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The MODERN BUILDING is a MACHINE

BY BASSETT JONES*

MOSTLY HISTORICAL

DAVEY exhibited the first electric light before the Royal Society in 1802. Edison produced the first successful incandescent lamp in 1879.

The first electric generator consisting of a disc of copper revolving near a permanent magnet was built by Faraday in 1831. The first generator that, at very low efficiency, developed sufficient electrical power to be of use was built by Gramme in 1871. So recently as 1887, at his little shop in Yonkers, Rudolph Eickemeyer designed and built the first electric motors and generators of the form almost universally used today.

The first central station for the generation, distribution and sale of electric power on a very small scale was built in 1882.

From 1882 to the present day, forty-two years, less than the time span of a single generation, the electrical industry, including the manufacture of electrical apparatus and central stations, has grown from an embryo to be the second in scale in this age (or, is it century?) of industries. The electrical industry furnishes the principal power and the apparatus used to make and apply this power for the motivation of other industries and of the mechanical equipment of buildings.

At the present time the amount spent annually in this country for electrical material in buildings, exclusive of central stations and industrial plants, is from two hundred million to three hundred million dollars, or roughly 5 per cent of the total annual building budget. More than this, the modern intensive erection of buildings in city groups has a direct effect on the whole of the electrical industry in that central stations of vast

capacity are built to supply the electrical power required to operate such buildings. The need of economic rapid transportation between such cities and the handling of the enormous traffic at city terminals have led directly to railroad electrification. Therefore, the building industry has become an important outlet for the electrical industry.

Within this short period the electrical equipment of buildings has increased from a mere matter of bell wiring until, today, practically every branch of the electrical industry is drawn upon to supply the apparatus and material required for the electrification of a single structure.

Similarly, about fifty years ago, our sole sanitary comforts consisted of a more or less shallow excavation over which was supported a seat of wood in which a hole was cut and rudely shaped. Only in the seventies of the last century were cast iron bowls with crude flushing arrangements introduced. Within the period of our own memory the fixed bathtub was considered a sign of unholy self-indulgence, and sermons were preached against such wanton waste and luxury. The tin tub kept under the bed and a ready pitcher of cold water typified the gentleman's toilet. Such hot water as was needed for the Saturday night scrub was heated on the crude kitchen stove. To make a social visit on this evening of steam, soap and slops was forbidden by custom.

On a chill Winter evening our grandparents huddled about the kitchen stove—commonly the sole source of heat in the house—or, in a hermetically sealed room, gathered about the open fire of hickory logs or the grate of smoky cannel coal, and read by the crude sperm candle, the whale oil lamp or, very recently, by the flickering and air-destroying gas flame. On such nights the act of preparing for bed in unheated rooms was a self-torture to be performed as rapidly as

*Meyer, Strong & Jones, Inc., Consulting Engineers, New York.

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possible and the prickly body stowed quickly between the sheets which, if the extreme of luxury was practiced, had been previously warmed to a degree by the hot warming pan.

On Winter days the frost-cramped fingers were loosened by the dry heat from the red hot office stove to the point where they could hold the pen. Meanwhile, the ink had thawed.

The first trace of an attempt to ventilate even a public building seems to have been in 1660 when Sir Christopher Wren, by what was in effect a series of open fireplaces and their associated chimneys, sought to relieve the foul conditions in the House of Commons. A crude hand operated wooden paddle fan was introduced in 1736, and in 1834, due to the "improvements" carried out under the direction of Sir Humphrey Davey, both buildings of Parliament were destroyed by fire. Meanwhile a crude and ineffective system of heating by steam had been installed in 1824.

The development of modern methods of heating and ventilating in this country is due principally to the work of Briggs, Baldwin and Billings during the seventies and eighties of the nineteenth century.

Today vast industries are engaged in the manufacture and application of devices to the end that our buildings may be the acme of sanitary luxury, and warmed and ventilated till the fresh clean atmosphere of a fine Spring day is little, if any, better. It has been proved without possibility of doubt that the working efficiency of the human machine is lowered by vitiated air.

Commonly our grandfathers lived over their places of business. Even in our childhood days, the methods of transportation were so crude that suburban life was practically unknown. Lacking a span of fine horses and the means to support a coachman or groom, one could not live further than walking distance from the money counter. The height of a building above the ground was limited both by our fathers' capacity for climbing stairs, and by the load carrying limits of practical masonry piers, even when broadly buttressed. The elevator was still a crude and slow-moving affair—generally a hand lift and, only recently, even belt-driven from line shafting. Today the larger areas in our "older" cities are still covered with such "antiquated" structures. The first steel skeleton frame building with curtain walls was erected in Chicago so recently as 1884. The first high-speed multiple-roped hydraulic elevator was installed in 1899, and the first electric gearless traction high-speed elevator of the commonly used type was installed in 1905. Without such means of rapid vertical transportation, the modern skyscraper would be a practical and economic impossibility.

The economic pressure of our day makes such demands upon our time, that more and more concentrated effort is required of us. The working limits of dawn to dark have been removed; so, in the evenings of the shorter days, sparkling and aerie towers of artificial light rise to the darkening skies. But the incandescent lamp, even when camouflaged to the extreme of ingenuity, is not the candle. Many dangers lurk within its bright filament, and we learn that misuse of this seemingly simple thing destroys the eyes it serves. The proper use of light is essential to the efficiency of the human mechanism, and so with improved methods of lighting we find that more light properly distributed increases our ability to work intensely. The illumination of our working places becomes a matter of prime importance, and again, almost over night, a great industry grows up about this new demand.

So, in a single generation, our buildings have ceased to be mere housings. They become machines requiring the sort of study in design given in this mechanistic age to other engines.

Stand on the Rector Street Station of the Sixth Avenue elevated and look East over Trinity Churchyard. Here is spread before you the entire history of the modern building—a history covering less than half a century; comparable with the short history of Athens in the Periclean age. Across Broadway is the First National Bank Building; a solid Æchean mass of masonry, and an object of astonishment when the spire of Trinity still towered above the city—a time that most of those who read this can remember. On the opposite side of Wall Street is an "early" attempt at the skeleton steel structure, near which stood the "ancient" and now insignificant Tower Building—the first of the modern buildings erected in New York.

Surrounding this historic picture is a group of modern mastadons, from the Empire Building to the Trinity Building, including the palatial home of a great financial institution and the Equitable Building, the latest and the greatest of them all.

In the foreground with its sacristy the finest bit of Gothic in this country, stands little Trinity, in its structural form typifying the construction methods of the past, and the age of handicraft. Against this looms the product of the steel mill and the factory—vast piles of machine made materials, in which, and to a lesser extent, even in our homes, hardly more than the decorative forms originating in the structural methods of our ancestors can find a place, much after the fashion that the Romans applied ashlar and casings of Hellenistic structure in stone, to brick and concrete domes and arches.

THE AMERICAN ARCHITECT—THE ARCHITECTURAL REVIEW

Equitable Building
American Surety Building

Bankers' Trust Co.



Trinity Building

Trinity Church

First National Bank

No. 1 Wall Street

TRINITY CHURCHYARD, NEW YORK, AND SURROUNDINGS

THE BUILDING AN ENGINEERING PROJECT

No matter how beautiful a modern building may be, if it does not in every way meet the living demands of our times, it is a failure. In the purely practical sense, the building must work, and it must perform this work with the highest possible economy and efficiency. Only in so far as the building fulfills this condition does it embody the spirit of our times, even though beauty be defined as an expression of function through appearance. It is the engineer, whether he call himself an architect or not, who establishes the criteria of function. It is the architect, even if he be an engineer, who so moulds the appearance of materials that they express their functional use.

Thus the planning of a modern structure must begin with an analysis of the purpose it is to serve, and the best means by which the building may be made to function properly and to the end in view. As the building more and more takes on the character of a machine, so do its design, construction and operation become subject to the same type of rules that govern the design, construction and operation, for instance, of a machine tool or of a locomotive. To a large extent, the same sort of economic factors that control the selection of the character and capacity of the central station equipment determines the wisdom of erecting this or that type and size of building on any given ground area in any given locality. The advisability of investing the required amount of capital in the project is determined in the same manner that the probable success of the same investment in advertising, in a projected manufacturing plant, or in a proposed mining venture, is established. And in all of these considerations the probable continued usefulness of the structure for its intended purpose becomes of greater importance as the rapid strides of science bring the future nearer and nearer.

Our grandfathers built for the succeeding generations. The rate of development was slow, and a building which would generally serve the demands made upon it for a century would necessarily be of a substantial nature. But with us in a single generation, even the best we can do with all the data and facilities at our command, lags hopelessly behind the procession, and just as in the industrial plant a tool is out of date almost before it has shown signs of appreciable wear, so a building erected today is outclassed tomorrow. The writer well remembers the late Douglas Robinson, when outlining the location and property to be improved by the construction of a building some twenty years ago, ending his directions with the proviso that it must be "the cheapest thing that will hold together for fifteen years." When the amortization charges must be based on

so short a period as this, and with land taxes constantly increasing, it becomes obvious that construction costs must be based on a cubic foot valuation that prohibits the use of any but the cheapest materials and methods. It is no wonder that a well known builder with a tradition of first-class construction behind him, recently remarked that we have entered the era of "near building."

Even the cost of carrying the required capital inactive during the period of construction has its effect in speeding up production to the point where every part of the building that, by any ingenuity of man, can be machine made must be so made. Standardized parts jammed or dragged through dies, cut to template and, so as to avoid machining, spot welded together, become necessary to the successful building, as we moderns define success. Steady is the increased comparative cost of hand fabrication. And only in hand fabricated construction can the individual taste of the designer or workman find expression. So, with ever increasing acceleration, the very erection of the building becomes a purely mechanized process. Here arises the very difficulty that, as Frederick W. Ackerman recently pointed out, ("Craftsmen—Machines—Credit—Speed," *Journal, A. I. A.*, June, 1923), has led to a series of crises in the building industry occurring with increasing frequency, for, due to the tremendous demand for manufactured building materials created by this sudden development in building construction, vast industries have sprung up and, under scientific leadership, have reduced their output to pure machine products. Meanwhile the mechanization of building construction to a considerable extent, yet remains a hand process depending on a fading craftsmanship for which the required human tool is decreasing both in number and adaptability. So it appears that unless our entire economic and industrial systems, as they affect the building industry, can be radically altered, both the architect and the builder must devise ways and means to adapt themselves to this situation. If there be such a thing, a new tradition is required in the building industry—a new spirit expressed in new designs and methods modeled on those developed in our laboratories and motor-driven workshops. Just as the engineer has learned to apply the lesson of science in the production of manufactured goods, so must the architect and builder learn to apply this same lesson to the construction of buildings. Otherwise, and sooner or later science and machine industry, for their own self-protection, and to control their output, must take the helm, as indeed at the present time they are beginning to do.

The successful architect of today is the one who has learned thus to treat the building as a machine. His designs are successful because the

completed structure works; it is economical to build, and its operation is efficient. In his effort to meet the conditions of the times, the architect may have sacrificed appearance because he has been compelled to cut himself adrift from traditional designs developed about structural forms that are no longer useful. Nothing else can be expected in this age of extreme transition. It is a phase that will pass when methods of construction become stable and endure long enough to become familiar.

Here again the mechanical industries have set the pace. Nothing can be more expressive of function; strange as it may seem, nothing can

He knows that honest and bold expression of functional purpose must result in pleasing construction. He is learning that ornament properly used serves only to accent function, not to disguise it. But, the modern building!

"Deformed, unfinished, sent before my time
Into this breathing world, scarce half made up."

THE SERVICE FUNCTIONS OF A BUILDING

Thus thinking of the building as a machine, we may follow S. F. Voorhees (*The Design of Buildings for Economy in Operation*—Trans. Building Owners and Managers Association—1922) in classifying as follows the several serv-



A MODERN POWER PLANT

be more perfectly classical in its structural simplicity and harmonious proportions, than the interior of many modern power plants. Nothing is wasted. Every part has its purpose. Decoration is superfluous.

Not so long ago the mechanical industries aped the architect in covering over their designs with the sickly cast of misplaced ornament. The horrible gilded scroll of the early Pullman car, the dreadful fruit of bad example plastered on a cast iron radiator; such staring examples of degeneracy in applied art have gone or are fast disappearing. No longer is there any attempt to produce a "Gothic" motor or a "Renaissance" transformer. The manufacturer even discusses ways and means of arousing in his designers a sense for fair proportion that will result in further improving the appearance of his apparatus.

ice functions that the building must render its occupants:

1. *Service of Support* (Includes foundations, vertical supporting members and floor arches or slabs)
2. *Service of Enclosure* (Includes outer walls, roofs and partitions for the subdivision of interior space)
3. *Service of Access and Transportation* (Includes entrances, corridors, doors, stairs and elevators)
4. *Service of Sanitation and Water Supply*
5. *Service of Heating and Ventilation*
6. *Service of Illumination* (Includes light courts, windows and skylights associated with natural illumination)
7. *Service of Signaling and Communication* (Includes telephones, messenger calls, stock and

news tickers, time systems, fire alarms, watchmen's system)

8. *Service of Power Supply* (Includes all power for the special uses of tenants or occupants)

9. *Service of Appearance* (Includes all decoration, architectural treatment and special finishes not essential to the structural services)

In general the relative importance of each such service is affected differently by the general requirements determined by the use to which the building must be put. Each service must be evaluated accordingly before an intelligent budget of first cost, fixed charges, and operating costs can be prepared. Without a budget based on some such functional analysis, the probable return on the required investment remains an indeterminate guess, and no accurate formulation of the most economical and efficient solution of the architect's problem as a whole is possible. Furthermore, the analysis must take into account not only initial conditions, but also ultimate conditions at the end of the amortization period, for as has been pointed out above, the service and operating requirements of buildings are changing very rapidly—so rapidly, in fact, that it becomes a question whether or not we may come to consigning buildings to the scrap heap just so soon as they have outlived their economic usefulness, precisely as is now done with machine tools and locomotives.

This method of preparing the data about which an intelligent design may be drawn, is the method employed in setting up an engineering project, whether it be an electric motor, a steel mill, or an extensive hydraulic power development.

From the viewpoint of the operation of the building, the several items included in the different service functions outlined above, may be classified either as *static* if they do not require a supply of power, or *dynamic* if they do require a supply of power. The dynamic functions are elevators, sanitation, water supply, heating, ventilation, artificial illumination, signaling and communicating systems, and tenants' power supply.

Generally, except heating, all of these services are electrically operated. Each year the demand upon all of them has progressively increased, until, at the present time, the average and peak electrical load per sq. ft. floor area in commercial buildings has reached, and in many cases exceeded, the average and peak loads per sq. ft. floor area in electrically-driven manufacturing plants.

The average load in shops employing diversified small tool units will reach about 2.0 watts

per sq. ft. floor area, although with the increasing use of automatic tools and intensive methods of manufacture, requiring improved illumination, these values tend to increase until in certain shops operated at high production efficiency, the average combined light and power load may reach 4.0 watts per sq. ft. floor area. The average load in a busy modern New York office building is 2.5 watts per sq. ft. floor area. Over restricted areas such as a machine operated accounting department, the load may considerably exceed this value.

A large modern high-class office building, say of approximately 200,000 sq. ft. gross inside floor area will absorb about 1200 horse power in motors for the operation of elevators, sanitation, ventilation and water supply alone. In the average machine shop using individual drive on the tools, the average motor may be taken at approximately 3.0 horse power, so, in a sense, the power required for these purposes in the building may be taken as roughly equivalent to a group of 400 motor driven tools! But this is a large factory.

Furthermore, this building will be equipped by the tenants with about 1500 small and fractional horse power motors for the operation of local ventilation and motor-driven office machinery, the use of which during the last few years has rapidly increased.

If the requirements for artificial illumination be taken as a connected load of 2.0 watts per sq. ft. of yield area, and it certainly should not be less, at least 360,000 watts in lamps will be required, or roughly, eighteen hundred 200 watt lamps and luminaires.

The problems connected with the economical generation or purchase and distribution of the power required to operate electrical devices of so large an aggregate capacity are of considerable complexity. Obviously the electrification of the modern building has ceased to be a mere wiring or "lighting" job. It is a problem in distribution and utilization approaching in importance the similar problem in an industrial plant. It is a problem whose economic and engineering phases must receive adequate study if the system is not to prove inadequate, or if serious waste is to be avoided—not only waste in first cost, but waste in operation and in maintenance.

The dynamic equipment of buildings is no longer of minor importance. This is the thing that makes the building work, and more and more are buildings being classified as to rental value by the quality of the dynamic services that they render. If a building does not work properly no amount of decoration, no emphasizing of its appearance, will help. It is a failure.

ELECTRICITY in the HOME

BY W. CREIGHTON PEET, *Electrical Engineer**

THE really modern home is one which, in addition to being equipped with an up-to-date plumbing system, an efficient heating plant, and other elements conducive to the health and happiness of the occupants, has a complete and adequate electrical installation.

The up-to-date wiring job is that which is designed with a view to permit those dwelling in the house to enjoy the unrestricted use of electricity for its three purposes—light, heat and power.

By so doing, the architect is placing at the disposal of the housewife a force which, it has been estimated, can reduce her labors by as much as fifty per cent and which will provide the ideal illuminant in the various ways in which it is possible to use it. A leading magazine, in a recent issue, made the following statement: "It may safely be said that the electrification of America, including the home as well as industry, accompanied by an actual decrease in the cost of electricity as a commodity, is one of the greatest scientific and industrial achievements in the history of the nation."

It is possible that a man who consults an architect with a view to building a house does not know what complete electrification means. He may understand in a general way something about it and not be fully conversant with the subject. Such a man should have brought to his attention some of the facts in the matter, for he cannot be expected to have any more information on that subject than on the matter of the latest style sewer trap or radiator valve. It devolves upon someone to tell him and in this case it is the architect. New things that can add to his comfort when the home is completed are generally

brought to his attention as being due him, and in suggesting a complete electrical installation at the time of building, which costs very little more than an incomplete one, the architect is rendering his client a signal service. He is bringing to the latter's attention something that will have a decided bearing on his comfort and happiness in the new home.

In the cases of houses built for speculation, too, the architect is able to be of great assistance to the builder as well as to the future occupant. A

good electrical installation has been known to be of material assistance in selling a house; in many cases it is known that dwellings well equipped electrically have sold at figures far above others built at the same time, and not thoroughly equipped. In indicating a job of complete wiring, the architect is specifying something which is just as sound as an efficient plumbing or heating system.

Within recent years there have been perfected and placed on the market electrical appliances of various kinds designed to relieve housekeeping of

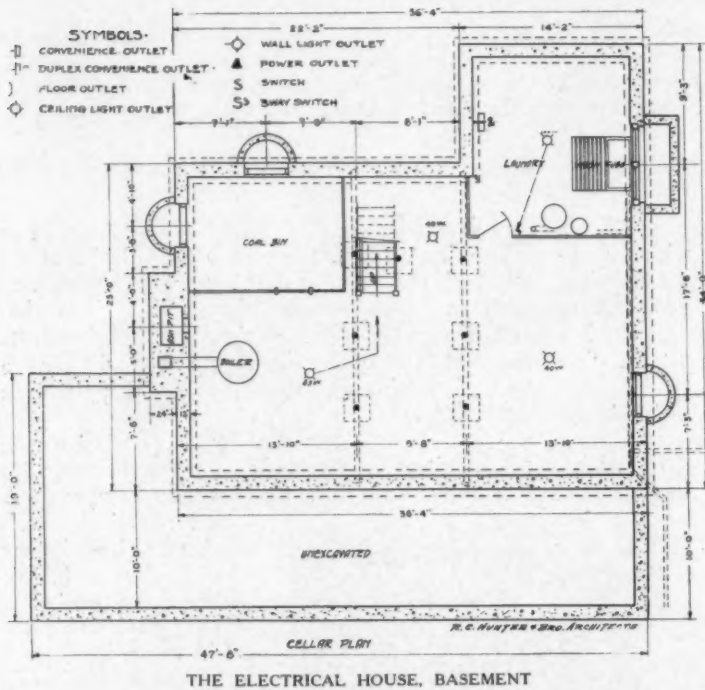
some of its burdens, and when the electrification of the home was included in the quotation already mentioned, it was undoubtedly intended to express the importance of the use of these appliances in addition to the employment of electricity as an illuminating medium.

It is safe to assume that every house that is built will be lighted by electricity, a certainty if it is within reach of central station lines. This means that wiring will be employed to carry the current in from the street and to distribute it from the point of entry to the various lighting outlets throughout the house. It should be extended sufficiently to enable the occupants to enjoy the benefits of electricity for every possible



This living room is lighted by six candle type wall brackets and portable lamps. Convenience outlets supply the player piano, vacuum cleaner, fan and other appliances

*Peet and Powers, New York



THE ELECTRICAL HOUSE, BASEMENT

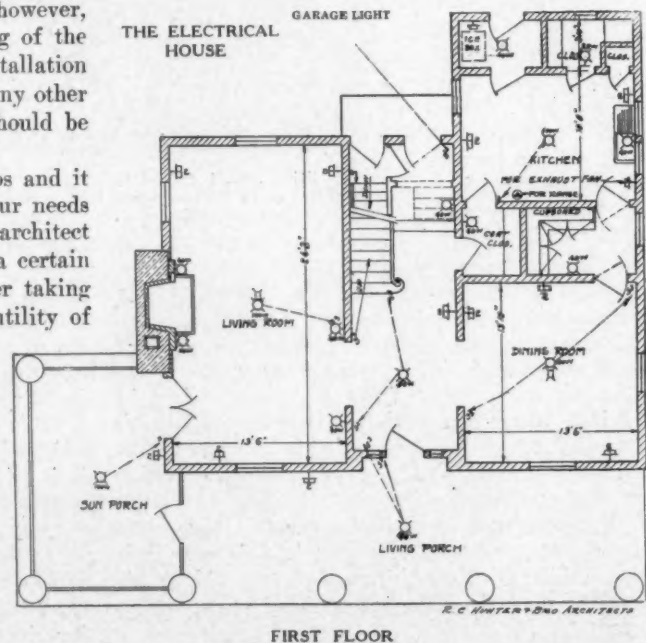
purpose. Sufficient and adequate wiring and convenience outlets will enable them to have scientifically correct lighting; it will make possible the operation of household appliances of various kinds; it will permit the use of portable lamps, which do so much to add to the appearance of a room, and, at the same time, provide means for a variety of lighting schemes. There is, however, more to be done than the mere providing of the wire and outlets. The electrical installation should be planned with as much care as any other thing that goes into the house, and it should be designed for efficiency and convenience.

This force is literally at our finger tips and it seems unreasonable to make its use for our needs attended by any inconvenience. An architect will specify a radiator to be located at a certain place in the room and he does this after taking into consideration the convenience and utility of the place chosen. He would not indicate a radiator to be placed in the middle of the dining room floor, for example, because in that location it would hardly add to the convenience of the occupants. In other words, the lighting fixtures, switches, and convenience outlets should be installed only after due consideration has been given to their locations and to their uses. I have seen dwellings under construction in which the location of the

electrical outlets was indicated with absolutely no reference to their ultimate use. I have actually seen them placed on the jamb of a swinging door in a dining room, and it is certain that such a location is hardly a fitting one. One particular offense against convenience, and a very common one, is indicating a switch behind a door. The switch is used primarily for the convenient operation of a lighting fixture, and its use should not be inconvenient. To operate a switch placed in such a position as this, it is necessary to grope behind the door in the dark, but if it was placed on the opposite side of the door, it would be a simple matter to turn on the light after opening the door a few inches. Then, too, in addition to being a great convenience, a switch will pay for itself in a short time through the saving of current. It is an easy matter

to turn off the lights in a room when they are not needed if a switch is conveniently located, and a person is more apt to do so in such a room than in one where there is no such convenience.

The location and height of outlets for use with appliances and portable lamps are other matters to be given consideration. Too often we see these



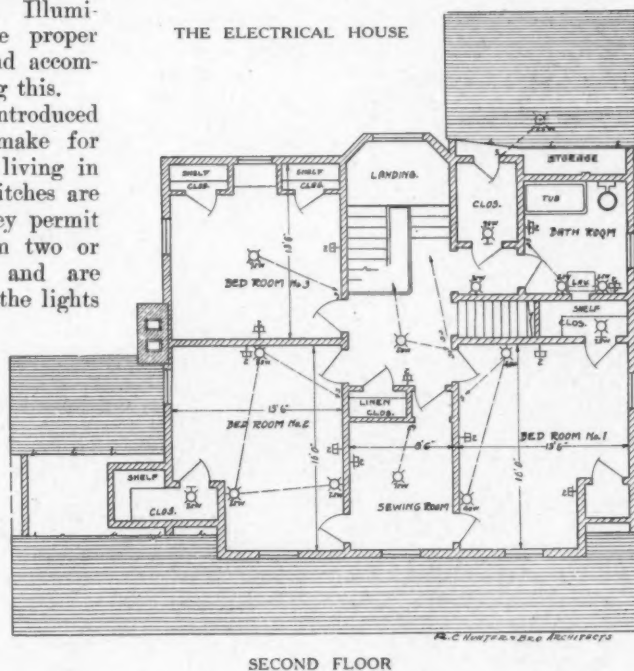
FIRST FLOOR

devices installed in a hit-or-miss manner, with no reference whatever to their use. Very often, of course, an architect is unacquainted with the final furniture layout and is compelled to work more or less at random. In many cases, however, he may approximate the location of the various pieces and in a bedroom, for instance, can generally determine in advance where the bed, or beds, will be placed, and can indicate an outlet near to its head for a lamp or some sort of appliance. The placing of the lighting fixtures and the height at which they are hung are other items worthy of much consideration. Very frequently the effect of an otherwise beautiful room will be spoiled by an unattractive or improper unit, or one which is hung too high or too low. Illuminating engineers have worked out the proper heights of fixtures of various kinds, and accompanying this article is a chart explaining this.

There are several things that can be introduced into an electrical installation which make for the comfort and convenience of those living in the house. The three- and four-way switches are of great assistance as step savers. They permit the operation of lighting fixtures from two or three different locations, respectively, and are especially useful in turning on and off the lights located on one floor from another floor. A light in the garage operated by a three-way switch located at the door of the house and within the garage, will prove to be a great convenience. The electric ventilating fan is another device making for comfort. These fans are operated on the lighting circuit, using but little current, and one in the kitchen is invaluable in controlling the odors of cooking and in addition, it keeps the kitchen cool and prevents grease particles from settling on the walls and furniture. The bell ringing transformer makes possible the operation of the door bells, annunciator, kitchen buzzer and other low voltage conveniences without the use of batteries, and eliminates the possibility of their being out of order. Only recently, in an architect's specifications for a home, there were indicated dry batteries for the operation of the bells, etc., and this shows that little things are being omitted which should be installed in every dwelling. The "master" switch is designed to flood with light every room in the house in case of burglary, fire, or any other emergency, and is located generally in the owner's bedroom. Another item which will be appreciated, is the location of the meter box. If possible, this should be placed in such a position that it can be read by the central station company's meter reader from outside the house. However, most central station companies have fixed rules as to meter loca-

tions and just how they are to be installed. The architect should consult the utility company before specifying the location of the meter.

In the plans of the dwelling accompanying this article, is indicated a model wiring and lighting installation for a moderate priced home, and one which is applicable to any home of the same size. Care has been taken not to overload it in any respect, and the indications are made with a view to the comfort and convenience of the occupants. It will be noticed that duplex outlets have been specified in almost every instance. This is because the duplex type costs but a trifle more than the single variety, and the owner never knows



when he will have occasion to use this extra side. A liberal use has been made of the three-way switch and inspection will show that, wherever it has been specified, the installation was improved by its use. It will be noted that different arrangements of the lighting units in the three bedrooms are indicated. This is done to show the possibilities of having different types of lighting layouts for various rooms. The figures on the plan beside each lighting outlet indicate the approximate wattage which will give the best results in each case.

The first place where the three-way switch comes into play, is on the front porch, operating the fixture located there. The control points of this switch are located both outside the front door and immediately inside, which arrangement makes possible the operation of the light from either of these points. This will be found a decided con-

venience to anyone at night, since one is able to flood the porch with light and thus have sufficient illumination to find his way to the switch in the lower hall. The porch light can then be extinguished from the inside. It is also con-

other three-way switch in the lower hall controlling the lighting unit upstairs, the second location being in the upper hall. The convenience outlet in the hall should be placed in the base-board. Most likely it will be used with a port-

BEDROOM

Unit	Recommended Height	Lamp Size
	Not less than 75 inches from floor.	100 or 150-watt lamp.
	Not less than 75 inches from floor.	50 or 75-watt diffusing lamps.
	Not less than 75 inches from floor.	25 to 40-watt all-frosted lamps or 50-watt diffusing lamps.
	Light center 5½ feet above floor—one on each side of mirror.	50-watt diffusing lamps.
	Light center 5½ feet above floor—one on each side of mirror.	50-watt diffusing lamp.
	Light center 10 to 12 inches above table top.	25 or 40-watt all-frosted lamps.
	Light center 24 inches above table top.	25 or 40-watt all-frosted lamp.
	Clamped to head of bed for reading.	50-watt diffusing lamp.

BATHROOM

	Light center 5½ feet above floor—one on each side of mirror.	50-watt diffusing lamp.
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KITCHEN

Unit	Recommended Height	Lamp Size
	At ceiling.	100-watt clear or 150-watt "day-light" lamp.
	At ceiling.	100-watt clear or 150-watt "day-light" lamp.
	Not less than 75 inches clearance above floor.	100-watt clear or 150-watt "day-light" lamp.
	Supplementary fixture—wall-bracket or pendant—at sink, stove, etc.	50-watt diffusing lamp.

LAUNDRY AND BASEMENT

	As close to the ceiling as possible.	100-watt clear or 150-watt "day-light" lamp.
	For laundry, close to ceiling. For work-bench, 7 feet from floor.	100-watt Bowl—Enameled or 150-watt bowl—frosted "daylight" lamp.
	At ceiling.	50-watt diffusing lamp.

GARAGE

	Usually not less than 75 inches clearance above floor for work-bench and engine.	100, 150 or 200-watt Bowl Enameled lamp.
	Hand-lamp on drop cord.	50-watt Mill Type lamp.

SCHEDULE OF LIGHTING FIXTURES

venient for lighting the porch without opening the door.

The fixture in the hall is also controlled in the same way and can be operated from both upstairs and down. This step-saver provides light for the person ascending the stairs and enables him to extinguish it from above. There is an

able lamp on a console table, and the extra outlet will be used for the occasional attachment of the vacuum cleaner.

The living room is lighted by a main ceiling fixture and four side wall brackets. The main fixture is controlled by a switch located at the entrance of the room, and the wall lights are in-

dividually operated. There is a tendency at the present time to eliminate the central lighting fixture in living rooms and in some cases to leave out the wall brackets also, using portable lamps exclusively. It may be necessary at various times to provide a high intensity of general lighting, at which times the absence of such a unit may be severely felt. There are three duplex convenience outlets in this room and a floor outlet

side of the mantel placed just a few inches above it, instead of permanent fixtures. This arrangement is designed for use in connection with electric candlesticks, torcheres or some other form of decorative lighting. At the entrance to the sun porch from the living room is a switch controlling the ceiling unit there. There is also indicated a duplex convenience outlet for use with a portable lamp and some other appliance. On the

LIVING ROOM AND SUN ROOM

Unit	Recommended Height	Lamp Size
	Not less than 75 inches from floor.	50-watt diffusing lamp.
	Not less than 75 inches above floor.	50 or 75-watt diffusing lamps.
	Not less than 75 inches from floor.	100 or 150-watt lamp.
	On mantel—height according to taste.	15-watt all-frosted lamp.
	Usually 6 feet from floor.	15-watt all-frosted lamp.

HALLS

	Not less than 75 inches from floor.	25-watt all-frosted or 50-watt diffusing lamp.
	Close to ceiling.	25 or 40-watt clear lamp.

DINING ROOM

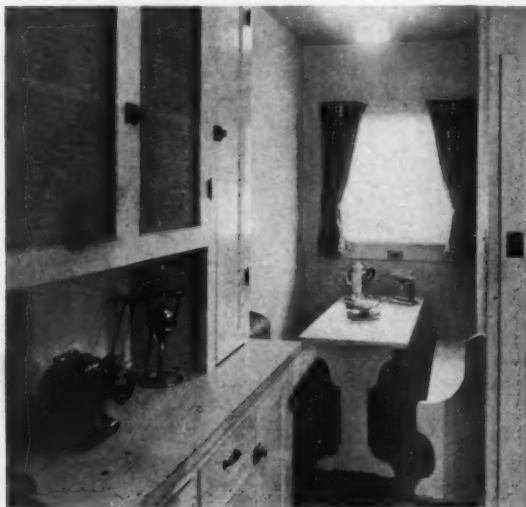
Unit	Recommended Height	Lamp Size
	24 inches clearance between dome and table top.	75 or 100-watt lamp or "daylight" lamp.
	24 inches clearance between dome and table top.	75 or 100-watt lamp or "daylight" lamp.
	Approximately 30 inches clearance above table top.	75-watt "daylight" lamp in center dome. 15 or 25-watt all-frosted lamps in candles.
	36 inches clearance between bottom of shades and table top.	25 to 50-watt all-frosted or 50-watt diffusing lamps.
	45 inches clearance between bottom of shades and table top.	25 or 40-watt all-frosted lamps.
	36 inches clearance between bottom of shades and table top.	50-watt diffusing lamps in bowl and pendants.
	For dining table not over 14 inches high.	25-watt all-frosted lamp.
	On buffet—height according to taste.	15-watt all-frosted lamp.

SCHEDULE OF LIGHTING FIXTURES

in the center. The wall outlets should be placed in the baseboard since they will be used primarily with portable lamps. They are so arranged that it is possible to reach all parts of the room with a vacuum cleaner attached to an extra outlet, and are placed in positions where it will be most convenient to operate electrical appliances designed for use in a living room. Some architects prefer to install convenience outlets on either

living porch a duplex outlet has been indicated. In the dining room the main lighting unit over the table is operated by a three-way switch located at the entrance from the hall and one near the pantry door. This arrangement will be appreciated since it eliminates the necessity of crossing the darkened room to turn on the light. The duplex convenience outlets in the dining room are designed for use with cooking appliances of

various kinds, and should be installed 36 inches above the floor. This height eliminates the necessity of stooping over in attaching or detaching them, and since their use is limited usually to the dining hours, this height will greatly facilitate the operation of the appliances. Some electrical cooking appliances, such as the toaster, are intended to be operated on the dining room table



A dining booth in a kitchen has a duplex convenience outlet above the table to operate the toaster, percolator and other appliances

and to provide means for using them in the most convenient manner possible, a floor outlet has been placed in the center of the room under the dining room table. The wall outlets are located where furniture is most likely to be placed.

The main illuminating unit in the kitchen is a central ceiling fixture and it is controlled by a switch located near the door. Since a person standing at the sink generally casts a shadow on the work when a center ceiling unit only is employed, an individually controlled wall bracket has been placed over the sink. This provides localized illumination on the work and eliminates the inconvenience of the shadow. Two duplex convenience outlets are provided on opposite side walls of the room and both should be 36 inches high. They are intended to operate appliances on the workboard by the sink and on a table, which will very likely be placed against the opposite wall. When placed at this height, they eliminate stooping in attaching and detaching them. Space has been provided in the entry for the ice-box, and if an electrical refrigerator, which is the most efficient type from every standpoint, is to be used, the outlet should be placed about 60 inches from the floor. This is of the single variety and is one of the few instances in which such a one has been specified. Another single outlet

for use in operating a ventilating fan should be placed approximately at the top of the window, to one side. There is also indicated in the kitchen a power outlet for use with an electric range. The lights in the closet and entry are both operated individually and the same applies to the wall brackets in the pantry, clothes closet and rear of the main hall.

At the rear of the lower hall is located, near the door, a three-way switch for controlling the light in the garage. The latter may be placed just over the entrance and will provide illumination for unlocking the door. The lights in the garage should be controlled by another switch and should be placed at either side of the ceiling. This arrangement provides a light on both sides of the car and does away with the shadow ordinarily cast by the car itself. Outlets should also



The kitchen has a power outlet for the electric range. Duplex outlets for mixers, utility motor, fan and other appliances

be provided for use with the trouble lamp and various appliances intended for the use of automobilists. Another method of garage lighting would be to have an outlet over the doors on the outside, two outlets located overhead in front, and two feet from the side walls and one outlet overhead, one foot from the rear wall. This arrangement also could be operated from the three-way switch, located in the same manner.

In the upper hall will be found the second station of the three-way switch controlling the light located there, and one for operating the light in the lower hall. A baseboard convenience outlet has been provided for the vacuum cleaner, and possibly a portable lamp. The main hall light will supply ample illumination for the linen closet, so no fixture has been specified there. Switch control has been provided for illumination of the three bedrooms, three different layouts being specified.

One duplex convenience outlet in each bedroom should be placed in the baseboard, where the bed will be located, and the others should be 36 inches high since they are intended to be used with electrical appliances and possibly portable lamps on the various articles of furniture.

door and operated by means of a pull-chain socket. It is also possible to provide lights which will operate when the door is opened and closed but the hand-operated unit makes it possible to leave the door open, as when cleaning, without having the light burning.

LIST of ELECTRIC CONVENIENCES

Porch	Bedrooms	Nursery
Fan Reading Lamp	Hair Dryer Curling Iron Massage Vibrator Heating Pad Violet-ray Outfit Fan Radiator Water Heater Cleaner Boudoir Lamps	Milk Warmer Heating Pad Radiator Sterilizer Immersion Heater Hair Dryer Curling Iron Fan Cleaner Toy Transformer for Electrically Operated Toys
Front Hall		
Electric Clock Floor Lamp Cleaner Fan		
Living Room	Bathroom	Pantry
Piano Lamp Coffee Percolator Corn Popper Cigar Lighter Fan Tea Samovar Chafing Dish Phonograph Motor Christmas Tree Outfit Electric Piano Lamp for Writing Table Cleaner	Radiator Shaving Mug Shaving Mirror Immersion Heater Hair Dryer Curling Iron Massage Vibrator Fan Cleaner	Cooking Appliances Plate Warmer Percolator Fan
Dining Room	Den	Kitchen
Toaster Coffee Percolator Tea Samovar Grill Disk Stove Egg Boiler Chafing Dish Drink Mixer Fan Cleaner Candlesticks	Reading Lamp Desk Lamp Cigar Lighter Chafing Dish Fan Cleaner Coffee Percolator Tea Samovar Grill Toaster Radiator	Electric Range Fireless Cooker Dish Washer Electric Refrigerator Grill Griddle Ice Cream Freezer Plate Warmer Utility Motor Exhaust Fan Mixer for Sauces, Eggs, etc. Egg Tester Mixer for Bread and Cakes Chopper Hot Water Heater Electric Clock Fan Coffee Grinder Percolator Cleaner
Basement	Sewing Room	Electric Laundry and Basement
Iron Washer Ironing Machine Ice Cream Freezer Also Bell Ringing Transformer permanently installed.	Sewing Machine Motor Radiator Portable Lamp Iron Fan Cleaner	Clothes Washer Electric Irons Ironing Machine Furnace Control, Thermostatic Furnace Burner, Kerosene, motor-driven Ironing Stand with connections Clothes Dryer Fan Radiant Heater

The sewing room has been provided with a switch-controlled ceiling fixture and a duplex convenience outlet. The latter is designed for use with an electric sewing machine and the extra side would be used with an appliance, such as an iron, or a lamp designed to provide localized illumination.

The closets in bedrooms 1 and 2 are provided with wall brackets located immediately above the

Two fixtures are placed on either side of the lavatory and bathroom, and these are controlled by a switch located near the door. Two duplex convenience outlets are specified, the one near the basin being located approximately 36 inches from the floor and designed to operate a water heater, electrical shaving mug or some other appliance. The other outlet should be approximately 24 inches from the floor and will generally



A convenience outlet in the center of the dining room serves the table appliances. A duplex outlet on the buffet operates the fan, percolator, chafing dish, lamp or other device. A heating outlet is in the baseboard

be used with a radiant heater. The large closet and passageway are lighted by wall brackets individually controlled. The storage space is lighted by a fixture controlled by a switch in the closet. This arrangement eliminates the necessity of groping about in the dark trying to find the light.

The light in the cellar near the furnace is operated by a switch located at the head of the stairs, and in addition there are two individually controlled outlets specified. The laundry is equipped with a main ceiling unit, switch-controlled, and a duplex outlet about 36 inches high should be installed for the operation of washing machine, ironer and other laundry equipment.

There is a great variety of lighting fixtures designed for the various rooms of the house and the most popular of these are illustrated in connection with this article. Attention should be directed to the selection of the proper unit for the proper surroundings, and to the correct height at which the fixture should be hung. This very important consideration is too often overlooked, and we frequently find, for example, dome fixtures in the dining room hung in such a way that the direct undiffused light shines in the faces of the diners, making it most uncomfortable.

No low voltage circuits have been indicated in this plan. The architect, of course, will install call bells to the doors and annunciator system and kitchen buzzer, possibly intercommunicating telephones, illuminated door number and thermostat control for the furnace.

PROPOSED REGISTRATION LAW IN THE DISTRICT OF COLUMBIA

A BILL has been introduced in the United States Senate by Senator Ball, which provides for the examination and registration of architects and regulates the practice of architecture in the District of Columbia. The bill is designated as S.933 and has been referred to the Committee on the District of Columbia.

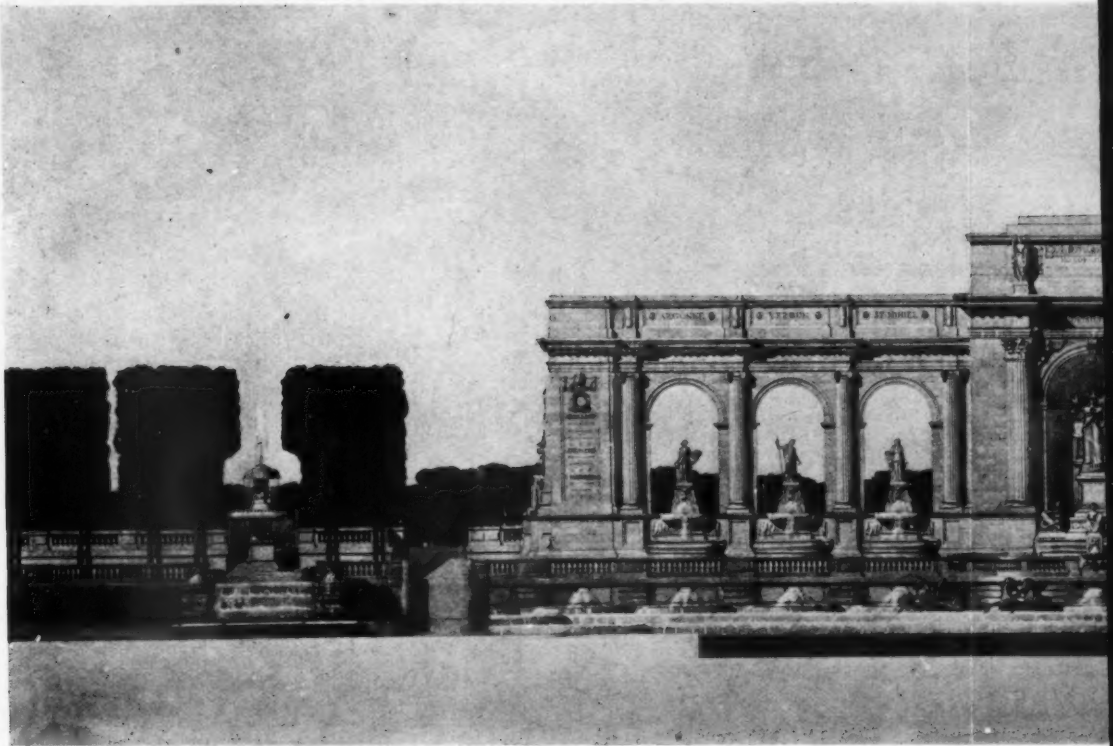
It provides that a Board of Examiners and Registrars of Architects, consisting of five architects who have been in active practice in the District for not less than ten years, shall be appointed by the Commissioners of the District. The Board shall have the power to issue certificates of registration to architects who were in active practice before the passage of the law, after examination, and, under certain conditions, to those having certificates of registration in other states.

The effect of the bill seems to be weakened by the following clause: "Nor shall anything contained in this Act prevent persons, engineers, mechanics, or builders from making plans, specifications for, or supervising the erection, enlargement, or alteration of buildings or any appurtenance thereto: *Provided*, That the plans

and specifications for such construction are signed by the authors thereof with their true appellations, without the use in any form of the title 'architect' or 'architects.'" Another clause reads: "*Provided*, That nothing in this Act shall prevent any person who was actually engaged in the practice of architecture under the title of architect prior to the time this Act takes effect from continuing the practice of said profession without a certificate of registration and without the use in any form of the title 'registered architect.'"

These provisions apparently weaken the effect of regulating the practice of architecture, which should be its intent and purpose. It is doubtful if the purchasers of architectural service will discriminate closely between an "architect" and a "registered architect." The word "registered" is used in so many ways in this country that its effect is often of little value. The Act also permits engineers to render architectural service as engineers and without any control over their qualifications. In some cities in this country architectural service by engineers constitutes as much as fifty per cent, in money value, of the entire architectural service rendered. There should be some control over this in order to make the Act of benefit to the architectural profession.

5



PROPOSED WAR MEMORIAL IN

THOMAS HASTINGS,

SINCE the completion a number of years ago of the Catskill Water System for the City of New York, the lower reservoir in Central Park, forming a part of the old Croton system, became available for park or other purposes. It covers approximately thirty-seven acres.

In an interview with Thomas Hastings, F.A.I.A., the architect, the following was learned with reference to the inception of the scheme and the development and final acceptance:

At the outset, it was decided by the committee of experts that was formed at Mr. Hastings' insistence and with whom he has at all times harmoniously worked, that the stone walls of the reservoir should be removed and about three-fourths of the area treated in a rural manner, to conform with and to be added to the existing park.

The committee of experts as organized was composed as follows:

H. A. MacNeil—National Sculpture Society

Charles Butler—New York Chamber of Architects

Howard Greenley—The Architectural Record

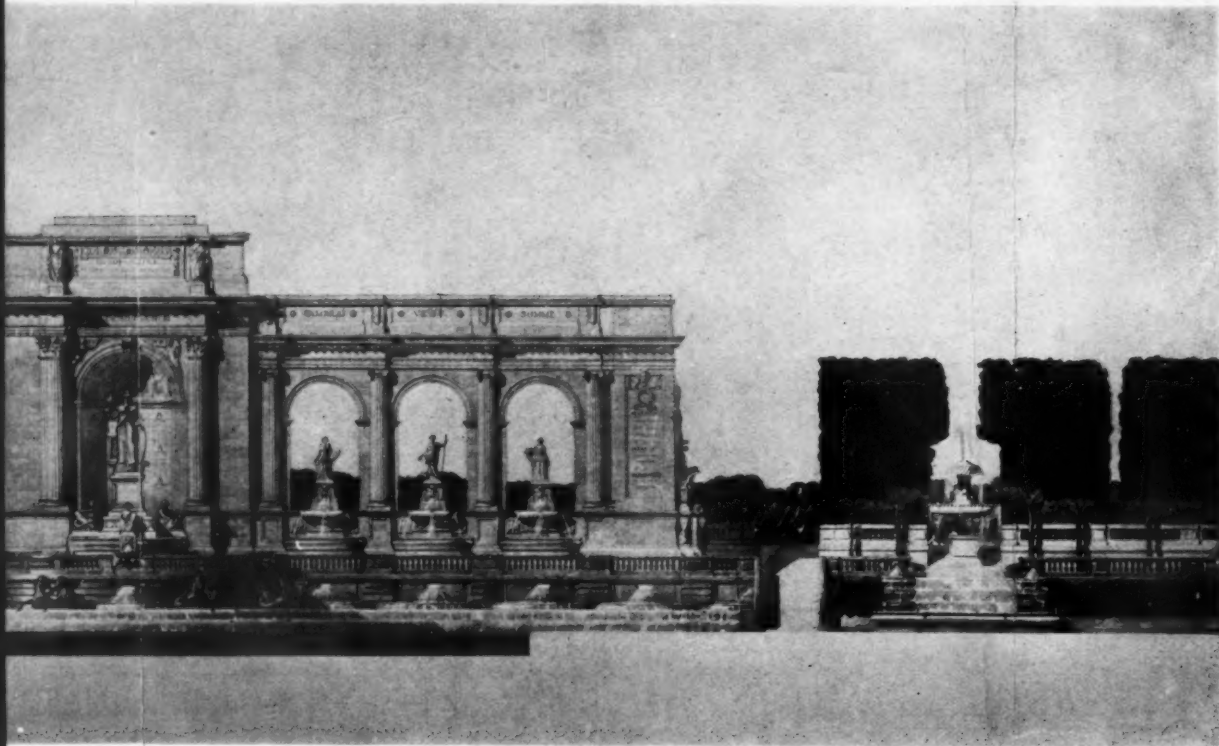
James Gamble Rogers—Society of Architects

John Mead Howells—Société des Architectes Français

J. Monroe Hewlett—The Muralist

The memorial itself as proposed occupies a strip of land now lying between the lake and the reservoir in question.

The city is already contemplating the removal of the strip of land between the Museum of Natural History and the lake, and this would connect with the lower of



MEMORIAL IN CENTRAL PARK, NEW YORK

AS HASTINGS, F.A.I.A., ARCHITECT

ew York Chapter, The American Institute of

-The Architectural League of New York

ers—Society of Beaux-Arts Architects

ls—Société des Architectes Diplômés par la Gou-
çais

—The Mural Painters

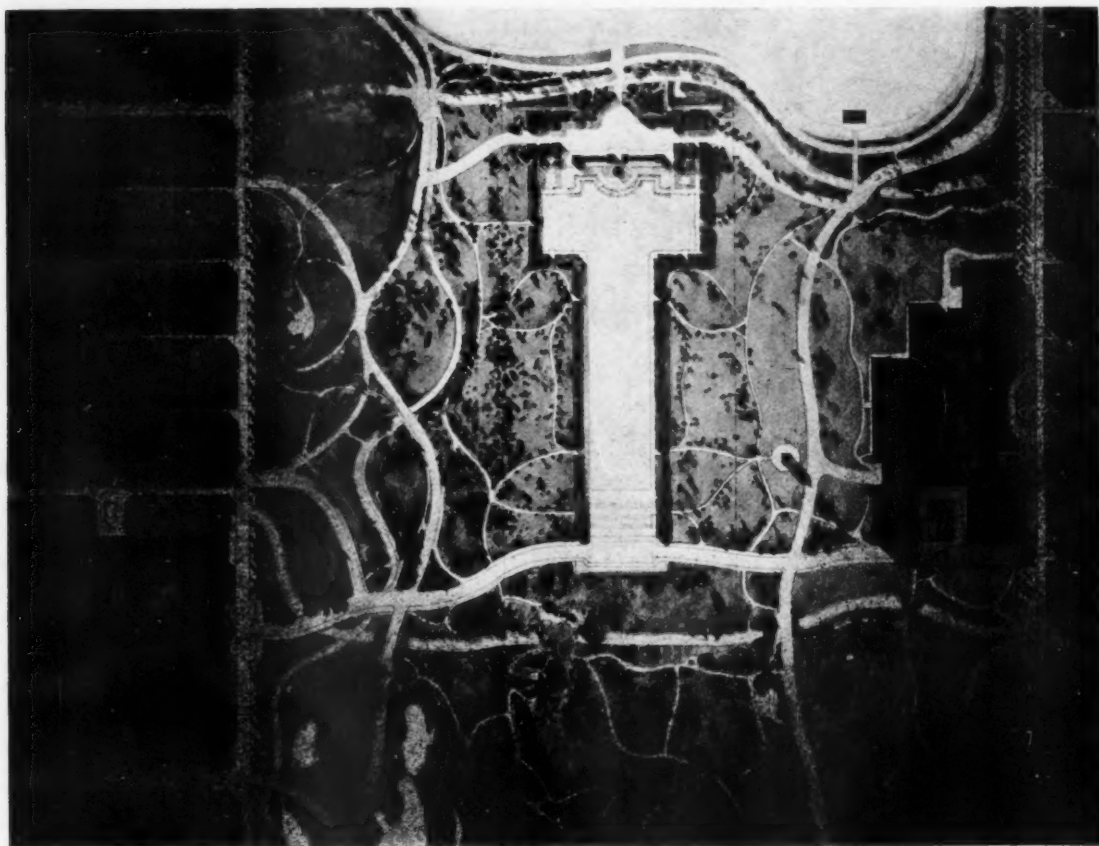
If as proposed would be placed on the narrow
between the larger upper reservoir and the reser-

y contemplating an intercommunicating road be-
Natural History and the Metropolitan Museum;
th the lower or Southern end of this lagoon and

at this connection the road will be so widened as to form a terrace with
steps descending to the water level.

From this terrace would be obtained the principal view of the pro-
posed monument, reflected in the water approach. This lagoon, bor-
dered by a double row of trees on either side, would be built only for
the decorative effect obtained and there would be no thought of its
being used as a swimming pool.

As finally agreed upon, the monument forms a screen or peristyle
comparatively low with central feature in form of an arched niche
which creates a background for the central sculptural feature surmount-
ing the fountain or cascade of water. In the open arcade at either side
of the central feature, statues or groups will be placed to represent
allegorical or historical features of the Great War. Behind the central
feature is placed a small room as seen in the plan, to provide space for
war relics, inscriptions, memorials in the wall, etc.

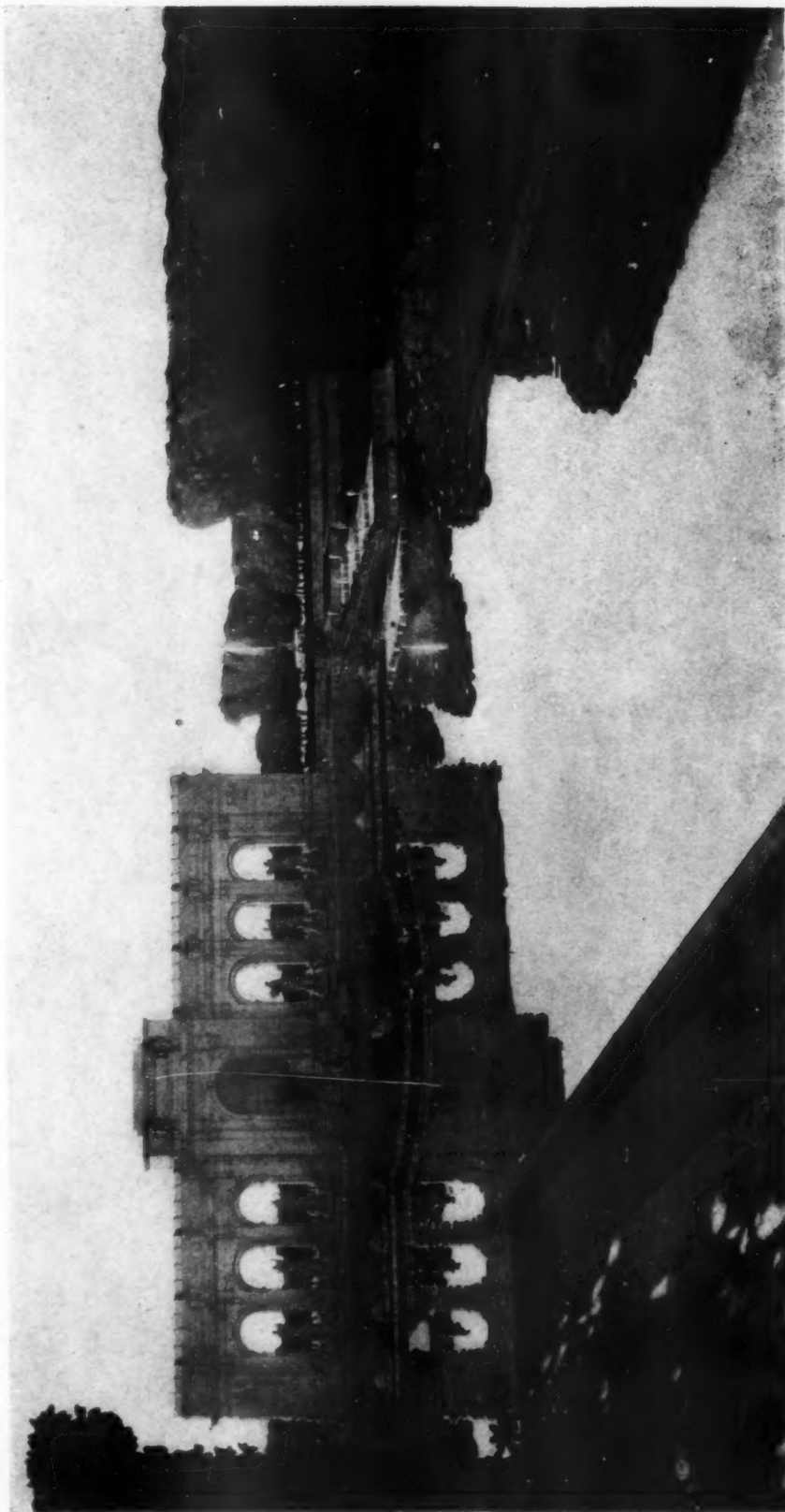


PROPOSED WAR MEMORIAL IN CENTRAL PARK, NEW YORK

THOMAS HASTINGS, F.A.I.A., ARCHITECT

THE building indicated in black in lower left corner is the Museum of Natural History, on Central Park West (Eighth Avenue); that at center of right edge, the Metropolitan Museum of Art on Fifth Avenue.

The proposed road connecting these two Museums, and touching the Southern edge of the reflecting pool is shown on the plot plan.



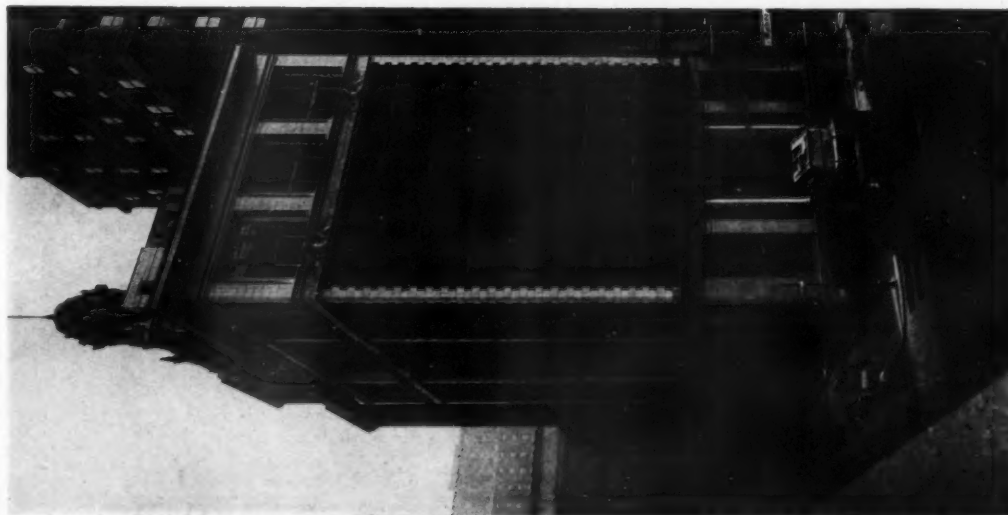
VIEW LOOKING ACROSS THE REFLECTING POOL
PROPOSED WAR MEMORIAL IN CENTRAL PARK, NEW YORK
THOMAS HASTINGS, F.A.I.A., ARCHITECT



PROPOSED WAR MEMORIAL IN CENTRAL PARK, NEW YORK

THOMAS HASTINGS, F.A.I.A., ARCHITECT

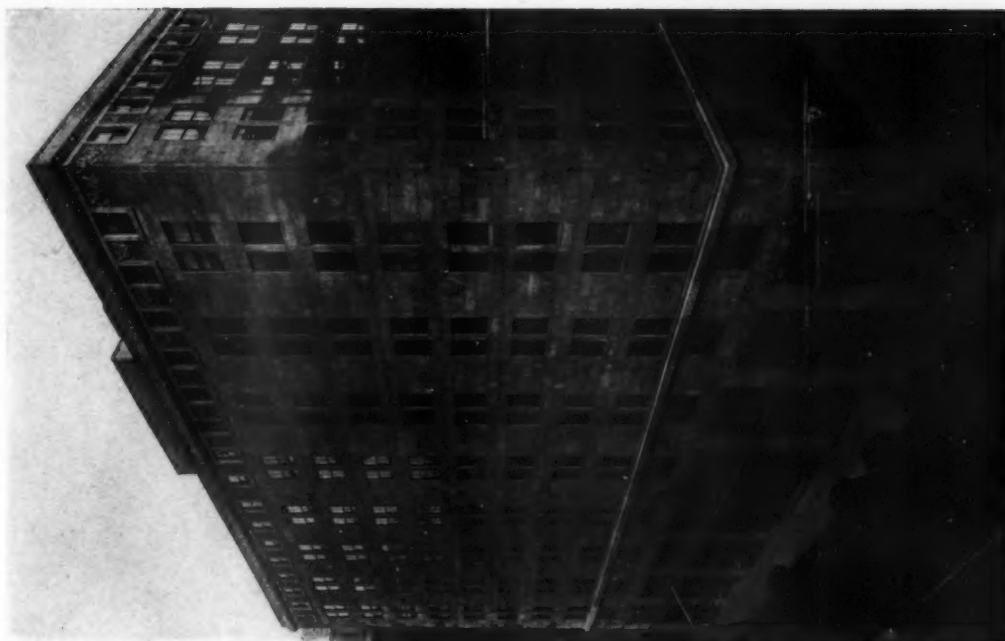




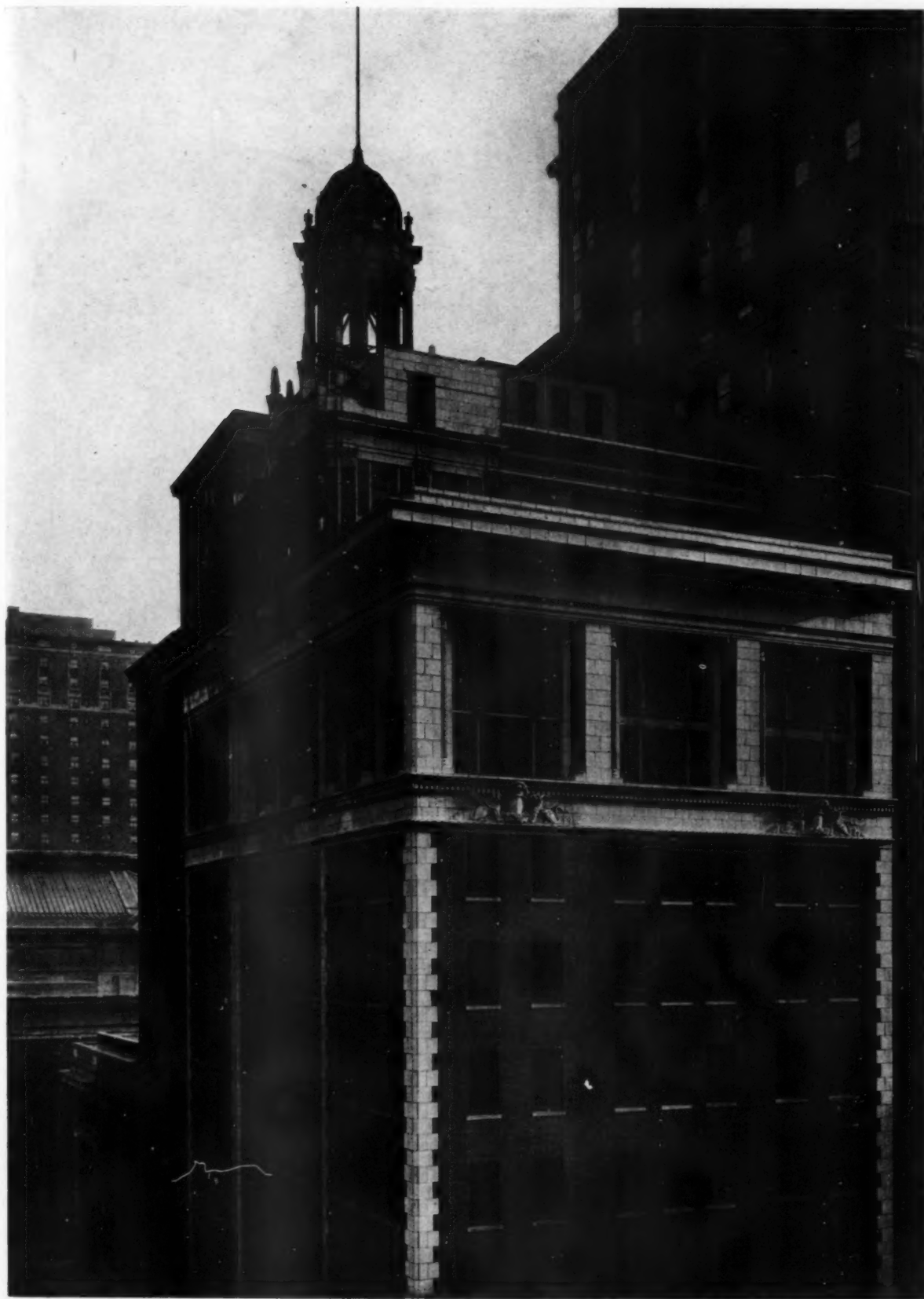
ALTERED BUILDING, 331 MADISON AVENUE
SEVERANCE & VAN ALLEN, ARCHITECTS

ANNUAL AWARDS
OF THE
FIFTH AVENUE ASSOCIATION
NEW YORK
FOR BEST NEW BUILDING
AND BEST ALTERATION
IN 1923

The Committee making these awards is appointed jointly by the Fifth Avenue Association and the New York Chapter of The American Institute of Architects. It is composed of three architects and three laymen.



NEW BUILDING, 383-385 MADISON AVENUE
CROSS & CROSS, ARCHITECTS



UPPER STORIES

ALTERED BUILDING, 331 MADISON AVENUE, NEW YORK

SEVERANCE & VAN ALLEN, ARCHITECTS

Awarded first prize by Fifth Avenue Association, New York, for best alteration in 1923

THE DETROIT FREE PRESS
FEB 5 1924



THE NEW CITY CLUB, ST. LOUIS, MO.

T. P. BARNETT CO., ARCHITECTS

(From a pencil sketch by Tom P. Barnett)

ELECTRIFICATION of BUILDINGS

BY R. E. ARGERSINGER, *Electrical Engineer**

IN general the electrical services in buildings of practically all types may be divided into three classes: (1) power, (2) lighting, and (3) telephones and signals. The relative importance of each service will vary with buildings of different character but, with the exception of small residences, in which there is practically no power load, all must usually be provided for to a greater or less extent.

The power requirements in buildings not used for manufacturing purposes will usually be limited to the general building services, such as elevators, ventilating systems, laundry equipment, refrigeration systems, and, in some cases, pumping and heating systems. In providing for and supervising the installation of such equipment, the architect, working with the electrical engineer, should see to it that motors, especially of the induction type, are not larger than necessary. Equipment that is "over motored" causes low power factor and public utilities are more and more coming to use rate schedules which penalize low power factor. This practice is correct and in the end will benefit the user, but the architect who is carefully watching his client's interest should make sure that the apparatus is properly selected. In some cases, particularly for pumps and air compressors, synchronous motors, which will raise the power factor, may be used.

The telephone and signal requirements will usually be easily arrived at from a consideration of the uses to which the building is to be put.

The service may include telephones, both private and public, messenger and ticker service, watchmen's systems, electrical clock systems, fire and burglar alarms, annunciators and other similar circuits for which space must be provided and outlets conveniently arranged.

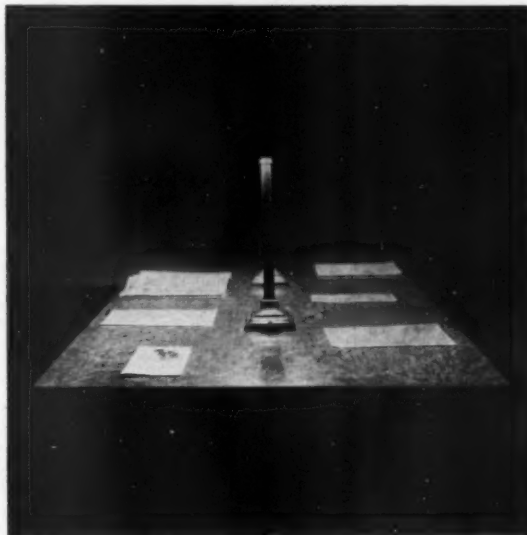
In studying the lighting requirements, how-

ever, it is not safe to be guided entirely by the layouts now in use. Experience has proved that in the effort to economize we have kept the illumination in buildings so low that there has been too great a decrease in productive effort during the period when artificial light is in use. Experiments have been carried out which emphasize the advantage of using higher lighting intensities than have heretofore been considered necessary. For instance, it has been demonstrated that one can read print much faster with a high than with a low illumination intensity. A gain

in a certain factory raising the illumination at the working surface from 2 to 11 foot candles increased production approximately 35 per cent at a cost amounting to only 5.5 per cent of the payroll. In another case, a test of show window lighting proved that nearly 80 per cent more people stopped at the window when the lighting intensity was raised from 15 to 100 foot candles. A recent survey made in a Western city showed that of 1000 stores examined, nearly 50 per cent had distinctly poor lighting and only

in 2 per cent of the entire number could the installation be classed as of strictly high grade character.

In securing proper illumination intensities, however, care must be taken to avoid glare and too high brilliancy which will produce eye strain and thus prevent the attainment of the desired results. Attention must be paid to the design of the lighting fixture. If of the open direct type, bowl enameled lamps should be used. With enclosed units the glassware or other material enclosing the lamp should be of proper size and diffusing quality to avoid these undesirable characteristics. To secure efficient use of the available light, walls and ceilings should be finished in light colors. Ceilings especially should be white, if possible with an indirect light. A white



AN EXAMPLE OF HIGH INTENSITY ILLUMINATION ON A WORKING PLANE, WITHOUT GENERAL LIGHTING IN USE

*Stone & Webster, Inc., Boston

ceiling will afford 25 to 30 per cent greater illumination than one having a buff color. It follows also that the finish should permit cleaning. The reflection effect from a dark smoke covered wall may be only 5 per cent while from a clean white surface a factor of 70 per cent may be obtained. On the other hand, glare from the wall must be prevented. Obviously a glossy surface is much worse from this standpoint than one having a dull finish. The character of paint to be used should be given careful attention where special lighting effects are desired as their reflecting

the requirements of the National Board of Fire Underwriters, both state and local regulatory bodies have laid down certain restrictions concerning the manner in which the work must be performed. These state and local codes vary in different localities so that the preliminary work should include a study of such regulations to the end that the specifications shall outline clearly and specifically the construction required for compliance with the law. In addition, it is desirable to insert in the specifications a general clause calling for the work to be in accordance with all



THE EVENNESS OF LIGHT DISTRIBUTION THROUGHOUT THE CLEVELAND PUBLIC HALL IS PARTICULARLY NOTICEABLE. THIS EFFECT IS SECURED BY THE ARRANGEMENT OF THE LIGHTING UNITS IN THE ATTIC

value differs with the character of the ingredients. Some materials also decrease in reflecting value with age. This subject has been treated at some length by A. L. Powell in an article entitled "Effect of Color of Walls and Ceilings on Resultant Illumination" in the *General Electric Review* for March, 1920.

It is important, therefore, that the architect should carefully study the lighting layout, not only with respect to the number, size, design and location of lighting outlets, but also the treatment of the structure itself, so that the resulting installation will give the maximum return in production for the money expended.

CODE REQUIREMENTS

In the preparation of the electrical specification, it must be remembered that in addition to

state and local regulations, as well as with those of the National Board of Fire Underwriters.

CHARACTER OF SERVICE SUPPLY

In any modern large city high grade central station service is available and a private plant is usually justified only in exceptional cases, such as a penal institution, sanitarium or school in a country district where the supply lines from a central station cannot be reached without prohibitive cost. It is true that articles have been published showing, under some conditions, possible economies by installing an isolated plant where service from a public utility can be obtained, but even if the analysis is correct, which is rarely the case, it is so difficult to secure, in a

small plant, attendants of sufficient ability to maintain and operate the equipment economically that such savings are almost never actually realized.

If, due to a remote location, an isolated plant is necessary, it will usually be developed as part of the heating plant, and will be housed in a separate building, so that services from it will be brought into the other plant buildings in about the same way as services from a central station.

In industrial plants, with a number of buildings, power circuits may be brought into one distributing substation, where the voltage may be stepped down to some lower value for redistribution to the various buildings. Such a substation may contain rotating equipment for transforming from alternating to direct current or apparatus for voltage regulation, or it may have only switching apparatus for the control of the various distribution circuits. Where buildings cover a considerable area it may be desirable to use an intermediate voltage for distribution from the central distributing station to secondary substations in each building. Under such conditions a careful analysis of the entire situation should be made, based on the cost of construction and of operating losses, before making a decision as to the layout to be followed.

The source of energy supply will be either direct or alternating current. For certain industrial purposes, direct current may be desirable for the operation of variable speed machine tool drives, but if the supply is alternating current the cost of transforming equipment may not be justified as the desired result can sometimes be obtained in other ways.

In office buildings, where high speed elevators are used, direct current service should be used if available. If the central station supply is alternating current, provision should be made for a motor generator set to furnish direct current. Such sets are necessary with some of the modern elevator equipments to give the voltages necessary for proper control and if of proper design and size and driven by an alternating current motor, will also furnish the necessary direct current power supply.

Ordinarily lighting service may be taken from either a direct or alternating current source, but it is necessary occasionally to provide absolutely continuous lighting service, as, for instance, in hospital operating rooms. This may be accomplished by arranging a storage battery to serve as a temporary emergency source of power to which the lamps can be automatically thrown in case of failure of the normal supply. Even with such a service, however, there is no objection to the use of alternating current as the normal source of energy since incandescent lamps can be used interchangeably on direct or alternating cur-

rent. Certain types of buildings, such as theatres and public auditoriums, are usually required to provide special exit lighting. Such service may be obtained from separate incoming feeders if run from a separate generating bus or from a storage battery as described above. If a battery is used, the size to be specified will depend on the number of lamps and the length of time during which they must be lighted. To arrive at a reasonable assumption as to this length of time, the reliability of the normal service must be considered. This is a matter that should be investigated whether or not battery relay service is to be installed. The number of supply feeders to be used in serving the building, the load already connected to them, their route from the power station, and any other factors affecting their ability to render a continuous service must be studied. It may be desirable to obtain special relay feeders in order to increase the probability of continuous normal service, and where this feature is of importance, the matter should be thoroughly discussed with the company from whom service is to be obtained.

TYPE AND LOCATION OF SERVICE ENTRANCE

Having arrived at the number and character of service feeders, the point of entrance to the building should be determined and shown on the plans. The lines may be overhead or underground and may be in or on the street in front, or an alley in the rear. If overhead, they will probably be carried to anchor insulators attached to the building wall and taken in conduit down the wall and into the basement. If the service is underground, the lines will usually be run in ducts directly into the basement. If the electrical load is small, that is, of the usual residence character, the service will terminate at a meter and fuse board, the simplest form of service entrance. If the building contains a number of suites, such as an apartment house or an office building, there may be one meter for the general building service, including elevators, stairway lighting, etc., and separate meters for each suite. All meters should be located at the service entrance, which should be so located that it will be accessible without passing through any private apartments. In a large building or one used for industrial purposes, a private switchboard may be necessary for the control of circuits feeding motors or cabinet panels located throughout the building.

In all cases, specifications should cover the number of circuits, the instrument and switch equipment required for each and the character of the supporting structure. Attention should also be paid to the arrangement and type of lighting fixtures required for the illumination of such switchboards. Plenty of space should be allowed around them to permit safe operation and maintenance.

Where the electrical load in a building is large, it may be necessary to install transformers especially for it. If the service is overhead, such transformers may be located on a pole alongside the building, but if the entrance is underground a transformer vault constructed in accordance with code requirements should be provided in the basement. Plans should show the size of vault, the equipment it is to contain, the points at which the circuits enter and leave and the means of ventilation provided.

tors involving both wiring and motors. The energy losses in the wiring system will vary inversely with the square of the voltage used. They will also vary inversely with the size of copper conductor. The fixed charges on equipment must balance the cost of energy losses to secure an economical system and, of course, the cost of energy and of materials will affect this balance so that an arrangement which is correct for one location may be unsuitable for another. Other factors, however, may limit the selection of the motor

SYSTEM	DIAGRAM	DESCRIPTION	CURRENT	COPPER SIZE BASED ON CURRENT DENSITY (SHORT FEEDERS)				COPPER SIZE BASED ON PERCENT VOLTAGE DROP (LONG FEEDERS)			
				COPPER SIZE	TOTAL COPPER WEIGHT	PERCENT VOLTAGE DROP	POWER LOSS	COPPER SIZE	TOTAL COPPER WEIGHT	PERCENT VOLTAGE DROP	POWER LOSS
A		1 Ph. or d.c. 2 Wire 110 Volt	100	100	100	1.00	100	100	100	1.00	100
B		1 Ph. or d.c. 3 Wire 220-110 Volt	Outside 50 Neutral 0	Outside 50 Neutral 50	75	.50	50	Outside 25 Neutral 25	37.5	1.00	100
C		2 Ph. 3 Wire 110 Volt	Outside 50 Common 70.7	Outside 50 Common 70.7	85.3	1.00	85	Outside 50 Common 70.7	85.3	1.00	85
D		2 Ph. 4 Wire 110 Volt	50	50	100	1.00	100	50	100	1.00	100
E		2 Ph. 5 Wire 220-110 Volt	Outside 25 Neutral 0	Outside 25 Neutral 25	62.5	.50	50	Outside 12.5 Neutral 12.5	31.25	1.00	100
F		3 Ph. 3 Wire 110 Volt	57.7	57.7	86.5	.865	86.5	50	75	1.00	100
G		3 Ph. 4 Wire 191-110 Volt	Outside 33.3 Neutral 0	Outside 33.3 Neutral 33.3	66.7	.50	50	Outside 16.7 Neutral 16.7	33.3	1.00	100

COMPARISON OF DISTRIBUTION SYSTEMS

(Based on equal feeder lengths and equal loads, and using System "A" as a base for comparison)

WIRING LAYOUT

To determine the capacity and arrangement of the distribution system within the building, one must first arrive at the amount and location of the electrical load. The general division of the load must also be analyzed. There may be only one common lighting service, or there may be both normal and emergency systems. If electricity is used for heating, it should have a service separate from the lighting circuits. If energy is supplied to a motor load, there may be one or more power feeder systems with which a heating service may be combined.

After the amounts and locations of the loads have been determined, then an analysis of the cost of the different methods of supplying them must be made.

For power supply the voltage to be used can only be decided after consideration of many fac-

voltage such as code limitations, safety of operation and maintenance and the voltage of motors available in local stocks.

For incandescent lamps a voltage approximating 110 is almost universally used. There are, however, several different wiring methods in use. These are fully described in a paper on Power Station Lighting presented by R. A. Hopkins at the 1923 annual convention of the Society of Illuminating Engineers at Lake George. The table shown above outlines their differences.

The most common and one of the most efficient systems is that using 220/110 volts, i.e., a three wire arrangement having 220 volts between outside wires with the third wire serving as a neutral or common return with 110 volts between it and either outside wire. The neutral wire is solidly grounded. If the lights can be perfectly balanced on either side of the neutral, there will be no return current in the neutral wire and the

effect will be that of carrying the entire load at 220 volts. Some study is, therefore, warranted in attempting to secure a balanced system.

In large buildings it is usual to run feeder circuits from the main switchboard to distribution cabinets located on the various floors. One feeder may serve a number of cabinets and if an emergency service is necessary, separate feeders and cabinets may be required or divided cabinets may be used, part of the cabinet being fed from the normal and part from the emergency service. The cabinets may be mounted on the walls or may be set flush in the walls, depending on the character of the building. There is a wide variation in the quality of cabinets and the designer will do well to make specifications clear as to the desired arrangement and the details of construction.

In preparing drawings of the electrical installation, complete information should be given not only as to the location of the outlets but the conduit run should be indicated from the outlet to the cabinet and to the switchboard. The number of wires in the conduit and their size should be specified and the circuit connections between outlets and cabinets should be clearly shown. Such information will make the estimator's work much easier and result in more uniform bids on electrical work. In laying out the lighting wiring for a high grade office building a voltage drop of approximately one per cent between switchboard and cabinets and about two per cent between cabinets and the most remote outlets should be allowed. This will usually give a difference in outlet voltage of not more than two per cent.

The connections of the signal and telephone systems will be determined by the character of the service and the designer's problem is to analyze the functions which the building must serve and select the particular systems required therefor.

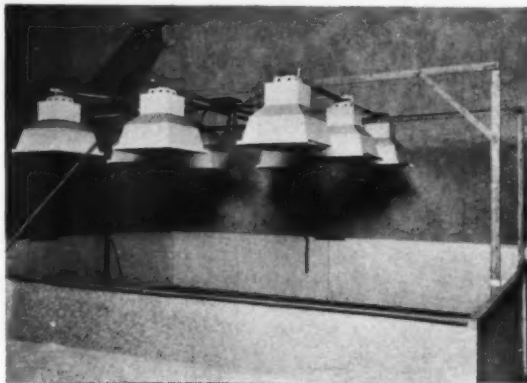
CONDUIT SYSTEM

Means must be provided for carrying wires through the building. In some industrial buildings it is possible to use open wiring carried on insulating supports attached to the building frame. In some structures also, particularly wood buildings, "knob and tube" construction is permitted under certain limitations laid down by the Underwriters' Code. In most large buildings, however, some form of conduit must be used for carrying wire.

The conduit may be rigid iron or fibre pipe, flexible metal conduit or some form of metal moulding. It may be exposed or concealed in walls or floors. In cheaper structures flexible metal conduit is sometimes used but is not as satisfactory for large buildings as rigid iron pipe

and the saving made by its use will probably not exceed ten per cent of the cost of the conduit work. In providing for power loads, conduit terminal boxes should be specified on all motor frames and on control equipment so that the conduit system will be continuous and no wiring will be exposed at the motor. Flexible conduit connections will usually be necessary for this purpose.

In the layout of office buildings, it is difficult to predetermine the location of desks and therefore of telephone and signal outlets. To meet this situation, a number of forms of under floor and



REFLECTOR EQUIPMENT UNIT IN THE CLEVELAND PUBLIC HALL WITH ILLUMINATION THROUGH CRYSTAL GLASS CEILING LIGHTS. NOTE THE RIGIDITY OF THE FRAME SUPPORTING THE REFLECTORS AND THE CURBING EXTENDING AROUND EACH PANEL TO RETAIN THE LIGHT AND TO AFFORD A BACKGROUND WHEN THE CEILING IS VIEWED AT AN ANGLE. LIGHTING IN FOUR COLORS

side wall conduits have been developed which are provided with fittings designed to permit changes in location of outlets and additions of new outlets as occasion demands. Some such system should be used in buildings where tenants may change and where unsightly exposed signal and telephone cords are undesirable. Under some conditions, however, telephone companies will not permit their circuits to be run in such conduits when used also to carry other services, so that attention should be given to the necessity of providing sufficient facilities for all.

WIRE INSULATION

For the usual building installation the National Electric Code compound insulation is satisfactory if properly selected for the required voltage. This insulation will deteriorate, however, in the presence of heat or moisture. Asbestos compounds will resist high temperatures but often are not permanent if moisture is also present. Varnished cambric will withstand moderately high temperatures and some vulcanized compounds are said to

withstand both heat and moisture, but if water is actually present continuously a lead covering should be used. Under ordinary conditions, the boiler room is about the only part of a build-

ing where this question requires special study and with care in the location of conduit runs, it is not usually a difficult problem to keep the temperature in the conduits below the danger point.

The DISTRIBUTION and CONTROL of ELECTRIC CURRENT

BY H. F. RICHARDSON, *Electrical Engineer**

IN determining the scheme of distribution for the various electrical systems in any building there are two principal considerations. First, the system must adequately meet the requirements for each kind of service both for the initial installation and for likely future changes and second, with the above in mind, the system must be the most economical for the purpose. Too great economy in first cost may result in expensive future changes and on the other hand, a great deal of money is often wasted providing for all kinds of possible contingencies. While experience is probably the only safe guide to determining the balance between these two considerations for any particular building, there are certain general principles which apply to most buildings of each type.

In an office building it is almost invariably an economy to provide for "tenant changes." It is quite certain that most, if not all, of the interior partitions will be changed during the life of the building. Therefore it would seem desirable to keep electrical work out of these partitions as far as possible, locating switches and outlets on the outer walls or columns and receptacles in lighting circuits and outlets for telephone service on the outer walls, on columns or in the floor. Conduits should be installed in partitions only where connected to an outlet in that partition, so that no circuit will be interrupted if the partition is moved. Many people feel that the only place for a switch is at the strike side of the door to the space in which the lights controlled by the switch are located. This is probably true in certain types of buildings but in an office building the lights are generally lighted by a person who is already in the room and who can just as well walk to a column or outside wall as to the door. Even if a person is entering a room in the dark there will probably be enough light from other sources so that he can easily locate the switch. It will materially reduce the cost of "tenant changes" if

switches can be located on fixed parts of the structure.

Usually the wiring for an office building must be laid out and often is installed before the various spaces are rented. The distributing system for ceiling lights should therefore be more or less independent of the location of partitions. The circuit from the panel board should be terminated in a junction outlet placed in the ceiling just off the corner of a column or some other convenient location. Wiring may be extended to the ceiling outlets in each bay from this junction outlet and also down to the switch controlling the lights. If the spacing of columns and windows is such that the possible location of partitions may be forecast, then it may be possible to install ceiling outlets in advance with the expectation of making a certain number of changes later. This may often be cheaper than holding up part of the electric work and installing this work as spaces are rented. If, however, the arrangement of the building is such that it is not possible to anticipate location of partitions, then all work up to the junction outlets may be installed and also probably the extensions from junction outlets to switches, delaying the extension of ceiling outlets until the partitions are laid out. These extensions may be in the usual conduit if there are suspended ceilings or in "oval duct" or 5/16" flexible conduits installed in the plaster.

It is recommended that in an office building an ample number of ceiling outlets and switches be provided not only for better service but because less changes are required. It is also recommended that for a high grade office building an insertion receptacle be installed on each column. This will generally be found ample for all needs for fans, dictaphones, adding machines in the usual commercial office building but not adequate in an insurance company or similar occupancy using large numbers of electrically driven machines. Desk lights need not generally be provided for, as with modern fixtures ample light may be obtained from the ceiling.

*Meyer, Strong & Jones, Inc., Consulting Engineers, New York.

For a high grade building it is also desirable to install a line of ducts in the floor along the outer walls and at a distance out from the wall of two to three feet and so designed that outlets may be inserted at any point desired. This will provide, without running wires along the top of the baseboard, for wiring desks for telephones, when the desk is located out from the wall as well as for desks along the wall. To provide desks at greater distances from the wall, additional lines of ducts may be installed if desired at intervals of five or six feet from the outer walls. For desks along the wall, wires for telephones may be installed along the baseboard if desired,



DIRECT LIGHTING SYSTEM TO ILLUMINATE THE WORKING SPACE IN A BANK

either exposed or through a hollow baseboard or in a moulding installed as a capping to the baseboard. This should be satisfactory if there are not too many offsets around columns, and provided the removable part of the base is of such design that it will not easily be deformed and so that it always can be easily replaced. There does not seem to be any need for such a moulding for the distribution of lighting wires in most buildings as receptacles installed on each column or possibly closer will be ample. In an office building it is important, where tenants are to be charged for current, that provision be made for metering the current for each tenant and this must be flexible to take care of changes in occupancy. The panel boards should be of the "me-

tering" type and the circuits and conduits should be laid out so as to facilitate the division of circuits between tenants.

For a large bank or insurance company or similar occupancy where there will be a great number of desks located in large open spaces, the distribution of wires for telephones, push buttons, dictaphones, adding machines or other electrical equipment, must be studied. As most of these desks will be located away from walls or columns the wires can be distributed only through the floor. If the initial layout of desks and equipment can be determined sufficiently in advance, it is, of course, possible to install floor outlets for each desk requiring wiring and to install conduits to these outlets only. However, it will generally be found that it is difficult to determine even the initial layout with any degree of certainty until a very short time before the space is to be occupied and changes in the layout of furniture for a large corporation are almost a continuous performance. For this reason the wiring system should be flexible enough to take care of almost any arrangement. If the floors are of wood, additional sleepers may be installed at intervals of five or six feet in such a way as to form raceways under the floor through which wires may be pulled later. Provision must, of course, be made for conduits to feed these raceways. Where floors are of cement, lines of ducts designed to be cut into through the floor, may be installed at intervals of five or six feet, also including provision for feeding the conduits. These ducts may also be installed, if desired, under a wood floor instead of forming raceways with sleepers. Proper outlet fittings may be installed in raceways or ducts as desired and it has been found that such a system will provide for almost any arrangement or change in arrangement of desks. For any office building where desks requiring wiring are distributed away from columns or outer walls, it is essential that an ample floor fill be provided. The thickness from the top of the structural slab to the finished floor should be not less than $4\frac{1}{2}$ " and preferably greater.

In a bank or other occupancy using a bank or counter screen, the distribution to equipment along the screen may be taken care of by metal troughs with removable covers installed along the screen, on the side away from the public space, flush with the finish. Where there are wire mesh partitions, the wiring for apparatus adjacent thereto may be installed in the tubes supporting the wire panels if the tubing is designed with this in mind. If these tubes are to be so used care should be taken that an uninterrupted passage is provided with edges at joints smoothed so as not to injure wire in pulling. At each intersection of members of the tube frame small

openings with removable covers should be provided to facilitate the installation of wires.

In a loft or industrial building it is usually just about as difficult to obtain advance information as to the layout for tenants, departments, etc., as in an office building. In an industrial building the problem is in some ways even more difficult than for an office building as the needs for the various departments of a manufacturing company are so widely different. One section may be occupied by clothes lockers, another by a department where general ceiling illumination is satisfactory; another department may require intense local illumination or a large area may be filled with stock racks extended to the ceiling. Each will require an entirely different layout of lights, yet the wiring system must be designed before the occupancy has been determined. Fortunately in a building of this character there is generally little objection to exposed conduits. It is, therefore, possible to lay out a comprehensive "back bone" of a concealed system, having, say, one outlet only in each bay which will serve as a junction to which other outlets may be connected by conduits installed exposed after the requirements have been definitely determined.

In an industrial building, the distributing system of power wiring for electrically driven machinery must also be considered. This is much more difficult than the lighting system as the requirements for power vary more widely. On account of the greater cost of the heavier power cables, it is important that the system be studied so that power, as may be needed, can be supplied to any department without a large amount of unused copper in departments where power is not required. Changes in the layout of departments in an industrial building are about as frequent as in an office building. If there are to be a number of individually driven machines, provision will probably be required for distribution of wiring through the floors.

For many types of buildings such as schools, hospitals, theatres, hotels and churches, flexibility of the system of distribution to take care of changes need not be considered and the problem is, therefore, much simpler. In fact, in such buildings the problem of distribution is simply to supply wiring to the necessary outlets for light, power, telephones, in the most economical manner.

In designing the distributing system for light or power in a building of any size, the location of the main switchboard and the location and number of riser shafts and panel boards are important. While each case must be decided after a study of the particular conditions, generally speaking the main distributing switchboard should be located somewhere in a line between the source of service and nearest riser shaft, in other words, so as to reduce the length of source

and distribution feeders to a minimum. Of course, the board must be located so as to be readily accessible for supervision and the replacement of fuses, but in general it is not essential that it be located in the mechanical plant if this involves any great increase in the length of feeders. If located away from the mechanical plant, the board should be in a separate room with locked door. In determining the number of panel boards on each floor, and this generally determines the number of riser shafts, it is desirable that there be sufficient panel boards so that no branch circuit need be greater than 100 feet in length from the panel board. As a matter of fact, as far as the cost of the electrical work is concerned, it will generally be more economical to provide for even shorter circuits but the space required is usually difficult to provide. If branch circuits are too long, in addition to the objectionable loss in voltage in the wires and the higher cost of the electrical work, there is the further objection that this will concentrate too many circuits at one point. A panel board so high may result that the upper switches are out of reach unless space is available to make the width of the panel in two or more sections. Also it may be very difficult, if not impossible, to install, in the floor construction, the necessary number of conduits concentrating at the panel board.

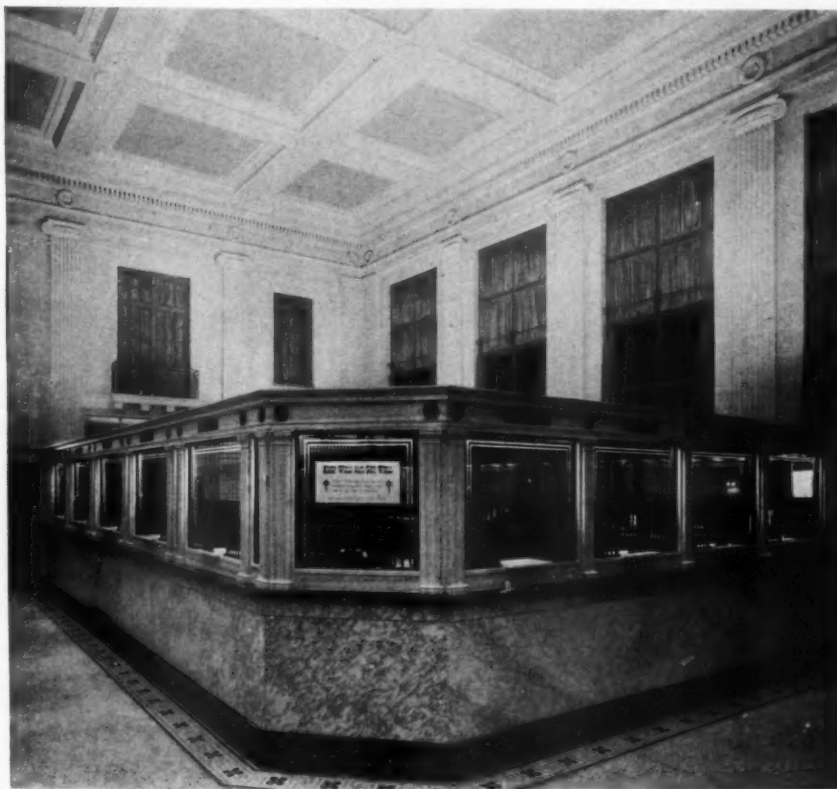
Space is usually required for risers for telephones and other services, although these may not require as many shafts as are required for light and power. It is to be recommended that the telephone and other companies be consulted as to the provision to be made for this work. It is generally not necessary or desirable to install vertical conduits in a shaft for such services, but rather to provide a shaft with access openings on each floor in which cables may be installed. Conduits should be provided across any offsets in the riser shafts. Conduits should be provided from the riser shafts for telephones to a number of points on each floor to provide for concealing the cables which distribute from the riser shaft. It is still general practice to install conduits in shafts for light and power risers although there is a growing tendency toward the elimination of conduits and the installation of cables, supported on proper insulators, either of bare or insulated copper.

The future, as well as the present, requirements of the building should be borne in mind when figuring the size of light or power feeders. In an office building, for instance, a floor may be rented to a tenant requiring considerably more light than necessary for general office use. A drafting room generally requires at least twice the light that is required in an ordinary office. Of course it is not necessary to provide for the

possibility of such lighting on each floor but it would seem wise to provide for a reasonable increase in the initial load on a feeder and on the other hand, it is seldom necessary to figure on the entire load being connected at one time. It is usually safe to assume that the maximum lighting load on a feeder will not exceed, say, 75 per cent of the total connected. However, in some cities there are arbitrary rules as to feeder sizes and these must be followed. Lighting feeders must be figured for current carrying capacity, and also so that the drop in voltage will not be too great. This may increase the size of a long

for lighting feeders where the size is determined by the drop in voltage. If riser cables are to be installed without conduit, then the insulation may be either of the above or it may be of the "slow burning" type. Cables may be without insulation and copper bars have been used, but this is not usually economical.

There are many types of panel boards available, probably too many. Panel boards may have screw plug or cartridge fuses, push button, tumbler or knife type branch switches and may be "dead front" type with all live parts covered or of the open front type. Main switches are often



THE INDIRECT GENERAL ILLUMINATION OF THIS BANKING ROOM IS VERY EFFECTIVE AND PLEASING. DIRECT LIGHTING IS USED IN THE WORK PLACES

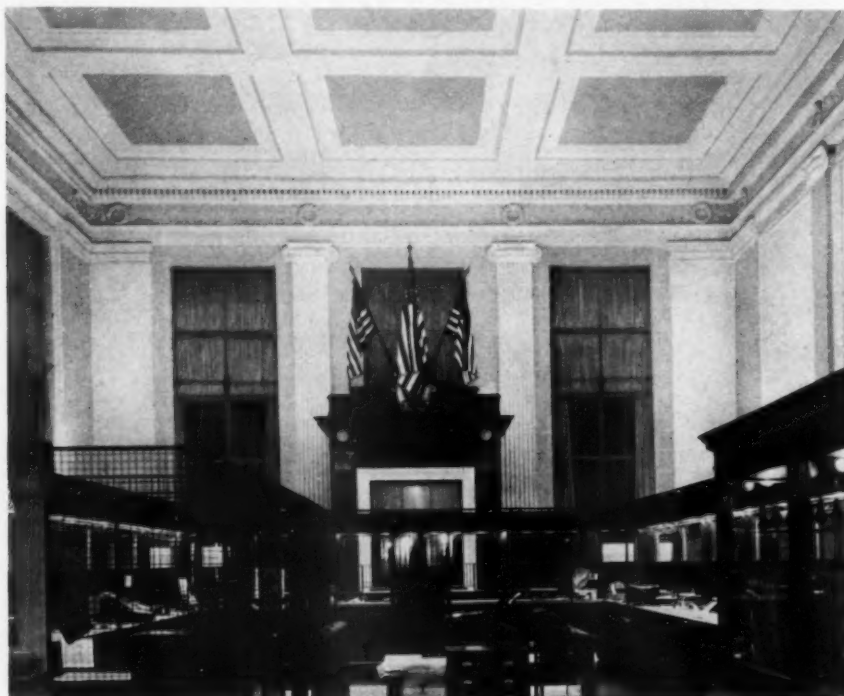
feeder to double or more the size required to carry the current. It is not generally necessary to consider the drop in voltage in a power feeder.

If feeders are to be in conduits the insulation may be of rubber or varnished cambric. The carrying capacity of the cambric insulated cable is greater than that of the rubber insulated cable, as the cambric is less affected by heat. For this reason it often will be found economical to use cambric insulated cables for power feeders, using a smaller size than that required for rubber insulated cable. This is not usually an economy

installed on panel boards although there is seldom any need for them. A panel board with knife switches in the branch circuits and with cartridge fuses, all mounted on a plate or marble base, is probably the most durable type and best adapted to severe use. The purpose of the branch switches is to open a circuit in case of alterations or to replace a blown out fuse. The use of switches, while desirable, is not essential as circuits may be opened by removing the fuses. With cartridge fuses this means handling the live metal of the fuses and with plug fuses, if there is a

load on the circuit when opened, there is danger of an arc at the base of the fuse as it is screwed out, which may seriously damage the panel board. There does not seem to be any real necessity for the "dead front" type of panel in a building where the panel boards are accessible only to an electrician. "Dead front" panel boards generally cost more and are not as substantial as the open front type. However, for a residence or where switches are likely to be handled

facturer nor the electrical contractor is familiar with this kind of work and where this type of trim is in the electrical contract, the result is generally unsatisfactory for all concerned. The electrical contract should in all cases provide for a complete box with steel door trim and if higher grade doors and trim are required, the panel box with the steel doors should be set back so that the finished doors may be installed by others outside of the steel door. In this way the outer



DIRECT LIGHTING IN THE WORKING SPACE OF A BANK WITH INDIRECT LIGHTING FOR GENERAL ILLUMINATION

by others than an electrician the "dead front" type is desirable.

In an office building where provision is required for metering current for tenants, panel boards should be of the "metering" type, designed so any circuit or any number of circuits may be connected to any one of the number of meters for which the board is designed. Provision must also be made for a cabinet or meter board for meters. This may be incorporated in the same box as the panel board or may be adjacent to the panel board.

Where it is desired that doors and trims for panel boards or for any other boxes under the electric contract match the surrounding wood or metal trim, it is strongly recommended that such doors be placed in the trim contract rather than in the electrical contract. Neither the box manu-

doors do not have to fit the various divisions of the box but simply cover the entire box. Endless confusion generally results from an attempt to fit finished trims to a panel box, particularly if there are several sections to the box.

In fireproof buildings wiring is usually installed in rigid iron conduit although some flexible conduit is used, particularly where adjustment of the exact location of an outlet is necessary. Iron pipe conduit may be either galvanized or black enamelled. The galvanized is used on most high grade work as the galvanizing is practically a better protector against corrosion than the black enamel. As a matter of fact, the enamel coating is a better protection than commercial weights of galvanizing, if it could be maintained intact, but while being installed a large part of the enamel is usually removed from the conduit.

Even the galvanized conduit has a comparatively short life in cinder fill unless the conduits are covered with cement mortar before the fill is put in place. There are several materials available for making short extensions from the conduit system, these being principally used for "tenant changes" where it is difficult to make extensions in regular conduit without excessive cutting of structural floor slabs.

The 1923 National Electric Code permits the use of 5/16" diameter flexible conduits, with one wire in each, extended on the face of partitions or on the under side of floor arches and plastered in. The use of this material is limited to the room or suite in which the extension originates. In some localities the use of an oval shaped conduit or an oval shaped twin-conductor armored cable is permitted for such extensions. Where suspended ceilings are provided, extensions can be made easily with standard size flexible conduit.

It is recommended that all outlet boxes be of the deep type, providing for conduits entering from the sides as well as from the top. These not only facilitate changes, but in many cases are easier to install and provide more space for the circuit wires and splices.

There are a number of types of local wall switches available. Some have porcelain bodies and some composition, some have mechanisms completely enclosed and some are open in front

or are provided with a thin fibre covering. Some switches are operated by push buttons, by trim buttons or are of the "toggle" type with projecting levers. The composition body switches are much less liable to breakage than the porcelain body type and the metal parts are more likely to stay tight for a number of years as the screws can be set up more tightly in composition than with porcelain. The fully enclosed switches are preferable to the open or fibre paper covered type as the mechanism is better protected from dirt and from mechanical injury during installation. As to the various methods of operation, that is, push button, trim button, snap type or toggle type, there is probably no choice mechanically.

As to insertion receptacles, a number of manufacturers have standardized on a type which will take plugs with either the tandem or parallel blades. The fact that these are standardized and that most portable electrical devices come with plugs to fit these receptacles attached, is a great advantage. For most uses these receptacles are entirely satisfactory but where subject to severe usage, as in a hotel or an office with a number of electrically driven machines, it is strongly recommended that a more substantial type of receptacle be used. It is also recommended that the plates for all wall switches and receptacles be of brass at least .060" (sixty thousandths of an inch) as plates thinner than this are easily bent and do not look well.

MICHIGAN REGISTRATION LAW

THE *Bulletin* of the Associated Technical Societies of Detroit states that the Michigan law, which is open to criticism, is probably as good as any obtainable at the time of its enactment in 1919. The four years of experience under it have indicated several possible improvements by amendment. Members of the professions concerned should study the question and be prepared to offer constructive suggestions. Some may believe that the law should be repealed and the subject dropped entirely, but the probability is that registration under some law is desired by the majority in the belief that the benefits outweigh the difficulties.

The State Board of Examiners has recently submitted its second biennial report to the Governor. Meetings are held on the second Wednesday of each month at the Board's office, 601 Charlevoix Bldg., Detroit. Examinations are held at U. of M., M. A. C. and College of Mines twice a year. The present members of this Board are Geo. L. Harvey, architect, Port Huron; Byron E. Parks, mechanical engineer, Grand Rapids; Edward M. Walker, civil engineer, Detroit; Prof. Emil Lorch, architect, Ann Arbor;

John J. Cox, civil engineer, Ann Arbor; George Jerome, civil engineer, Detroit, and John A. Broad, civil engineer, formerly of Newberry, now of Detroit.

The terms of appointment of Mr. Lorch, Mr. Walker and Mr. Broad have expired but as no one has been appointed to fill their places, they have continued to serve on the Board. In the two years since December 1, 1921, the Board has considered 708 applications for registration, of which number 259 were from applicants who were given the written examination. Final action has been taken upon practically all of these applications. Three hundred and sixty-seven have been approved and the applicants have been registered, 49 have been rejected and the fees returned to the applicants, while the rest have been put on file until such time as the applicants take the examinations or signify to the Board their intention of withdrawing their applications.

The total number of applicants granted registration since the original architects law went into effect in April, 1919, is seventeen hundred and forty-eight (1748) distributed as follows:

Architects	612
Engineers	1017
Surveyors	119

SPECIAL ELECTRICAL REQUIREMENTS

BY JOHN E. DUTCHER, Mechanical Engineer*

NO architect would think of designing a building without giving thought to the light and power requirements. The result is, that in practically every building, standard light and power units can be installed and connected to the original service lines without much trouble or expense. There are other electrical devices used in buildings which vary with the occupancy of the building and they are important enough to receive more consideration than is generally given them. The owner of a new building may have been dreaming over a general layout for years and when he conveys his general scheme to the architects, he is apt to forget a number of important items that he needs in the building in order to have it come up to his expectations. Modern business methods require and demand the use of labor saving devices such as the telephone, signal system, telautograph and many other special electrical systems.

The telephone is too well known to need describing in detail any of the successful systems. The stations of public telephone companies are central energy plants from which the current for ringing and talking is provided and only in special cases, such as at private exchange boards at a distance from the central station, do they need batteries. The automatic system in which the switching is done by electrical mechanical devices, thereby eliminating the operators, seems to be gaining over the other types. The voltage used in telephone work is usually below 48 volts and is not subject to the inspection requirements of state and municipal codes.

In all modern buildings it is advisable to install a complete system of conduit and junction boxes to accommodate the wires installed by the telephone company which has a trained force of men for that purpose. In the case of a private telephone installation it is advisable to get a higher grade of workman than is generally employed. In the larger cities there are contractors who make a specialty of telephone work and the results obtained are far better than when it is done by the average contractor. If it is necessary to incorporate this work in an electrical contract, it is advisable for the architect to specify that that portion of the work should be done by trained mechanics making a specialty of that kind of work. The following data gives the requirements and sizes of conduits to accommodate standard lead covered telephone cables in the market today.

TELEPHONE DATA

Size of Conduit Required for Lead Covered Telephone Cable

Pairs	Conduit Size in Inches
15	$\frac{3}{4}$ to 1
25	1 to $1\frac{1}{4}$
50	$1\frac{1}{4}$
100	$1\frac{1}{2}$
200	2
300	2
400	$2\frac{1}{2}$ to 3
600	3
900	$3\frac{1}{2}$
1200	$3\frac{1}{2}$

NOTE: Use the large size when more than two bends on the conduit run occurs.

Size of conduit required for rubber covered telephone wire

Pairs	Conduit Size in Inches
2	$\frac{1}{2}$
2	$\frac{1}{2}$

NOTE: This allows for future pulling of an extra pair of wires.

This service cable should be figured no smaller than 25 pairs and in addition an extra spare duct should be provided for emergencies, so that a new cable may be pulled in.

Service cable size should be based on the following:

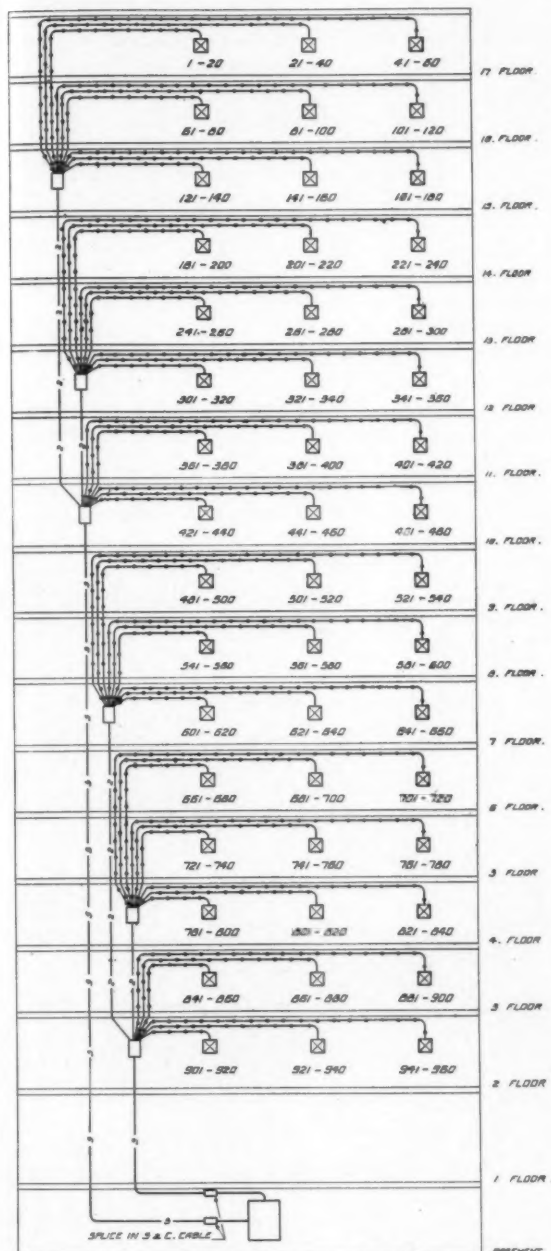
OFFICE	Financial	1 Pr. to 90 Sq. ft. of rentable floor area
OFFICE	Commercial	1 Pr. to 125 Sq. ft. of rentable floor area
LOFT	Loft	1 Pr. to 900 Sq. ft. of rentable floor area

CLOCKS

The electric clock system has no substitute, except in special places where air is used. The master clock is the main governor of the electric clock system and the regulation depends on its quality. A variation of not to exceed ten seconds in thirty days is the best that manufacturers will guarantee. It requires close adjustment in this field to get inside this limit. A variation of thirty seconds per month is generally considered good.

The master clock should have a mercurial, fully compensated pendulum beating seconds. The master clock, generally by mechanical means, closes an electric circuit that operates relays at certain definite periods of time, generally once every minute. The secondary clocks are connected in groups of thirty to sixty on a circuit. On these relays and at each closing of the circuit by the master,

*Of Richard E. Schmidt, Garden & Martin, Architects, Chicago, Ill.



TELEPHONE RISER DIAGRAM.

SYMBOLS

LEAD COVERED 20 PR. CABLE	—1—	IN 1 1/2" CONDUIT
LEAD COVERED 100 PR. CABLE	—2—	IN 1 1/2" CONDUIT
LEAD COVERED 200 PR. CABLE	—3—	IN 2" CONDUIT
LEAD COVERED 300 PR. CABLE	—4—	IN 2" CONDUIT
LEAD COVERED 400 PR. CABLE	—5—	IN 3" CONDUIT
LEAD COVERED 500 PR. CABLE	—6—	IN 3" CONDUIT

they advance one minute. A small secondary clock for each circuit controlled by the master clock should be mounted in the case of the master

clock so it can be seen at a glance if all of the clocks are in operation and indicating properly. The secondary clock wiring should be done in a permanent way, using No. 14 rubber covered wire with all joints soldered and protected from grounds and corrosion. These wires should be in conduit in buildings of fireproof construction.

In some clock systems storage batteries or a direct connection to the lighting circuit furnishes the power to operate the secondaries. In case batteries are used, they should not supply current or anything but the clocks and the charging of the batteries should be accomplished by using a simple form of rectifier. The master clock should be located in a clean, well lighted and heated room, not subject to sudden changes of temperature.

The type of secondary clock should be looked into closely. The size of the works are generally small, but the size of the clock face can be any size as needed, according to the size of the room. A small clock in a small room looks better than a large one. Special wood or metal clock cases can be designed to harmonize with the architectural treatment. Secondary clocks to be used in hotels or hospitals should not make an objectionable noise. Secondary clocks operated by electro magnets are very apt to make enough noise to be objectionable to a great many people. A practically noiseless secondary is made by several manufacturers.

The care of a clock system often is turned over to incompetent men and the result is poor service. The average electrician thinks he is an expert and with a hammer, screw driver and a pair of wire cutting pliers for tools, he will, in the course of a few attempts, get the clock system in such a bad condition that an expert jeweler is needed to repair the damage. A set of small, simple tools should be provided with the system to be used in maintaining and adjusting the mechanical parts.

The time stamp, controlled by the master clock, stamps the date, the hour and the minute on any paper or package where such a record is desirable. All clock manufacturers make a stamp of this kind and generally they prove quite successful. They are not very expensive, when a clock system is already installed to give the time.

TIME RECORDERS

The time recording clock at the employees' entrance is controlled by the master clock as is also the program machine used in schools to ring bells or light signal lamps if a silent call is needed, at any predetermined time.

SIZE OF SECONDARY CLOCKS

For rooms 20' long an 8" dial, mounted approximately 10' above the floor, is considered good practice. For each 10' additional length of room add 2" to the diameter of the dial; for each 10' added to the mounting height of the clock add 2" to the diameter of the dial. Clocks mounted on the exterior of buildings should be provided with automatic electric heaters to control the temperature and lights to illuminate the dial at night. It is possible in many cities to receive special synchronized time waves over the wires leading from the central stations furnishing light and power current for the buildings. By this means, one synchronizing master clock will regulate the time for an entire city. Where such a service is available the secondary clock, time stamp or recorder can be plugged into an ordinary wall receptacle.

X-RAY

The X-ray was first used in taking pictures for surgical use. High powered machines now have been developed for medical treatment and in addition we find that the X-ray is being used for a great many commercial purposes, such as the detection of blow holes in castings, the detection of foreign substances in electric insulation, and the destroying of bacteria in tobacco and food products. The service wiring for X-ray machines has been increasing continuously and in order to take care of the modern high power machines it should be connected to separate feeders from the service point and preferably on a transformer separate from that of either the lighting or power service of the building as a fluctuation in voltage causes damage to the tubes. The sizes of the wires to this apparatus should be No. 00, having a capacity of 150 amperes on a 220-volt line. The transformer on the apparatus itself raises this to from 60,000 to 300,000 volts. The limitation is the amount of voltage that the X-ray tubes will withstand. This high voltage in buildings presents two problems: first, the high voltage wires, which are generally rods or tubes of considerable cross section for strength, must be located preferably high up in the room for safety. They also must be widely separated from each other and from the building structure. The insulation of these conductors must correspond to that used on high voltage transmission lines.

The X-rays produced by the high voltage current passing through the tubes are dangerous. The human body can withstand only a limited amount of exposure to the stray rays without serious results. The operators of this apparatus must protect themselves from these rays by using heavy lead screens, lead being the best protection from these rays yet discovered. In order to protect people in rooms adjacent to X-ray machines,

the walls, floor and ceiling must be covered with sheet lead $\frac{1}{8}$ " to $\frac{1}{4}$ " thick, costing approximately \$1.50 per sq. ft. applied. Sheet lead on walls and ceilings $\frac{1}{8}$ " thick is generally considered ample, but due to the fact that the direction of the X-ray tube is generally downward, the lead protection in the floor should be $\frac{1}{4}$ " thick. For this reason, it is preferable to locate the X-ray apparatus in the basement, rather than on the upper floors of a building.

Barium sulphate plaster has been used in a few cases in England and the United States for protection from the X-ray instead of sheet lead. Experiments are being made with this material to determine how effective and reliable it is. The method employed has been to make a mortar using from one to four parts of commercial barium sulphate, one part of sand and one part of cement, applying this to one or both sides of the partitions in the same manner as ordinary plaster. The indications are, at present, that the value of this material depends very largely upon obtaining a uniform mixture and that $\frac{3}{4}$ " of this plaster is equivalent to sheet lead having a thickness of .04 of an inch.



EFFECTIVE INSTALLATION OF INDIRECT LIGHTING FOR GENERAL ILLUMINATION IN A LARGE MEN'S FURNISHING STORE, WITH DIRECT LOCAL LIGHTING IN THE SHOW CASES

In one instance, several layers of lead foil were applied to the walls the same as wall paper, giving fair results. After covering this with canvas the walls can be tinted any color desired.

TEMPERATURE INDICATING INSTRUMENT

An electric temperature indicating instrument can be installed in the chief engineer's or superintendent's office which will enable them, at any time, to check up the temperature of any room in the building or in any storage bin in a mercantile establishment where goods are stored which would suffer from any stated temperature.

The apparatus consists of a special electric line resistance coil, mounted at the point where the temperature is to be read, which varies in resistance directly in proportion to the temperature of the room. From each instrument two insulated wires are run to the central indicating instrument. The resistance in the lines from the room instrument shall be such that they are absolutely alike. The engineer can press a button and read on the indicating instrument the temperature in any room. A device of this kind is especially adapted for use in grain elevators where the temperature of the grain in the middle of the bin can be determined and which could not be found by any other method.

CARDIOGRAPH

The cardiograph is one of the most delicate and sensitive systems used in hospitals. The contraction of the muscles of the heart generates an electric impulse in unison with the heart beat. This impulse is measured by a ray of light deflected from a very sensitive galvanometer on to a photographic film, which makes a record of the strength and action of the heart. The cardiograph machine is quite complicated, requiring as a general thing 4 to 10 amperes on a 16 to 20 volt direct current line. The light ray deflected from the galvanometer is generally obtained from a 110 volt lighting circuit. Wires can be run from the machine to the various floors of the building where they should terminate in suitable outlets. A simple intercommunicating telephone system should be provided between each of these outlets and the machine in order to make it possible properly to direct the taking of a record from remote points. If this wiring system is omitted, it would be necessary to bring the patients to the machine room, which might in many cases be undesirable.

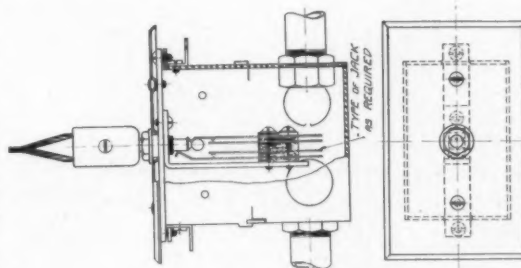
TELAUTOGRAPH

The telautograph is a system of telegraphy which reproduces handwriting, figures or sketches. The sender, with a pencil, writes on a tablet, which is connected to two resistances by two light levers, so that the motions are split up into two parts and the resistance in each part is varied according to the position of the pencil. The resistances are in separate line circuits. At the receiving end two magnetic coils, which are located in the magnetic field, are connected through two lever arms to the reproducing pencil. The result is that the variation in the current flowing in the two coils operates the reproducing pencil in unison with the sending station. The telautographic system is used in connection with hotels, clubs, railway terminals, banks and industrial buildings wherever it is desired to have

at the receiving end a copy of written orders in the handwriting of the person sending it.

RADIO WIRING FOR BUILDINGS

Many buildings today require wiring for the use of radio receiving sets. The first thing necessary is a good outside antenna. Several types of antennae or aerials are used, such as single or multiple wire, flat-top L or T type. Another one is the single wire suitable for small spaces. The antenna should consist of a single or stranded wire 75 to 125 feet long or if space will not permit, use two or more wires strung parallel and spaced not less than 2 feet apart, separated by spreaders. The antenna should be well insulated from the supports. All connections should be soldered to insure perfect contact. The lead-in should connect to the antenna, nearest the receiving set location and be supported in a secure manner on porcelain knob insulators fastened to the building wall. The lead-in wire, down to a point where it enters the building, may be a bare wire but from this point to the receiving instrument it should be insulated. Outside the building, close to where this wire enters, a lighting arrestor should be installed. The wire should be insu-



RADIO RECEPTACLE AND PLUG

lated by a long porcelain tube which should extend from the outside to the inside of the wall. The raising of the antenna, to increase the signal strength, is not efficient unless the resistance is decreased. In general, the high antenna will collect more so-called static than a low antenna and is less selective. Careful attention should be given the antenna wire for resistance, corrosion, strength and ease of handling. Insulators that withstand high voltages should be used as the ordinary house type insulators are not satisfactory.

Other types of aerials, such as the inside aerial, loops, light socket plug, coils, or bed springs may be used, but they are only about twenty-five per cent efficient when compared with an outside aerial. The ground system of the receiving instruments is the governing factor in the efficiency of the receiving apparatus. The interior ground

may be made to the nearest cold water supply or steam pipe. If this is not near or available the ground wire should be clamped or soldered to a rod or galvanized pipe driven 6 feet into the moist earth as near as possible to the lighting arrestor. Many persons use a multiground, such as to a radiator, a water pipe and also to the earth, and are then certain to have at least one good ground.

Essential to good radio reception, is a good joining of wires together or to pipes, rods, or other things. The surface should be scraped to a bright smooth finish to remove all dirt, grease, rust or paint and then join with soft solder to make a good contact.

RADIO SELECTIVITY OF RECEIVING

To meet the wants of the tenants of an office building, the guests of a hotel or the patients in a hospital, it may be found necessary to have more than one receiving set. For instance one broadcasting station may be sending out a musical program, another market reports or the weather forecast, or it may be a lecture. The receiving sets should be connected to a switchboard, designed somewhat similar to a telephone switchboard but arranged with special wiring, so that the operator can, upon request, connect the caller through a system of plugs, switches or keys to any one of the stations broadcasting an entertainment or information to his or her liking. The cut shows a wall outlet to which the receiving set can be plugged. This should be of special construction, so that these outlets cannot be used for any other purpose. It would be dangerous to connect a receiving set into a standard light wall plug.

SILENT SIGNALS

The silent call signal system in general depends upon the lighting of small electric lamps to indicate by color or number the desired message. Systems of this kind are used for a great many purposes, and when applied to elevators they indicate the position of each car in a group of elevators and direct the individual operator to keep up with his schedule. With a special push button, the elevator starter can signal any of the cars by pressing a button at his station. In moving picture theatres a system of this kind can be used to inform the doorman as to how many people are leaving the separate aisles. By this means, they can keep the seats full with the least annoyance to their patrons.

This type of apparatus has a real place in hospitals where noise cannot be tolerated.

SCHEME OF OPERATION

To signal a nurse, a patient presses a portable button at the end of a flexible cord, attached to the bed. By pressing this button the patient

lights a small electric lamp in the corridor over the door, also one on an annunciator at the nurses' station which indicates the number of the room from which the patient is calling. They also light special pilot lamps, in the serving rooms and other special work rooms where the duty of a nurse is liable to cause her to spend a considerable amount of her time. In addition, a special supervising annunciator in the superintendent's office indicates the room number from which a call is made, thus enabling the superintendent to note the time required by the nurse to reach the patient. The call can only be cancelled by the nurse going to the patient's bedside and pressing the re-set button. The wall plate from which the patient's cord is attached corresponds to a standard electric light switch plate.

In wards, each of these wall plates should, in addition, have a small bull's-eye so that when the nurse enters the room the light on the plate indicates the patient who made the call. The pilot light over the corridor should preferably be equipped by having neat dome-shape shades. These lights are quite important to the nurse while on duty for at any point in the corridor she can see what rooms are calling without going back to her station, thus saving many steps.

ANNUNCIATOR AND CABINET

The nurses' station annunciator should preferably be made of enameled steel and set flush with the wall. In this annunciator one small light should be provided for each bedside outlet and this should be enclosed in a separate lightproof compartment, the front of which contains a number or letter indicating the room from which the call originates. Generally 12 volts are used in these systems. In case an alternating current is used in the building, a simple transformer should be provided to reduce the voltage to correspond to the lamp used.

WIRING

The amount of wiring that is installed in a great many buildings is surprising, the lineal feet of conductors exceeding by two or three times the lineal feet of wire used for light and power. The greater part of this special wiring is operated under low voltage and for this reason is not inspected by the local inspector and as a general thing is inspected by the Underwriters only by special request.

More attention should be given in the architect's specifications to require a better grade of material and then make sure that it goes into the building. Also that the workmanship is of the highest grade, that standard rubber-covered wire, the same as is called for in lighting and power circuits, is used. All joints should be soldered and taped and in fireproof buildings all special wires should be run in conduit.



NEW BUILDING
for the
AMERICAN RADIATOR CO.

Located on West 40th Street

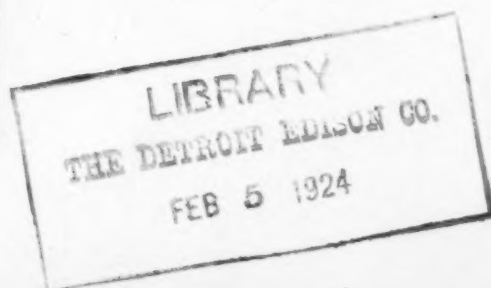
Facing Bryant Park

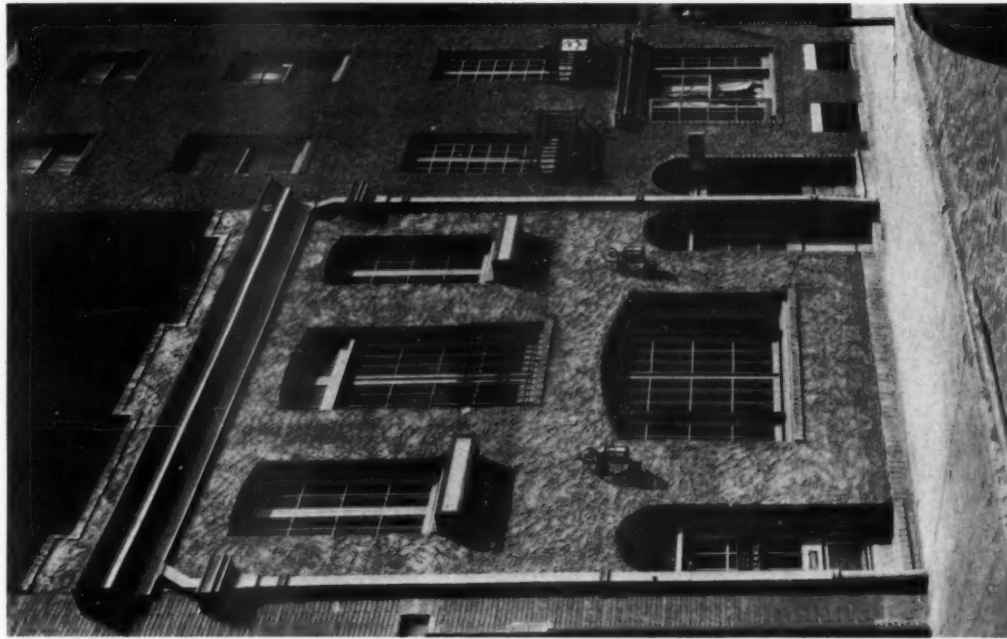
NEW YORK

RAYMOND M. HOOD
ARCHITECT

This building, unusual in color plan and architectural design, is now nearing completion.

By arrangement with the architect there will appear in a later issue of THE AMERICAN ARCHITECT a complete illustration of the architectural and engineering details.





PHILADELPHIA SHOP FRONTS

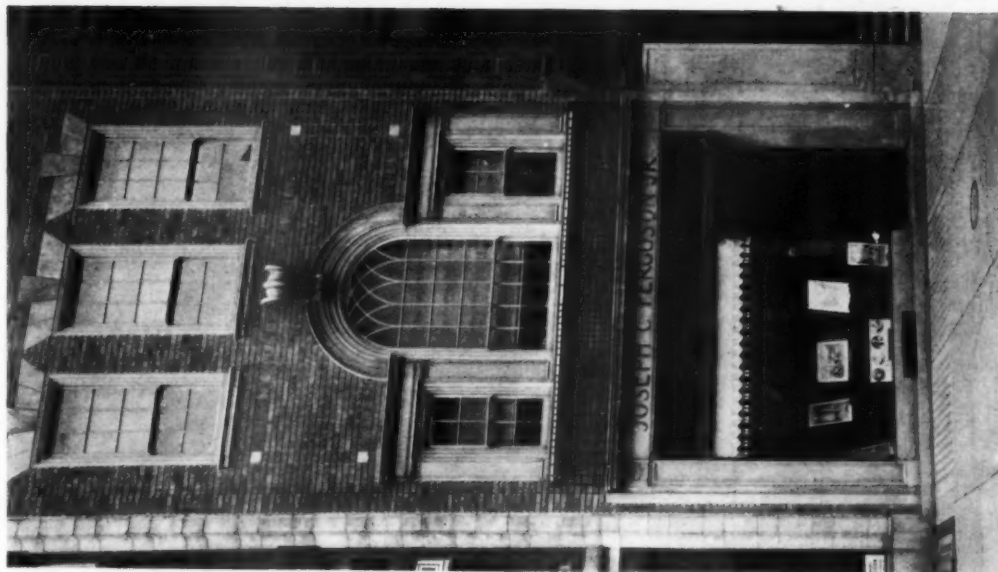
WILLIAM B. KOELLE, ARCHITECT

The insistent encroachment of trade on Philadelphia's residence section has resulted in many alterations of dwellings for business purposes. Some recent examples of this transformation are shown on this and the following page



CLARENCE E. WUNDER, ARCHITECT

PHILADELPHIA SHOP FRONTS



WILLIAM B. KOELLE, ARCHITECT

The HOUSEBOAT "WHITE MALLARD"

C. ERROL BARRON, Architect

THE owner of this houseboat has a large hunting preserve in the marshlands of Southwest Louisiana and the question of a hunting lodge presented the problem of either building a house on a "made" island in the marsh, calling for rather a large dredging operation, in addition to its being useful for only the duck shooting season, or building a houseboat which would be mobile, enabling him to use it during the Summer months in the lakes and rivers for house parties and for the fishing season. Due to there being so seldom the necessity of moving it, there is no power on the houseboat, a small tug being used in moving it from place to place. Because of the twisting and narrow canals which must be traveled the overall dimensions had to be reduced in the greatest degree possible, the greatest possible use being made of all the floor space.

On account of the shallow draft which must be effected, it was necessary that all living and working space be placed on the main floors. It was possible to use the hold only for storage of the tanks for the fresh water supply, coal and ice storage and for the disposal of the plumbing, heating and electric lines.

The hull is of the scow frame type, of heart yellow pine, and is 26 x 66 feet overall. The house portion is 20 x 50 feet outside overall dimensions. This provides for forward and aft, upper and lower decks 8 x 26 feet, while the upper and lower side decks are three feet wide overall.

To overcome the effect of top-heaviness, which might result in a double-decker of this type, the ceilings were kept quite low, the lower ceiling being 7½ feet and the upper ceiling being 7 feet.

All interior partitions, except one bearing partition, are only three inches thick, formed of 2 x 4 edgeways, ⅝" car siding both sides with one layer of quilt. All plumbing lines are in lead, in order to do away with hubs, in addition to the obvious fact that the lead makes the better job. The exterior walls are sheathed with ¾" center matched flooring covered with waterproof quilt

and sided with ¾" car siding put on vertically, as is also all the interior wall ceiling.

The floors are double, the lower floor having a subfloor 2" thick, and are insulated with quilt, as are the walls. The flooring is of heart edged grain yellow pine, finished with four coats of varnish.

The roof is sheathed with flooring and covered with 12 oz. canvas, soaked in paint and given three coats of paint after being applied.

The fresh water supply is contained in two 21½ x 6 x 14 cypress tanks placed in the hold, these being filled with rain water from the roof. The water is served throughout the houseboat by an automatic pressure system. There is also an auxiliary hand pump for filling the emergency gravity tank placed in the attic, in case the electric pump should go out. Also, in the event of drought, provision is made for taking water from overboard into the tanks, and a connection has also been provided which will permit the tanks to be filled from a city water supply.

Electric current for all lighting and power purposes is supplied by an automatic plant, all the wiring being in conduit.

A study of the plans will cause speculation as to why a more or less elemental structural idea—that of carrying partitions over one another—was disregarded, and the men's sleeping room placed where it was. The actual condition of use was responsible for this. This houseboat is essentially designed for duck shooting, the marshes lie largely to the rear of the anchorage and the anchorage itself is simply a cut in the side of the Intercoastal Canal, the bow of the houseboat facing the canal. It was desired that the men's quarters be easily reached by the hunter as he returned from the marsh and as it is actually arranged, the hunter may step from his pirogue, go up the rear outside stairway and reach his quarters without tracking through the main part of the houseboat. Also, it was desired that the quarters for the ladies (which is the intent of the four upper staterooms and bath) be in the bow and easily accessible from the living room.



HOUSEBOAT OF W. M. CADY, McNARY, LA.
C. ERROL BARRON, ARCHITECT



LIVING ROOM DECK



MEN'S SLEEPING ROOM

HOUSEBOAT OF W. M. CADY, McNARY, LA.

C. ERROL BARRON, ARCHITECT



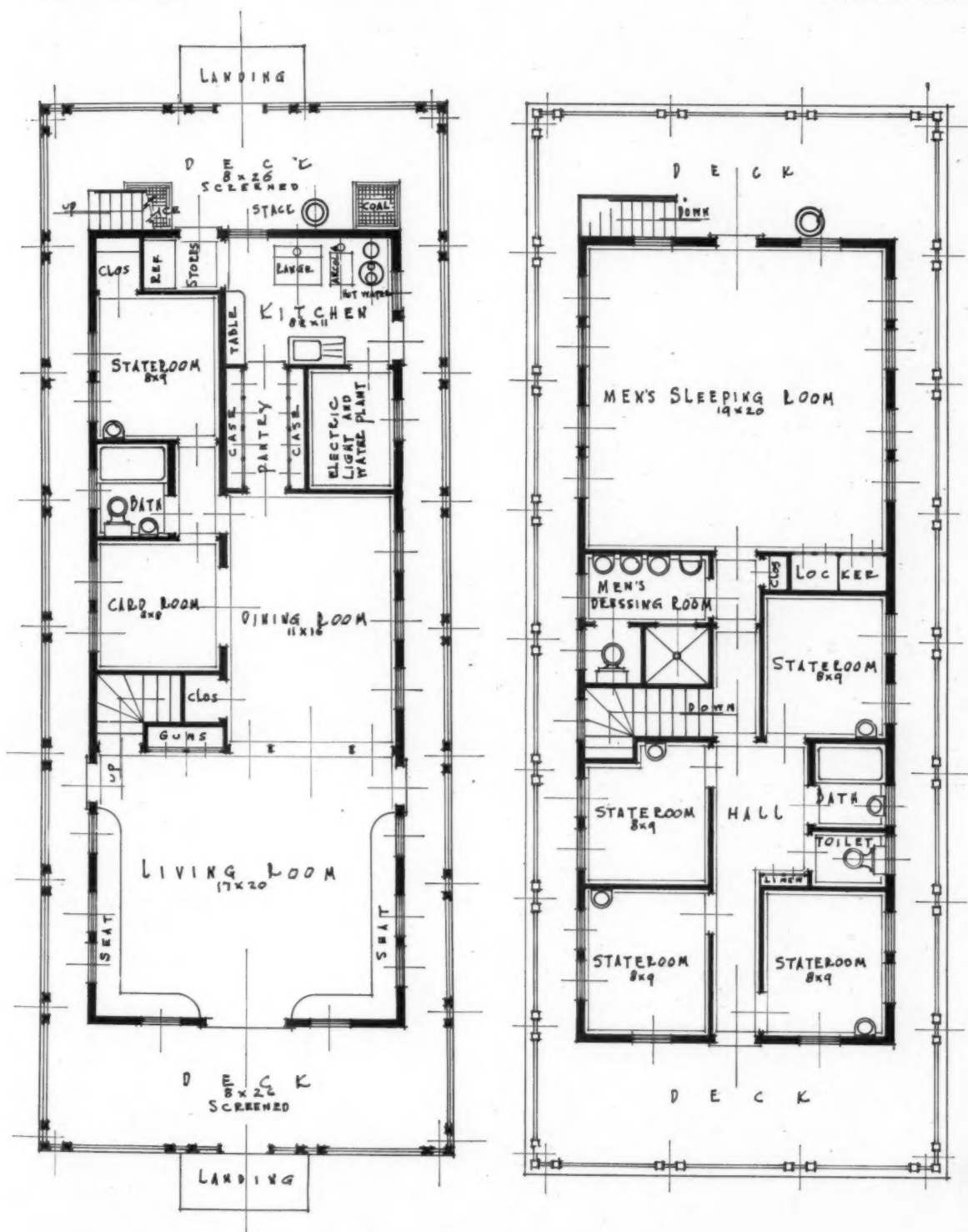
DINING ROOM



LIVING ROOM

HOUSEBOAT OF W. M. CADY, McNARY, LA.

C. ERROL BARRON, ARCHITECT



HOUSEBOAT OF W. M. CADY, McNARY, LA.

C. ERROL BARRON, ARCHITECT

ELECTRICAL MECHANICAL EQUIPMENT

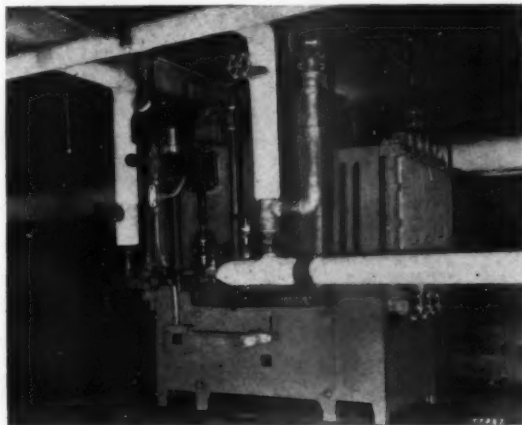
BY J. GORDON TURNBULL, *Electrical Engineer**

THE two principal uses of electricity in buildings are for power and illumination.

Its application as power covers an extremely wide range which can be divided into the common and the special. The common uses of electricity for power purposes in buildings are separated into four general divisions which pertain to the pumping of water, refrigeration, elevator service, and heating and cooking. In this article these services will be described.

WATER SYSTEM

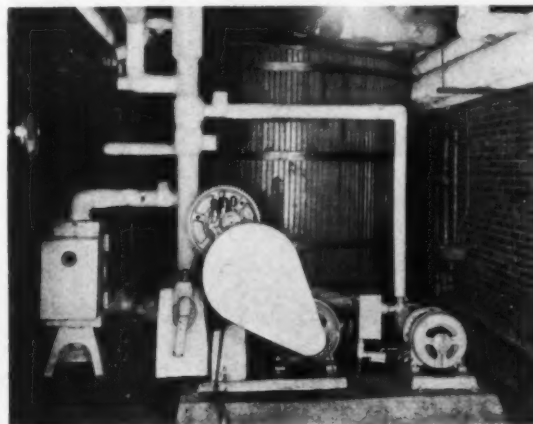
Pumping machinery of various designs constitutes an important item in the mechanical equipment of the different types of buildings, and all such equipment, either reciprocating or centrifugal, can be driven by electric motors. Except where an isolated plant is installed, the motor-driven pump is indisputably superior in economy and efficiency to the steam or gas-engine operated unit.



OZONE STERILIZER AND DEODORIZER, GENERAL MOTORS BUILDING

For the water supply, the first consideration should be given to the purification and deodorization of the water. This can be accomplished electrically by two methods—the ultra violet ray and oxidation. The ultra violet ray sterilizer consists of a mercury vapor lamp set in a water compartment so arranged that the water passes around or near the lamp in a thin film, being always exposed to its rays. The ultra violet ray is destructive to all germ life and bacteria, but does not deodor-

ize. The oxidation method consists of the repeated fine division of water in the presence of an atmosphere of ozone, which is produced by subjecting oxygen, either contained in air or pure gas, to the action of the discharge which is set up when an electric current of high potential is allowed to discharge through an atmosphere of oxygen. The oxidation process not only purifies, but also eliminates all tastes and odors, especially those of chlorine, from water previously treated with the gas or hypochlorites.



ULTRA VIOLET RAY STERILIZER AND TRIPLEX MOTOR-DRIVEN CIRCULATING PUMP, GENERAL MOTORS BUILDING

Except where water is supplied by gravity, there are the two general systems to which electricity can be economically adapted:

- a—The hydro-pneumatic system
- b—The elevated tank system

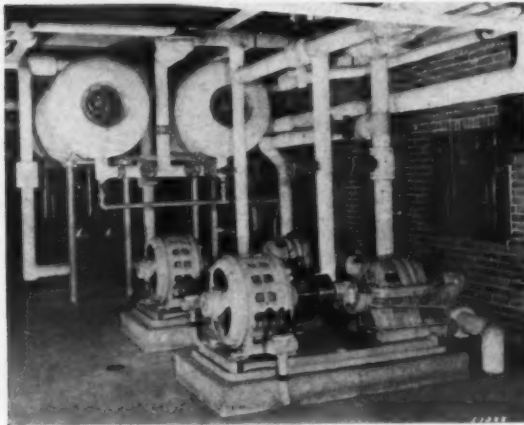
The hydro-pneumatic system in general is adapted to residences, farms and estates where a community supply is not available, and in tall buildings where the city pressure is not sufficient to supply the upper stories. This system consists of a storage tank, which contains both water and air, the water and air being pumped into the tank at any predetermined pressure. Pumps of either the reciprocating or centrifugal type are used and the air compressor can be either an integral part of the pump or a separate unit.

The elevated storage tank system is adapted to installations where the water supply is inadequate for peak demands, or where the pressure is not sufficient to reach the upper stories. This system is exactly what its name implies—a tank sit-

*Office of Albert Kahn, Architect, Detroit, Mich.

uated on a roof or high tower to which water is forced by a pump situated at the water supply.

Motor-driven pumps are used for both the above systems. The service being intermittent and the load when in operation constant, either alternating or direct current motors operate equally well and with maximum efficiency. Care, however,



MOTOR-DRIVEN, THREE STAGE WATER SUPPLY PUMPS, FIRST NATIONAL BANK BUILDING, DETROIT

should be exercised in determining the load under which a centrifugal pumping unit should work, as a pump designed for a head greater than that for which it is used, will cause the motor to overload itself, resulting in a burned out motor.

The motors may be entirely automatic in operation, being controlled by means of either float or pressure switches.

REFRIGERATION

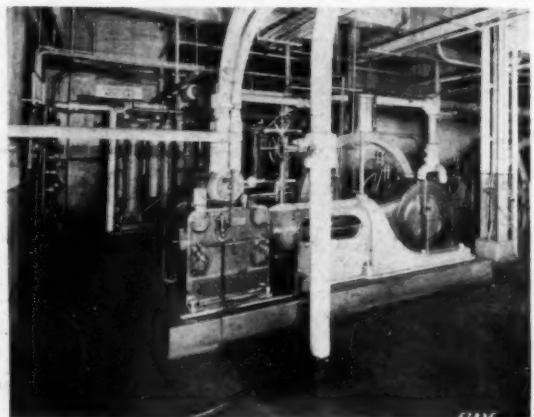
Electrically-operated refrigerating plants have come so generally into use during the past five years, that it is now necessary that consideration be given to its adoption for practically every type of building and industry.

On the farm or country estate, cold storage by means of natural ice has three inherent defects—the presence of dampness, the impossibility of regulating and controlling the temperature, and a constant reduction of the available energy. In addition to this, there is the labor involved in cutting and storing the ice, and the danger of impurities which do not exist in ice artificially made with pure water.

In the better class residences, the electrically-operated refrigerator has superseded the old ice-filled compartments. These units are automatic in operation and require very little attention; the motor being small, the installation may be either alternating or direct current, or a universal motor may be used, which is adapted for either alternating or direct current.

In apartment houses, the refrigerators are supplied either from the main refrigerating plant, or by individual electrically-operated units in each apartment. In the first instance the temperature of each refrigerator is controlled at the box by means of a thermostat. For the store, butcher shop, delicatessen and restaurant, provision should always be made for the installation of such units as would care for all meats, eggs, butter, milk and other perishable goods. In the office building and factory, provision should be made for units of such size as to care for the drinking water. In banks and large restaurants or grills, provision should be made for the cooling of air as well as the other requirements.

The application of electric drive to ice and refrigerator plants offers the same advantages over steam as in the other industries. A low operating cost is assured by the steady character of the load, and many disagreeable features subject to steam-operated plants, are eliminated. Where direct expansion is used, the direct current motor is somewhat more efficient, due to the variable speed; the alternating current induction motor is more commonly used, however, for a brine circulating plant, the desired flexibility being obtained



FIFTY TON REFRIGERATING PLANT, USING CARBONIC ACID GAS, GENERAL MOTORS BUILDING

by the installation of two units, or by disconnecting one side of the compressor.

Except in the larger plants, the entire electrical equipment may be automatic in operation, the temperature of the brine or ice box being controlled by a thermostat, which in turn operates an automatic starter or compensator.

ELEVATORS

Electrically-driven elevators have practically superseded all other types. The steam elevator is almost extinct and the hydraulic elevator has shown a marked decrease in the number of installations during the past ten years, while elec-

tric elevators have developed very rapidly during the same period.

In contemplating the electrical requirements for elevator installation, the following should be given consideration:

- a—Kind of current
- b—Speed and travel
- c—Class of service

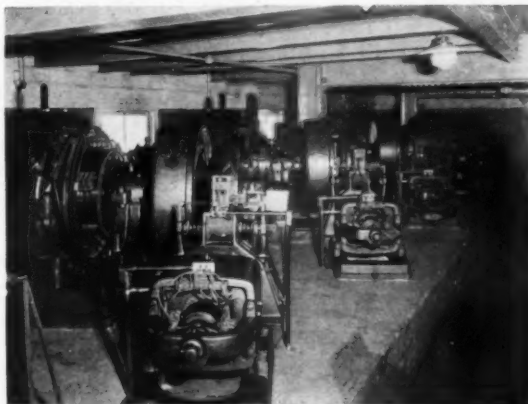
Elevators of practically all speeds and capacities may be had from the larger manufacturers, which are designed for either alternating or direct current and which have proved satisfactory in service. The noise produced by certain makes of alternating current hoisting engines and control boards, is objectionable, however, in some locations and should be given consideration.

The slip ring or wound rotor induction motor is both unnecessary and undesirable in connection with an alternating current elevator on account of the noise. The squirrel cage type has very largely superseded this type and may be either single or two speed, dependent upon the speed of car desired, or the necessity for accurate landing of the platform.

Motors driven by direct current have at present a slight advantage over the alternating current type because they may be operated at more speeds and are, therefore, more easily controlled. There is also a difference in efficiency amounting

make use of alternating current for driving direct current elevators, through the use of motor generator sets which transform the alternating current into direct current.

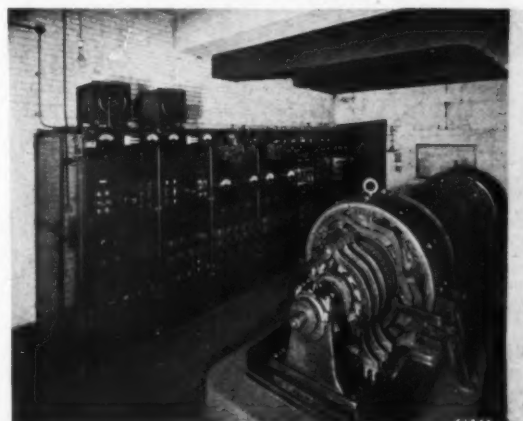
Two of the large electric companies and one of the elevator companies are now building elevator hoisting engines which are known as variable voltage machines and which are an adaptation of the Ward Leonard System. This system was brought out about twenty years ago for the purpose of obtaining a broad range of motor speeds. No successful application of this method was made to elevator motors, however, until about three years ago. Each elevator unit using this system comprises a motor generator set and elevator motor if using direct current supply and



BATTERY SHOWING NINE OF THE THIRTY-SIX HOISTING ENGINES FOR ELEVATORS IN THE GENERAL MOTORS BUILDING. NOTE THE AUXILIARY MOTOR FOR SELF-LEVELING DEVICE

to about twenty per cent in favor of the direct current type.

The current available in the location where the elevator is to be installed, is usually the deciding factor as to whether alternating or direct current will be used, and to meet this condition in alternating current districts, the larger elevator companies have developed equipment designed to



ROTARY CONVERTER AND SWITCHBOARD PANELS FOR MULTI-VOLTAGE OPERATED ELEVATORS, FIRST NATIONAL BANK BUILDING, DETROIT

an additional small motor generator set for field excitation if using alternating current service. Briefly, the system functions as follows: The current used to drive the elevator motor is supplied at a variable voltage from the generator of the larger motor generator set. The voltage of this generator is varied by means of a field rheostat in the elevator cab, which controls the field excitation current of the generator which is supplied by the exciter motor generator set in the case of alternating service, or by the main supply line in the case of direct current service.

The advantage of this form of control is due to the remarkably uniform acceleration and deceleration obtained, which is equal to the best hydraulic installations, without the surging action so noticeable in hydraulic elevators. A further advantage is, that the speed variation is obtained by varying a field current of 3 to 5 amperes as compared with varying an armature current of from 100 to 300 amperes in the usual type of elevator motor, which naturally results

in a much greater loss of electrical energy through heat dissipated in the controlling resistances.

The disadvantage of this system is due to the fact that to operate any elevator it is necessary to run its motor generator set which must be of sufficient size to furnish the maximum operating current required by the elevator motor and in the case of alternating current service the exciter motor generator set must also be in operation. One exciter set may, however, be used for any number of elevators.

Automatic leveling equipment for the purpose of stopping an elevator platform even with the floor landing is desirable in many installations, principally in connection with freight elevators where loads carried on small wheels or casters are to be rolled on or off the platform.

HEATING AND COOKING

The application of electricity for heating is not in general use except on the West Coast, where the cost of electric energy is low and the prevailing temperatures are such that heat is only required for short intervals.

Electric heating appliances are in quite general use for the household. These consist of air heaters, glow radiators, warming pads, water heaters and oil filled cast iron radiators with electric heating elements.

The above appliances are of standard make and capacities, and in caring for their use in the modern building, the following capacities should be considered:

Appliance	Wattage Input	Voltage
Air Heaters	250-3000	110-220
Glow Radiators	250-1500	110-220
Warming Pads	48-65	110-220-32
Oil Filled Radiators	1000-4000	110-220
Water Heaters*	1000-25000	110-220

*Commercial Water Heaters have range of from 10 to 200 gallons of water per hour with a corresponding wattage input of from 1000 to 25,000 watts.

Cooking by electricity has developed from the toaster to the large range, until at the present time nearly all of the electric household help may be found in the modern home.

The electric ranges are thermostatically controlled, allowing a far greater and more dependable unit than either the gas or the coal fired ranges. This is also true of the fireless cooker, the electrical elements taking the place of the preheated stone elements.

Among the advantages of cooking by electricity, cleanliness is paramount, there being a total absence of soot or grease, or ashes produced. It is sanitary, and all parts of the electrical cooking appliances may be cleaned.

Following is a list of electric cooking and household appliances and their capacities:

Appliance	Wattage Input	Voltage
Coffee Percolators	400-600	110-220
Chafing Dishes	150-600	110-220
Nursery Milk Warmers	500	110-220
Toasters	150-500	110-220
Waffle Irons	600	110-220
Hot Plates	600-2000	110-220
Kitchen Ranges	600-4000	110-220
Curling Iron	15	110-220
Flat Irons 6½ lbs.	550	110-220
Flat Irons 8 lbs.	650	110-220
Tailor's Goose	700	110-220

Most of the above appliances are equipped with three heat control.

With the exception of the ranges, all outlets provided for the appliances should be equipped with indicating switch with pilot light.

In arranging the wiring to care for heating and cooking appliances, it is good practice to keep the lighting wiring entirely separate. By doing this, the inconvenience of being without light, if a fuse should burn out, is eliminated; all wiring should be run in conduit and the plugs should be of the three pole type with one pole grounded. The size wire for any of the smaller appliances may be the usual No. 14, but for ranges, etc., the capacity of the unit contemplated will determine the size wire.

The illustrations in this article are taken from plants designed, specified and installation supervised by the office of Albert Kahn, architect.

BEAUX-ARTS INSTITUTE of DESIGN

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OFFICIAL NOTIFICATION OF AWARDS

JUDGMENT OF JANUARY 8, 1924

CLASS "A"—II PROJET

"THE DECORATION OF A CABARET"

The owners of a metropolitan restaurant intend to convert a ballroom on the second floor into a cabaret. The room at present, a vast hall without intermediate columns, is 70'-0" wide, 100'-0" long and 40'-0" high. It is entered from a foyer at one of the narrow ends, and is lighted on the two long sides by windows, which, however, as the cabaret is used at night, need serve only for ventilation, and may be concealed behind the decorative treatment.

The owners desire a dignified but striking room, and for that purpose, propose a competition of ideas. Suggestions have been made to treat it in various ways, as for example:—a great Spanish Patio with an awning ceiling, surrounded by arcades, wrought iron grilles, etc.; a Chinese Garden; an Italian Salon with its rich ceiling and sumptuous tapestries; or an open garden with a blue vaulted ceiling. Whatever the effect desired, however, the room should give an atmosphere of permanency, avoiding an excessively theatrical or flamboyant character. It is essential that the room shall be rich in color, gay and seductive in character.

At the end opposite the entrance should be a raised platform or stage. This stage may be treated as an integral part of the ballroom scheme, or enclosed by a proscenium. It should be connected with the floor by a wide flight of steps which will be used in the development of pageants and spectacles.

The floor of the hall should be arranged with a small dancing space in the center, and should be stepped up around this dancing floor so as to give the people at all tables a fair view of the dancing floor and the stage. A number of boxes or open loges should be arranged around the outside of the hall.

JURY OF AWARDS:—R. M. Hood, H. O. Milliken, W. Warren, B. W. Morris, W. E. Shepherd, Jr., J. H. Freedlander, E. S. Hewitt, J. M. Howells, W. A. Delano, J. G. Rogers, E. Trumbull, C. Mackenzie, H. Hornbostel, H. W. Corbett, P. P. Cret, E. V. Meeks, F. C. Hirons, H. Sternfeld, and C. Grapin.

FIRST MEDAL:—L. Timotheeff and T. M. Prentice, Columbia Univ., N. Y. C.; W. J. Perkins, Carnegie Inst. of Tech., Pittsburgh; J. F. Borton, A. D. Reid, H. Cunin, T. P. Yang and W. P. Wagner, Univ. of Pennsylvania, Philadelphia; W. Ferrari, Yale Univ., New Haven.

SECOND MEDAL:—J. H. Delo, Elsa M. Griesser, H. L. Carter, J. Franklin, W. Z. Bane, P. F. McLean and W. C. Pyle, Carnegie Inst. of Tech., Pittsburgh; E. C. Morris, O. W. Wilson, J. B. Walther, Columbia Univ., N. Y. C.; J. S. Thomas, Jr., Georgia Sch. of Tech., Atlanta; D. K. Frohwerk, Atelier Hirons, N. Y. C.; B. Riaboff, J. F. Lauck and R. Ruhnka, Univ. of Pennsylvania, Philadelphia; H. O. Williams and D. Douglas, Yale Univ., New Haven.

FIRST MENTION:—N. L. Flint, I. E. Nicolai, E. A. Lynch, C. Stiehl, H. F. Reynolds, J. R. Koberling, Jr., O. F. Cerny, A. R. Hauser, R. F. Houlihan, R. V. Faro, I. Alexander, R. Brandt, Armour Institute of Tech., Chicago; J. Roca, H. Dumper, C. Fuller, C. Leonardi, C. L. Cummings, G. F. Trapp, S. Whinston, V. Rambusch, A. E. Klueppelberg, N. B. Hanes, S. R. Moore, R. S. Buck, Jr., G. R. Tyler, C. H. Dornbusch, Columbia Univ., N. Y. C.; J. P. Bills, Catholic Univ., Wash., D. C.; H. C. Douden, R. A. McKee, P. F. Hohorst, Carnegie Inst. of Tech., Pittsburgh; R. H. Newstead, P. B. Nichols, Cornell Univ., Ithaca; V. Pribil, Atelier Corbett-Koyl, N. Y. C.; A. S. Phillips and R. L. Linder, Atelier Denver, Denver; W. Harris, George Wash. Univ., Wash., D. C.; J. J. Whitfield, Jr., Georgia Sch. of Tech., Atlanta; J. Gambaro, Atelier Hirons, N. Y. C.; W. G. Nicola, Ruth

E. Morris, R. M. Switzer, Jr., Ohio State University, Columbus; C. Ferris, Syracuse Univ., Syracuse; E. I. Harrison, A. B. Gallion, W. E. Armantrout, D. Kosvich, F. W. Lang, R. A. Mattson, Univ. of Illinois, Urbana; E. R. Duckering, J. F. Bradley, J. W. Everhard, H. H. Weisse, J. L. Evans, University of Pennsylvania, Philadelphia; R. H. H. Hugman, Univ. of Texas, Austin; J. T. Jacobsen, Univ. of Washington, Seattle; H. B. Marsh, Atelier Wynkoop-Seymour, N. Y. C.; C. F. Ferrari, H. P. Staats, W. Faulkner, D. W. Orr, Yale Univ., New Haven.

SECOND MENTION:—H. E. Anderson, Armour Inst. of Tech., Chicago; J. Korhinen, A. H. Emerick, J. M. Lindeman, Cornell Univ., Ithaca; M. G. Maybeck, W. E. Page, Columbia Univ., N. Y. C.; H. A. Page, Carnegie Inst. of Tech., Pittsburgh; R. E. Stiffler, Atelier Denver, Denver; F. Sakata, John Huntington Poly. Inst., Cleveland; T. W. Rayburn, H. Boster, Ohio State Univ., Columbus; B. C. deMello, Syracuse Univ., Syracuse; E. P. Newbeury, V. N. Jones, A. K. Arai, W. B. Glynn, H. B. Hoover, Univ. of Washington, Seattle; O. Stepan, E. Mittelbush, Univ. of Illinois, Urbana; R. Ainsworth, Univ. of Texas, Austin; E. D. Stevens, Univ. of Virginia, Charlottesville; I. Horton, III, Yale Univ., New Haven. H. C.:—H. S. Sands, Isabel B. Chancellor, W. A. Sampson, Ohio State University, Columbus.

CLASS "A"—II ESQUISSE-ESQUISSE

"AN AEROPLANE RECEPTION STATION"

It will soon be customary for people to cross the oceans by airplane, and among the foreigners visiting us, there will always be a number of distinguished persons, such as have heretofore been met at their arrival by special representatives of the Government. For these it is proposed to erect a special reception pavilion on a landing field near a great city.

The landing field is a flat plateau, from which the ground slopes gently toward a great river. On the edge of the field, overlooking the river is the site for the pavilion. Between the river and the pavilion, the ground will be laid out in a formal garden treatment. The formal treatment will include an esplanade and a space for the parking of motor cars, while at the bottom of the slope at the river's edge will be a dock for steamers or yachts that may occasionally take the aeroplane passengers to their final destination. The pavilion to which the arriving guests will go directly should contain a main reception room, two or three private retiring rooms, and the other necessary services for the press, telephone, etc.

The treatment of the entire composition will be of a very dignified and rather formal design in view of its distinguished function, and emphasis should be placed on the fact that its appearance and disposition as seen from the sky are of almost primary importance.

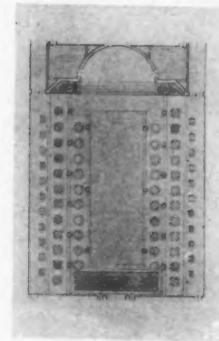
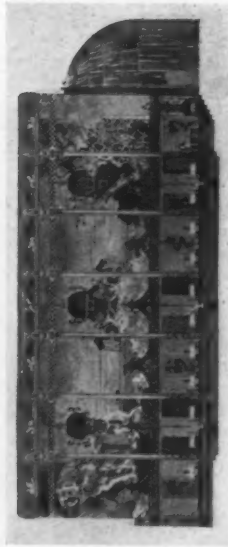
The entire piece of ground to be disposed of in this composition, exclusive of the landing field, measures 750'-0" in a direction parallel to the river, and 1000'-0" from the edge of the landing field to the river.

JURY OF AWARDS:—R. M. Hood, H. O. Milliken, B. W. Morris, E. S. Hewitt, W. E. Shepherd, Jr., J. C. Levi, C. Mackenzie, G. P. Butler, F. C. Hirons, H. Sternfeld and C. Grapin.

FIRST MENTION:—W. C. Pyle, Carnegie Inst. of Tech., Pittsburgh; R. Nickel and A. Westover, Jr., "T" Square Club, Philadelphia.

SECOND MENTION:—P. F. McLean, Carnegie Inst. of Tech., Pitts.; C. H. Dornbusch, Columbia Univ., N. Y. C.; W. E. Willner, "T" Square Club, Philadelphia; J. F. Lauck, R. Ruhnka and T. P. Yang, Univ. of Pennsylvania, Philadelphia.

Awards in Class "B"—II Esquisse-Esquisse and Class "A" and "B" Archaeology-II Projet will appear in the issue of February 13.

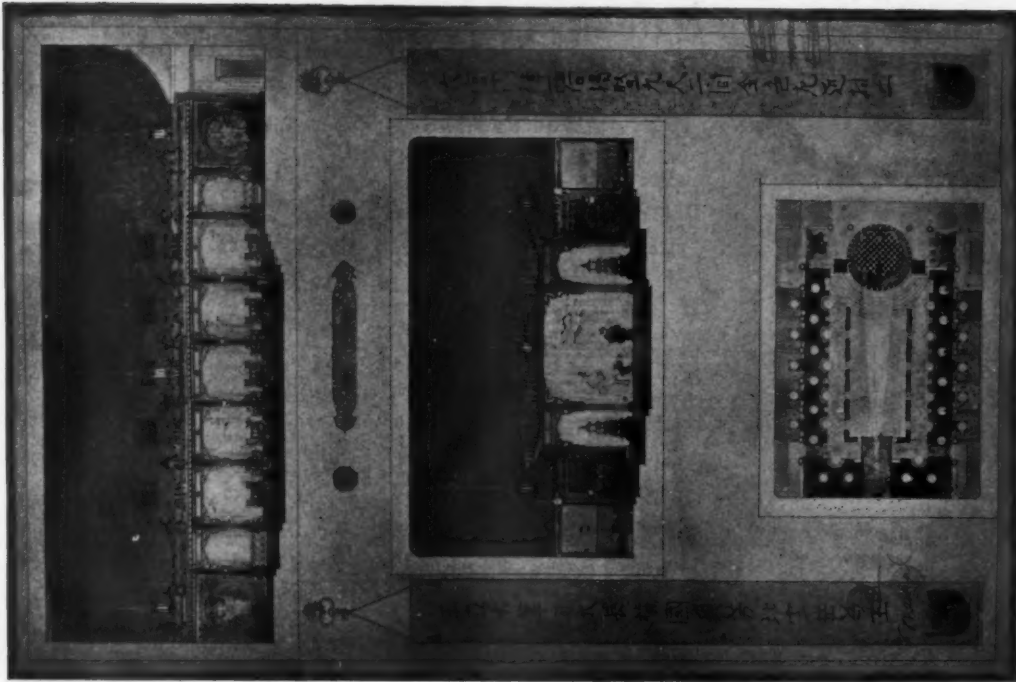


W. J. PERKINS

FIRST MEDAL

CARNEGIE INST.

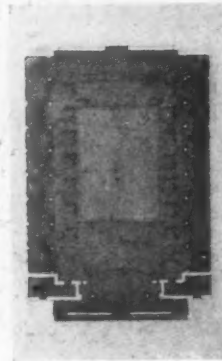
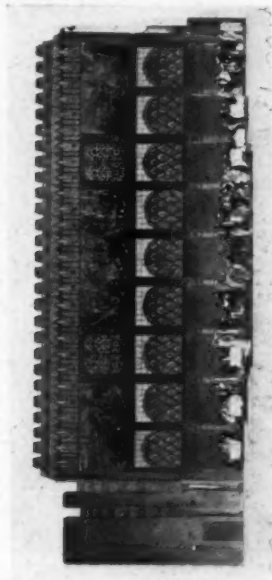
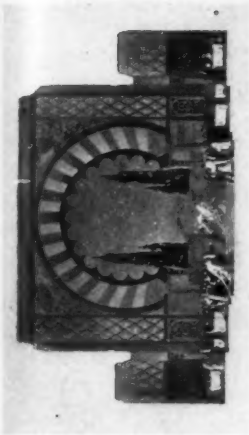
CLASS "A"-II PROJET—THE DECORATION OF A CABARET
STUDENT WORK, BEAUX-ARTS INSTITUTE OF DESIGN



W. FERRARI

FIRST MEDAL

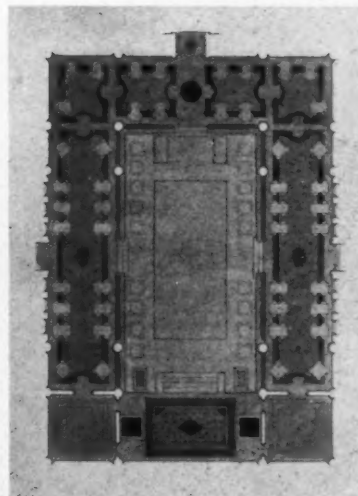
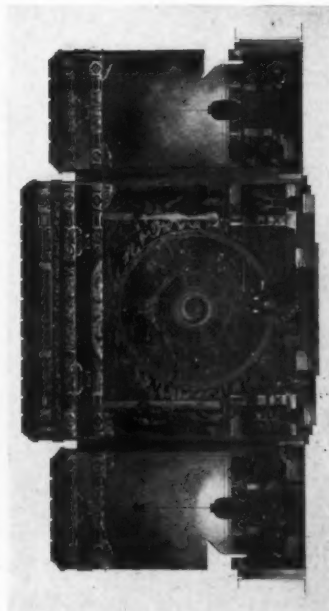
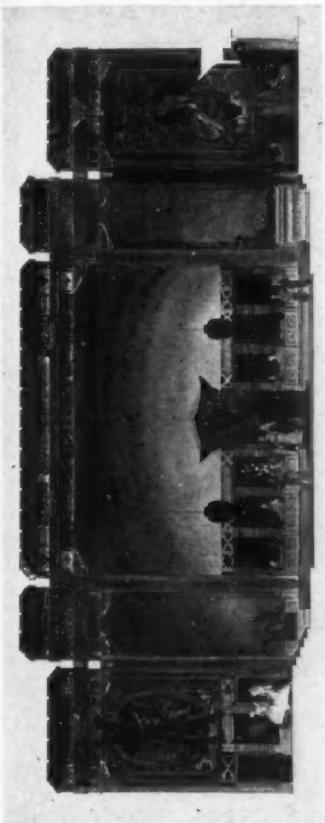
YALE UNIVERSITY



COLUMBIA UNIVERSITY

FIRST MEDAL

T. M. PRENTICE

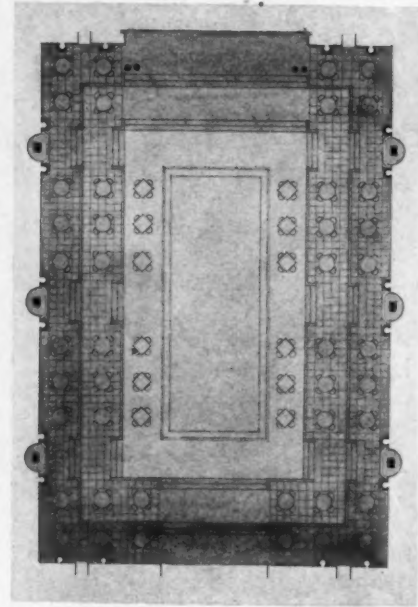
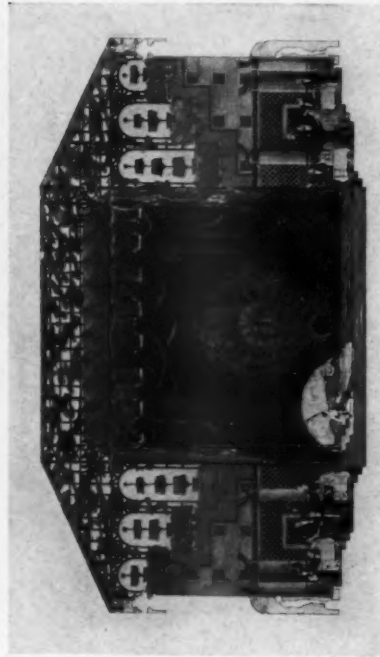
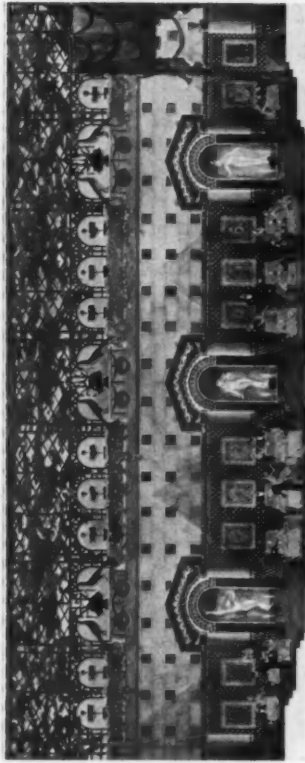


UNIV. OF PENN.

FIRST MEDAL

T. P. YANG

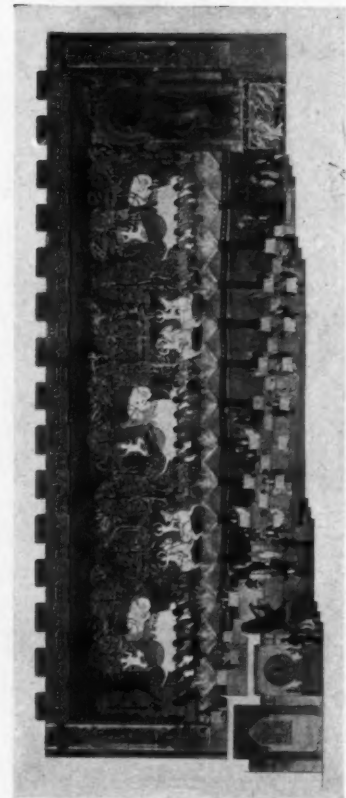
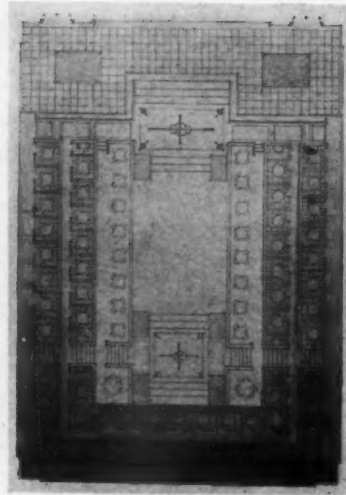
CLASS "A"—II PROJET—THE DECORATION OF A CABARET
STUDENT WORK, BEAUX-ARTS INSTITUTE OF DESIGN



UNIV. OF PENN.

FIRST MEDAL

A. D. REID
CLASS "A"-II PROJET—THE DECORATION OF A CABARET
STUDENT WORK, BEAUX-ARTS INSTITUTE OF DESIGN



UNIV. OF PENN.

FIRST MEDAL

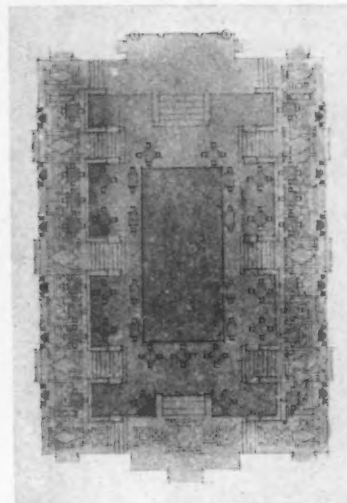
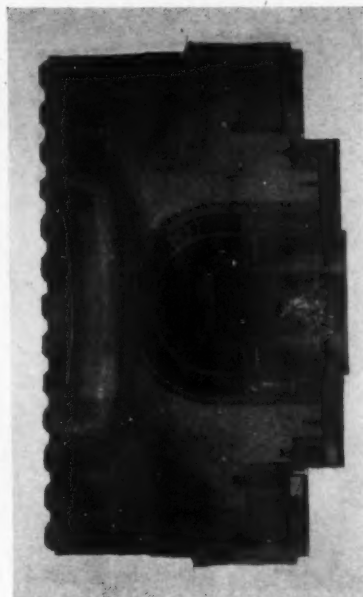
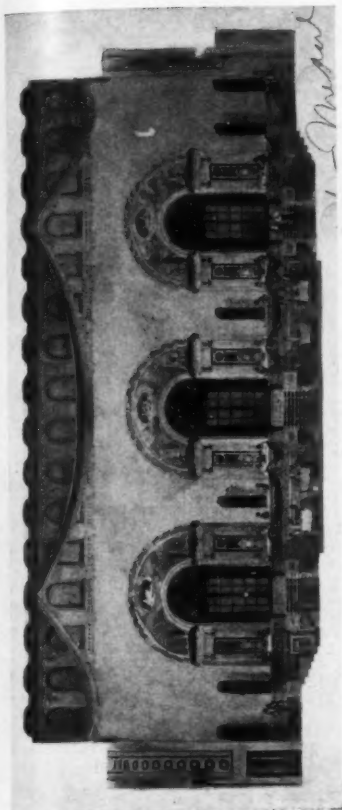
W. P. WAGNER

UNIV. OF PENN.

FIRST MEDAL

CLASS "A"—II PROJET—THE DECORATION OF A CABARET
STUDENT WORK, BEAUX-ARTS INSTITUTE OF DESIGN

FIRST MEDAL



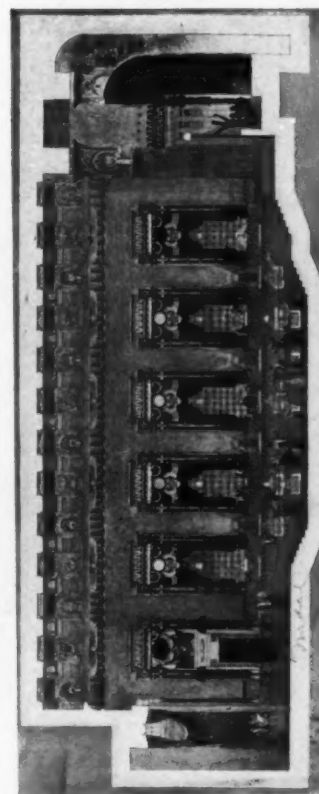
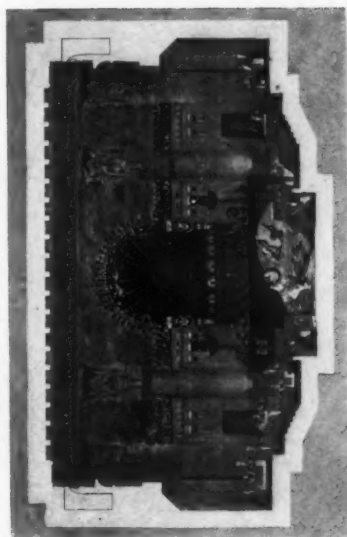
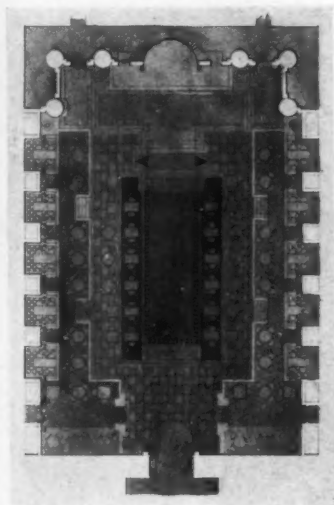
UNIV. OF PENN.

FIRST MEDAL

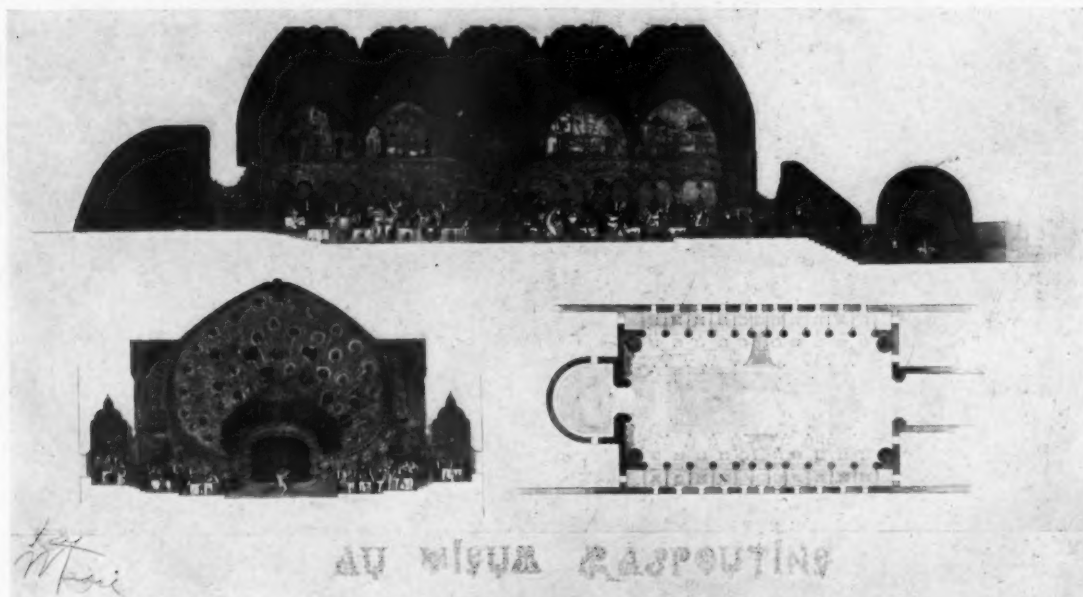
CLASS "A"—II PROJET—THE DECORATION OF A CABARET
STUDENT WORK, BEAUX-ARTS INSTITUTE OF DESIGN

FIRST MEDAL

J. F. BOOTON



UNIV. OF PENN.

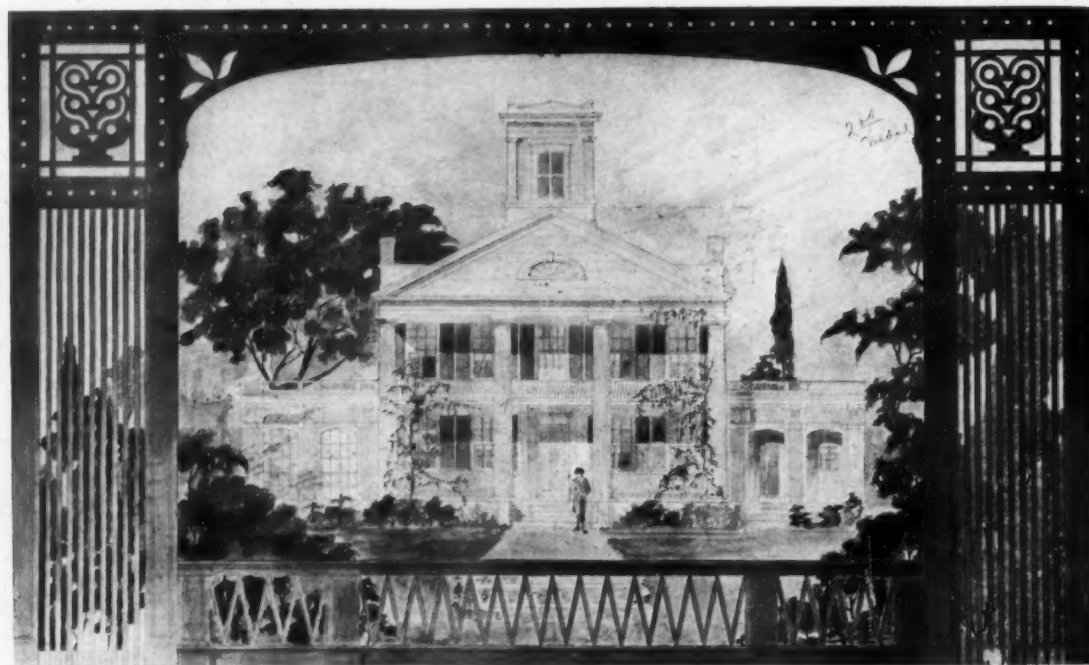


L. TIMOTHEEFF

FIRST MEDAL

COLUMBIA UNIVERSITY

CLASS "A"—II PROJET—THE DECORATION OF A CABARET



R. BRIDGES

SECOND MEDAL

UNIVERSITY OF SYRACUSE

CLASS "A" AND "B"—ARCHAEOLOGY II—MEASURED DRAWINGS
STUDENT WORK, BEAUX-ARTS INSTITUTE OF DESIGN

MODERN METHODS of ARTIFICIAL ILLUMINATION

BY A. L. POWELL, Illuminating Engineer

EVERYONE realizes that illumination is a broad subject. When the writer was requested by the editor to give a discussion of the lighting requirements of a long list of various classes of service, he replied that it was quite out of the question in the space available. A thorough analysis of the illumination of any one type of interior, a church, store or factory, would require an entire issue. It seems well, therefore, to consider only certain general aspects of the question.

In lighting we have two factors, light and illumination—cause and effect. The lamp and its accessory emit light (the cause) producing illumination (the effect). It is well to outline, first, the desirable qualities of an illuminant, then the desirable features of illumination and finally discuss the standard types of equipments which have diversified applications for the different classes of service. With this information in hand, the designer can then select equipment having the ability to produce the qualities of illumination best suited to the problem in hand. The church demands radically different equipment from the industrial plant, while the requirements of the office are not those of the home.

DESIRABLE QUALITIES OF AN ILLUMINANT

Intensity—Other things being equal, a lamp of high candlepower will deliver a high intensity of illumination. Very frequently people have a tendency to judge the candlepower of a lamp by simply looking at it. An inexperienced observer is likely to over-rate a glaring lamp and under-rate a diffused light. The size of lamp to be selected depends upon the height and spacing, as well as the intensity desired. When lamps can be placed high or when a relatively intense light is desired, larger units are more to be preferred than where lamps must be hung low or where only a low intensity is desired.

Diffusion—Practically all efficient light sources are too brilliant to permit their being looked at steadily without discomfort or injury to the eye. The glare interferes with the ability to see and is overcome by either placing the lamps out of the line of view or by using some form of an auxiliary, such as a shade or diffusing globe. Such devices have the further advantage of softening shadows and eliminating strong contrasts.

Color—The color of light produced by an illuminant should not depart radically from that of natural light. The Mazda incandescent lamp is quite acceptable for most service.

Steadiness—An illuminant should not flicker or vary in intensity if the illumination is to be comfortable.

Reliability—Interruption in illumination is often a serious matter and may result in a loss of property or even of life. Therefore, one of the characteristics of the illuminant should be that of reliability. The use of complicated lamps requiring delicate adjustments should be avoided.

Economy—Economy is always an important factor, although it should re-

ceive more consideration in a manufacturing or business establishment than in a place where a highly decorative effect is sought. At first thought, economy in the production of illumination seems to be principally a question of lamp efficiency, and there is a tendency to make selection of lamps on this basis. While the lamp efficiency is one of the most important items to be considered, the omission of other factors is liable to lead to false conclusions. The cost of operation is made up of—cost of energy, cost of renewals, cost of maintenance, repairs, depreciation and interest.

The efficient Mazda C lamp, in the last analysis, meets all the above requirements in a better manner than any other illuminant, and this very reason is probably the cause of its becoming practically the standard illuminant for almost all classes of service. The high efficiency, low main-



The decorative element is very important in the lighting of ornamental interiors, such as theatres. In this particular installation general illumination is provided from lamps placed above circular openings in the ceiling, filled with decorated diffusing glass. The highly colored mural paintings are especially lighted by lamps in angle reflectors concealed from view. In each side of the proscenium arch is hanging a castle of colored glass made luminous by lamps placed therein. Standard equipment is unsuitable for such work

tenance cost, convenience of control, steadiness, pleasing color of light and extremely wide range of sizes available, all work toward this end.

DESIRABLE QUALITIES OF ILLUMINATION

Intensity—There must be an adequate amount of light on the work if the eye is to function effectively. Too low an intensity means eye strain, fatigue and a general slowing up of activities. The intensity which prevails under artificial lighting is very much lower than that found under daylight. When we speak of high-level



Soft, well diffused illumination is provided in this industrial dining room from 100 watt clear Mazda C lamps in mirrored glass totally indirect luminaires of simple design. Outlets are placed 10'-0" on centers

illumination, we are thinking in terms of possibly 10 to 50 foot-candles, yet, on a bright, sunny day, in an open field, intensities may run in the order of 10,000 foot-candles.

It has been found, as a result of carefully conducted tests, that under high-level lighting, production in industrial plants is increased, sales in merchandising establishments are greater, and in the office and school, fatigue is reduced.

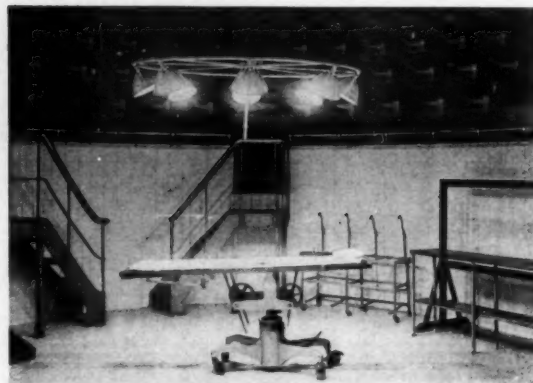
Strictly speaking, there is no such thing as over-lighting, and those rooms which have been characterized as "over-lighted" are usually glaringly illuminated or sharp contrasts prevail. In other words, there is some other feature than too high an intensity, which is the distracting influence.

Diffusion—The effect of glare has been mentioned above. Diffusion tends to eliminate glare and is a very necessary feature of illumination. Diffusion reduces shadows, changing the sharp, harsh, black shadow to what might be termed a transparent shadow with a graded fringe or edge.

On the other hand, diffusion should not be so extreme as to eliminate shadows which are very necessary to bring out the contour and shape of objects.

Direction of Light—It is quite obvious that the light should fall on the objects to be seen and not directly on the eye. The natural direction of light is from overhead. In certain classes of service, such as the school or office, it may be desirable so to place light sources that the predominating direction is the same as that from the windows. In other interiors, such as the machine shop, it is necessary to have the correct direction of light at the working point, as on the lathe or shaper.

Distribution of Light—A few years ago, it was common practice to provide but a low intensity of general illumination and supplement this by local or drop lamps close to the work. Now, general illumination, which furnishes a relatively even intensity throughout a room (often better than that of natural light) is generally used irrespective of the location of machines, counters or furniture.



Special lighting equipment must be provided in many places. For example, the hospital operating amphitheatre as shown here. Eight focusing type units are mounted around a ring, some 6'-0" in diameter, directing beams of light from different angles at the central or working point

Other Features—The color of illumination is dependent on the color of light emitted by the illuminant, although it may be modified somewhat by reflected light from the surroundings. If the characteristics of the illuminant are such that it is steady, then there need be no fear of varying illumination.

In discussing the question of economy of illumination, one must take into consideration the particular type of service. Equipment can be selected to give a maximum intensity on the horizontal or working surface, with a minimum expenditure of power, yet this type of equipment may be absolutely unsuited to the type of service.

On the other hand, a system may be installed which gives but very little light on the work for a given wattage, yet considering, the total effect as to diffusion, decoration and distribution may be ideal. It is in the co-ordination of these elements that the experienced lighting man shows his skill.

REFLECTING DEVICES

We have discussed, in a rather general manner, some of the principal considerations applying to a light source itself and to illumination.



A



B



C



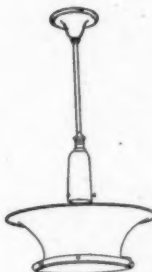
D



E



F



G



H

COMMERCIAL LUMINAIRES

COMMERCIAL LUMINAIRES

Opalescent Enclosing Globes—If the proper glass is chosen, these conceal the light source from view and diffuse the light so that the entire surface of the ball is equally bright. This should, of course, be done with minimum absorption. Individual makes and varieties of glass are quite different in this respect, and in choosing equipment, carefully drawn specifications of diffusion and loss of light should be adhered to. (There is a great variety of standard shapes and designs.)

It is quite apparent that the bare lamp with no accessories is far from being a satisfactory lighting unit. In the first place, all commercial light sources are too bright and need some means of diffusion or shading. Secondly, the natural distribution of light is poorly suited for most purposes, and finally, the element of pleasing appearance or decoration must be given consideration. There is on the market, a large variety of standard equipment, each of which is especially well suited to certain particular kinds of service. The attempt has been made below to analyze the qualities of the most important types of lighting accessories. With this information available, the designer of a lighting system knowing the conditions relative to a given proposition, can then select the equipment which most nearly fills the requirements.

A few examples given in the illustrations indicate dominant features of some of the principal types of service.

Spherical enclosing globes (A) do not materially change the distribution of light from that of the lamp itself, as light is sent almost equally in all directions. This is not so serious as it might appear at first thought, for the light which strikes the light colored ceiling is largely reflected downward; that going to the side is useful in illuminating vertical surfaces and giving an appearance of cheerfulness and brightness to the room.

Flattened or shallow opal glass enclosing globes (B) which tend to send the maximum light up and down rather than to the sides are now available. These naturally have the feature of more efficient lighting in their favor and find a wide application.

Semi-enclosing Units—A number of patented designs of reflectors fall in this class which in general consist of a lower diffusing member and an upper reflecting device. Some are one piece (C), others open (D). The upper reflector is opaque in certain types and translucent in others.

As a class they give the same order of diffusion as the enclosing globe with more directional effect. The same precautions as to adequate size must be observed. The open units are susceptible to dust collection and those with an opaque top likely to cast a dense objectionable shadow on the ceiling if care is not taken to insure proper spacing and hanging height.

Semi-enclosing units are obviously of particular service when dark surroundings prevail.

Semi-indirect Opalescent Bowls—The standard shapes, sizes and decorations of semi-indirect bowls (E) are almost without number. Many

overcome the difficulty there has been recently introduced a one piece glass semi-indirect enclosing unit (F). The bottom and sides are enameled white, giving the necessary direction and diffusive effect and the upper half is of clear glass. This is designed to have minimum absorption and is so sloped as to reduce the accumulation of dust as much as possible. The light emitting properties and quality of illumination produced are identical with the opalescent bowls here discussed. It is apparent that this type of fixture has qualities which strongly recommend it from an operating standpoint.



COMMERCIAL LUMINAIRES

are tinted and otherwise decorated. Some progressive institutions have a design made especially for themselves, with a monogram or special feature etched or pressed into the structure of the dish. For the indirect systems the ceiling and walls must be light in color if the light is to be effective. Since the ceiling is the most brightly illuminated part of the structure and considerable light also is thrown toward the side walls, the room appears bright—often a desirable condition. Of course, for equal illumination on the work, somewhat more power must be used than that required for direct lighting.

Enclosing Semi-indirect—While any type of lighting unit must be regularly cleaned if it is to continue effective, nevertheless, inverted bowls are inherently most susceptible to the collection of dust and other foreign material. This makes the depreciation of light somewhat more rapid and requires a shorter period between cleanings. To

Metal and Glass Semi-indirect—A form of equipment which has a wide application consists of an inverted porcelain enameled reflector with an opening in the bottom covered by a diffusing glass plate (G). With the proper curvature of the reflector and the plate in the correct relation to it, a wide distribution of light is secured and the exterior of the opaque reflector slightly illuminated. These devices give a soft, pleasing quality of illumination and are susceptible of a wide variety of treatment with various ornamental accessories, such as silk, cretonne, and parchment shades, cast metal ornaments and silk diffusing screens.

Prismatic Semi-indirect—Advantage is taken of the light controlling property of prismatic glass to produce a fixture (H) which is efficient in directing the light to the ceiling and at the same time having a very low exterior brightness. Decorative fabric shields can be used to tone the

transmitted light and ornament the bowl. Excellent artistic effects can be secured with practically no sacrifice in light.

Totally Indirect—There are two main types of totally indirect units:—one employs mirrored



A uniform distribution of well diffused light is provided in this school room from five 200 watt Mazda C lamps in metal and glass semi-indirect luminaires. Lighting of this kind preserves the vision of the pupil and is desirable

glass bowl shaped reflectors inverted within housings (I); the other utilizes a shallow porcelain enameled steel reflector in the same manner (J). The mirrored type is slightly more efficient, while the enameled variety is less expen-

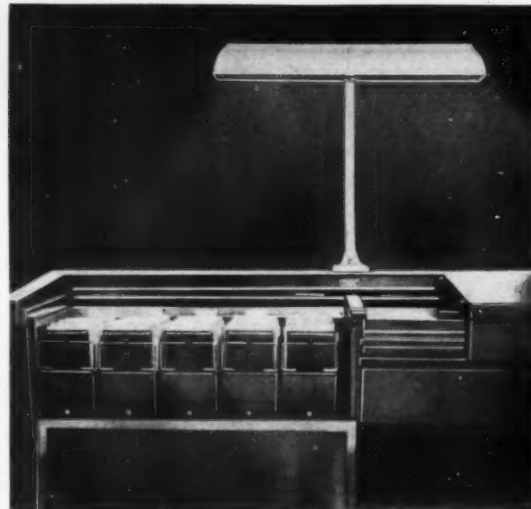


Effective installation of white glass semi-indirect luminaires in a department store. One outlet is provided in the center of each bay, the spacing being 16'-0" x 30'-0"

sive. Many styles of housings are available and these are finished in any tint suited to the particular interior in which they are to be installed. The illumination from the totally indirect system is very well diffused and no light source is visible. These factors promote pleasant working conditions.

To prevent the opaque fixture appearing as a dark spot against the illuminated ceiling, a form of unit known as a luminous bowl indirect is employed. Mirrored inverted reflectors are used but a small amount of light is allowed to escape and illuminate the glass bowl which conceals the mechanism.

Deep Bowl Direct Lighting Reflectors—These are made in a wide variety of designs of heavy, medium, and light density opal glass (K) and well designed prismatic glass (L). The heavy density opal and the prismatic varieties direct the light quite strongly into the lower hemisphere, while the light density opal directs a much smaller amount, transmitting a large part through the glass upward and to the side. The variation in



Special lighting for a card ledger desk. The lighting unit is back of the faces of the cards which are effectively illuminated by the light reflected from the back of the card in front of the one in use

efficiency between individual makes of any one glass—say, light density—is very slight, and a reflector should be chosen whose design or decoration seems most suitable. The highest utilization is obtained with the heavy density, while the light density, transmitting more light to the ceiling and side walls, makes the room appear brighter. This is thought by many to be a desirable condition.

With any type of open mouth reflector, prismatic or opalescent, the exposed portion of the lamp should be of a diffusing character. The bowl enameled Mazda C lamp falls in this category.

The shallow bowl or flat opal reflector is sometimes employed. This practice has little to recommend it, for a large portion of the lamp is vis-

ible and a glaring installation is very likely to result.

Summary—An attempt has been made below to classify the various types of commercial reflecting devices, in order of their effectiveness in certain directions. This summary is based on the average high grade room, finish of light color and is not absolute; as, for example, some dense opalescent enclosing globes may be less efficient than a semi-indirect unit in a room with a light ceiling.

Bright Appearing Interior

- Opalescent enclosing globes
- Semi-indirect
- Opalescent bowl reflectors
- Prismatic units
- Totally indirect

Diffusion or Softness of Illumination

- Totally indirect
- Semi-indirect
- Opalescent enclosing globes
- Opalescent bowl reflectors
- Prismatic units

Maximum Light on the Work for a Given Amount of Power

- Efficient prismatic bowl reflectors
- Opal bowl reflectors
- Opalescent enclosing globes (quite dependent on the kind of glass used)
- Semi-indirect
- Totally indirect

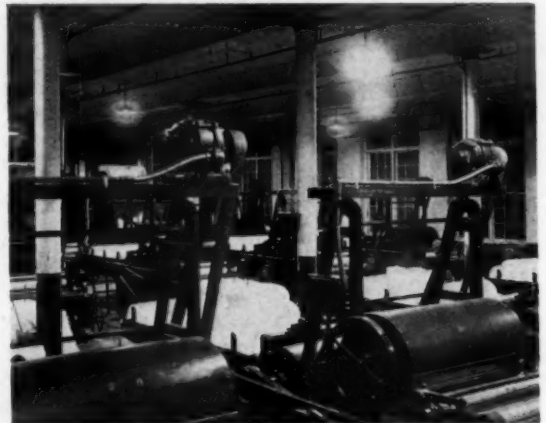
INDUSTRIAL LUMINAIRES

RLM Standard Dome Reflectors—When the Mazda C lamps appeared on the market, there were no reflectors available designed especially for them and they were first installed in equipments formerly used with Mazda B lamps. In many instances the filament was not in the proper position and poor distribution as well as a glaring installation resulted. The engineers of the leading reflector and lamp manufacturers recognizing this condition gave the matter careful consideration and developed a design and set of specifications which are known as the RLM (Reflector and Lamp Manufacturers) Standard. The RLM Standard Dome reflector (M) gives a desirable distribution of light, at high efficiency, provides a suitable cut-off ($17\frac{1}{2}$ degrees below the horizontal) and is well made of porcelain enameled metal. When fitted with a bowl enameled lamp this reflector meets the requirements of general illumination in the majority of industrial plants and is probably the most useful of any single form of lighting accessory.

Deep Bowl Reflector—Where lamps must be hung low (in the line of view) as over a machine or where the light must be confined to a rather definite area, the deep bowl reflector (N) is use-

ful. This gives a lower cut-off than the dome type. This type is made of porcelain enameled steel and also of mirrored glass. The latter is more efficient although of higher cost and presents greater danger of being broken.

Glass Steel Diffuser—This new development (O) combines the advantages of glass and steel and is recommended for use where a very high grade of illumination is desired in the industrial plant. It consists of an opalescent glass diffusing globe, around the clear lamp, surrounded by a porcelain enameled dome-shaped steel reflector. An aperture in the top of the reflector allows some light to pass upward to illuminate shafting, belting, etc. It is efficient, provides good illumination on vertical surfaces, soft shadows and reduces direct and reflected glare to a minimum.



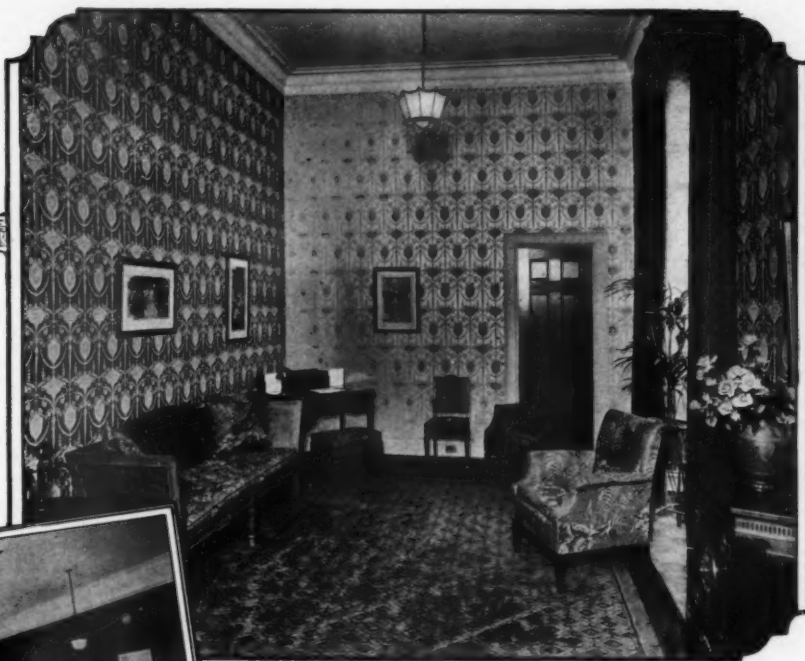
In the industrial plant it is necessary to provide a relatively high intensity of well diffused light throughout the working area. This modern mill is illuminated by 200 watt bowl-enameled Mazda C lamps in RLM Standard Dome reflectors hung close to the ceiling, one per bay. The light colored surroundings tend to make the lighting system efficient and introduce considerable diffusion, thus softening shadows

Angle Reflectors—The angle reflectors (P) made of porcelain enameled steel and mirrored glass are especially useful where a maximum illumination must be obtained on vertical surfaces as in the show window or around high machinery. Such equipment is also of service where a large area must be lighted from the sides, as a crane bay with outlets on the posts below the track.

Industrial Diffusing Units—Where a rather wide spread of light attended by some means of reducing the brilliancy of the filament is desired, equipment consisting of a diffusing globe and a rather flat reflector (Q) is used. Yards and passage ways generally impose such conditions.

Summary—Below is presented a rough classification of the various types of industrial accessories best suited for particular requirements:

Buffalo Athletic Club—Ladies' Room on the Main Dining Room Floor. Walls decorated with a Wedgwood design in relief in colors of ivory, gold and flesh, giving the effect of rich damask.
—Architect, E. B. Green, Buffalo, N. Y.—Decorators, The Francis H. Bacon Co., New York and Boston.



Buffalo Athletic Club—Main Game Room (upper illustration). Walls decorated with paper producing the effect of hand tooled illuminated leather. Small Card Rooms (lower illustration). Walls decorated with Elephant hide paper in a panel design showing nail heads.

Warmth Without Sacrifice of Dignity

Wallpaper has been used liberally in the new and beautiful home of the Buffalo Athletic Club to give its rooms an atmosphere of warmth and intimacy. Though the club house itself is of majestic proportions and its furnishings are of supreme richness, the austerity and coldness so frequent in large rooms are lacking.

Wallpaper may be utilized most successfully in the treatment of walls when the aim is to preserve feeling without sacrifice of true dignity. There are wallpapers of authentic design and colorings to match every architectural composition or period. Many of these wallpapers are exact reproductions of designs employed by such masters as Sheraton and the French Schools.

Send for our *Architect's Service Bulletin* which offers practical co-operation in supplying architects samples of wallpaper and other aids to the solution of specific problems in the decoration of walls.



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 Dome Reflector and Glassteel Diffuser.
 Best shading effect—Deep Bowl Reflector
 Maximum light on vertical surfaces—Angle
 Reflector

Low initial cost—RLM Standard Dome Re-
 flector
 Ease of maintenance—RLM Standard Dome
 Reflector
 Best results with Mazda C daylight lamps—
 Glassteel Diffuser
 Flexibility (permitting varying intensity of
 illumination without changing equipment)
 —Glassteel Diffuser

The SPECIFICATION and the ELECTRICAL CONTRACTOR

BY C. J. RYDER*

ALTHOUGH electrical installations in build-
 ings are as important as the other
 branches of mechanical equipment, often
 less care is given to the selection of electrical con-
 tractors than that given to other contractors. This
 may result, in part, from the fact that the cost of
 electrical installations is very often less than that
 of the other mechanical branches. Electrical
 specifications often fail to mention definitely all
 of the equipment and they vaguely require that
 the work should comply with the code of the Na-
 tional Board of Fire Underwriters, or local board
 of authority having jurisdiction and that a cer-
 tificate of inspection from some authority or
 Underwriters' organization be furnished on com-
 pletion of the work. This seems to obviate the
 necessity of awarding the contract to reliable con-
 tractors owing to the supervision and inspection
 of others. Architects should assume the responsi-
 bility of making complete detailed specifications
 and competent inspection, regardless of other
 agencies. They should be most careful in the
 selection of electrical contractors.

Some illustrations will serve to make clear the
 importance of the definite specification. Specifi-
 cations for the wiring of dwellings and apartments
 sometimes call for the use of BX. This is a
 trade name given to an armored cable consist-
 ing of a spiral metallic double covering wound
 over a rubber insulated wire. It is also called
 double strip armored cable to distinguish it from
 a single strip armored cable which has only one
 metallic sheath. This latter is also armored cable
 and both are acceptable to the National Board of
 Fire Underwriters and a certificate of inspection
 would be given whichever one is used. There is

a considerable difference in price and quality
 which the certificate of inspection would not dis-
 close and an unreliable contractor could substi-
 tute the inferior article with the ordinary super-
 ficial supervision.

Very often the specification merely calls for a
 type of switch to be made by a reliable manufac-
 turer. Many responsible manufacturers make a
 strictly high grade switch and also make a simi-
 lar one of a much cheaper construction known as
 the "competitive" switch. The architect often
 does not definitely identify the high grade switch
 he has in mind and depends on the manufac-
 turer's reputation and the reliability of the con-
 tractor to provide the desired article. Again,
 switch plates are made in several thicknesses vary-
 ing from heavy solid plates to very thin stamped
 plates. These examples of common conditions
 illustrate the necessity for carefully selecting
 electrical contractors and for preparing definite
 specifications eliminating possibility for substitution
 which place electrical contractors on an equal
 basis when bidding.

When specifying wire always mention the grade
 as code, intermediate or high grade. The quality
 of the copper is the same but the grade estab-
 lishes the quality of the rubber insulation. Code
 grade is used for practically all commercial work.
 If exposed to moisture or in damp places it should
 be encased in lead sheathing. Intermediate and
 high grade wire is used to secure greater efficiency
 and at a greater cost. If the grade of the wire
 is specified, it is unnecessary to go into a long
 explanation of the tests which it must satisfy.
 The grades of wire are guaranteed by the manu-
 facturer and they do comply with the code of the
 National Board of Fire Underwriters. Rigid
 conduit and outlet boxes should be specified as
 black enamelled or galvanized.

*Peet & Powers, Electrical Engineers and Contractors, New York
 City.



RUSKIN APARTMENTS, Pittsburgh, Pa.: H. L. Steens & Company, New York, Architects; Bailey-Farrel Mfg. Co., Pittsburgh, Jobbers; Wey Bros., Pittsburgh, Plumbers

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And the RUSKIN APARTMENTS

KOHLER

This name, unobtrusively fused into the enamel of every Kohler fixture, is a guaranty of genuineness and of these distinctive Kohler qualities—(1) the beautiful snowy whiteness of the durable enamel; (2) the uniformity of that whiteness in every fixture.

The recently completed Ruskin Apartments, Pittsburgh, take rank among the noteworthy Kohler installations of the past year.

The architects of this impressive building selected for its equipment 101 Kohler "Viceroy" built-in baths.

The insistence upon the built-in bath for the better class of installation, as illustrated in this instance and many others, quite naturally leads to the choice of Kohler Enameled Plumbing Ware, for the Kohler "Viceroy" bath was the originator of the now accepted style.

Kohler quality, no less than the correctness of Kohler design, provides a persuasive argument for the specification of this well-known and highly regarded ware.

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It is more satisfactory to specify switches, receptacles and other apparatus by the catalog numbers of the manufacturer, one or more if desired. A short description of standard panels and switchboard is sufficient unless a more elaborate article is required. It is not necessary that the capacity of the copper or the design of the bolts be described but the name of acceptable reputable manufacturers should be mentioned.

In connection with low tension apparatus it should be stated whether the wiring will be installed in conduit or in openwork in floors and partitions, whether annunciators are of the flush or surface type, the style of drop required, whether a metal or wooden case is desired and whether the annunciator shall operate in multiple, in case there is more than one. The same detailed information should be given to the other devices and apparatus included in the installation.

Definite mention should be made of the kind of current which will be supplied, its voltage and characteristics, whether from private plant or a public service corporation, whether a separate service for power, whether brought to the building overhead or underground, whether high or low tension—all very essential points and often not given in specifications.

The electrical plans should include everything that can be shown by the symbols adopted by the National Electrical Contractors Association. It is also important that the electrical service entering the building, the switchboard, the panel boards, every fixture outlet and the switches which control them be definitely located. It is also ad-

visable to show diagrammatically the route of conduits and wires between outlets or definitely specify the maximum number of outlets permitted on each circuit. All power wiring for motors, heaters or electric ranges should be shown together with the horsepower or wattage of each and also the location of the starter or controlling apparatus.

The plans for large commercial, office, residential, hotel or factory buildings should include a cross section of the building, drawn to scale, showing the trunk lines between the service and distribution board, feeder conduits with the size of wire between the distribution and the panel boards, motors and their feeders. There should also be shown the risers for telephones, bells, signals and other miscellaneous apparatus. Such plans will greatly facilitate the construction and also the work of estimating, resulting in better and more intelligent proposals.

Low tension bell work and telephone outlets in private residence plans are as important as the lighting layout and they should be indicated on the plans as they assist greatly in making the estimate of cost.

These are but a few citations, illustrating the necessity for the definite specification. Withal, the specification can be brief and specific. When prepared in this way it is unnecessary for the contractor to request interpretations when preparing his proposal or executing the work. The combination of such specifications and adequate plans results in many advantages to the architect, the owner and the contractor.

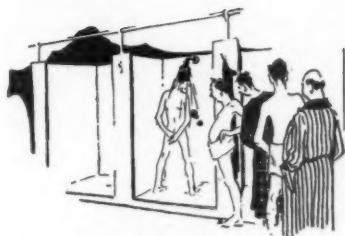
AN ACKNOWLEDGMENT

ACKNOWLEDGMENT is made to the Electrical Industry's Joint Committee for Business Development for securing the articles entitled *Electricity in the Home*; *Modern Methods of Artificial Illumination*; and *The Specification and the Electrical Contractor*, which are printed in this issue of *THE AMERICAN ARCHITECT*.

NATIONAL DEPARTMENT OF PUBLIC WORKS

THE consolidation of twelve government bureaus which have to do with building and engineering construction work is proposed and a bill for that purpose is before Congress. This first took form in the Jones-Reavis bill introduced in 1919. As the campaign progressed for these bills, it was thought that they should be deferred, pending a general reorganization of the Executive Departments of the Federal Govern-

ment. A Joint Committee was appointed in 1919 to formulate a bill to that end. After Mr. Harding became President, he endorsed the plan and appointed Walter F. Brown, of Toledo, Ohio, as his personal representative on the Joint Committee. On February 16, 1923, the plan of reorganization, carrying the recommendation of the President and his Cabinet, was submitted to Congress. Since then there has been little or no action. Consequently it is timely for architects and engineers again to put forth an effort to secure the formation of a National Department of Public Works. The plan provides for this within the Department of the Interior under an Assistant Secretary for Public Works. Considerable opposition has developed and the success of the movement is questionable. Engineering organizations are again becoming active in efforts to secure its passage. This bill is of importance to architects and if passed, should result in a better governmental architecture.



**They stood in line
at the Union League Club**

The showers of this prominent Chicago club were formerly equipped with ordinary mixers. The management decided to test the Powers Mixer on one of the showers. Members say that the men quickly found out that it did all we claim for it and actually stood in line to use it.

Some Recent Installations

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Style A
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Piping

The Powers Shower Mixer

Comes in 4 styles. For exposed and concealed piping. Made of solid brass with nickel plated dial and handle. It is ruggedly built and has no delicate parts to get out of order.



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Have you ever been cheated out of a pleasant, enjoyable shower by a sudden, unexpected "shot" of cold or scalding hot water? This menace to your complete enjoyment of a safe and comfortable bath is eliminated by the Powers Shower Mixer.

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The Powers Shower Mixer is different from all other mixers. Turn the handle of the ordinary mixer to "Warm," and if cold water is drawn from nearby showers, faucets, flush valves, etc., the reduced pressure on the cold water line allows a "shot" of hot water to reach the bather. Ordinary mixer's give no protection against changing water pressures.

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Bul. 154 gives full information and roughing-in dimensions. May we send it?

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The purpose, simply stated, is to afford an organization which, it is believed, will become a most important element in architectural practice and building operations, a medium through which it may, without expense to itself, reach a class of readers that are most intimately identified with the field of the activities of The American Specification Institute.

Publishers, THE AMERICAN ARCHITECT AND THE ARCHITECTURAL REVIEW.

OUTLINE OF SPECIFICATIONS FOR OVERHEAD TRANSMISSION SYSTEM SERIAL NO. 77

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37. Ground Wire:
38. Loads and Factors of Safety:



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DOORS of extra large size are frequently necessary in industrial plants. While it is comparatively simple to construct big doors, it is a real problem to hang them satisfactorily and permanently.

"*Slidetite*" Industrial Door Hardware has successfully solved this problem in numerous instances. A typical "*Slidetite*" installation of this kind is that at the J. A. Torstensen Company, Chicago, shown in the illustration above. The doors are 21 feet high to permit trucks loaded with large lights of plate glass to pass through. These doors move smoothly and easily in spite of their great height and bulk.

Doors hung on "*Slidetite*" slide and fold completely out of the way, leaving an unobstructed opening up to 30 feet wide if necessary. Require no tinkering as they never sag or bind. Easy to open, even in a high wind, and cannot possibly slam shut. Close tight, snug and secure.

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Richards-Wilcox Mfg. Co.
A Hanger for any Door that Slides
AURORA, ILLINOIS, U.S.A.

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(211) Exclusive manufacturers of "*Slidetite*"—the original sliding-folding garage door hardware

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West Side Junior High School, Bay City, Michigan
Perkins, Fellows & Hamilton, Architects
Unglazed Terra Cotta used for ornamental trim throughout

DEPENDABLE TERRA COTTA

Twenty-six manufacturers of Terra Cotta produce material conforming to an adopted standard of the highest excellence. Dependable results are thus assured under open competition in public work.

For Standard Specifications lately perfected by the Terra Cotta Industry covering proper requirements in manufacture and setting address

NATIONAL TERRA COTTA SOCIETY

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New York, N. Y.

PERSONALS

R. C. Archer, Jr., architect, has moved his offices to 1759 U Street, N. W., Washington, D. C.

J. C. Niemeyer, architect, announces that he has moved to new offices at 107 East Third Street, St. Paul, Minn.

Max L. Waeber, architect, has moved his office to 78 Willoughby Street, near Bridge Street, Brooklyn, N. Y.

Sheffield A. Arnold, landscape architect, announces the removal of his office to 230 Clarendon Street, Boston, Mass.

Albert Joseph Bodker, architect, has moved his offices from 62 West Forty-fifth Street to 37 West Fifty-seventh Street, New York City.

George I. Lovatt, A.I.A., architect has moved his offices from 416 Walnut Street to 223 South Sydenham Street, Philadelphia, Pa.

Elton J. Moughton, architect, has moved his office from 7 Miller Building to Suite 503-4 First National Bank Building, Sanford, Fla.

Edgar A. Rassinier, architect, formerly in the Louisville Trust Building, Louisville, Ky., is now located at 1118 Hilliard Avenue, that city.

Bonsack & Pearce, architects, are now located in their new offices, suite 305-6 Republic Building, 704 Olive Street, St. Louis, Mo. Manufacturers' catalogs and samples are desired.

It is announced that John Sloan, architect, has moved his office from the Straus Building to the twenty-sixth floor of the Pershing Square Building, 1 Pershing Square, New York City.

Francis Y. Joannes, architect, Robert C. Dunbar, Henry C. Hahn, associates, announce the removal of their offices to the Park Lexington Building, 247 Park Avenue, New York City.

David A. Ogilvie, architect, formerly identified with the office of Reginald D. Johnson, architect, has established an office at 100 East Colorado Street, Pasadena, Cal., to practice architecture.

Announcement is made that Harlan M. Clark, architect and engineer, has opened an office at 3115 Mapledale Avenue, Cleveland, Ohio, for the general practice of his profession. Manufacturers are requested to send catalogs and samples.

David Podoloff, architect, formerly located at 129 Church Street, New Haven, Conn., announces the removal of his office to 116 East Fifty-seventh Street, New York City.

Johnson, Miller, Miller & Yeager is the new firm name of architects with offices at 30 N. Fifth Street, Terre Haute, Ind. The firm was heretofore known as Johnson, Miller & Miller.

C. E. Schermerhorn, A. I. A., architect, and Watson K. Phillips, architect, announce the removal of their offices from 430 Walnut Street to 213 South Fifth Street, Philadelphia, Pa.

The architectural firms of Folsom & Stanton and John Graham, Jr., have combined under the name of Folsom, Stanton & Graham, architects, with offices at 10 South Eighteenth Street, Philadelphia, Pa.

Judson N. Churchill, architect, announces the removal of his office from 514 Oakland Building to 906 Prudden Building, Lansing, Mich., the Oakland Building having recently been destroyed by fire. Manufacturers are requested to send catalogs and samples.

Edward B. Lee, architect, 1210 Chamber of Commerce Building, Pittsburgh, Pa., has recently been appointed as the representative of The American Institute of Architects on the National Board of Jurisdictional Awards *vice* Ernest J. Russell, resigned.

Samuel Lewis Malkind and Martyn N. Weinstein, architects, formerly of 16 Court Street, announce the removal of their offices to the new Chanin Building, 105 Court Street, Brooklyn, N. Y. Manufacturers are requested to send catalogs and samples.

Emmet G. Martin, architect, formerly manager of the offices of Albert C. Martin, architect, has opened offices for the practice of architecture at 603 Citizens' National Bank Building, Los Angeles, Cal., with Arlos R. Sedgley, architect, in charge. Manufacturers' catalogs and samples are desired.

Osterhage & Sutton, architects and engineers, announce the death of the senior member, L. H. Osterhage, on December 12 last. Byron Sutton has formed a partnership with Lester W. Routt and will continue the business at the present address under the firm name of Sutton & Routt, architects and engineers, Citizens' Trust Building, Vincennes, Ind.



A Venetian Lake at Miami

Thousands of visitors at this famous winter resort will enjoy the pleasure of sporting in this, the largest artificial swimming pool in America.

Designed by Mr. Denman Fink of New York, it has many interesting and unusual features which

Of unusual interest will be the rock grottos with their seats in which bathers may escape the heat of the noonday sun or dream of mermaids while looking out on the reflected colors of the night.

As a matter of construction this pool has much of interest. It is excavated in the coral rock formation and the grottos were built up with the natural rock surfaced with Gunite.

Coral rock is made up of sharp shells which of course make a surface unsuitable for the comfort of bathers. Also it is very porous and even with the pumps going at full capacity there would be



INTERIOR OF GROTTO

will make it a distinctive addition to Miami's attractiveness. The strong Venetian feeling will be enhanced by the island in the center with its connecting arched bridge, its pier and colorful float. The depth of water will range from twelve feet at the base of the diving rock to the sloping, sandy kiddie beach. The bottom will be tinted in varying soft shades in keeping with the general design.



ENTRANCE TO GROTTO

such an out-seepage of water as to make maintenance almost impossible.

To obtain the architectural effects and to provide the smooth surface requisite for bathers and to make the pool absolutely water tight it was completely surfaced with Gunite which has been so extensively used in the stucco construction about Miami. This construction has proved much more economical and much more satisfactory than any other that could be found, and lends itself with especial advantage in obtaining the artistic features desired in this pool.

Gunite is a sand cement concrete and is the product of the "Cement Gun" manufactured by the Cement Gun Company Inc., of Allentown, Pa. The company will be glad to send full information about Gunite, together with reports of tests, on application.

Specifications of most products advertised in THE AMERICAN ARCHITECT appear in the Specification Manual

JAY HAMBIDGE DIES

JAY HAMBIDGE, widely known as the proponent of a theory of Dynamic Symmetry, died suddenly on 20 January, while lecturing before art students.

Mr. Hambidge's theory caused discussion among artists and students of Greek art all over the world. The two groups that were disposed either to accept or reject it, were almost evenly divided, and the men who stood for or against it of equal prominence in their respective fields. At all times did Mr. Hambidge have the courage of his convictions, and up to the very moment of his death he strenuously maintained the accuracy of his contentions. Many artists, Academicians or Associates, declared their belief in the soundness of the Hambidge theory, and built the composition of their pictures on its principles. It was probably among designers that this application of mathematical formula to artistic forms was most strenuously discussed. Undoubtedly there are many men who will eagerly take up this theory where Mr. Hambidge has laid it, and his untimely death will not, it is believed, mark the end of the matter.

Mr. Hambidge began his artistic life as a member of the Art Students' League and later was a student under the late William M. Chase. His work in art, up to almost twenty years ago, when he first announced his theory of Dynamic Symmetry, was as an illustrator. Since that time he had been more largely engaged in lecturing and writing. He addressed, by invitation, important artistic and scientific bodies in Europe. The Hellenic Society of London declared he had made the most significant contribution to art in 2400 years.

BRIGGS IS NEW OHIO STATE ARCHITECT

HERBERT B. BRIGGS, Cleveland, was recently appointed state architect of Ohio by L. A. Boulay, director of highways, to succeed Robert S. Harsh.

Mr. Briggs is president of the Ohio State Association of Architects, a member of The American Institute of Architects and formerly was president of the Cleveland chapter of that organization.

He is chairman of the Ohio Board of Building Standards, now engaged in the revision of the building code of Ohio and formerly was a member of the state house of representatives from Cuyahoga County, and a trustee of Buchtel College (the Municipal University of Akron) and of Kent State Normal School.

The new state architect is a graduate of Buchtel College. For eight years he was draftsman and superintendent of construction for Coburn &

Barnum, Cleveland, architects, and for eight years he was a member of the firm of F. S. Barnum & Co., also Cleveland architects. Until recently he was the senior member of the Cleveland architectural firm known as Briggs & Nelson.

PHILADELPHIA ARCHITECT RECEIVES MEDAL

THE International Congress of Architects of the Americas, which recently met in Rio de Janeiro, Brazil, awarded a medal to Albert Kelsey, F.A.I.A., architect, Philadelphia, Pa., in recognition of his architectural accomplishment.

NEW YORK SOCIETY OF ARCHITECTS

THE regular monthly meeting of the New York Society of Architects took place on Tuesday, 15 January, at the Hotel Astor, with President James Riely Gordon in the chair. Over fifty members were present, both from Greater New York and elsewhere. A dinner preceded the business meeting. A principal feature of the occasion was an address by William C. McTarnahan, vice president and general sales manager of the Petroleum Heat and Power Company. Mr. McTarnahan dwelt on the subject of the conversion of boiler plants to fuel oil. The lecture was illustrated with lantern slides.

ARCHITECTS ON ADVISORY BOARD OF PRINCETON

PROFESSOR RAYMOND E. BOSSANGE, head of the School of Architecture at Princeton University, Princeton, N. J., announced the appointment recently of Donn Barber, John W. Cross and Raymond M. Hood, New York architects, to the Advisory Board of the school. They will be in charge of advanced courses in designing and will judge the students' work.

WINS ART IN INDUSTRY MEDAL

HENRI CREANGE was awarded the Michael Friedsam Art in Industry Medal, presented to the individual who had contributed the most to the development of art in industry in America during 1923, it was announced recently by Howard Greenley of The Architectural League of New York.

The medal, which was designed by Robert Aitken, N.A., sculptor, is a gold medallion, the front of which shows Industry learning from Art; the back, Art nascent from Industry. It was offered further to encourage the trend of American industry toward art and its appreciation, and will be presented each year.

Mr. Creange is an American of French origin, whose influence in the silk industry has been felt by the entire United States. He is art director of Cheney Brothers.



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REFERENCE LIST OF BUSINESS LITERATURE

A service arranged for the use of the Architect, Specification Writer, and Architectural Engineer.

This list of the more important business literature of Manufacturers of building material and equipment is published each issue. Any of these publications may be had without charge, unless otherwise noted, by applying to The American Architect and The Architectural Review, 243 West 39th Street, New York, or obtained directly from the manufacturers. Either the titles or the numbers may be used in ordering.

AIR CONDITIONING—See also Heating and Ventilation
The Bayley Manufacturing Company, 732-760 Greenbush St., Milwaukee, Wis.

486. *Bulletin No. 23.* This bulletin is descriptive of the Bayley Turbo-Atomizer, the Bayley Turbo Air-Washer and Air Conditioner, for cleaning, cooling, tempering, humidifying and dehumidifying air. It contains an interesting treatise on air conditioning methods together with useful tables and a set of specifications. 32 pp. Ill. 7 1/2 x 10 1/2 in.

ARCHITECTURAL IRON WORK—See also Ornamental Metal Work

ASBESTOS—See also Lumber—Roofing

Johns-Manville Co., New York, N. Y.

372. *Catalog No. 304.* A treatise on the manufacture and uses of Johns-Manville Building Materials made of asbestos and mastic for all places exposed to fire or corrosion. 100 pp. Ill. in colors. Board covers. 8 1/2 x 11 in.

ASBESTOS ROOFING—See also Roofing

The Phillip Carey Co., Lockland, Cincinnati, Ohio.

390. *Asbestos versus Fire.* Booklet in colors. Contains information about asbestos; data on Carey Prepared and Built-up Asbestos Roofing; pictures of buildings on which they have been used. 15 pp. Ill. 6 x 9 in.

ASH HOISTS—See also Hoists

Gillis & Geoghegan, 545 West Broadway, New York, N. Y.

329. *General Catalogue.* Contains specifications in two forms, (1) using manufacturer's name, and (2) without using manufacturer's name. Detail in 1/4 in. scale for each telescopic model and special material handling section. Fully illustrated with photographs of actual installations and descriptive matter of same. 20 pp. 2 colors. 8 1/2 x 11 in.

BRICK

American Face Brick Association, 1754 People's Life Bldg., Chicago, Ill.

103. *The Story of Brick.* Contains the history of, and basic requirements of building brick, artistic, sanitary and economic reasons, comparative costs, and fire safety with photographs and drawings, and illustrates ancient and modern architectural works of note in brick. Size 7 x 9 1/4 in. 56 pp.

137. *A Manual of Face Brick Construction.* The history of brick making, types of face brick, showing details of construction for walls, chimneys and arches. Details of use of tile and brick construction and different types of bonds are given. A series of plans and elevations of small brick houses, descriptions, useful tables and suggestions are illustrated and described. Size 8 1/2 x 11 in. 116 pp. Price \$1.00.

155. *The Home of Beauty.* A booklet containing fifty prize designs for small brick houses submitted in national competition by architects. Texts by Aymar Embury II, Architect. Size 8 x 10 in. 72 pp. Price 50 cents.

371. *Architectural Details in Brickwork. Series One, Two and Three.* Each series consists of an indexed folder case to fit standard vertical letter file, containing between 30 and 40 half-tones in brown ink on fine quality paper. These collections are inspiring aids to all designers. Sent free to architects who apply on their office stationery; to others, 50 cents for each series.

454. *Bungalow and Small House Plans.* Four booklets containing plans for attractive small brick houses, containing 3-4, 5, 6, and 7-8 rooms. 50 pp. Ill. 8 1/2 x 11 in. 25 cents each, \$1.00 for the set.

BRICK AND TILE—See also Brick

B. Miffin Hood Brick Co., Atlanta, Ga.

561. *Pottery.* A beautifully prepared and illustrated book and portfolio of work executed with the products of this company. Included are "Riviera" Mission Roofing Tile, "Riviera" Shingle Roofing Tile, Rubble Random Tile and Quarrie Tile for walks, floors and terraces, fireplace tile and Hood Brick. Many of the illustrations are in full color and give an excellent impression of the results attained. Printed on one side for convenient filing. 46 pp. Ill. 9 1/2 x 12 1/2 in.

BUILDING CONSTRUCTION

Cement-Gun Company, Allentown, Pa.

503. *Report on Gunite Walls.* A report of fire tests made by Underwriters' Laboratories on Gunite walls, resulting in giving them a three-hour fire resistance classification. 90 pp. Ill. 6 x 9 in.

Concrete Engineering Co., Omaha, Neb.

247. *Handbook of Fireproof Construction.* An illustrated treatise on the design and construction of reinforced concrete floors with, and without suspended ceilings. The Meyer Steel-form Construction is emphasized and tables are given of safe loads for ribbed concrete floors. 40 pp. Ill. 8 1/2 x 11 in.

Curtis Companies Service Bureau, Clinton, Iowa.

602. *Better Built Houses.* Vol. XIII. This volume contains floor plans and perspectives of 21 two family houses. The designs were made by Trowbridge and Ackerman, Architects, New York, and illustrations rendered by Schell Lewis. Printed in sepia on heavy cream paper. Sent free to architects, east of the Rockies, requesting it on business stationery, otherwise price \$1.00. 24 pp. Ill. 9 x 12 in.

David Lupton's Sons Company, Philadelphia, Pa.

529. *Catalog C, Second Edition.* A catalog of steel shelving with bolted adjustment, also steel bins and racks, utility cabinets, bench legs, bench drawers, tool cabinets and stands, tote boxes, foremen's desks, waste bins, etc., 39 pp. Ill. 8 1/2 x 11 in.

Portland Cement Association, 347 Madison Ave., New York City.

595. *Concrete Floors.—Proposed Standard Specifications of the American Concrete Institute.* Specification with explanatory notes covering materials, proportions, mixing and curing. Plain and reinforced slabs are covered as well as one and two course floors and wearing courses. 18 pp. 6 x 9 in.

Truscon Steel Company, Youngstown, Ohio.

317. *Truscon Floortyle Construction. Form D-352.* Contains complete data and illustrations of Floortyle installations. 16 pp. Ill. 8 1/2 x 11 in.

318. *Truscon Standard Buildings. Form D-398.* Describes Truscon Standard Steel Buildings, with diagrams, illustrations of installations, descriptive matter and list of users. 48 pp. Ill. 8 1/2 x 11 in.

319. *Truscon Building Products. Form D-376.* Contains a brief description of each of the Truscon Products. 112 pp. Ill. 8 1/2 x 11 in.

320. *Modern School Construction. Form D-396.* Contains illustrations of schools, with typical elevations, showing advantages of Truscon Products for this construction. 16 pp. Ill. 8 1/2 x 11 in.

BUILDING DIRECTORIES

The Tablet & Ticket Co., 1015 West Adams St., Chicago, Ill.

517. *Office Building Directory.* Bulletin illustrating and describing directories made by this company providing for any required number of names. Frames of wood or metal with glass cover or doors. Name strips with one quarter inch white letters furnished. Size 7 x 10 in. 4 pp.

BUILDING HARDWARE—See Hardware

BULLETIN BOARDS

R. W. Clark Mfg. Co., 1774 Willson Ave., Chicago, Ill.

588. *Clark Directories and Clark Changeable Bulletin Boards.* Two pamphlets describing the Clark Changeable Bulletin Board and Directories for Office Buildings, Hotels, Business Buildings, etc. 8 pp. and 4 pp. Ill. 6 1/2 x 9 in.

The Tablet & Ticket Co., 1015-1021 West Adams Street, Chicago, Ill.

510. *T. & T. Changeable Bulletin Display Boards.* Describes bulletin boards with changeable type which has a self-spacing device so the lettering always looks neat and regular. 24 pp. Ill. 6 x 9 in.

CABINETS

Hess Warming & Ventilating Co., 1204-7 Tacoma Building, Chicago, Ill.

350. *The Hess Sanitary Medicine Cabinet Lockers and Mirrors.* Description with details of an enamelled steel medicine cabinet for bathrooms. 20 pp. Ill. 4 x 6.

CASEMENTS—See Doors and Windows

CEDAR LINING—See Lumber

CEILINGS, METAL

The Edwards Manufacturing Company, Cincinnati, O.

103. *Pamphlet of 32 pages* describing metal ceilings and wainscoting. Well illustrated, with list prices and rules for estimating. 7 x 10 in.

CELLAR SASH—See Doors and Windows

CEMENT

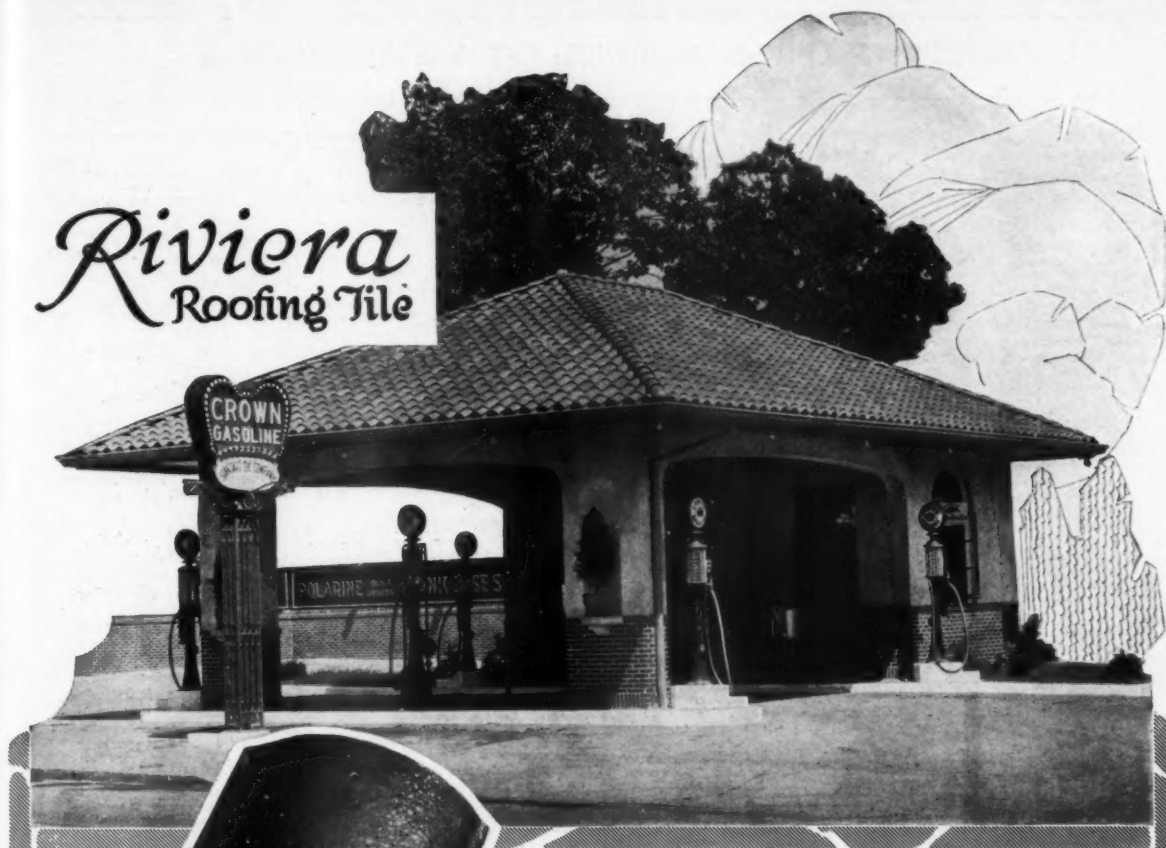
The Carney Co., Mankato, Minn.

448. *The Bond That Guarantees the Wall.* Attractive catalog for architects, engineers, contractors, and dealers. Describes fully the characteristics, durability and economy of this nature-mixed cement that requires no lime. Contains simple formula for mixing and illustrations of Carney-laid buildings. 24 pp. Ill. 8 1/2 x 11 in.

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REFERENCE LIST OF BUSINESS LITERATURE—Continued

CEMENT

The Carney Co., Mankato, Minn.

599. A circular describing improvements in manufacturing the material, cost comparisons, physical tests and specifications for use. 4 pp. Ill. $8\frac{1}{2} \times 11$ in.

Durastone Co., 422 East 3rd St., New York, N. Y.

418. *Durastone Brand Cement*. A description of a cement which matches any stone or marble, any color or texture. Can be cast in molds and also used for walls or plain surfaces. Illustrations are given of beautiful work executed with this material. 12 pp. $8\frac{1}{2} \times 11$ in.

Louisville Cement Company, Inc., Louisville, Ky.

518. *Brizment for Perfect Mortar*. Attractive booklet, with tabbed cover for filing, containing information, in both descriptive and tabular form, regarding the physical properties and manufacture of this special cement for brick and stone work, contains reports of testing laboratories and contractors on results attained with its use. Size $8\frac{1}{2} \times 11$ in. 90 pp. Illustrated.

Portland Cement Association, 111 West Washington St., Chicago, Ill.

630. *Concrete Data for Engineers and Architects*. A valuable booklet containing the reports of the Structural Materials Research Laboratories at Lewis Institute, Chicago, in abbreviated form. It is of great value to writers of specifications. 18 pp. Ill. $8\frac{1}{2} \times 11$ in.

650. *Concrete Floors*. Contains the tentative specifications of the American Concrete Institute for concrete floors of all kinds, with notes on floor finishes, coverings, typical construction designs and computing data. 16 pp. Ill. $8\frac{1}{2} \times 11$ in.

CHAIRS—See Furniture

The B. L. Marble Chair Co., Bedford, Ohio.

587. *Office Chairs, Catalog No. 31*. Describes a complete line of seating fixtures, for offices, directors' rooms and other places consisting of stationary and swivel chairs, settees and couches, both plain and leather upholstered. Also stenographer's chairs, stools, waste baskets, coat trees and accessories. 75 pp. Ill. 9×12 in.

CHUTES—See also Laundry Equipment

Edwin A. Jackson & Bro., Inc., 50 Beekman St., New York.

171. Booklet showing general construction and size of chutes to receive coal. Two types are built into the foundation wall with glass panel in place of cellar window; another type is placed flush with the ground, and is placed adjacent to wall, or can be placed near the street curb. Size $3\frac{1}{2} \times 6\frac{1}{2}$ in. 16 pp.

CLOCKS

Landis Engineering and Manufacturing Co., Waynesboro, Penna.

469. *Landis Electric Time and Program System*. A collection of bulletins No. 100, 110, 120, 130, 150 and 160, dealing with master and secondary clocks, equipment, time stamps, etc. Bound in expandable filing cover of tough paper. 48 pp. Ill. $8\frac{1}{2} \times 11$ in.

COLUMNS

Lally Column Co. of New York, 334 Calyer Street, Brooklyn, N. Y.

122. *Lally Columns, Handbook*. Detailed construction diagrams for various types of steel construction. The text describes advantages of endurance and economy of the column. Various tests, tables of sizes, dimensions, weight, carrying capacities, and data on other structural materials are given. Size $4\frac{1}{2} \times 6\frac{1}{2}$ in. 81 pages.

CONCRETE, REINFORCED—See also Reinforcing Steel

CONDUITS—See Pipe

DAMP-PROOFING—See also Waterproofing

DOORS AND WINDOWS

Andersen Lumber Company, Bayport, Minn., (formerly South Stillwater).

559. *Complete Catalog for Architects and Builders*. Describes Andersen Standard Window Frames and Cellar Sash Frames, which are in 7 units instead of 57 and may be assembled and nailed in 10 minutes. Shows uses in special construction for it comes in 121 sizes and styles. 24 pp. Ill. $7\frac{1}{4} \times 10\frac{1}{4}$ in.

Crittall Casement Window Co., Detroit, Mich.

672. *Crittall Universal Casements, Catalog No. 27*. Contains complete description, photographs, specifications and details of steel casement windows for banks, schools, residences, churches, hospitals, set directly into masonry and with auxiliary frames. 76 pp. Ill. 9×12 in.

Dahlstrom Metallic Door Co., Jamestown, N. Y.

674. *Architectural Catalog*. Illustrated catalog showing styles and types of Dahlstrom Standard Construction Hollow Metal Doors and Trim, Condu-Base, etc. Also various types of frames, jamb construction and architectural shapes. 178 pp. Ill. $8\frac{1}{2} \times 11$ in., in loose leaf.

Henry Hope & Sons, 103 Park Ave., New York.

65. *Hope's Casements and Leaded Glass*. Portfolio. Gives specifications, description and photo-engraving of Hope Casements in English and American Architecture, full size details of outward and inward opening and pivoted casements, of residential and office types. Size $12\frac{1}{4} \times 18\frac{1}{2}$ in. 32 pp.

The Kinnear Manufacturing Company, Columbus, Ohio.

455. *Steel Rolling and Folding Doors and Shutters, Catalog No. 52*. This catalog is devoted to service doors adaptable to buildings of all classes, piers, factories, warehouses, etc. Illustrates their use and contains tables for designers and detailers. 96 pp. Ill. 8×11 in.

David Lupton's Sons Co., Philadelphia, Pa.

526. *Catalog No. 11, Service, Products*. A complete technical catalog for the engineer and contractor of large industrial plants and business buildings. Contains full architects' specifications and details for laying out industrial, school and office sash, partitions, doors and skylights for large projects. 191 pp. Ill. $8\frac{1}{2} \times 11$ in.

527. *Lupton Casements and Double Hung Windows*. A book showing details and applications of steel casements and steel plate windows for the higher grade of banks and business buildings. Complete details and specifications. 41 pp. Ill. $8\frac{1}{2} \times 11$ in.

528. *Steel Windows for Apartment Houses, Residences, Offices, and Schools*. Booklet on "out-at-side" windows of casement appearance for medium priced residences. Covers also steel basement windows, and types of steel windows suited for Schools, Hospitals and Office Buildings of moderate cost. 16 pp. Ill. $8\frac{1}{2} \times 11$ in.

583. *Lupton, Steel Windows, No. 110*. A catalogue covering types of sash suitable for small to medium sized industrial and office buildings. Contains everything needed for the average builder in compact form. 70 pp. Ill. $8\frac{1}{2} \times 11$ in.

S. H. Pomeroy Company, 282 East 134th St., New York, N. Y.

614. *Solid Metal Double Hung Window, Type "A," Bulletin 4*. Complete specifications and details of sash, frame, stools and stool and apron. 4 pp. Ill. $8\frac{1}{2} \times 11$ in.

Truscon Steel Co., Youngstown, Ohio.

315. *Truscon Steel Sash*. A catalog containing designing data, tables and views of Stock Sash installations. 6 pp. Ill. $8\frac{1}{2} \times 11$ in.

348. *Truscon Steel Sash*. This handbook has been prepared for detailers and specification writers. The descriptions are clear and the details are complete. 80 pp. Ill. $8\frac{1}{2} \times 11$ in.

638. *Daylighting Schools*. A treatise on the daylighting and window ventilation of school buildings quoting eminent authorities, illustrated with diagrams of lighting data and details of suitable windows. 28 pp. Ill. $8\frac{1}{2} \times 11$ in.

The J. G. Wilson Corporation, 3 East 36th St., New York City.

656. *Wilson Rolling Partitions and Hygienic Wardrobes, Catalog "P."* Complete catalog of vertical and horizontal wooden rolling partitions and ventilated wardrobes with disappearing doors. 32 pp. Ill. 6×9 in.

DRAFTING MATERIALS

American Lead Pencil Co., 220 Fifth Ave., New York, N. Y.

208. *Booklet C-20, Venus Pencil in Mechanical Drafting*. An interesting illustrated booklet showing the possibilities of the Venus Drawing Pencil for drafting. 6×9 in.

Joseph Dixon Crucible Company, Pencil Department, Jersey City, N. J.

325. *Finding Your Pencil*. A book explaining the various degrees of hardness of the Eldorado pencil and the grade most suitable for every man who uses a pencil be he business or professional man, clerk or draftsman. Accompanied by a color chart of Dixon colored crayons. 16 pp. and 4 pp. in color chart. Ill. in colors. $3\frac{1}{4} \times 6$ in.

DRAINS—See also Plumbing Equipment

The Josam Manufacturing Co., 2d and Canal Sts., Michigan City, Indiana.

630. *Josam Floor, Shower and Roof Drains, Catalog F*. A loose leaf catalog illustrating complete line of adjustable drainage devices for floors, shower baths, roofs, swimming pools, railroad and deck drains, special use drains, strainers and accessories. Details and dimensions. 55 pp. Ill. $8\frac{1}{2} \times 11$ in.

631. *Josam Plate Numbers*. A loose leaf portfolio containing blue print details with dimension schedules of drainage fixtures for floors, showers, roofs, decks and special uses. 25 pp. Ill. $8\frac{1}{2} \times 11$ in.

DUMB-WAITERS—See also Elevators

Kaestner & Hecht Co., 1500 No. Branch St., Chicago, Ill.

598. *Electric Dumb-waiters, Bulletin No. 520*. Illustrated catalog, 8 pp. $8\frac{1}{2} \times 11$ in.

Sedgwick Machine Works, 144 West 15th Street, New York.

60. *Hand Power Elevators and Dumb-waiters in Modern Architectural Construction*. Illustrated catalogue. $4\frac{1}{2} \times 8\frac{1}{2}$ in. 80 pp.

ELECTRICAL EQUIPMENT—See also Lighting

Frank Adam Electric Co., St. Louis, Mo.

290. *Catalog No. 25*. A catalog and price list of knife switches, switchboards, panel boards, steel cabinets, switchboard material. 83 pp. Ill. $3 \times 10\frac{1}{2}$ in.



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ELECTRICAL EQUIPMENT—See also Lighting

Benjamin Electric Mfg. Co., Chicago, Ill.

671. *Benjamin Industrial Lighting Equipment. Bulletin No. 52.* Contains lighting data and general information, complete catalog of reflectors, interchangeable devices, vapor proof units, indoor and outdoor equipment, store and office fixtures, show case lighting, fittings and accessories. 80 pp. Ill. 8 x 10½ in.

Harvey Hubbell, Inc., Bridgeport, Conn.

207. *Electrical Specialties. Catalog No. 17, 1921.* This catalog contains descriptions with prices of the thousand and one items connected with electric light, electric alarm and small electric appliance installations in modern buildings. 104 pp. Ill. 8 x 10½ in.

Minneapolis Heat Regulator Co., Minneapolis, Minn.

570. *The Minneapolis Thermostatic Relay Switch.* Used in connection with any Minneapolis Thermostat, provides a means of temperature control for automatic oil burners, electric refrigerating apparatus, electric heating units and any similar equipment where it is necessary to operate an electric switch in accordance with temperature changes. 4 pp. Ill. 8½ x 11 in.

National Metal Molding Co., Pittsburgh, Pa.

481. *Liberty Rubber Insulated Wires, Cables and Cords.* A descriptive catalog of insulated wires, cables and cords for electric wiring. Contains much special information together with useful tables. 20 pp. Ill. 6 x 9 in.

ELEVATORS—See also Dumb-waiters and Hoists

A. B. See Electric Elevator Co., 52 Vesey St., New York.

169. Photographs and description in detail of elevator equipment manufactured by the A. B. See Electric Elevator Co. Size 6 x 8 in.

Kaestner & Hecht Co., 1500 No. Branch St., Chicago, Ill.

507. *Electric Traction Elevators. Bulletin No. 500.* Illustrated catalog describing gearless traction elevators and worm-gear traction elevators. 81 pp. 8½ x 11 in.

Kimball Brothers Company, Council Bluffs, Iowa.

330. *Kimball Elevators.* An illustrated catalog of hand power, sidewalk, and garage elevators and dumb-waiters and electric passenger, freight and push button elevators. 32 pp. Ill. 7½ x 10½ in.

Otis Elevator Co., 260 Eleventh Ave., N. Y. C.

651. *Otis Geared and Gearless Traction Elevators.* Leaflets describing all types of geared and gearless traction elevators with details of machines, motors and controllers for these types. Illustrated. 8½ x 11 in.

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

335. *"Ideal" Elevator Door Equipment.* Catalog showing elevator door hangers for one, two and three speed doors, also doors in pairs and combination swing and slide doors. Door closers and checks. 24 pp. Ill. 8½ x 11 in.

ELEVATOR LOCKS

Elevator Locks Co., 119 No. Washington St., Peoria, Ill.

536. *M-C-K Safety Elevator Locks.* A description of locks for elevators which mechanically lock the power and gate automatically, while gate is open; keep power locked until gate is securely closed; securely lock gate before power can operate; control the landing. Contains several pages of names of contacted users. 24 pp. Ill. 4 x 9½ in.

ESCALATORS

Otis Elevator Co., 260 Eleventh Ave., N. Y. C.

652. *Elevators and Inclined Elevators.* A comprehensive catalog illustrating the use of escalators for transporting people in stores, subways, railroad stations, theatres and mills; also inclined freight elevators for stores, factories, warehouses and docks adjustable to tide levels. 22 pp. Ill. 8½ in.

FENCE

The Stewart Iron Works Company, Cincinnati, Ohio.

456. *Book of designs "B."* A book of fence designs full of suggestions for architects. All illustrations are from photographs. 80 pp. Ill. 9½ x 12 in.

FILTERS—See Air Filters**FINANCING OF ENTERPRISES**

S. W. Straus & Co., 565 Fifth Ave., New York, N. Y.

- 183H. *Forty Years Without Loss to Any Investor.* A book describing the Straus Plan of investments. This firm underwrites and sells only first mortgage serial bonds secured by newly improved income producing properties, or high grade industrial properties. 37 pp. Ill. 5 x 8 in.

FIRE DOORS AND SHUTTERS—See Doors and Windows**FIREPLACES AND MANTELS**

Colonial Fireplace Co., 4619 Roosevelt Road, Chicago, Ill.

675. *Everything for the Fireplace.* A catalog showing a complete line of well designed andirons in various finishes; portable, club and basket grates; wood holders, firesets and Franklin stoves; folding screens, spark guards and fenders; hoods and set grates; gas logs, electric fires, ash traps, cranes and kettles and head throats and dampers. 24 pp. Ill. 8½ x 11 in.

H. W. Covert Co., 137 East 46th St., New York.

70. *Hints on Fireplace Construction.* Diagrams of construction and installation of Covert "Improved" and "Old Style" dampers and smoke-chambers, and other fireplace accessories. Size 5½ x 8½ in. 12 pp.

Edwin A. Jackson & Bro., Inc., 50 Beekman St., New York.

92. *Dampers, Chutes, Doors and Dumps.* Illustrated catalog. Equipment and appurtenances of various types, construction and installation, data, dimensions and prices.

Peerless Manufacturing Company, Inc., Louisville, Ky.

513. *The Lure of the Fireplace.* This booklet contains information and diagrams for the design and building of fireplaces, together with descriptions of modern domes and dampers so that a fireplace will work effectively at all times. Contains many illustrations of tasteful mantel designs. 24 pp. Ill. 5 x 7 in.

FLOOR COVERING—See Flooring**FLOORING, SUB—See also Stucco Base****FLOORING**

Armstrong Cork Co., Linoleum Department, Lancaster, Pa.

222. *Business Floors.* A handy reference on floors for public and semi-public buildings, containing specimen specifications, directions for laying and other helpful data. Illustrated in color. 6 x 9 in.

223. *Armstrong's Linoleum Floors.* A handbook for architects, published in the file form (8½ x 11 in.) recommended by the American Institute of Architects. A technical treatise on linoleum containing general information, tables of grades, gauges and weights, specimen specifications, and detailed directions for laying linoleum. Profusely illustrated in colors.

The Barber Asphalt Co., Philadelphia, Pa.

659. *Genasco Trinidad Lake Asphalt Mastic.* A book describing its manufacture uses and methods of application, including application over old floors. Separate specifications for flooring, waterproofing and roofing uses. 34 pp. Ill. 6 x 9 in.

Bonded Floors Co., Inc., 1421 Chestnut St., Philadelphia, Pa.

615. *Standard Specification for Installation of Battleship Linoleum Over Concrete.* A booklet containing specifications and explanatory notes for laying Battleship Linoleum Over Concrete and Wood, with detailed drawings. 8 pp. 8½ x 11 in. A. L. A. File No. 23. Ill.

653. *Gold-Seal Treadlite Tile.* An illustrated booklet showing Treadlite Tile installations and containing general information, specifications, etc., with reproductions of the product in colors.

669. *Distinctive Floors.* An attractive publication illustrated in color, describing Gold Seal Rubber Tile for floors. 8 pp. Ill. 8 x 10½ in.

The Long-Bell Lumber Co., R. A. Long Building, Kansas City, Mo.

204. *The Perfect Floor.* Tells how to lay finish and care for Oak Flooring. 16 pp. 14 illus. 5½ x 7½ in.

The Marbleloid Co., 461 Eighth Ave., New York.

61. *The Universal Flooring for Modern Buildings.* Illustrated booklet. Describes uses and contains specifications for Marbleloid flooring, base, wainscoting, etc. Size 6¼ x 9¼ in. 32 pp.

523. *Marbleloid for Schools.* A bulletin showing schools in which Marbleloid flooring is used. It is a composition flooring applied in a plastic state. Other bulletins show where it has been used in various classes of buildings. 4 pp. Ill. 3½ x 11 in.

Franklyn R. Muller Co., Waukegan, Ill.

242. *Asbestos Flooring Composition.* A book describing uses of and giving specifications and directions for Composition Flooring. Base. Wainscoting, etc. 8½ x 11 in. Ill.

Oak Flooring Bureau, 1014 Ashland Block, Chicago, Ill.

493. *Modern Oak Floors.* A book that tells the complete story of Oak Flooring 24 pp. Ill. 6¼ x 9¼ in.

The Rodd Co., Century Bldg., Pittsburgh, Pa.

688. *Redwood Block Floor Booklet.* A treatise on the advantages of Redwood Block Floors in factories, warehouses, hotels, office buildings, department stores, hospitals, etc. Details, dimensions and specifications for installing. 14 pp. Ill. 4 x 9 in.

Stedman Products Co., South Braintree, Mass.

585. *Stedman Naturalized Reinforced Flooring.* A circular describing a product formulated from rubber reinforced with cotton fibre, made in various colors and used for floors, wainscoting, sanitary base, stair treads, interior decorative units, wall coverings, table and desk tops and drain mats. 6 pp. Ill. 8½ x 11 in.

FLOORS—See Building Construction**FRAMES—See Doors and Windows****FURNACES—See Heating****FURNITURE—See Chairs****GARAGE CONSTRUCTION—See also Building Construction****GARAGE INCLINES AND RAMPS**

Amerleann Abrasive Metals Co., 50 Church St., N. Y. C.

677. *Feralun Anti-Slip Treads for Garage Inclines and Ramps.* A folder explaining the advantages of and illustrating the actual use of Feralun Anti-Slip Treads on ramps and inclines in public garages. 3 pp. Ill. 8½ x 11 in.

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REFERENCE LIST OF BUSINESS LITERATURE—Continued

GARBAGE DESTROYERS

Kerner Incinerator Company, 1029 Chestnut St., Milwaukee, Wis.

384. *The Sanitary Elimination of Household Waste, M-3 Folder*. Description of construction, installation and operation of the Kernerator for residences. Illustrated by views of residences in which the Kernerator is installed, with cuts showing all details. 16 pp. Ill. 4 x 9 in.

GARBAGE RECEIVERS

Edwin A. Jackson & Bro., Inc., 50 Beekman St., New York.

170. Booklet showing general construction and sizes of garbage receivers to be placed underground for suburban use; also types to be built into the wall of city homes and apartments; also types for suburban wall with opening on inside for the maid and outside for the garbage man. Size 3½ x 6½ in. 16 pp.

GARDENS

Julius Roehrs Company, Rutherford, N. J.

400. The Ten-Ten books issued three times a year—covering nursery stock in general, such things as fruit trees, roses and perennials. Also one general greenhouse catalog, listing orchids and greenhouse plants.

GLASS

Plate Glass Manufacturers of America, First National Bank Bldg., Pittsburgh, Pa.

484. *The Part that Plate Glass Plays in the Life of Every Man*. An illustrated folder describing the many uses of plate glass. Ask also for special circular for work in hand. 6 pp. Ill. in color. 3½ x 6½ in.

GRANITE—See Stone**GUNITE**

Cement Gun Company, Allentown, Pa.

564. *The Cement Gun, Its Application and Uses*. Reprint of a paper by Byron C. Collier, M. Am. Soc. C. E. A description of what the cement gun is and how it works, together with reports on tests. 21 pp. Ill. 6 x 9 in. Ask also for companion pamphlet "Gunite Slabs" containing working tablets for designers and reports on slab tests. 30 pp. Ill. 6 x 9 in.

GUTTERS AND DOWNSPOUTS—See also Roofing

The New Jersey Zinc Co., 160 Front Street, New York, N. Y.

220. *Zinc Spouting*. Describes leaders, gutters, etc. "Made from Horse Head Zinc," giving information concerning their economy and durability. 8 pp. Ill. 6 x 9 in.

HARDWARE

Allith-Prouty Co., Danville, Illinois.

500. *General Catalog No. 50*. This catalog embraces a description of a complete line of door hangers and tracks, garage door hardware, spring hinges, rolling ladders, fire door hardware, overhead carriers, light hardware and hardware specialties. 144 pp. Ill. 7½ x 10½ in.

P. & F. Corbin, New Britain, Conn.

540. *Automatic Exit Fixtures*. A catalog of fixtures that provide a ready exit at all times, as a child can operate them with ease. Doors to which they are applied can always be opened from the inside, even when locked against entrance. 4 pp. Ill. 8½ x 11½ in.

Field Hardware Mfg. Co., 111 East 31st St., Kansas City, Mo.

- F789. *NoPole Top Sash Operator*. A leaflet describing a hardware device for lowering the top sash of double hung windows without window poles. 4 pp. Ill. 8½ x 11 in.

Monarch Metal Products Co., 5060 Penrose St., St. Louis, Mo.

438. *Monarch Casement Hardware*. A book describing hardware for casement windows. This Manual and folder comply with all suggestions made by the Structural Service Committee of the A. I. A. 18 pp. Ill. 7½ x 10½ in., in heavy folder for vertical file properly indexed.

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

330. *Modern Hardware for Your Home*. Catalog of hangers for vanishing French doors; "Air-Way" multifold hardware for sun parlors and sleeping porches; "Slidrite" garage door hardware. 24 pp. Ill. 8½ x 11 in.

435. *Distinctive Garage Door Hardware. Catalog No. A-22*. This is more than a catalog. It is a treatise for architects and builders on the door equipment of garages, covering sliding, folding and combination sliding and folding doors, with their hardware. 94 pp. Ill. 8½ x 11 in.

430. *Sliding Door Hardware. Catalog No. A-17*. A catalog of sliding door hardware of Parallel, Accordion and Flush Door partitions. 22 pp. Ill. 7 x 10 in.

632. *Distinctive Garage Door Hardware. Catalog A No. 29*. A complete treatise on garage doors of every kind both hand and mechanically operated with description of standard and special hardware and accessories. 66 pp. Ill. 8½ x 11 in.

Russell & Erwin Mfg. Co., New Britain, Conn.

600. *Russwin Period Hardware*. A brochure illustrating hardware trim in twelve architectural styles or periods. 71 pp. Ill. 5 x 8 in.

610. *Catalog of Hardware, Volume Fourteen*. A complete catalog of building hardware, trim, locks, butts and accessories. 359 pp. Ill. 8 x 11 in.

Sargent & Company, New Haven, Conn.

500. *Sargent Locks and Hardware for Architects*. The latest complete catalog of locks and hardware. 762 pp. Ill. 9 x 12 in.

The Stanley Works, New Britain, Conn.

11. *Wrought Hardware. New 1921 Catalog*. This new catalog describes additions to the Stanley line of Wrought Hardware, as well as the older well known specialties and various styles of butts, hinges, bolts, etc. 376 pp. Ill. 6½ x 9½ in.

12. *Garage Hardware. Booklet illustrated*. Garages and their equipment, such as hinges, hasps, door holders, latch sets, chain and hand bolts, showing illustrations and text with dimensions of garages, describing the Stanley Works product. Size 6 x 9 in. 24 pp.

13. *Eight Garages and Their Stanley Hardware*. Booklet Plans, drawings and complete hardware specifications. Size 5 x 7 in. 32 pp.

127. *The Stanley Works Ball Bearing Butts*. Booklet, illustrated. Description with full size illustrations of many typed butts and their parts, dimensions and finish. Size 5 x 7½ in. 32 pp.

495. *Stanley Detail Manual*. A catalog in loose leaf binder, consisting of five sections on Butts, Bolts, Blind and Shutter Hardware, Stanley Garage Hardware, Screen and Sash Hardware. Detail drawings are given, showing clearances and other data needed by detailers. 116 pp. Ill. 7½ x 10½ in.

Vonnegut Hardware Co., Indianapolis, Ind.

300. *Von Duprin Self-Releasing Fire Exit Devices*. A catalog and educational work on panic-proof, burglar-proof self releasing exit devices for doors and windows of buildings of any kind of occupancy. 41 pp. Ill. 8 x 11 in.

310. *Prince Self-releasing Fire Exit Devices. Supplement to Von Duprin Catalog No. 12*. Contains valuable information for architects on the selection, detailing, etc., of Prince devices for doors and windows to insure safety against fire panic. 32 pp. Ill. 8 x 11 in.

HEATERS—See Water Heaters**HEATING**

American Radiator Company, 104-108 W. 42nd St., New York, N. Y.

427. *Ideal-Arcola Heating Outfits*. A book describing a system of hot water heating for small and medium size houses. The boiler is placed in a room and resembles a stove. No cellar required. The ash carrying reduced to a minimum. 24 pp. Ill. 6 x 8½ in.

Central Radiator Co., 41 East 42nd St., New York City.

- F788. *Lansdale Radiators*. A leaflet describing standard two and three column and wall radiators, with dimensions and capacities. 4 pp. Ill. 6 x 9 in.

Crane Company, 836 So. Michigan Ave., Chicago, Ill.

241. *Steam Catalogue*. A book containing full descriptions of the complete line of Crane valves, fittings, etc. 800 pp. Ill. 6 x 9 in.

The Farquhar Furnace Company, Wilmington, Ohio.

355. *Healthful Helpful Hints*. A discussion of furnace and chimney design and capacity for hot air heating and ventilation. 16 pp. Ill. 4½ x 9½ in.

350. *A Plain Presentation to Dealers*. A book of selling talk for dealers in Farquhar Furnaces. Four model heating layouts are shown and there is a page of useful "Do and Don't" advice. 24 pp. Ill. 8½ x 11 in.

General Rollers Company, Waukegan, Ill.

444. *Catalog No. 7*. A catalog completely describing the construction and operation of Pacific Steel Boilers. Contains also specifications and price lists. 22 pp. Ill. 6 x 9 in.

Hess Warming & Ventilating Co., 1209 Tacoma Bldg., Chicago, Ill.

178. *Modern Furnace Heating*. An illustrated book on the Hess Welded Steel Furnaces. Pipe and Pipeless, notes for installation, sectional views, showing parts and operation, dimensions, register designs, pipes and fittings. Size 6 x 9½ in. 48 pp.

Illinois Engineering Co., Racine Ave., at 21st St., Chicago, Ill.

501. *Illinois Heating Systems. Vapor Details Bulletin 20*. This bulletin contains typical plans and elevations of heating systems, with description of details and "Standards for Computing Radiation and Boiler Sizes" of the Chicago Master Steam Fitters' Association. 18 pp. Ill. 8 x 10½ in.

502. *Illinois Bulletins. No. 102* contains detailed description with capacities and dimensions of Eclipse Pressure Reducing Valves. 20 pp. Ill. Nos. 202, 302, 452, 502 and 703 describe, with illustrations, Steam Specialties, Back Pressure Valves, Stop and Check Valves, Exhaust Heads, Balanced Valves, Separators, Steam Traps.



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REFERENCE LIST OF BUSINESS LITERATURE—Continued

HEATING

- Jenkins Bros.**, 30 White St., New York, N. Y.
235. *Catalog No. 12*. This catalog contains descriptions of all the valves, packing, etc., manufactured by Jenkins Bros. Includes also dimensions and price lists of valves and parts. 271 pp. Ill. 4 x 6 1/4 in. Stiff paper cover.
237. *The Valve Behind a Good Heating System*. This booklet describes Jenkins Radiator Valves, Automatic Air Valves and other valves used in connection with steam and hot water heating. 16 pp. 4 1/2 x 7 1/4 in. Stiff paper cover.
- Johnson Service Company**, 149 Michigan St., Milwaukee, Wis.
301. *The Regulation of Temperature and Humidity*. A description of the Johnson System of temperature regulation and humidity control for buildings; showing many kinds of thermostatic appliances for automatically maintaining uniform temperatures. 63 pp. Ill. 8 1/2 x 11 in.
302. *Johnson Electric Thermostat, Valves and Controllers*. A catalog of devices mentioned in the title. 24 pp. Ill. 3 1/2 x 6 in.
- Kewanee Boiler Co.**, Kewanee, Illinois.
574. *Fire Box Boilers, Catalog No. 76*. A description of smokeless steel firebox boilers with complete data of capacities and dimensions of the brick set and portable types. 35 pp. Ill. 6 x 9 in.
575. *Power Boilers, Catalog No. 73*. A complete description of brick set horizontal tubular power boilers with full and half-front setting. Also smokeless tubular boilers with down draft furnace and steel casing. Also steel portable locomotive boilers, grates, breechings, cast iron fronts, air receivers, storage tanks and accessories. 35 pp. Ill. 6 x 9 in.
- Minneapolis Heat Regulator Co.**, Minneapolis, Minn.
600. *Minneapolis Dual Control*. This circular describes in detail the No. 65 Hydrostat and No. 70 Pressurestat and their application for the automatic heat control of hot water, steam or vapor systems. 12 pp. Ill. 3 1/4 x 6 in.
- Richardson & Boynton Co.**, New York, N. Y., Chicago, Ill., Philadelphia, Pa., Providence, R. I., Boston, Mass.
200. *The Richardson Vapor Vacuum-Pressure Heating System*. An interesting book which presents in clear non-technical language the principles of Vapor-Vacuum-Pressure heating; the economy over ordinary steam heating, steam and hot-water systems may be altered to use this principle with views of buildings where the V-V-P system is installed. 14 pp. Ill. 8 x 11 in.
201. *Perfect Warm Air Furnaces*. No. 203. Contains a full description of various types of warm air furnaces and parts, with dimensions and necessary data. 24 pp. Ill. 8 x 10 1/2 in.
202. *Perfect Cooking Ranges*. Description and dimensions of the complete line of the new high enamel finish Richardson Perfect ranges, with charts and information regarding combination coal and gas cooking ranges. 40 pp. Ill. 8 1/2 x 11 in.
- Tuttle & Bailey Mfg. Co.**, 2 West 45th St., New York, N. Y.
305. *About Radiator Enclosures*. A booklet showing how easily and effectively unsightly radiators may be concealed by enclosures which adorn a room. 15 pp. Ill. 6 1/2 x 9 1/4 in.
306. *Special Designs, Catalog 66A*. A book of designs for grilles, screens, registers and ventilators to be used in connection with heating installations. Made of bronze, brass, iron and steel. 40 pp. Ill. 6 1/2 x 9 1/4 in.
- Utica Heater Company**, Utica, N. Y.
557. *Utica Imperial Super-Smokeless Boilers*. These boilers burn all fuels and consume soft coal without smoke. The illustrated catalog contains complete technical data with lists of illustrations. 76 pp. Ill. 8 1/2 x 11 in. (Separate bulletins may be had featuring the following buildings: Schools, Churches, Public Buildings, Apartments, Hotels, Residences, Industrial Buildings, Office and Theatres.)
558. *Warm Air Heating*. A folder featuring warm air heating equipment including *New Idea* pipeless furnaces. Superior pipe furnaces and *Super-Smokeless* furnaces for burning soft coal.

HEATING AND VENTILATION

- American Blower Co.**, Detroit, Mich.
301. *Sirocco Service*. A quarterly publication containing descriptions of heating and ventilating systems installed by the American Blower Company, together with useful data for architects and engineers. 16 pp. Ill. 8 1/2 x 11 in.
302. *General Catalog "ABC" Products*. A book full of useful data for all men who have to deal with heating and ventilating problems. 122 pp. Ill. 8 1/2 x 11 in.
645. *Special bulletins describing in detail all of the apparatus in their general catalog*. Sent on request. Ill. 8 1/2 x 11 in.
- Buffalo Forge Co.**, 490 Broadway, Buffalo, N. Y.
215. *Buffalo Fan System of Heating, Ventilating and Humidifying*. Catalog 709. This contains a general discussion of heating and ventilating under four heads. Part 1, Public Buildings. Part 2, Industrial Plants. Part 3, Buffalo Apparatus. Part 4, Fan Engineering.
- Garden City Fan Co.**, McCormick Bldg., Chicago, Ill.
673. *New Sectional Catalog No. 200*. Describing the latest improved cycloidal multivane fans for heating, ventilating and drying also standard steel plate fans and pipe coil heaters. Details, capacity tables and specifications, 24 pp. Ill. 7 1/2 x 10 1/2 in.

The H. W. Nelson Corporation (formerly Moline Heat), Moline, Ill.

411. *Universal Ventilation, Architects' and Engineers' Edition*. A scientific treatise on ventilation for schools, offices and similar buildings; with 40 pages of engineering data on ventilation for architects and engineers. 72 pp. Also "Supplement A" on Air Conditioning. 12 pp. Ill. with half-tones, line drawings and designing charts. 8 1/2 x 11 in.

HOISTS—See Elevators and Ash Hoists

INCINERATORS—See Garbage Destroyers

INSULATION—See also Stucco Base

Samuel Cabot, Inc., 141 Milk St., Boston, Mass.

639. *Heat Insulation*. A treatise on the methods of securing insulation for various kinds of buildings and conditions by using different insulating quilts. 25 pp. Ill. 7 1/2 x 10 1/2 in.

Insultite Division, Minnesota & Ontario Paper Company, International Falls, Minn.

487. *Universal Insultite in Building Construction*. Describes a clean, sanitary, odorless and vermin proof board made from selected waterproofed wood fibres, felted into light, strong, uniform sheets. Examples are given for use indoors and outdoors together with details and useful data. 37 pp. Ill. 8 1/2 x 11 in.

United States Mineral Wool Co., 280 Madison Ave., New York.

63. *The Uses of Mineral Wool in Architecture*. Illustrated booklet. Properties of insulation against heat, frost, sound, and as a fire-proofing, with section drawings and specifications for use. It gives rule for estimate and cost. Size 5 1/4 x 6 1/2 in. 24 pp.

IRON AND STEEL—See also Metals

The American Rolling Mill Co., Middletown, Ohio.

658. *The Story of Commercially Pure Iron*. A most interesting booklet recounting the historical development of iron and its present day manufacture in commercially pure, durable form. 48 pp. Ill. 6 x 9 in.

682. *What's Under the Galvanized Coating?* A booklet describing the process of galvanizing, its protective service and also the necessity for pure iron as a basis for galvanizing. 16 pp. Ill. 8 1/4 x 6 1/4 in.

KITCHEN EQUIPMENT—See also Stoves

Bramhall, Deane Co., 261-A West 36th St., New York.

59. *The Heart of the Home*. Booklet, illustrated. Deane's French Ranges (all fuels), cook's tables and plate warmers. Size 6 x 9 in. 32 pp.

The Prometheus Electric Co., 352 West 13th St., New York.

145. *Prometheus Electric Plate Warmers*. Leaflets illustrating the plate warmer, describing its construction, utility and types, adaptable for residences and hotels, according to specifications. Sizes and dimensions. Size 5 1/2 x 9 in.

LATH, EXPANDED WOOD

Expanded Wood Lath Corporation, 818-155 N. Clark St., Chicago, Ill.

605. *Ex-Wo Expanded Wood Lath*. An expanded wood lath made in sheets and attached to a sheathing paper. Description, directions for installation, specifications and tests. 2 and 4 pp. Ill. 9 x 11 1/2 and 7 1/2 x 11 in.

LATH, METAL

American Steel & Wire Co., Chicago, Ill.

228. *Stucco Houses Reinforced With Triangle Mesh Fabric*. A pamphlet containing valuable data on stucco work with tables of quantities of material and many illustrations of houses covered with stucco applied on Triangle Mesh Fabric. 24 pp. Ill. 6 x 9 in.

Concrete Engineering Co., Omaha, Neb.

346. *How to Use Ceco Lathing Materials*. An illustrated treatise on the use of expanded metal lath. Contains construction details and complete specifications, with sample piece of lath in pocket on cover of book. 16 pp. Ill. 8 1/2 x 11 in.

The General Fireproofing Co., Youngstown, Ohio.

592. *Building for Permanence and Beauty*. A booklet containing illustrations and plans of residences with stucco exteriors and describing proper stucco construction on Herringbone Metal Lath. 36 pp. Ill. 6 1/4 x 7 1/4 in.

685. *The Right Angle*. A monthly magazine devoted to fireproof construction involving the use of metal lath, expanded metal and steel lumber. Specifications and details. Circulation free to architects and contractors. 16 pp. Ill. 8 1/2 x 11 in.

Truscon Steel Company, Youngstown, Ohio.

316. *Hy-Rib and Metal Lath*. Tables, general data and illustrations of Hy-rib and metal lath construction. 6 pp. Ill. 8 1/2 x 11 in.

LAUNDRY EQUIPMENT

Chicago Dryer Co., 2210 N. Crawford Ave., Chicago, Ill.

66. *Laundry Appliances*. Illustrated catalog. Descriptions of Laundry Dryers, Electric Washing Machines and Ironing Machines, especially adapted for use in residences, apartment buildings and small institutions. Size 8 1/2 x 11 in. 48 pp.

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THE HART & HEGEMAN MFG. CO. HARTFORD, CONN.

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REFERENCE LIST OF BUSINESS LITERATURE—Continued

LAUNDRY EQUIPMENT

The Pfandler Company, Rochester, N. Y.

581. *Glass Lined Steel Laundry Chute*. Catalog describing a glass lined steel laundry chute with flushing ring at top and drain connection at bottom, specifications, dimensions and details adapted to hospitals and hotels. 14 pp. Ill. $5\frac{1}{2} \times 7\frac{1}{2}$ in.

LIGHTING—See also Electrical Equipment

Frank Adam Electric Co., 3649 Bell Ave., St. Louis, Mo.

629. *The Control of Lighting in Theatres*. A book describing means for complete control of lighting the stage, auditorium and other parts of theatres with distribution schedules and specifications. Also applications of control to Masonic buildings, schools and colleges. 32 pp. Ill. 8×11 in.

Cooper Hewitt Electric Company, 95 River Street, Hoboken, N. J.

553. *Industrial Lighting Briefs*. No. 1 deals with Industrial Lighting in theory and practice. No. 2 deals with the engineering of illumination with Cooper Hewitt Lamps. No. 3 deals with the quickness of response of the Hand to Eye. Each 4 pp. $8 \times 10\frac{1}{2}$ in.

E. Erikson Electric Co., 6 Portland St., Boston, Mass.

613. *Erikson Reflectors*, Catalog No. 90. Description of and details for installing reflectors in show windows, display cases, art galleries, rug racks, banks, churches, and other buildings. 32 pp. Ill. $6\frac{1}{4} \times 9\frac{1}{2}$ in.

I. P. Frink, Inc., 24th St. and 10th Ave., New York.

150. *Light Service for Hospitals*. Catalogue 421. A booklet illustrated with photographs and drawings, showing the types of light for use in hospitals, as operating table reflectors, linoleum and multiple concentrators, ward reflectors, bed lights and microscopic reflectors, giving sizes and dimensions, explaining their particular fitness for special uses. Size 7×10 in. 12 pp.

218. *Picture Lighting*. Booklet 422. A pamphlet describing Frink Reflectors for lighting pictures, art galleries, decorated ceilings, cove lighting, the lighting of stained glass, etc., and containing a list of private and public galleries using Frink Reflectors. 24 pp. Ill. $5\frac{1}{2} \times 7$ in.

219. *Frink Reflectors and Lighting Specialties for Stores*. Catalog No. 424. A catalog containing a description of the Frink Lighting System for Stores; the Synthetic System of Window Illumination; and a number of appliances to produce the most effective lighting of displayed objects. 20 pp. Ill. 8×11 in.

220. *Frink Lighting Service for Banks and Insurance Companies*. Reflectors. Catalog No. 425. A very interesting treatise on the lighting of offices; with details of illustrations and description of lamps and reflectors. Contains a list, covering several pages, of banks using Frink Desk and Screen Fixtures. 36 pp. Ill. $8\frac{1}{4} \times 11$ in.

Harvey Hubbell, Inc., Bridgeport, Conn.

401. *Hubbell Flush Door Receptacles*. Description of a safe, convenient and practical wall outlet de luxe for fine residences, clubs, hotels, public buildings and offices. 4 pp. Ill. 8×10 in.

Mitchell Vance Co., Inc., 503-511 West 24th St., New York, N. Y.

309. *Catalog No. 25*. A descriptive catalog, with prices, of the "T. R. B." Lighting Unit, for perfect distribution of light without glare and without shadows. 24 pp. Ill. 8×10 in.

LIME

The Ohio Hydrate & Supply Co., Woodville, Ohio.

404. *A Job that Took a Million Years*. A description of how limestone is formed and how it is later converted into lime. All the processes are shown in detail and the uses of lime are illustrated. 16 pp. Ill. $8\frac{1}{2} \times 11$ in.

LINCRUSTA-WALTON—See also Wall Covering

The Lincrusta-Walton Company, Hackensack, N. J.

519. *Lincrusta-Walton*. This book gives directions for buying, caring for and applying Lincrusta-Walton; together with color chart and many pages showing patterns. 67 pp. $8\frac{1}{2} \times 11$ in. Ill. Bound in boards.

LOCKERS, STEEL—See Factory Equipment

LUMBER

Arkansas Soft Pine Bureau, Little Rock, Ark.

649. *Arkansas Soft Pine Handbook*. An exceptionally well prepared book containing technical descriptions, grading rules, standard molding designs including those by the American Institute of Architects and the National Lumber Manufacturers' Association. Price 50 cents. 82 pp. Ill. $8\frac{1}{2} \times 11$ in.

E. L. Bruce Co., Memphis, Tenn.

533. *Now the Cedar Clothes Closet*. A book illustrated in colors describing "Bruce Cedaline," for lining clothes closets as a complete protection against moths. 12 pp. Ill. $4\frac{1}{4} \times 6$ in.

The Long-Bell Lumber Co., R. A. Long Building, Kansas City, Mo.

203. *From Tree to Trade*. This book tells the story of the manufacture of lumber. Gives an idea of the scope of the business and the care and attention given to the manufacture and grading of Long-Bell trade-marked products. 100 illustrations. 48 pp. $8\frac{1}{2} \times 11$ in.

The Pacific Lumber Company of Illinois, 2060 McCormick Bldg., Chicago, Ill.

303. *Construction Digest*—The use of California Redwood in residential and industrial construction. Contains illustrations, grading rules, specifications and other technical data for architects and builders. 16 pp. Ill. $8\frac{1}{2} \times 11$ in.

304. *Engineering Digest*—The use of California Redwood in industrial construction and equipment for factories, railroads, mines and engineering projects. 16 pp. Ill. $8\frac{1}{2} \times 11$ in.

LUMBER, ASBESTOS

Asbestos Shingle, Slate & Sheathing Co., Ambler, Pa.

54. *Ambler Asbestos Building Lumber*. Catalog illustrated. Describes uses of this fireproof product for both exteriors and interiors. Tables of sizes and illustrations of various types of buildings in which it has been used. Size $8\frac{1}{2} \times 11$ in. 32 pp.

MAIL CHUTES

Cutler Mail Chute Co., Rochester, N. Y.

294. *The Cutler Mail Chute, Model F*. Describes the Cutler Mail Chute in its standard form, known as Model F. Contains data for rough floor openings not included in the Mail Chute contract. 16 pp. Ill. $4 \times 9\frac{1}{4}$ in.

MANTELS

Edwin A. Jackson & Bro., Inc., 50 Beekman St., New York.

90. *Wood Mantels, Portfolio*. Wood mantel designs of various types and openings, giving dimensions, projections and showing fireplace grate designs. Size $9 \times 6\frac{1}{4}$ in. 32 pp.

MARBLE—See Stone

The Georgia Marble Co., Tate, Pickens Co., Ga., New York Office, 1226 Broadway.

634. *Why Georgia Marble is Better*. Booklet $3\frac{1}{2} \times 6$ in. Gives analysis, physical qualities, comparison of absorption with granites, opinions of authorities, etc.

635. *Convincing Proof*. Booklet $3\frac{1}{2} \times 6$ in. 8 pp. Classified list of buildings and memorials in which Georgia Marble has been used, with names of architects and sculptors.

METALS—See also Iron and Steel—Roofing

American Brass Co., Main Office, Waterbury, Conn.

138. *Price List and Data Book*. Illustrated. Loose-leaf Catalog. Covers entire line of Sheets, Wire Rods, Tubes, etc., in various metals. Useful tables. Size $3\frac{1}{2} \times 7$ in. 168 pp.

385. *Copper Products*. Illustrated price list and tables of weights. Covers copper for roofing purposes, including strip copper for forming into leaders, gutters, valleys, flashings, etc. 64 pp.

Ameriann Sheet & Tin Plate Co., Frick Building, Pittsburgh, Pa.

452. *Reference Book, Pocket Edition*. Covers the complete line of Sheet and Tin Mill Products. 168 pp. Ill. $2\frac{1}{2} \times 4\frac{1}{2}$ in.

Bridgeport Brass Co., Bridgeport, Conn.

483. *Seven Centuries of Brass Making*. A brief history of the ancient art of brass making and its early (and even recent) method of production—contrasted with that of the Electric Furnace Process—covering tubular, rod and ornamental shapes. 80 pp. Ill. $8 \times 10\frac{1}{2}$ in.

Copper & Brass Research Association, 25 Broadway, New York, N. Y.

406. *How to Build a Better Home*. A book on building written for the prospective builder. It contains keyed illustrations of houses and details of houses and should be of value to architects in explaining technical terms to clients. 30 pp. Ill. $7\frac{1}{4} \times 10\frac{1}{2}$ in.

Rome Brass & Copper Company, Rome, N. Y.

473. *Price List No. 70*. A loose-leaf binder containing full price list of Rome Quality products, together with useful tables. $5\frac{1}{2} \times 7\frac{1}{4}$ in.

METAL MOLDINGS

National Metal Molding Co., Pittsburgh, Pa.

152. *Hand-book for the Man on the Job*. An illustrated book of fittings and methods with description and instructions for installing National Metal Molding under all conditions; a book meant to be conveniently carried and used on the job. Size $4\frac{1}{2} \times 6$ in. 102 pp.

MILLWORK—See also Lumber—Building Construction—Doors and Windows

MORTAR—See also Cement

Louisville Cement Company, Inc., Louisville, Ky.

311. *Brixment, the Perfect Mortar*. The reading of this little book gives one a feeling that definite valuable information has been acquired about one of the oldest building materials. Modern science has given the mason a strong water-resisting mortar with the desirable "feel" of the best rich lime mortar. 16 pp. Ill. in colors. $5\frac{1}{2} \times 7\frac{1}{4}$ in.

MORTAR COLORS—See also Paints, Stains, Varnish

Ricketson Mineral Paint Works, Milwaukee, Wis.

376. *Ricketson Mortar Colors*. Two interesting folders with color card for these well known fadeless mortar colors in use for 35 years. $3\frac{1}{4} \times 6$ in.

OFFICE EQUIPMENT

Art Metal Construction Company, Inc., Jamestown, New York.

542. *Art Metal Steel Office Equipment*. A descriptive catalog of art metal shelves, filing cases, lockers, desks, bookcases, plan files, safes and furniture. 128 pp. Ill. $8\frac{1}{2} \times 11$ in.

The General Fireproofing Co., Youngstown, Ohio.

686. *Allsteel Office Furniture*. A descriptive catalog of steel office furniture, filing cabinets, desks, tables, counterheights, steel shelving, fireproof safes. 90 pp. Ill. $5\frac{1}{2} \times 7\frac{1}{4}$ in.

Specifications of most products advertised in THE AMERICAN ARCHITECT appear in the Specification Manual

FRINK REFLECTORS



Concealed lighting that is concealed. Guarantee Trust Bldg., Atlantic City, New Jersey. The result of early cooperation between the architect J. Vaughan Mathis and our engineers

Two High-lights on the Subject of Concealed Lighting

For years we have requested that, when concealed lighting is to be used, we be called into conference when plans are in sketch stage.

Our reason for this is two-fold.

- 1—Often, when a plan is complete, an obstacle has been developed that prohibits the satisfactory use of concealed lighting. Such obstacles can often be avoided though, if recognized before they are built into a building.
- 2—Concealed lighting often has a different effect on colors and shadows than direct lighting, and for the best results such effects should be carefully considered.

On either of these points, or on any problem, one of us would gladly confer with you.

One half century of experience is at your disposal.

I. P. FRINK Inc.

24th Street and 10th Avenue, New York

Chicago, Ill.
Cleveland, O.

Boston, Mass.
Seattle, Wash.
Pittsburgh, Pa.

Detroit, Mich.
Buffalo, N. Y.
St. Louis, Mo.

Cincinnati, O.
Birmingham, Ala.
Atlanta, Ga.

San Francisco, Cal.
Philadelphia, Pa.

CANADA:

Associated with Robert Mitchell, Ltd., 64 Belair Ave., Montreal

Specifications of most products advertised in THE AMERICAN ARCHITECT appear in the Specification Manual

REFERENCE LIST OF BUSINESS LITERATURE—Continued

PAINTS, STAINS, VARNISHES—See also Waterproofing

Joseph Dixon Crucible Co., Jersey City, N. J.

324. *Dixon's Silica-Graphite Paint*. A pamphlet describing the physical properties of silica-graphite paint and especially the wide difference between it and other protective paints. Contains also sample color card with specifications. 20 pp. and 6 pp. in color card. Ill. $3\frac{1}{4} \times 6\frac{1}{4}$ in.

Hydrex Asphalt Products Corp., 120 Liberty St., New York.

62. *Dampproofing Walls, Above and Below Grade*. Illustrated booklet. Uses and specifications of Hydrex Paint, Hydrex (Bitumen), Compound and Hydrex Waterproof Primer for walls above and below grade, stainproofing cut stone, acid-proofing floors, etc., described. Size $8\frac{1}{2} \times 11$ in. 8 pp.

National Lead Company, 111 Broadway, New York, N. Y.

389. *Color Harmony*. Color card for glass finish and flat finish together with useful notes on painting and a collection of approximate formulas for obtaining the colors shown on the color card. 8 pp. Ill. $3\frac{1}{2} \times 5\frac{1}{2}$ in.

390. *Dutch Boy Flating Oil*. A booklet describing the characteristics of flat and glass paints, volatile thinners and a treatise on methods of obtaining special paint surfaces together with formulas. 24 pp. $3\frac{1}{2} \times 6$ in.

The New Jersey Zinc Co., 160 Front St., New York, N. Y.

227. *Painting Specifications*. A booklet full of useful information concerning paint mixtures for application on various surfaces.

Ripolin Co., The, Cleveland, Ohio.

419. *Ripolin Specification Book*. $8 \times 10\frac{1}{4}$ in., 12 pp. Complete architectural specifications and general instructions for the application of Ripolin, the original Holland Enamel Paint. Directions for the proper finishing of wood, metal, plaster, concrete, brick and other surfaces, both interior and exterior, are included in this Specification Book.

Standard Varnish Works, 443 Fourth Ave., New York, N. Y.

505. *Immaculate Distinction*. A book describing Satinette Enamel, and enduring white enamel for interior and exterior use. Specifications are given for use on new and old work, metal, plaster, etc. 23 pp. Ill. 5×7 in.

506. *Architectural Reference Book, Third Edition*. A readily accessible and concise compilation of practical finishing information from which specifications readily can be written on varnishes, stains, fillers and enamels. 24 pp. Ill. in colors with samples on wood, etc. $8\frac{1}{2} \times 11$ in.

FILES, CONCRETE

Raymond Concrete Pile Co., 140 Cedar St., New York.

150. *Raymond Concrete Piles—Special Concrete Work*. A booklet with data concerning the scope of the Raymond Concrete Pile Co., for special concrete work. It classifies piles, showing by illustration, text and drawings, the relative value of special shape and manufacture of piles. It gives formulae for working loads, and relative economy. Size $8\frac{1}{2} \times 11\frac{1}{2}$ in. 60 pp.

PIPE—See also Metals

Bridgeport Brass Company, Bridgeport, Conn.

556. *Brass Pipe and Piping; When and How it Should be Used*. Bulletin No. 15. This book contains valuable tables, charts and examples for the design of hot water installations, with illustrations of details and connections. It also discusses the use of pipe of different materials; various processes for preventing rust and corrosion in iron and steel pipes. It is a valuable treatise for all architects and engineers. 47 pp. Ill. $8 \times 10\frac{1}{2}$ in.

A. M. Byers Company, Pittsburgh, Pa.

679. *What is Wrought Iron?* Bulletin 26 A. Contains the definition of wrought iron, methods of manufacture, chemical and physical characteristics; advantages of wrought iron as a pipe material; service records from old buildings equipped with Byers Genuine Wrought Iron Pipe. How to tell the difference between iron and steel pipe. 40 pp. Ill. $8 \times 10\frac{1}{4}$ in.

A. M. Byers Company, Pittsburgh, Pa.

680. *The Installation Cost of Pipe*, Bulletin 38. Contains cost analysis of a variety of plumbing, heating, power and industrial systems, with notes on corrosive effects in different kinds of service. 32 pp. Ill. $8 \times 10\frac{1}{4}$ in.

The Duriron Company, Dayton, Ohio.

548. *Duriron Acid-Proof Drain Pipe*. This is a handbook for the architect and engineer on Duriron drain pipe fittings, exhaust fans, sinks, etc. Contains specifications for installations, detail dimensioned drawings, reports on corrosive tests, long partial list of successful installations, etc. 20 pp. Ill. $8 \times 10\frac{1}{2}$ in.

National Tube Co., Frick Bldg., Pittsburgh, Pa.

670. *National Bulletin No. 25B, 3rd Edition*. Devoted to the installation of steel pipe in large buildings, architectural anti-corrosion engineering, gas piping, specifications and tables of strength and properties. 74 pp. Ill. $8\frac{1}{2} \times 10\frac{1}{4}$ in.

Rome Brass and Copper Company, Rome, N. Y.

509. *Bulletin No. 1, Seamless Brass Pipe*. This bulletin illustrates in colors nine installations of hot water heaters between range boiler, basement furnace, tank and instantaneous heaters for one and two-family houses and larger buildings. Contains also a number of estimating and designing tables, rules and formulas. 22 pp. Ill. $7\frac{1}{2} \times 11\frac{1}{2}$ in.

A. Wyckoff & Son Co., Elmira, N. Y.

397. *Wyckoff Wood Pipe*. Catalog No. 42. A description of machine-made woodstave pipe and Wyckoff's express steam pipe casing. Contains also a number of pages of useful formulas and tables for hydraulic computations. 92 pp. Ill. 6×9 in.

PIPE COVERING

The Philip Carey Co., Lockland, Cincinnati, Ohio.

379. *Pipe and Boiler Coverings*. Catalog 1262. A catalog and manual pipe and boiler coverings, cements, etc. Contains a number of valuable diagrams and tables. 71 pp. Ill. 6×9 in.

PLUMBING EQUIPMENT—See also Drains

Bridgeport Brass Co., Bridgeport, Conn.

461. *Plumbing Supplies*. Catalog of adjustable swivel traps; basin and bath supplies and waste; basin and sink plugs; low tank bends; iron pipe sizes of brass pipe. 20 pp. Ill. $8 \times 10\frac{1}{2}$ in.

Crane Company, 836 So. Michigan Ave., Chicago, Ill.

240. *General Plumbing Catalogue*. A very complete and well illustrated booklet describing the complete line of Crane plumbing goods. 80 pp. $8\frac{1}{2} \times 11$ in.

Philip Haas Company, Dayton, Ohio.

524. *Catalog B*. This catalog contains a complete description of the full line of waterclosets made by this company, together with illustrations of combinations for every type or class of service. Wall hanging closets are an innovation here fully described. A feature of interest to designers is the series of roughing in plates with dimensions. 91 pp. Ill. $6\frac{1}{2} \times 9\frac{1}{2}$ in.

Jenkins Bros., 80 White St., New York, N. Y.

236. *Jenkins Valves for Plumbing Service*. This booklet contains all necessary information about Jenkins Valves commonly used in plumbing work. 16 pp. Ill. $4\frac{1}{4} \times 7\frac{1}{4}$ in. Stiff paper cover.

Kohler Company, Kohler, Wisconsin.

209. *"Kohler of Kohler."* A booklet on enameled plumbing ware describing processes of manufacture and cataloging staple baths, lavatories, kitchen sinks, slop sinks, laundry trays, closet combinations. 48 pp. Ill. $5\frac{1}{2} \times 8$ in. Roughing-in Measurement Sheets 5×8 in.

531. *Catalog F*. This is a complete catalog of Kohler enameled ware for plumbing installations, together with high grade fittings. There is also a brief and interesting description of the manufacture of high grade enameled ware and a statement of the facts about Kohler village one of the discussed experiments in modern industrial town building. 215 pp. cloth bound. Ill. $7\frac{1}{2} \times 10\frac{1}{2}$ in.

The Vulcan Brass Manufacturing Co., Cleveland, Ohio.

214. *Paragon Ball Bearing Self Closing Faucets, Bibbs and Stops—Catalog B*. Illustrated book showing sectional drawings, illustrations and text describing "Paragon" self-closing work, high pressure ball cocks, parts and valves.

678. *Paragon Brass Goods, Catalog C*. New catalog showing sectional drawings, illustrations and text describing exclusive feature of "Paragon" self closing basin and sink faucets and stops; high pressure ball cocks, vitreous china bubblers, compression and quick-compression work. 60 pp. Ill. $7\frac{1}{2} \times 10\frac{1}{2}$ in.

PUMPS

The Dayton Pump and Manufacturing Company, Dayton, Ohio.

475. *Electric House Pumps and Water Supply Systems*. A heavy paper binder containing illustrated bulletins $8\frac{1}{2} \times 11$ in. These bulletins describe pumps as well as complete automatic electric and gasoline water supply systems and all accessories, together with specifications, detail drawings and tables of dimensions. 43 pp.

The Goulds Mfg. Co., Seneca Falls, N. Y.

387. *Power Pump Bulletins*. There are 22 of these bulletins treating on piston, plunger, air pressure, vacuum, triplex and centrifugal pumps. Bulletin 112 and Bulletin 122 containing the theory of pumps together with power pump data are of especial value to engineers in the offices of architects. 16 to 36 pp. Ill. 8×10 in.

Leader-Trahern Co., Decatur, Illinois.

626. *The Pumping Engineer*. Booklets containing engineering data, specifications, details and dimensions of hand power, gasoline engine or electric motor driven pumps for water systems with hydro-pneumatic tanks; force, milk and special pumps with complete line of accessories. 170 pp. Ill. 4×7 in.

REFRIGERATION

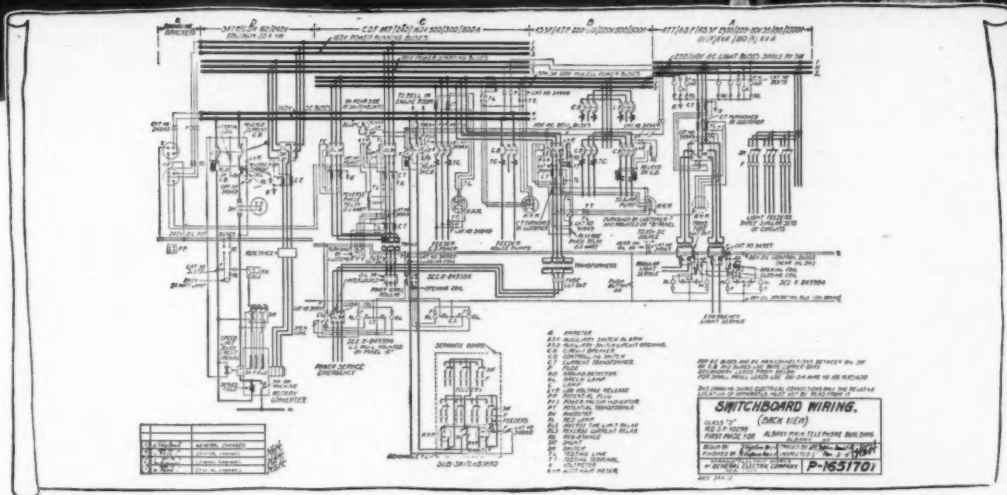
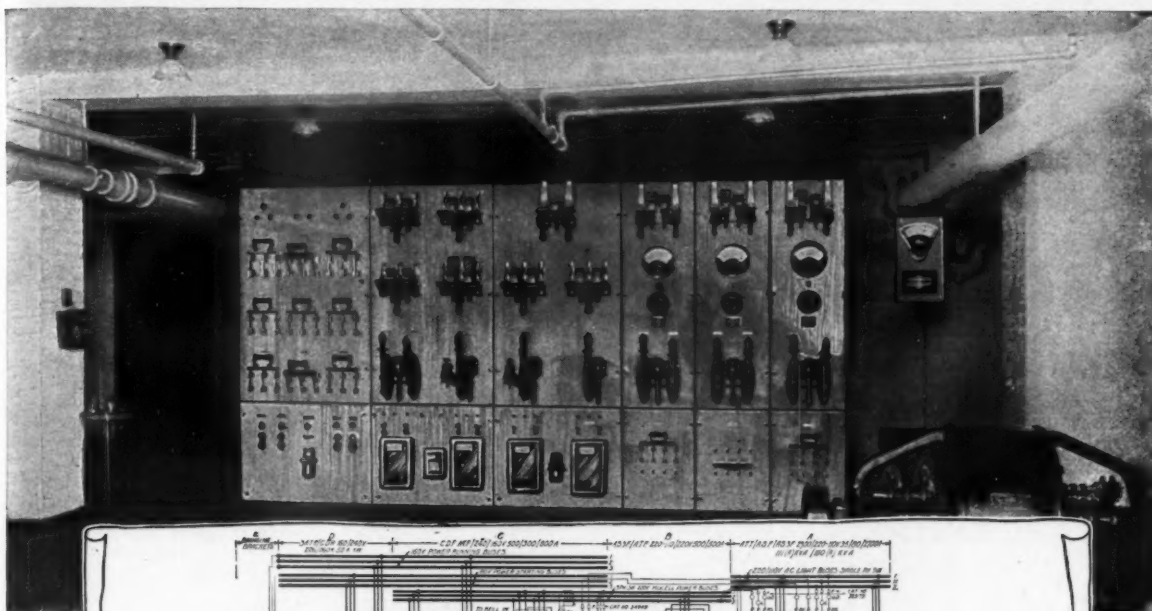
The Automatic Refrigerating Co., Hartford, Conn.

209. *The Mechanics of Automatic Refrigeration and Automatic Refrigeration for Hospitals and Sanatoriums*. Two essential booklets for the library of designers and specification writers. 24 and 28 pp. Ill. $8\frac{1}{2} \times 11$ in.

370. *Automatic Refrigeration for Retail Markets*. A valuable treatise on the subject matter mentioned in the title. 30 pp. Ill. $8\frac{1}{2} \times 11$ in.

Baker Ice Machine Co., Inc., Omaha, Nebraska.

661. *Baker System Refrigeration*. A catalog explaining the application of refrigeration for hotels, hospitals, institutions and restaurants requiring up to 60 ton daily capacity including mechanical details and specifications. 20 pp. Ill. 9×12 in.



New York Telephone Co. Building, Albany, N. Y.
Architects—McKenzie, Voorhees & Gmelin
Consulting Engineers—Meyer, Strong & Jones

Switchboards in Architecture



This is the second part of a story of the building of quality switchboards. We shall later explain the fabrication of marble and slate. May we be permitted to suggest that you give this a place in your file No. 31c2?

General Electric Company
Schenectady, N. Y.

Structural limitations of buildings necessitate a comprehensive engineering analysis of architectural and electrical requirements before an adequate switchboard can be planned. A thorough knowledge of all sources of current supply and current distribution is essential in switchboard design if efficiency of electrical control be harmonized with arrangement and appearance.

The wide experience of the General Electric Company particularly fits its switchboard engineers to offer architects the requisite talent to design switchboards with the proper appreciation of every stipulated electrical condition and of the many essential necessities familiar to modern building structures. And the clean cut wiring diagram furnished with the switchboard to assist in making the proper electrical connections may be retained as a permanent record of the solution of the problems involved.

GENERAL ELECTRIC

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REFERENCE LIST OF BUSINESS LITERATURE—Continued

REFRIGERATION

- Jamison Cold Storage Door Co.**, Hagerstown, Md.
 569. *Heavy Duty Cold Storage Doors. Catalog No. 10.* Complete description of both hinged and sliding cold storage doors for every equipment. Also description of cold storage windows and ice chutes. 79 pp. Ill. 5 1/4 x 9 in.

REFRIGERATORS

- The Jewett Refrigerator Company**, 27 Chandler Street, Buffalo, N. Y.
 231. *Refrigeration and Health. Vital Facts You Ought to Know.* A booklet outlining the basic requirements of a good refrigerator and explaining how to use a refrigerator to secure best results. 16 pp. Ill. 4 1/4 x 7 1/4 in.
 655. *Manual of Refrigerators.* This manual completely describes the construction of refrigerators for use in hotels, clubs, hospitals, institutions and residences, with specifications. Numerous plans showing size and arrangement of refrigerators in kitchens, service and lunch rooms are included. 30 pp. Ill. 8 1/2 x 11 in.
McCray Refrigerator Co., Kendallville, Ind.
 472. *Refrigerators and Cooling Rooms. Cat. 33.* A catalog of cooling equipment for hotels, restaurants, hospitals, institutions, colleges and clubs. Catalog No. 96 deals with refrigerators for residences. 52 pp. each. Ill. in colors. 7 1/2 x 10 in.

REINFORCING STEEL—See also Concrete, Reinforced

- Rail Steel Products Association**, Reinforcing Bar Division, Arcade Bldg., St. Louis, Mo.
 582. *Rail Steel for Concrete Reinforcing.* A book describing the manufacturing, fabrication and physical properties of rolled, billet and rail steel bars with specifications for their use. 84 pp. Ill. 8 1/2 x 11 in.

RESTAURANT EQUIPMENT—See Kitchen Equipment

ROOFING—See also Slate—Metals—Shingles

- American Brass Company**, Main Office, Waterbury, Conn.
 515. *Copper Roofing. Service Sheet.* This service sheet contains details for laying copper roofing together with standard specifications. 17 x 22 in. folding to 8 1/2 x 11 in. printed both sides.
American Sheet & Tin Plate Co., Frick Building, Pittsburgh, Pa.
 403. *Copper—its Effect Upon Steel for Roofing Tin.* Describes the merits of high grade roofing tin plates and the advantages of the copper-steel alloy. 28 pp. Ill. 8 1/2 x 11 in.
Asbestos Shingle, Slate & Roofing Co., Ambler, Pa.
 53. *Ambler Asbestos Corrugated Roofing.* Catalog gives complete data for specifying, drawings, methods of application, tables, etc. Size 8 1/2 x 11 in. 20 pp.
The Barber Asphalt Company, Land Title Bldg., Philadelphia, Pa.
 422. *Standard Trinidad Built-Up Roofing Specifications.* Contains two specifications for applying a built-up roof over boards and two for applying over concrete. Gives quantities of materials and useful data. 8 pp. 8 x 10 1/2 in. Ask at same time for Good Roof Guide Book. 32 pp. Ill. 6 x 9 in.
The Philip Carey Co., Lockland, Cincinnati, Ohio.
 378. *Architects' Specification Book on Built-Up Roofing.* A manual for detailers and specification writers. Contains complete details and specifications for each type of Carey Asphalt Built-Up Roof. 20 pp. Ill. 8 1/2 x 11 in.
The Copper and Brass Research Association, 25 Broadway, New York, N. Y.
 408. *Copper Roofing.* Weights of various roofing materials. Up-to-date practice in the laying of copper roofs—Batten or wood rib method. Standing seam method, flat copper roofs. Copper shingles. Suggestions for avoiding error and obtaining the full value of copper. Decorative effects and how to obtain them. Flashings, reglets, gutters and leaders. Cornices. Copper-covered walls. Specifications. 32 pp. Ill. 8 1/2 x 11 in.
The Edwards Manufacturing Company, Cincinnati, Ohio.
 535. *Shingles and Spanish Tile of Copper.* This book, illustrated in colors, describes the forms, sizes, weights and methods of application of roof coverings, gutters, downspouts, etc., of copper. 16 pp. Ill. in special indexed folder for letter size vertical files.
Ludowici-Celadon Co., Chicago, Ill.
 120. *Roofing Tile.* A detailed Reference for Architects' Use. Sheets of detailed construction drawings to scale of tile sections of various types and dimensions, giving notes of their uses and positions for various conditions of architectural necessity. Size 9 1/2 x 13 1/2 in. 106 plates.
 154. *The Roof Beautiful.* Booklet. Well illustrated with photographs and drawings, giving history and origin of roofing tile, and advantages over other forms of roofing. Types shown by detailed illustrations. Size 8 x 10 1/4 in. 32 pp.
The Richardson Company, Lockland, Cincinnati, Ohio.
 492. *Vitahut Membrane Roofs.* Contains specifications for applying Membrane roof over boards and also for applying over concrete. Illustrated with line drawings of several approved methods of flashings. 3 pp. 8 1/2 x 11 in.

Rising and Nelson Slate Company, 101 Park Ave., New York, N. Y.

496. *Tudor Stone Roofs.* This leaflet discusses colors and sizes of Tudor hand-wrought slates; deals with the service given to architects and tells how the material is quarried for each product after careful drawings and specifications are prepared in co-operation with architects. Special grades are described in detail and illustrations are given of buildings with Tudor slate roofs. Contains also specifications of laying slate. 4 pp. Ill. 8 1/2 x 11 in.
 571. *Tudor Stone Roofs.* A brochure describing the 7 special grades of Tudor Stone and the 7 grades of commercial slate produced by this company with illustrations of many structures on which it has been used. 28 pp. Ill. 6 x 9 1/2 in.
Vendor Slate Co., Easton, Pa.
 333. Occasional brochures on architecturally pertinent phases of roofing slate sent on request. See also listing under Slate.

ROOF CONSTRUCTION

- Forete Mfg. Co.**, 2 Verona Ave., Newark, N. J.
 258. *Forete Roof Decks.* An illustrated circular describing Forete (a new light-weight concrete) for use in fireproof roofs for all buildings. 4 pp.

ROOF-LIGHTS—See Glass Construction

SANDSTONE—See Stone

SAFES

- Art Metal Construction Company, Inc.**, Jamestown, New York.
 544. *Measured Protection.* A catalog of steel safes for all office purposes, tested by Underwriters' Laboratories and bearing the Underwriter label. 32 pp. Ill. 8 1/2 x 11 in.

SASH—See Doors and Windows

SCREENS

- American Wire Fabrics Company**, 208 So. La Salle St., Chicago, Illinois.
 305. *Catalog of Screen Wire Cloth.* A catalog and price list of screen wire cloth, black enamelled, galvanized, aluminoid, copper, bronze. 30 pp. Ill. 3 1/2 x 6 1/4 in.
The Higgin Manufacturing Co., 5th and Washington Ave., Newport, Ky.
 353. *Screen your Home in the Higgin Way.* A description of Higgin door and window screens with practical data. 16 pp. Ill. 8 1/2 x 11 1/2 in.
New Jersey Wire Cloth Company, 614 South Broad St., Trenton, N. J.
 409. *A Matter of Health and Comfort. Booklet No. 2331.* A booklet telling all about screens, the durability of copper and its superiority over all other metals for screen purposes. 16 pp. Ill. 5 x 7 1/4 in.

SASH CHAIN AND CORD

- Samson Cordage Works**, Boston, Mass.
 586. *Samson Sash Cord.* Specifications and condensed descriptions of Samson spot window sash cord, Samson mahogany wire center sash cord and accessories. 24 pp. Ill. 3 1/2 x 6 1/4 in.

SHINGLES—See also Roofing

- The Philip Carey Co.**, Lockland, Cincinnati, Ohio.
 381. *Carey Asphalt Slate Shingles.* Folder containing illustrations of attractive buildings and residences on which Carey Asphalt Slate Shingles have been used. Describes this type of shingle, showing its special claims and advantages.

SIDEWALK LIGHTS—See also Vault Lights

SLATE—See also Roofing

- Vendor Slate Co., Inc.**, Easton, Pa.
 332. *The Vendor Book of Roofing Slate for Architects.* Contains original information on slate in various architectural uses; history, geology, sundry practical matters; complete descriptive classification; extended treatise on architectural roof design and specifications. 24 pp. Ill. 8 1/2 x 11 in.

STAINS—See also Paints, Stains, Varnishes

STAIRWAYS—MOVABLE

- The Bessler Movable Stairway Co.**, Akron, Ohio.
 541. *The Modern Way Up.* A book describing a stairway that helps utilize attic space. 1. folds up in the ceiling and is concealed when not in use. Letters are given from contented users. 24 pp. Ill. 4 3/4 x 7 3/4 in.

STEEL JOIST CONSTRUCTION

- Truscon Steel Co.**, Youngstown, Ohio.
 641. *Truscon Steel Joist Data Book.* Complete data of steel joists giving properties, dimensions, safe loads, coefficients of deflection, details of connections, specifications, directions for installations. 32 pp. Ill. 8 1/2 x 11 in.

STONE

- The Appalachian Marble Company**, Knoxville, Tenn.
 503. *Appalachian Tennessee Marble.* A new booklet on the qualities to be demanded in marble and a treatise on Tennessee marble by T. Nelson Dale (Retired Geologist, U.S.G.S.). Contains also illustrations of the plant of the company, buildings in which Appalachian Tennessee Marble has been used and four-color process plates of the six major Appalachian marbles. In tough paper indexed cover. 12 pp. Ill. 8 1/2 x 11 in.

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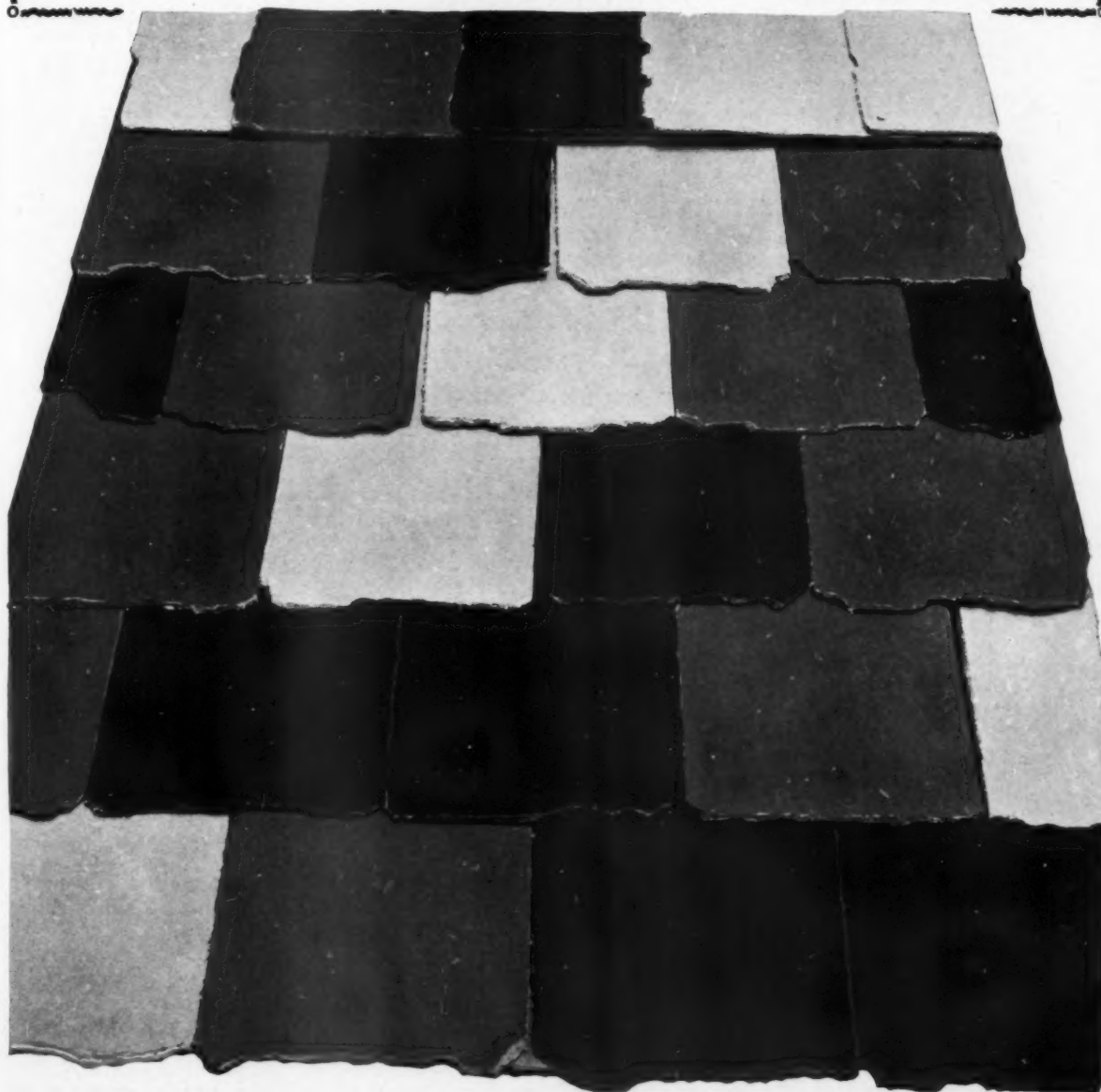
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STONE

Indiana Limestone Quarrymen's Assn., P. O. Box 503, Bedford, Ind.

37. *Indiana Limestone.* Illustrated booklet. Vol. I, of the Limestone Library. Size 6 x 9 in. 36 pp.

205. *Folders, Series D.* Structural detail and data sheets showing methods of detailing cut stone work in connection with modern building construction. 4 pp. each. 8½ x 11 in.

300. *Standard Specifications for Cut Stone Work.* This is Vol. III, Series "A-3," Service publications on Indiana Limestone, containing Specifications and Supplementary Data, relating to best methods of specifying and using this stone for all building purposes. This valuable work is not for general distribution. It can be obtained only from a Field Representative of the Association or through direct request from architect written on his letterhead. 56 pp. Ill. 8½ x 11 in.

National Building Granite Quarries Asso., Inc., 31 State Street, Boston, Mass.

410. *Architectural Granite No. 1 of the Granite Series.* This booklet contains descriptions of various granites used for building purposes; surface finishes and how obtained; profiles of moldings and how to estimate cost; typical details; complete specifications and 19 plates in colors of granite from various quarries. 16 pp. Ill. 8½ x 11 in.

STORE FRONTS

Detroit Show Case Co., Detroit, Mich.

77. *Designs.* A booklet. Store fronts and display window designs, giving plans and elevations, and descriptions. Size 9¼ x 12 in. 16 pp.

78. *Details.* Sheets of full size details of "Desco" awning transom bar covers, sill covers, side, head and jamb covers, ventilated hollow metal sash and profile of members. Size 16 x 21¼ in. 3 sheets.

The Kawneer Company, Niles, Mich.

407. *A Collection of Successful Store Front Designs.* Illustrations of recently erected modern store fronts with all framing covered with solid copper. Maximum show window surface secured by these designs. Many classes of occupancy shown. 64 pp. Ill. 6¼ x 9¼ in.

530. *Catalog L, 1922-1923 Edition.* Details of solid copper store fronts construction. This is a treatise on the installation of copper store fronts and contains sectional and detail views of Kawneer sash, corner and division bars, jambs, sill and transom bar coverings and other members. Intended for the detailer. 32 pp. Ill. 8½ x 11 in.

STOVES

National Stove Co., Division of American Stove Co., Lorain, Ohio.

506. *Catalog No. 94, Second Edition.* A catalog of Direct Action Gas Ranges equipped with Lorain Oven Heat Regulator; also cookers, laundry stoves, hot plates, kitchen heaters and waste burners, automatic water heaters, coil heaters, ovens, etc.

Quick Meal Stove Co., Division of American Stove Co., St. Louis, Mo.

505. *Catalog No. 131.* A catalog of gas (also combination coal and gas) cook stoves; gas boilers, soldering furnaces, cake bakers, hot plates, water heaters, gas heaters for rooms. Lorain Oven Heat Regulator, etc. 56 pp. 6 x 9 in.

STUCCO—See also Cement

Portland Cement Association, 347 Madison Ave., N. Y. C.

504. *Portland Cement Stucco.* Illustrated leaflet of recommended practice for Portland Cement Stucco. Contains data on materials, proportions, application and curing. Table of colors for various tints, photographs of surface textures and drawings of construction details also given. 15 pp. Ill. 8½ x 11 in.

STUCCO BASE

The Bishopric Manufacturing Company, Cincinnati, Ohio.

451. *Bishopric for All Time and Climate.* A booklet describing Bishopric materials; giving building data, detailed drawings and specifications. Illustrated with half tones from photographs of houses built of Bishopric materials. 52 pp. Ill. 8 x 10½ in.

TELEPHONES

Automatic Electric Co., 945 W. Van Buren St., Chicago, Ill.

083. *Architect's Specifications for Interior Telephone System.* A complete and short specification for the installation of interior telephone systems adapted to all kinds of buildings and uses. 4 pp. 8½ x 11 in.

084. *The Straight Line.* A booklet devoted to interior communication by use of private automatic exchanges and the P-A-X Code Calls. Description of switchboards, instruments and accessories. 38 pp. Ill. 5 x 8 in.

Stromberg-Carlson Telephone Mfg. Co., Rochester, New York.

304. *Inter-Communicating Telephone Systems.* Bulletin No. 1017. A pamphlet giving just the information required for the installation of intercommunicating systems from 2 to 32 stations capacity. 15 pp. Ill. 7¼ x 10 in.

TERRA COTTA

Atlantic Terra Cotta Company, 350 Madison Avenue, New York, N. Y.

425. *Questions Answered.* A brief but full description of Atlantic Terra Cotta and its use in buildings. 22 pp. Ill. 5¼ x 7 in.

National Terra Cotta Society, 19 West 44th St., New York City.

004. *Standard Specifications.* Contains complete detailed specifications for the manufacture, furnishing and setting of terra cotta, a glossary of terms relating to terra cotta and a short form specification for incorporating in architect's specification. 12 pp. 8½ x 11 in.

006. *Color in Architecture.* An illustrated treatise upon the principles of color design and appropriate technique. 38 pages. Ill. 8½ x 11 in.

007. *Present Day Schools.* Illustrating 42 examples of school building architecture with an article on school house design by James O. Betelle, A. I. A. 32 pp. Ill. 8½ x 11 in.

008. *Better Banks.* Illustrating many banking buildings in terra cotta with an article on its use in bank design by Alfred C. Bossom, architect. 32 pp. Ill. 8½ x 11 in.

The Northwestern Terra Cotta Co., 2525 Clybourn Ave., Chicago, Ill.

00. *Architectural Terra Cotta.* A collected set of advertisements in a book, giving examples of architectural terra cotta, ornamental designs and illustrations of examples of façades, of moving-picture houses, office buildings, shops, vestibules and corridors in which Northwestern Terra Cotta was used. Size 8½ x 11 in. 78 pp.

TILE—ORNAMENTAL

The Associated Tile Manufacturers, Beaver Falls, Pa.

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TOILET PARTITIONS—See Wainscoting

TRIM—See also Doors and Windows

TRUSSES—See Building Construction

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VAULT LIGHTS

American Three Way Luxfer Prism Co., 13th Street and 55th Court, Chicago, Ill.

424. *Daylighting. Catalog 21.* A complete catalog on glass prisms for use in transoms, sidewalk and floor lights, skylights, etc., for lighting places inaccessible to direct daylight. Contains also measurements, specifications and other data required by designers. 42 pp. Ill. 8½ x 11 in.

VENTILATION—See Heating and Ventilation

VENTILATORS

The Burt Manufacturing Co., Akron, Ohio.

207. *General Catalogue* covering entire line of Ventilators, Exhaust Heads and Filters. Separate leaflets on each type of ventilator, vent and damper.

525. *The Great Outdoors Brought Inside.* In this book is a description of the new rectangular combination skylight and ventilator; the Burt fan ventilator for removing odors, fumes, etc., when atmospheric conditions interfere with the gravity process; and a table giving prices, dimensions, weights and gauges of iron of the Burt Ventilator. Some good general information about ventilators is included. 16 pp. Ill. 3¼ x 6¼ in.

WAINSCOTING

The Vitrolite Company, Chamber of Commerce Building, Chicago, Ill.

048. *Toilet Partitions and Wainscoting.* *Architects Tile Bulletin* No. 7. Describing the uses of Vitrolite, its physical properties, details of installation and specifications. 32 pp. Ill. 8½ x 11 in.

WALL COVERING—See also Linerusta-Walton

Standard Textile Products Co., 320 Broadway, New York, N. Y.

111. *Sanitas, Modern Wall Covering.* Folio. Plates of color renderings of various interiors, with suggestions for the library, living room, dining room, boudoir, kitchen and church wall covering, using Sanitas. Size 11½ x 6 in. 15 plates.

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114. *Hints to Decorators.* Booklet. Instructions and specifications for the application of Sanitas, with notes on finishes and material. Size 5 x 6¼ in. 20 pp.

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Rund Manufacturing Co., Pittsburgh, Pa.

507. *Rund Gas Water Heaters.* Bulletins in filing folder describing instantaneous automatic water heaters for small homes and special uses, multi-coil automatic storage systems, automatic storage systems and tank water heaters. Details for connections, hot water service and specifications. 19 pp. Ill. $8\frac{1}{2} \times 11$ in.

589. *Rund Automatic Storage Systems.* Catalog of automatic hot water storage systems for domestic, industrial and commercial uses. Details, capacities, dimensions and other data. 24 pp. Ill. 6×9 in.

590. *Rund Multi-Copper-Coil Automatic Storage Systems.* Catalog describing automatic hot water storage systems of large capacity for large residences, apartment buildings, hotels, hospitals, gymnasiums and factories. Details, capacities and dimensions for complete line. 32 pp. Ill. 6×9 in.

WATERPROOFING—See also Dampproofing

The General Fireproofing Co., Youngstown, Ohio.

646. *The Waterproofing Handbook* (Sixth Edition). A revised edition of this valuable book treating of sub-structure and super-structure waterproofing, cement and wood floor preservatives, technical paints and coatings and GF waterproofings, preservatives and their uses. 72 pp. Ill. $8\frac{1}{2} \times 11$ in.

WATER PURIFICATION

The H. U. V. Company, Inc., 165 Broadway, New York.

606. *Ultra Violet Ray Sterilization.* Bulletins treating of water sterilization for homes, hotels, office buildings, hospitals, schools, industrial plants, breweries, ice plants, swimming pools, water works and other places. Ill.

WATER SOFTENERS

The Permutit Company, 440 Fourth Ave., New York.

105. *Permutit (Water Rectification Systems.)* Illustrated booklet. Describes all methods of softening water, including the original Zeolite process. For homes, hotels, apartment houses, swimming pools, laundries and industrial plants. Size $8\frac{1}{2} \times 11$ in. 32 pp.

Wayne Tank and Pump Company, Fort Wayne, Ind.

482. *Bulletin No. 1600.* This bulletin treats of the value of soft water in the house and describes the Wayne Domestic Water Softening System. 6 pp. Ill. $8\frac{1}{4} \times 10\frac{1}{2}$ in.

WATER SUPPLY—See Pumps

WEATHER STRIPS

The Diamond Metal Weather Strip Co., Columbus, Ohio.

616. *The Diamond Way.* A catalog of full size details showing the application of Diamond metal weather strips to double hung and casement windows and doors with complete specifications. 34 pp. Ill. $8\frac{1}{2} \times 11$ in.

The Higgin Manufacturing Co., 5th and Washington Ave., Newport, Ky.

354. *Higgin Metal Weather Strips.* A booklet of considerable value to architects and builders on the use of weather strips. Ask also for the companion book on "The Reason Why." Each booklet 12 pp. Ill. 6×9 in.

Monarch Metal Products Co., 5020 Penrose Street, St. Louis, Mo.

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WINDOWS—See Doors and Windows

WIRE AND CABLE—See Electric Wire and Cable

WOODWORK—See also Doors and Windows—Lumber

Curtis Companies Service Bureau, Clinton, Iowa.

663. *Keeping Down the Cost of Your Woodwork.* A book illustrating Curtis interior woodwork and built-in cabinets and fixtures designed by Trowbridge and Ackerman, Architects, New York. Colored illustrations and details. 16 pp. Ill. $7 \times 9\frac{1}{4}$ in.

Hartmann-Sanders Company, 6 East 39th St., New York, N. Y.

334. *Catalog No. 47.* Illustrating Kell's Patent Lock Joint wood stave columns for exterior and interior use. 48 pp. Ill. $7\frac{1}{2} \times 10$ in.

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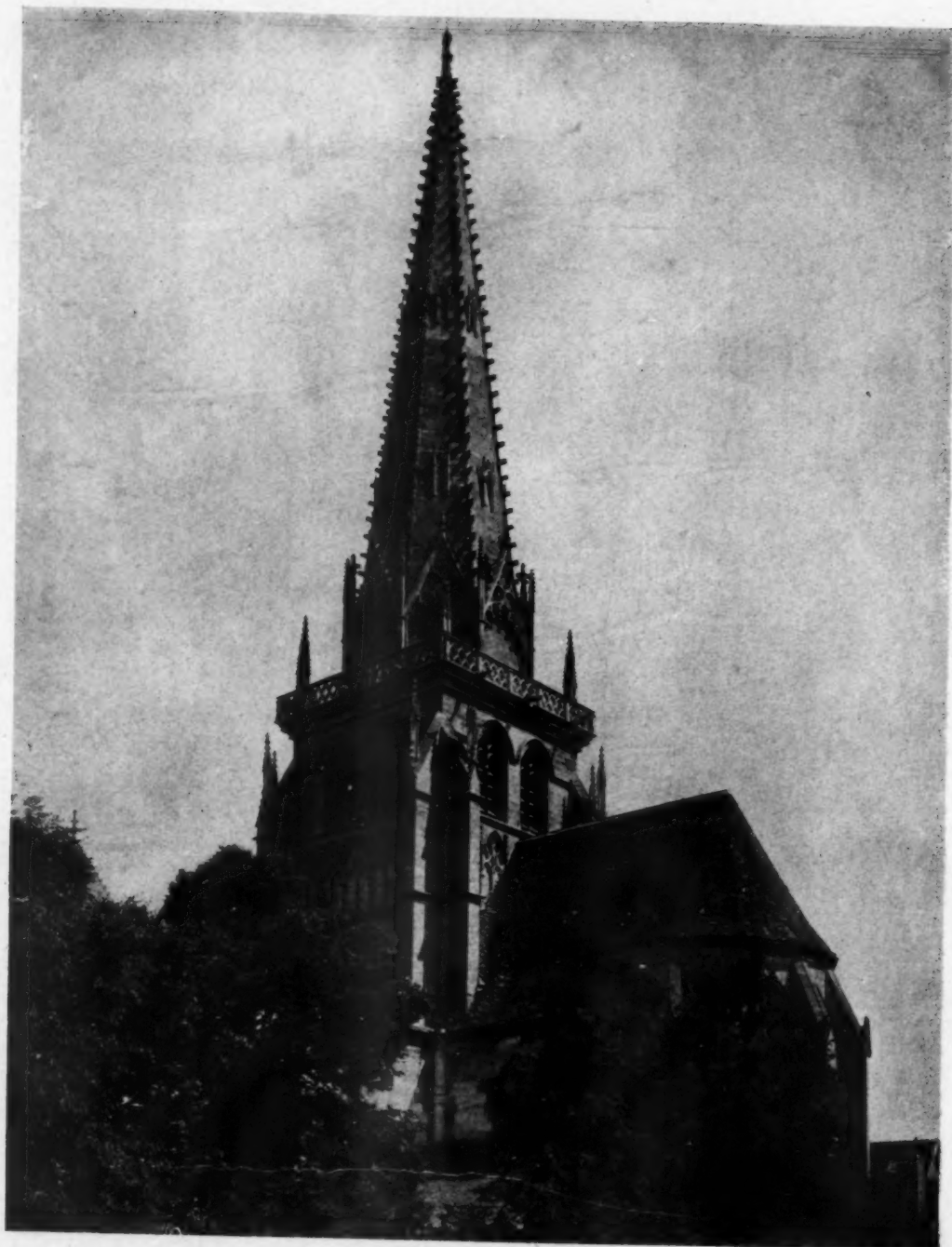
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