.—*Warren D. Miller, Miller & Yeager, Architects, Terre Haute, Indiana.*

• NO LILLIPUTIANS

Editor, AMERICAN ARCHITECT:

YOUR Time-Saver Standards in my opinion are about the finest published as yet. The size of the sheets is especially interesting as Lilliputian files are not in my opinion useful.

Enclosed find application for two sets of Time-Savers.—*William J. Provost, A.I.A., Stamford, Conn.*

• A VALUABLE CONTRIBUTION

Editor, AMERICAN ARCHITECT:

WE consider your Time-Saver Sheets a valuable contribution to the data which every architect's office should keep on file for reference. We trust you will continue the good work. —*Visscher & Burley, New York.*

• INTERESTING AND PRACTICAL

Editor, AMERICAN ARCHITECT:

YOUR Time-Saver articles appearing in AMERICAN ARCHITECT are very interesting and practical.

These articles will certainly be very valuable if continued.—*F. W. Acock, New York.*

• "PROMOTE THE IDEA" YEA! FURTHER

Editor, AMERICAN ARCHITECT:

YOUR article in the October issue of AMERICAN ARCHITECT on "Promoting the Idea" of letting the public be the Jury for Architectural Competitions deserves and should be given more publicity than it has received.

The London Merchant, according to your article, knew his public, as is evidenced by his insistence that the Awarding Jury, of a recent Architectural Competition, be Mr. and Mrs. General Public.

Is it the purpose of our Professional Juries to foist upon the Public "always something new" and must it necessarily be modern?

In the recent G. E. Company's "Home Electric Competition" Mr. and Mrs. General Public were most severely reprimanded for their seeming lack of taste because practically all of the prize winning designs for homes were modern.

Mr. and Mrs. General Public not only pooh-pooh-ed the reprimand, but retaliated by their extremely forcible edict "Dollars."

We are told that "The proof of the pudding is the eating," hence please note on page 523 of the October issue of Pencil Points, a house designed by Royal Barry Wills, with the following accompanying note:

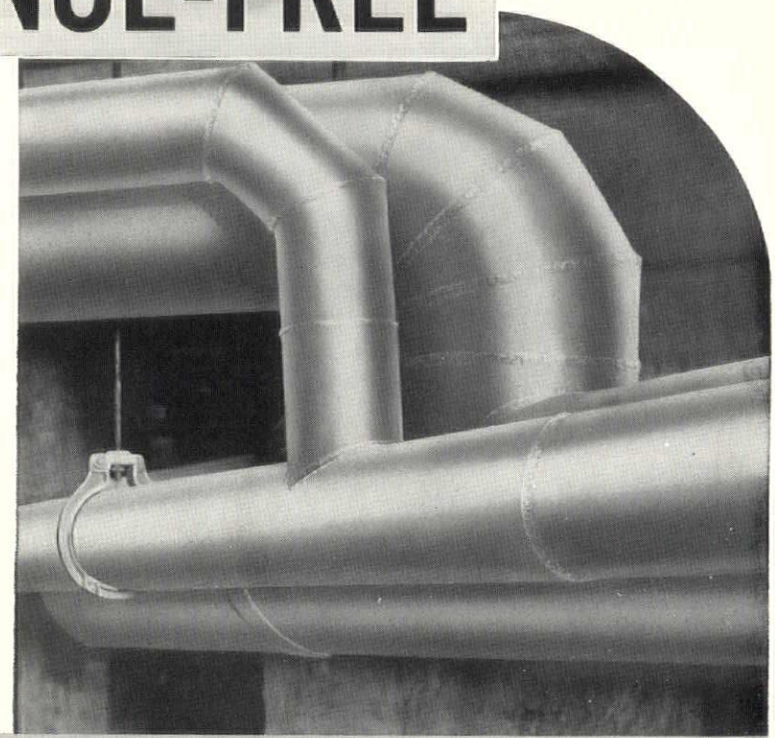
"Although this design won neither prize nor mention in the competition, it was selected by the company for inclusion in its portfolio of New American Houses made available to prospective home builders under the G. E. Home Building Program. We are informed that it is the *people's favorite* (italics is mine) if not the Jury's and that more have arranged to build it than any of the winners."

We, as professional men, believe the public should be educated in architectural appreciation, true, and yet can anyone say of this man's design—bad taste—absolutely NOT!

Then let us invite the public, our life's blood to have its say—and maybe we, architects, will learn as well as they. "PROMOTE THE IDEA"—Yea—"FURTHER."—*E. H. Hughes, Architect, Evanston, Ill.*

MAINTENANCE-FREE

forever



· OXWELDED PIPING ·

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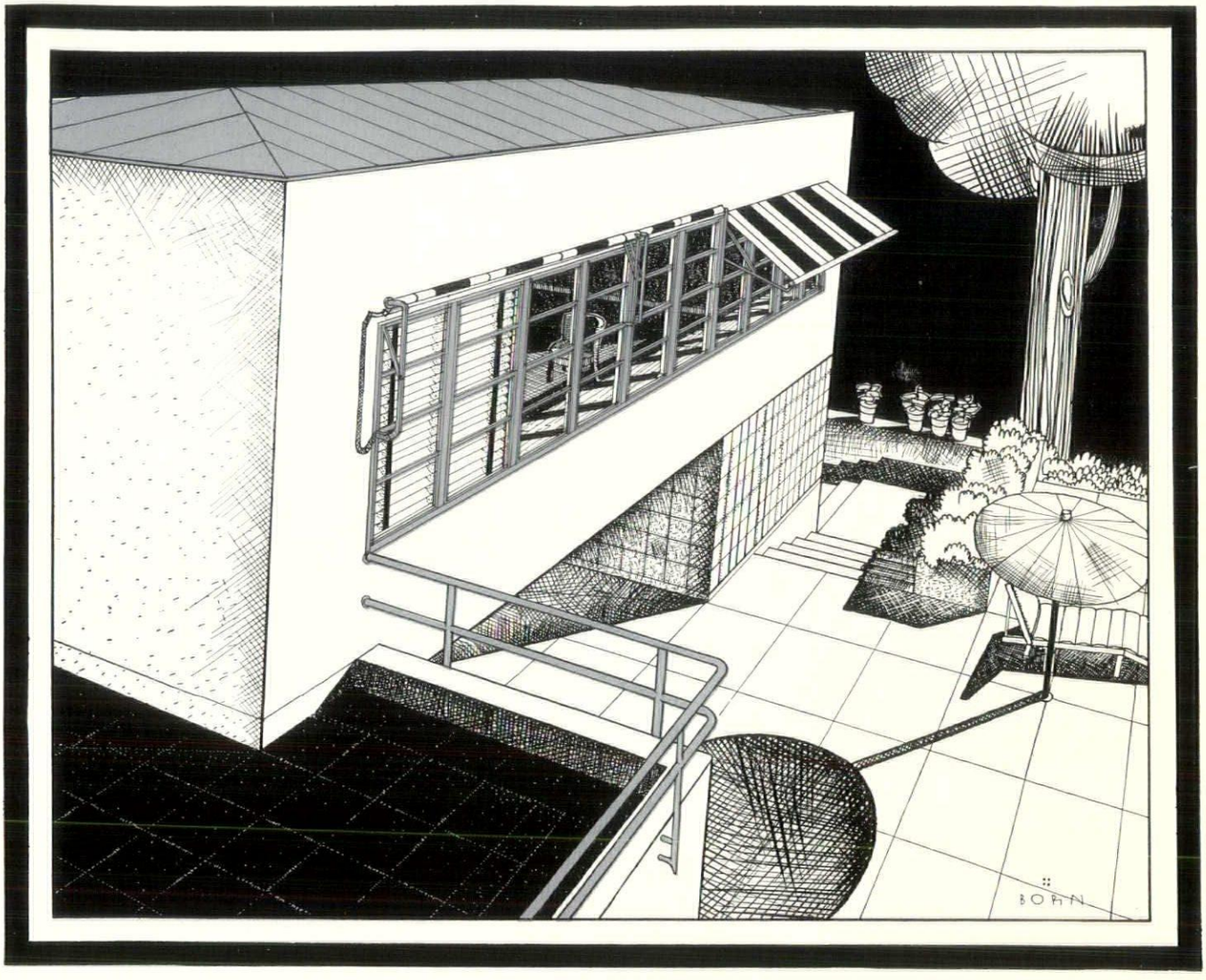

LOOK CLOSELY...THEY ARE DOUBLE-HUNG

The small, strong sections and precise profiles of the new Aluminum *light-weight* double-hung window give new scope to fenestration ★ Traditional design limitations are no more ★ To inherent simplicity and efficiency Aluminum adds lightness and ease of operation, plus freedom from maintenance ★ Decidedly, these windows are not expensive ★ Ingenious extruded shapes of Alcoa Aluminum, and advanced fabrication techniques by their manufacturers, make these windows a *must.* We shall be glad to furnish the names of manufacturers, upon request ★ Aluminum Company of America, 1895 Gulf Building, Pittsburgh, Pennsylvania.

ALCOA ALUMINUM

AMERICAN ARCHITECT

Trade-Mark Reg. U. S. Patent Office

VOLUME CXLVII NUMBER 2640

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THE GOVERNOR'S PALACE, RESTORATION, WILLIAMSBURG, VIRGINIA

Perry, Shaw & Hepburn, Architects

THE CLASSIC OF TOMORROW

Form follows Function! Function creates Form! Shades of Louis Sullivan! The sway of forceful slogans. Labels have helped confusion rather than clarification. "Functional architecture," "International style" —what have you. The real thing is quite simple.

BY WILLIAM LESCAZE

FUNCTION does not altogether dictate Form. Function indicates Form.

The real architect (that rare combination of artist, scientist, businessman) chooses from the many possible forms, all functionally adequate, *that one* which is aesthetically most satisfying. Thus since form depends on personal selection, as well as on such factors as purpose, climate, available materials, cost—the modern architecture of Sweden can't possibly look like the modern architecture of Texas. "International" refers to a common approach to life and to design, not to a set of "universal" forms, not to a bag of tricks nor a sack of streamlined gadgets.

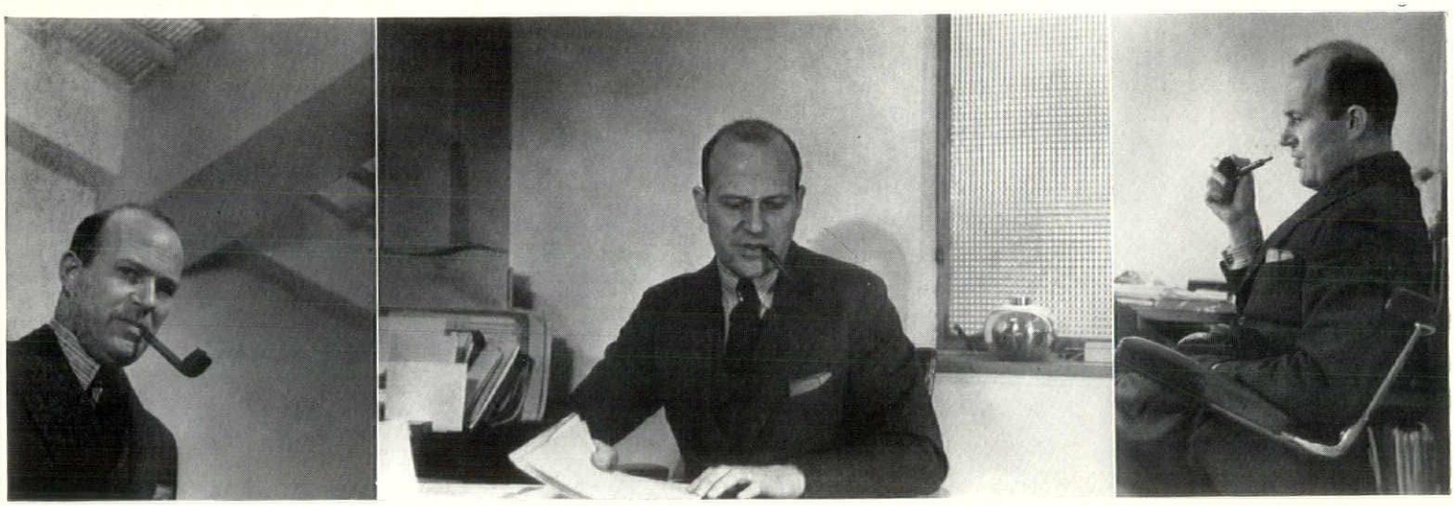
Modern architecture is not just another style—it is essentially an IDEA, that of readjusting forms to the life of today—to the needs of human beings living today. It has grown into an ATTITUDE of mind—a philosophy of life. It says, among other things, Life of Today is a grand and fascinating thing. We need not be ashamed of the mechanized tools of our civilization. If we were more honest and frank about them, if we gave up camouflaging them, most of them would be more pleasant to look at—and they might possibly work better. It says—Ugliness is not a necessary evil. Over a hundred years of rapidly growing industrialization may have piled up ugliness, darkness, confusion in our houses, in our cities. But there is a way out. It is possible to create order out of this chaos. It can be done—it must be done—all men have a right to air, sun and trees.

Modern architecture puts MAN first, it exists to serve man, to be in scale with man, to provide for the comfort of man—light and air for his dwellings, for his working place, for his recreation. The man-scale of modern architecture is paramount.

The modern architecture of today will be the classic architecture of tomorrow. What we call classic was the modern architecture of a past period.

Good architecture, classic or modern is essentially of its time, growing out of the life of its time, fully aware of the requirements of that time—making use of the materials available at that time—of the methods of construction known at that time—erecting forms with those materials according to these methods—forms beautifully appropriate to the requirements of that time. This is true—regardless of time—(XII Century—XX Century)—regardless of requirements (temple, palace, cathedral)—regardless of materials (marble, wood, stone, brick).

Essentially, modern architecture starts from a basis of good sound common sense: A good building must work.



PHOTOS: RICHARD CARVER WOOD

LESCAZE . . . felicitation . . . concentration . . . conversation

Its *plan* must be sensible, free, easy to follow, natural, economical, designed for the life to be lived inside.

Its *façade* must carry out that plan, simply, honestly—in vertical surfaces expressing the plan, with order and rhythm in its elements, windows and walls—these related to the sun, to vistas.

The building must be placed and adjusted to its site, must make the best use of natural grades and verdure.

Its *materials* must be logically chosen—watertight, heat-and-cold-resisting, with minimum of handling costs and maximum of ease in erection.

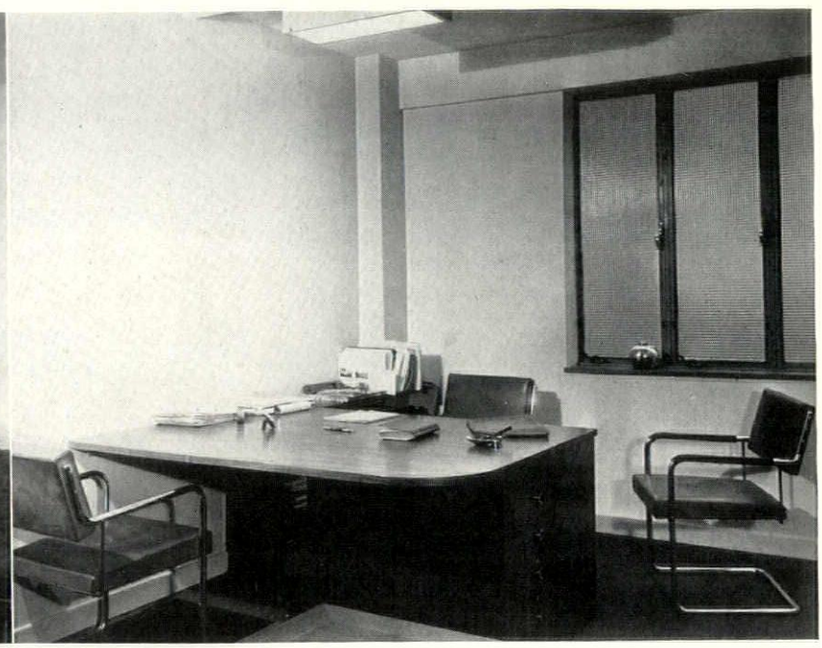
Its *financial set-up* must have a sensible relationship to cost and to income of the client.

There is no pattern for modern architecture, uninformed critics to the contrary notwithstanding. But there are rigid patterns for "period" styles. For each of them there is a pattern of plan, materials, proportion, detail and even color. People who know the details of these period patterns can criticize period buildings—old or new—with justice. The more closely the brand new period house approaches the best examples built a century or more ago, the more "successful" it is judged by those who like it.

But this *does not hold at all for a modern building of any type*. There is no pattern, no mould and there never should be. A building is not modern nor is it a good building, just because it has a corner window or a flat roof. It is only modern, and good modern, if it meets in every requirement the needs and purposes of the people living in it, or working in it. It starts from their list of requirements, from the knowledge of how they want to live and can afford to live—

Reception Room

Private Office



not from a pattern, symmetrical or asymmetrical. So in looking at a modern building—any modern building—in order to be a just critic, one has always to go back to the requirements of the people who put up the building.

Such architecture demands architectural thinking, architectural synthesis. That has not been said often enough. We need much more thinking and much less drawing.

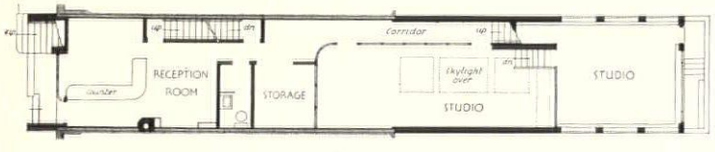
What makes the growth of modern architecture so slow? It may be that most of us are creatures of habit—or still worse, we have become immune to the buildings which surround us. We work and live a great part of our lives in rooms which we couldn't describe—we notice so little—we think so little outside of our own fields—the manufacturer of his products, the banker of his bank. A friend of mine, a banker, wakes up in a Louis XV bedroom, breakfasts in a Spanish dining room, rides down in a Chinese Elevator, drives to Wall Street in a Lincoln and works all day inside of a Renaissance Room and seems almost totally oblivious to all of them. It doesn't seem to make sense. A little more sense might bring a little more happiness.

It may be that we have been too busy these last 100 years developing the means for production to bother much about what was produced so long as it would sell. Mechanical discoveries, electrical inventions, industrial developments—these took all our time. Analysis of the results in terms of man was limited to—"the more, the better." Today, therefore, we are surrounded by a chaos of unplanned things, of meaningless buildings, of unnecessary misery.

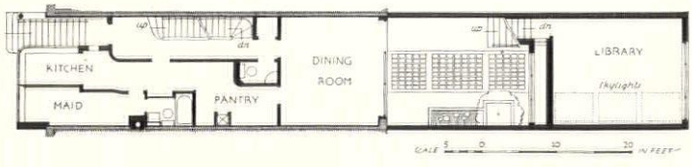
I am confident we can re-plan to make what we have, and what we will have, work more efficiently, in a more orderly way. A still more fully mechanized civilization can be made more harmonious through following the same principles that guide the modern architect. The architect's sphere is not a private occupation, as is the writer's or painter's; it embraces the planning and building of all the community; it is concerned with sun and air, with health and welfare, with culture and happiness.

The modern architect must realize this responsibility and must do his share to form an enlightened public opinion. With the support of an intelligent, informed public we can produce cities, towns, buildings, that work and that give pleasure in their use and in their appearance. And then will the modern architecture of today become the classic architecture of tomorrow.

OFFICE OF WILLIAM LESCAZE, ARCHITECT

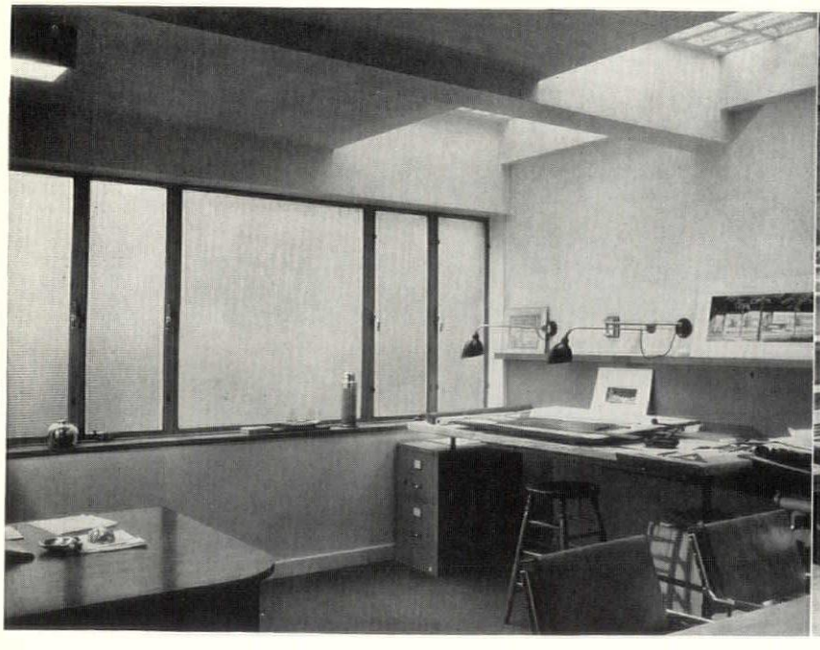


First Floor

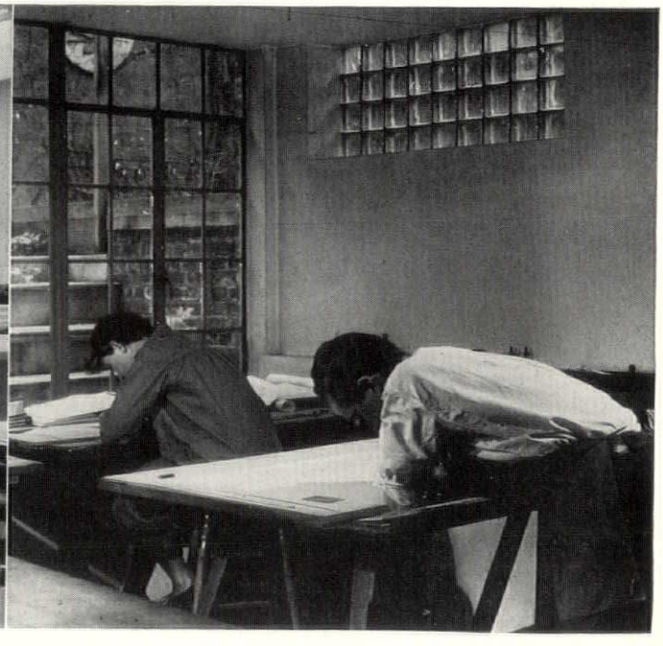


Second Floor

Private Drafting Room



Corner in the Drafting Studio

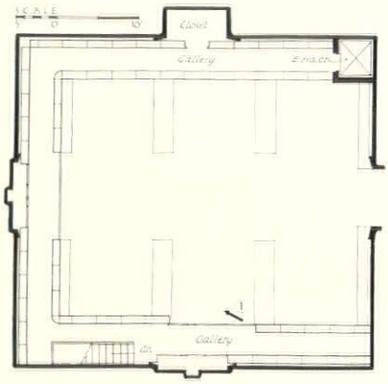


PHOTOS: RICHARD CARVER WOOD

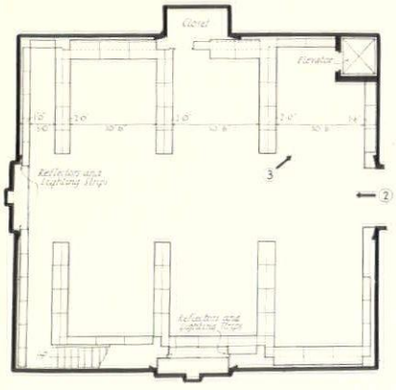
THE WILBOUR LIBRARY
BROOKLYN MUSEUM, BROOKLYN, NEW YORK
HOWE AND LESCAZE, ARCHITECTS

THE room for the Wilbour Library of Egyptology is operated as a division of the Brooklyn Museum Library, and communicates by automatic elevator with the principal reading rooms, stack rooms and offices of the Library on the second floor. It adjoins the Wilbour Memorial Collection of Egyptian objects, which in turn opens out of the classical court, so that the materials illustrating the principal ancient civilizations represented by the collection in the Museum are now assembled conveniently and accessibly. The problem here was to utilize unoccupied space in an existing building to the best advantage. This alteration is significant architecturally in that throughout the country there are many monumental public buildings which need exactly this type of renovation. These alterations must be carried out with sympathy and respect for the whole architectural scheme of the building on the one hand and with a realistic consciousness of the functional needs on the other. The architects in this instance have achieved this difficult balance with a marked degree of success. A study of the room plans show how the steel stacks have been arranged on the main floor and balcony in a way to create an impression of spaciousness, convenience, easy accessibility and safe storage. A unique arrangement of the stacks of all steel construction, especially designed by the architects for the purpose, located on the main floor provides study alcoves with ample space for large reading tables and comfortable chairs.

The color scheme emphasizes the modern construction and functional character of the general design. The chief background color is gray — gray paint on the steel cases, gray metal, gray glass, the bright silver color of the chromium tubing as the high light in this color. Against the background is a broad band of solid lapis blue running around the balcony, thus utilizing for decorative purposes the back of book cases that screen the balcony from the main floor. The elevator door and door cases are red which is repeated in the red leather bindings of the books



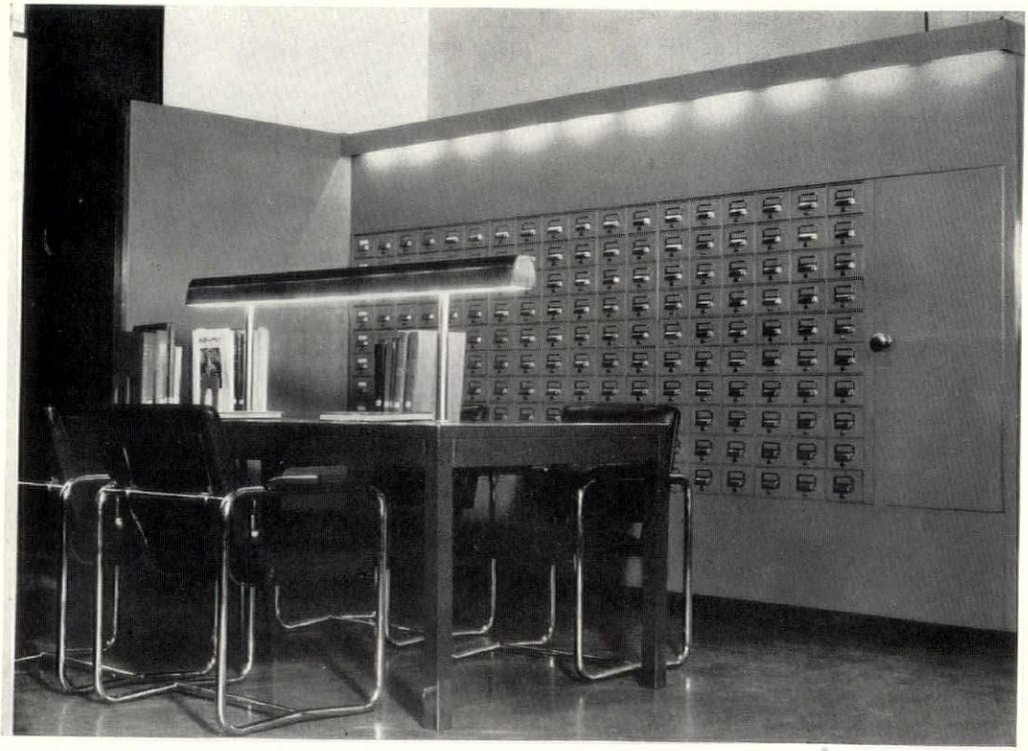
Balcony Floor Plan



First Floor Plan

The general lighting of the room is by large studio windows opening on the balcony and screened with venetian blinds, or at night by lights hung slightly above the level of the balcony and screened with ground glass globes. Concealed lights are used for reading tables and book shelves, thus eliminating all direct glare on the eyes

2



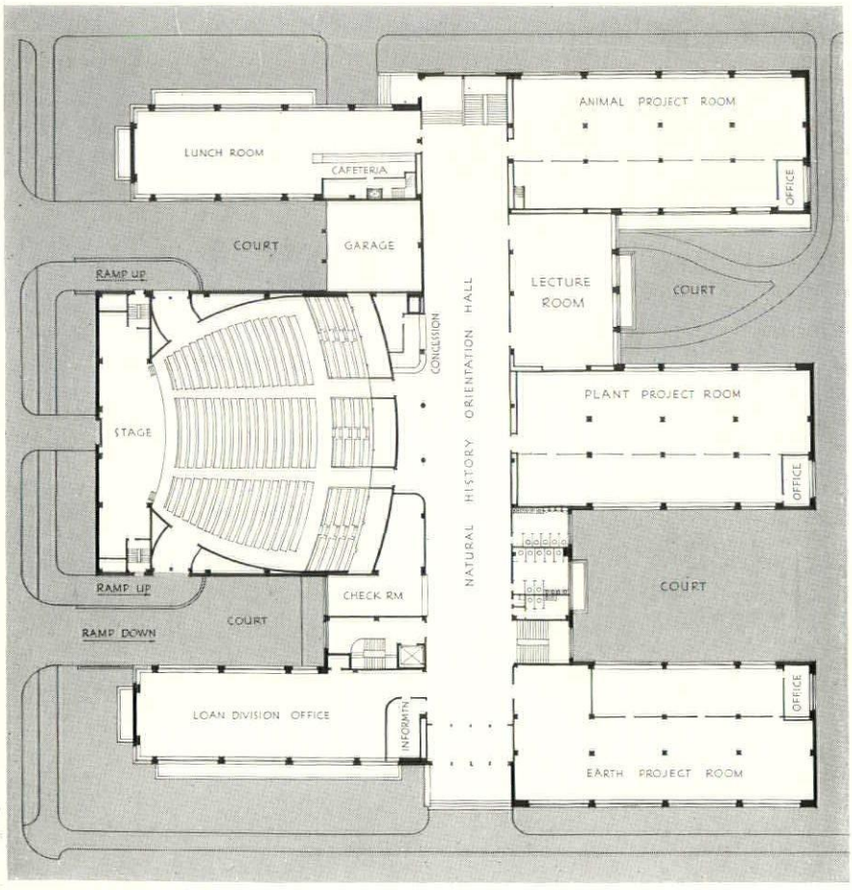
3

ACME

This old mansion, erected in the late eighteen sixties, by William Newton Adams, has housed the Brooklyn Children's Museum since its establishment in 1899. It is soon to be demolished to give way for the new Museum, illustrated on the opposite page

THE PROPOSED CHILDREN'S MUSEUM, BROOKLYN, N. Y.

WILLIAM LESCAZE, ARCHITECT



THE Brooklyn Children's Museum is essentially an experimental and scientific laboratory for juvenile education—fostering the development of the child mind according to the natural instincts and predominating characteristics of each individual. It teaches the child to learn under the drive of his or her own interest, and to think clearly for oneself.

Leading educators are aware of the incalculable worth of the Children's Museum in introducing the child mind to its natural and scientific environment. The fame of its specialized activities has become world wide and has induced the setting up of nine similar institutions in the United States, while one has been completed in Tokio and others are pending abroad.

In the Museum the children are brought into direct contact, in a free and natural way, with a large variety of fields; history, geography, zoology, botany, mineralogy, and are shown the relationship between one field and another. They are encouraged to acquire in an informal way all the knowledge possible of absorption.

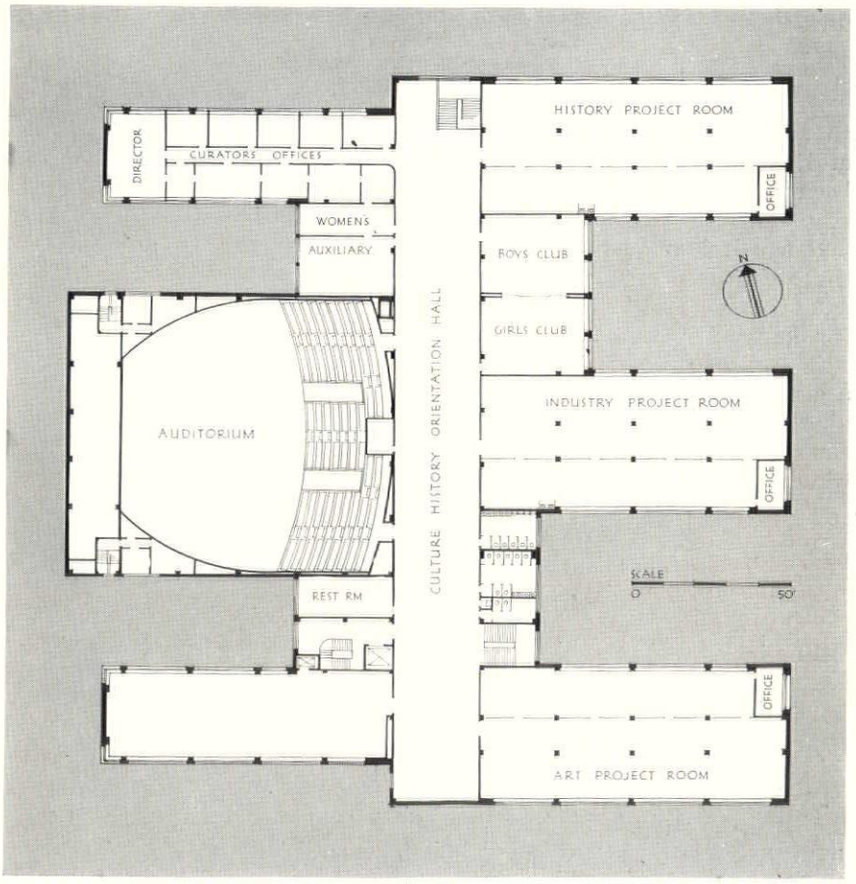
The theory back of the Museum's educational program is based on four fundamental concepts with these objectives:—(1) casual, informal introduction to the subjects, (2) the breaking down of prejudices, (3) appeal to a portentous variety of interest, and (4) the

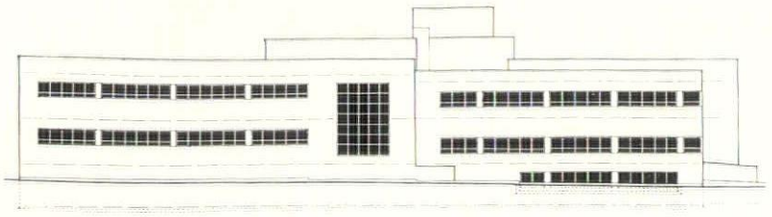
Modern in simplicity of design, the new Brooklyn Children's Museum expresses the functional character of the building. The plans have been worked out on a scientific basis, co-ordinating every element in the Museum's educational scheme of approach to the child mind. Light, air, sunshine; those necessary requisites to the health of growing children have been adequately provided. The building will be used by a million or two million students annually

stimulus to initiative provoked by an opportunity of having free access to the great volume of source material available in the Museum.

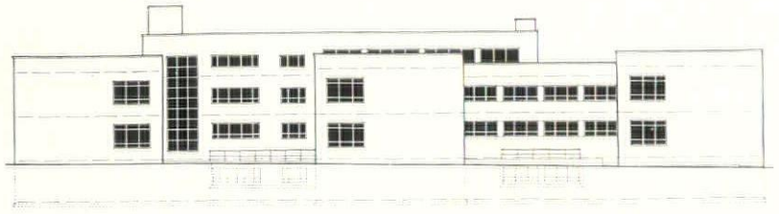
The proposed new building, designed by William Lescaze, Architect, modern in its simplicity of design, is expressive of the functional purpose of the building. It has been planned from a scientific point of view, co-ordinating every element in the Museum's scheme of educational approach to the child mind, and makes possible ideal working conditions for both students and instructors. Light, sunshine and air have been adequately provided for the protection of the health and the happiness of the children. Each department has been so arranged as to promote efficiency in the handling of students, and to make each unit a separate and distinct project in relation to its function. It permits the paralleling of exhibits and lectures with manual activity. It is highly possible that it will become a model for similar institutions throughout the country.

The plans call for a two-story building of buff-colored limestone, with an entrance leading into a hall running the full length of the building. On one side of the hall will be three galleries filled with movable exhibits. On the other side will be a group of project rooms and an auditorium seating 1,070 persons. A library for the Museum's 20,000 books and 50,000 pictures and charts is included. The



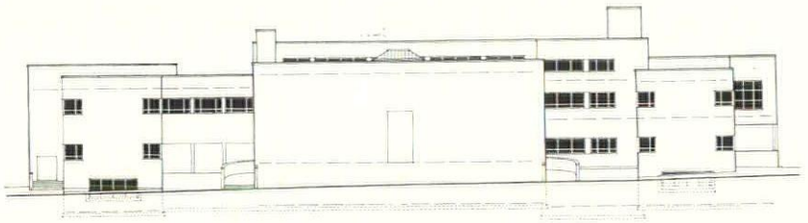


NORTH ELEVATION ON ST. MARKS AVENUE



EAST ELEVATION ON THE LOT LINE

SOUTH ELEVATION ON PROSPECT PLACE



WEST ELEVATION ON BROOKLYN AVENUE

rooms have been designed to accommodate school classes of at least sixty children. A dining room and kitchen have been planned to serve those who remain throughout the day. Two large rooms are provided for Boy and Girl Scouts, and a solarium on the roof for quiet reading, art classes, dramatic rehearsals and recreation. The building will have a total cubage of 1,650,000 cubic feet, and will be adequate for housing one to two million children annually.

The common conception of a museum is a place where a great many things of would-be interest are hidden behind glass, or so displayed that they are of little interest or value, especially to a child, for invariably there are many signs which say—DO NOT TOUCH—and the child's curiosity for further knowledge is stifled. Not so in the Brooklyn Children's Museum. Here everything is out in the open. The objects can be seen, they can be handled, and in some cases heard—thus, is made an appeal to at least three of the five senses.

For instance, in the history department—the method used for catching and holding the attention of the child, is by presenting the subject through the medium of illuminated models. Below each model is a framed story telling something about the scene represented and other events connected with it. The frames are hung on hinges so that a child can hold the story in his hands and tilt it to the angle which is most convenient to his height. The models serve the double purpose of making the events real to the children and stimulating a further desire for the enlarged story of which the scenes are highlights. Once this desire is stimulated, it is an easy matter for the child to find all he wants to know through the perusal of books in the Museum.

The bulk of fascinating exhibits in every department are presented in a similar manner, making it possible for a child to give each object that minute scrutiny which the satisfaction of a child's curiosity demands.

This method of educational training, whereby the child is allowed to work with the various objects and discover for himself the full meaning of science and its relation of component parts, is not intended to replace the more formal methods of education, rather is the method intended as a supplement to the academic training received in the public and private schools.

To the more pedagogic, the time, effort and expense involved in such an educational scheme may seem beyond comprehension, but it works. It has succeeded where other methods have failed.

As evidence of the growing popularity of this form of education, some six hundred thousand children attended the Museum last year.. It is estimated that a million children would attend the Museum yearly, if proper housing facilities were available. The present building, erected in 1867, and in use since the establishment of the Museum in 1899, has outlived its usefulness. It is totally inadequate to care for even the present demands upon the institution.

POSITIVE PLANNING . . . A way to get things done

"Much of the present-day planning is tentative. Plans are prepared on the basis that if and when development occurs it shall be in accordance with the main lines of a plan prepared years in advance. Although there is need for such plans they have the disadvantage that many of them may never be realized. The most urgent need today is to find a means by which planning may be given a more realistic aspect"*

BY ARTHUR C. HOLDEN, † A.I.A.

TO the professions of architecture and city-planning belong the task of organizing the thought that controls city growth. While it is one sort of task to organize the laying out of a new city upon a virgin site, it is quite another to organize channels of thought capable of dealing effectively with the problems created by past growth.

The second task is the unsolved problem which is faced by us today. We must find a way to transform the makeshift facilities of a past generation into facilities which will serve the standards of city life which we know to be possible of realization. The planner must remember that his client in this new task is neither a royal sovereign nor a dictator, but thousands of free-born individuals. It is the habit of tyrants to trade upon the fears and conflicting jealousy of individuals. The hope of democratic leadership is that it can awaken individuals to a sense of their common interest as human beings. Our cities and towns should not choke our life. They should make it richer. Modern technology has steadily reduced the number of workers required to sustain life. We have a great body of former workers newly released for the now possible task of making life fuller and better. It is our task as leaders of democracy to find ways and means of setting them to work.

We must not be satisfied to approach this task with the same technique that we would use if we were laying out new cities. Nor must we talk as if the only way out were to abandon our hotchpotch urban agglomerations and seek new sites where we can design and build unhampered by the realities of the existing channels of life.

Progress Made. We have already made considerable progress in developing the new technique. We have learned how to criticize and to analyze the city as it stands. We have learned how to define the social and the physical problem. We have been able to adopt our technique of planning so as to formulate the Master Plan for the rebuilding of the city. In many cases we have been able to make extensions to the city in conformity with the Master Plan. Occasionally by superhuman effort we have been able to effect badly needed changes in the heart of the city, which, though all too frequently a compromise, do, in spirit at least, follow the Master Plan. But in spite of these gains, the major part of the city growth still goes on in ways that are beyond our control; that we know to be shortsighted; that build up new problems for the future. We have not yet bridged the gap between the theoretical (though admittedly desirable) Master Plan and the actual growth which takes place. We have not yet developed a method or program of Positive Planning; a way to get things done.

The Economic Attack. To make Positive Planning a reality we must do more than define the social and the physical problem. We must attack the *economic* problem and solve it. The solution must be worked out with a full understanding of what we know to be our realizable social and physical needs. We must constantly bear in mind that the city is a service organization, and that all the facilities within it, whether public or private, have value for the service which they perform.

Paying for Services. The economic problem is a problem of balancing services. The different nature of the services performed complicates the problem. On the one hand we have originating or *creative* services, which produce facilities, whether they be streets, sewers or buildings. On the other we have *maintenance* services, such as the cleaning and repairing of streets or sewers, or the operation and

* *The request made in the program of the 1935 International Housing and Town Planning Congress.*

† *Member of the Mayor's Committee on City Planning, New York City.*

repair of buildings, or the maintenance of Order. A reasonable method of balancing or paying for these many types of service is essential to the solution of the economic problem.

Services can only be exchanged on a basis of use or serviceability. We must distinguish between services which are used in common by the community and those which are used by individuals, recognizing that the former are paid for by a tax upon the particular service. We must recognize that tax, fiscal, and financial experts have places in city planning. At least they do if they are capable of original thinking. If they are not, then we who are interested in city planning, must make ourselves masters of tax, fiscal, and financial matters and do our own creative thinking in terms of the problem as we see it.

Bridging the Gap. In order to solve the economic problem we must have tools for the work. We must find economic entities capable of effective action. *At the present time there is virtually no effective entity between the incorporated city and the individual owner of an individual piece of property. We talk about the community, and about the community plans, but we have no recognized economic entity which corresponds to the community, consequently we have not positive means by which we can make community planning effective.*

By our lack of understanding of fiscal matters we have allowed our cities to encumber themselves in burdens of debt which have made them undependable units for the pledge of the credits which are needed to liberate work. Because of the impotence of our cities the hue and cry have gone up that we must have national subsidies to the cities for needed public improvements, subsidies to hastily organized city-wide authorities for the promotion of housing.

On the other hand, the individual property owner is as impotent and helpless as the city. Directly in Europe and indirectly in America, there have been limited efforts to subsidize the individual property owner in order to prod him into action. But even when subsidized, the action, of which the individual property owner is capable, is not in consonance with the development of the newer and better type of city which those of us who are interested in city planning believe to be the accepted standard of enlightened, modern, democratic life.

New Owner Entities. It is time to give our best thoughts, to dedicate our best efforts to devising new types of entities which will permit individuals to band together in ways which will reduce the uneconomic and unnecessary burdens under which people are now groaning, and which will permit individuals to act together for common interest to achieve goals which would be otherwise unattainable.

To do this we must first think creatively, envisioning possibilities and advantages that will provide an incentive to co-operative action. In the second place we must find ways and means to cast off the shackles that now bind individual property owners, outmoded laws and customs that compel them to resort to outworn, unsocial procedure in the vain hope of overcoming the economic waste and cut-throat competition which have been ruining them. I need only point out that, in particular, trustees under present conditions must hold properties out of use; must resort to the delays and expense of individual foreclosure proceedings; must hope for a realization through a sale which capitalizes the right to exploit and the right to withhold from co-operative action, unless they are paid-out on the basis of nuisance value rather than the true value of use.

The Land Utilization Committee in New York has made extensive studies of the cost of maintaining obsolescent and depreciated slum properties. It has been found that maintenance costs alone, exclusive of taxation, run to 40 per cent, 50 per cent, and even 60 per cent of gross rents and that when taxes are added, insufficient balance is left to pay the contract financing charges stipulated in the mortgage.

Pooling Agreements. There is a need for the efficient reorganization of these depreciated properties. It should be made easy rather than difficult for owners to band together in order to reduce maintenance charges and to get rid of vacancies by the removing of the more unfit buildings. Through co-operative pooling agreements the tenants may be temporarily accommodated in the better buildings, and little by little land may be cleared for rebuilding.

But rebuilding should not be commenced without adequate planning. We must set up homogeneous planning areas and work out a progressive program for these local areas in harmony with the general outline of the master plan. We must divide our planning areas in turn into local improvement districts and arrange for credits to be advanced to these districts which will be adequate for the preparation of effective working entities. We need to combine individual properties into incorporated or co-operative blocks, and these blocks in turn into combinations of blocks or sub-districts.

Appraisal Bases. It is important to work out improved systems of appraisal so that properties may be combined into these new entities on the basis of the ratio of their value one to another and to the total of the properties entering into the combination. By this method the savings brought about by more efficient management as well as the benefits derived from the improvements may be equitably shared.

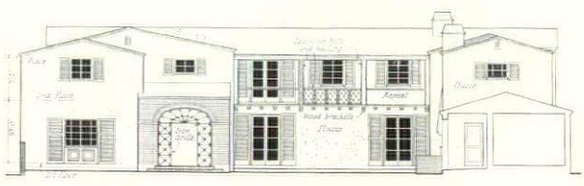
Here is a task to which architects and city planners may address themselves with enthusiasm. No group which is trained for leadership is more conscious of the necessity for the creation of effective local planning entities to bridge the gap between the Master Plan and the individual owner of property. It is a big task; it is a complicated task; but it is a task which offers us the opportunity for Positive Planning; for turning theories into reality; for getting things done.

PHOTOS: SAMUEL H. GOTTSCHO

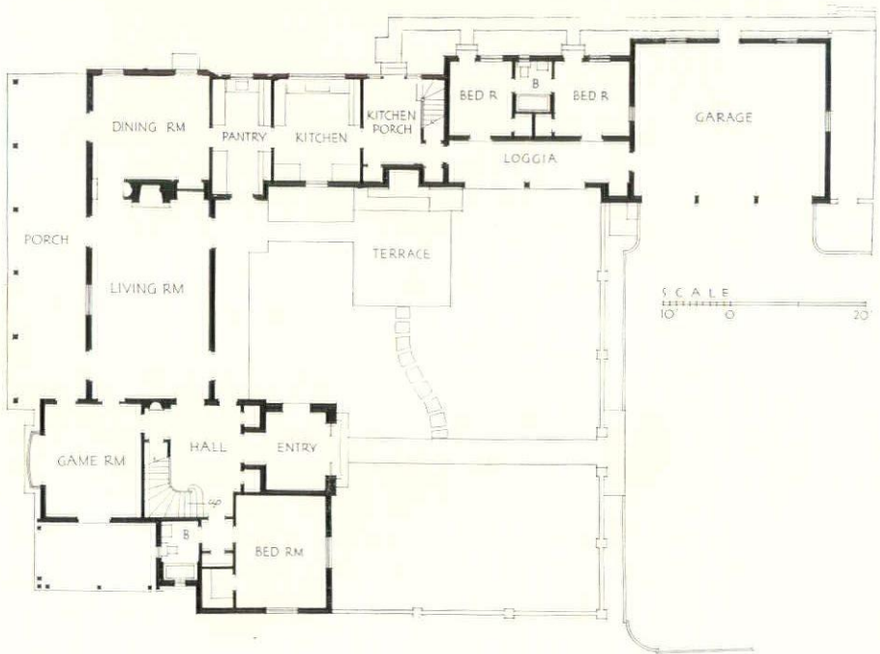
HOUSE OF ANDREW W. JOHNSON, MIAMI BEACH, FLORIDA

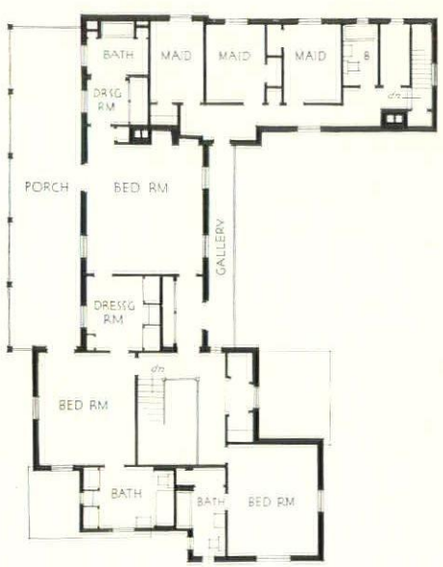
RUSSELL T. PANCOAST, ARCHITECT

The arrangement of all the principal rooms in this house was somewhat influenced by the fact that the best view was from the west, and that the prevailing breezes were from the east and south. From the second story gallery off the main bedroom on the east, one looks directly into the uniquely designed patio living room as shown on page 25



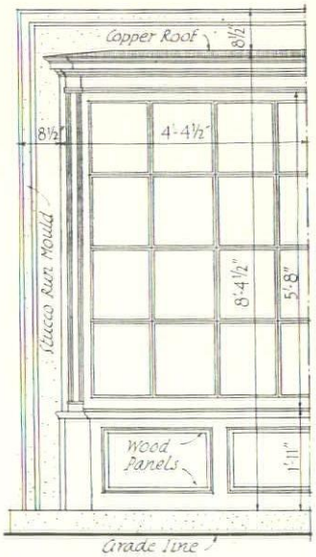
HOUSE OF ANDREW W. JOHNSON, MIAMI BEACH, FLORIDA. RUSSELL T. PANCOAST, ARCHITECT



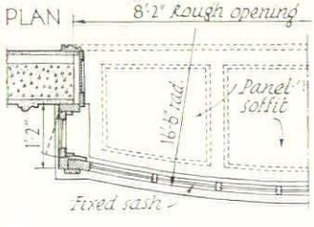


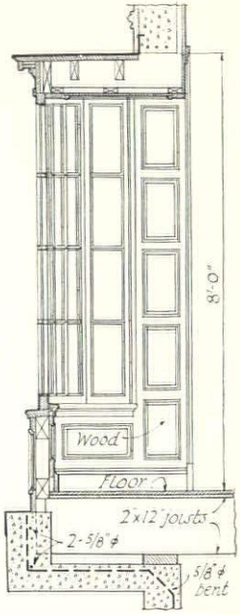
Planned for outdoor living in almost-tropical America, the design of this house, with its wide verandas on the west and patio living room on the east, is reminiscent of the traditional architecture of New Orleans and Monterey Colonial of California. The walls are concrete block and stucco; roof, Rugg texture shingle tile; woodwork, cypress; wood shutters painted blue green. First floor framing of treated lumber for protection against termites and dry rot. The house contains 82,400 cubic feet and was erected at a cost of 37½ cents per cubic foot . . . A detail of bay window, at right, appears on page 24

The walls and ceiling in the card room, below, are of smooth sand finished plaster. The floor is gray inlaid linoleum with blue and light red inlays in a conventional pattern in the corners. . . . The floor in the stair hall is black and white marble squares with a border of black marble. The stairway is of birch, and the walls and ceiling are sand finished plaster



½ ELEVATION

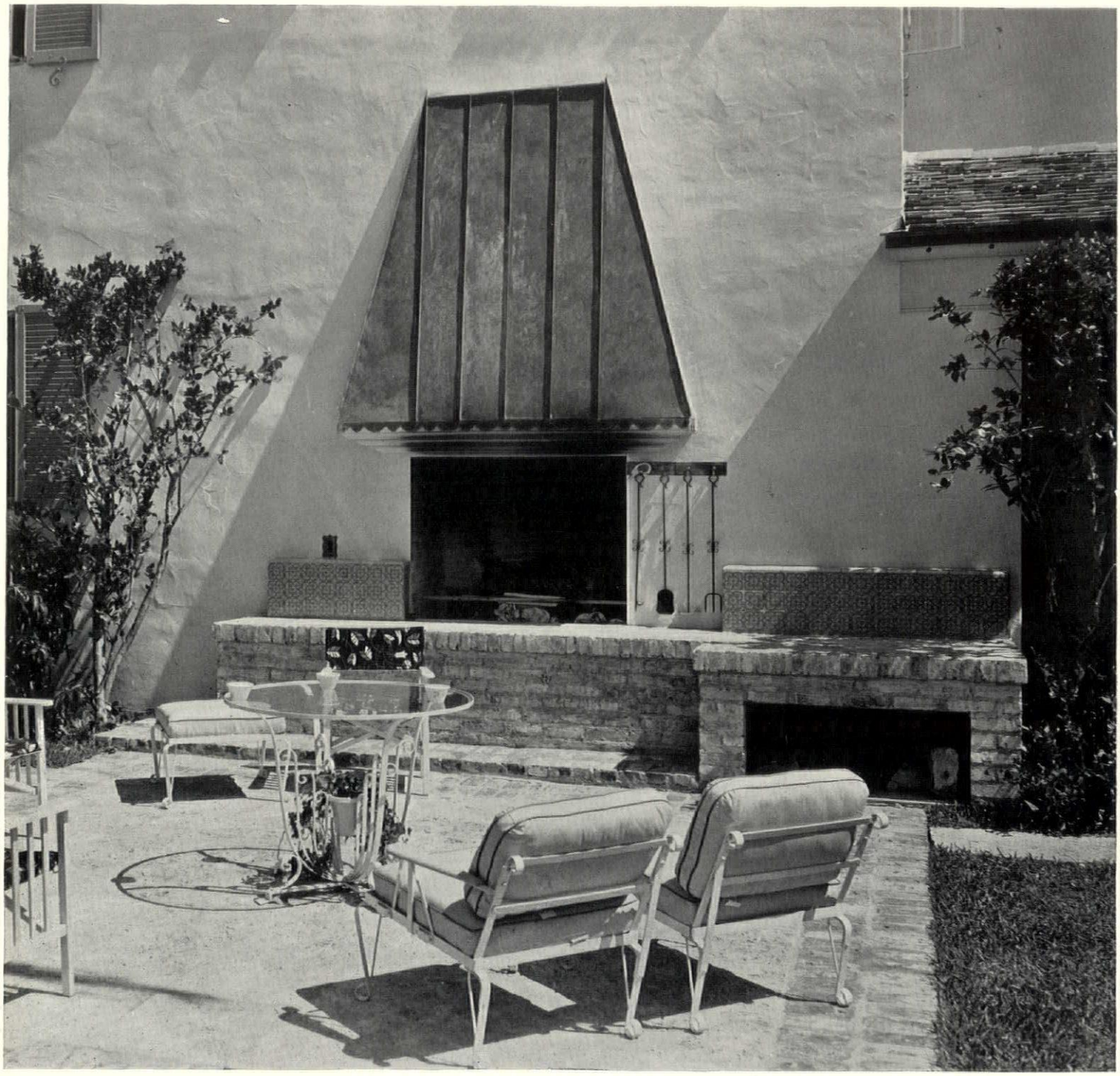




SECTION

SCALE

DETAILS OF BAY WINDOW IN CARD ROOM



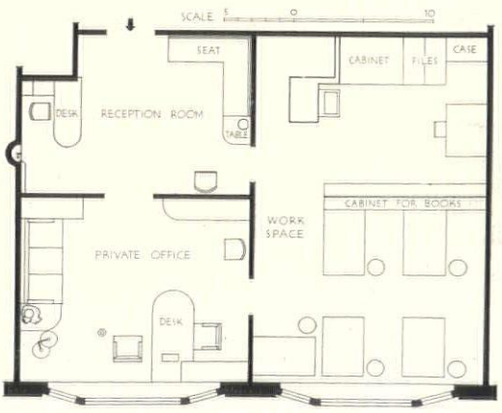
PATIO LIVING ROOM, HOUSE OF ANDREW W. JOHNSON, MIAMI BEACH, FLA. RUSSELL T. PANCOAST, ARCHITECT

Opportunity for outdoor living, a prime commodity of Miami Beach, is amply provided in this patio living room. The fireplace hood is natural colored copper and the hearth is of old red brick with colorful decorative tiles at the sides. The floor is of coarse texture stone of light buff color with coral formations showing through, making an interesting pattern on the cut faces. The border is of old red brick

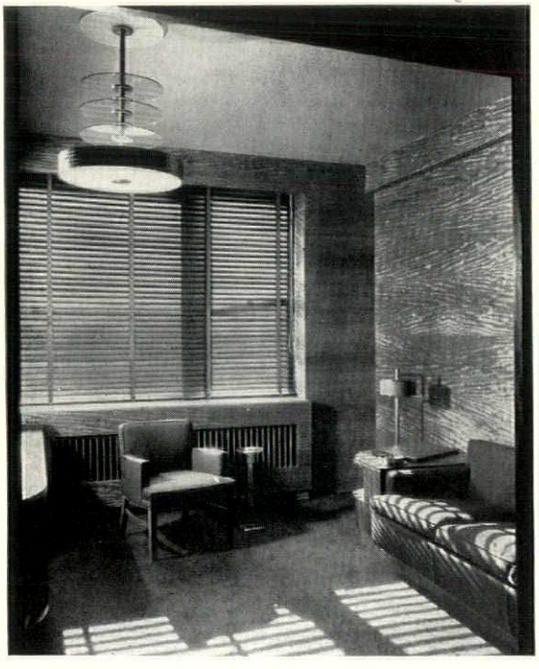
PHOTOS: HEDRICH-BLESSING STUDIOS

OFFICE OF JAMES F. EPPENSTEIN, ARCHITECT, CHICAGO, ILLINOIS

THE Office of James F. Eppenstein, designed and furnished in the modern manner, is at once impressive. Here the architect and his clients can meet to discuss their problems amid a setting of home-like comfort and richness. The working space was planned to promote efficiency and to provide ideal working conditions for its occupants. The office of Mr. Eppenstein, illustrated on this and the opposite page, has for its wall covering a thin veneer of mahogany in natural finish. The ceiling is copper in color and the floor covering matches the ceiling. The furniture and fixtures were specially designed and are mahogany in natural finish. (Note the absence of handles on desk drawers—the extensions of drawers on sides serve as handles. The cabinet at side of desk is for telephones.) The couch and chairs are upholstered in a combination of green wool and green leather.



THE OFFICE OF
JAMES F. EPPENSTEIN
CHICAGO ARCHITECT

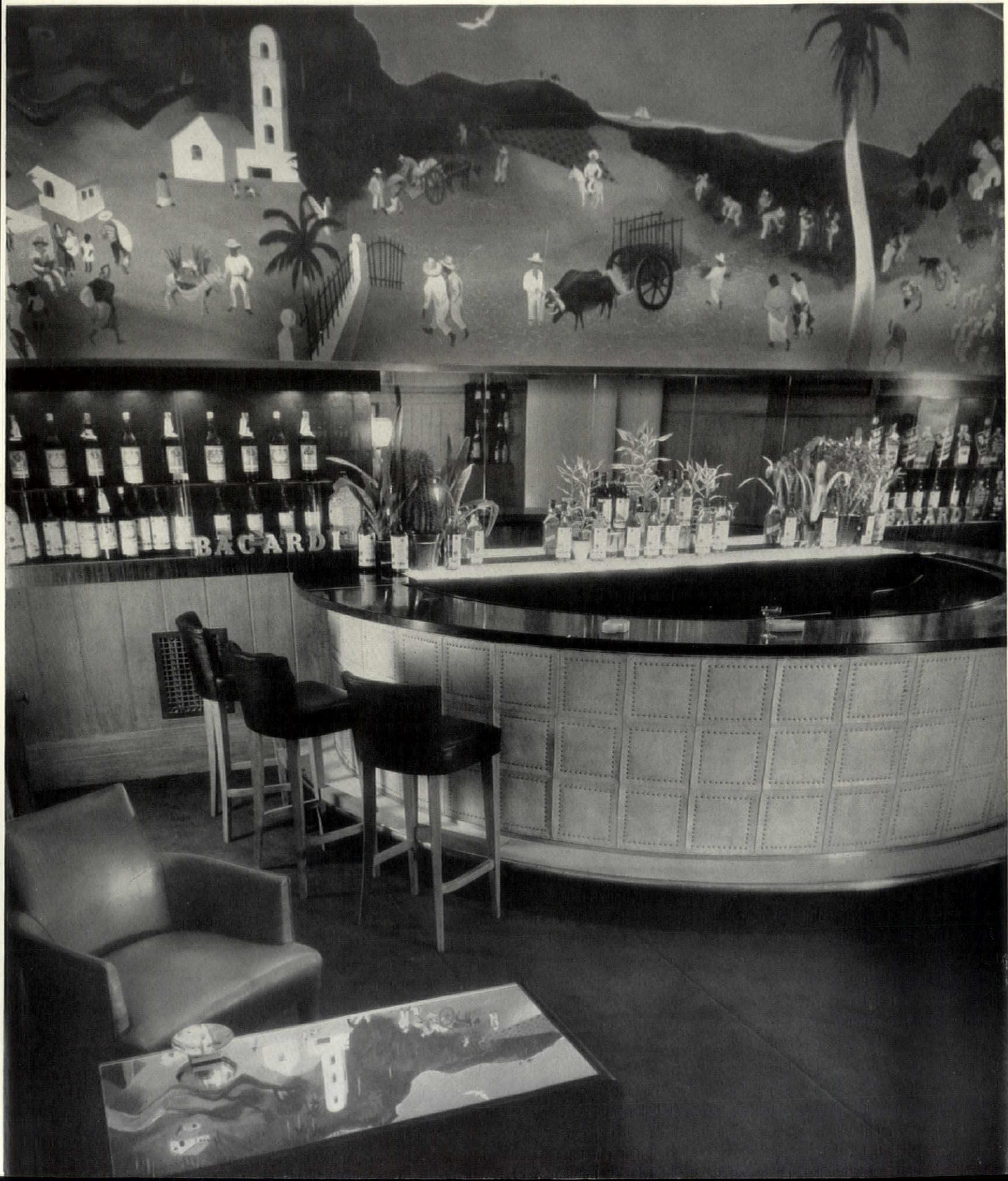


The walls of the reception room, shown above, are covered in imitation pigskin, with copper strips used to form panels. The ceiling is gold lead in color. The specially designed furniture and fixtures are mahogany in natural finish. The carpet is copper in color and the chairs are upholstered in green leather. Indirect lighting is provided through the vertical recessed glass wall panel shown at the left in the illustration. . . . At the left is a detail in the private office of Mr. Eppenstein

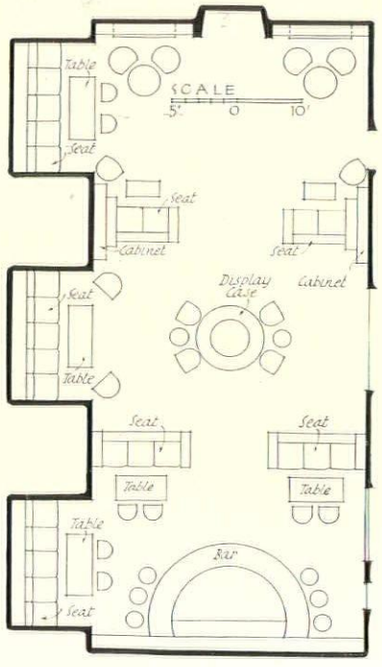
THE BACARDI BAR AND IMPORT LOUNGE

SCHENLEY PRODUCTS COMPANY, NEW YORK

MORRIS B. SANDERS, ARCHITECT

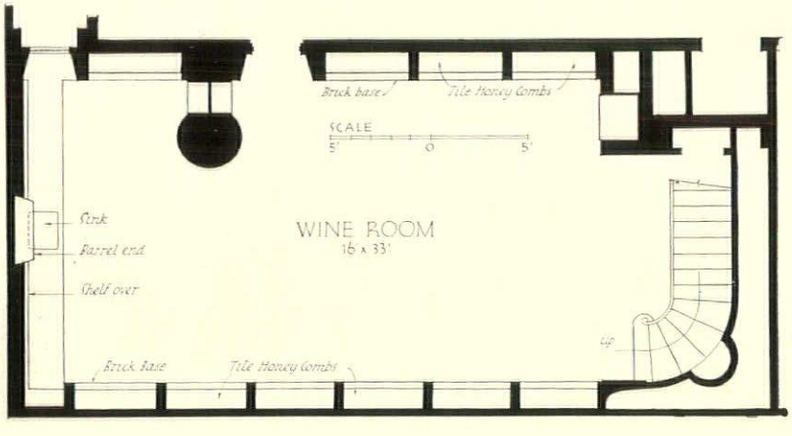


PHOTOS: RICHARD GARRISON



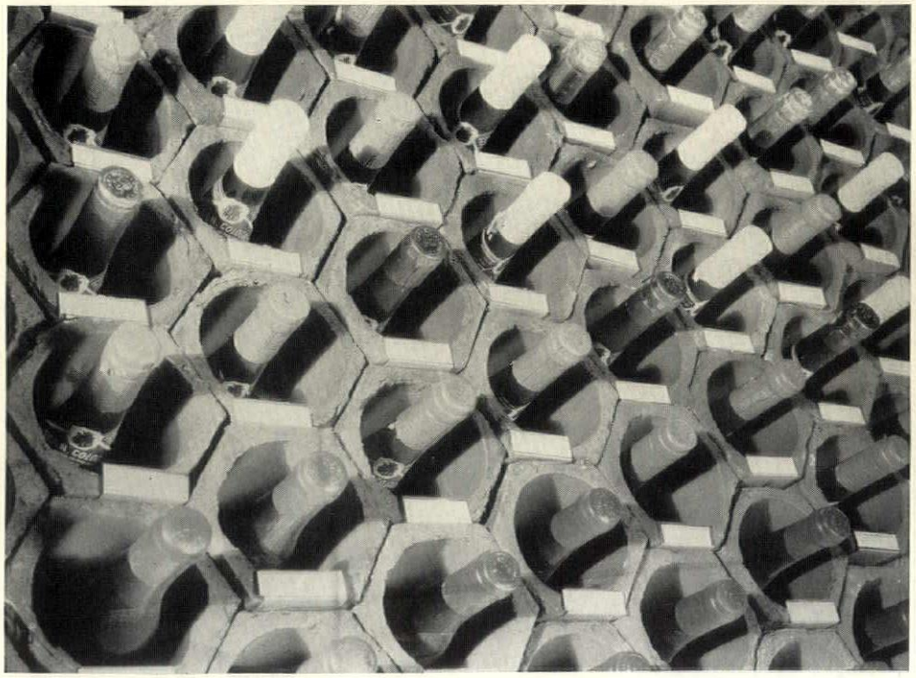
SCHENLEY BACARDI BAR AND IMPORT LOUNGE, MORRIS B. SANDERS, ARCHITECT

The Schenley Bacardi Bar and Import Lounge is unique in that no liquors are sold over the bar. This room was designed exclusively for Schenley executives and for the entertainment of the company's customers. The architect was given a free hand in the design of the room—its decorative features and furnishings. The result is strikingly modern, colorful and interesting. For the general color scheme—browns, golds, vermilions, off-whites, and touches of black are used. The ceiling is done in gold leaf and the wainscot in old oak, grayed-down. The carpet is Tete de Negre. The ceiling panel, in the center of the room and above fireplace, is white leather. Above this panel are indirect lighting fixtures. The cabinet work is Macassar ebony, the cases are lined with amber velvet. The bar chairs are oak upholstered in black leather. The bar top is dark mahogany and the bar step is of Formica. The bar counter is of white leather veneer. The Tambour screen, dividing the bar and lounge, is cherry wood with the lounge side lacquered an off-white. Divans, beige leather; tables crackled off-white lacquer, and Macassar ebony with gold mirror tops, and the draperies are gold antique satin. The murals at either end of the room were done by William Gropper, and painted on the walls after the room was completed. The colors in these murals are in perfect harmony with the general color scheme of the room



THE SCHENLEY WINE CELLAR

This room is entered by a stair from the main floor lobby and is directly under the Bacardi Bar. The ceiling is of antique gray-green plaster; walls and piers, red common brick; woodwork, grayed oak; floor, slate in variegated colors of black, gray, blue and green; furniture, black stained oak. Niches are lighted from below through 1" frosted glass. The mural is by William Gropper, depicting the twelve months of the year in simple Gothic colors. Morris B. Sanders, Architect



The bottles and their labels, illustrated, were designed by the architect, Morris B. Sanders. They are remarkably fresh and original in their graphic treatment and color—a unique design problem for an architect. The wine bins, detail at right, are plain hexagon drain tile, laid-up without grouting

Along the wall of the stairway leading to the Schenley wine cellar is the "wine festival" mural, shown at the right. This was done by the distinguished painter, William Gropper. The artist work in the Schenley Bar and Wine Cellar is proclaimed by Lewis Mumford as the finest mural work of the past year

THE SCHENLEY WINE CELLAR
MORRIS B. SANDERS, ARCHITECT

THE LEGAL SIDE O ARCHITECTURE

Agreement to postpone payment of fee should include specific time limit

BY CLINTON H. BLAKE

Blake and Voorhees, Counsellors-at-Law

IT sometimes happens, especially in these depression years, that an architect will be asked by a client to postpone the payment of his commission. The request may be merely that payment be postponed for a definite period, or it may be that payment be postponed until such time as the client is able to make payment. Where an agreement of this character is made a nice legal question is presented concerning the right of the architect to enforce payment where his client shows no disposition to settle the account.

In the case decided by the Court of Appeals of Kentucky (Mock v. Trustees of First Baptist Church of Newport, 252 Kentucky 243) the court was called upon to pass upon this exact problem. The contract provided for the payment of 2½% of the cost of the building, with the proviso that, if upon the opening of bids the Church was unable to proceed with the erection of the building, the architect should receive his compensation based upon the lowest bona fide estimate. The bids were greatly in excess of expectations and, after considerable delay, the Church erected a portion of the structure according to the original design, putting on a temporary roof and leaving the completion of the building to a future time. The architect later asked that there be paid to him the fee of 2½% on the amount of the lowest bid. The Church refused to pay. Among other defenses it claimed: first, that the architect had secured the job by misrepresentation, in that he had represented that the building could be erected for $55,000; and second, that it made an agreement with the architect that he would accept the payment on account of $1,800, which was paid, and would wait for future payments "until such time as the Church in its discretion was financially able and deemed it advisable to erect and complete the building."

CONTRACT NOT RESCINDED FRAUD CLAIM WAIVED

AS to the first defense, the court found that, as a matter of fact, the evidence did not justify the claim of fraud, but that, even if there had been fraud, the defense would not be tenable, because it would have been waived by the failure of the Church then and there to rescind the contract. The court in this connection quoted another Kentucky case (Cox v. Riggins, 223 Kentucky 510), as follows:

"When knowledge of the fact that fraud has been committed in procuring a contract is brought home to him, the party to it thereby aggrieved is put upon his election. The election to repudiate or rescind the contract for the fraud must be made seasonably. Any further pursuit of the benefits accruing to him under the contract constitutes his election to abide by the contract and condone the fraud. Such an election is irrevocable, and he may not thereafter again seek to be relieved of the obligations placed upon him by the terms of the contract because of the fraud practiced upon him in procuring him to become a party to it, because, by electing to pursue the benefits accruing to him under the contract, he has elected to abide by it, and thereby he has condoned the fraud."

As to the other defense, the architect denied the alleged agreement that he would wait for his payment until the Church decided to go ahead, and claimed that he had merely agreed to wait for the balance of his compensation until such time as the construction work began. He also claimed that there was no legal consideration for the agreement to extend the time of payment. The court held that it was not necessary that it consider these conflicts in the evidence, but that, assuming the agreement as claimed by the Church was made, the architect would nevertheless be entitled to judgment.

PAYMENT MUST BE MADE WITHIN A REASONABLE TIME

THE court said: "We may make predominant and accept as conclusive the defendant's version of the settlement; that is, that the plaintiff accepted the balance of $1,800 and agreed to wait until the building was completed for the balance due him, based upon the cost of the building, and that the Church had not since regarded itself as being financially able to construct the house. Such an agreement cannot be construed as requiring the architect to wait more than a reasonable time. He did not mean that he would wait forever. It cannot be conceived that he intended to surrender a just claim, which would be the result, should the letter of the condition be applied and the Church should abandon

its purpose to erect the building as designed. It was agreed that payment was to be made upon the happening of an occurrence. When that is the condition, the law adds to the contract by implication the qualification that it shall be done in a reasonable time, depending upon the particular circumstances of the case.

"And the authorities are to the effect that a promise to pay when the promisor is financially able to do so is to be construed to mean that payment is to be made within a reasonable time. 6 R. C. L. 284. So, too, in the absence of circumstances showing it to be perpetual, a forbearance to sue for an indefinite time is regarded as calling for a reasonable period.

"Who will say that four years is not a reasonable time for the architect to have waited before filing suit. It was over eight years before the judgment was rendered. The court is of opinion that there was nothing to submit to the jury, and that the plaintiff was entitled to a judgment for the balance due him."

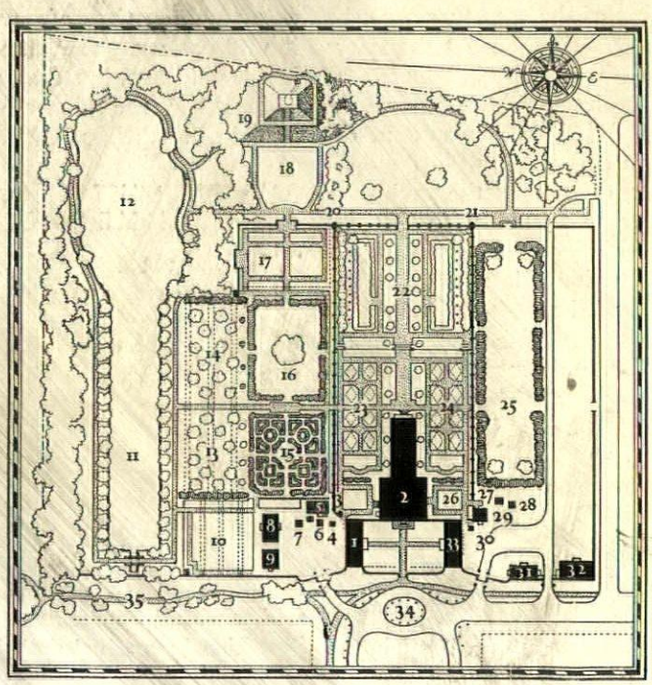
DEMAND SHOULD BE MADE WHEN PAYMENT IS DUE

THE court held that it was necessary that demand should be made for payment at the time when it should be considered that the account became payable. It held, therefore, that the architect was entitled to interest only from the date when he filed his petition and thereby made demand for the payment of the claim.

Notwithstanding the foregoing decision, any agreement in general terms to wait for payment upon the convenience of the client or his ability to pay is obviously dangerous. It is true that a general promise to pay implies that payment will be made within a reasonable time. On the other hand, a valid agreement might quite easily be entered into which would leave the date of payment wholly in the discretion of the client and enable the latter to hold up the payment indefinitely. If an architect desires to gamble with respect to his compensation and to agree that its payment may be postponed, he should at the least see that some definite date for payment is specified. He may provide, if he wishes, that the client shall make payment as soon as he is able to do so, but he should add to this a proviso that in any event payment shall be made not later than some future and definitely specified date. This will obviate any issue, such as that which was raised in the Kentucky case, and will place the architect in a position where, if payment be not made previously, he may successfully enforce his claim when the time limit date is reached.

While it is true, also, as indicated in the Mock case, that a defense of fraud can be waived, the case emphasizes again the importance which I have many times stressed of avoiding any representations with respect to cost. The architect can indulge in no more dangerous habit than that of suggesting that the building can be constructed for any named amount. The less he says about the cost the better. If it is necessary that he give some estimate, it is of vital importance that he make it clear, with written confirmation of the fact, that the estimate is not guaranteed; that it is merely his best guess as to what the work will cost, and that it is not to be construed in any way as a representation on his part that the work can be done for the estimated amount.

PLAN OF THE PALACE GROUNDS, WILLIAMSBURG, VIRGINIA



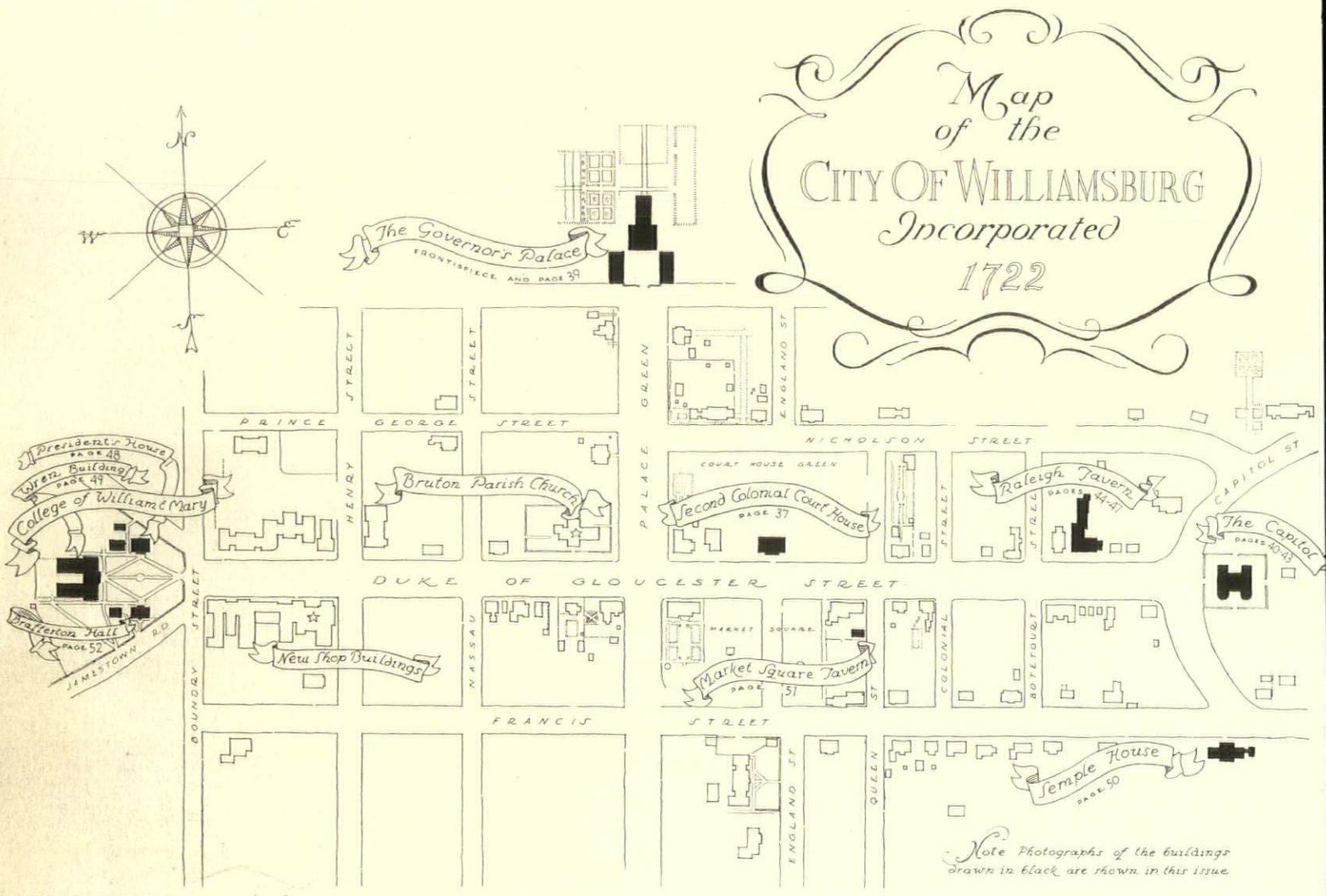
1. West Flanking Building
2. The Palace
3. The Hexagon Outbuilding
4. The West Well
5. The Laundry
6. The Salt House
7. The Smoke House
8. The Kitchen
9. The Scullery
10. The Vegetable Garden
11. The Canal
12. The Fish Pond
13-14. The Falling Gardens
15. Box Garden
16. Revolutionary Soldiers Burying Ground
17. Fruit and Vine Garden
18. The Maze
19. Ice House and Mount
20-21. Necessary Houses
22. The North Garden
23-24. The Ballroom Garden
25. The East or Tree Box Garden
26. The Holly Garden
27-28. Frame Outbuildings
29. Public Wash Rooms
30. The East Well
31-32. The Brick Quarter
33. The East Flanking Building
34. The Turnaround
35. Scotland Path

PHOTOS: © LINCOLN

THE RESTORATION OF WILLIAMSBURG, VIRGINIA

Perry, Shaw and Hepburn, Architects

AFTER more than eight years of effort devoted to research both here and abroad, and to planning, designing and construction under the direction of Perry, Shaw and Hepburn, architects, the Restoration of Williamsburg, Va., has been formally completed. The problem was to rebuild an historic 18th Century city and, so far as possible, to reproduce its original appearance and atmosphere. The thoroughness of the research and the architectural fidelity to the spirit, detail, materials and methods of the early period are exceptional. Sixty-six Colonial buildings have been rebuilt, restored or repaired and some four hundred and sixty "modern" (post Early Republican) buildings have been demolished or moved. . . . The building above is the Williamsburg - James City County Court House, which was built during the year 1770


Map of the CITY OF WILLIAMSBURG Incorporated 1722
The Governor's Palace
FRONTISPIECE AND PAGE 39
President's House
PAGE 48
Wren Building
PAGE 49
College of William & Mary
Bruton Parish Church
Second Colonial Court House
PAGE 37
Raleigh Tavern
PAGES 34-41
The Capitol
PAGES 40-43
Brafferton Hall
PAGE 52
New Shop Buildings
Market Square Tavern
PAGE 51
Temple House
PAGE 50
PRINCE GEORGE STREET
DUKE OF GLOUCESTER STREET
FRANCIS STREET
NICHOLSON STREET
BOUNDRY STREET
HENRY STREET
NASSAU STREET
PALACE GREEN
ENGLAND ST
QUEEN ST
COLONIAL STREET
BOTETOURT STREET
CAPITOL ST
COURT HOUSE GREEN
MARKET SQUARE
JAMESTOWN RD
Note Photographs of the buildings drawn in black are shown in this issue

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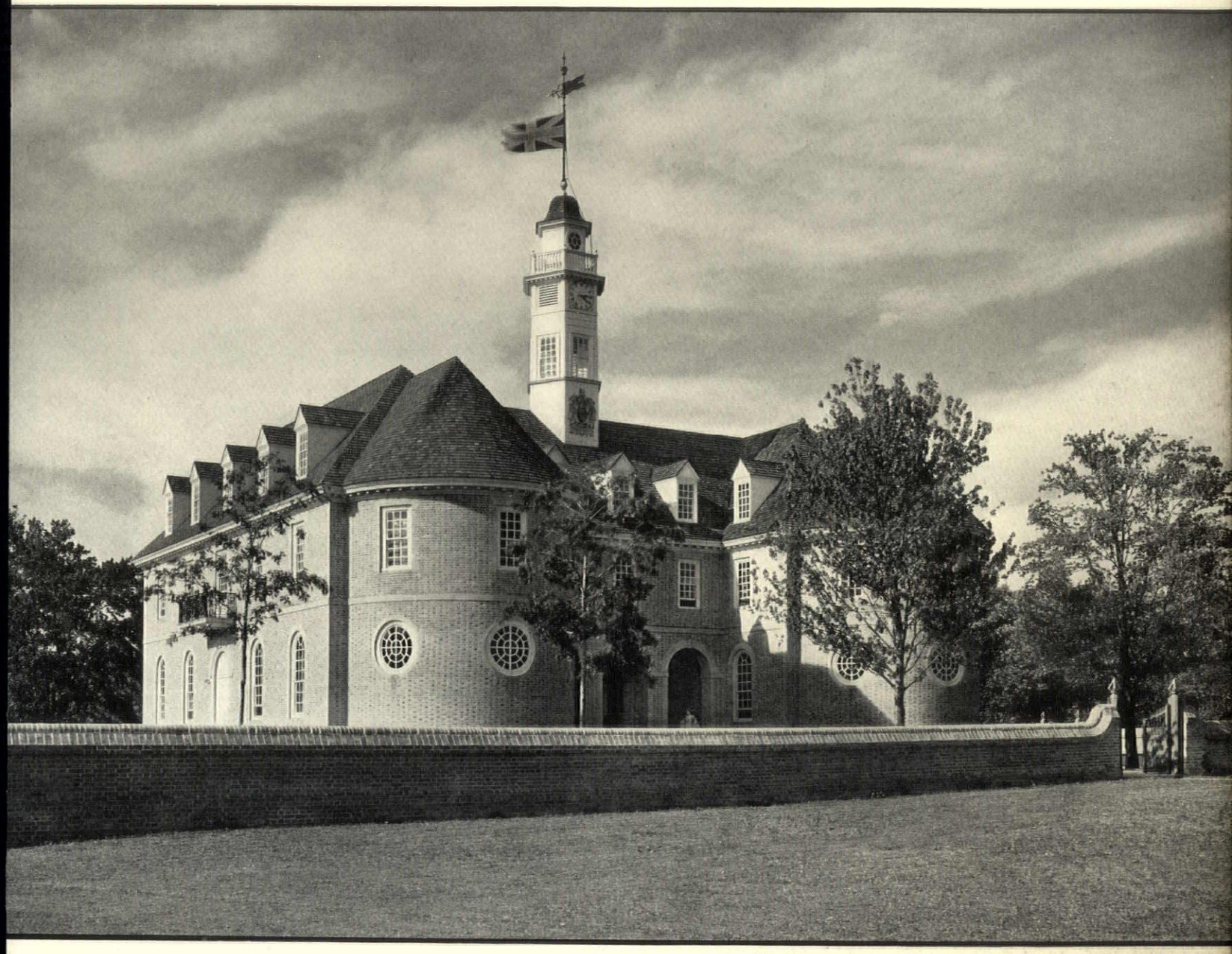
THE GOVERNOR'S PALACE

THE Governor's Palace was the center of official social and political life for the seventy-six years before its destruction by fire in 1781. The fire occurred while the building was being used as a hospital by General Washington's army at Yorktown. From the voluminous records, including more than 300 pages of historical source material—a copper plate engraving, a plan drawn by Thomas Jefferson and the so-called Frenchman's map—the architects were able to reconstruct the Governor's Palace and its numerous dependencies very largely on the original foundations. In addition, extensive formal gardens have been built. *(For general plan of the Palace grounds see page 36)*

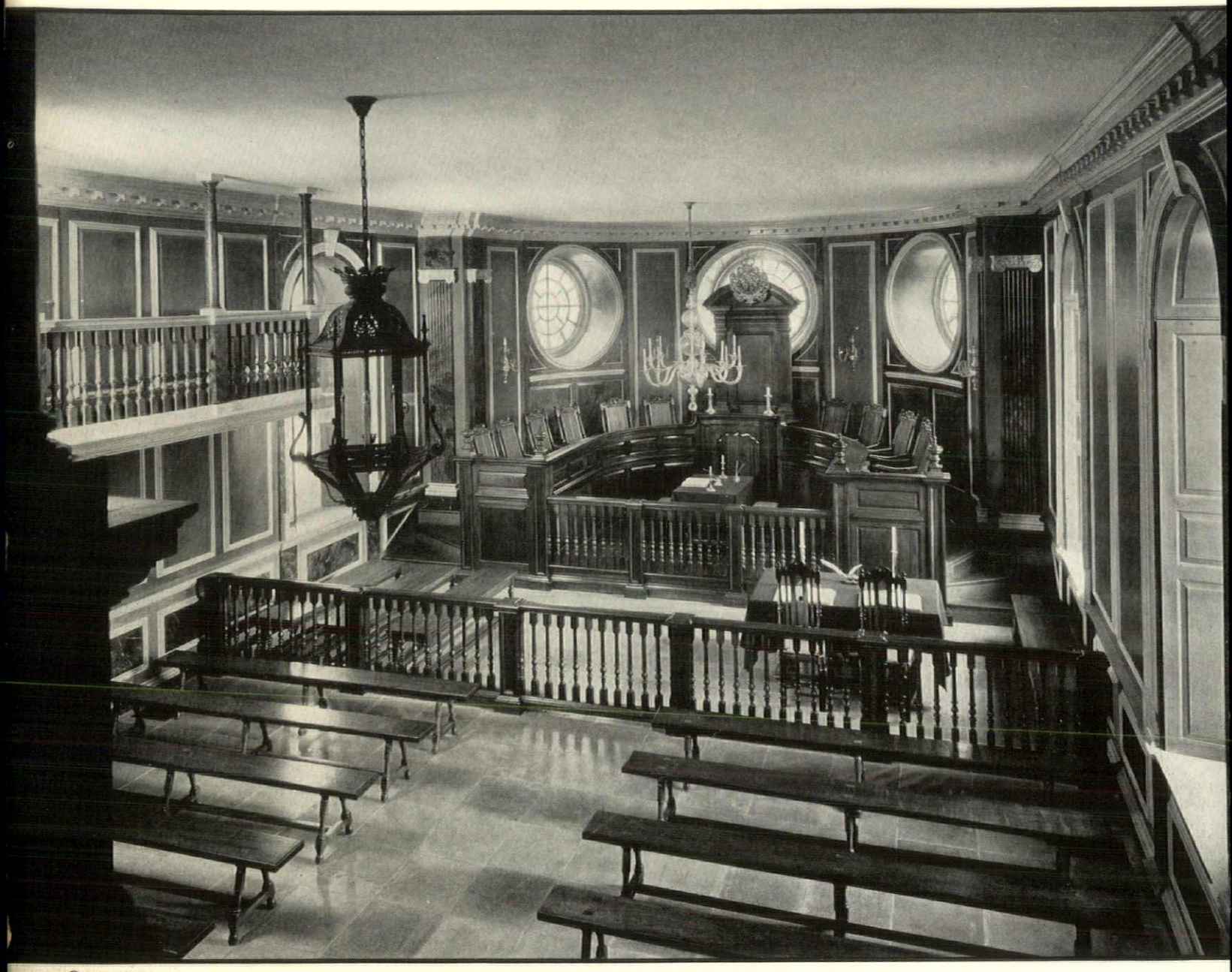
THE CAPITOL, from the north

THE House of Burgesses, the Council and the General Court of the Virginia Colony met in the Capitol in 1704, although the building was not completed until a year later. In 1747 this building was destroyed by fire. In 1751 another Capitol was built on the site of the original building, and it likewise was destroyed by fire, in 1832. Of the two buildings, the first was by far the best in design. On the basis of extensive search through records from the official documents of the Colony and from archaeological evidence, the present building was designed and reconstructed on the foundations of the original structure



THE CAPITOL, from the south

THE H plan of the building follows that of the original Capitol built in 1705. The General Court Room and the office of Court Secretary were on the ground floor of the West wing. In the East wing the House of Burgesses met and the Clerk had his office. A portico connects the two wings. On the second floor, in the West wing, was the Council Chamber and the office of the Clerk of the Council. Three Committee rooms were in the East wing, and a large Conference room between the two wings directly over the ground floor portico.



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THE GENERAL COURT ROOM

THE Governor and Council performed their judicial functions in this room, sitting as the General Court. This court had jurisdiction over all courts of law and justice in the colony except the ecclesiastical. It is on the ground floor of the west wing of the Capitol. According to descriptions of this room and of the original structure contained in the Journals of the House of Burgesses, the woodwork has been painted "like marble"

THE HOUSE OF BURGESSES

IN this room were held the meetings of the General Assembly, corresponding to the House of Delegates in the General Assembly of the present day. The details of furniture and furnishings conform as closely as possible to descriptions given in contemporary records of the Virginia Colony and particularly reports concerning the original structure found in the Journals of the House of Burgesses of Virginia.

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THE RALEIGH TAVERN

BUILT somewhat prior to 1742, the Raleigh Tavern was the center of the social, political and economic life of the Colonists in Williamsburg. The plan of the building is an L in shape, one portion facing the street, the other extending at right angles at the rear. Both parts are similar in external appearance. At the left is a detail of the entrance crowned by the bust of Sir Walter Raleigh

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Many of the historic associations of Raleigh Tavern come from the memorable events which took place in these rooms. Here patriotic Burgesses met before the Revolution, and it was here that the first meeting of Phi Beta Kappa Society was held. . . . At the left is the Bar, and below is the Common Dining Room

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From modest beginnings the Raleigh Tavern increased in size as the demand for additional accommodations developed. It reached its maximum size shortly before the Revolution. Best known of all the public rooms was the "Apollo", shown below, which was added to the original building about 1750. At the right is the Parlor.

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COLLEGE OF WILLIAM AND MARY

THE Wren Building on the campus of the College of William and Mary is the oldest academic building in America. Its foundations were laid in 1695. The building has been damaged by three fires (1705, 1859, 1862), but its outside walls are largely original. Its restoration to its early Colonial appearance was one of the first major projects of the Williamsburg Restoration. Erected in 1732, the dwelling at the left is the president's house. It has served as the residence of all the presidents of the College

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THE SEMPLE HOUSE

OWNED in 1799 and probably built by James Semple, a representative in the House of Delegates, a judge of the General Court and a professor of law at the College of William and Mary, this property remained in the hands of his heirs until 1850. It has been restored to its original appearance

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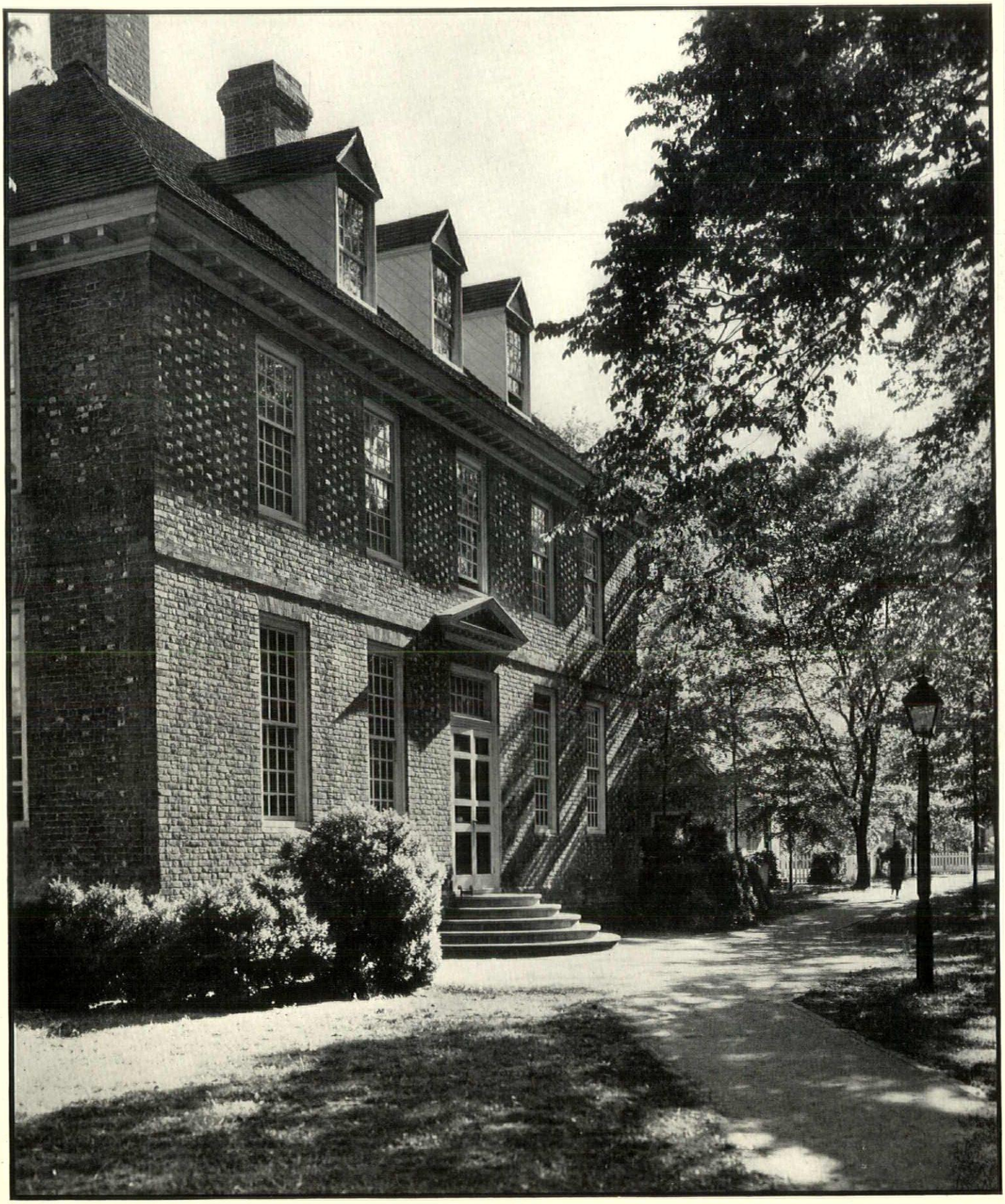
The kitchen shown above, back of Market Square Tavern, and the shop next to Raleigh Tavern, at the right, are typical of the smaller buildings which have been restored or rebuilt



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Brafferton Hall on the Campus of the College of William and Mary. Built 1723

TWO WILLIAMSBURGS

THE two Williamsburgs which are in the architectural eye at the present have little in common except the name Williamsburg and the fact that they are both large scale architectural projects. The one in Virginia, "The Restoration of Colonial Williamsburg," has recently been completed. The Williamsburg Housing Project in Greater New York is still in the working drawing stage and most of the site has just been acquired. Two more different projects can hardly be imagined. One is designed to preserve architectural history; the other to play its part in the making of architecture's history of service to society.

The Restoration of Williamsburg is a monument to the exceptional ability and exhaustive research of the architects who have left no stone unturned in their quest for those facts which make the reconstructed Williamsburg an authentic reproduction of an historic town in both spirit and detail. No expense was spared to ascertain how, when and why this early setting of American political development was built. Excavation, travel abroad, studies of archives and library research were thoroughly carried on in order that this shrine of early American history might be preserved for posterity.

Unlike the projects for the preservation of antiquities abroad, where such work is considered a function of the Government, the Williamsburg Restoration was financed as a private corporation supported by John D. Rockefeller, Jr. The results of the eight years or more of painstaking effort will be viewed by the American Institute of Architects in Convention next May, and by some 60,000 and more visitors each year.

The Virginia Williamsburg will be enjoyed for generations because of the beauty of its architecture and the spell cast by the atmosphere created out of red brick and white wood by architects of our colonial era.

In striking contrast to the atmosphere of this historic town will be the simple and orderly development designed to provide decent housing for a small fraction of New York's under-privileged. Seekers for beauty of architectural detail and for the picturesque or charming will not make pilgrimages to the Williamsburg Housing Project. Absolute economy has been the watchword in its design because of the necessity of providing space, light, air and safety for a multitude that can pay for nothing more,—and that is now living in unspeakably less. Ingenuity in plan of both site and buildings, research into the cost and efficiency of materials have little to do with archaeology and look rather toward the future than the past. The architects have spent unstintingly of their time in the hope of creating one more step in the advance of better living conditions for the citizens of the nation. Their designs have been completed in less than a year from their conception.

Both Williamsburgs have their place and function in the growth of American architecture,—one as a preserver of the best of early tradition; the other as a demonstration of the architectural approach to the persistent problem of housing with all its technical, social, economic and political aspects. Both will be looked upon as outstanding examples in their respective fields.

As It Looks

SMOKE 'EM OUT OR BUY 'EM OUT

HARRY L. SHUPE, of the Cleveland Chapter of the A. I. A., in the November issue of "The Octagon," unearths a plan to free the profession of the "rate cutters." Says, Architect, Shupe: "While this scheme may appear too expensive, a simple illustration of the way it works will convince the most skeptical that it is practical. Let us suppose that your office has a chance to build a $25,000 house for some client and that you would have every reason to expect that you were to receive a 6 per cent fee or $1,500.00. Now let us further suppose that word of this contemplated improvement has reached the ears of one of our chiseling fraternity who thereupon seeks out your prospective client and agrees to do the same amount of work in a professional way for the staggering sum of $100—result, you are out $1,500.00 and your prospective client has on his hands a house, and that's all you can say about it. Would it not have been better for you financially and for the profession architecturally for you to have given your competitor say even more than $100, possibly $150? In the long run everybody would have been happier and better off financially. You would have had $1,350.00, our chiseling brother would have had $150 and the hopeful home builder would have had a house that would not be a perpetual eyesore.

"This plan may smack of subserviency and is contrary on the surface, at least to our grand old American slogan of 'Millions for Defense and not a Cent for Tribute.' However the situation is so grave that heroic treatment is necessary. We can't smoke them out so let's buy them out."

THERE'S MONEY A PLENTY

EVERYONE seems to agree that we are on the verge of a building boom, if in fact, we are not already well within the first stage of such a happy event. But the question that is continually coming to your mind is probably this: "Where is the money coming from to finance all this new construction?" The answer to that question is not quite so hard as it might seem. Let's see just how much Mr. and Mrs. Average American, can afford to spend for new buildings, if they were willing to tap their financial reservoir. On June 30th of this year, there was in the saving banks of this country a grand total of $22,652,489,000, according to reports received by the Saving Division of the American Bankers Association. And a most encouraging fact is that within the past two years these saving deposits showed an increase of $1,526,955,000—that the increase in total number of depositors amounted to 1,753,032, which made the grand total 42,315,206, or approximately 32.7 per cent of the country's total population with ready cash laid away in the banks of this country. So, the question is not—Where is the money coming from to finance this building boom—but, "How can we influence Mr. and Mrs. Average American to bring their money out of the vaults and put it into circulation, through the building industry?"

ARCHITECT'S PROTECTION

BANKS in Brooklyn, N. Y., who hold $700,000,000 in real estate mortgages, have issued a set of construction specifications for one- and two-family houses which must be followed by any builder who expects to secure mortgage money from their institutions. "It is not their intention to attempt to standardize building, but rather to protect their own investment as mortgagees and the investment of their mortgagors and depositors against inferior construction, thus lowering the maintenance expenses and guaranteeing longer economic life for the buildings. Compliance with these specifications will add little to the cost of construction and will definitely improve the neighborhood." Where loans are made, the banks will make their own inspections to see that these minimum requirements are fulfilled, or will employ their own architect. We have a feeling that should all banking institutions and mortgage loan associations adopt a similar idea, a great many architects would receive commissions that are now going the way of the speculative builder. Architects can easily improve their opportunities by encouraging such a procedure among the financial institutions in their respective communities.

WHO'LL PROVIDE FOR THEM?

ARCHITECTS will do well to study these figures, and analyze these facts in their relation to, and importance upon the future market for architectural service. Government economists, inform us that today there are 5,000,000 more persons in the United States to be fed, clothed, housed, educated and entertained, than at the beginning of the depression. A further gain of 8,000,000 inhabitants in the next fifteen years is in prospect. But, advises the economist, at the end of this period we might expect the population growth to become static, with a total population of approximately 135,000,000.

to the Editors

It is interesting to note that so far this year 1,000,000 persons have left the rural districts for the towns and cities. If further gains are made in general business conditions, it is estimated that 2,000,000 annually will find their way into our already congested cities during the next few years. Today, the largest single group in this population analysis, is represented by 2,650,000 children 14 years of age. Ten years from now, say the economists, the largest group will be men and women of 24, and ten years later persons of 34 years. Those 2,650,000 children will be of marriageable age ten years from today, which means a vast demand for homes. In the mean time there must be schools to educate them, there must be theatres to entertain them, there must be new industrial plants to provide for their daily needs and wants. Upon the architectural profession's shoulders rest the responsibility to provide the right kind of living conditions for this vast increase in population, not only homes, but new communities, revamped cities with fresh air and sunshine for health, and where squalor and congestion will be unknown.

TRAINING FOR PLANNING

IN this issue of AMERICAN ARCHITECT, Arthur C. Holden, A. I. A., a member of the Mayor's Committee on City Planning, New York City, outlines an interesting method for, "Practical Planning —A Way To Get Things Done." The method suggested by Mr. Holden is particularly timely in view of the resolution passed by the recent meeting of the International Congress of Architects: "That the architect is particularly fitted for the solution of all problems of City Planning, and that therefore it is proper that architects should direct and control the development of all that is related to the study and creation of both regional and city plans. That it is essential that in the education and training of the architect he be brought to realize the great importance of individual design in its relation to, and influence upon the ultimate completed whole, and that consequently preparation for practice must be so organized as to include the inculcation of the principles of general, comprehensive planning or urbanism, as a fundamental." That international thought is being applied to this all-important phase of architectural practice bids well for the future of our cities and urban communities. The problem should not go unheeded by individual architects. It presents both an opportunity and a challenge to the profession and the educational institutions.

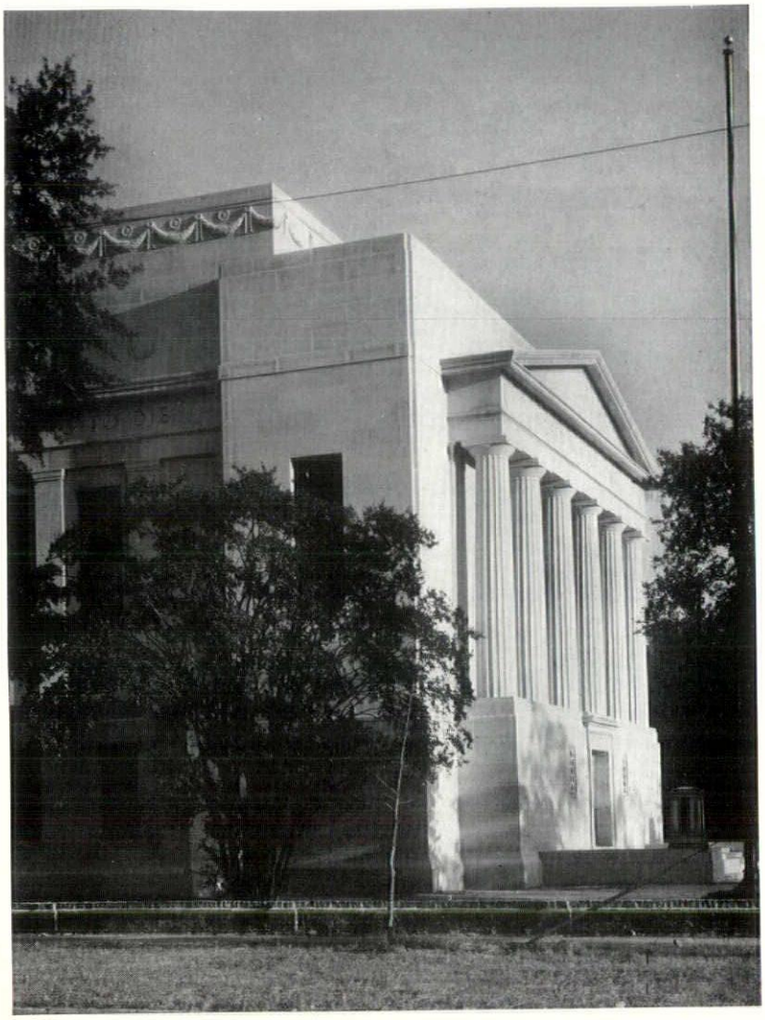
SIX POINTS FOR GOVERNMENT'S PROGRAM

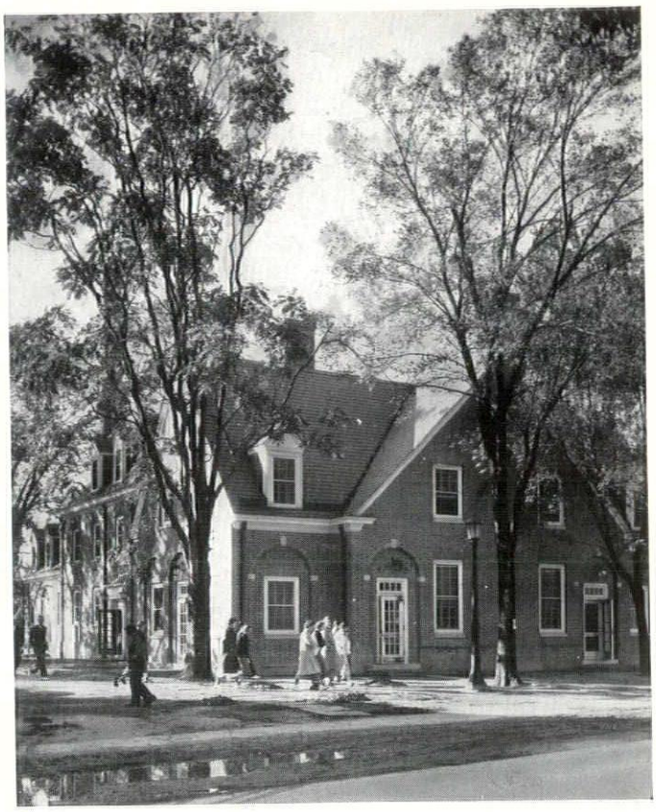
WITH the meeting of the United States Congress only a few weeks away, the heads of business, industry, finance, and what have you, are busily engaged in passing resolutions, formulating suggested plans, in preparation to voice their views to the Congress. The Construction Industry, through the Construction League of the United States, is no exception. The League met early in November, reviewed the public works situation and formulated its policy on the question. In the interest of recovery and stabilization it urges that all construction groups support the adoption of these six principles:

Elimination of the wasteful construction projects now carried on by WPA as a means of relief. . . . Continuation of a substantial program of useful federal public works and of federal aid to highways. . . . Continuation of PWA aid to States and municipalities for useful projects that add to the public wealth. . . . Grants for state and municipal projects, an emergency appropriations for highways to be on a descending scale in proportion to the increase in private employment. . . . Ear-marking of all appropriations for particular purposes. . . . Mandatory provisions that construction projects financed in whole or part by federal funds should be carried out in a normal manner through public lettings and contracts and the regular engagement of professional services without arbitrary and artificial restrictions. In other words, by architects.

THE PRIMARY OBJECTIVE

THE National Retail Dry Goods Association has adopted a seven-point policy emphasizing retailer participation in many of the activities of the Federal Housing Administration. The policy stresses the view that "merchants are concerned with the 'rehousing' of the United States, to the extent that it is done through private initiative and sound financing." A most important point, is that the merchants desire to see the small house developed under some system of good quality construction with freedom of architectural design. They estimate that such a program would bring into their coffers some $5,000,000,000 within the next five years, for home appliances and furnishings. A purely selfish reason, of course for their co-operation in such a movement, but nevertheless, the publicity which would accrue from the backing of such an organization would undoubtly react for the benefit of the architectural profession, and all allied groups.





New World War Memorial Building, Columbia, S. C., to house the State's $1,000,000 collection of archives and trophies. Built with a PWA grant of $32,200. . . . . Above, recently completed Administrative Building on the campus of William and Mary College, Williamsburg, Virginia. Financed by the PWA

ACME

Tribunal Council Building, in the newly created Stone Capitol village, for the Noman Indians, in the Navajo Reservation in Arizona

Trends and Topics

175,000 NEW HOMES FOR 1936 . . . is the prediction of Stewart McDonald, Federal Housing Administrator, in announcing on December 10th, that the volume of business done by the FHA had passed the $500,000,000 mark. In addition, $1,150,000,000 worth of home modernization and repair work, insured by FHA, has been generated through the organization's activities. The announcement came at the time the PWA publicly financed low-cost housing and slum clearance program and the Resettlement Administration "green belt" housing undertakings were about to get underway. The Resettlement Administration announced on the same day that it would construct a $10,000,000 "model green belt community" at Mount Healthy, near Cincinnati, to provide low-rent housing for the families of 1,500 workers. About 7,000 men will be employed on the project at the peak of activities. The scheme calls for schools, stores, playgrounds, and other facilities for the accommodation of the new city's inhabitants.

The Techwood Housing development, Atlanta, Ga., dedicated by President Roosevelt on Nov. 29th. The first of PWA's low-cost housing projects. Burge & Stevens, Architects. . . . At left, President Roosevelt, lauded the Pine Mountain Valley Rural Rehabilitation project in Georgia on his recent trip of inspection.

. . . Below, Mrs. Roosevelt, Mrs. Mary Kingsbury Simkhovitch and Senator Robert F. Wagner, at the National Public Housing Conference held in New York on Dec. 3rd. . . . Mrs. Roosevelt cut the tape, while Governor Lehman, left, and Mayor LaGuardia, right, looked on, at the dedication of New York City's first slum clearance project

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of the Times . . . .

Up to December 9th the FHA had insured 646,940 modernization and repair notes, totalling $234,105,461, and selected 62,359 home mortgages totalling $240,597,352, for appraisal, and accepted mortgages on 15 low-cost housing projects costing $27,030,234, with a total undertaking of $501,733,047. This business was done by private capital released through banks, trust companies, building and loan associations, mortgage companies and other private financial institutions, with FHA insuring mortgages and notes. With these announcements likewise came a statement from Secretary Ickes indicating his approval, and that he was in accord with the plan of Senator Robert F. Wagner of New York to set up a Federal body to foster low-cost housing. Senator Wagner plans to introduce in Congress, at its coming session, a bill calling for a housing appropriation of $800,000,000. Secretary Ickes, followed up his approval of the Senator's housing plan by making a statement that, "Our housing money would have gone three times as far in the past if we could have carried out housing projects on a loan and grant basis!

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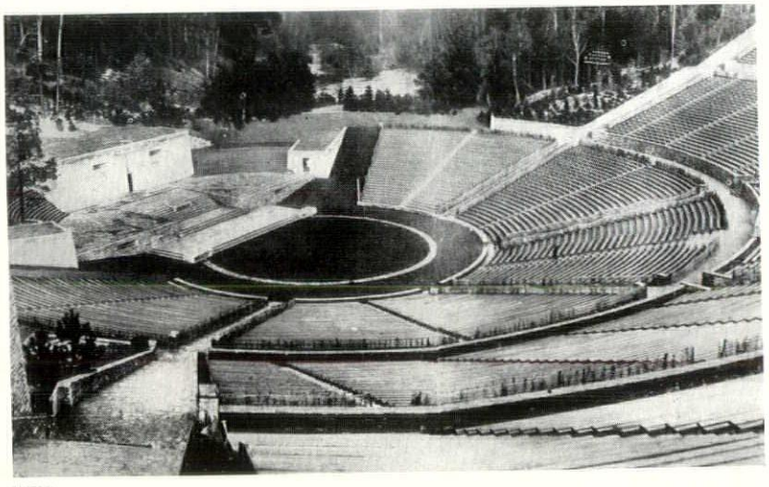
The new Olympic Stadium in Berlin silhouetted through the framework of a nearby building. Here athletes from all parts of the world will meet in 1936



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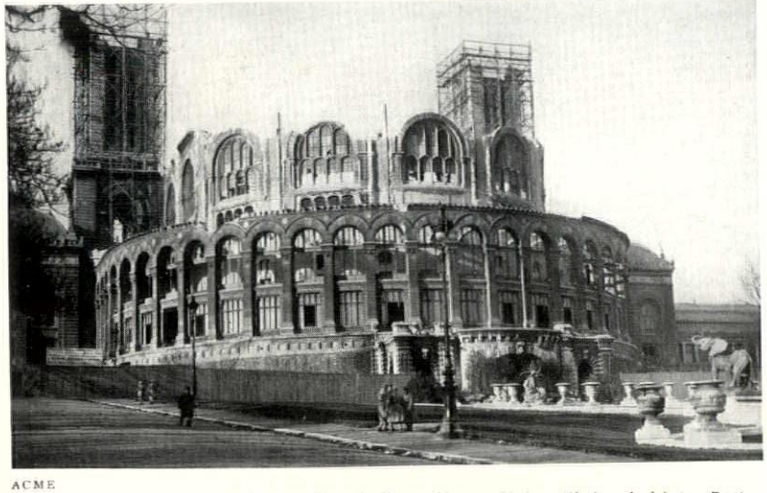
A magnificent setting in the wooded hills outside of Berlin has been provided for the new Dietrich-Eckart open air theater on the Reich Sport Field



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In preparation for the International Exposition which will be held in Paris in 1937, workmen are busy tearing down the center of the famous Trocadero

SENATOR WAGNER'S HOUSING PLAN . . . Until recently PWA, FHA, and even the President have been so tied up with emergency measures that little thought has been given to the creation of permanent departments of housing or to the formation of long term plans for housing. Evidently this neglect has not been shared by various other social minded citizens. For last month the air has been full of long term housing plans.

The first, and one accorded the most chance of success, was proposed by Senator Wagner, Democrat of New York, prominently identified with the Social Security, Labor Disputes, and Railway Pensions measures. Senator Wagner is advocating a 10-year government subsidized housing program to provide homes for 8,000,000 families having incomes of less than $2,500.

Already pending is a bill proposed by Wagner that would create a permanent Division of Housing in Secretary Ickes' Department, and would consolidate under one head all of the scattered housing agencies in the Interior Department and Resettlement Administration. This new agency, according to Mr. Wagner's plan, could make grants and loans to local public housing bodies for low-rent and slum-eradicating projects. The government would put up 30 per cent of the cost of the labor and materials, and the local institutions the remainder. Where no responsible housing body existed, the agency could build and operate housing.

Essence of Low Cost Housing . . . Anxious to prevent a recurrence of the building evils of the 1920s, Senator Wagner believes that, since private industry can build only 6,000,000 of the 14,000,000 homes needed by 1945, and these for people of moderate income and for the rich, government subsidy must look out for the remainder.

Said Senator Wagner, "Stated simply, this is the whole essence of the low cost housing idea. It embodies recognition on the part of a socially awakened people that the distribution of our national income has not been entirely equitable, and that partly subsidized housing, like free schools, free roads, free parks, is the next step that we must take to forge a better order."

At Thanksgiving time it seemed likely that Senator Wagner was gaining ground with his proposal. Secretary Perkins already had expressed her approval, and the President, off for a holiday at Warm Springs, Georgia, had promised to talk it over when he returned.

8,000,000 Homes . . . Senator Wagner had scarcely sat down from his speech to the United States Conference of Mayors before the Committee of Economic Recovery, Inc., had brought fortl. a similar program. Like Wagner the committee, composed of business men representing various fields of enterprise, wants to see 8,000,000 homes constructed in the next ten years; wants (*Continued on page* 96)

STORE FRONTS

and Show Windows

Merchandising principles and store policies that control planning, design and equipment. . . . How display techniques form a basis for the work of architect and engineer. . . . "Promotional" versus "Institutional" stores. . . . Factors in planning. . . . Window sizes and lighting. . . . What to do about glass reflections. . . . A check-list of many shops and plates that reflect current practice in store front planning and design. . . .

As many merchandising techniques exist, probably, as there are merchandising directors. Each store is a unit in a highly competitive field—a field in which imagination to create the unusual in display and originality in sales promotion are rated as of controlling importance. Thus, classification of technique as it refers to the physical development of a store front, or display within the show window is virtually impossible.

Involved in every merchandising technique, however, is a searching regard for three factors that constitute an *a priori* basis for the architect's work. These factors are: 1. the type of store; 2. the kind of goods sold; and, 3. the merchandising policies of the management.

1. The Type of Store—Stress has been laid upon the commercial desirability of spacious entrances and enormous show windows. Too little appreciated by architect and merchant alike has been the fact that such things are essential to the plan of a huge metropolitan department store in a teeming shopping center but may be a business embarrassment to the men's clothing store next door and almost ruinous to the exclusive cosmetic salon across the street.

Location, an important influence upon the design and equipment of store fronts, is likewise a function of the type of store with which the architect may be concerned. In exclusive shopping areas, competition among "smart shops" centers about unusual attractiveness of display, brilliance of window lighting and a striking, sophisticated quality of store front design.

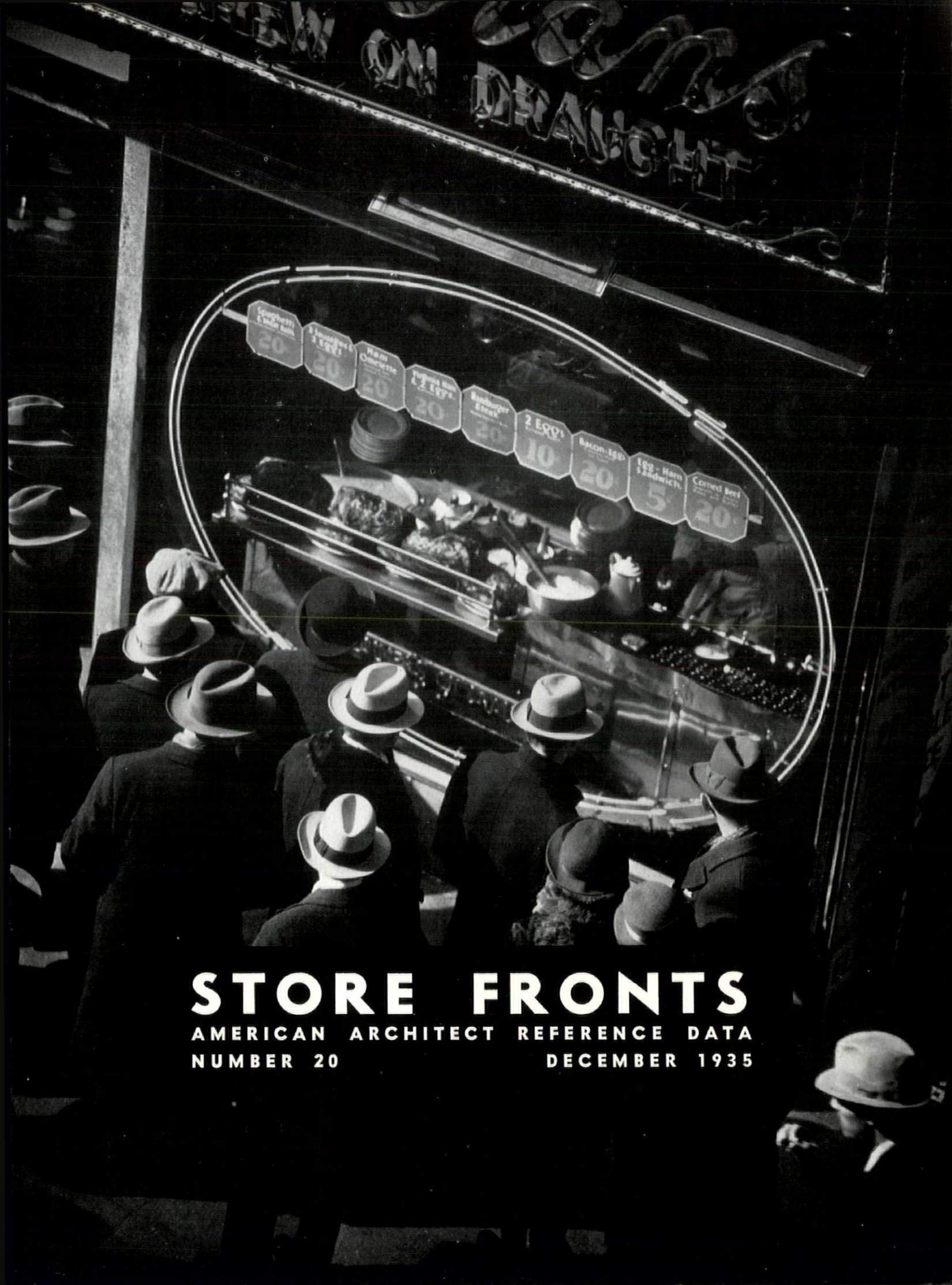
In less expensive districts a certain garishness is often desirable from the merchant's viewpoint. This is because consumers—more numerous, but less appreciative of quality—are often "window buyers." Thus, many goods are displayed so that windows serve nearly as sales counters and the customer can select his purchase from the street. The store front itself becomes merely a means of attraction, usually through the medium of signs and the liberal employment of facade lighting.

Size is not always a ruling factor so far as store facades and show windows are concerned. A department store, for example, may present a facade out of proportion to its actual size, due to complications of property ownership. The handicap must be overcome by the utmost ingeunity in the design and equipment of those show windows which are available and in development of the store's merchandising displays.

On the contrary, a store specializing in furnishings, may have a building as large as many a department store, an excellent location on a corner and many show windows. Displays are changed with relative infrequency but require depth and unusual height to simulate various room interiors. Show windows can well be separated by unusually wide areas of blank wall to emphasize interest of large displays, a procedure contrary to general practice for department stores.

Specialty stores such as haberdasheries, gown shops, shoe stores and the like vary so widely in size, degree of "smartness" and location that scarcely any formula for the design of their entrances and show windows can be developed. Most of them, however, have a common problem in display, for they deal in a type of merchandise susceptible to dramatic presentation within comparatively small show window space.

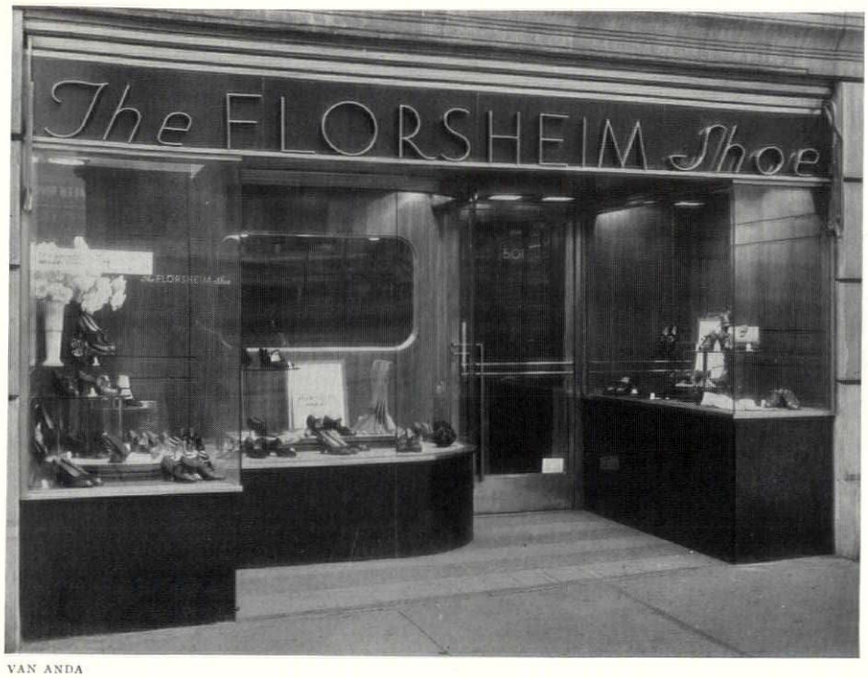
In thousands of cases the same type of store front and show window has served adequately to display a wide range of goods. And it is probably true that merchants have been satisfied with the mechanics involved. Thus to a very large number of store owners the problem of adequate merchandise display centers less about the store entrance and windows



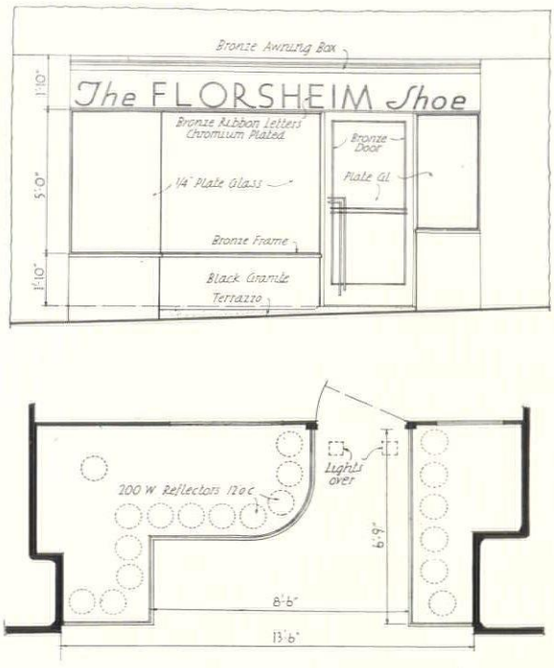
STORE FRONTS

AMERICAN ARCHITECT REFERENCE DATA

NUMBER 20 DECEMBER 1935



VAN ANDA



Well-planned windows for narrow frontage. A chain-store unit in New York. Pearl and Boriss, designers

than about the kind of goods which they are selling and methods by which the public may be attracted to examine and buy them.

2. The Kind of Goods—Department store executives will tell you that an ideal window arrangement consists of several banks of large windows—each bank containing at least three with glass areas of 12′-6″ by 8′-6″—interrupted with much smaller windows. Reasons include the fact that department stores display all types of goods, from double beds to cigarette-lighting gadgets. Large windows are essential to delineate properly a "display idea" involving furniture sets or a parade of seasonal fashions, the bank arrangement making possible a continuity of dramatic presentation. Small articles are lost in such windows—unless the windows are masked—for they require show spaces that focus the attention of the public. Generally speaking, large stores require windows equipped much like the stage of a theater.

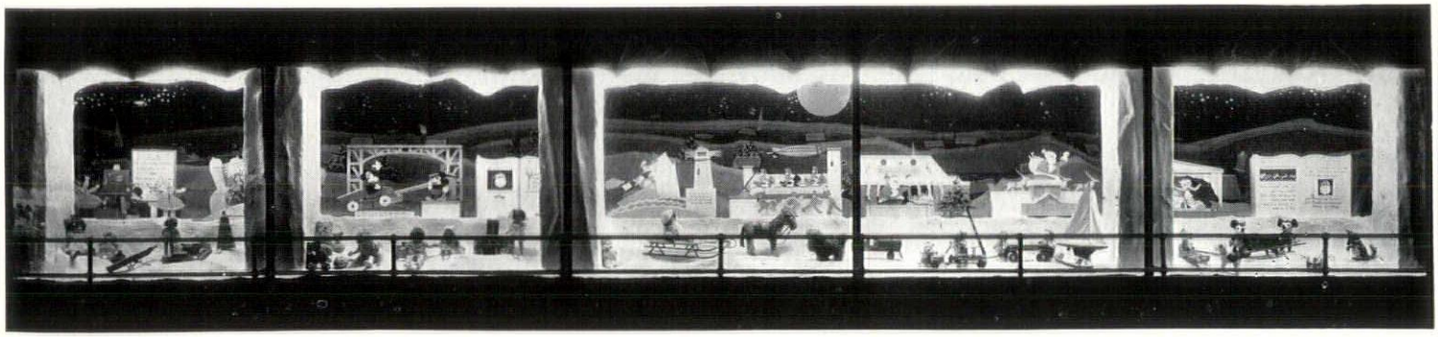
In the case of a small specialty store the contrary may be true, though in the case of every store window mechanical adaptability to changes in display is essential. For example, a shoe store needs little in the way of window equipment beyond good lighting and the imagination of a good window dresser. The display of jewelry—particularly in the better class of shop—is a problem in focussing attention upon rare objects wrought in fine detail. Lighting is important and may involve general lighting from above, sides or front, spot lighting or a combination of both. These requirements may hold equally true in the case of optical goods.

Similar principles of display apply throughout the field of commodity selling. Hardware stores for example, usually show many small items and the window problem becomes one of providing a permanent, neutral background, good light and sufficient floor space within the window to satisfy requirements of the window dresser. In stores handling groceries, dairy products, liquor, drugs, china or books, displays are usually made up of a large number of small objects as opposed to a small number of large objects in the case of a decorating establishment, a furniture store or a clothing shop.

Stores selling both large and small articles require windows that are easily adapted to wide variation in display. This means, to the merchant, a large window with a high ceiling and deep floor, a permanent background, a battery of overhead lights and service outlets permitting the use of portable side, overhead and front foot lights, overhead and side spotlights. With this equipment the window can be masked at the front and made smaller at the back and sides with portable settings similar to the wings and sets of a theater.

From the display man's point of view, such a flexibility is a desirable feature of any window, regardless of the type of goods at hand, for it allows him the widest latitude in the creation of unusual, and therefore compelling, presentations. From the management's point of view, windows with such equipment are ideals to be realized only to the extent that policies of the store make the necessary expenditure commercially desirable.

3. Merchandising Policies of Management—Executives group store policies under two general headings. The first—and by far the largest—is the policy of "promotional selling." The second is that of "institutional merchandising." Each has a bearing upon the store front and windows to the extent that displays may be radically different and may, therefore, involve different sets of mechanics in entrances and windows.



WINDOW TYPES . . . "PROMOTIONAL" VERSUS "INSTITUTIONAL" DISPLAY

Above: A Christmas window at R. H. Macy's in New York. Behind ninety feet of glass is a mechanical display theatrically arranged so that toys move. By a continuously moving parade behind which stars twinkle and a full moon rises and sets, the observer is impelled to buy. An effective, ingenious type of "promotional" display Left: This window, a product of B. Altman's "institutional" policy, primarily emphasizes a reason for buying. Goods displayed indicate the store's capacity to satisfy any sort of cold-weather clothing needs dramatically suggested by the backgrounds. Lighting is concealed above a removable cloth ceiling » » » » »

A promotional policy places emphasis on the goods themselves. Selling objectives are quick sales at low prices, large turnover, small profits on a great number of items. Every part of the selling program is geared to an immediate opportunity to attract and sell to a mass market. Hence seasonal activity is the rule; sales campaigns featuring special items are frequent. Window displays are unusual—even bizarre—in an effort to arouse public interest quickly. They are changed frequently; and elaborate displays of a theatrical nature are developed often as selling campaigns mature in various departments of the store.

What is true of a "promotional" department store holds in the case of promotional specialty store. The promotional selling policy requires a store front that compels attention and windows that are completely equipped for the creation of displays which stress the desirability of goods themselves in a theatrical, arresting manner.

Invariably this means the greatest possible window glass areas, maximum window depths, backgrounds and ceilings that can be moved or changed easily and at will, permanent overhead lighting with multiple controls and provision for portable banks of foot and side lights, automatic controls of several circuits and foot, side and overhead spots. Ideally the permanent show space ceiling should be high enough above the window head to permit installation of a low velocity ventilating fan vented through a transom.

A store with a policy of "institutional selling" deals more conservatively with display problems. The management's prime objective is to sell the store as an institution standing for quality in merchandise, fairness in all business transactions, sound, though slow expansion gained by public approval of the establishment as a solid member of the community.

Large inventories, rapid, forced turnover, the lowest prices—these are not considered so important as the development of a permanent buying group attracted to the goods of the store by a policy of conservatism.

Displays geared to this institutional policy are less concerned with mass appeal than with the presentation of carefully chosen items that reflect the store's reputation for quality. Windows usually are arranged to suggest buying what the store offers rather than the goods actually displayed. Seasonal activity is not neglected, nor are special selling programs. But usually the latter come at stated intervals and extraordinary efforts are lacking to promote quick disposal of speculatively purchased goods.

In a large specialty shop or department store this merchandising policy implies the need for windows quite as

CHECK LIST FOR WINDOW PLANNING

Type of Store	Bulkhead Ht. from sidewalk	Height of window glass	Depth of window floor	Type of Background recommended for maximum adaptability	Notes
Art	30"–36"	5'– 6'	3' – 5'	Closed–Removable	Equip windows so background is effaced and goods dominant
Automobile	6"–12"	8'–10'	6' – 8'	None	Background display usually not important. Brilliant lighting essential
Bakery and Candy	24"–30"	5'– 6'	2' – 4'	None or semi-closed	Ventilation in windows essential to protect goods
Book	30"–36"	5'– 6'	2' – 3½'	Semi-closed—Removable	Massed display with high "interest points." Excellent lighting prime essential. A "selling window"
China	30"–36"	5'– 6'	3' – 5'	Closed—Removable	Set displays important. Lighting with fairly low intensity desirable
Clothing—Men's	18"– 6"	6'– 8'	4' – 5'	Closed—Permanent	Brilliant lighting, adaptability of window to variety in display essential
Clothing—Women's	14"–18"	6'– 8'	4' – 5'	Closed—Permanent	
Dairy Products	18"–24"	5'– 6'	2' – 5'	Open or closed—Permanent	Ventilation in window essential unless refrigerating cases used
Decorator	12"–18"	10'–12'	5' – 8'	Closed—Permanent	Equip window for use as stage set. Service outlets, wide access doors essential
Decor. Accessories	30"–36"	5'– 7'	2' – 5'	Open or closed—Removable	Service equipment for striking display—background and lighting necessary
Drug	24"–30"	6'– 8'	1½'– 3'	Semi-closed—Removable	"Selling windows" with occasional small sets of special displays
Florist	12"–18"	6'– 8'	3' – 4'	Open or glass enclosed	Ventilation essential, unless window is used as cold room
Furniture	9"–24"	10'–12'	6' –10'	Closed—Permanent	A stage-set problem
Furrier	18"–24"	6'– 8'	3' – 5'	Semi-closed—Ventilated	Furs are damaged by high intensity lighting without lenses. Ventilation desirable
Grocery	18"–30"	6'– 8'	3' – 6'	Open preferable	Air circulation necessary to avoid quick spoilage
Haberdashery	18"–26"	5'– 7'	2' – 4'	Closed—Removable	A "selling window"; background incidental, lighting important
Hardware—Paint	12"–30"	6'– 8'	3' – 6'	Semi-closed—Removable	Massed display of objects. Sets are rarely used—backgrounds incidental
Hat	30"–36"	5'– 6'	3' – 5'	Closed—Removable	Similar to Haberdashery windows
House Furnishing	18"–24"	8'–10'	4' – 6'	Closed—Permanent	Usually massed displays. Brilliant lighting with spots desirable.
Jewelry	36"–42"	4'– 5'	1½'– 3'	Semi-closed—Removable	Small displays—spot lighting in exclusive stores—mass displays and general lighting in less expensive stores
Leather	24"–30"	5'– 6'	3' – 5'	Closed—Permanent	Backgrounds incidental—goods require less brilliant lighting than most others. A "selling window" rather than display
Liquor	24"–30"	5'– 6'	2' – 4'	Semi-closed—Permanent	
Millinery	30"–36"	5'– 6'	2' – 4'	Open or closed	Similar to hat windows
Music	30"–36"	5'– 8'	3' – 6'	Open or closed	Window equipment depends upon display—or not—of instruments, as pianos
Optical Goods	36"–42"	4'– 5'	2' – 3'	Closed—Permanent	Usually mass display with high interest points
Shoe	18"–36"	5'– 6'	2' – 4'	Semi-closed—Permanent	Backgrounds incidental to mass displays. Air circ'n desirable
Sporting Goods	18"–24"	6'– 8'	3' – 6'	Closed—Permanent	Equip window for both object and set displays—spot and general lighting
Tailoring	18"–24"	6'– 8'	3' – 5'	Closed preferable	Object, not mass, display. Background incidental
Tobacco	30"–36"	5'– 6'	2' – 3'	Semi-closed—Permanent	Gadget displays. Air circulation—good lighting essential

adaptable as those of a "promotional" store. But in smaller shops it often means that the store itself serves as a display. Fronts are carefully designed to attract; window glass areas are reduced; the display space is often dwarfed, the background omitted and the observer allowed a comparatively clear view of the shop interior. In such cases the finish of the window areas is an important concern of the architect, even though in some stores goods are seasonally displayed against special backgrounds and with special lighting effects.

In brief summary, the merchandising executive regards his shop front and windows as an advertisement and as an aid to sales promotion. No rules—other than the exercise of originality to compel attention—exist for store front layouts. These must be governed largely by exigencies of location, the various limitations of structure and maintenance expense. Regarding windows the display executive desires the greatest possible adaptability of show space and lighting. He rightly looks upon a show window as a display stage which, like a theater, should be equipped for the production of a wide gamut of presentation possibilities.

ARCHITECTURAL FACTORS

FEW rules can be laid down for the physical layout of a store front. Involved are: 1. Location (exclusive neighborhood or otherwise); 2. Store policies; 3. Structural limitations (new or remodeling project; extent of frontage; local building restrictions); and 4. Cost. Variations of each make it obvious that every store front is a problem special to the individual circumstances involved. But some criteria can be set regarding components of any store front problem. The following, in outline represent current practice generally—though not unanimously—considered satisfactory.

1. Planning—It has been estimated by C. B. Reymers, display manager of the Liggett Drug Stores, that window space represents from twenty to fifty per cent of a store's total rental. He emphasizes the value of window displays further by the statement (in American Druggist, October, The A B C of Window Display) that modern methods of merchandising are based upon the fact that eighty-seven per cent of all purchases result from an appeal to the sense of sight.

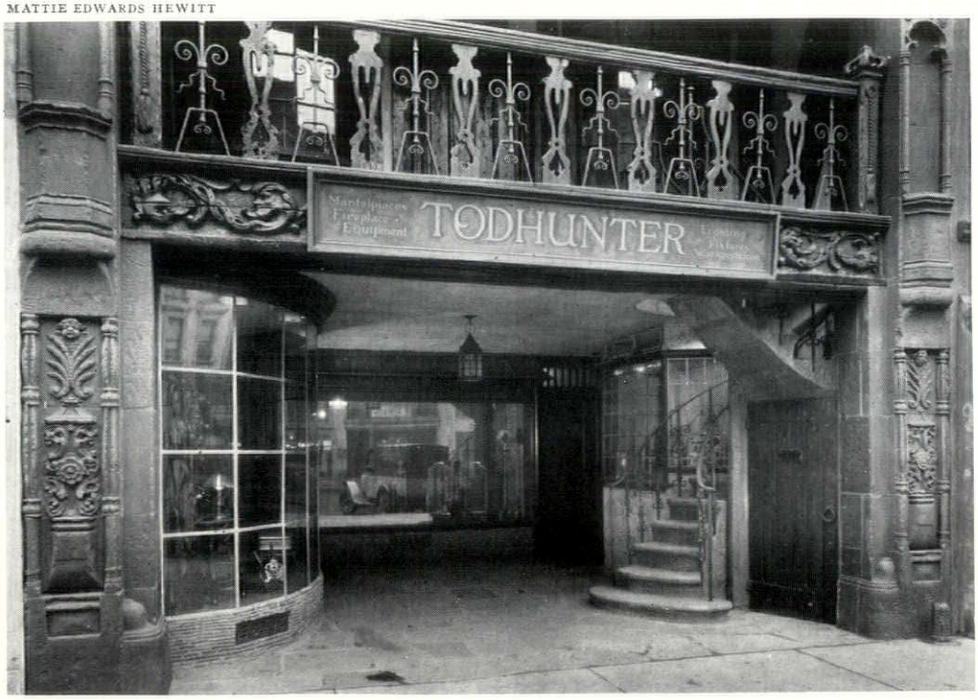
Only seven seconds are required to pass the average store window. For greatest effectiveness, therefore, windows should be parallel to the street. The vestibule window is an expedient employed to overcome limitations of small frontages. The trend is toward elimination of deep window vestibules. Reasons are: 1. In better class stores vestibule windows defeat the "institutional" purpose of display by forcing a mass display of goods. 2. Interior sales space is reduced. 3. Windows are difficult to dress. 4. Installation and maintenance expenses are high.

Bulkhead heights vary depending on goods displayed. Window heights should be such that the sash frames the center of the display at the eye-level and completely masks a bank of front overhead lights—without the need for a valence. The table on page 67 indicates a range of practical dimensions. Single entrance doors should never be less than 2'-8". Three foot doors are recommended. Double doors should be at least 2' wide. Entrance vestibules are desirable in all cases and are a necessity in large stores where traffic is heavy.

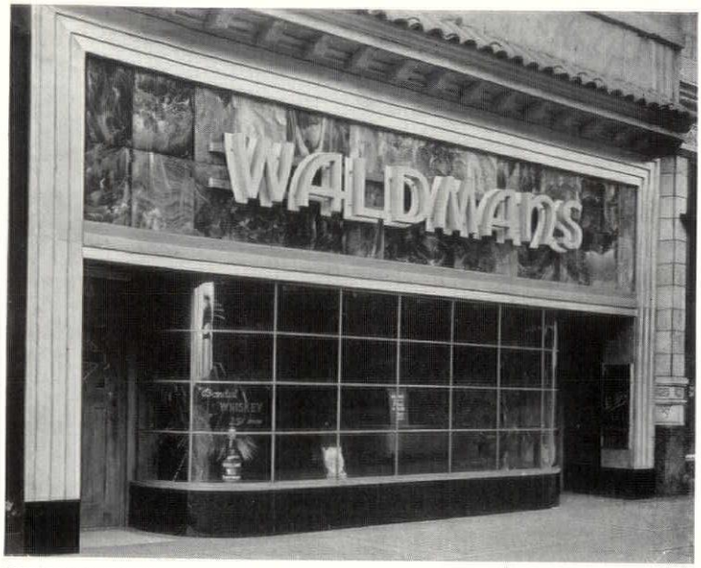
2. Window Lighting—The only two rules that fit all cases are: 1. Lighting should be concealed and facilities adaptable to all types of displays; and 2. Intensities of general window illumination should be such as to establish a lighting level adequate to the display. No more definite statements can be made. Adaptability of lighting facilities depends upon the type of store, the kind of windows and the character of goods and backgrounds. Intensities depend upon location of the store, lighting levels of the district, brilliance of lighting in adjacent windows, area and depth of show window spaces and the types of goods and setting to be lighted.

The presence of so many variables makes lighting specifications a subject for special study in every instance. Tests made by lighting engineers indicate that fifty per cent more people stop to look at a window lighted at an intensity of 65 foot-candles as against an intensity of 15-foot candles. When the intensity is raised to 100 foot-candles the percentage becomes seventy-three. This proves the attraction value of light, but takes no apparent account of merchandising factors mentioned above. It is quite possible that an

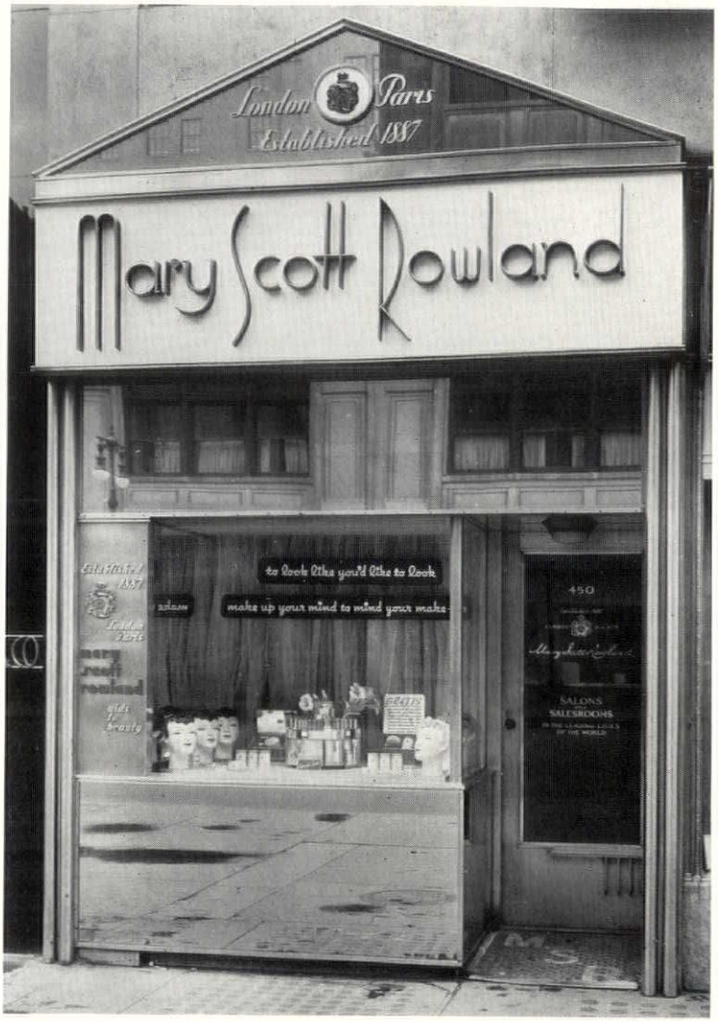
MATTIE EDWARDS HEWITT



A store front excellently adapted to advertise the business of the establishment. As the business of the store is unusual, so the disposition of windows and entrances is unusual. The utilization of the type of materials in which the store deals gives an interest compelling result. This facade, designed by Arthur W. Todhunter, is proof that skillful designing can successfully combine the principles of "promotional" and "institutional" selling



HEDRICH-BLESSING



VAN ANDA

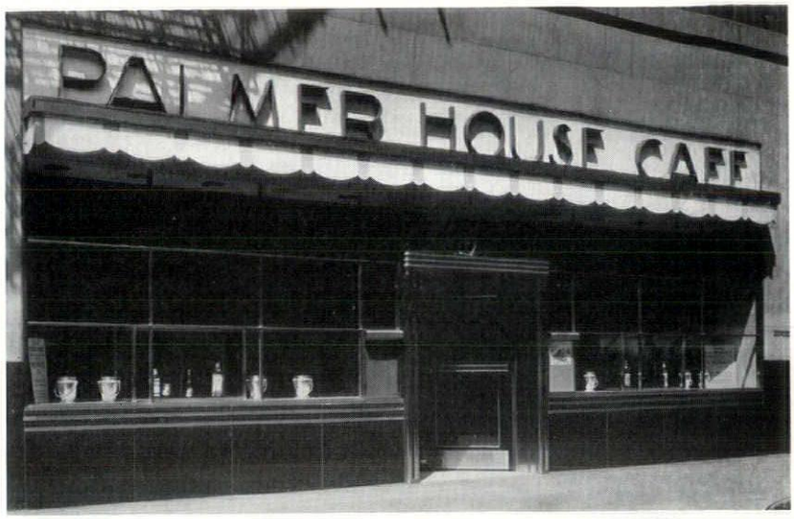
"THE PERSONALITY OF A STORE IS STAMPED UPON THE FRONT"

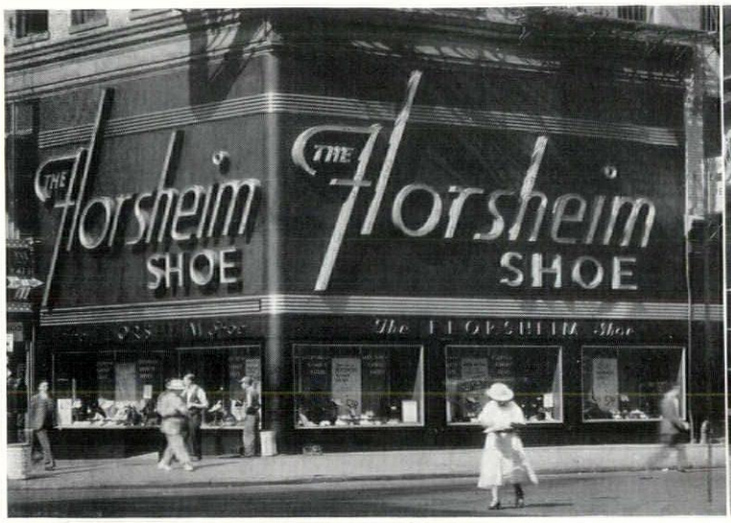
Three successful examples that prove the force of the quotation. Simplicity in detail and a direct planning combine to produce an attractive masculine appearance to this cafe. Benjamin Franklin Olson, architect. Delicate femininity in the Rowland shop is produced by fine detail and the use of blue mirror for bulkhead, facia and pediment. Benjamin H. Freedman, designer. Below: Well planned windows and the jade and black of easily cleaned vitrolite emphasize efficient management and quality merchandise which characterize controlling policies of this chain store unit

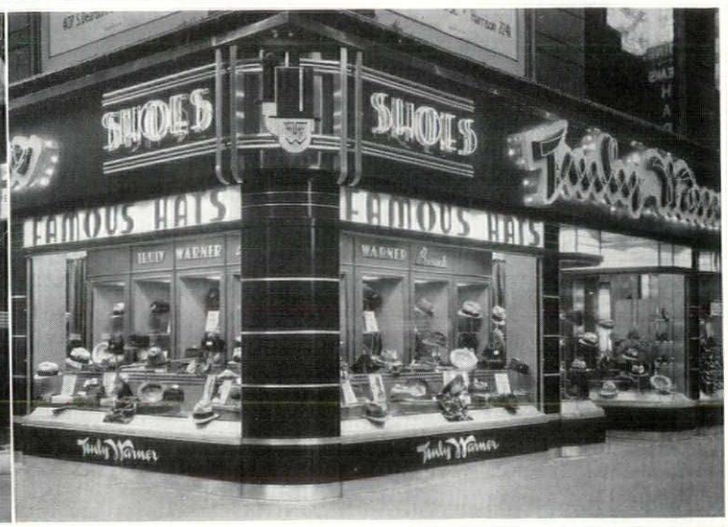
COURTESY, VITROLITE SALES CORP.

SIGNS . . . .

As much a necessity from the merchant's point of view as show windows are signs. Shown here are four examples of signs designed as logically important elements of the store front. Right: stainless metal letters, lighted from a trough below. Below, left: large display sign in a "white way district" designed to compete for attention with many others. Letter outlines are metal troughs containing double lines of Neon tubing. Background is black, matte-finish glass. Below, right: façade lighting by means of display signs which combine silhouettes with Neon tube outlines. Bottom of page: upon signs depends the façade scheme of this building. A corner location made possible an unusually valuable diagonal show window, emphasized by the large Neon tube and bronze signs that are clearly visible from all directions. Deyoung and Moscowitz, architects







PHOTOS BY WURTS BROS. AND HEDRICH-BLESSING

unusually striking display lighted at low intensity might prove more effective from the merchandising point of view than a brilliantly lighted but poorly arranged window.

Lamp sizes and spacings likewise vary. The following table, prepared by Henry L. Logan, Consulting Electrical Engineer, indicates a point of departure.

LAMP SIZES FOR SHOW WINDOWS

Location	Large Cities A	B	C	Medium Cities A	B	C	Small Cities A	B	C
White Way District	500	15"	Yes	300	15"	Yes	200	12"	Yes
Business Thoroughfares	300	15"	Yes	200	12"	No	150	12"	No
Neighborhood Stores	150	12"	No	150	12"	No	100	12"	No

A—Lamp sizes in watts. B—Lamp spacing in inches. C—Footlights

In the majority of cases higher wattages on the spacing indicated will prove too expensive from the merchant's point of view. Current practice rates wattages of 100 to 200 per foot of window frontage as adequate for general overhead window lighting. This is often supplemented with corner spotlights using either a 250 or 500 watt lamp, depending upon the window size. Provision of service outlets at five-foot intervals, two circuits for each overhead bank of lights and one switch for each 300 watts of light complete a window lighting system satisfactory for display demands of the average store. So-called "shadowless lighting" of high brilliance is possible through use of gaseous tube units in place of incandescent lamps.

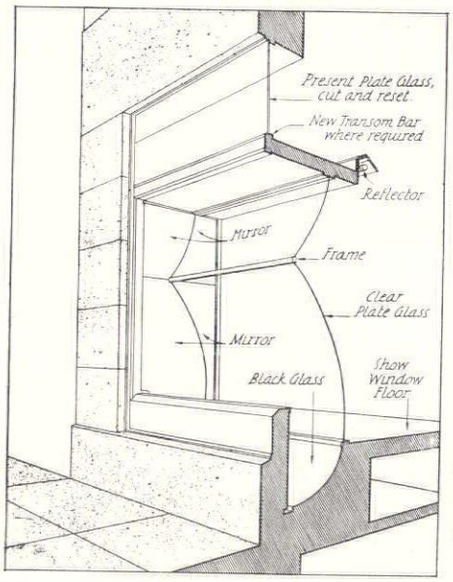
3. Glass Reflections—So long as plane, polished plate glass is used in store windows annoying daytime reflections will result in spite of brilliant window lighting or awnings. Lighting intensities to overcome glass reflections on sunny days are economically impossible for any store to consider; and even on dull days intensities must be very high—about 1000 foot-candles—to be at all effective.

To minimize annoyance of reflections, backgrounds should be light and neutral. Dark backgrounds accent reflections. But in order to eliminate reflections, plane glass surfaces must be discarded. An arrangement of curved plate glass with a light-absorbing pocket below has proved an effective and less costly substitute for high intensity lighting.

4. Mechanical Equipment—Current practice does not include provision of heating or cooling show window space. But in large, brilliantly lighted windows this should be considered as well as a means of low-velocity ventilation. Burglar alarms should be included in the electrical equipment of all store fronts and in the case of large stores automatic control of entrances by means of photo-electric cells might prove advantageous both for operation and for alarms.

Signs are a necessary part of both mechanical and design parts of the store front. In every case details of their location, size, installation and electrical control are problems to be solved as special cases. (See Ref. Data No. 18, July, 1935, Exterior Illumination of Buildings.)

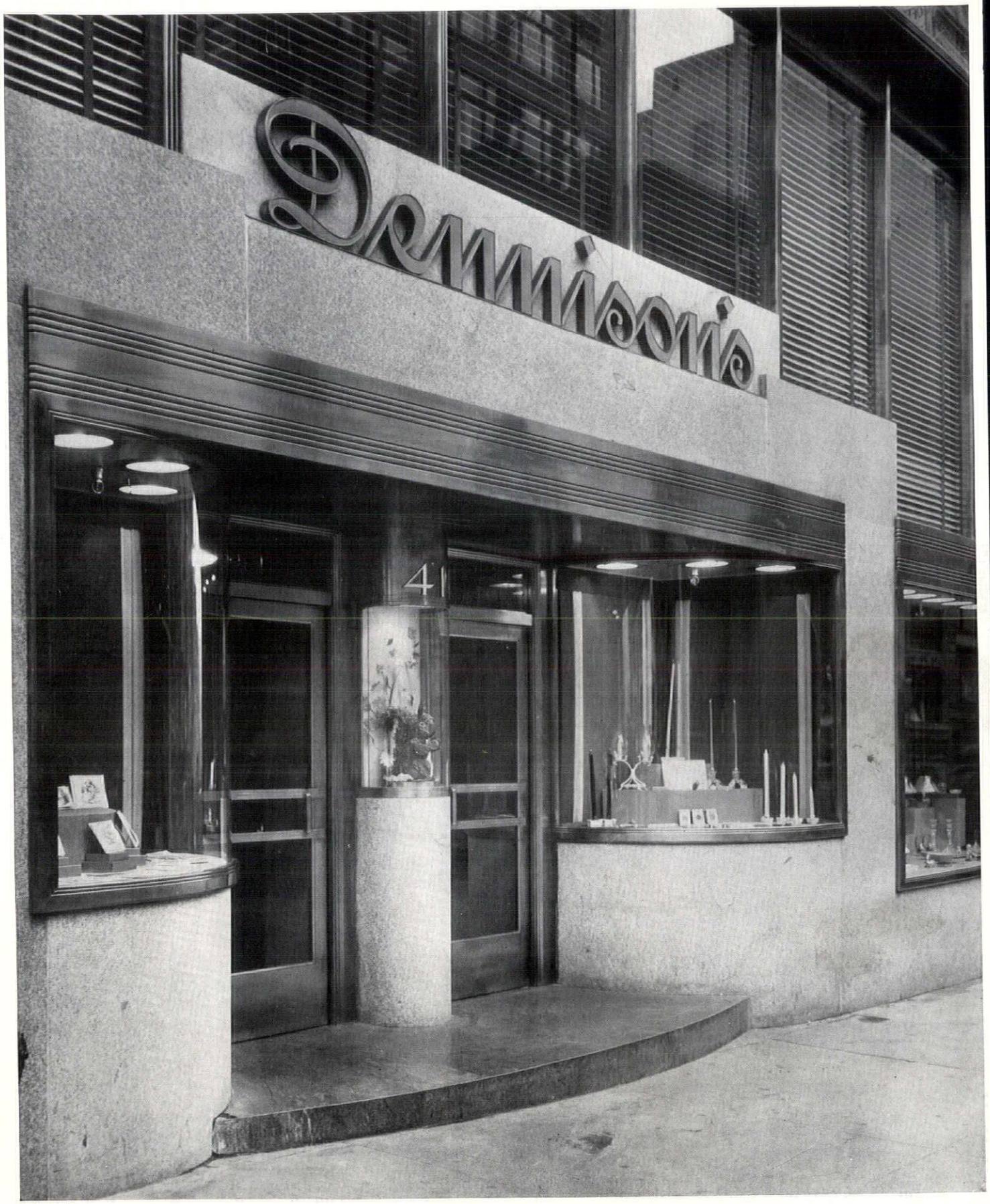
Show windows that can be lowered to the basement for display arrangement have been installed in relatively few stores. They represent an expense in elevator machinery that cannot usually be justified. Such a mechanical scheme is a necessity in the rare case of an island window, however, if the window shape precludes the possibility of any outside access. In such cases basement headroom must be sufficient to accommodate the tallest practical display set.



COURTESY, INVISIBLE GLASS CO.

VAN ANDA PHOTOS

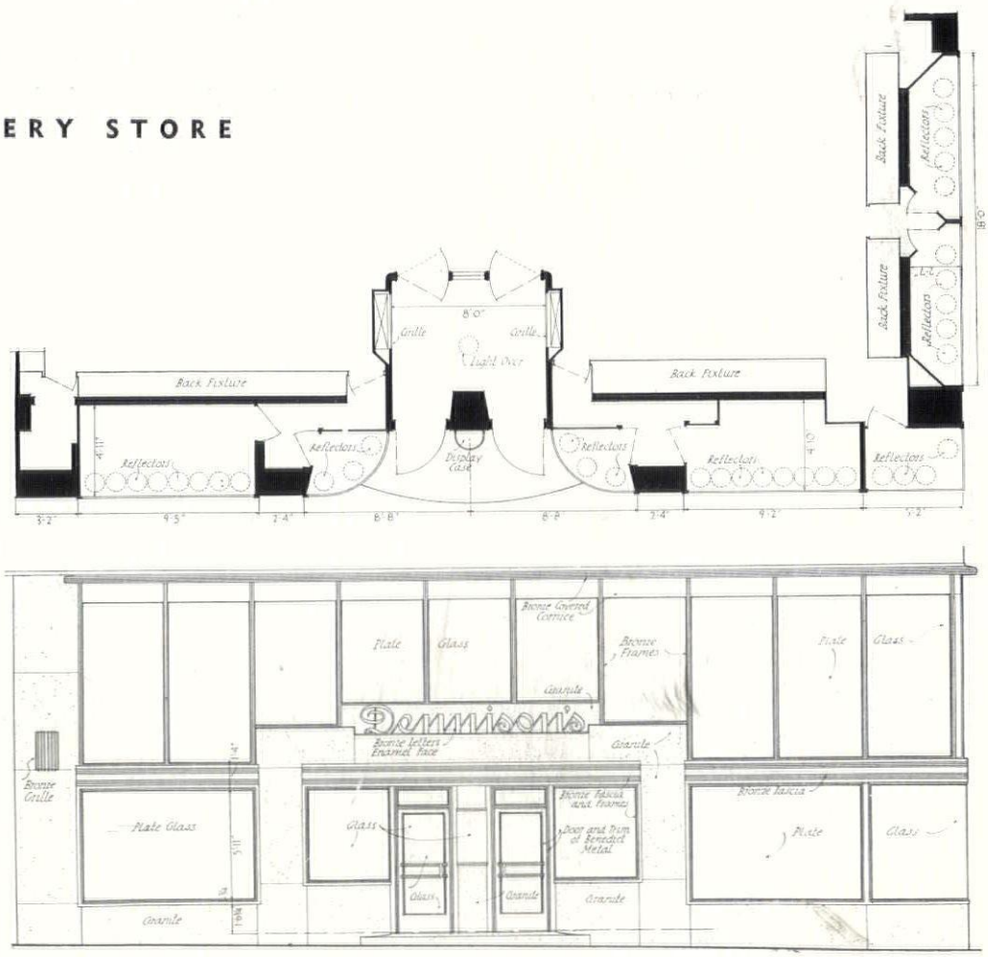
Glass reflections are one annoyance common to every type of shop. By controlling the angle of reflection, this arrangement of curved plate glass eliminates the mirror effect of plane glass and gives an illusion that no glass is present. Curves vary for different window sizes, but the pocket below is common to all installations. Note how mirrors at window jambs create impression of added show space



VAN ANDA

BROWNING

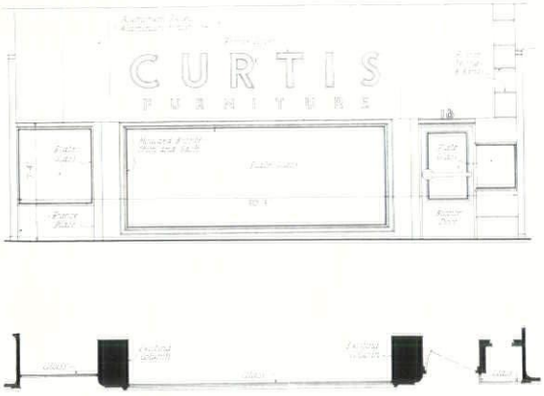
A NOVELTY STATIONERY STORE

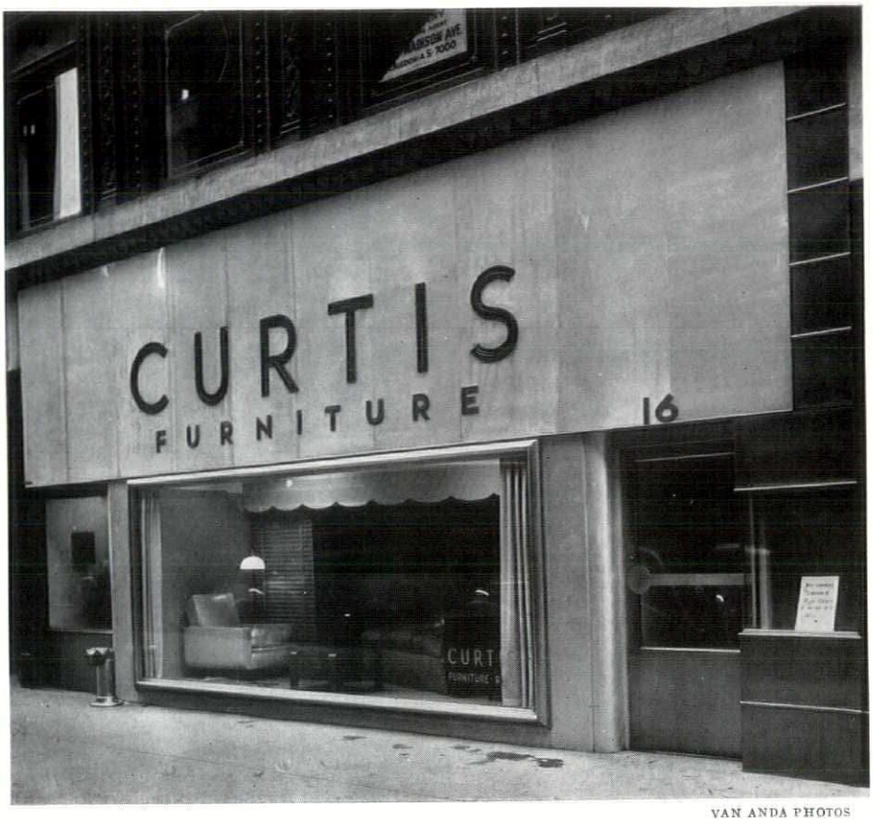


Store of The Dennison Manufacturing Co., New York. Frank H. Holden, architect; J. Scott Dawson, associate. Bulkhead and entrance trim, light gray granite. All metal work, bronze. Lettering, bronze with blue enamel. Though window lights are not concealed with any valance, glare is absent because fixtures are fitted with lenses that hide the lamp filaments. Window backgrounds are of plywood, painted a light neutral color

A FURNITURE STORE

Windows of the Curtis Store in New York, Ben Schlanger, architect, are open to the interior, the center one being lighted with two 500-watt reflectors. Facade is of Alumilite with bronze trim and frames. Letters are bronze, lined with Neon tube lights

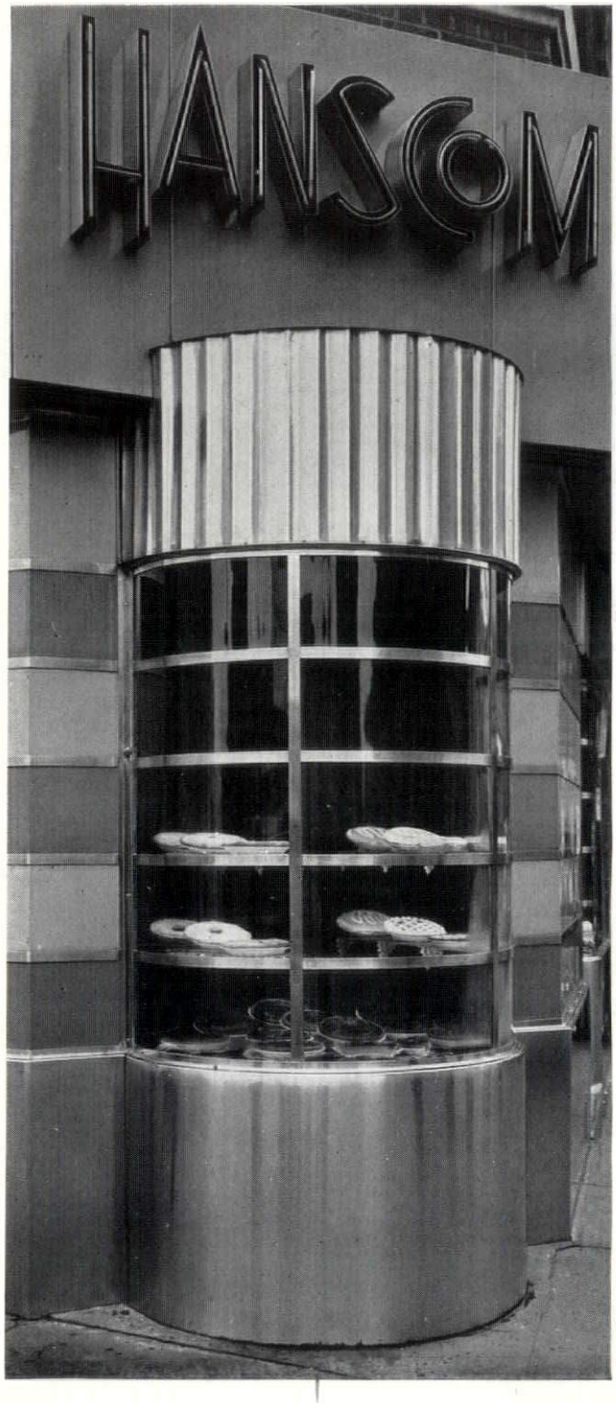




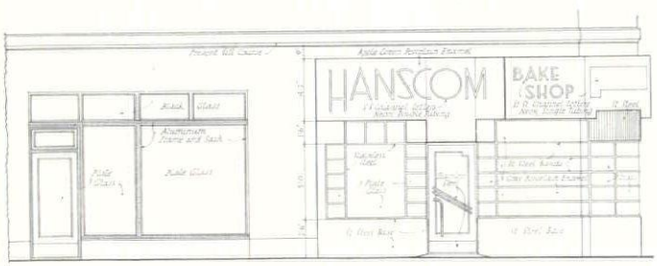
VAN ANDA PHOTOS

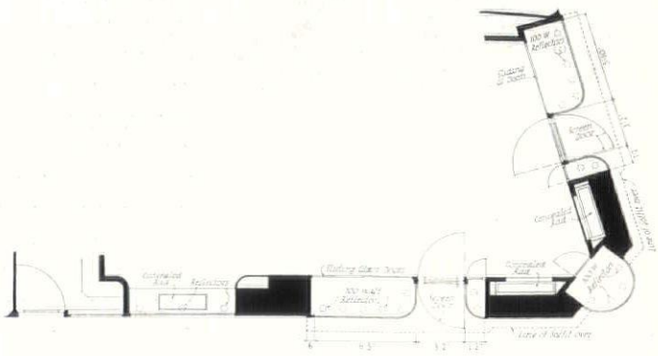
NEIGHBORHOOD UNIT OF A CHAIN-STORE BAKERY

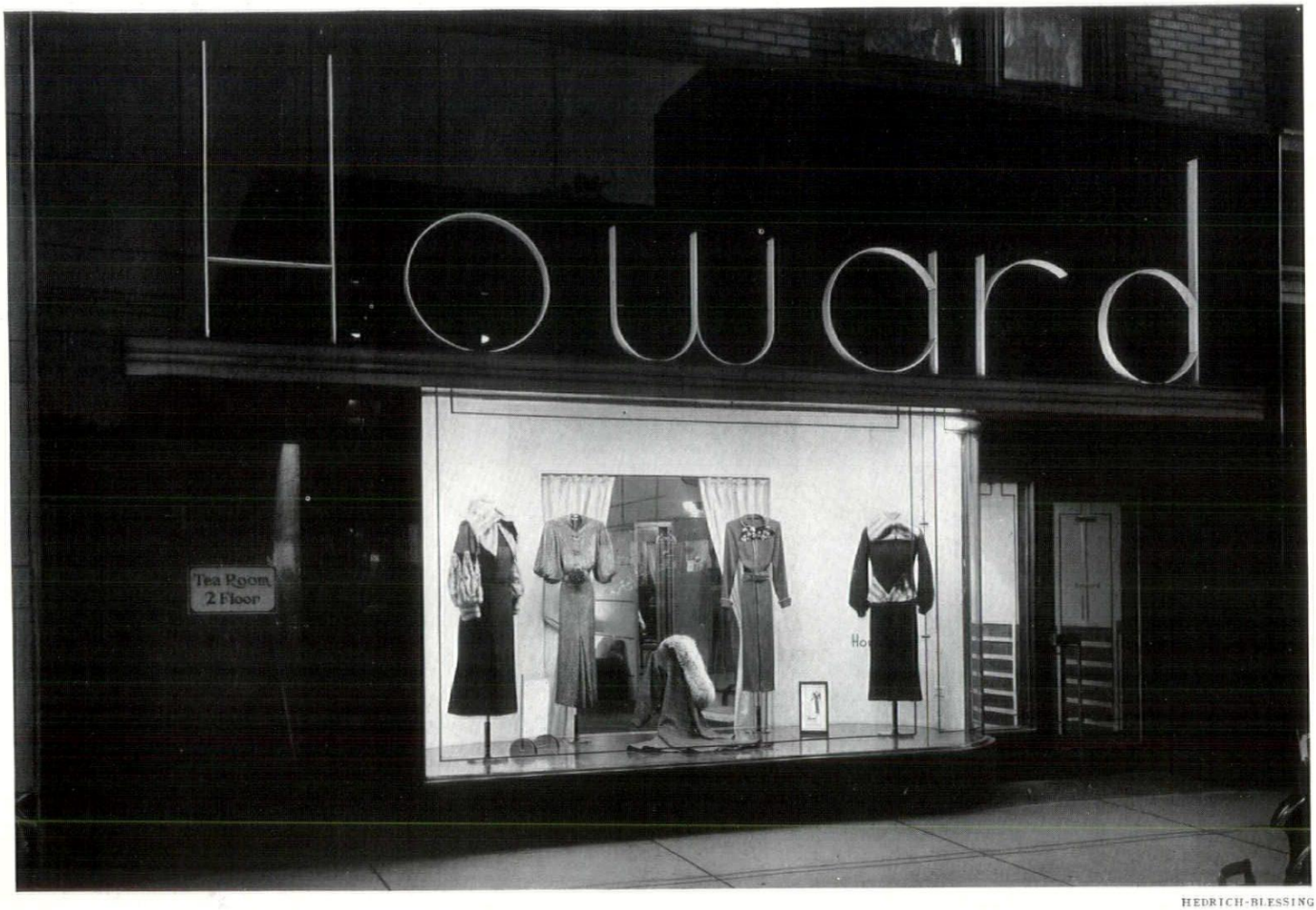
One of several retail stores operated by the Hanscom Bakery in New York. Horace Ginsbern, the architect, has taken advantage of the corner location to stress the display of goods in a compelling fashion. In common with other units of the bakery chain, this one is faced with enameled iron sheets, trimmed with stainless steel. Signs are lighted with Neon tubes


HANSCOM

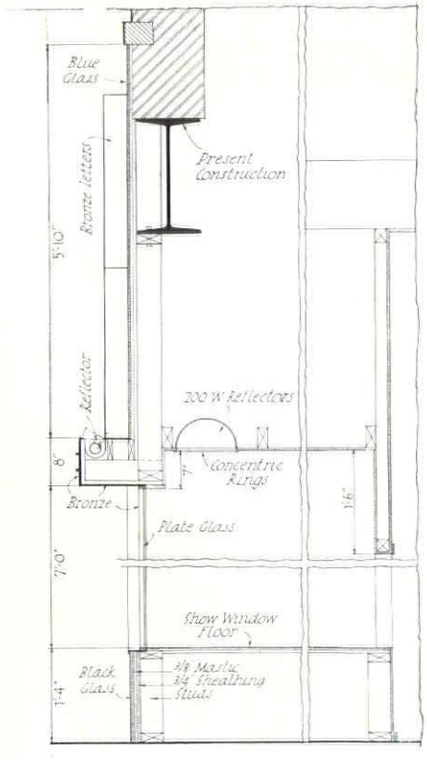

HANSCOM
BREAD AND CAKE
AS YOU LIKE IT
HANSCOM


HANSCOM
BAKE
SHOP



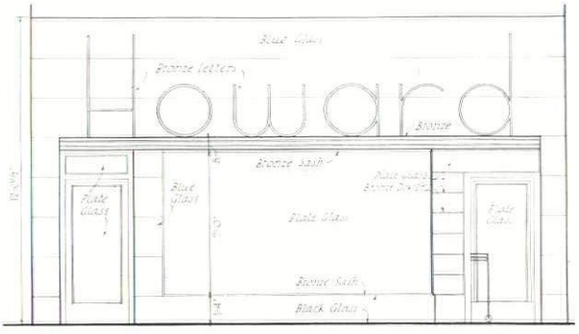


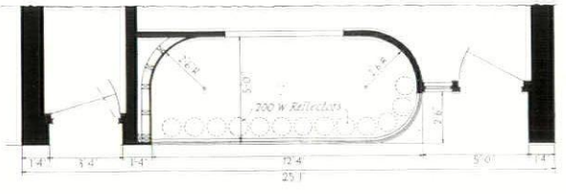
HEDRICH-BLESSING



A SMALL GOWN SHOP

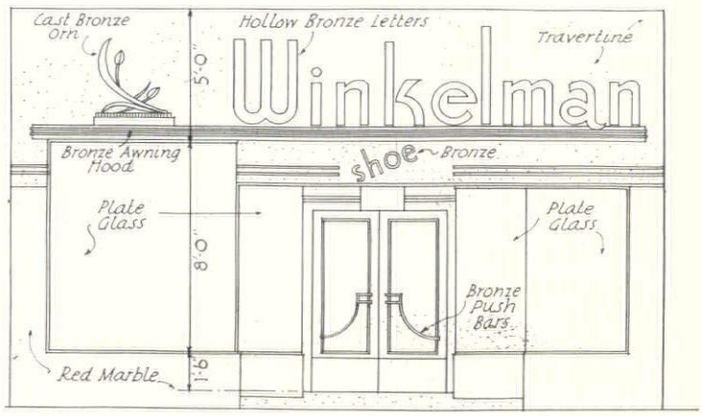
Store for Howard, Inc., Oak Park, Illinois. Pioso and Peterson, designers. Like most current store fronts, this was the result of a remodeling project. It is an able handling of the problem presented by a narrow frontage. Façade is faced with black glass. Sash bars, hardware and canopy are satin bronze; letters, illuminated from below, are steel with white japan finish. Background in show window is permanent and is painted light buff

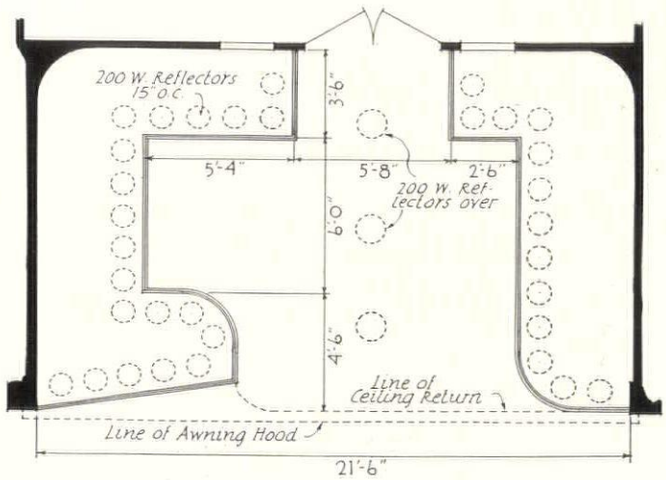




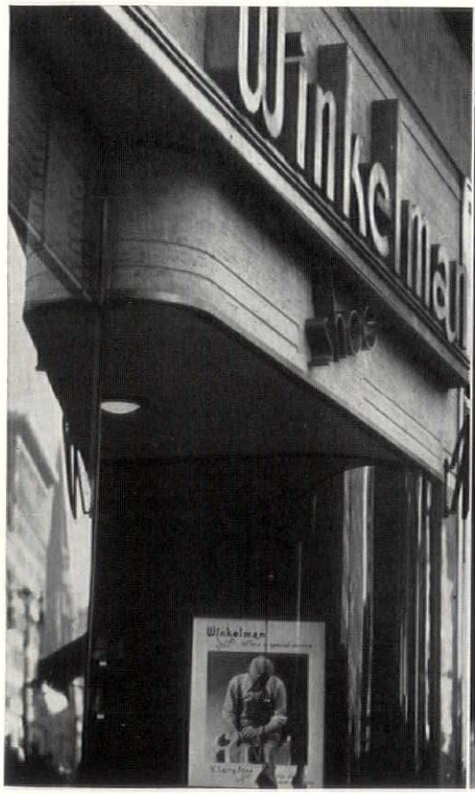
A STORE FOR WOMEN'S SHOES

Winkelman Shoe Store, New York. Solomon Kaplan, architect. Unusual in plan for the angle at which the main show window is placed and for the curved face of the secondary window at the right. In elevation it is notable for the successful handling of varying window heights and the handling of the sign problem. Bulkheads are Red Verona marble; the facia is Travertine. Sash bars, awning hood, lettering and hardware are of satin bronze



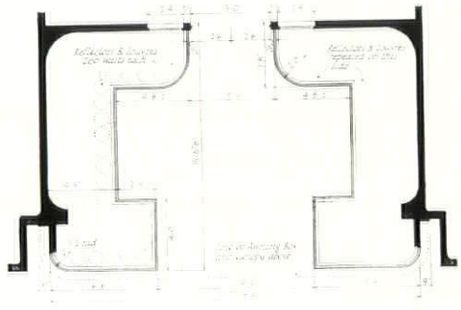


BROWNING



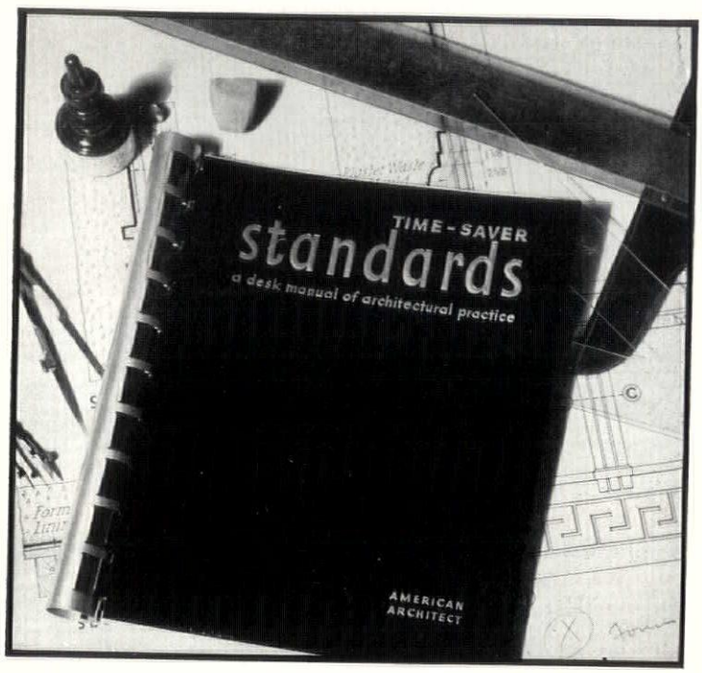
HEDRICH-BLESSING

A REMODELED SHOE STORE



Store for Wm. Hahn & Co., Washington, D. C. Pioso and Peterson, designers. A city ordinance allowed the architects to extend the lower portion three feet beyond the building line. Curved ends were used at the show windows to enhance value of displays. Facing of lower portion, black glass. The upper part of the building is of Indiana limestone. Sash bars, trim, hardware and awning canopy are of satin finish bronze. Lower lettering is satin bronze lined with red lacquer, illuminated from behind. Upper letters are steel with black japan finish, illuminated from window canopy below them

Time-Saver Standards



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1. A member of an architectural firm or an individual architect in private practice; 2. A consulting or designing engineer actively engaged in building work; 3. A regular employe of an architectural or engineering organization in the capacity of designer, specification writer or "squad boss"; or, 4. A designer, supervising architect or engineer for a financial institution, large property owner or developer.

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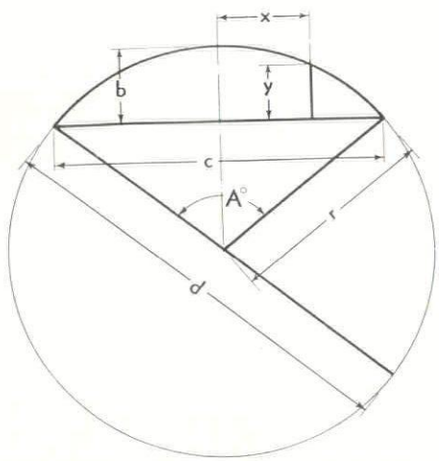
MATHEMATICS—Properties of the Circle



Functions of π with Logarithmic Equivalents

$\pi = 3.14159265$, log $= 0.4971499$

$\frac{1}{\pi} = 0.3183099$, log $= \bar{1}.5028501$

$\pi^2 = 9.8696044$, log $= 0.9942997$

$\frac{1}{\pi^2} = 0.1013212$, log $= \bar{1}.0057003$

$\sqrt{\pi} = 1.7724539$, log $= 0.2485749$

$\sqrt{\frac{1}{\pi}} = 0.5641896$, log $= \bar{1}.7514251$

$\frac{\pi}{180} = 0.0174533$, log $= \bar{2}.2418774$

$\frac{180}{\pi} = 57.2957795$, log $= 1.7581226$

PROPERTIES OF THE CIRCLE

Circumference = C
$= d\,\pi = d \times 3.1416$
$= 2\,\pi\,r = 2 \times r \times 3.1416$

Diameter = d
$= C \div 3.1416$
$= C \times 0.31831$

Diameter of Circle, having circumference equal to periphery of square
= side of square $\times$ 1.27324

Side of Square, having periphery equal to circumference of circle
$= \frac{d\pi}{4} = d \times 0.7854$

Diameter of Circle, circumscribed about square
= side of square $\times$ 1.41421

Side of Square, inscribed in circle
$= d \times 0.70711$

Arc, $a = \frac{\pi\,r\,A^\circ}{180} = 0.017453\,r\,A^\circ$

Angle, $A^\circ = \frac{180^\circ\,a}{\pi\,r} = 57.29578\,\frac{a}{r}$

Radius, $r = \frac{4\,b^2 + c^2}{8\,b}$

Diameter, $d = \frac{4\,b^2 + c^2}{4\,b}$

Chord, $c = 2\sqrt{2\,b\,r - b^2} = 2\,r \sin\frac{A^\circ}{2}$

Rise, Trigonometric Calculations
$b = \frac{c}{2}\tan\frac{A^\circ}{4} = 2\,r\sin^2\frac{A^\circ}{4}$

Rise, Algebraic Calculations
$b = r + y - \sqrt{r^2 - x^2}$
$b = r - \frac{1}{2}\sqrt{4\,r^2 - c^2}$
$x = \sqrt{r^2 - (r + y - b)^2}$
$y = b - r + \sqrt{r^2 - x^2}$

TABLE 1—AREAS OF CIRCLES IN SQUARE FEET—Diameter in Feet and Inches

Feet	Inches 0	1	2	3	4	5	6	7	8	9	10	11
0	.0000	.0055	.0218	.0491	.0873	.1364	.1963	.2673	.3491	.4418	.5454	.6600
1	.7854	.9218	1.069	1.227	1.396	1.576	1.767	1.969	2.182	2.405	2.640	2.885
2	3.142	3.409	3.687	3.976	4.276	4.587	4.909	5.241	5.585	5.940	6.305	6.681
3	7.069	7.467	7.876	8.296	8.727	9.168	9.621	10.08	10.56	11.04	11.54	12.05
4	12.57	13.10	13.64	14.19	14.75	15.32	15.90	16.50	17.10	17.72	18.35	18.99
5	19.63	20.29	20.97	21.65	22.34	23.04	23.76	24.48	25.22	25.97	26.73	27.49
6	28.27	29.07	29.87	30.68	31.50	32.34	33.18	34.04	34.91	35.78	36.67	37.57
7	38.48	39.41	40.34	41.28	42.24	43.20	44.18	45.17	46.16	47.17	48.19	49.22
8	50.27	51.32	52.38	53.46	54.54	55.64	56.75	57.86	58.99	60.13	61.28	62.44
9	63.62	64.80	66.00	67.20	68.42	69.64	70.88	72.13	73.39	74.66	75.94	77.24
10	78.54	79.85	81.18	82.52	83.86	85.22	86.59	87.97	89.36	90.76	92.18	93.60
11	95.03	96.48	97.93	99.40	100.9	102.4	103.9	105.4	106.9	108.4	110.0	111.5
12	113.1	114.7	116.3	117.9	119.5	121.1	122.7	124.4	126.0	127.7	129.4	131.0
13	132.7	134.4	136.2	137.9	139.6	141.4	143.1	144.9	146.7	148.5	150.3	152.1
14	153.9	155.8	157.6	159.5	161.4	163.2	165.1	167.0	168.9	170.9	172.8	174.8

If given diameter is not found in this table, reduce diameter to feet and decimals of a foot by aid of the following auxiliary table, and then find area from Table 4.

TABLE 2—Conversion from Inches and Fractions of an Inch to Decimals of a Foot

Inches	1	2	3	4	5	6	7	8	9	10	11
Feet	.0833	.1667	.2500	.3333	.4167	.5000	.5833	.6667	.7500	.8333	.9167
Inches	1/8	1/4	3/8	1/2	5/8	3/4	7/8				
Feet	.0104	.0208	.0313	.0417	.0521	.0625	.0729				

Example. 5 ft. 7⅜ in. = 5.0 + 0.5833 + 0.0313 = 5.6146 ft.

NOTE 1

HOW TO FIND CIRCUMFERENCES (from Table 3)

This table gives the product of π times any number D from 1 to 10; that is, it is a table of multiples of π. (D = diameter.)

Moving the decimal point **one** place in column D is equivalent to moving it **one** place in the body of the table.

Circumference $= \pi \times$ diam. $= 3.141593 \times$ diam.

Conversely,

Diameter $= \frac{1}{\pi} \times$ circumf. $= 0.31831 \times$ circumf.

Examples:

Diameter given; Circumference sought:
Diameter = 3.57 feet. Find 3.5 in left hand column, read right to column 7 and find 11.22 feet = circumference.

Circumference given; Diameter sought:
Circumference = 20.17 feet. Find 20.17 in body of table, read left and find 6.4, note 20.17 is in column 2, which add = 6.4 + .02 = 6.42 = diameter.

NOTE 2

HOW TO FIND AREAS (from Table 4)

Moving the decimal point **one** place in column D is equivalent to moving it **two** places in the body of the table. (D = diameter.)

Area of circle $= \frac{\pi}{4} \times$ (diam.²) $= 0.785398 \times$ (diam.²)

Conversely,

Diam. $= \sqrt{\frac{4}{\pi}} \times \sqrt{\text{area}} = 1.128379 \times \sqrt{\text{area}}$

Examples:

Diameter given; Area sought:
Diameter = 12.3 feet. Move decimal one point right = 1.23. Find 1.2 in left column, read right to column 3, find area of 1.23 = 1.188. Move decimal two points left = 118.8 sq. ft. = area.

Area given; Diameter sought:
Area = 4927 sq. in. Move decimal two points left = 49.27. Find 49.27. Read left and find 7.9. Note 49.27 is in column 2, which add = 7.9 + .02 = 7.92. Move decimal one point right = 79.2 inches = diameter.

MATHEMATICS—Properties of the Circle

Serial No. 23 **DECEMBER 1935**

TABLE 3—CIRCUMFERENCES BY HUNDREDTHS. SEE NOTE 1

D	0	1	2	3	4	5	6	7	8	9
1.0	3.142	3.173	3.204	3.236	3.267	3.299	3.330	3.362	3.393	3.424
.1	3.456	3.487	3.519	3.550	3.581	3.613	3.644	3.676	3.707	3.738
.2	3.770	3.801	3.833	3.864	3.896	3.927	3.958	3.990	4.021	4.053
.3	4.084	4.115	4.147	4.178	4.210	4.241	4.273	4.304	4.335	4.367
.4	4.398	4.430	4.461	4.492	4.524	4.555	5.587	4.618	4.650	4.681
1.5	4.712	4.744	4.775	4.807	4.838	4.869	4.901	4.932	4.964	4.995
.6	5.027	5.058	5.089	5.121	5.152	5.184	5.215	5.246	5.278	5.309
.7	5.341	5.372	5.404	5.435	5.466	5.498	5.529	5.561	5.592	5.623
.8	5.655	5.686	5.718	5.749	5.781	5.812	5.843	5.875	5.906	5.938
.9	5.969	6.000	6.032	6.063	6.095	6.126	6.158	6.189	6.220	6.252
2.0	6.283	6.315	6.346	6.377	6.409	6.440	6.472	6.503	6.535	6.566
.1	6.597	6.629	6.600	6.692	6.723	6.754	6.786	6.817	6.849	6.880
.2	6.912	6.943	6.974	7.006	7.037	7.069	7.100	7.131	7.163	7.194
.3	7.226	7.257	7.288	7.320	7.351	7.383	7.414	7.446	7.477	7.508
.4	7.540	7.571	7.603	7.634	7.665	7.697	7.728	7.760	7.791	7.823
2.5	7.854	7.885	7.917	7.948	7.980	8.011	8.042	8.074	8.105	8.137
.6	8.168	8.200	8.231	8.262	8.294	8.325	8.357	8.388	8.419	8.451
.7	8.482	8.514	8.545	8.577	8.608	8.639	8.671	8.702	8.734	8.765
.8	8.796	8.828	8.859	8.891	8.922	8.954	8.985	9.016	9.048	9.079
.9	9.111	9.142	9.173	9.205	9.236	9.268	9.299	9.331	9.362	9.393
3.0	9.425	9.456	9.488	9.519	9.550	9.582	9.613	9.645	9.676	9.708
.1	9.739	9.770	9.802	9.833	9.865	9.896	9.927	9.959	9.990	10.022
.2	10.05	10.08	10.12	10.15	10.18	10.21	10.24	10.27	10.30	10.34
.3	10.37	10.40	10.43	10.46	14.49	10.52	10.56	10.59	10.62	10.65
.4	10.68	10.71	10.74	10.78	10.81	10.84	10.87	10.90	10.93	10.96
3.5	11.00	11.03	11.06	11.09	11.12	11.15	11.18	11.22	11.25	11.28
.6	11.31	11.34	11.37	11.40	11.44	11.47	11.50	11.53	11.56	11.59
.7	11.62	11.66	11.69	11.72	11.75	11.78	11.81	11.84	11.88	11.91
.8	11.94	11.97	12.00	12.03	12.06	12.10	12.13	12.16	12.19	12.22
.9	12.25	12.28	12.32	12.35	12.38	12.41	12.44	12.47	12.50	12.53
4.0	12.57	12.60	12.63	12.66	12.69	12.72	12.75	12.79	12.82	12.85
.1	12.88	12.91	12.94	12.97	13.01	13.04	13.07	13.10	13.13	13.16
.2	13.19	13.23	13.26	13.29	13.32	13.35	13.38	13.41	13.45	13.48
.3	13.51	13.54	13.57	13.60	13.63	13.67	13.70	13.73	13.76	13.79
.4	13.82	13.85	13.89	13.92	13.95	13.98	14.01	14.04	14.07	14.11
4.5	14.14	14.17	14.20	14.23	14.26	14.29	14.33	14.36	14.39	14.42
.6	14.45	14.48	14.51	14.44	14.58	14.61	14.64	14.67	14.70	14.73
.7	14.77	14.80	14.83	14.86	14.89	14.92	14.95	14.99	15.02	15.05
.8	15.08	15.11	15.14	15.17	15.21	15.24	15.27	15.30	15.33	15.36
.9	15.39	15.43	15.46	15.49	15.52	15.52	15.58	15.61	15.65	15.68
5.0	15.71	15.74	15.77	15.80	15.83	15.87	15.90	15.93	15.96	15.99
.1	16.02	16.05	16.08	16.12	16.15	16.18	16.21	16.24	16.27	16.30
.2	16.34	16.37	16.40	16.43	16.46	16.49	16.52	16.56	16.59	16.62
.3	16.65	16.68	16.71	16.74	16.78	16.81	16.84	16.87	16.90	16.93
.4	16.96	17.00	17.03	17.06	17.09	17.12	17.15	17.18	17.22	17.25
5.5	17.28	17.31	17.34	17.37	17.40	17.44	17.47	17.50	17.53	17.56
.6	17.59	17.62	17.66	17.69	17.72	17.75	17.78	17.81	17.84	17.88
.7	17.91	17.94	17.97	18.00	18.03	18.06	18.10	18.13	18.16	18.19
.8	18.22	18.25	18.28	18.32	18.35	18.38	18.41	18.44	18.47	18.50
.9	18.54	18.57	18.60	18.63	18.66	18.69	18.72	18.76	18.79	18.82
6.0	18.85	18.88	18.91	18.94	18.98	19.01	19.04	19.07	19.10	19.13
.1	19.16	19.20	19.23	19.26	19.29	19.32	19.35	19.38	19.42	19.45
.2	19.48	19.51	19.54	19.57	19.60	19.63	19.67	19.70	19.73	19.76
.3	19.79	19.82	19.85	19.89	19.92	19.95	19.98	20.01	20.04	20.07
.4	20.11	20.14	20.17	20.20	20.23	20.26	20.29	20.33	20.36	20.39
6.5	20.42	20.45	20.48	20.51	20.55	20.58	20.61	20.64	20.67	20.70
.6	20.73	20.77	20.80	20.83	20.86	20.89	20.92	20.95	20.99	21.02
.7	21.05	21.08	21.11	21.14	21.17	21.21	21.24	21.27	21.30	21.33
.8	21.36	21.39	21.43	21.46	21.49	21.52	21.55	21.58	21.61	21.65
.9	21.68	21.71	21.74	21.77	21.80	21.83	21.87	21.90	21.93	21.96
7.0	21.99	22.02	22.05	22.09	22.12	22.15	22.18	22.21	22.24	22.27
.1	22.31	22.34	22.37	22.40	22.43	22.46	22.49	22.53	22.56	22.59
.2	22.62	22.65	22.68	22.71	22.75	22.78	22.81	22.84	22.87	22.90
.3	22.93	22.97	23.00	23.03	23.06	23.09	23.12	23.15	23.18	23.22
.4	23.25	23.28	23.31	23.34	23.37	23.40	23.44	23.47	23.50	23.53
7.5	23.56	23.59	23.62	23.66	23.69	23.72	23.75	23.78	23.81	23.84
.6	23.88	23.91	23.94	23.97	24.00	24.03	24.06	24.10	24.13	24.16
.7	24.19	24.22	24.25	24.28	24.32	24.35	24.38	24.41	24.44	24.47
.8	24.50	24.54	24.57	24.60	24.63	24.66	24.69	24.72	24.76	24.79
.9	24.82	24.85	24.88	24.91	24.94	24.98	25.01	25.04	25.07	25.10
8.0	25.13	25.16	25.20	25.23	25.26	25.29	25.32	25.35	25.38	25.42
.1	25.45	25.48	25.51	24.54	25.57	25.60	25.64	25.67	25.70	25.73
.2	25.76	25.79	25.82	25.86	25.89	25.92	25.95	25.98	26.01	26.04
.3	26.08	26.11	26.14	26.17	26.20	26.23	26.26	26.30	26.33	26.36
.4	26.39	26.42	26.45	26.48	26.52	26.55	26.58	26.61	26.64	26.67
8.5	26.70	26.73	26.77	26.80	26.83	26.86	26.89	26.92	26.95	26.99
.6	27.02	27.05	27.08	27.11	27.14	27.17	27.21	27.24	27.27	27.30
.7	27.33	27.36	27.39	27.43	27.46	27.49	27.52	27.55	27.58	27.61
.8	27.65	27.68	27.71	27.74	27.77	27.80	27.83	27.87	27.90	27.93
.9	27.96	27.99	28.02	28.05	28.09	28.12	28.15	28.18	28.21	28.24
9.0	28.27	28.31	28.34	28.37	28.40	28.43	28.46	28.49	28.53	28.56
.1	28.59	28.62	28.65	28.68	28.71	28.75	28.78	28.81	28.84	28.87
.2	28.90	28.93	28.97	29.00	29.03	29.06	29.09	29.12	29.15	29.19
.3	29.22	29.25	29.28	29.31	29.34	29.37	29.41	29.44	29.47	29.50
.4	29.53	29.56	29.59	29.63	29.66	29.69	29.72	29.75	29.78	29.81
9.5	29.85	29.88	29.91	29.94	29.97	30.00	30.03	30.07	30.10	30.13
.6	30.16	30.19	30.22	30.25	30.28	30.32	30.35	30.38	30.41	30.44
.7	30.47	30.50	30.54	30.57	30.60	30.63	30.66	30.69	30.72	30.76
.8	30.79	30.82	30.85	30.88	30.91	30.94	30.98	31.01	31.04	31.07
.9	31.10	31.13	31.16	31.20	31.23	31.26	31.29	31.32	31.35	31.38

TABLE 4—AREAS BY HUNDREDTHS. SEE NOTE 2

D	0	1	2	3	4	5	6	7	8	9
1.0	0.785	0.801	0.817	0.833	0.849	0.866	0.882	0.899	0.916	0.933
.1	0.950	0.968	0.985	1.003	1.021	1.039	1.057	1.075	1.094	1.112
.2	1.131	1.150	1.169	1.188	1.208	1.227	1.247	1.267	1.287	1.307
.3	1.327	1.348	1.368	1.389	1.410	1.431	1.453	1.474	1.496	1.517
.4	1.539	1.561	1.584	1.606	1.629	1.651	1.674	1.697	1.720	1.744
1.5	1.767	1.791	1.815	1.839	1.863	1.887	1.911	1.936	1.961	1.986
.6	2.011	2.036	2.061	2.087	2.112	2.138	2.164	2.190	2.217	2.243
.7	2.270	2.297	2.324	2.351	2.378	2.405	2.433	2.461	2.488	2.516
.8	2.545	2.573	2.602	2.630	2.659	2.688	2.717	2.746	2.776	2.806
.9	2.835	2.865	2.895	2.926	2.956	2.986	3.017	3.048	3.079	3.110
2.0	3.142	3.173	3.205	3.237	3.269	3.301	3.333	3.365	3.398	3.431
.1	3.464	3.497	3.530	3.563	3.597	3.631	3.664	3.698	3.733	3.767
.2	3.801	3.836	3.871	3.906	3.941	3.976	4.011	4.047	4.083	4.119
.3	4.155	4.191	4.227	4.264	4.301	4.337	4.374	4.412	4.449	4.486
.4	4.524	4.562	4.600	4.638	4.676	4.714	4.753	4.792	4.831	4.870
2.5	4.909	4.948	4.988	5.027	5.067	5.107	5.147	5.187	5.228	5.269
.6	5.309	5.350	5.391	5.433	5.474	5.515	5.557	5.599	5.641	5.683
.7	5.726	5.768	5.811	5.853	5.896	5.940	5.983	6.026	6.070	6.114
.8	6.158	6.202	6.246	6.290	6.335	6.379	6.424	6.469	6.514	6.560
.9	6.605	6.651	6.697	6.743	6.789	6.835	6.881	6.928	6.975	7.022
3.0	7.069	7.116	7.163	7.211	7.258	7.306	7.354	7.402	7.451	7.499
.1	7.548	7.596	7.645	7.694	7.744	7.793	7.843	7.892	7.942	7.992
.2	8.042	8.093	8.143	8.194	8.245	8.296	8.347	8.398	8.450	8.501
.3	8.553	8.605	8.657	8.709	8.762	8.814	8.867	8.920	8.973	9.026
.4	9.079	9.133	9.186	9.240	9.294	9.348	9.402	9.457	9.511	9.566
3.5	9.621	9.676	9.731	9.787	9.842	9.898	9.954	10.01	10.07	10.12
.6	10.18	10.24	10.29	10.35	10.41	10.46	10.52	10.58	10.64	10.69
.7	10.75	10.81	10.87	10.93	10.99	11.04	11.10	11.16	11.22	11.28
.8	11.34	11.40	11.46	11.52	11.58	11.64	11.70	11.76	11.82	11.88
.9	11.95	12.01	12.07	12.13	12.19	12.25	12.32	12.38	12.44	12.50
4.0	12.57	12.63	12.69	12.76	12.82	12.88	12.95	13.01	13.07	13.14
.1	13.20	13.27	13.33	13.40	13.46	13.53	13.59	13.66	13.72	13.79
.2	13.85	13.92	13.99	14.05	14.12	14.19	14.25	14.32	14.39	14.45
.3	14.52	14.59	14.66	14.73	14.79	14.86	14.93	15.00	15.07	15.14
.4	15.21	15.27	15.34	15.41	15.48	15.55	15.62	15.69	15.76	15.83
4.5	15.90	15.98	16.05	16.12	16.19	16.26	16.33	16.40	16.47	16.55
.6	16.62	16.69	16.76	16.84	16.91	16.98	17.06	17.13	17.20	17.28
.7	17.35	17.42	17.50	17.57	17.65	17.72	17.80	17.87	17.95	18.02
.8	18.10	18.17	18.25	18.32	18.40	18.47	18.55	18.63	18.70	18.78
.9	18.86	18.93	19.01	19.09	19.17	19.24	19.32	19.40	19.48	19.56
5.0	19.63	19.71	19.79	19.87	19.95	20.03	20.11	20.19	20.27	20.35
.1	20.43	20.51	20.59	20.67	20.75	20.83	20.91	20.99	21.07	21.16
.2	21.24	21.32	21.40	21.48	21.57	21.65	21.73	21.81	21.90	21.98
.3	22.06	22.15	22.23	22.31	22.40	22.48	22.56	22.65	22.73	22.82
.4	22.90	22.99	23.07	23.16	23.24	23.33	23.41	23.50	23.59	23.67
5.5	23.76	23.84	23.93	24.02	24.11	24.19	24.28	24.37	24.45	24.54
.6	24.63	24.72	24.81	24.89	24.98	25.07	25.16	25.25	25.34	25.43
.7	25.52	25.61	25.70	25.79	25.88	25.97	26.06	26.15	26.24	26.33
.8	26.42	26.51	26.60	26.69	26.79	26.88	26.97	27.06	27.15	27.25
.9	27.34	27.43	27.53	27.62	27.71	27.81	27.90	27.99	28.09	28.18
6.0	28.27	28.37	28.46	28.56	28.65	28.75	28.84	28.94	29.03	29.13
.1	29.22	29.32	29.42	29.51	29.61	29.71	29.80	29.90	30.00	30.09
.2	30.19	30.29	30.39	30.48	30.58	30.68	30.78	30.88	30.97	31.07
.3	31.17	31.27	31.37	31.47	31.57	31.67	31.77	31.87	31.97	32.07
.4	32.17	32.27	32.37	32.47	32.57	32.67	32.78	32.88	32.98	33.08
6.5	33.18	33.29	33.39	33.49	33.59	33.70	33.80	33.90	34.00	34.11
.6	34.21	34.32	34.42	34.52	34.63	34.73	34.84	34.94	35.05	35.15
.7	35.26	35.36	35.47	35.57	35.68	35.78	35.89	36.00	36.10	36.21
.8	36.32	36.42	36.53	36.64	36.75	36.85	36.96	37.07	37.18	37.28
.9	37.39	37.50	37.61	37.72	37.83	37.94	38.05	38.16	38.26	38.37
7.0	38.48	38.59	38.70	38.82	38.93	39.04	39.15	39.26	39.37	39.48
.1	39.59	39.70	39.82	39.93	40.04	40.15	40.26	40.38	40.49	40.60
.2	40.72	40.83	40.94	41.06	41.17	41.28	41.40	41.51	41.62	41.74
.3	41.85	41.97	42.08	42.20	42.31	42.43	42.54	42.66	42.78	42.89
.4	43.01	43.12	43.24	43.36	43.47	43.59	43.71	43.83	43.94	44.06
7.5	44.18	44.30	44.41	44.53	44.65	44.77	44.89	45.01	45.13	45.25
.6	45.36	45.48	45.60	45.72	45.84	45.96	46.08	46.20	46.32	46.45
.7	46.57	46.69	46.81	46.93	47.05	47.17	47.29	47.42	47.54	47.66
.8	47.78	47.91	48.03	48.15	48.27	48.40	48.52	48.65	48.77	48.89
.9	49.02	49.14	49.27	49.39	49.51	49.64	49.76	49.89	50.01	50.14
8.0	50.27	50.39	50.52	50.64	50.77	50.90	51.02	51.15	51.28	51.40
.1	51.53	51.66	51.78	51.91	52.04	52.17	52.30	52.42	52.55	52.68
.2	52.81	52.94	53.07	53.20	53.33	53.46	53.59	53.72	53.85	53.98
.3	54.11	54.24	54.37	54.50	54.63	54.76	54.89	55.02	55.15	55.29
.4	55.42	55.55	55.68	55.81	55.95	56.08	56.21	56.35	56.48	56.61
8.5	56.75	56.88	57.01	57.15	57.28	57.41	57.55	57.68	57.82	57.95
.6	58.09	58.22	58.36	58.49	58.63	58.77	58.90	59.04	59.17	59.31
.7	59.45	59.58	59.72	59.86	59.99	60.13	60.27	60.41	60.55	60.68
.8	60.82	60.96	61.10	61.24	61.38	61.51	61.65	61.79	61.93	62.07
.9	62.21	62.35	62.49	62.63	62.77	62.91	63.05	63.19	63.33	63.48
9.0	63.62	63.76	63.90	64.04	64.18	64.33	64.47	64.61	64.75	64.90
.1	65.04	65.18	65.33	65.47	65.61	65.76	65.90	66.04	66.19	66.33
.2	66.48	66.62	66.77	66.91	67.06	67.20	67.35	67.49	67.64	67.78
.3	67.93	68.08	68.22	68.37	68.51	68.66	68.81	68.96	69.10	69.25
.4	69.40	69.55	69.69	69.84	69.99	70.14	70.29	70.44	70.58	70.73
9.5	70.88	71.03	71.18	71.33	71.48	71.63	71.78	71.93	72.08	72.23
.6	72.38	72.53	72.68	72.84	72.99	73.14	73.29	73.44	73.59	73.75
.7	73.90	74.05	74.20	74.36	74.51	74.66	74.82	74.97	75.12	75.28
.8	75.43	75.58	75.74	75.89	76.05	76.20	76.36	76.51	76.67	76.82
.9	76.98	77.13	77.29	77.44	77.60	77.76	77.91	78.07	78.23	78.38

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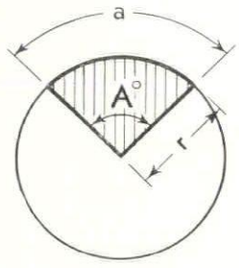

FIG. 1

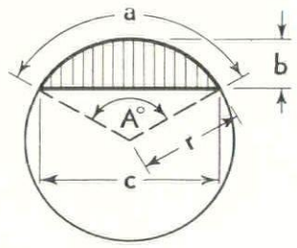

FIG. 2

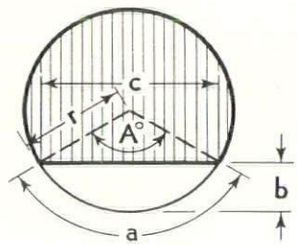

FIG. 3

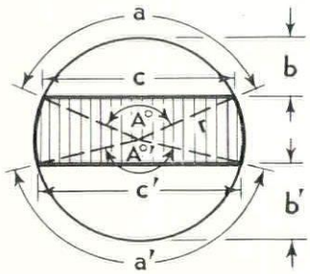

FIG. 4

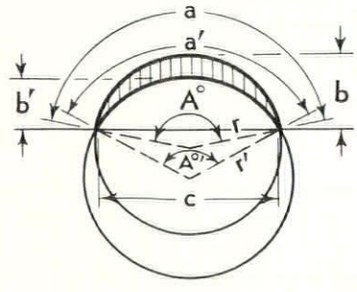

FIG. 5

Nomenclature—(**From Serial No. 23**)

A° = Angle in degrees = $\frac{180^\circ\, a}{\pi\, r}$

a = Arc = $0.017453\ r\ A^\circ$

b = Rise = $2\ r \sin^2 \frac{A^\circ}{4}$

c = Chord = $2\ r \sin \frac{A^\circ}{2}$

d = Diameter = $2\ r = \frac{4\ b^2 + c^2}{4\ b}$

$\pi = 3.1416$

r = Radius = $\frac{d}{2} = \frac{4\ b^2 + c^2}{8\ b}$

S = Area = $\frac{\pi\ d^2}{4} = 0.7854\ d^2$

AREA OF CIRCULAR SECTOR—**Figure 1**

$$\text{Area} = \frac{a\ r}{2} = \frac{S\ A^\circ}{360}$$

AREA OF CIRCULAR SEGMENT—**Figure 2**
(Less than half circle)

$$\text{Area} = \frac{a\ r - c\ (r - b)}{2} = \frac{SA^\circ}{360} - \frac{c\ (r - b)}{2}$$

AREA OF CIRCULAR SEGMENT—**Figure 3**
(Greater than half circle)

$$\text{Area} = S - \left[\frac{a\ r - c\ (r - b)}{2}\right] = S - \left[\frac{S\ A^\circ}{360} - \frac{c\ (r - b)}{2}\right]$$

AREA OF CIRCULAR ZONE—**Figure 4**

$$\text{Area} = S - \left[\frac{a\ r - c\ (r - b)}{2} + \frac{a^1\ r - c^1\ (r - b^1)}{2}\right]$$

$$= S - \left[\frac{S\ A^\circ}{360} - \frac{c\ (r - b)}{2} + \frac{SA^{\circ 1}}{360} - \frac{c^1\ (r - b^1)}{2}\right]$$

AREA OF CIRCULAR LUNE—**Figure 5**

$$\text{Area} = \left[\frac{a\ r - c\ (r - b)}{2}\right] - \left[\frac{a^1\ r^1 - c\ (r^1 - b^1)}{2}\right]$$

$$= \left[\frac{SA^\circ}{360} - \frac{c(r - b)}{2}\right] - \left[\frac{S^1A^{\circ 1}}{360} - \frac{c\ (r^1 - b^1)}{2}\right]$$

AREA OF CIRCULAR SEGMENT—**From Table 1**
(Using Rise and Chord)

Area = c × b × coefficient.

Example: chord, c = 3.52; rise, b = 1.49

$$\frac{b}{c} = \frac{1.49}{3.52} = 0.4233$$

coefficient of 0.4233 = 0.7542

$3.52 \times 1.49 \times 0.7542 = 3.9556$ = area of segment

AREA OF CIRCULAR SEGMENT—**From Table 2**
(Using Rise and Diameter)

Area = d^2 × coefficient

Example: diameter, $d = 5\frac{3}{32}$; rise, $b = 2\frac{7}{16}$

$5\frac{3}{32} = 5.09375$; $2\frac{7}{16} = 2.4375$

$$\frac{b}{d} = \frac{2.4375}{5.09375} = 0.478528$$

Interpolation:

Coefficient for 0.479 = 0.371705
0.478 = 0.370706
.001 = 0.000999

.478528
.478000
.000528 × 528 / 0.000527

Coefficient + 0.370706
for 0.478528 = 0.371233

$5.09375 \times 5.09375 \times 0.371233 = 9.6321$ = area of segment

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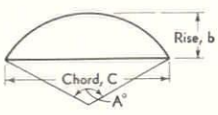
AREAS OF CIRCULAR SEGMENTS

TABLE I—FOR RATIOS OF RISE AND CHORD



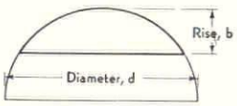
Area = C x b x Coefficient

A°	Coeff.-cient	b/C	A°	Coeffi-cient	b/C	A°	Coeffi-cient	b/C	A°	Coeffi-cient	b/C
1	.6667	.0022	16	.6674	.0350	31	.6691	.0681	46	.6722	.1017
2	.6667	.0044	17	.6674	.0372	32	.6693	.0703	47	.6724	.1040
3	.6667	.0066	18	.6675	.0394	33	.6694	.0725	48	.6727	.1063
4	.6667	.0087	19	.6676	.0416	34	.6696	.0747	49	.6729	.1086
5	.6667	.0109	20	.6677	.0437	35	.6698	.0770	50	.6732	.1109
6	.6667	.0131				36	.6700	.0792			
7	.6668	.0153	21	.6678	.0459	37	.6702	.0814	51	.6734	.1131
8	.6668	.0175	22	.6679	.0481	38	.6704	.0837	52	.6737	.1154
9	.6669	.0197	23	.6680	.0504	39	.6706	.0859	53	.6740	.1177
10	.6670	.0218	24	.6681	.0526	40	.6708	.0882	54	.6743	.1200
			25	.6682	.0548				55	.6746	.1224
11	.6670	.0240	26	.6684	.0570	41	.6710	.0904	56	.6749	.1247
12	.6671	.0262	27	.6685	.0592	42	.6712	.0927	57	.6752	.1270
13	.6672	.0284	28	.6687	.0614	43	.6714	.0949	58	.6755	.1293
14	.6672	.0306	29	.6688	.0636	44	.6717	.0972	59	.6758	.1316
15	.6673	.0328	30	.6690	.0658	45	.6719	.0995	60	.6761	.1340

A°	Coeffi-cient	b/C	A°	Coeffi-cient	b/C	A°	Coeffii cient	b/C	A°	Coeffi-cient	b/C
61	.6764	.1363	91	.6895	.2097	121	.7100	.2916	151	.7408	.3871
62	.6768	.1387	92	.6901	.2122	122	.7109	.2945	152	.7421	.3906
63	.6771	.1410	93	.6906	.2148	123	.7117	.2975	153	.7434	.3942
64	.6775	.1434	94	.6912	.2174	124	.7126	.3004	154	.7447	.3977
65	.6779	.1457	95	.6918	.2200	125	.7134	.3034	155	.7460	.4013
66	.6782	.1481	96	.6924	.2226	126	.7143	.3064	156	.7473	.4049
67	.6786	.1505	97	.6930	.2252	127	.7152	.3094	157	.7486	.4085
68	.6790	.1529	98	.6936	.2279	128	.7161	.3124	158	.7500	.4122
69	.6794	.1553	99	.6942	.2305	129	.7170	.3155	159	.7514	.4159
70	.6797	.1577	100	.6948	.2332	130	.7180	.3185	160	.7528	.4196
71	.6801	.1601	101	.6954	.2358	131	.7189	.3216	161	.7542	.4233
72	.6805	.1625	102	.6961	.2385	132	.7199	.3247	162	.7557	.4270
73	.6809	.1649	103	.6967	.2412	133	.7209	.3278	163	.7571	.4308
74	.6814	.1673	104	.6974	.2439	134	.7219	.3309	164	.7586	.4346
75	.6818	.1697	105	.6980	.2466	135	.7229	.3341	165	.7601	.4385
76	.6822	.1722	106	.6987	.2493	136	.7239	.3373	166	.7616	.4424
77	.6826	.1746	107	.6994	.2520	137	.7249	.3404	167	.7632	.4463
78	.6831	.1771	108	.7001	.2548	138	.7260	.3436	168	.7648	.4502
79	.6835	.1795	109	.7008	.2575	139	.7270	.3469	169	.7664	.4542
80	.6840	.1820	110	.7015	.2603	140	.7281	.3501	170	.7680	.4582
81	.6844	.1845	111	.7022	.2631	141	.7292	.3534	171	.7696	.4622
82	.6849	.1869	112	.7030	.2659	142	.7303	.3567	172	.7712	.4663
83	.6854	.1894	113	.7037	.2687	143	.7314	.3600	173	.7729	.4704
84	.6859	.1919	114	.7045	.2715	144	.7325	.3633	174	.7746	.4745
85	.6854	.1944	115	.7052	.2743	145	.7336	.3666	175	.7763	.4787
86	.6869	.1970	116	.7060	.2772	146	.7348	.3700	176	.7781	.4828
87	.6874	.1995	117	.7068	.2800	147	.7360	.3734	177	.7799	.4871
88	.6879	.2020	118	.7076	.2829	148	.7372	.3768	178	.7817	.4914
89	.6884	.2046	119	.7084	.2858	149	.7384	.3802	179	.7835	.4957
90	.6890	.2071	120	.7092	.2887	150	.7396	.3837	180	.7854	.5000

AREAS OF CIRCULAR SEGMENTS

TABLE II—FOR RATIOS OF RISE AND DIAMETER



Area = d^2 x Coefficient

b/d	Coeffi-cient	b/d	Coeffi-cient	b/d	Coeffi-cient	b/d	Coeffi-cient	b/d	Coeffi-cient
.001	.000042	.046	.012971	.091	.035586	.136	.064074	.181	.096904
.002	.000119	.047	.013393	.092	.036162	.137	.064761	.182	.097675
.003	.000219	.048	.013818	.093	.036742	.138	.065449	.183	.098447
.004	.000337	.049	.014248	.094	.037324	.139	.066140	.184	.099221
.005	.000471	.050	.014681	.095	.037909	.140	.066833	.185	.099997
.006	.000619			.096	.038497			.186	.100774
.007	.000779	.051	.015119	.097	.039087	.141	.067528	.187	.101553
.008	.000952	.052	.015561	.098	.039681	.142	.068225	.188	.102334
.009	.001135	.053	.016008	.099	.040277	.143	.068924	.189	.103116
.010	.001329	.054	.016458	.100	.040875	.144	.069626	.190	.103900
		.055	.016912			.145	.070329		
.011	.001533	.056	.017369	.101	.041477	.146	.071034	.191	.104686
.012	.001746	.057	.017831	.102	.042081	.147	.071741	.192	.105472
.013	.001969	.058	.018297	.103	.042687	.148	.072450	.193	.106261
.014	.002199	.059	.018766	.104	.043296	.149	.073162	.194	.107051
.015	.002438	.060	.019239	.105	.043908	.150	.073875	.195	.107843
.016	.002685			.106	.044523			.196	.108636
.017	.002940	.061	.019716	.107	.045140	.151	.074590	.197	.109431
.018	.003202	.062	.020197	.108	.045759	.152	.075307	.198	.110227
.019	.003472	.063	.020681	.109	.046381	.153	.076026	.199	.111025
.020	.003749	.064	.021168	.110	.047006	.154	.076747	.200	.111824
		.065	.021660			.155	.077470		
.021	.004032	.066	.022155	.111	.047633	.156	.078194	.201	.112625
.022	.004322	.067	.022653	.112	.048262	.157	.078921	.202	.113427
.023	.004619	.068	.023155	.113	.048894	.158	.079650	.203	.114231
.024	.004922	.069	.023660	.114	.049529	.159	.080380	.204	.115036
.025	.005231	.070	.024168	.115	.050165	.160	.081112	.205	.115842
.026	.005546			.116	.050805			.206	.116651
.027	.005867	.071	.024680	.117	.051446	.161	.081847	.207	.117460
.028	.006194	.072	.025196	.118	.052090	.162	.082582	.208	.118271
.029	.006527	.073	.025714	.119	.052737	.163	.083320	.209	.119084
.030	.006866	.074	.026236	.120	.053385	.164	.084060	.210	.119898
		.075	.026761			.165	.084801		
.031	.007209	.076	.027290	.121	.054037	.166	.085545	.211	.120713
.032	.007559	.077	.027821	.122	.054690	.167	.086290	.212	.121530
.033	.007913	.078	.028356	.123	.055346	.168	.087037	.213	.122348
.034	.008273	.079	.028894	.124	.056004	.169	.087785	.214	.123167
.035	.008638	.080	.029435	.125	.056664	.170	.088536	.215	.123988
.036	.009008			.126	.057327			.216	.124811
.037	.009383	.081	.029979	.127	.057991	.171	.089288	.217	.125634
.038	.009764	.082	.030526	.128	.058658	.172	.090042	.218	.126459
.039	.010148	.083	.031077	.129	.059328	.173	.090797	.219	.127286
.040	.010538	.084	.031630	.130	.059999	.174	.091555	.220	.128114
		.085	.032186			.175	.092314		
.041	.010932	.086	.032746	.131	.060673	.176	.093074	.221	.128943
.042	.011331	.087	.033308	.132	.061349	.177	.093837	.222	.129773
.043	.011734	.088	.033873	.133	.062027	.178	.094601	.223	.130605
.044	.012142	.089	.034441	.134	.062707	.179	.095367	.224	.131438
.045	.012555	.090	.035012	.135	.063389	.180	.096135	.225	.132273

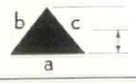
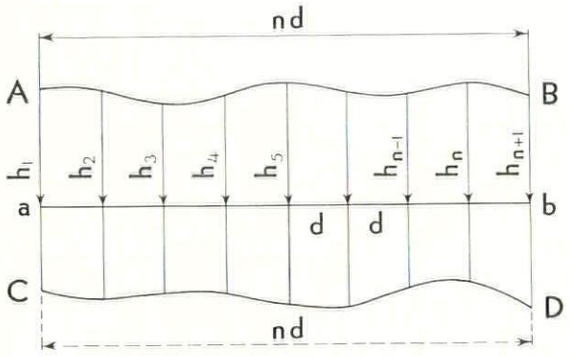
b/d	Coeffi-cient	b/d	Coeffi-cient	b/d	Coeffi-cient	b/d	Coeffi-cient	b/d	Coeffi-cient
.226	.133109	.281	.180918	.336	.231689	.391	.284569	.446	.338804
.227	.133946	.282	.181818	.337	.232634	.392	.285545	.447	.339799
.228	.134784	.283	.182718	.338	.233580	.393	.286521	.448	.340793
.229	.135624	.284	.183619	.339	.234526	.394	.287499	.449	.341788
.230	.136465	.285	.184522	.340	.235473	.395	.288476	.450	.342783
		.286	.185425			.396	.289454		
.231	.137307	.287	.186329	.341	.236421	.397	.290432	.451	.343778
.232	.138151	.288	.187235	.342	.237369	.398	.291411	.452	.344773
.233	.138996	.289	.188141	.343	.238319	.399	.292390	.453	.345768
.234	.139842	.290	.189048	.344	.239268	.400	.293370	.454	.346764
.235	.140689			.345	.240219			.455	.347760
.236	.141538	.291	.189956	.346	.241170	.401	.294350	.456	.348756
.237	.142388	.292	.190865	.347	.242122	.402	.295330	.457	.349752
.238	.143239	.293	.191774	.348	.243074	.403	.296311	.458	.350749
.239	.144091	.294	.192685	.349	.244027	.404	.297292	.459	.351745
.240	.144945	.295	.193597	.350	.244980	.405	.298274	.460	.352742
		.296	.194509			.406	.299256		
.241	.145800	.297	.195423	.351	.245935	.407	.300238	.461	.353739
.242	.146656	.298	.196337	.352	.246890	.408	.301221	.462	.354736
.243	.147513	.299	.197252	.353	.247845	.409	.302204	.463	.355733
.244	.148371	.300	.198168	.354	.248801	.410	.303187	.464	.356730
.245	.149231			.355	.249758			.465	.357728
.246	.150091	.301	.199085	.356	.250715	.411	.304171	.466	.358725
.247	.150953	.302	.200003	.357	.251673	.412	.305156	.467	.359723
.248	.151816	.303	.200922	.358	.252632	.413	.306140	.468	.360721
.249	.152681	.304	.201841	.359	.253591	.414	.307125	.469	.361719
.250	.153546	.305	.202762	.360	.254551	.415	.308110	.470	.362717
		.306	.203683			.416	.309096		
.251	.154413	.307	.204605	.361	.255511	.417	.310082	.471	.363715
.252	.155281	.308	.205528	.362	.256472	.418	.311068	.472	.364714
.253	.156149	.309	.206452	.363	.257433	.419	.312055	.473	.365712
.254	.157019	.310	.207376	.364	.258395	.420	.313042	.474	.366711
.255	.157891			.365	.259358			.475	.367710
.256	.158763	.311	.208302	.366	.260321	.421	.314029	.476	.368708
.257	.159636	.312	.209228	.367	.261285	.422	.315017	.477	.369707
.258	.160511	.313	.210155	.368	.262249	.423	.316005	.478	.370706
.259	.161386	.314	.211083	.369	.263214	.424	.316993	.479	.371705
.260	.162263	.315	.212011	.370	.264179	.425	.317981	.480	.372704
		.316	.212941			.426	.318970		
.261	.163141	.317	.213871	.371	.265145	.427	.319959	.481	.373704
.262	.164020	.318	.214802	.372	.266111	.428	.320949	.482	.374703
.263	.164900	.319	.215734	.373	.267078	.429	.321938	.483	.375702
.264	.165781	.320	.216666	.374	.268046	.430	.322928	.484	.376702
.265	.166663			.375	.269014			.485	.377701
.266	.167546	.321	.217600	.376	.269982	.431	.323919	.486	.378701
.267	.168431	.322	.218534	.377	.270951	.432	.324909	.487	.379701
.268	.169316	.323	.219469	.378	.271921	.433	.325900	.488	.380700
.269	.170202	.324	.220404	.379	.272891	.434	.326891	.489	.381700
.270	.171090	.325	.221341	.380	.273861	.435	.327883	.490	.382700
		.326	.222278			.436	.328874		
.271	.171978	.327	.223216	.381	.274832	.437	.329866	.491	.383700
.272	.172868	.328	.224154	.382	.275804	.438	.330858	.492	.384699
.273	.173758	.329	.225094	.383	.276776	.439	.331851	.493	.385699
.274	.174650	.330	.226034	.384	.277748	.440	.332843	.494	.386699
.275	.175542			.385	.278721			.495	.387699
.276	.176436	.331	.226974	.386	.279695	.441	.333836	.496	.388699
.277	.177330	.332	.227916	.387	.280669	.442	.334829	.497	.389699
.278	.178226	.333	.228858	.388	.281643	.443	.335823	.498	.390699
.279	.179122	.334	.229801	.389	.282618	.444	.336816	.499	.391699
.280	.180020	.335	.230745	.390	.283593	.445	.337810	.500	.392699

AMERICAN ARCHITECT

Time-Saver Standards

DECEMBER 1935 Serial No. 25

MATHEMATICS — Areas and Solids

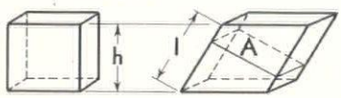
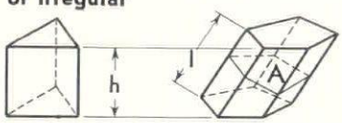
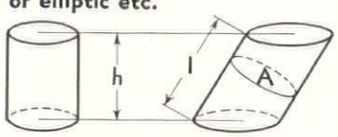
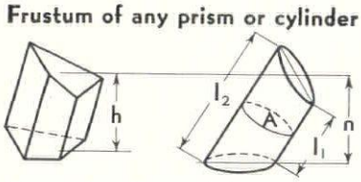
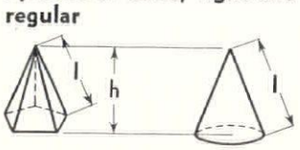
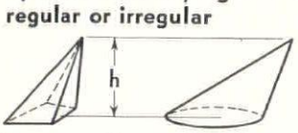
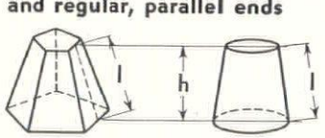
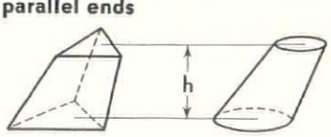
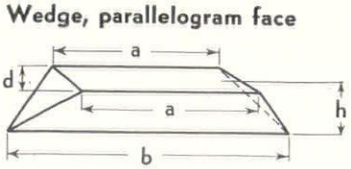
FORM		METHOD OF FINDING AREAS
TRIANGLE		Base × ½ perpendicular height. $\sqrt{s(s-a)(s-b)(s-c)}$, s = ½ sum of the three sides a, b, c.
TRAPEZIUM		Sum of area of the two triangles
TRAPEZOID		½ sum of parallel sides × perpendicular height.
PARALLELOGRAM		Base × perpendicular height.
REG. POLYGON		½ sum of sides × inside radius.
CIRCLE		$\pi r^2 = 0.78540 \times \text{diam}^2. = 0.07958 \times \text{circumference}^2.$
SECTOR OF A CIRCLE		$\frac{\pi r^2 A^\circ}{360} = 0.0087266\ r^2 A^\circ$, = arc × ½ radius
SEGMENT OF A CIRCLE		$\frac{r^2}{2}\left(\frac{\pi A^\circ}{180} - \sin A^\circ\right)$
CIRCLE of same area as a square		Diameter = side × 1.12838
SQUARE of same area as a circle		Side = diameter × 0.88623
ELLIPSE		Long diameter × short diameter × 0.78540
PARABOLA		Base × ⅔ perpendicular height.
IRREGULAR PLANE SURFACE		Divide any plane surface A, B, C, D, along a line a - b into an even number, n, of parallel and sufficiently small strips d, whose ordinates are $h_1, h_2, h_3, h_4, h_5, \ldots h_{n-1}, h_n, h_{n+1}$, and considering contours between three ordinates as parabolic curves, then for section A B C D, $\text{Area} = \frac{d}{3}\left[h_1 + h_{n+1} + 4\,(h_2+h_4+h_6 \ldots\ldots +h_n) + 2\,(h_3+h_5+h_7 \ldots\ldots +h_{n-1})\right]$ or, approximately, Area = sum of ordinates × width d.

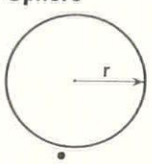
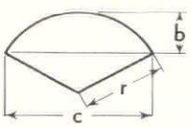
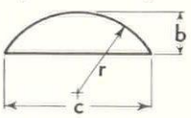
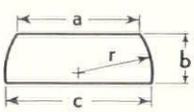
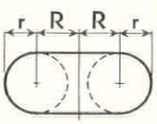
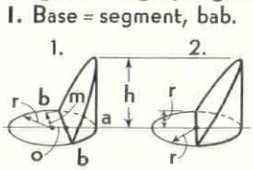
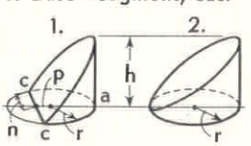
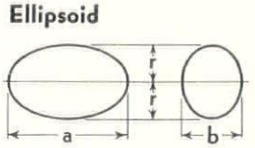
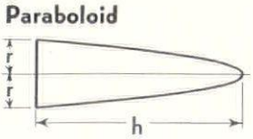
AMERICAN ARCHITECT
Time-Saver Standards

MATHEMATICS—Areas and Solids

Serial No. 25 DECEMBER 1935

METHOD OF FINDING SURFACES AND VOLUMES OF SOLIDS

SHAPE	FORMULAE
	S = lateral or convex surface **V** = volume
Parallelopiped 	**S** = perimeter, P, perp. to sides × lat. length l : Pl : **V** = area of base, B, × perpendicular height, h : Bh. **V** = area of section, A, perp. to sides, × lat. length l : Al.
Prism right, or oblique, regular or irregular 	**S** = perimeter, P, perp. to sides × lat. length l : Pl : **V** = area of base, B, × perpendicular height, h : Bh. **V** = area of section, A, perp. to sides, × lat. length l : Al.
Cylinder, right or oblique, circular or elliptic etc. 	**S** = perimeter of base, P, × perp. height, h: Ph. S_l = perimeter, P_l, perp., × lat. length, l : P_l l. **V** = area of base, B, × perp. height, h: Bh. V = area of section, A, perp. to sides × lat. length l: Al.
Frustum of any prism or cylinder 	**V** = area of base, B, × perpendicular distance h, from base to centre of gravity of opposite face: Bh. for cylinder, ½ A $(l_1 + l_2)$
Pyramid or Cone, right and regular 	**S** = perimeter of base, P, × ½ slant height l : ½ Pl. **V** = area of base, B × ⅓ perpendicular ht., h : ⅓ Bh.
Pyramid or Cone, right or oblique, regular or irregular 	**V** = area of base, B, × ⅓ perp. height, h : ⅓ Bh. **V** = ⅓ vol. of prism or cylinder of same base & perp. height. **V** = ½ vol. of hemisphere of same base and perp. height.
Frustum of pyramid or cone, right and regular, parallel ends 	**S** = (sum of perimeter of base, P, and top, p) × ½ slant height l : ½ l (P+p). **V** = (sum of areas of base, B, and top, b + sq. root of their products) × ⅓ perp. height, h : ⅓ h (B+b+$\sqrt{B\,b}$).
Frustum of any pyramid or cone, parallel ends 	**V** = (sum of areas of base, B, and top, b, + sq. root of their products) × ⅓ perpendicular height, h : ⅓ h (B+b+$\sqrt{B\,b}$).
Wedge, parallelogram face 	**V** = ⅙ (sum of three edges, a b a, × perpendicular height, h, × perpendicular width, d) : ⅙ d h (2 a + b).

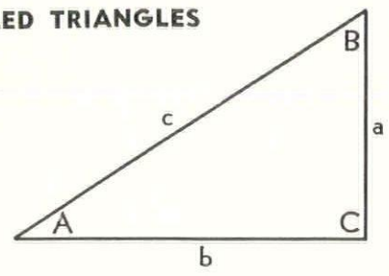
SHAPE	FORMULAE
	S = lateral or convex surface **V** = volume
Sphere 	**S** = $4\pi r^2 = \pi d^2 = 3.14159265\ d^2$. **V** = $\frac{4}{3}\pi r^3 = \frac{1}{6}\pi d^3 = 0.52359878\ d^3$.
Spherical Sector 	**S** = $\frac{1}{2}\pi r\,(4b + c)$. **V** = $\frac{2}{3}\pi r^2 b$.
Spherical Segment 	**S** = $2\pi r b = \frac{1}{4}\pi(4b^2 + c^2)$. **V** = $\frac{1}{3}\pi b^2(3r - b) = \frac{1}{24}\pi b\,(3c^2 + 4b^2)$.
Spherical Zone 	**S** = $2\pi r b$. **V** = $\frac{1}{24}\pi b\,(3a^2 + 3c^2 + 4b^2)$.
Circular Ring 	**S** = $4\pi^2 R r$. **V** = $2\pi^2 R r^2$.
Ungula of right, regular cylinder **1.** Base = segment, bab. **2.** Base = half circle 	**S** = (2rm − o × arc, bab) $\frac{h}{r-o}$. **V** = ($\frac{2}{3}$ m³ − o × area, bab) $\frac{h}{r-o}$. **S** = 2rh. **V** = $\frac{2}{3}r^2h$.
1. Base = segment, cac. **2.** Base = circle 	**S** = (2rn + p × arc, cac) $\frac{h}{r+p}$. **V** = ($\frac{2}{3}$ n³ + p × area, cac) $\frac{h}{r+p}$. **S** = πrh. **V** = ½ r² πh.
Ellipsoid 	**V** = ⅓ πrab.
Paraboloid 	**V** = ½ πr²h. Ratio of corresponding volume of a Cone, Paraboloid, Sphere & Cylinder of equal height: ⅓, ½, ⅔, 1.

AMERICAN ARCHITECT
Time-Saver Standards

DECEMBER 1935 Serial No. 26

MATHEMATICS—Trigonometric Functions

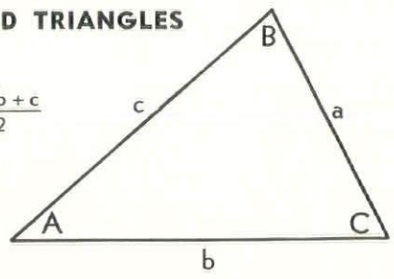
RIGHT-ANGLED TRIANGLES



Given	Sought	Formulae
a, c	A, B, b	$\sin A = \frac{a}{c}$, $\cos B = \frac{a}{c}$, $b = \sqrt{c^2 - a^2}$
	Area	Area $= \frac{a}{2}\sqrt{c^2 - a^2}$
a, b	A, B, c	$\tan A = \frac{a}{b}$, $\tan B = \frac{b}{a}$, $c = \sqrt{a^2 + b^2}$
	Area	Area $= \frac{a\,b}{2}$
A, a	B, b, c	$B = 90° - A$, $b = a \cot A$, $c = \frac{a}{\sin A}$
	Area	Area $= \frac{a^2 \cot A}{2}$
A, b	B, a, c	$B = 90° - A$, $a = b \tan A$, $c = \frac{b}{\cos A}$
	Area	Area $= \frac{b^2 \tan A}{2}$
A, c	B, a, b	$B = 90° - A$, $a = c \sin A$, $b = c \cos A$
	Area	Area $= \frac{c^2 \sin A \cos A}{2}$ or $\frac{c^2 \sin 2A}{4}$

OBLIQUE-ANGLED TRIANGLES

$S = \frac{a+b+c}{2}$



Given	Sought	Formulae
a, b, c	A	$\sin \frac{1}{2} A = \sqrt{\frac{(s-b)\,(s-c)}{b\,c}}$, $\cos \frac{1}{2} A = \sqrt{\frac{s(s-a)}{b\,c}}$, $\tan \frac{1}{2} A = \sqrt{\frac{(s-b)\,(s-c)}{s(s-a)}}$
	B	$\sin \frac{1}{2} B = \sqrt{\frac{(s-a)\,(s-c)}{a\,c}}$, $\cos \frac{1}{2} B = \sqrt{\frac{s(s-b)}{a\,c}}$, $\tan \frac{1}{2} B = \sqrt{\frac{(s-a)\,(s-c)}{s(s-b)}}$
	C	$\sin \frac{1}{2} C = \sqrt{\frac{(s-a)\,(s-b)}{a\,b}}$, $\cos \frac{1}{2} C = \sqrt{\frac{s(s-c)}{a\,b}}$, $\tan \frac{1}{2} C = \sqrt{\frac{(s-a)\,(s-b)}{s(s-c)}}$
	Area	Area $= \sqrt{s\,(s-a)\,(s-b)\,(s-c)}$
a, A, B	b, c	$b = \frac{a \sin B}{\sin A}$ $c = \frac{a \sin C}{\sin A} = \frac{a \sin (A+B)}{\sin A}$
	Area	Area $= \frac{1}{2} a\,b \sin C = \frac{a^2 \sin B \sin C}{2 \sin A}$
a, b, A	B	$\sin B = \frac{b \sin A}{a}$
	c	$c = \frac{a \sin C}{\sin A} = \frac{b \sin C}{\sin B} = \sqrt{a^2 + b^2 - 2\,ab \cos C}$
	Area	Area $= \frac{1}{2} a\,b \sin C$
a, b, C	A	$\tan A = \frac{a \sin C}{b - a \cos C}$, $\tan \frac{1}{2}(A-B) = \frac{a-b}{a+b} \cot \frac{1}{2} C$
	c	$c = \sqrt{a^2 + b^2 - 2\,ab \cos C} = \frac{a \sin C}{\sin A}$
	Area	Area $= \frac{1}{2} ab \sin C$

$a^2 = b^2 + c^2 - 2bc \cos A$, $b^2 = a^2 + c^2 - 2\,a\,c \cos B$ $c^2 = a^2 + b^2 - 2\,ab \cos C$

Degrees	SINES 0′	10′	20′	30′	40′	50′	60′	Cosines
0	0.00000	0.00291	0.00582	0.00873	0.01164	0.01454	0.01745	89
1	0.01745	0.02036	0.02327	0.02618	0.02908	0.03199	0.03490	88
2	0.03490	0.03781	0.04071	0.04362	0.04653	0.04943	0.05234	87
3	0.05234	0.05524	0.05814	0.06105	0.06395	0.06685	0.06976	86
4	0.06976	0.07266	0.07556	0.07846	0.08136	0.08426	0.08716	85
5	0.08716	0.09005	0.09295	0.09585	0.09874	0.10164	0.10453	84
6	0.10453	0.10742	0.11031	0.11320	0.11609	0.11898	0.12187	83
7	0.12187	0.12476	0.12764	0.13053	0.13341	0.13629	0.13917	82
8	0.13917	0.14205	0.14493	0.14781	0.15069	0.15356	0.15643	81
9	0.15643	0.15931	0.16218	0.16505	0.16792	0.17078	0.17365	80
10	0.17365	0.17651	0.17937	0.18224	0.18509	0.18795	0.19081	79
11	0.19081	0.19366	0.19652	0.19937	0.20222	0.20507	0.20791	78
12	0.20791	0.21076	0.21360	0.21644	0.21928	0.22212	0.22495	77
13	0.22495	0.22778	0.23062	0.23345	0.23627	0.23910	0.24192	76
14	0.24192	0.24474	0.24756	0.25038	0.25320	0.25601	0.25882	75
15	0.25882	0.26163	0.26443	0.26724	0.27004	0.27284	0.27564	74
16	0.27564	0.27843	0.28123	0.28402	0.28680	0.28959	0.29237	73
17	0.29237	0.29515	0.29793	0.30071	0.30348	0.30625	0.30902	72
18	0.30902	0.31178	0.31454	0.31730	0.32006	0.32282	0.32557	71
19	0.32557	0.32832	0.33106	0.33381	0.33655	0.33929	0.34202	70
20	0.34202	0.34475	0.34748	0.35021	0.35293	0.35565	0.35837	69
21	0.35837	0.36108	0.36379	0.36650	0.36921	0.37191	0.37461	68
22	0.37461	0.37730	0.37999	0.38268	0.38537	0.38805	0.39073	67
23	0.39073	0.39341	0.39608	0.39875	0.40142	0.40408	0.40674	66
24	0.40674	0.40939	0.41204	0.41469	0.41734	0.41998	0.42262	65
25	0.42262	0.42525	0.42788	0.43051	0.43313	0.43575	0.43837	64
26	0.43837	0.44098	0.44359	0.44620	0.44880	0.45140	0.45399	63
27	0.45399	0.45658	0.45917	0.46175	0.46433	0.46690	0.46947	62
28	0.46947	0.47204	0.47460	0.47716	0.47971	0.48226	0.48481	61
29	0.48481	0.48735	0.48989	0.49242	0.49495	0.49748	0.50000	60
30	0.50000	0.50252	0.50503	0.50754	0.51004	0.51254	0.51504	59
31	0.51504	0.51753	0.52002	0.52250	0.52498	0.52745	0.52992	58
32	0.52992	0.53238	0.53484	0.53730	0.53975	0.54220	0.54464	57
33	0.54464	0.54708	0.54951	0.55194	0.55436	0.55678	0.55919	56
34	0.55919	0.56160	0.56401	0.56641	0.56880	0.57119	0.57358	55
35	0.57358	0.57596	0.57833	0.58070	0.58307	0.58543	0.58779	54
36	0.58779	0.59014	0.59248	0.59482	0.59716	0.59949	0.60182	53
37	0.60182	0.60414	0.60645	0.60876	0.61107	0.61337	0.61566	52
38	0.61566	0.61795	0.62024	0.62251	0.62479	0.62706	0.62932	51
39	0.62932	0.63158	0.63383	0.63608	0.63832	0.64056	0.64279	50
40	0.64279	0.64501	0.64723	0.64945	0.65166	0.65386	0.65606	49
41	0.65606	0.65825	0.66044	0.66262	0.66480	0.66697	0.66913	48
42	0.66913	0.67129	0.67344	0.67559	0.67773	0.67987	0.68200	47
43	0.68200	0.68412	0.68624	0.68835	0.69046	0.69256	0.69466	46
44	0.69466	0.69675	0.69883	0.70091	0.70298	0.70505	0.70711	45
	60′	50′	40′	30′	20′	10′	0′	
Sines	COSINES							Degrees

Degrees	COSINES 0′	10′	20′	30′	40′	50′	60′	Sines
0	1.00000	1.00000	0.99998	0.99996	0.99993	0.99989	0.99985	89
1	0.99985	0.99979	0.99973	0.99966	0.99958	0.99949	0.99939	88
2	0.99939	0.99929	0.99917	0.99905	0.99892	0.99878	0.99863	87
3	0.99863	0.99847	0.99831	0.99813	0.99795	0.99776	0.99756	86
4	0.99756	0.99736	0.99714	0.99692	0.99668	0.99644	0.99619	85
5	0.99619	0.99594	0.99567	0.99540	0.99511	0.99482	0.99452	84
6	0.99452	0.99421	0.99390	0.99357	0.99324	0.99290	0.99255	83
7	0.99255	0.99219	0.99182	0.99144	0.99106	0.99067	0.99027	82
8	0.99027	0.98986	0.98944	0.98902	0.9885S	0.98814	0.98769	81
9	0.98769	0.98723	0.98676	0.98629	0.98580	0.98531	0.98481	80
10	0.98481	0.98430	0.98378	0.98325	0.98272	0.98218	0.98163	79
11	0.98163	0.98107	0.98050	0.97992	0.97934	0.97875	0.97815	78
12	0.97815	0.97754	0.97692	0.97630	0.97566	0.97502	0.97437	77
13	0.97437	0.97371	0.97304	0.97237	0.97169	0.97100	0.97030	76
14	0.97030	0.96959	0.96887	0.96815	0.96742	0.96667	0.96593	75
15	0.96593	0.96517	0.96440	0.96363	0.96285	0.96206	0.96126	74
16	0.96126	0.96046	0.95964	0.95882	0.95799	0.95715	0.95630	73
17	0.95630	0.95545	0.95459	0.95372	0.95284	0.95195	0.95106	72
18	0.95106	0.95015	0.94924	0.94832	0.94740	0.94646	0.94552	71
19	0.94552	0.94457	0.94361	0.94264	0.94167	0.94068	0.93969	70
20	0.93969	0.93869	0.93769	0.93667	0.93565	0.93462	0.93358	69
21	0.93358	0.93253	0.93148	0.93042	0.92935	0.92827	0.92718	68
22	0.92718	0.92609	0.92499	0.92388	0.92276	0.92164	0.92050	67
23	0.92050	0.91936	0.91822	0.91706	0.91590	0.91472	0.91355	66
24	0.91355	0.91236	0.91116	0.90996	0.90875	0.90753	0.90631	65
25	0.90631	0.90507	0.90383	0.90259	0.90133	0.90007	0.89879	64
26	0.89879	0.89752	0.89623	0.89493	0.89363	0.89232	0.89101	63
27	0.89101	0.88968	0.88835	0.88701	0.88566	0.88431	0.88295	62
28	0.88295	0.88158	0.88020	0.87882	0.87743	0.87603	0.87462	61
29	0.87462	0.87321	0.87178	0.87036	0.86892	0.86748	0.86603	60
30	0.86603	0.86457	0.86310	0.86163	0.86015	0.85866	0.85717	59
31	0.85717	0.85567	0.85416	0.85264	0.85112	0.84959	0.84805	58
32	0.84805	0.84650	0.84495	0.84339	0.84182	0.84025	0.83867	57
33	0.83867	0.83708	0.83549	0.83389	0.83228	0.83066	0.82904	56
34	0.82904	0.82741	0.82577	0.82413	0.82248	0.82082	0.81915	55
35	0.81915	0.81748	0.81580	0.81412	0.81242	0.81072	0.80902	54
36	0.80902	0.80730	0.80558	0.80386	0.80212	0.80038	0.79864	53
37	0.79864	0.79688	0.79512	0.79335	0.79158	0.78980	0.78801	52
38	0.78801	0.78622	0.78442	0.78261	0.78079	0.77897	0.77715	51
39	0.77715	0.77531	0.77347	0.77162	0.76977	0.76791	0.76604	50
40	0.76604	0.76417	0.76229	0.76041	0.75851	0.75661	0.75471	49
41	0.75471	0.75280	0.75088	0.74896	0.74703	0.74509	0.74314	48
42	0.74314	0.74120	0.73924	0.73728	0.73531	0.73333	0.73135	47
43	0.73135	0.72937	0.72737	0.72537	0.72337	0.72136	0.71934	46
44	0.71934	0.71732	0.71529	0.71325	0.71121	0.70916	0.70711	45
	60′	50′	40′	30′	20′	10′	0′	
Cosines	SINES							Degrees

MATHEMATICS—Trigonometric Functions

Serial No. 26 **DECEMBER 1935**

TANGENTS

Degrees	0′	10′	20′	30′	40′	50′	60′	Cotangents
0	0.00000	0 00291	0.00582	0.00873	0.01164	0.01455	0.01746	89
1	0.01746	0.02036	0.02328	0.02619	0.02910	0.03201	0.03492	88
2	0.03492	0.03783	0.04075	0.04366	0.04658	0.04949	0.05241	87
3	0.05241	0.05533	0.05824	0.06116	0.06408	0.06700	0.06993	86
4	0.06993	0.07285	0.07578	0.07870	0.08163	0.08456	0.08749	85
5	0.08749	0.09042	0.09335	0.09629	0.09923	0.10216	0.10510	84
6	0.10510	0.10805	0.11099	0.11394	0.11688	0.11983	0.12278	83
7	0.12278	0.12574	0.12869	0.13165	0.13461	0.13758	0.14054	82
8	0.14054	0.14351	0.14648	0.14945	0.15243	0.15540	0.15838	81
9	0.15838	0.16137	0.16435	0.16734	0.17033	0.17333	0.17633	80
10	0.17633	0.17933	0.18233	0.18534	0.18835	0.19136	0.19438	79
11	0.19438	0.19740	0.20042	0.20345	0.20648	0.20952	0.21256	78
12	0.21256	0.21560	0.21864	0.22169	0.22475	0.22781	0.23087	77
13	0.23087	0.23393	0.23700	0.24008	0.24316	0.24624	0.24933	76
14	0.24933	0.25242	0.25552	0.25862	0.26172	0.26483	0.26795	75
15	0.26795	0.27107	0.27419	0.27732	0.28046	0.28360	0.28675	74
16	0.28675	0.28990	0.29305	0.29621	0.29938	0.30255	0.30573	73
17	0.30573	0.30891	0.31210	0.31530	0.31850	0.32171	0.32492	72
18	0.32492	0.32814	0.33136	0.33460	0.33783	0.34108	0.34433	71
19	0.34433	0.34758	0.35085	0.35412	0.35740	0.36068	0.36397	70
20	0.36397	0.36727	0.37057	0.37388	0.37720	0.38053	0.38386	69
21	0.38386	0.38721	0.39055	0.39391	0.39727	0.40065	0.40403	68
22	0.40403	0.40741	0.41081	0.41421	0.41763	0.42105	0.42447	67
23	0.42447	0.42791	0.43136	0.43481	0.43828	0.44175	0.44523	66
24	0.44523	0.44872	0.45222	0.45573	0.45924	0.46277	0.46631	65
25	0.46631	0.46985	0.47341	0.47698	0.48055	0.48414	0.48773	64
26	0.48773	0.49134	0.49495	0.49858	0.50222	0.50587	0.50953	63
27	0.50953	0.51320	0.51688	0.52057	0.52427	0.52798	0.53171	62
28	0.53171	0.53545	0.53920	0.54296	0.54674	0.55051	0.55431	61
29	0.55431	0.55812	0.56194	0.56577	0.56962	0.57348	0.57735	60
30	0.57735	0.58124	0.58513	0.58905	0.59297	0.59691	0.60086	59
31	0.60086	0.60483	0.60881	0.61280	0.61681	0.62083	0.62487	58
32	0.62487	0.62892	0.63299	0.63707	0.64117	0.64528	0.64941	57
33	0.64941	0.65355	0.65771	0.66189	0.66608	0.67028	0.67451	56
34	0.67451	0.67875	0.68301	0.68728	0.69157	0.69588	0.70021	55
35	0.70021	0.70455	0.70891	0.71329	0.71769	0.72211	0.72654	54
36	0.72654	0.73100	0.73547	0.73996	0.74447	0.74900	0.75355	53
37	0.75355	0.75812	0.76272	0.76733	0.77196	0.77661	0.78129	52
38	0.78129	0.78598	0.79070	0.79544	0.80020	0.80498	0.80978	51
39	0.80978	0.81461	0.81946	0.82434	0.82923	0.83415	0.83910	50
40	0.83910	0.84407	0.84906	0.85408	0.85912	0.86419	0.86929	49
41	0.86929	0.87441	0.87955	0.88473	0.88992	0.89515	0.90040	48
42	0.90040	0.90569	0.91099	0.91633	0.92170	0.92709	0.93252	47
43	0.93252	0.93797	0.94345	0.94896	0.95451	0.96008	0.96569	46
44	0.96569	0.97133	0.97700	0.98270	0.98843	0.99420	1.00000	45
	60′	50′	40′	30′	20′	10′	0′	
Tangents								Degrees

COTANGENTS

Degrees	0′	10′	20′	30′	40′	50′	60′	Tangents
0	∞	343.77371	171.88540	114.58865	85.93979	68.75009	57.28996	89
1	57.28996	49.10388	42.96408	38.18846	34.36777	31.24158	28.63625	88
2	28.63625	26.43160	24.54176	22.90377	21.47040	20.20555	19.08114	87
3	19.08114	18.07498	17.16934	16.34986	15.60478	14.92442	14.30067	86
4	14.30067	13.72674	13.19688	12.70621	12.25051	11.82617	11.43005	85
5	11.43005	11.05943	10.71191	10.38540	10.07803	9.78817	9.51436	84
6	9.51436	9.25530	9.00983	8.77689	8.55555	8.34496	8.14435	83
7	8.14435	7.95302	7.77035	7.59575	7.42871	7.26873	7.11537	82
8	7.11537	6.96823	6.82694	6.69116	6.56055	6.43484	6.31375	81
9	6.31375	6.19703	6.08444	5.97576	5.87080	5.76937	5.67128	80
10	5.67128	5.57638	5.48451	5.39552	5.30928	5.22566	5.14455	79
11	5.14455	5.06584	4.98940	4.91516	4.84300	4.77286	4.70463	78
12	4.70463	4.63825	4.57363	4.51071	4.44942	4.38969	4.33148	77
13	4.33148	4.27471	4.21933	4.16530	4.11256	4.06107	4.01078	76
14	4.01078	3.96165	3.91364	3.86671	3.82083	3.77595	3.73205	75
15	3.73205	3.68909	3.64705	3.60588	3.56557	3.52609	3.48741	74
16	3.48741	3.44951	3.41236	3.37594	3.34023	3.30521	3.27085	73
17	3.27085	3.23714	3.20406	3.17159	3.13972	3.10842	3.07768	72
18	3.07768	3.04749	3.01783	2.98869	2.96004	2.93189	2.90421	71
19	2.90421	2.87700	2.85023	2.82391	2.79802	2.77254	2.74748	70
20	2.74748	2.72281	2.69853	2.67462	2.65109	2.62791	2.60509	69
21	2.60509	2.58261	2.56046	2.53865	2.51715	2.49597	2.47509	68
22	2.47509	2.45451	2.43422	2.41421	2.39449	2.37504	2.35585	67
23	2.35585	2.33693	2.31826	2.29984	2.28167	2.26374	2.24604	66
24	2.24604	2.22857	2.21132	2.19430	2.17749	2.16090	2.14451	65
25	2.14451	2.12832	2.11233	2.09654	2.08094	2.06553	2.05030	64
26	2.05030	2.03526	2.02039	2.00569	1.99116	1.97680	1.96261	63
27	1.96261	1.94858	1.93470	1.92098	1.90741	1.89400	1.88073	62
28	1.88073	1.86760	1.85462	1.84177	1.82907	1.81649	1.80405	61
29	1.80405	1.79174	1.77955	1.76749	1.75556	1.74375	1.73205	60
30	1.73205	1.72047	1.70901	1.69766	1.68643	1.67530	1.66428	59
31	1.66428	1.65337	1.64256	1.63185	1.62125	1.61074	1.60033	58
32	1.60033	1.59002	1.57981	1.56969	1.55966	1.54972	1.53987	57
33	1.53987	1.53010	1.52043	1.51084	1.50133	1.49190	1.48256	56
34	1.48256	1.47330	1.46411	1.45501	1.44598	1.43703	1.42815	55
35	1.42815	1.41934	1.41061	1.40195	1.39336	1.38484	1.37638	54
36	1.37638	1.36800	1.35968	1.35142	1.34323	1.33511	1.32704	53
37	1.32704	1.31904	1.31110	1.30323	1.29541	1.28764	1.27994	52
38	1.27994	1.27230	1.26471	1.25717	1.24969	1.24227	1.23490	51
39	1.23490	1.22758	1.22031	1.21310	1.20593	1.19882	1.19175	50
40	1.19175	1.18474	1.17777	1.17085	1.16398	1.15715	1.15037	49
41	1.15037	1.14363	1.13694	1.13029	1.12369	1.11713	1.11061	48
42	1.11061	1.10414	1.09770	1.09131	1.08496	1.07864	1.07237	47
43	1.07237	1.06613	1.05994	1.05378	1.04766	1.04158	1.03553	46
44	1.03553	1.02952	1.02355	1.01761	1.01170	1.00583	1.00000	45
	60′	50′	40′	30′	20′	10′	0′	
Cotangents								Degrees

SECANTS

Degrees	0′	10′	20′	30′	40′	50′	60′	Cosecants
0	1.00000	1.00000	1.00002	1.00004	1.00007	1.00011	1.00015	89
1	1.00015	1.00021	1.00027	1.00034	1.00042	1.00051	1.00061	88
2	1.00061	1.00072	1.00083	1.00095	1.00108	1.00122	1.00137	87
3	1.00137	1.00153	1.00169	1.00187	1.00205	1.00224	1.00244	86
4	1.00244	1.00265	1.00287	1.00309	1.00333	1.00357	1.00382	85
5	1.00382	1.00408	1.00435	1.00463	1.00491	1.00521	1.00551	84
6	1.00551	1.00582	1.00614	1.00647	1.00681	1.00715	1.00751	83
7	1.00751	1.00787	1.00825	1.00863	1.00902	1.00942	1.00983	82
8	1.00983	1.01024	1.01067	1.01111	1.01155	1.01200	1.01247	81
9	1.01247	1.01294	1.01342	1.01391	1.01440	1.01491	1.01543	80
10	1.01543	1.01595	1.01649	1.01703	1.01758	1.01815	1.01872	79
11	1.01872	1.01930	1.01989	1.02049	1.02110	1.02171	1.02234	78
12	1.02234	1.02298	1.02362	1.02428	1.02494	1.02562	1.02630	77
13	1.02630	1.02700	1.02770	1.02842	1.02914	1.02987	1.03061	76
14	1.03061	1.03137	1.03213	1.03290	1.03368	0.03447	1.03528	75
15	1.03528	1.03609	1.03691	1.03774	1.03858	1.03944	1.04030	74
16	1.04030	1.04117	1.04206	1.04295	1.04385	1.04477	1.04569	73
17	1.04569	1.04663	1.04757	1.04853	1.04950	1.05047	1.05146	72
18	1.05146	1.05246	1.05347	1.05449	1.05552	1.05657	1.05762	71
19	1.05762	1.05869	1.05976	1.06085	1.06195	1.06306	1.06418	70
20	1.06418	1.06531	1.06645	1.06761	1.06878	1.06995	1.07115	69
21	1.07115	1.07235	1.07356	1.07479	1.07602	1.07727	1.07853	68
22	1.07853	1.07981	1.08109	1.08239	1.08370	1.08503	1.08636	67
23	1.08636	1.08771	1.08907	1.09044	1.09183	1.09323	1.09464	66
24	1.09464	1.09606	1.09750	1.09895	1.10041	1.10189	1.10338	65
25	1.10338	1.10488	1.10640	1.10793	1.10947	1.11103	1.11260	64
26	1.11260	1.11419	1.11579	1.11740	1.11903	1.12067	1.12233	63
27	1.12233	1.12400	1.12568	1.12738	1.12910	1.13083	1.13257	62
28	1.13257	1.13433	1.13610	1.13789	1.13970	1.14152	1.14335	61
29	1.14335	1.14521	1.14707	1.14896	1.15085	1.15277	1.15470	60
30	1.15470	1.15665	1.15861	1.16059	1.16259	1.16460	1.16663	59
31	1.16663	1.16868	1.17075	1.17283	1.17493	1.17704	1.17918	58
32	1.17918	1.18133	1.18350	1.18569	1.18790	1.19012	1.19236	57
33	1.19236	1.19463	1.19691	1.19920	1.20152	1.20386	1.20622	56
34	1.20622	1.20859	1.21099	1.21341	1.21584	1.21830	1.22077	55
35	1.22077	1.22327	1.22579	1.22833	1.23089	1.23347	1.23607	54
36	1.23607	1.23869	1.24134	1.24400	1.24669	1.24940	1.25214	53
37	1.25214	1.25489	1.25767	1.26047	1.26330	1.26615	1.26902	52
38	1.26902	1.27191	1.27483	1.27778	1.28075	1.28374	1.28676	51
39	1.28676	1.28980	1.29287	1.29597	1.29909	1.30223	1.30541	50
40	1.30541	1.30861	1.31183	1.31509	1.31837	1.32168	1.32501	49
41	1.32501	1.32838	1.33177	1.33519	1.33864	1.34212	1.34563	48
42	1.34563	1.34917	1.35274	1.35634	1.35997	1.36363	1.36733	47
43	1.36733	1.37105	1.37481	1.37860	1.38242	1.38628	1.39016	46
44	1.39016	1.39409	1.39804	1.40203	1.40606	1.41012	1.41421	45
	60′	50′	40′	30′	20′	10′	0′	
Secants								Degrees

COSECANTS

Degrees	0′	10′	20′	30′	40′	50′	60′	Secants
0	∞	343.77516	171.88831	114.59301	85.94561	68.75736	57.29869	89
1	57.29869	49.11406	42.97571	38.20155	34.38232	31.25758	28.65371	88
2	28.65371	26.45051	24.56212	22.92559	21.49368	20.23028	19.10732	87
3	19.10732	18.10262	17.19843	16.38041	15.63679	14.95788	14.33559	86
4	14.33559	13.76312	13.23472	12.74550	12.29125	11.86837	11.47371	85
5	11.47371	11.10455	10.75849	10.43343	10.12752	9.83912	9.56677	84
6	9.56677	9.30017	9.06515	8.83367	8.61379	8.40466	8.20551	83
7	8.20551	8.01565	7.83443	7.66130	7.49571	7.33719	7.18530	82
8	7.18530	7.03962	6.89979	6.76547	6.63633	6.51208	6.39245	81
9	6.39245	6.27719	6.16607	6.05886	5.95536	5.85539	5.75877	80
10	5.75877	5.66533	5.57493	5.48740	5.40263	5.32049	5.24084	79
11	5.24084	5.16359	5.08863	5.01585	4.94517	4.87649	4.80973	78
12	4.80973	4.74482	4.68167	4.62023	4.56041	4.50216	4.44541	77
13	4.44541	4.39012	4.33622	4.28366	4.23239	4.18238	4.13357	76
14	4.13357	4.08591	4.03938	3.99393	3.94952	3.90613	3.86370	75
15	3.86370	3.82223	3.78166	3.74198	3.70315	3.66515	3.62796	74
16	3.62796	3.59154	3.55587	3.52094	3.48671	3.45317	3.42030	73
17	3.42030	3.38808	3.35649	3.32551	3.29512	3.26531	3.23607	72
18	3.23607	3.20737	3.17920	3.15155	3.12440	3.09774	3.07155	71
19	3.07155	3.04584	3.02057	2.99574	2.97135	2.94737	2.92380	70
20	2.92380	2.90063	2.87785	2.85545	2.83342	2.81175	2.79043	69
21	2.79043	2.76945	2.74881	2.72850	2.70851	2.68884	2.66947	68
22	2.66947	2.65040	2.63162	2.61313	2.59491	2.57698	2.55930	67
23	2.55930	2.54190	2.52474	2.50784	2.49119	2.47477	2.45859	66
24	2.45859	2.44264	2.42692	2.41142	2.39614	2.38107	2.36620	65
25	2.36620	2.35154	2.33708	2.32282	2.30875	2.29487	2.28117	64
26	2.28117	2.26766	2.25432	2.24116	2.22817	2.21535	2.20269	63
27	2.20269	2.19019	2.17786	2.16568	2.15366	2.14178	2.13005	62
28	2.13005	2.11847	2.10704	2.09574	2.08458	2.07356	2.06267	61
29	2.06267	2.05191	2.04128	2.03077	2.02039	2.01014	2.00000	60
30	2.00000	1.98998	1.98008	1.97029	1.96062	1.95106	1.94160	59
31	1.94160	1.93226	1.92302	1.91388	1.90485	1.89591	1.88709	58
32	1.88708	1.87834	1.86970	1.86116	1.85271	1.84435	1.83608	57
33	1.83608	1.82790	1.81981	1.81180	1.80388	1.79604	1.78829	56
34	1.78829	1.78062	1.77303	1.76552	1.75808	1.75073	1.74345	55
35	1.74345	1.73624	1.72911	1.72205	1.71506	1.70815	1.70130	54
36	1.70130	1.69452	1.68782	1.68117	1.67460	1.66809	1.66164	53
37	1.66164	1.65526	1.64894	1.64268	1.63648	1.63035	1.62427	52
38	1.62427	1.61825	1.61229	1.60639	1.60054	1.59475	1.58902	51
39	1.58902	1.58333	1.57771	1.57213	1.56661	1.56114	1.55572	50
40	1.55572	1.55036	1.54504	1.53977	1.53455	1.52938	1.52425	49
41	1.52425	1.51918	1.51415	1.50916	1.50422	1.49933	1.49448	48
42	1.49448	1.48967	1.48491	1.48019	1.47551	1.47087	1.46628	47
43	1.46628	1.46173	1.45721	1.45274	1.44831	1.44391	1.43956	46
44	1.43956	1.43524	1.43096	1.42672	1.42251	1.41835	1.41421	45
	60′	50′	40′	30′	20′	10′	0′	
Cosecants								Degrees

SECANTS

AMERICAN ARCHITECT

Time-Saver Standards

DECEMBER 1935 Serial No. 27 **MATHEMATICS — Units of Measurement**

LINEAR MEASURE

Measures of Length

12 inches	= 1 foot
3 feet	= 1 yard
5½ yards = 16½ feet	= 1 rod, pole or perch
40 poles = 220 yards	= 1 furlong
8 furlongs = 1760 yards = 5280 feet	= 1 mile
3 miles	= 1 league
4 inches	= 1 hand
9 inches	= 1 span

Nautical Units

6080.20 feet	= 1 nautical mile
6 feet	= 1 fathom
120 fathoms	= 1 cable length
1 nautical mile per hr.	= 1 knot

Surveyor's or Gunter's Measure

7.92 inches	= 1 link
100 links = 66 ft. = 4 rods	= 1 chain
80 chains	= 1 mile
33⅓ inches	= 1 vara (Texas)

Length Equivalents

Centimeters	Inches	Feet	Yards	Meters	Chains	Kilometers	Miles
1	0.3937	0.03281	0.01094	0.01	$0.0_2$4971	10^{-5}	$0.0_5$6214
2.540	1	0.08333	0.02778	0.0254	0.001263	$0.0_4$254	$0.0_4$1578
30.48	12	1	0.3333	0.3048	0.01515	$0.0_3$3048	$0.0_3$1894
91.44	36	3	1	0.9144	0.04545	$0.0_3$9144	$0.0_3$5682
100	39.37	3.281	1.0936	1	0.04971	0.001	$0.0_3$6214
2012	792	66	22	20.12	1	0.02012	0.0125
100000	39370	3281	1093.6	1000	49.71	1	0.6214
160935	63360	5280	1760	1609	80	1.609	1

Subscripts after any figure, 0_3, 9_4, etc., mean that that figure is to be repeated the indicated number of times.

MEASURES OF AREA

144 square inches	= 1 square foot
9 square feet	= 1 square yard
30¼ square yards	= 1 square rod, pole or perch
160 square rods = 10 square chains = 43,560 sq. ft. = 5645 sq. varas (Texas)	= 1 acre

640 acres = 1 square mile = 1 "section" of U. S. Govt. surveyed land

Area Equivalents

Square Meters	Square Inches	Square Feet	Square Yards	Square Rods	Square Chains	Roods	Acres	Square Miles or Sections
1	1550	10.76	1.196	0.0395	0.002471	$0.0_3$9884	$0.0_3$2471	$0.0_6$3861
$0.0_3$6452	1	0.006944	$0.0_3$7716	$0.0_4$2551	$0.0_5$1594	$0.0_6$6377	$0.0_6$1594	$0.0_9$2491
0.09290	144	1	0.1111	0.003673	$0.0_3$2296	$0.0_4$9184	$0.0_4$2296	$0.0_7$3587
0.8361	1296	9	1	0.03306	0.002066	$0.0_3$8264	0.0002066	$0.0_6$3228
25.29	39204	272.25	30.25	1	0.0625	0.02500	0.00625	$0.0_5$9766
404.7	627264	4356	484	16	1	0.4	0.1	0.0001562
1012	1568160	10890	1210	40	2.5	1	0.25	$0.0_3$3906
4047	6272640	43560	4840	160	10	4	1	0.001562
2589998	.....	27878400	3097600	102400	6400	2560	640	1

(1 hectare = 100 ares = 10,000 centiares or square meters)

Subscripts after any figure 0_3, 9_4, etc., mean that that figure is to be repeated the indicated number of times.

VOLUMETRIC MEASURE

Measures of Volume

1728 cubic inches	= 1 cubic foot
27 cubic feet	= 1 cubic yard
1 cord of wood	= 128 cu. ft.
1 perch of masonry	= 16½ to 25 cu. ft.

Liquid or Fluid Measure

4 gills	= 1 pint
2 pints	= 1 quart
4 quarts	= 1 gallon
7.4805 gallons	= 1 cubic foot

(There is no standard liquid barrel; by trade custom, 1 bbl. of petroleum oil, unrefined = 42 gal.)

Dry Measure

2 pints	= 1 quart
8 quarts	= 1 peck
4 pecks	= 1 bushel

1 std. bbl. for fruits and vegetables = 7056 cu. in. or 105 dry quarts, struck measure

Board Measure

1 board foot = { 144 cu. in. = volume of board 1 ft. sq. and 1 in. thick.

No. of board feet in a log = $[\frac{1}{4}(d-4)]^2L$, where d = diam. of log (usually taken inside the bark at small end), in., and L = length of log, ft. The 4 in. deducted are an allowance for slab. This rule is variously known as the Doyle, Conn. River, St. Croix, Thurber, Moore and Beeman, and the Scribner rule.

Volume and Capacity Equivalents

Cubic inches	Cubic feet	Cubic yards	U. S. Apothecary liquid ounces	U. S. quarts: Liquid	U. S. quarts: Dry	U. S. gallons: Liquid	U. S. gallons: Dry	Bushels U. S.	Liters (l)
1	$0.0_3$5787	$0.0_4$2143	0.5541	0.01732	0.01488	$0.0_2$4329	$0.0_2$3720	$0.0_3$4650	0.01639
1728	1	0.03704	957.5	29.92	25.71	7.481	6.429	0.8036	28.32
46656	27	1	25853	807.9	694.3	202.0	173.6	21.70	764.6
1.805	0.001044	$0.0_3$3868	1	0.03125	0.02686	0.007813	0.006714	$0.0_3$8392	0.02957
57.75	0.03342	0.001238	32	1	0.8594	0.25	0.2148	0.02686	0.9464
67.20	0.03889	0.001440	37.24	1.164	1	0.2909	0.25	0.03125	1.101
231	0.1337	0.004951	128	4	3.437	1	0.8594	0.1074	3.785
268.8	0.1556	0.005761	148.9	4.655	4	1.164	1	0.125	4.405
2150	1.244	0.04609	1192	37.24	32	9.309	8	1	35.24
61.02	0.03531	0.001308	33.81	1.057	0.9081	0.2642	0.2270	0.02838	1

Subscripts after any figure, 0_3, 9_4, etc., mean that that figure is to be repeated the indicated number of times.

MEASURES OF WEIGHT

Weights

(The grain is the same in all systems)

Avoirdupois Weight

16 drams = 437.5 grains	= 1 ounce
16 ounces = 7000 grains	= 1 pound
100 pounds	= 1 cental
2000 pounds	= 1 short ton
2240 pounds	= 1 long ton
1 std. lime bbl., small	= 180 lb. net
1 std. lime bbl., large	= 280 lb. net

Also (in Great Britain):

14 pounds	= 1 stone
2 stone = 28 lb.	= 1 quarter
4 quarters = 112 lb.	= 1 hundredweight (cwt.)
20 hundredweight	= 1 long ton

Troy Weight

24 grains	= 1 pennyweight (dwt.)
20 pennyweights = 480 grains	= 1 ounce
12 ounces = 5760 grains	= 1 pound

1 **Assay Ton** = 29,167 milligrams, or as many milligrams as there are troy ounces in a ton of 2000 lb. avoirdupois. Consequently, the number of milligrams of precious metal yielded by an assay ton of ore gives directly the number of troy ounces that would be obtained from a ton of 2000 lb. avoirdupois

Apothecaries' Weight

20 grains	= 1 scruple ℈
3 scruples = 60 grains	= 1 dram ʒ
8 drams	= 1 ounce ℥
12 ounces = 5760 grains	= 1 pound

Mass Equivalents

Kilograms	Grains	Ounces: Troy and apoth.	Ounces: Avoirdupois	Pounds: Troy and apoth.	Pounds: Avoirdupois	Tons: Short	Tons: Long	Tons: Metric
1	15432	32.15	35.27	2.6792	2.205	$0.0_2$1102	$0.0_3$9842	0.001
$0.0_4$6480	1	$0.0_2$2083	$0.0_2$2286	$0.0_3$1736	$0.0_3$1429	$0.0_7$7143	$0.0_7$6378	$0.0_7$6480
0.03110	480	1	1.09714	0.08333	0.06857	$0.0_3$3429	$0.0_3$3061	$0.0_4$3110
0.02835	437.5	0.9115	1	0.07595	0.0625	$0.0_3$3125	$0.0_2$2790	$0.0_4$2835
0.3732	5760	12	13.17	1	0.8229	$0.0_4$4114	$0.0_3$3673	$0.0_3$3732
0.4536	7000	14.58	16	1.215	1	0.0005	$0.0_3$4464	$0.0_3$4536
907.2	140_6	29167	320_3	2431	2000	1	0.8929	0.9072
1016	15680_4	32667	35840	2722	2240	1.12	1	1.016
1000	15432356	32151	35274	2679	2205	1.102	0.9842	1

Subscripts after any figure, 0_3, 9_4, etc., mean that that figure is to be repeated the indicated number of times.

AMERICAN ARCHITECT
Time-Saver Standards

MATHEMATICS – Units of Measurement

Serial No. 27 **DECEMBER 1935**

DECIMAL OF AN INCH AND OF A FOOT

Fractions of Inch or Foot		Inch Equivalents to Foot Fractions	Fractions of Inch or Foot		Inch Equivalents to Foot Fractions	Fractions of Inch or Foot		Inch Equivalents to Foot Fractions	Fractions of Inch or Foot		Inch Equivalents to Foot Fractions
	.0052	1/16		.2552	3 1/16		.5052	6 1/16		.7552	9 1/16
	.0104	1/8		.2604	3 1/8		.5104	6 1/8		.7604	9 1/8
1/64	.015625	3/16	17/64	.265625	3 3/16	33/64	.515625	6 3/16	49/64	.765625	9 3/16
	.0208	1/4		.2708	3 1/4		.5208	6 1/4		.7708	9 1/4
	.0260	5/16		.2760	3 5/16		.5260	6 5/16		.7760	9 5/16
1/32	.03125	3/8	9/32	.28125	3 3/8	17/32	.53125	6 3/8	25/32	.78125	9 3/8
	.0365	7/16		.2865	3 7/16		.5365	6 7/16		.7865	9 7/16
	.0417	1/2		.2917	3 1/2		.5417	6 1/2		.7917	9 1/2
3/64	.046875	9/16	19/64	.296875	3 9/16	35/64	.546875	6 9/16	51/64	.796875	9 9/16
	.0521	5/8		.3021	3 5/8		.5521	6 5/8		.8021	9 5/8
	.0573	11/16		.3073	3 11/16		.5573	6 11/16		.8073	9 11/16
1/16	.0625	3/4	5/16	.3125	3 3/4	9/16	.5625	6 3/4	13/16	.8125	9 3/4
	.0677	13/16		.3177	3 13/16		.5677	6 13/16		.8177	9 13/16
	.0729	7/8		.3229	3 7/8		.5729	6 7/8		.8229	9 7/8
5/64	.078125	15/16	21/64	.328125	3 15/16	37/64	.578125	6 15/16	53/64	.828125	9 15/16
	.0833	1		.3333	4		.5833	7		.8333	10
	.0885	1 1/16		.3385	4 1/16		.5885	7 1/16		.8385	10 1/16
3/32	.09375	1 1/8	11/32	.34375	4 1/8	19/32	.59375	7 1/8	27/32	.84375	10 1/8
	.0990	1 3/16		.3490	4 3/16		.5990	7 3/16		.8490	10 3/16
	.1042	1 1/4		.3542	4 1/4		.6042	7 1/4		.8542	10 1/4
7/64	.109375	1 5/16	23/64	.359375	4 5/16	39/64	.609375	7 5/16	55/64	.859375	10 5/16
	.1146	1 3/8		.3646	4 3/8		.6146	7 3/8		.8646	10 3/8
	.1198	1 7/16		.3698	4 7/16		.6198	7 7/16		.8698	10 7/16
1/8	.1250	1 1/2	3/8	.3750	4 1/2	5/8	.6250	7 1/2	7/8	.8750	10 1/2
	.1302	1 9/16		.3802	4 9/16		.6302	7 9/16		.8802	10 9/16
	.1354	1 5/8		.3854	4 5/8		.6354	7 5/8		.8854	10 5/8
9/64	.140625	1 11/16	25/64	.390625	4 11/16	41/64	.640625	7 11/16	57/64	.890625	10 11/16
	.1458	1 3/4		.3958	4 3/4		.6458	7 3/4		.8958	10 3/4
	.1510	1 13/16		.4010	4 13/16		.6510	7 13/16		.9010	10 13/16
5/32	.15625	1 7/8	13/32	.40625	4 7/8	21/32	.65625	7 7/8	29/32	.90625	10 7/8
	.1615	1 15/16		.4115	4 15/16		.6615	7 15/16		.9115	10 15/16
	.1667	2		.4167	5		.6667	8		.9167	11
11/64	.171875	2 1/16	27/64	.421875	5 1/16	43/64	.671875	8 1/16	59/64	.921875	11 1/16
	.1771	2 1/8		.4271	5 1/8		.6771	8 1/8		.9271	11 1/8
	.1823	2 3/16		.4323	5 3/16		.6823	8 3/16		.9323	11 3/16
3/16	.1875	2 1/4	7/16	.4375	5 1/4	11/16	.6875	8 1/4	15/16	.9375	11 1/4
	.1927	2 5/16		.4427	5 5/16		.6927	8 5/16		.9427	11 5/16
	.1979	2 3/8		.4479	5 3/8		.6979	8 3/8		.9479	11 3/8
13/64	.203125	2 7/16	29/64	.453125	5 7/16	45/64	.703125	8 7/16	61/64	.953125	11 7/16
	.2083	2 1/2		.4583	5 1/2		.7083	8 1/2		.9583	11 1/2
	.2135	2 9/16		.4635	5 9/16		.7135	8 9/16		.9635	11 9/16
7/32	.21875	2 5/8	15/32	.46875	5 5/8	23/32	.71875	8 5/8	31/32	.96875	11 5/8
	.2240	2 11/16		.4740	5 11/16		.7240	8 11/16		.9740	11 11/16
	.2292	2 3/4		.4792	5 3/4		.7292	8 3/4		.9792	11 3/4
15/64	.234375	2 13/16	31/64	.484375	5 13/16	47/64	.734375	8 13/16	63/64	.984375	11 13/16
	.2396	2 7/8		.4896	5 7/8		.7396	8 7/8		.9896	11 7/8
	.2448	2 15/16		.4948	5 15/16		.7448	8 15/16		.9948	11 15/16
1/4	.2500	3	1/2	.5000	6	3/4	.7500	9	1	1.0000	12

METRIC MEASURES

Linear	Liquid and Dry	Weights
10 millimeters = 1 centimeter	10 milliliters = 1 centiliter	10 milligrams = 1 centigram
10 centimeters = 1 decimeter	10 centiliters = 1 deciliter	10 centigrams = 1 decigram
10 decimeters = 1 METER (m)	10 deciliters = 1 LITER (l)	10 decigrams = 1 GRAM (g)
10 meters = 1 decameter	10 liters = 1 decaliter	10 grams = 1 decagram
10 decameters = 1 hectometer	10 decaliters = 1 hectoliter	10 decagrams = 1 hectogram
10 hectometers = 1 kilometer	10 hectoliters = 1 kiloliter	10 hectograms = 1 kilogram

METRIC CONVERSION FACTORS

METRIC TO AMERICAN

Millimeters ÷ 25.4 = inches
Centimeters × 0.3937 = inches
Meters × 39.27 = inches
Millimeters × 0.003281 = feet
Centimeters × 0.03281 = feet
Meters × 3.281 = feet
Meters × 1.094 = yards
Kilometers × 0.621 = miles
Kilometers × 3280.7 = feet
Square millimeters ÷ 645.1 = square inches
Square centimeters ÷ 6.451 = square inches
Square meters × 10.764 = square feet
Square kilometers × 247.1 = acres
Hectares × 2.471 = acres
Cubic centimeters ÷ 16.383 = cubic inches
Cubic meters × 35.315 = cubic feet
Cubic meters × 1.308 = cubic yards
Cubic meters × 264.2 = gallons
Liters × 61.022 = cubic inches
Liters × 0.2642 = gallons
Liters ÷ 28.316 = cubic feet
Hectoliters × 3.531 = cubic feet
Hectoliters × 2.84 = bushels
Hectoliters × 0.131 = cubic yards
Hectoliters × 26.42 = gallons
Kilograms × 2.2046 = pounds
Kilograms ÷ 1102.3 = tons

AMERICAN TO METRIC

Inches × 25.4 = millimeters
Inches × 2.54 = centimeters
Inches × 0.0254 = meters
Feet × 304.8 = millimeters
Feet × 30.48 = centimeters
Feet × 0.3048 = meters
Yards × 0.9143 = meters
Miles × 1.6093 = kilometers
Feet ÷ 3280.7 = kilometers
Square inches × 645.1 = square millimeters
Square inches × 6.451 = square centimeters
Square feet ÷ 10.764 = square inches
Acres ÷ 247.1 = square kilometers
Acres ÷ 2.471 = hectares
Cubic inches × 16.383 = cubic centimeters
Cubic feet ÷ 35.315 = cubic meters
Cubic yards ÷ 1.308 = cubic meters
Gallons (231 cu. in.) ÷ 264.2 = cubic meters
Cubic inches ÷ 61.022 = liters
Gallons × 3.78 = liters
Cubic feet × 28.316 = liters
Cubic feet ÷ 3.531 = hectoliters
Bushels ÷ 2.84 = hectoliters
Cubic yards ÷ 0.131 = hectoliters
Gallons ÷ 26.42 = hectoliters
Pounds ÷ 2.2046 = kilograms
Tons × 1102.3 = kilograms

AMERICAN ARCHITECT

Time-Saver Standards

DECEMBER 1935 Serial No. 28

Weights of Materials; Live and Dead Loads

LIVE LOADS FOR STORAGE WAREHOUSES

Material	Pounds per Cubic Foot of Space	Height of Pile, Feet	Pounds per Square Foot of Floor	Recommended Live Loads, Pounds per Square Foot
Produce, Grain, Fruit, Etc.				
Grain, in bulk				
Barley and Corn	37	8	296	
Oats	26	8	208	
Rye and Wheat	48	8	384	
Fruit and Vegetables, in bulk				
Apples, Pears, etc	38	8	304	
Potatoes, Turnips, etc	44	8	352	
Miscellaneous Produce, packed				
Beans, in bags	40	8	320	250 to 300
Corn, in bags	31	8	248	
Cornmeal, in barrels	37	6½	240	
Oats, in bags	26	9	234	
Rice, in bags	58	5	290	
Wheat, in bags	39	8	312	
Wheat Flour, in barrels	40	7	280	
Hay, in bales, not compressed	14	9	126	
Hay, in bales, compressed	24	9	216	
Straw, in bales, compressed	19	9	171	
Groceries				
Miscellaneous Articles, packed				
Butter, Lard, etc., in barrels	32	6	192	
Canned Goods, Preserves, etc., in cases	58	6	348	
Cheese	30	8	240	
Coffee, green, in bags	39	8	312	
Coffee, roasted, in bags	33	8	264	
Dates and Figs, in cases, average	65	5	325	
Meat, Beef, Pork, etc., in barrels	37	5	185	250 to 300
Molasses, in barrels	48	5	240	
Salt, finely ground, in sacks	60	5	300	
Soap Powder, in cases	38	8	288	
Starch, in barrels	25	7	175	
Sugar, in barrels	43	5	215	
Tea, in chests	25	8	200	
Wines, Liquors, etc., in barrels	48	5	240	
Dry Goods, Cotton, Wool, Etc.				
Cotton, in bales, compressed, average	25	9	225	
" unbleached goods, in bales	24	9	216	
" tickings and duck, in bales	35	8	280	
" printed goods, in bales	19	9	171	
" printed goods, in cases	31	8	248	
" quilts and flannels, in cases	16	9	144	
" yarn, in cases	25	8	200	
Hemp, in bales, compressed	22	8	176	
" Manila, in bales, compressed	26	9	234	
" Sisal, in bales, compressed	24	9	216	
" Tow, in bales, compressed	29	9	261	200 to 250
" Burlaps, in bales, compressed	43	6	258	
Jute, in bales, compressed	41	6	246	
Linen, bleached goods, in cases	35	7	245	
" damask goods, in cases	50	5	250	
Wool, in bales, not compressed	13	9	117	
" in bales, compressed	48	5	240	
" dress goods, flannels, in cases	18	9	162	
" worsted goods, in cases	27	9	243	
Rags, in bales, compressed	19	9	171	
Excelsior, in bales, compressed	19	9	171	
Drugs, Oils, Paints, Etc.				
Chemicals:				
Acids, Muriatic and Nitric, in carboys	45	1⅔	75	
" Sulphuric, in carboys	60	1⅔	100	
Ammonia, in carboys	30	1⅔	50	
Alum, Pearl Alum, in barrels	33	7	231	
Bleaching Powder, in hogsheads	31	3⅓	103	
Copper Sulphate, Blue Vitriol, in bbls.	45	5	225	
Soda, Caustic Soda, in iron drums	88	3⅓	294	
Soda, Soda Ash, in hogsheads	62	2¾	170	
Soda Crystals, Sal Soda, in barrels	30	5	150	
Soda Nitrate, Niter, in barrels	45	5	225	
Soda Silicate, in barrels	53	5	265	
Zinc Sulphate, White Vitriol, in barrels	40	5	200	
Oils, Fats, Resins, etc.:				
Glycerine, in cases	52	6	312	
Oils, Animal, Lard, etc., in barrels	34	6	204	200 to 250
" Vegetable, Linseed, in barrels	36	6	216	
" Mineral, Lubricants, in barrels	35	6	210	
" Petroleum, Kerosene, in barrels	33	6	198	
" Naphtha, Gasolene, in barrels	28	6	168	
Rosin, in barrels	48	6	288	
Shellac Gum, in boxes	38	6	228	
Tallow, in barrels	37	6	222	
Dye Stuffs, Paints, etc.:				
Indigo, in boxes	43	6	258	
Logwood Extract, in boxes	70	4½	315	
Sumac, in boxes	39	5	195	
Red Lead, Litharge, dry, in barrels	132	3¾	495	
White Lead, dry, in barrels	86	4¾	409	
White Lead, paste, in cans	174	3½	609	
Building Materials				
Cement, Natural, in barrels	59	6	354	
" Portland, in barrels	73	6	438	300 to 400
Lime, Quick Lime, ground, in barrels	50	5	250	
Plaster of Paris, ground in barrels	53	5	265	
Sheet Metal and Wire				
Sheet Tin, in boxes	278	1½	417	
Wire, insulated copper, in coils	63	5	315	300 to 400
" galvanized iron, in coils	74	4½	333	
" magnet wire, on spools	75	6	450	
Miscellaneous				
Chinaware, Glassware, in crates	40	8	320	
" in casks	14	9	126	
Glass, in boxes	60	6	360	
Hardware, door and sash checks, in cases	46	6	276	
" hinges, in cases	64	6	384	
" locks, in cases	31	6	186	
" screws, in boxes	101	4	404	300 to 400
Hides, raw, not compressed, in bales	13	10	130	
" raw, compressed, in bales	23	10	230	
Leather, in bales	16	10	160	
Paper, calendered paper	50	6	300	
" newspaper, manila, strawboards	35	6	210	
" writing paper	64	6	384	
Rope in Coils	42	6	252	

MINIMUM LIVE-LOAD REQUIREMENTS

From the Report of the Building Code Committee, Department of Commerce

BUILDINGS, STRUCTURES, etc.	Lb. per Sq. Ft.
Storage-purposes, general	250
Storage-purposes, special	100
Manufacturing, light	75
Printing-plants	100
Wholesale stores, light merchandise	100
Retail salesrooms, light merchandise	75
Stables	75
Garages, all types of vehicles	100
Garages, passenger-cars only	80
Sidewalks, 250 lb. per sq. ft. uniformly distributed, or 800 lb. concentrated, whichever gives the larger bending moment or shear	000

From New York City Building Code

BUILDINGS, STRUCTURES, etc.	Lb. per Sq. Ft.
Residences	40
Places for assembly or for public purposes	100
Classrooms of schools or other places of instruction	75
Offices	50
Floors of any other class not included above	120
Roofs with a pitch of 20° or less	40
Roofs with a pitch of more than 20°, measured on the projection on the horizontal plane	30
Sidewalks between curb and building	300
Yards and courts inside the building-line	120

AMERICAN ARCHITECT
Time-Saver Standards

Weights of Materials; Live and Dead Loads

Serial No. 28 DECEMBER 1935

WEIGHTS OF MISCELLANEOUS MATERIALS

Substance	Weight, Pounds per Cu. Ft.
Metals, Alloys, Ores	
Aluminum, cast-hammered	165
" bronze	481
Antimony	416
Brass, cast-rolled	534
Bronze, 7.9 to 14% Sn	509
Chromium	428
Copper, cast-rolled	556
" ore, pyrites	262
Gold, cast-hammered	1205
Iron, cast, pig	450
" wrought	485
" steel	490
" spiegel-eisen	468
" ferro-silicon	437
" ore, hematite	325
" " " in bank	160-180
" " " loose	130-160
" " limonite	237
" " magnetite	315
" slag	172
Lead	706
" ore, galena	465
Magnesium	109
Manganese	456
Mercury	848
Molybdenum	562
Nickel	545
" monel metal	556
Platinum, cast-hammered	1330
Silver, cast-hammered	656
Tin, cast-hammered	459
" babbit metal	443
" ore, cassiterite	418
Tungsten	1180
Vanadium	350
Zinc, cast-rolled	440
" ore, blende	253
Various Solids	
Carbon, amorphous, graphitic	129
Cork	15
Ebony	76
Fats	58
Glass, common, plate	160
" crystal	184
" flint	220
Phosphorus, white	114
Various Solids—Cont.	
Porcelain, china	150
Resins, Rosin, Amber	67
Rubber, caoutchouc	58
Silicon	155
Sulphur, amorphous	128
Wax	60
Timber, U. S. Seasoned	
Ash, white-red	40
Cedar, white-red	22
Chestnut	41
Cypress	30
Fir, Douglas spruce	32
" eastern	25
Elm, white	45
Hemlock	29
Hickory	49
Locust	46
Maple, hard	43
" white	33
Oak, chestnut	54
" live	59
" red, black	41
" white	46
Pine, Oregon	32
" red	30
" white	26
" yellow, long-leaf	44
" " short-leaf	38
Poplar	30
Redwood, California	26
Spruce, white, black	27
Walnut, black	38
" white	26
Moisture Contents:	
Seasoned timber 15 to 20%	
Green timber up to 50%	
Various Liquids	
Alcohol, 100%	49
Acids, muriatic 40%	75
" nitric 91%	94
" sulphuric 87%	112
Lye, soda 66%	106
Oils, vegetable	58
" mineral, lubricants	57
Various Liquids—Cont.	
Petroleum	55
Gasoline	42
Water, 4° C, max. density	62.428
" 100° C	59.830
" ice	56
" snow, fresh fallen	8
" sea water	64
Minerals	
Asbestos	153
Barytes	281
Basalt	184
Bauxite	159
Borax	109
Chalk	137
Clay, marl	137
Dolomite	181
Feldspar, orthoclase	159
Gneiss, serpentine	159
Granite, syenite	175
Greenstone, trap	187
Gypsum, alabaster	159
Hornblende	187
Limestone, marble	165
Magnesite	187
Phosphate rock, apatite	200
Porphyry	172
Pumice, natural	40
Quartz, flint	165
Sandstone, bluestone	147
Shale, slate	175
Soapstone, talc	169
Stone, Quarried, Piled	
Basalt, granite, gneiss	96
Limestone, marble, quartz	95
Sandstone	82
Shale	92
Greenstone, hornblende	107
Bituminous Substances	
Asphaltum	81
Coal, anthracite	97
" bituminous	84
" lignite	78
" peat, turf, dry	47
Bituminous Substances —Cont.	
Coal, charcoal, pine	23
" " oak	33
" coke	75
Graphite	131
Paraffine	56
Petroleum, crude	55
" refined	50
" benzine	46
" gasolene	42
Pitch	69
Tar, bituminous	75
Coal and Coke, Piled	
Coal, anthracite	47–58
" bituminous, lignite	40–54
" peat, turf	20–26
" charcoal	10–14
" coke	23–32
Earth, etc., Excavated	
Clay, dry	63
" damp, plastic	110
Clay and gravel, dry	110
Earth, dry, loose	76
" " packed	95
" moist, loose	78
" " packed	96
" mud, flowing	108
" " packed	115
Riprap, limestone	80–85
" sandstone	90
" shale	105
Sand, gravel, dry, loose	90–105
" " " packed	100–120
" " " wet	118–120
Excavations in Water	
Sand or gravel	60
" " " and clay	65
Clay	80
River mud	90
Soil	70
Stone riprap	65

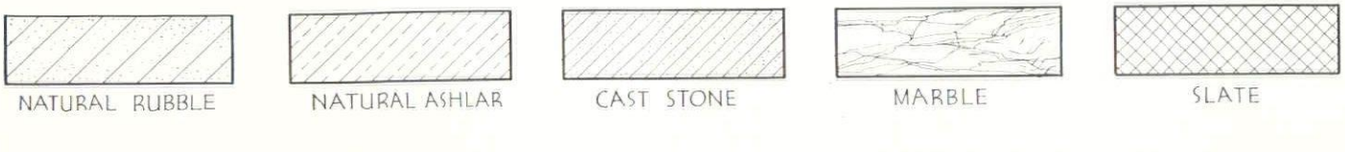
WEIGHTS OF BUILDING MATERIALS

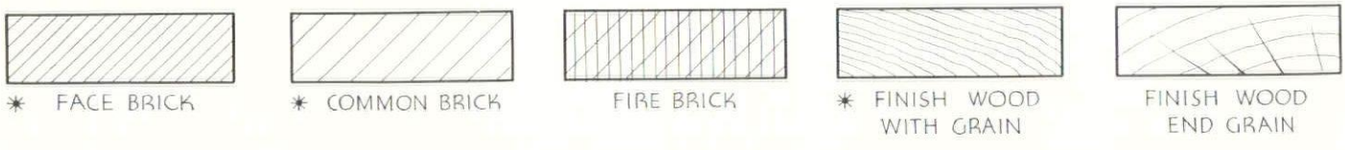
Materials	Lb. per Cu. Ft.	Lb. per Sq. Ft.
Ashlar masonry, granite, syenite, gneiss	165	.....
Ashlar masonry, limestone marble	160	.....
Ashlar masonry, sandstone, bluestone	140	.....
Mortar rubble masonry, granite, syenite, gneiss	155	.....
Mortar rubble masonry, limestone, marble	150	.....
Mortar rubble masonry, sandstone, bluestone	130	.....
Dry rubble masonry, granite, syenite, gneiss	130	.....
Dry rubble masonry, limestone, marble	125	.....
Dry rubble masonry, sandstone, bluestone	110	.....
Concrete masonry, cement, stone, sand	144	.....
Concrete masonry, cement, slag, etc	130	.....
Concrete masonry, cement, cinder, etc	100	.....
Cinder-concrete fill	60	.....
Cinder-concrete floor-arches	105	.....
Cinder fill, rammed in place	50 to 55	.....
Plain-stone or gravel concrete	144	.....
Reinforced-stone or gravel concrete	150	.....
Common brickwork	120	.....
Pressed brickwork	140	.....
Brickwork, 4-in. with 4-in. tile backing	.....	60
Brickwork, 4-in. with 8-in. tile backing	.....	75
Cement-mortar finish, 1 in. thick	.....	12
Clay-tile partitions, 3-in.	.....	18
Clay-tile partitions, 4-in.	.....	19
Clay-tile partitions, 6-in.	.....	25
Clay-tile partitions, 8-in.	.....	31
Creosoted wood-block flooring, 3-in. thick	.....	15
Gypsum partitions, 3-in., hollow	.....	11½
Gypsum partitions, 4-in., hollow	.....	14½
Hardwood flooring, ⅞-in. thick	.....	4
Lime or gypsum plasters, ¾-in. thick	.....	5
Pine, spruce or hemlock sheathing	.....	2½
Roofing-felt, 3-ply, and gravel	.....	5½
Roofing-felt, 4-ply, and gravel	.....	6
Roofing-felt, 5-ply, and gravel	.....	6½
Roofing-felt, 3-ply, and slag	.....	4½
Roofing-felt, 4-ply, and slag	.....	5
Roofing-felt, 5-ply, and slag	.....	5½
Roofing-tile, laid in place, book-tile 2-in.	.....	12
Roofing-tile, laid in place, book-tile 3-in.	.....	20
Roofing-tile, laid in place, flat, cement	.....	15 to 20
Roofing-tile, laid in place, shingle-type, clay	.....	12 to 14
Roofing-tile, laid in place, Spanish	.....	8 to 10
Skylights with ⅜-in. wire-glass and frame	.....	7½
Slate, laid in place, ¼-in.	.....	9½
Slate, laid in place, ⅜-in.	.....	14½
Slate, laid in place, ½-in.	.....	19½
Suspended ceilings, metal lath and cement plaster	.....	10
Wall-tiles, 8-in.	.....	33
Wall-tiles, 12-in.	.....	45

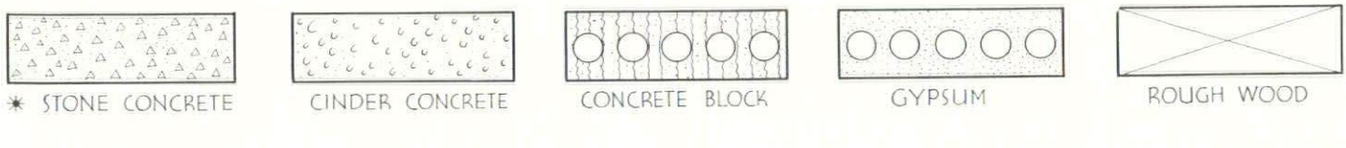
AMERICAN ARCHITECT
Time-Saver Standards

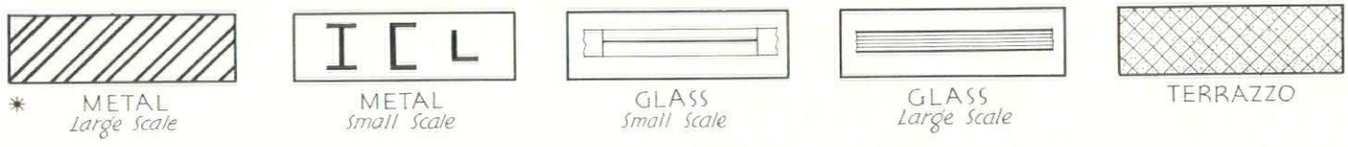
DECEMBER 1935 Serial No. 29

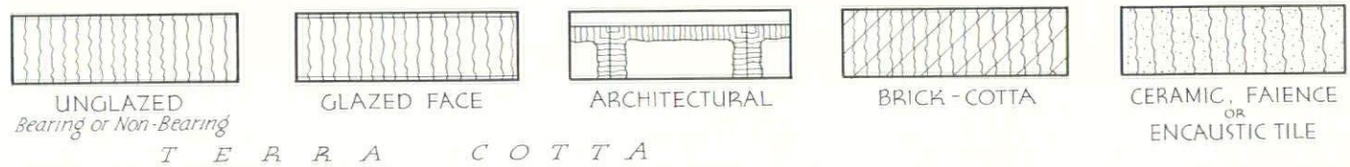
ARCHITECTURAL SYMBOLS



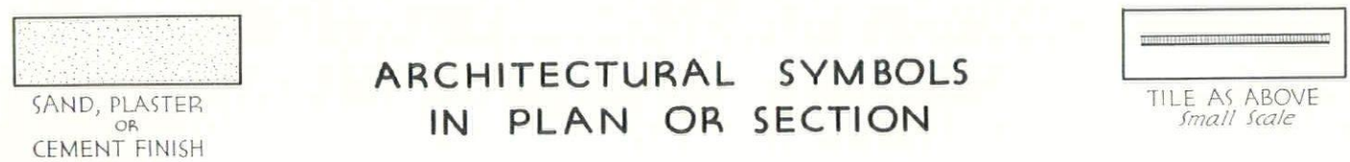




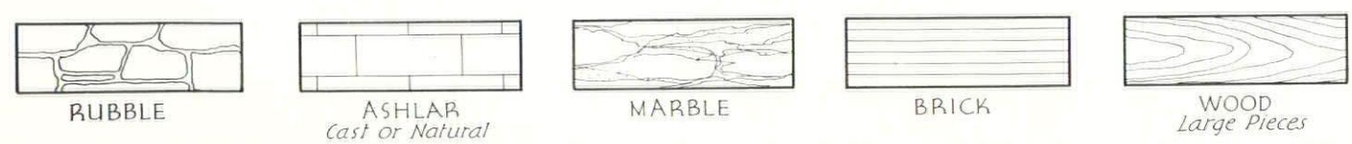




T E R R A C O T T A



ARCHITECTURAL SYMBOLS IN PLAN OR SECTION



ARCHITECTURAL SYMBOLS IN ELEVATIONS

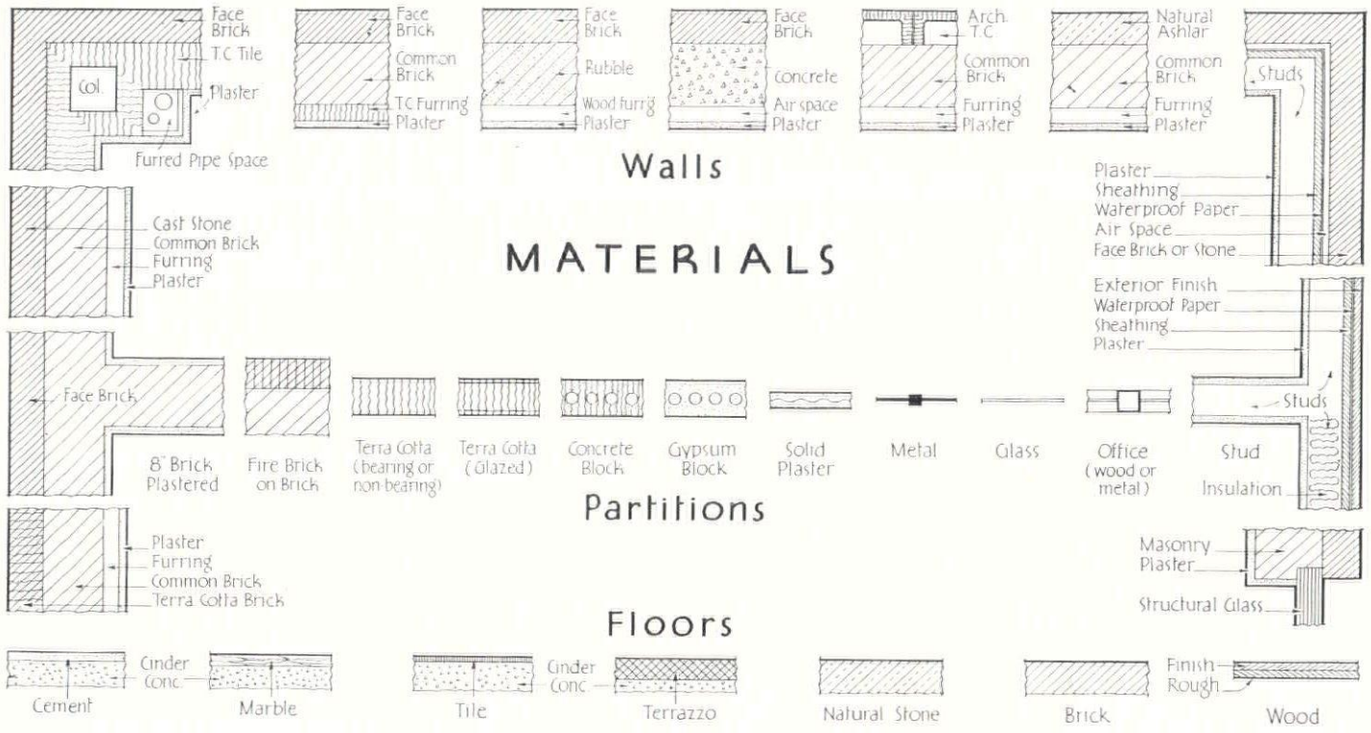
Symbols marked with an Asterisk (*) are A.S.A. and A.S.M.E. Standards. All others are recommended symbols which should be incorporated in a Legend on each sheet when applicable. Specific kinds of Metals, Stone, etc. should not be indicated as these are the province of the Specification.

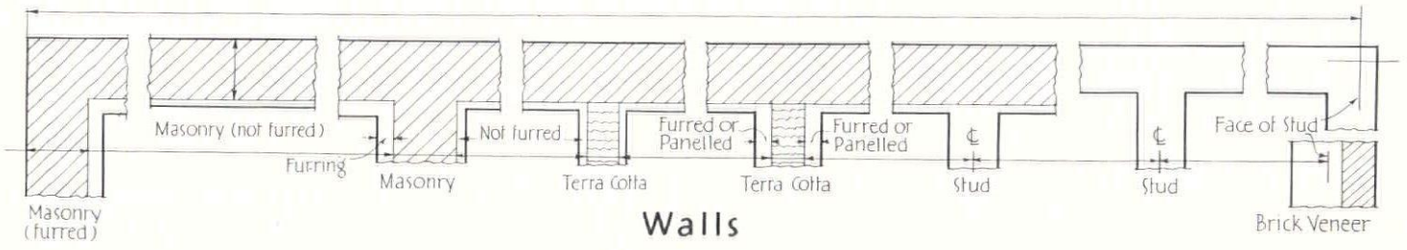
AMERICAN ARCHITECT
Time-Saver Standards

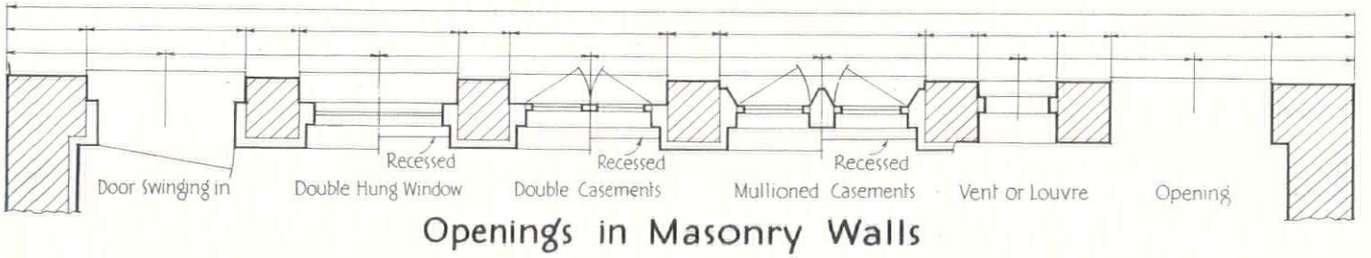
ARCHITECTURAL SYMBOLS

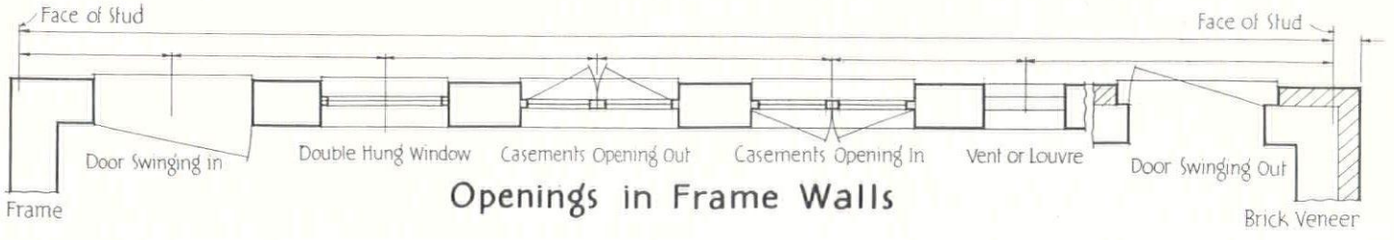
Serial No. 29 DECEMBER 1935

MATERIALS









DIMENSIONS

AMERICAN ARCHITECT
Time-Saver Standards

DECEMBER 1935 Serial No. 30

ELECTRICAL SYMBOLS

PURPOSE

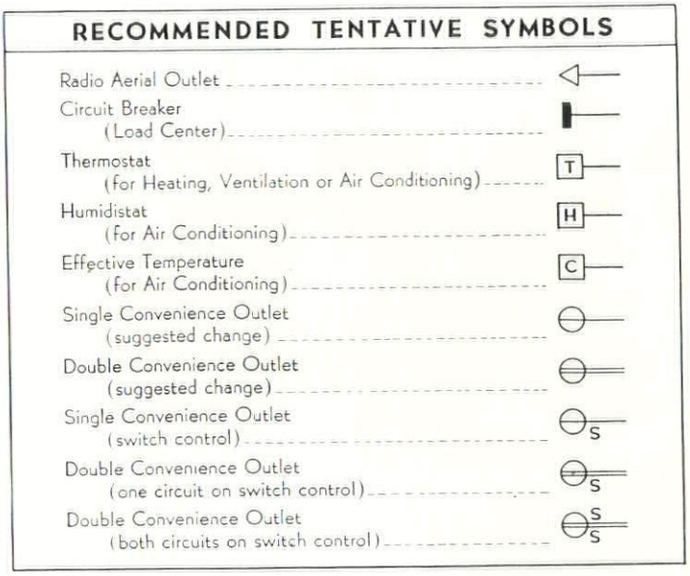
This sheet will enable the architect to place on his drawings symbols indicating specific outlets and circuits for electrical equipment of buildings.

The "standard symbols for electrical equipment of buildings" adopted by the Board of Governors of the American Institute of Electrical Engineers (A.I.E.E.) have also been adopted by the American Standards Association (A.S.A.) and are recognized by the electrical professions and trades. They, however, were adopted in December 1923 by the A.I.E.E. and jointly sponsored by the A.I.E.E., the American Institute of Architects (A.I.A.) and the Association of Electragists—International (A.E.I.) in March, 1934. No further alterations or additions to these standards have been made.

Obviously, these standard symbols do not cover the additional units developed and standardized since 1924. Additional symbols are necessary to meet the present day conditions and some of the original symbols need to be revised or abandoned.

A few suggested symbols for present day improved units are included as tentative recommended symbols. If these are used they should be carefully included in a legend upon the drawings where they occur. It is strongly urged that wherever any symbols are used that all be included in a legend on each drawing where they occur to eliminate any error or misunderstanding. When occasion arises additional symbols may be included by the architect but should always be indicated in the legend.

RECOMMENDED TENTATIVE SYMBOLS



AMERICAN ARCHITECT
Time-Saver Standards

ELECTRICAL SYMBOLS

Serial No. 30 **DECEMBER 1935**

STANDARD SYMBOLS FOR ELECTRICAL EQUIPMENT OF BUILDINGS

(Adopted by Board of Directors, American Institute of Electrical Engineers, December 14, 1923.)

- Ceiling Outlet
- Ceiling Outlet (Gas and Electric)
- Ceiling Lamp Receptacle Specification to Describe Type such as Key, Keyless or Pull Chain
- Ceiling Outlet for Extensions
- Ceiling Fan Outlet
- Floor Outlet
- Drop Cord
- Wall Bracket
- Wall Bracket (Gas and Electric)
- Wall Outlet for Extensions
- Wall Fan Outlet
- Wall Lamp Receptacle Specification to Describe Type such as Key, Keyless or Pull Chain
- Single Convenience Outlet
- Double Convenience Outlet
- Junction Box
- Special Purpose Outlet Lighting, Heating and Power as Described in Specification
- Special Purpose Outlet Lighting, Heating and Power as Described in Specification
- Special Purpose Outlet Lighting, Heating and Power as Described in Specification
- Exit Light
- Floor Elbow
- Floor Tee
- Pull Switch
- Local Switch - Single Pole
- Local Switch - Double Pole
- Local Switch - 3 Way
- Local Switch - 4 Way
- Automatic Door Switch
- Key Push Button Switch
- Electrolier Switch
- Push Button Switch and Pilot
- Remote Control Push Button Switch
- Tank Switch
- Motor
- Motor Controller
- Lighting Panel
- Power Panel
- Heating Panel
- Pull Box
- Cable Supporting Box
- Meter
- Transformer
- Branch Circuit, Run Concealed under Floor Above
- Branch Circuit, Run Exposed
- Branch Circuit, Run Concealed Under Floor
- Feeder Run, Concealed under Floor Above
- Feeder Run, Exposed
- Feeder Run, Concealed under Floor
- Pole Line
- Push Button
- Buzzer
- Bell
- Annunciator
- Interior Telephone
- Public Telephone
- Local Fire Alarm Gong
- City Fire Alarm Station
- Local Fire Alarm Station
- Fire Alarm Central Station
- Speaking Tube
- Nurse's Signal Plug
- Maid's Plug
- Horn Outlet
- District Messenger Call
- Clock (Secondary)
- Clock (Master)
- Time Stamp
- Electric Door Opener
- Watchman Station
- Watchman Central Station Detector
- Public Telephone - P. B. X. Switchboard
- Interior Telephone Central Switchboard
- Interconnection Cabinet
- Telephone Cabinet
- Telegraph Cabinet
- Special Outlet for Signal System as Described in Specification
- Battery
- Signal Wires in Conduit Concealed Under Floor
- Signal Wires in Conduit Concealed under Floor Above
- This Character Marked on Tap Circuits Indicates 2 No.14 Conductors in ½-in. Conduit (see note)
- 3 No.14 Conductors in ½-in. Conduit
- 4 No.14 Conductors in ¾-in. Conduit Unless Marked ½-in.
- 5 No.14 Conductors in ¾-in. Conduit
- 6 No.14 Conductors in 1-in. Conduit Unless Marked ¾-in.
- 7 No.14 Conductors in 1-in. Conduit
- 8 No.14 Conductors in 1-in. Conduit

Note:- If larger conductors than Number 14 are used, use the same symbols and mark the conductor and conduit size on the run.

ARCHITECTS
ENGINEERS
DESIGNERS
SPECIFICATION WRITERS

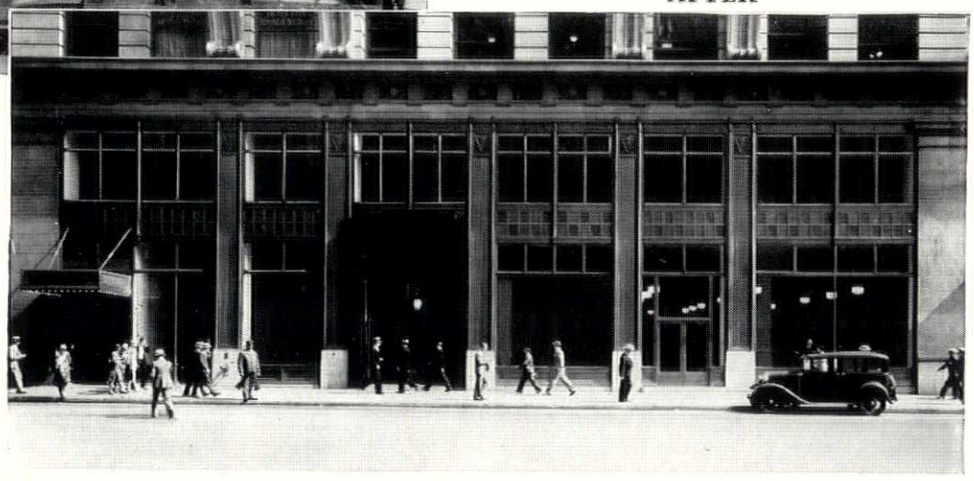
in active practice may have copies of all American Architect Time-Saver Standards sheets for convenient desk use...without cost!

SIMPLY FILL OUT AND MAIL
THE COUPON ON PAGE 107

Standard Anaconda Extruded Bronze Shapes

"effected a 67% saving in cost over cast metal"

BEFORE



AFTER

Before and after modernization . . . the facade of 15 Park Row in 1907 and today. Clinton & Russell, architects. *Penn Brass & Bronze Works,* contractors . . . *Awarded first prize by the Downtown League for the best alteration made in New York City's downtown district for the year 1931-32, this modernization has been described in an interesting folder. May we send you a copy?*

ONE FEATURE of the modernization of 15 Park Row was the economy with which the architect's designs were executed in ornamental Bronze. The contractor estimates that the judicious use of *standard* Anaconda Architectural Bronze Extruded Shapes, in constructing the five columns in the facade of the building, "effected a 67% saving in cost over cast metal." Elsewhere in the Bronze work substantial economies were realized by utilizing standard Anaconda shapes, thus eliminating die costs.

From the standpoints of lower original cost and of metal work that is always up to date, Anaconda Extruded Bronze in standard shapes offers almost endless possibilities for the faithful execution of even the most original designs. Thousands of extruded shapes may be had in Architectural Bronze and Nickel Silver, while Copper and various Copper alloys are available in a wide range of standard *drawn* shapes. These various metals offer interesting possibilities wherever contrast or close color harmony is desired.

• • •

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ANNOUNCEMENTS

HOUSE BEAUTIFUL COMPETITION

The Eighth Small House Competition conducted by House Beautiful closed on October 15th with 152 entries, consisting of plans and photographs, being submitted in three classes. Class I embraced houses of eight rooms or fewer; Class II, houses of nine to twelve rooms; and Class III, remodeled houses. In Class I, H. Roy Kelley of Los Angeles, California, was awarded first prize of $500, and Harrison Gill of New York the second prize of $300. First prize in Class II went to Richard Frederick King of Los Angeles and second prize to Robert Charles Dean of Newton, Mass. Evans, Moore and Woodbridge of New York received the special prize of $300 for remodeled houses. The awards were made by a jury of five composed of Cameron Clark and Arthur C. Holden of New York and Russell S. Walcott of Chicago, all architects, Arthur Samuels, editor of House Beautiful, and Ethel B. Power, Architectural Editor of House Beautiful.

SOAP SCULPTURE

The National Soap Sculpture Committee announces its twelfth annual competition for "Small Sculptures in White Soap," the contest will close May 1, 1936. $2500 in cash awards will be donated by the Procter & Gamble Company of Cincinnati, Ohio. Entry blanks, terms of the competition, and instruction in soap carving are available by writing 80 East 11th Street, New York City.

AMERICAN ACADEMY FELLOWSHIPS

The American Academy in Rome announces its annual competitions for fellowships in Architecture, landscape architecture, painting, sculpture, and musical composition. These competitions are open to unmarried men not over 30 years of age who are citizens of the United States. The term of the fellowship is two years, and has an estimated value of about $2000 per year. Entries for competitions will be received until February 1st. Circulars of information and application blanks may be obtained by addressing Roscoe Guernsey, Executive Secretary, American Academy in Rome, 101 Park Avenue, New York.

TOWN PLANNING STUDIES

A grant of $24,000 by the Carnegie Corporation of New York will finance new town planning studies to be directed by Henry Wright, architect, the Columbia School of Architecture announced recently. A study of the present advancement of the technique of site planning in the United States will be the first of the projects planned for a four year period. It is expected that Mr. Wright's results will be similar in form and purpose to the study of existing technique of apartment planning and housing as interpreted in his recent book "Re-Housing Urban America."

GLASS FOR BUILDINGS

Some architects and building engineers believe that glass blocks are destined to play an important part in the revival of construction activity, and may revolutionize traditional ideas of building design and styling. Aside from the beauty appeal of this type of construction, the builders point out that glass blocks have proven of tremendous value in transmitting and diffusing light. They prevent spotting of sunlight or lens effects of light on the inside and reduce the solar load or heat of sun rays on the outside. In Toledo, Ohio, the Owens-Illinois Glass Company, which has perfected the glass block as a practical building material, is constructing a large laboratory building, two stories high, entirely of glass blocks. This building will have no windows and will be air conditioned.

HEATING AND VENTILATING EXPOSITION

The ascendency of air conditioning as a new American industry will be brought to public attention by the Fourth International Heating and Ventilating Exposition to be held, January 27-31, 1936, at the International Amphitheatre in Chicago, Illinois. Hundreds of displays will illustrate the importance of the proper heating and humidifying of the air of houses, factories, and office buildings. Design trends toward modern, clear streamline contours will feature the housing of a wide range of devices from large industrial weather makers to the smallest instruments of precision. In the related fields of boilers, furnaces, hot water heaters, unit heaters, ventilating fans and blowers and thermal insulation, the trends will be toward advanced operating economy and the simplification of functions both in terms of operating sequences and design of product. Among the variety of special products which the Exposition will present will be refractory products, stove and furnace linings, new jointless firebrick, acoustic duct linings, unit steam mains, and thermal insulation of all kinds including cork and waterproof asbestos. All details of the Exposition are in charge of the International Exposition Company of Grand Central Palace, New York, with Mr. Charles F. Roth as director.

TERRA-COTTA WALL BLOCK COMPETITION

The Chicago Architectural Club announces the winners of the Terra-Cotta Wall Block Competition, under the joint sponsorship of the American Terra Cotta Company and the Northwestern Terra Cotta Corporation. The awards for the one-story shop building were as follows: First prize, Evald Young; second prize, George Recher; third prize, Roy Anderson. Honorable Mention, A. A. Zakharoff; Mention, C. Koncevic and G. W. Murison, Jr. The awards for the two-story shop and office building were as follows: First prize, A. A. Zakharoff; second prize, Herbert Roddle; third prize, Charles Koncevic. The jury of awards: Alfred Shaw, Andrew Rebori, Hugh Garden, Oscar Gross and F. O. Turper-White.

GLASS

DOMINATES DESIGNS FOR MODERNIZATION

Premiated drawings in Modernize Main Street Competition suggest the effective use of Libbey·Owens·Ford Polished Plate, both plain and colored, Vitrolite, Tuf-Flex and Blue Ridge Figured and Wire Glass.

● The architectural profession generally acclaims the Modernize Main Street Competition recently sponsored by Libbey·Owens·Ford one of the most interesting and helpful efforts of its kind in many years.

To make the results even more far-reaching, the 52 prize-winning designs have been published in book form and are now being distributed to logical prospects for modernizing. This should result in even more business for architects, for, while floor plans, specifications and other pertinent data are included, there are no working drawings and each store operator or real estate owner is urged to retain an architect in working out his individual problem.

A generous use of glass dominated practically all designs submitted by the 3,000 and more architects and designers who entered the competition. Since there is a Libbey·Owens·Ford product for almost every purpose where flat glass can be employed, architects specifying it are assured of one undeviating standard of higher quality throughout. The L·O·F label on every light guarantees your client's satisfaction, as well as your own. Look for it. It is advisable to instruct contractors and builders to leave the labels on until final inspection has been made.

LIBBEY·OWENS·FORD GLASS COMPANY . . . TOLEDO, OHIO.

LIBBEY·OWENS·FORD

Quality Glass

TRENDS AND TOPICS OF THE TIMES

(*Continued from page* 58)

these to sell at an average price of $4,000; and wants the aggressive co-operation of the Roosevelt administration.

To build houses at so low a figure, the plan would make available FHA guaranteed mortgages at a cost of one-quarter of one per cent of the depreciating balance, instead of the one per cent now charged. Interest rates covering all charges would be 4½ per cent. The cash-down-payment would be reduced to ten per cent of the purchase price.

Under the plan, private capital would build all homes for those earning in excess of $1,000 per year—approximately 85 per cent of the total.

250,000 in 1936 . . . The committee has already laid the groundwork for the application of the plan in 1936. Promotion work would be done by the Department of Commerce with all housing agencies co-operating. 250,000 homes would be built in 1936, 500,000 in 1937, and so on up until the estimated average of 750,000 yearly had been reached. To provide money for this plan, particularly at the low rates nominated, it is suggested that the program be financed through the Federal Savings and Loan Associations. These institutions, in which the government is a heavy stockholder, are reported to have $600,000,000 in assets, besides some $200,000,000 in reserves.

The membership of the committee proved the most interesting sidelight of the plan. Called a "voluntary, non-partisan, non-political organization of representative business men," its list of members is impressive. Besides the Chairman, Allie S. Freed, who heads Paramount Motors, the committee includes: Bruce Barton, Batten, Barton, Durstine & Osborn; W. B. Donham, Dean of the Harvard School of Business Administration; E. F. Hutton, General Foods Corporation; A. W. Robertson, Westinghouse Electric and Manufacturing Company; Thomas S. Holden, F. W. Dodge Corporation; E. S. Wherrett, Pittsburgh Plate Glass Company; and many others of equal distinction.

Endorsed by Prof. Moley . . . Professor Raymond Moley, editor of *Today* and formerly under-Secretary of State, was the first to give public endorsement to the plan submitted by the Committee of Economic Recovery, Inc.

Speaking in New York before the Association of Buying Offices, Moley not only sanctioned the Committee's twelve point home-building report, but further emphasized the need for 1,000,000 new low cost homes each year for the next ten years.

"Our next big market—a market that is so gigantic that it will generate lasting prosperity—is in the home. The automobile industry has been building for a great part of the 93 per cent of our population with annual incomes of less than $3,000. But the building industry, or what has passed for a building industry, has been building for 7 per cent of the people," Moley declared.

FHA MORTGAGE MONEY . . . The announcement of a new Federal Housing Administration low cost housing plan, coming on the heels of a wave of PWA spending, made it appear last month that these two agencies of housing were anxious to race one another for the title of "biggest aid to building." Fortunately, no such contest was being waged. It was merely coincidence that Administrator Ickes, rushing to meet a December 15th deadline when all PWA projects must be under way, announced the awarding of 46 new PWA contracts at the same time that Miles L. Colean, FHA's technical director, said he had found another new way to obtain adequate financing for low cost housing.

Despite the importance of PWA's worth while projects for slum clearance, which involved allotments of $133,096,000, major interest centered on what steps Colean had taken to provide money for building. Colean's answer was in two paragraphs of the Banking Act of 1935 which were intended to make lenders take a more generous attitude toward FHA insured loans, and to pave the way for publicly sold and privately under-written bond issues—issues of insured mortgage bonds.

Hope For Housing . . . Scarcely a half year ago, FHA felt sure that its power to insure mortgages would be a panacea for building ills. Unfortunately, few private lending institutions cautious to an extreme, were in a position to advance sums large enough to finance low cost housing projects, and the feverish activity forecast by FHA's directors failed to materialize. Apparently undaunted, FHA has crammed two provisions into the new Banking Act which should give, Colean feels, new impetus to low cost housing:

1. The Banking Act provided that it would no longer be necessary for one national bank to assume the *whole* mortgage on an FHA insured real estate loan;

2. It empowered the Comptroller of the Currency to designate bonds issued against FHA insured mortgages as "securities" rather than real estate loans.

The first provision was an attempt to increase the interest of national banks in low cost housing by making it possible for two or more such banks to assume jointly real estate mortgages insured by FHA. The second cleared the path for the new FHA bonds.

Although little information was available, it seemed probable that under FHA's plan a mortgage will be effected, in the form of an indenture of trust, that will provide for selling bonds to other than approved lending institutions. A trustee will be appointed to represent the stock holders. Since FHA's housing bonds will be labelled "securities" by Comptroller McCarl, they will be on at least a level with HOLF and FFMC bonds already on the market.

Said technical director Colean, "We have proceeded to the point where the work of preparing a

definite issue of these bonds is well under way and should be ready for announcement in a few weeks. A high quality of security will be made available through such issues and we are confident that the funds this source will provide will assure the fruition of many desirable projects during the coming year."

Reassurance to Private Builders . . . In between times, busy FHA officials took occasion to answer critics who say Federal housing is competing with private enterprise. Through new regulations drawn up for FHA Colean hopes to give reassurance that Federal low cost housing will not take bread from the mouths of individual builders. Three excerpts from FHA's new code show that bureau officials are in a co-operative frame of mind:

1. "No FHA projects will be permitted in localities where adequate housing is available;
2. Occupancy of FHA dwellings will be open only to those whose incomes are insufficient to permit, without sacrifice of other essentials of living or security, their occupancy of housing of adequate standards of sanitation, safety and amenity;
3. FHA will not insure mortgages on projects which are obliged to compete for tenancy by the offering of extraordinary facilities and services."

REZONING NEW YORK . . . "If built up to the present allowable maximum, areas now zoned for business and industry could provide working space for 340,000,000 persons, under present building regulations, and the areas reserved for residences could house 77,000,000."

Taking these two facts as a basis, the Merchants' Association of New York recommends changes in the City's zoning requirements that would check the building of skyscrapers without proper space around them, and would spread business and residential populations over wider areas.

The building of more skyscrapers, the Association feels, would be at the expense of all other available land, and particularly at the expense of light and air for other buildings. Besides, overdevelopment of some areas and underdevelopment of others are disruptive of sound real estate values, and create costly problems of traffic congestion and conveyance.

"Enlightened self-interest, therefore," says the Association, "ought to favor zoning rulings which would permit a greatly lessened intensity of land usage."

NATIONAL HOME SHOWS . . . "Bank spends $100,000 on west side houses; four altered buildings show larger income." Headlines like this one from the New York *Times* were conspicuous in the metropolitan press last month, and FHA and The Manufacturer's Housing Display Council decided that 1936 definitely will be the time to lend a hand to a building industry that is "hitting the high spots" on the comeback trail. From Washington, therefore, came the announcement that a nation-wide series of National Home Shows will be jointly sponsored by the Manufacturer's Housing Display Council—a group of 150 manufacturers of building products and equipment—and FHA.

The prime reason for having these home shows, said FHA, "is to educate the public in the opportunities to be derived from utilizing the provisions of the National Housing Act." To head its promotion FHA drafted Peter Grimm from the presidency of William A. White and Sons, New York rental agents. Beside him was FHA's chief of exhibits Henry A. Guthrie. Also on the staff were Joseph M. Upchurch, promoter of the "live at home" shows in North Carolina, and Franklin Ware of Philadelphia who is designing FHA's direct by mail pieces.

Not to be outdone, and equally anxious to co-operate, the National Association of Real Estate Boards established an exhibit department and placed John Servas, creator of the Horticulturist exhibit at Chicago's Century of Progress, in charge. It became his duty "to co-operate with local agencies in designing the shows."

First in Baltimore . . . On January 4th, 1936, in Baltimore's Fifth Regiment Armory, the first of these shows is scheduled to appear. The second will open in San Diego on January 15th in connection with the reopening of the America's exposition. Plans are already under way to present National Home Shows in Kansas City, Philadelphia, Buffalo, Houston, Oakland, Miami, Minneapolis, Louisville, Milwaukee, Indianapolis and Boston. Each show will last a minimum of eight days, and, except in cities of more than 500,000 population, a maximum of fifteen. Each will be locally financed.

Besides the usual exhibits of building materials and equipment, two other features are promised. For each show a house will be built, decorated, and landscaped. And FHA, to do its educational job, will furnish two cylindrical pylons, 17 feet high and 3½ feet in diameter, from which electrical transcriptions of FHA's public messages will be broadcast.

Guy T. O. Hollyday, president of the Baltimore Real Estate Board, announced that William Gordon Beecher, A. I. A., would design the five-room cottage to be constructed for the Baltimore Show.

UNCLE SAM—REALTOR . . . Among financiers it is an old maxim that the biggest bankers usually are also the biggest owners of real estate. By the middle of November it was becoming increasingly apparent that the Federal government, already the nation's biggest banker with $8,280,000,000 in loans outstanding, will prove no exception to this rule. For, through the 21 agencies it totally finances and the 10 others it helps to finance, the government has written down on the Treasury's books $94,582,194 worth of real estate—most of which came from loans that were not repaid.

Despite this enormous burden of real esate, most officials are in an optimistic mood concerning its disposal. The Federal Land Banks have 24,000 farms booked at a value of $22,405,398. But, since land values are on the upgrade and prices can be stepped up to keep pace with the market, officials feel that they are in a fair way "to get out from under."

The Home Owners' Loan Corporation has

$3,034,509 worth of real estate which it hopes to sell, or to rent through its newly created property management division. Besides the 361 homes which it actually owns now, foreclosures are under way against 2,105 homes.

The Reconstruction Finance Corporation has $3,298,825 worth of property for sale, consisting, for the most part, of collateral taken over in liquidating closed banks.

Although the Public Works Administration is booked for $10,189,560, it is the easiest creditor of the lot. PWA has no thought of taking over any of the courthouses, schools, or jails in which its funds are tied up.

While the 94 million dollars worth of real estate now controlled by the 31 agencies represent approximately 12 per cent of the total loans still outstanding, department heads seem to feel that the percentage of loan failures is not out of proportion.

FRANKLIN D. ROOSEVELT . . . President of the American Construction Council, says: "One of the surest steps toward permanent prosperity is the putting of American industry on a steady basis the year 'round. Winter construction is not only feasible and practicable but economical and worth serious consideration of every one planning to build." W. J. Lynch, in a recent issue of Engineering News-Record states that on a number of large reinforced concrete jobs running into $1,000,000 to $3,000,000 his firm has found that the additional cost of winter construction has run less than 1% of the total cost of the building and only in one case as much as 3%. This information should encourage a continuation of building activity through the coming months which at this time has gained much needed headway towards solving unemployment problem.

EDITORIALLY . . . Engineering News-Record in a recent issue, takes the statisticians to task for their summaries which indicate that we are now experiencing something of a boom in residential construction. In 1934 there were 30,000 dwelling units built; in the same year and every other year, as many dwelling units were destroyed by fire alone. A 150 per cent increase over 1934, to 75,000 units, is less than 15 per cent of the annual volume of residential building in every year from 1925 to 1929. Actually the housing deficiency which began in 1929 is still increasing by leaps and bounds. If the present rate of house-building were multiplied fifteen times, thinks Engineering News-Record, we would still need four years to make up the accumulated deficiency of more than two million dwelling units existing at the present time.

• The courts have held that a new and original design for a building is patentable, inasmuch as a building is, in fact, an article of manufacture, according to Everett G. Wright, a Detroit attorney. Items of interest to architects for which design patents have been issued recently are buildings, service stations, plumbing, furniture, cabinets, etc.

PERSONALS

• If you change your address, please report the change direct to American Architect five weeks before the change is to take effect, sending both old and new addresses. The Post Office will not forward copies to your new address unless extra postage is provided by you. Our request is made to save you this expense and to assure the receipt of your American Architect

• Christopher Grant La Farge, fellow and director of the American Institute of Architects, has been named lecturer on the Charles T. Mathews Foundation for 1935-6. The Foundation, established at Columbia University in 1934 through a gift of the late Charles T. Mathews, provides for a series of free lectures annually on Gothic art and architecture. Mr. La Farge already has sailed for France, where he will prepare his lectures. The first will be given January 8 in the auditorium of the Metropolitan Museum of Art.

• Peter Copeland, member of the Advisory Board of the School of Architecture of New York University, has established offices and a manufacturing plant at 244 West 23rd street, New York City, where he will practice architecture and create industrial designs and exhibits.

• Kenneth Murchison, A. I. A., prominent as head of the Annual Beaux Arts ball, has been named as one of a number of defendants in a million dollar suit over the management of the Beaux Arts Apartments. Joseph G. Haft, a stockholder, filed the suit in Supreme Court, and is demanding an accounting of the $1,000,000 lost by the apartments. He charges mismanagement. It is interesting to note that an architect can be connected, no matter how remotely, with that much money.

• Guy S. Pison of Paris, pupil of Victor Laloux, architect, has been awarded a scholarship for travel in the United States by the American Institute of Architects, it is announced by Charles Butler, chairman of the Institute's Committee on Education. M. Pison is the sixth foreign student of the arts to receive the scholarship, which was established by William A. Delano and Chester H. Aldrich of New York to advance the Institute's program of international relations.

• William E. Hunt, 62, architect of Torrington, Connecticut, died there October 13, 1935 after a long illness. His business will be continued by James H. Bruffee, architect.

• The Ann Arbor, Michigan, Society of Architects has elected William D. Cuthbert as President, L. L. Woodworth as Vice President, and Carl J. Rudine as Secretary and Treasurer for the coming year.

• The Architects' Emergency Committee sends the following notice to architects and draftsmen: "Because of the increased number of calls for architectural draftsmen it is important that you keep the office, located at 115 East 40th Street, New York, informed of any change in address or telephone."

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF MARCH 3, 1933

Of AMERICAN ARCHITECT, published monthly at New York, N. Y., for October 1, 1935.

State of New York } ss.:
County of New York }

Before me, a Notary Public in and for the State and county aforesaid, personally appeared R. F. Gardner, who, having been duly sworn according to law, deposes and says that he is the Business Manager of the American Architect and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher, International Publications, Inc., 959 8th Ave., New York City. Editor, Kenneth Stowell, 959 8th Ave., New York City. Managing Editor, Roger W. Sherman, 959 8th Ave., New York City. Business Manager, R. F. Gardner, 959 8th Ave., New York City.

2. That the owner is International Publications, Inc., 959 8th Ave. Sole Stockholder, American Newspapers, Inc., 100 West 10th St., Wilmington, Del. Sole Common Stockholder, W. R. Hearst, 137 Riverside Drive, New York City.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company, but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

R. F. GARDNER,
Business Manager.

Sworn to and subscribed before me this 30th day of September, 1935.

[Seal] REGINALD WEST.

Notary Public Queens County No. 3416. Reg. No. 3730. Cert. filed in N. Y. County No. 832. Reg. No. 6W521. Commission expires March 30, 1936.

• Nathan Straus has recently returned to the United States after visiting England, France and Switzerland where he made a study of municipal housing at the suggestion of Mayor LaGuardia of New York. Unlike ourselves, reports Mr. Straus, European countries have learned to treat low-cost housing and the clearance of slums as major and permanent problems of society . . . they do not consider such work as an emergency or temporary solution to work relief problems.

• Henry Hobson Richardson, well known early American architect, is to be honored on the fiftieth anniversary of his death, by an exhibition of his work at the Museum of Modern Art in New York. Professor Henry Russel Hitchcock, Jr., of Wesleyan University, author of several important books on modern architecture will direct the Richardson exhibition. At the same time will be issued a book by Mr. Hitchcock which will be a critical and historical study of the life and works of the famous architect. The exhibit will be held in January, 1936.

• Solomon Kaplan, architect, has moved his office from 10 S. 18th Street to 2120 Spruce Street, Philadelphia, Pa. Mr. Kaplan wants manufacturer's data sent to the new address.

• Warren Webster & Company, manufacturers of steam heating equipment, announce the appointment of John F. Hanbury as Manager of the Company's New York Office at 470 Fourth Avenue, succeeding the late William M. Treadwell. Mr. Hanbury has been with the company for more than 16 years.

• Clinton B. Cook, Architect, formerly of Asbury Park, N. J., and subsequently of Poughkeepsie, N. Y., has now established his office at 2233 Quenby Drive, Houston, Texas. Mr. Cook desires to receive catalogs pertaining to building and equipment.

• Cleo H. Jenkins, architect, Newberg, Oregon, has moved to LaGrande, Oregon, and opened an office at 1306 5th Street.

• Wayne S. Hertzka and William Knowles, architects, are now located at 369 Pine Street, San Francisco, California.

• Carl C. Ade, architect and engineer, formerly located at 80 East Avenue, Rochester, New York, has moved his office to 52 James Street.

• In a recent address Sir Giles Gilbert Scott, President of the R.I.B.A., said: "I feel convinced that architects stand on the threshold of a great adventure; circumstances are playing into our hands." In the present opportunity he visions planning as the great need of the moment and the soft-pedalling of the artistic qualifications of the architect as desirable in winning the confidence of a practical minded public.

NEW CATALOGS . . . .

Readers of AMERICAN ARCHITECT may secure without cost any or all of the manufacturers' catalogs described on this and the following page by mailing the prepaid post card printed below after writing the numbers of the catalogs wanted. Distribution of catalogs to draftsmen and students is optional with the manufacturers

Boilers and Radiators

825. . . . Eight different styles of boilers for hot water, steam, vacuum and vapor heating systems in residential and commercial buildings, are illustrated in color and interestingly described in the new 56-page "Boilers and Radiators" catalog issued by Crane Co., Chicago. This heating catalog embodies many engineering tables of technical data, charts, blueprint drawings, sectional illustrations, performance data records and other heating information. In addition to the boilers, the new book also includes similar facts about the Crane line of radiators.

Sarco Graduator System

826. . . . Bulletin 128 issued by Sarco Co., Inc., New York, pertains to a new system of automatic temperature control for large buildings. This system, called the Sarco Graduator System, affords direct-by-the-weather control of steam heating plants. The functions and advantages of this system are described and graphically illustrated.

Built-up Roofs

827. . . . A new illustrated brochure describing all types of J-M built-up roofs has been issued by Johns-Manville, New York. Drawings show construction details of the most commonly used roofs and are supplemented by a complete table showing the surface, underwriter's rating, materials used in construction and weight per 100 sq. ft. for the various types. Other sections are devoted to a description of the materials which go into a built-up roof, proper flashings, and the advantages of roof insulation.

Armstrong's Vibracork

828. . . . How to lessen vibration caused by rotating or reciprocating machinery with Armstrong's Vibracork is explained in a 12-page filing-sized catalog issued by Armstrong Cork Co., Lancaster, Pa. Methods of application are fully described.

Hot Water Service Heaters

829. . . . Some of the standard types of hot water service heaters, preheaters and converters manufactured by The Patterson-Kelley Co., Inc., East Stroudsburg, Pa., are illustrated and described in a new 24-page catalog (No. 16). Tables included give capacities, weights, clearance dimensions, conversion factors, hot water consumption data, etc. Filing size; A. I. A. File No. 29-D-25.

Galvannealed Steel Sheets

830. . . . The Superior Sheet Steel Co., Canton, Ohio, has issued a 24-page filing-sized booklet which describes the important features of Superior Galvannealed Sheets and explains the manufacturing process. Most of the booklet contains illustrations and descriptions of a broad range of products fabricated from these sheets.

Sturtevant Speed Heaters

831. . . . Complete data on the mechanical details and advantages of Sturtevant Speed Unit Heaters are given in Catalog 396-2, a 20-page filing-sized booklet issued by B. F. Sturtevant Co., Hyde Park, Boston, Mass. Also included are capacity and dimension tables, wiring diagrams, motor data, heat transmission coefficients, installation details and specifications.

Friez Wind Equipment

832. . . . A new bulletin entitled "Wind News," issued by Julien P. Friez & Sons, Inc., Baltimore, Md., describes the complete line of Friez Wind Equipment. Such equipment as The Weatherman, Airport Wintac-Selsyn, the Anemograph, Anemometers and various other types of wind direction and velocity indicators, transmitters and recorders, is illustrated and described. A 4-page supplement gives prices, shipping weights and electrical and installation characteristics.

Insulite Homes Folder

833. . . . The Insulite Co., Minneapolis, Minn., has just released the fourth in its series of folders dealing with the subject of proper residential construction and the fuel economies possible following the application of insulation. The booklet analyzes the coal, oil or gas fuel requirements for a typical home and gives comparisons between insulated and uninsulated construction for each of the four climatic zones in the United States.

Electric Air Heaters

834. . . . Electric Air Heater Co., Mishawaka, Indiana, has issued a comprehensive 24-page data book (No. 236) on electric air heaters. This book illustrates and describes space heating by forced heat, gives cost comparisons and shows applications of Electromode industrial, portable and "Bilt-in-Wall" all-electric fan-type unit heaters. Dimensions, capacities and specification data are also included. Filing size: A. I. A. File No. 31-K-3.

Convectors and Boilers

American Radiator Co., New York, has recently published two new catalogs:

835. . . . An 8-page booklet illustrating and describing the No. 11 Arco Oil Burning Boiler for the smaller home. Specifications, ratings and dimensions are included. Filing size; A. I. A. File 30-C-14.

836. . . . Data on Arco Convectors for concealed radiation are presented in an 8-page illustrated catalog. Filing size; A. I. A. File 30-C-4.

NO POSTAGE REQUIRED ON THIS CARD

AMERICAN ARCHITECT, New York — December, 1935

Please have the following catalogs reviewed in this issue sent to me.

Numbers .....

.....

• I also desire further information about the new products described in this month's "New Materials and Equipment." . . . (See pages immediately following this insert.)

Numbers .....

• I would like to have catalogs and information concerning the following products advertised in this issue. (Write page number or name.)

.....

☐ Check here for FREE copy of "WHEN YOU BUILD" booklet.

Name .....

Firm name .....

Address .....

City .....

Occupation .....

These NEW Catalogs may be obtained through AMERICAN ARCHITECT

United States Gypsum Products

Three new catalogs have been issued by United States Gypsum Co., Chicago:

837. . . . Sheetrock Tile Board for bathrooms, kitchens, shops, etc., is presented in a four-page catalog illustrated in color. Several examples of Sheetrock finished in typical tile colors are also shown.

838. . . . Rocklath, Rocklath Insulating Lath and the Rocklath Resilient System used for sound insulation, are briefly described in a 6-page broadside. Illustrations show application methods.

839. . . . What insulation is, where it is installed, who installs it, what it costs are some of the questions answered in a 6-page consumer broadside on Red Top Insulating Wool.

Caldwell Sash Balances

840. . . . A revised edition of its catalog illustrating and describing Caldwell Sash Balances for counterbalancing double hung windows is available from the Caldwell Manufacturing Co., Rochester, N. Y. Specifications and installation details are included together with data on door holders and other specialties. Filing size; A. I. A. File 27-A-1.

Rocor Cement Paint

841. . . . A small folder has been issued by Artstone Rocor Corp., Brooklyn, N. Y., which discusses the advantages of Rocor Cement paint for exterior and interior porous masonry surfaces. Several of the available colors are illustrated.

Therm-O-Tile Stream Conduit System

842. . . . H. W. Porter & Co., Inc., Newark, N. J., have issued an 8-page booklet (Bulletin 352) which gives specifications for a complete system of conduits for the protection and insulation of all pipe lines between buildings, including the excavation; backfilling; manholes and other concrete work; drainage; waterproofing, if required, etc. Also included are cross sections of typical installations of conduit parts, and a typical plot plan layout for conduit lines.

Alundum Cement Floor Aggregate

843. . . .The characteristics of Alundum (C. F.) Aggregate for making cement or asphalt floors, stairs, ramps, sidewalks and driveways serviceable and of non-slip character are explained in Catalog "D," a 4-page booklet issued by Norton Co., Worcester, Mass. Applications, sizes, costs, specifications and installation data are given. Filing size; A. I. A. File 3-D-5.

Hemco Wiring Devices

844. . . . Bulletin No. 15, issued by The Bryant Electric Co., Bridgeport, Conn., catalogs the complete line of Hemco Wiring Devices and Cord Sets. This bulletin supersedes Bulletin No. 14 issued earlier this year. It includes the new H311 soft rubber weatherproof socket with all-rubber leads recently added to the line. List prices are also given.

Trane Unit Heaters

845. . . . A new 24-page booklet issued by The Trane Co., La Crosse, Wis., illustrates and describes its line of Floor Line Spread Unit Heaters. The booklet opens with a discussion of the features of these heaters and this is followed by data on selection and application. Dimensions and capacities, specifications, piping connections, controls and other pertinent information are also given.

Janette Rotary Converters

846. . . . The Janette Rotary Converter for converting direct current to alternating current for radio and public address systems, gaseous tube electric signs, etc. is described and illustrated in a 4-page filing-sized catalog (Bulletin 13-I) issued by Janette Mfg. Co., Chicago. Application data, dimensions, weights and a price schedule are included.

Non-Scald Mixing Valve

847. . . . Factual data about the D'Este Non-scald Pressure Mixing Valve for residential and institutional installations are contained in an 8-page booklet (Bulletin 140) prepared by Julian D'Este Sales Corp., Boston, Mass. General specifications, dimension details and other information are included. Several types are illustrated. Also included is a description of the D'Este Combination Key Stop and Strainer. Filing size; A. I. A. File 29-H-31.

Burt Ridge Ventilator

848. . . . The Burt Mfg. Co., Akron, Ohio, has issued a four-page folder which presents the advantages and structural characteristics of the Monovent Continuous Ridge Ventilator for both industrial and residential use. Construction and mounting details are given as well as a table showing capacities. Filing size; A. I. A. File 12-K.

Marsh Wall Tile

849. . . . General information, applications and installation data on Marshtile and Marlite are given in a four-page booklet issued by Marsh Wall Tile Co., Dover, Ohio. Details of commercial and residential mouldings are shown and some of the various colors available are illustrated. Filing size; A. I. A. File 23-D.

Jointless Post Railings

850. . . . Illustrations and descriptions of the new all-welded, all-steel Jointless Post Railings manufactured by The Fabricated Steel Products Co., Wheeling, W. Va., are contained in a six-page filing-sized broadside recently issued. Also included are details and dimensional data on this company's self-supporting flag and antenna poles.

Bolt Anchors

851. . . . The Rawlplug Company, Inc., New York, has issued a small folder which contains data on its zinc and lead bolt anchor, called Rawl-Anchor. It shows how, where and why these anchors should be used, and also gives information on tests, sizes, dimensions, prices, etc.

G-E Time Switches

852. . . . Two types of general-purpose automatic time switches both for indoor and outdoor use, including store and show window lighting, street lighting, signs, floodlighting, water heaters and furnaces, etc., are described in publication GEA-1427D just issued by General Electric Company, Schenectady, N. Y. Rating and dimension data and installation details are given.

AMERICAN ARCHITECT

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NEW YORK, N. Y.

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572 Madison Avenue

New York, N. Y.

BRIEF REVIEWS OF MANUFACTURERS' ANNOUNCEMENTS TO KEEP THE ARCHITECT INFORMED OF NEW PRODUCTS

New Materials and Equipment

Steel Rolling Grille

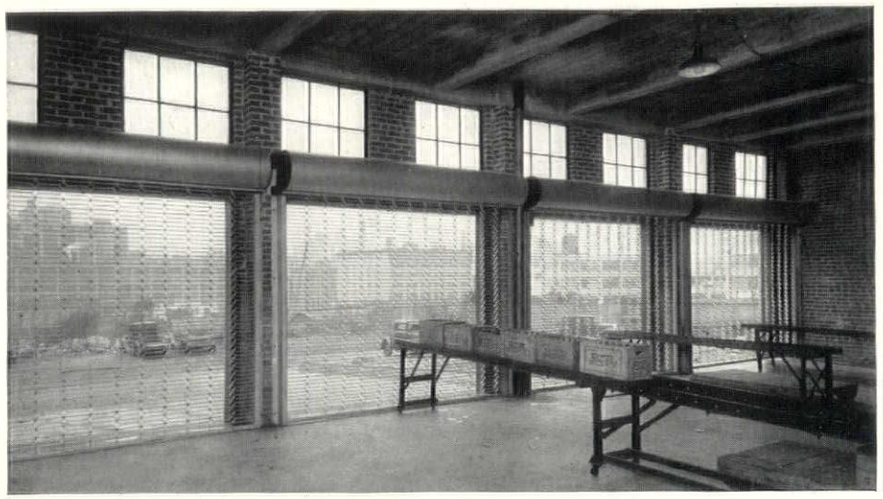
533M Without sacrifice of light, air or vision, a new steel rolling grille provides a protective barrier for all types of door and window openings in commercial, industrial and residential buildings. The grille proper is made of round steel bars connected by ornamental pressed steel links. It travels in guides mounted on the sides of the opening and coils on a heavy barrel above the lintel. Helical springs enclosed in the barrel provide accurate counterbalance. When closed the grille can be securely locked. It may be installed on the face of the wall or in reveals. This new unit, manufactured by Kinnear Mfg. Co., Columbus, Ohio, can be operated manually, mechanically, or electrically. It can be had in various metals and in practically any size.

Screws and Bolts

534M Screws and bolts with a newly designed recessed head have been added to the products of the American Screw Co., Providence, R. I. A tapered recess which exactly fits a tapered driver takes the place of the slot in the ordinary screw. The screw holds on the point of the driver and may be moved into position for driving with one hand. No pilot holes are required.

Glass Block

535M An improved glass block, which is said to reduce heat flow, deaden sound, transmit and diffuse light, deflect sun glare and resist fire, can be laid in practically the same way as any other bricks used in standard building construction. By a special process of enameling and sanding, mortar is so bonded as to prevent water leakage of the wall and to increase wall strength against lateral wind pressures. The adhesiveness of the block is obtained by applying a special enamel to the side which fits against the mortar immediately after it comes out of the oven. Another coating of enamel is applied to thicken it for an application of sand. The finished mortar-bearing surface is rough. The photograph shows the contrast between an enameled block and one that has not been treated. The Owens-Illinois Glass Co., Toledo, Ohio, is marketing this product.



Water-Operated Coal Stoker

536M Only a water connection is required to operate a new type of coal stoker. Counting three springs and a hydraulic diaphragm it has only nine moving parts. Simultaneous control of the inlet and outlet water is accomplished by flapper valve mechanism closely corresponding to the operation of an automobile vacuum tank. A piston moving ¾ of an inch each stroke delivers a trifle less than ¼ lb. of coal at a stroke. The speed of stroking can be regulated as frequently as once a minute or as infrequently as once in twenty minutes. Installation is said to be inexpensive and requires no alteration of the furnace. Firing through the regular fire door opening, the fuel is preheated and then discharged on a cone or sloping angle of repose. This water-operated coal stoker is offered by The American Home Stoker Co., Cleveland, O.

Pushbutton Motor Starter

537M Bulletin 9101 Pushbutton Motor Starter, recently introduced by Cutler-Hammer, Inc., Milwaukee, Wis., is designed for almost any fractional horsepower application, and can be used for surface mounting and as built-in control with the self-contained mounting bracket for front mounting or without the bracket for back or cavity mounting. The switch provides protection against overloads with a free-tripping thermal overload mechanism. An overload is instantly indicated by the return of the operating button to the "off" position. Pushing the "start" button resets the overload mechanism and restarts the motor. The capacity of the switch can be varied by changing the heater coil. The coil is readily accessible from the front of the switch by removing the cover plate and two screws.

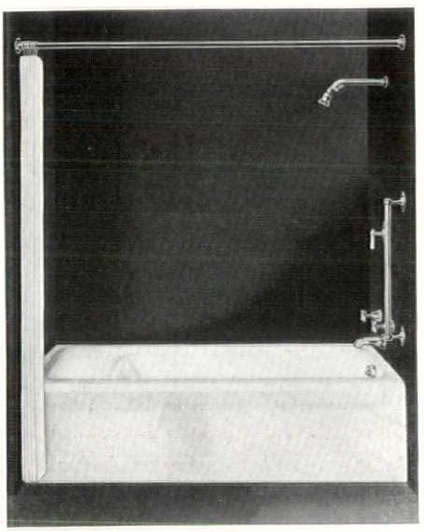
Series 3 Unit Heaters

538M The Fedders Manufacturing Co., Buffalo, New York, announces the addition of seven sizes to its line of Series 3 Unit Heaters, making twenty standard models now available. The addition of these seven Unit Heaters provides sizes and capacities up to 1300 EDR.

"Plug-In" Strip

539M A new wiring product, trade-marked "Plug-In" Strip, makes electricity available at intervals of six inches around the walls of any room, eliminating pyramided receptacles and long extension wires. "Plug-In" Strip is made of a

1 3-16 inches wide channel, zinc treated to prevent rust, with a bakelite cap having plug openings every six inches. It is manufactured in 1, 2, 3, 4 and 5-foot lengths, each unit being complete and ready for installation. A raceway channel is also provided from which odd sizes may be cut to meet wiring requirements of any sized room. The system is complete with five fittings, which consist of elbows, couplings and junction box. This is a new product of National Electric Products Corp., Pittsburgh, Pa.



Metric Showering Bath

540M The Metric Showering Bath with an integral seat, which has recently been introduced, is designed to fit any sized bathroom. It has straight lines, flat surfaces and recess panels and is said to be easy to clean—a person of average size can reach entire tub from the front. It is claimed that this new bath offers additional convenience for foot bathing, shower bathing or for bathing small children. In design the Metric harmonizes with other fixtures made by Kohler Company, Kohler, Wis.

Pushbutton Master Switches

541M A new line of water-tight pushbutton master switches, mounted in moulded phenolic-compound enclosures and intended for naval-type or equivalent industrial installations, has been announced by General Electric Co., Schenectady, N. Y. Each unit is operated by a moulded-compound lever and as many as four units may be mounted in an enclosure. Designated as CR2940 master switches, the units provide both normally open and closed circuits. Either momentary-contact units or a combination of momentary-contact and latched-in units are available.

Link-Belt Automatic Stoker

542M Stoker Department of Link-Belt Company, Chicago, announces the addition of household anthracite automatic stokers to its line of bituminous coal burners. Three sizes are available, with maximum coal feeds of 25, 35 and 50 lbs. per hour.

Curtis Luminaire Design 5500

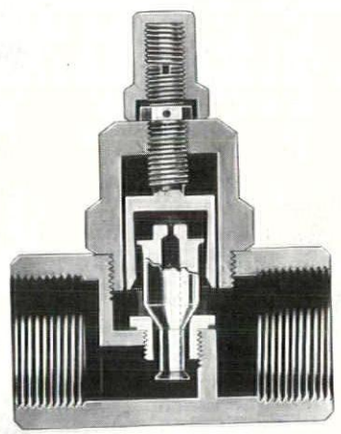
543M Available in the opaque or luminous type, the new luminaire, Design 5500, is particularly adaptable to low-ceilinged interiors because of its shallowness. In the opaque type the bowl is made of LunaX aluminum with LunaX reflecting surface. In the luminous type the upper member of the bowl is made of opal diffusing glass whereas the rounded cup at the bottom (the reflector) is of LunaX aluminum. A small amount of softly diffused direct light filters through the glass ring. This type is available in two sizes and will take a 200, 500 or 300 watt lamp. A product of Curtis Lighting, Inc., Chicago.

Briggs Kitchen Cabinet

544M A new kitchen cabinet sink has been announced by Briggs Mfg. Company, Detroit, Mich. It measures 25 inches x 60 inches, includes convenient accessories, and is enameled with acid-resisting porcelain. Two or three hole faucet fixtures may be used on this model, either on the back apron, or individual fixtures on the ledge. The base of the cabinet sets back 4 inches to provide toe room. Drain boards are recessed. The compartment under the drain board contains partitioned metal cutlery drawers and a wooden cutting board. Ventilation of the cabinet is obtained through holes in the bottom panel, entering air rising through spacing near the top of the sink. Width of sink has been standardized to meet requirements in case a 24-inch work table is constructed at either end. The cabinet is available in white or solid colors and in harmonious color combinations.

Beveled Cork Tile

545M Beveled cork tile has been added to the line of resilient tiles made by the Armstrong Cork Co., Lancaster, Pa. One of its features is that it can be installed over rough suspended subfloors without the necessity for sanding. Surface irregularities in the subfloor are offset by the beveling of the tile. Since sanding is eliminated, the smooth surface given to the tile in its manufacture need not be removed.



Yarway Impulse Steam Trap

546M A new steam trap which depends for its operation on the difference in flow characteristics of cold water, hot water and live steam flowing through two orifices with a chamber between, has recently been developed. The trap has only one moving part—a valve disc—requiring no buckets, floats, bellows or diaphragm. Movement of this disc is governed by variations in pressure in the space above the valve piston, called the control chamber; these changes in pressure occurring with changes in temperature of condensate. The device is made in six sizes, ½ inch to 2 inches, and is set to operate all pressures from 0 to 400 lbs. The Yarnall-Waring Co., Chestnut Hill, Philadelphia, is the manufacturer.

EAGLE INSULATION CHEATS FLAMES

The Parkway Towers, beautiful East Yonkers apartment building. Eagle Insulation, installed early last spring for the year-round comfort of tenants, actually prevented costly damage a few months later when a roof blaze threatened to sweep the building. Fireproof Eagle mineral wool installed under the roof stopped the fire from spreading to the apartments below.

Spectacular roof blaze on East Yonkers Apartment kept from spreading by thick layer of fireproof Eagle Insulation

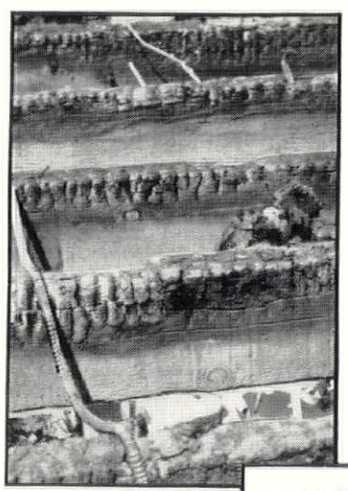
LOSS MINIMIZED!

• When crossed wires under the roof of the Parkway Towers, 219 Bronx River Road, East Yonkers, N. Y., started a spectacular fire last June, more than 75 families fled from their apartments. The whole building seemed doomed to ruin.

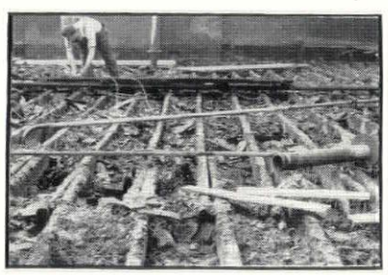
• But the blaze was quickly brought under control. A thick 4-inch blanket of Eagle Insulation, between ceiling beams in all top-floor ceilings, kept the roaring flames from spreading to the apartments below.

• The roof was almost completely destroyed, but the top floor ceilings were not even scorched . . . a dramatic demonstration of the fireproof protection that Eagle Insulation gives to apartment buildings and homes.

• No wonder more and more families are today insisting on insulation—the thick, efficient kind of insulation that Eagle mineral wool provides. This "loose fill" material is easily installed in any type of building by a special pneumatic process . . . . keeps homes up to 15° cooler in summer . . . saves up to 40% of fuel bills in winter . . . and is approved by the U. S. Board of Underwriters as being absolutely fireproof.



Note how flames were stopped at the point where Eagle Insulation began. (This fireproof mineral wool was scraped back before photograph was taken.)



Actual photograph taken the morning after the Parkway Towers fire. Note complete destruction of the roof. Because the ceiling beams were lined with Eagle Insulation, the fire could not spread to the floors below.

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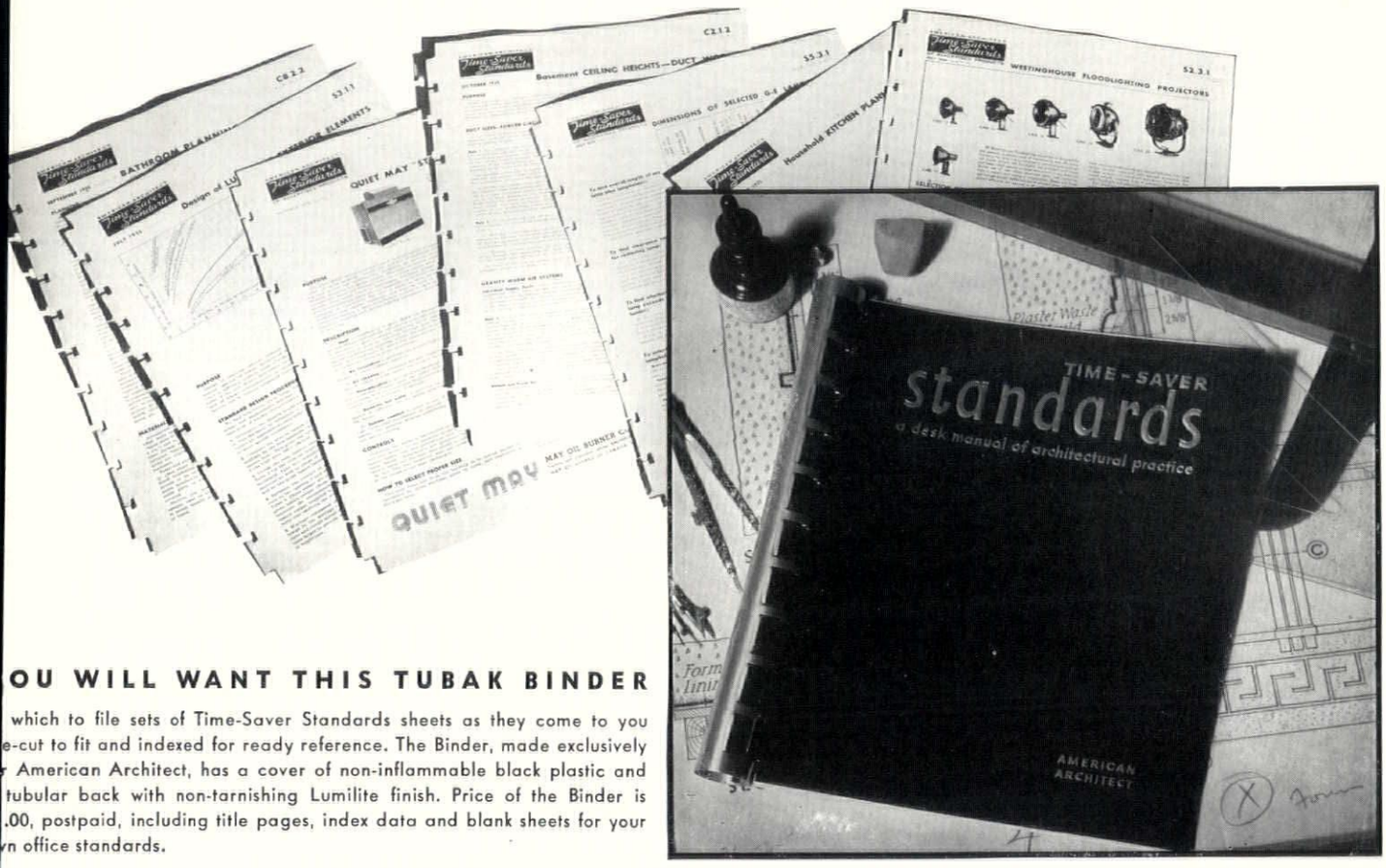

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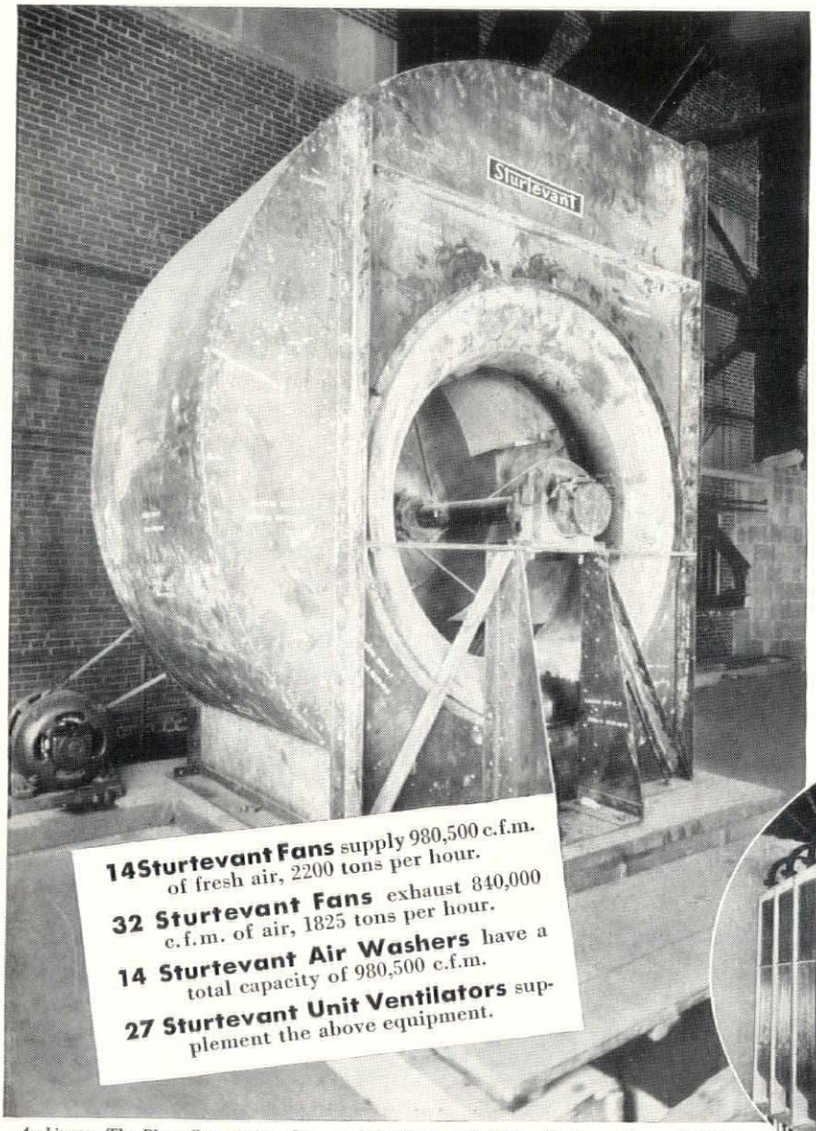

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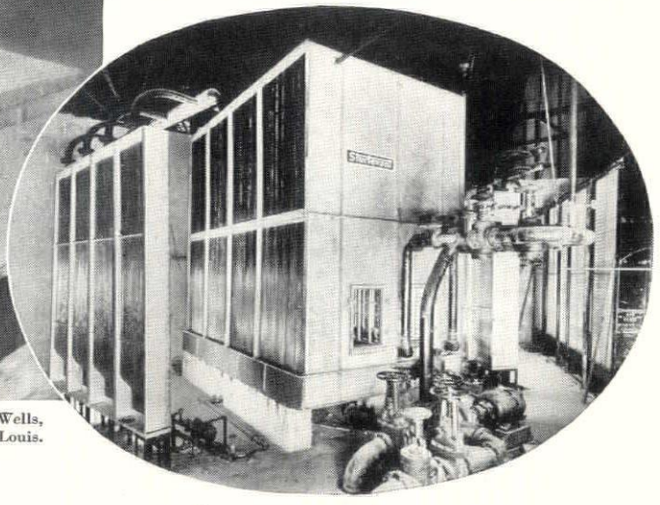

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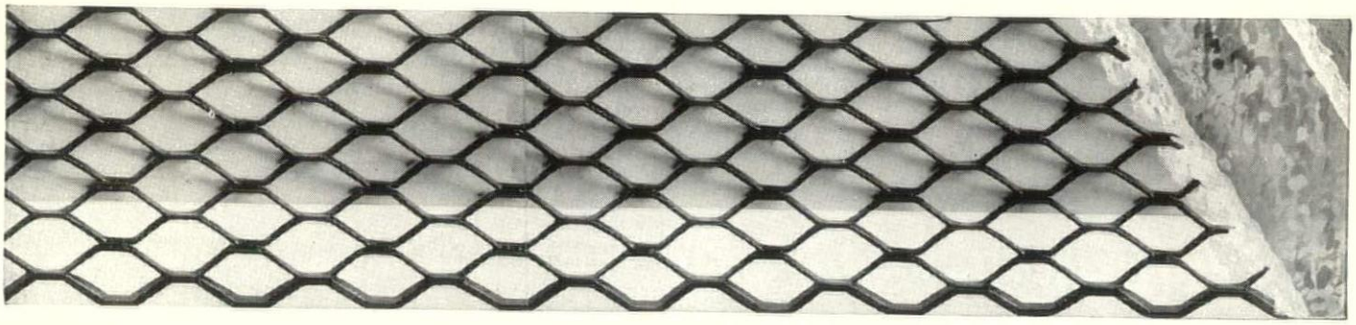

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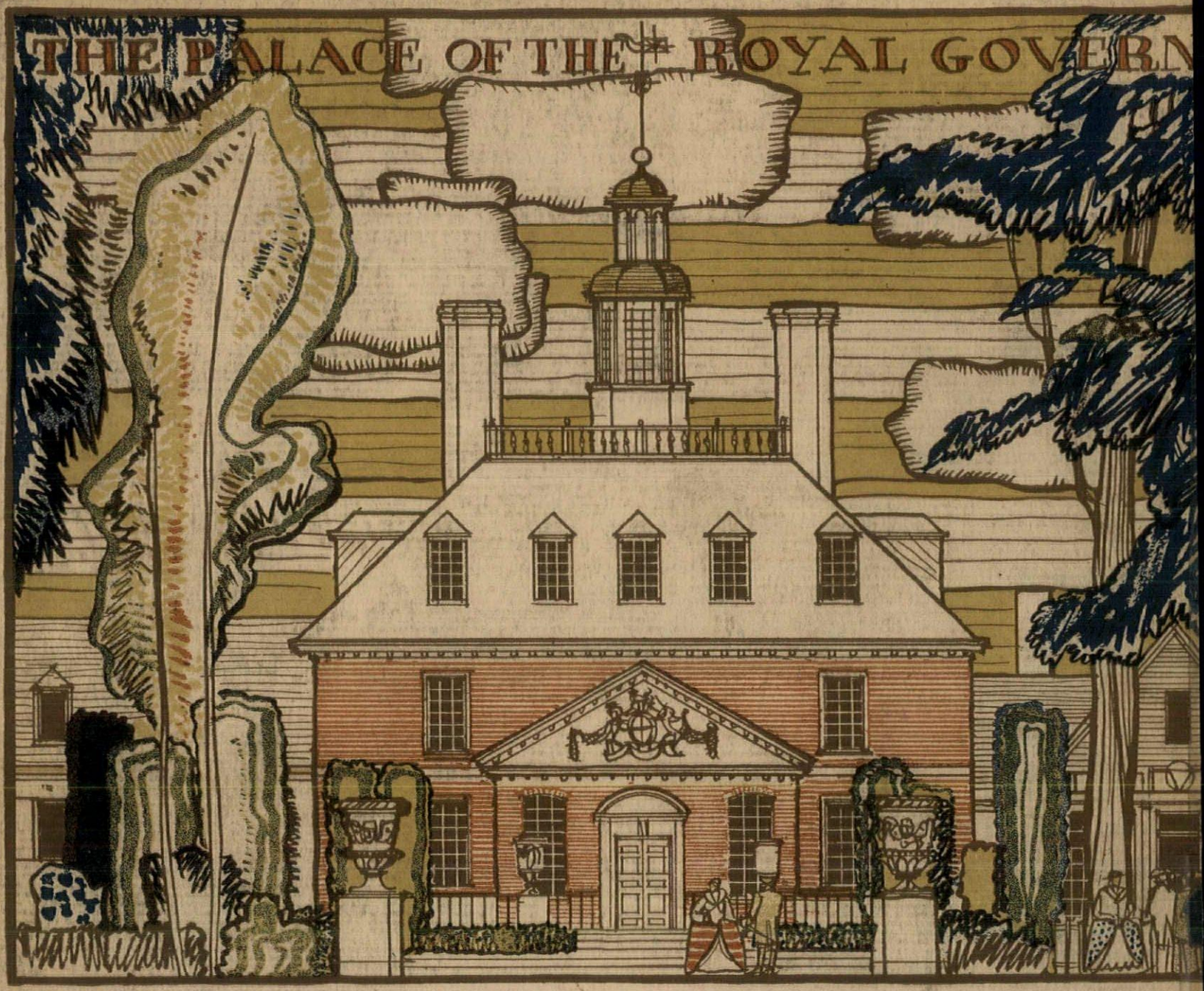

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