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DECEMBER 1927

LIBRARY AND MUSEUM REFERENCE NUMBER
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LETTERPRESS

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From a Drawing by Will Griffis

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A Trend in Museum Design
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Modern Museum Design
Mayric R. Rogers

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EXCAVATIONS IN ATHENS

URING October a number of New York newspapers made announcement of an undertaking of considerable interest and importance to American archaeologists. Thus The New York Times: "Acting on behalf of an anonymous American philanthropist, Colonel Arthur Woods, former Police Commissioner of New York, has, it was learned recently, furnished funds to the American School for Classical Studies at Athens to begin in the heart of classic Athens the most ambitious and costly archaeological enterprise ever undertaken.

"The American School for Archæological Studies at Athens has obtained from the Greek government concessions, which are now under examination by lawyers in this city, granting the right to dig up the 25-acre site of the Agora, or market place, which was in ancient times covered with temples, libraries and other public edifices and full of artistic treasures described by classic writers. Great buildings were erected there by Greek and non-Greek rulers, from Pericles to Hadrian. The project to dig this most promising of all sites of antiquity has been agitated for a century and is now for the first time nearing realization. Professor Edward Capps of Princeton University, who conducted the negotiations with the Greek government which resulted in the concessions, has been planning to raise $2,500,000 to carry out the project, in a 20-year period or longer, by calling for financial help from all the great universities of the country and from previous liberal supporters of American archæological work in Greece, including John D. Rockefeller, Jr., J. P. Morgan, Thomas L. Chadbourne, the Carnegie Corporation, and others."

A FOURTH ANNUAL SALON

A T the Marshall Field Picture Galleries, Chicago, there will be held from January 28 to February 15, 1928 the fourth annual exhibition sponsored by the "Hoosier Salon." The exhibition will be open to the work of "any artist born in Indiana, any artist who has lived in Indiana for a period of five years or more, or who is identified with a group of Indiana artists and who returns to that state for periodical sketching trips." A number of cash prizes have been offered, and the Indiana Limestone Company offers a prize of $200 for "the best piece of carved limestone which shows creative design and which can be embodied in an architectural design either exterior or interior." The Executive Secretary, in charge of the arrangement of the exhibition, to whom application for entries should be made, is Mrs. C. B. King, 113 North Homan Boulevard, Chicago.

GERMAN BRICKWORK

EARLY in November there was opened in New York an exhibition of photographs illustrating the skillful use of brick which has long been made in Germany. The photographs are of brickwork of both the mediaeval and the modern periods, and give an excellent idea of the possibilities inherent in a material which has done so much to render German architecture interesting and distinguished. Later on these photographs, which form a "traveling exhibit," are to be placed on view in Cleveland and Detroit, and possibly in Boston, Hartford, Philadelphia, St. Louis, Cincinnati, St. Paul, Denver, San Francisco, Los Angeles, and probably in other cities, eventually becoming part of the working equipment of some American school of architecture, which will be selected later.

A RECENT SYMPOSIUM ON CHURCH ARCHITECTURE

THE Conference of Church Bureaus and Departments of Architecture and the Home Missions Council of the Protestant Churches held lately in Chicago a two-day's conference on church architecture. The conference was attended by a considerable number of architects, clergymen, denominational officers and others. Addresses were given by Professor Watson of the University of Illinois on acoustics, and by Dr. Von Ogdin Vogt on art and religion. Other addresses were on church organs, stained glass, financial methods, promoting building campaigns, etc. The addresses were followed by discussion, and an interesting letter from Ralph Adams Cram on architectural education was read. Stereopticon views of many modern churches and floor plans were shown during the two-days' session.

The matter of securing well trained architects who are intelligent as to the architectural history of the Christian Church and who are sympathetic with the ideals and objectives of the Church was discussed at length, the churchmen claiming that the architectural colleges are giving little recognition to the needs of the modern Protestant Church, though some give attention to problems of chapels for millionaires' estates, circular or octagon chapels, and synagogues. The situation was rather sharply criticised in view of the apparent utter lack of sympathy on the part of the colleges with the Gothic, and also from the fact that one Protestant body alone spent $20,000,000 on new church construction in 1926. The obtuseness of church committees came in for a good share of criticism by the churchmen, it being claimed that the taste of the people is improving, and that the churches realize better what they need to provide for.
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FROM AN ETCHING BY CHILDE HASSAM
LIBRARIES are not exempt from the operation of the universal law of evolution, under which organisms develop from the simple to the complex. Fifty years ago a library was a book dormitory, where the librarian slept with his tomes, seldom disturbed by the public; today it is a center of multifarious activities. In earlier days a person would go miles for a book; today it must be within effortless reach. The modern librarian advertises his wares like a merchant and strives to excel other libraries in the registration of readers and in book circulation. The degree of service depends largely upon location, the size of the community, and upon the abilities of those in control, seconded by a properly arranged building, planned to accommodate readers and books economically and yet attractively.

Site. To facilitate such service the library should be easily accessible to the expected clientele. In a small town, where one building suffices, it may well be placed on a side street near the shopping center. A large city requires branch libraries to bring the books within reach of every home. The lot should admit of having ample light and air. A site sloping from front to rear benefits the basement and facilitates service. Many factors control the choice of a site, but the matter of cost usually dominates. The bibliophile or dilettante might prefer a shaded and befountained park, but business men, on the average library board, visualize the world through their pocket-books, and the economical site generally wins!

Determination of Size. The site determined, it is necessary to calculate the dimensions and proportions of the building. The architect should study the librarian's requirements and convert the data furnished into a proper solution of the problem, to do which requires time and experience. He should estimate the size of building possible for the appropriation or, vice versa, compute the amount of money necessary to construct and equip a suitable building, a structure appropriate to its surroundings.

The design of a library involves the hygienic accommodation of the greatest number of readers; the housing of the maximum number of books; and the architectural expression of the building's purpose. With a given appropriation, it is necessary first to estimate the size and quality of the structure before developing the plans. Building costs vary in different sections of the country, but an average, which will include all items, may be struck on this basis:

<table>
<thead>
<tr>
<th>Item</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>General construction, exclusive of metal stacks</td>
<td>57%</td>
</tr>
<tr>
<td>Plumbing, heating, electric wiring and fixtures</td>
<td>13%</td>
</tr>
<tr>
<td>Metal stacks, wood shelving and equipment</td>
<td>70%</td>
</tr>
<tr>
<td>Architect's fees and allowance for contingencies</td>
<td>20%</td>
</tr>
<tr>
<td></td>
<td>10%</td>
</tr>
</tbody>
</table>

Assuming an appropriation of $300,000, 70 per cent would be $210,000. Dividing this by cubic foot cost of say 50 cents, gives 420,000 as the cubic foot limitation. The height of the building, to include basement and two stories, would approximate 42 feet, which divided into 420,000 yields 10,000 square feet as the ground area of the structure. With the appropriation of $300,000 we should endeavor to house 300,000 volumes and to accommodate 300 readers simultaneously seated, allowing 30 square feet per chair, which would require 9,000 square feet total floor area in the various reading, reference, children's periodical, club and similar rooms. The 300,000 volumes may be apportioned 250,000 to the stacks and 50,000 to shelving throughout the various reading rooms. Five stories (each of 7½ feet) of stacks may be contained in the height of the building, allotting to each story one-fifth of the 250,000 volumes or 50,000, which divided by 20, the average number of volumes per square foot of stack space, seven shelves high, gives as a resultant, 2,500 square feet as the ground area probably necessary for the stacks.

Rather than carry the stacks vertically through the building, it is better, where possible, to arrange two or three tiers of stacks below the first floor. For two such stories the 250,000 volumes would require 6,250 square feet, and for three stories, 4,166 square feet. This arrangement has given satisfaction in the libraries at Wilmington, Del., and Highland Park, Detroit; (Plates 105 and 98) in the Knight Memorial at Providence (page 501), and elsewhere. Such
stacks can be kept in the darker central part of the basement (which is better for books than sunlight), thus giving the lighter portions of the basement to work rooms, for which good lighting is necessary.

Properly constructed stack spaces are readily warmed and ventilated, owing to the vertical slits at the bottom of each tier, whereby air circulation is engendered. In a large building, whose cost exceeds a million, it is possible to combine both arrangements of stacks, by extending them vertically through the central portion of the building so that the periphery of the structure on each story may be allotted to readers or workers. An economical library plan devotes minimum spaces to lobbies, corridors, stairways and such "circulation," and the maximum areas to the library proper. In some monumental library buildings one-half of the ground area is used for walls, halls, stairs, etc., but it should be possible to limit them to 20 per cent of the area, and yet do justice to their functions.

In the example under discussion, deducting 20 per cent from the 10,000 square feet, will leave 8,000 square feet, net area, in the basement and first story and (allowing for possible light wells) 6,500 square feet in the second story, or a grand total of 22,500 square feet. These areas may be apportioned among the library's departments, possibly on this basis:

<table>
<thead>
<tr>
<th>Department</th>
<th>Square Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Charging and delivery</td>
<td>1,000</td>
</tr>
<tr>
<td>The various reading rooms</td>
<td>9,000</td>
</tr>
<tr>
<td>Stack (area of two tiers in basement)</td>
<td>6,250</td>
</tr>
<tr>
<td>Catalog, work rooms and toilets</td>
<td>2,750</td>
</tr>
<tr>
<td>Librarian and staff rooms</td>
<td>2,000</td>
</tr>
<tr>
<td>Lecture room</td>
<td>1,500</td>
</tr>
</tbody>
</table>

22,500

The boiler and coal room might be below basement level, where in many instances they actually are.

Provision for Expansion. The size of a library building bears a natural relation to the population it is to serve. During the pre-war years, the Carnegie Corporation's donations were figured on a basis of $2 per capita, but with the increased costs of construction, $3 scarcely suffices, except for the simplest types. Where a new building replaces an older, there is usually an immediate increase in the patronage and within 10 to 15 years it becomes congested and requires expansion for both readers and books. It is well, therefore, to design the building so that it may be enlarged. Where such expansion has not been originally considered, it very frequently requires considerable ingenuity to secure a good result. The plan of the Saginaw Library accomplishes the purpose by changing location of the main entrance, which the corner lot made possible.

Admission, General Control, and Delivery Room. "Entrance at grade level" is a slogan with some librarians. It precludes, however, having a well-lighted basement. This presents the alternatives—less exertion for the readers or more light for the workers. If the lot slopes sharply, both are attained. A library building is a "free for all" club house with no social barriers. Casual pedestrians are allured by electrically lighted bulletins and by book exhibits in the front windows designed like shop fronts. In a small library the adult public should enter and leave by one main doorway, admitting them through a vestibule, to delivery room. A separate entrance for children may be desirable. The delivery counter, in a small library, should be near the entrance—ample space behind being more serviceable than excessive area in front; people enter singly or in small groups,
but congregate beyond the counter. The delivery room is the heart of a small library; its pulsations vitalize every part. To minimize the personnel required, the control must be centralized by locating the delivery (or charging) counter where it commands readers, book shelves, and entrances. Where crowds are served, it is advisable to have a restraining rail to keep the people in line by the counter.

In large libraries auxiliary desks in the different reading rooms are centers of information and control. A formation that radiates from the central counter, like staff officers surrounding their superior, is ideal for control and for economy of administration. The size and components of every delivery counter depend upon the librarian's requirements and vary too much to be detailed here. There are three main elements—registration; charging or loaning; and receiving. In large libraries three separate counters may be necessary. The delivery space is the center of movement and commotion; it should be so disposed as to offer the least annoyance to those using the reading rooms. An adjacent room wherein to shunt garrulous gossips is a desideratum.

The delivery room should be well lighted, and its location may necessitate skylighting, in which case "actinic" glass in the ceiling sash will exclude the heat without interfering with the light rays. In cool climates diffusing glass of various kinds may be used. Ample artificial illumination, well distributed, is essential. The room should appeal by appropriate decoration in form and color. It should contain display racks for new acquisitions and informing bulletin boards. Settles are not out of place, and from the room may extend "open" fiction shelves, forming alcoves where the public may browse, and take the selected books to the charging counter to be recorded.

**Circulation Department.** In a small library this department is combined with the delivery room. In a large library it may be segregated from the reading rooms and be provided with a special street entrance, as in the New York Public Library. The importance of a library is based largely on the number of books circulated annually. Librarians of different localities vie with one another in enlarging their respective "circulations,"—sometimes at a sacrifice of the quality of books distributed. The workers in this department have opportunities of encouraging the use of edifying books. Bacon said: "Books can never teach the use of books," so the librarian's knowledge may happily aid in directing the ignorant or uncertain readers to higher ideals.

**Reading Rooms.** The comfort, convenience and seclusion of the public are enhanced by the proper location, arrangement and design of the reading rooms. The collaboration of librarian and architect is here vitally necessary. The size and shape of any reading room can best be determined by plotting out the furniture. The tables should be spaced about 5 feet apart and the same distance from the walls of the room. The details are too varied to enlarge upon here, since the individual preference of the librarian and the requirements differ with every locality. But a fundamental condition, applicable to every case, is that of maintaining a reasonable pro-rata cost per reader accommodated. In our suppositional problem we have allowed 9,000 square feet for reading and ancillary rooms, to accommodate 300 readers at 30 square feet for each. The appropriation being $300,000 makes each of the 300 seatings represent $1,000 outlay, which is less than a third of the cost of the reader's seat in many large city libraries, built at considerable expense.
The selection of reading room chairs may make necessary a choice between beauty and strength,—two qualities that do not always combine. The “Windsor” type is attractive, but it seldom withstands hard usage; the most enduring seems to be a chair without arms, with wood saddle seat, and with back, seat and legs thoroughly framed together and reinforced. The tables should be built up five-ply,” with softwood cores veneered with the hardwood selected for the finish of the room,—preferably oak for service and for excellence of appearance.

Shelving. The book shelving should have a fixed bottom shelf, 4 to 6 inches above the floor level, with the other shelves carried on pins which fit holes in the uprights bored every inch apart in height to permit of adjustment for different sized books; a basis for total height is 11-inch centers between shelves, which will give from 6 feet, 10 inches to 7 feet for a total height of seven shelves including base and cornice. A depth of 8 inches suffices for the shelves excepting those for the larger volumes, certain reference books, encyclopedias, and technical works. The wall shelving requires no wood backing, but may set against the plaster, unless it conceal heating coils, in which case the shelving must be supplied with wood backs insulated with asbestos and sheet metal to shield any books from the heat. Shelving cannot be properly made by the ordinary mill but only by manufacturers accustomed to cabinet construction. This applies to the furniture and technical library equipment throughout. Other concomitants to the rooms under discussion are dictionary stands, atlas cases, filing cabinets for clippings and for photographs. For atlases and folios, tables with sloping tops are convenient. The floor covering of all readers’ room should be resilient and quiet. Cork carpet or cork tile are used largely in many libraries.

Newspapers and Periodicals. Newspaper reading in libraries is generally discouraged. As much space is occupied by the reader of a two-cent paper as of a two-dollar book, and newspapers are cheap enough for everyone to buy his own. Such a room is likely to become a dormitory for vagrants who seek it for repose rather than for edification. Some of the large libraries, however, allot space to current newspapers and storage for the bound volumes, for the use of persons with legitimate motives. For such rooms high stand-up desks with broad, sloping sides discourage loafing. Small libraries may subscribe to their local dailies,—a half-dozen of them can be filed in a section of wall shelving in which the shelves have been replaced with cleats attached to the sides and sloping from top-rear to bottom-front, with hooks or rebates to hold the files.

Periodical space is indispensable. In college libraries, periodicals are cognate to the reference books and frequently impart more recent information. They may be variously cared for,—sloping shelves for the current periodicals with horizontal shelves beneath each, to hold the previous issues until ready to bind; or horizontal shelves, 4 inches apart, properly labeled for the current numbers with cupboards below for back numbers. In either case the shelves for displaying the magazines should be within eye range of a standing person to be entirely practical.

Catalogs. The catalog cases should be accessible to the public, the delivery counter, the reference room, and the cataloguing workroom. It is difficult to locate them contiguously with all four elements enumerated, so the cataloguing room is likely to be sacrificed. One solution is shown in the Knight Memorial Library, where the catalog trays are planned to slide both ways. The writer invented this system 25 years ago for Juniata College. It would not suffice for large libraries, where conflicts would arise too frequently between users on opposite sides of the cases. Such libraries must incur the expense of duplicate catalogs; the children’s department, fur-
thermore, will need its own in most instances. The standard tray holds 1,000 cards, or a possible 1,200 of thinner paper. Averaging five cards to a title, there would be required, for our imaginary 300,000 volumes, 1,500,000 cards, which would require 1,250 to 1,500 trays. It is desirable to limit the case height to 15 trays (13 are better), which would necessitate 84 to 100 trays horizontally. The width of trays approximates 6 inches center to center. Therefore the lineal extent would be 45% to 54% feet, unless in double rows. Some standard cases have sliding shelves to rest the trays upon while consulting the cards, but this is objectionable, since one person obstructs the access to many other trays. It is better to have small “stand-up” tables, approximately 40 inches high, upon which to set the trays, the tables covered with a cork or similar surface. Separate catalog cases may be required for special collections, such as those devoted to music.

Special Departments. The sub-division of departments under special heads depends upon the demands made upon the library. In manufacturing towns it is necessary to have collections of germane technical works. Books on patents and patent law are closely allied to the technological. Differing from these in appeal are the art and music collections. Each art folio should be laid flat on roller shelves. Broad tables with sloping tops are desirable for consulting the folios. Valuable books should be in cases with locked doors whose panels may be of wire mesh or glass. Thin music scores, if shelved upright, require racks with partitions not over 12 inches apart or with adjustable supports on the shelves. Large maps in frequent demand may be hung on spring rollers from a “canopy” at the ceiling. The average-sized maps should be pasted on muslin and folded to the dimensions necessary to fit shallow drawers designed for them. Photographs and clippings should be mounted and filed vertically in cabinets whose deep drawers are provided with cloth separators that slide along small rods. Very large photographs and pictures can be kept in portfolios placed vertically in cupboards with doors hinged at the bottom, to afford ease of access.

Children’s Department. Ever-increasing thought and effort are being expended upon this department to cooperate with the schools in developing good citizens. Branch school work has grown to large proportions. Publishers are specializing in juvenile books issued in such numbers that shelf room needs frequent expansion. After school hours the children crowd to the library, and it is noteworthy that the parents of the majority are of foreign birth. In Cleveland’s libraries the children must wash their hands before handling books, a useful lesson in cleanliness, which results in many improved homes. Children are restless, and in a library they must be segregated from the adults either on the opposite side of the building under supervision of the main desk, or in another story. If in the basement, special care should be taken to make the rooms damp-proof, airy and light. This position permits of direct entrance from the outside. If placed in an upper story the children should not enter the adult sections of the building. The problem has been solved at the Mount Pleasant Branch, Washington, where an outside stair admits the children to their department, divided into separate spaces for the “little folks,” the grammar, and the high school grades (Plate 106). The heights of chairs and tables for children are proportioned to the users. The standard table top for children is 30 inches by 52 inches, the adults’ 36 inches by 60 inches, dimensions practically standard.

Club rooms in town libraries and seminar rooms in college libraries are essential adjuncts. Advance notice to the librarian gives opportunity to prepare the books on the given subject, ready at the time.

Staff Offices and Work Rooms. Comfortable
quarters for the staff, including rest room, locker room, toilet room, possibly with shower, and kitchenette, will yield better returns in efficiency and library results than those obtained from a disproportionate lecture room. A good librarian and an efficient staff are as essential to a library as a competent president and faculty are to a college, and it is equally important to maintain esprit de corps in a library.

In a small library it is usually necessary to locate the librarian's office within easy reach of the delivery counter, but in larger libraries the librarian should be more secluded, where he can work with less chance of interruption. It is well for his room to be large enough to hold a table where the trustees may assemble for occasional board meetings, for which a separate room is an unnecessary luxury except in metropolitan libraries where it may be excusable. Combining the librarian's and trustees' rooms gives space to the former to conduct his work in unhampered quarters and to have his documents at hand when the trustees require his reports. A secretary's room adjacent, where the callers may be received and their business analyzed without unnecessarily interrupting the librarian, is desirable. The working space and rooms should be ample to insure the proper running of the machinery of administration. The order and cataloging rooms should be near the librarian's office, for convenience of supervision, and should be within easy reach of the stacks either on the same level or by lifts. They are equipped with typewriters, shelf list cases, shelving, and work tables. Good light and air are vital to ensure the health of the occupants and to enable them to prosecute their arduous work effectively. A floor covered with cork carpet or good mastic is usually satisfactory, noiseless, and easy to walk upon.

A bindery is not necessary except in very large libraries, since it is usually cheaper to send books out for rebinding; but a room or space for ordinary repairs is desirable, and means should be supplied for warming the glue pots. Lavatories and sinks are requisites in all work or repair rooms. A receiving and unpacking room in basement or at grade level should communicate by lift with the work rooms just mentioned. The lift should be large enough to accommodate a book truck and one or two people. An electric push-button lift is the most useful. Passenger lifts for the public are expensive to install and to operate and are unnecessary except in buildings of several stories, where upper floors may be devoted to exhibition or lecture rooms much used.

**Galleries for Exhibits.** Exhibits of paintings and historical or other collections have educational value, but the cost of space required usually overbalances their value in a library. Collections increase by donations, often of questionable merit, and with the constant growth of the library, a state of mutual crowding is engendered which embarrasses both. It is better to devote the building to library work and to house collections in a separate structure. If a delivery room runs through two stories with a gallery around the upper level, it is profitable at times to utilize such space with museum cases for the exhibiting of small objects germane to the library work. Appropriate paintings, pictures and illustrations in the children's room are always desirable and are not to be excluded elsewhere on the library walls if hung where they do not attract gazers to the detriment of readers. Statues and plaster casts of aesthetic value are likewise desiderata when properly placed in relation to the architecture of the building.

**Lecture Room.** The lecture room, unless usable
for other purposes, is likely to make the least return and should not, therefore, be too large nor occupy valuable space on the main floor. For this building the lecture room need not accommodate more than 125 to 150 seats, for which 8 to 10 square feet per seat are necessary to allow for aisles and platform space. The cubic feet content of such a room, with a 12-foot ceiling, would be 18,000, and at 50 cents (the cubic foot cost of our building) would represent $9,000 as the amount invested in the lecture room. Interest at 6 per cent would be $540, to which must be added the expenses of light, heat and janitor’s labor. It is usually better economy to hire a hall in the neighborhood for lectures and entertainments and to omit such a room from a library building, or at least to reduce it to very small dimensions. In a Philadelphia branch the children’s room is converted on occasion into a lecture room, a large table becoming the platform. The combination works well, since the hours of use do not generally conflict.

Furniture. The furniture will consist of delivery or charging counter, catalog cases, bulletin boards, tables, chairs, shelving, and the various items of equipment for the rooms devoted to periodicals, newspapers, fine arts and special collections, as well as the suite for the librarian and staff, for the cataloguing and work rooms, and for the lecture room. Our building, as before said, is intended to accommodate 300 readers, and for convenience we can assume that the tables will be the standard 3 feet by 5 feet size for four persons, making a total of 75 tables and 300 chairs. The 50,000 volumes to be distributed throughout the rooms will need about 1,000 feet of bookcases, five shelves high in the children’s room, and seven shelves high elsewhere, and will cost about $7,500, if made properly. Metal shelving can be installed for nearly the same price, but it is usually not so attractive in its appearance.

Stacks. As before indicated, the amount of stack required may be calculated by multiplying the square foot area of the stack room by 20 volumes, if but one tier of seven shelves he required; by 40, if two tiers be required, and so on. Conversely, if we wish to know the size of stack room necessary to house 300,000 volumes in one tier, seven shelves high, divide by 20, giving 15,000 square feet; for two tiers, divide by 40, giving 7,500 square feet; for three tiers, divide by 60, giving 5,000 square feet, and so on. Metal stack construction is an invention of recent years, and its rapid development has kept pace with modern library demands. There are several makes of metal stacks upon the market, each claiming to have special features of superiority. A few systems are suitable where the conditions impose heavy loadings of superimposed tiers, and where compactness and strength are desiderata. The weight of each tier of stacks, with its complement of books, may be figured at 125 pounds to the square foot. The cost may be roughly computed at 50 cents per cubic foot of stack, including floors.

There are two general types of metal stacks, the so-called “standard type” and the “bracket type.” There are radical differences in the construction of the various makes of stacks and in the use of cast iron, steel, and pressed or sheet iron. Before selecting one, a careful consideration should be given to the different types and makes, from full-sized models or, when possible, from work actually installed. Space will not permit of an analytical description of the different makes, but general points may be indicated, which might aid in selecting a type.

(A) Narrow upright supports between shelves.
make for economy. The space of a half-volume gained means 1½ to 2 per cent increased volume capacity; that is, 1,500 to 2,000 volumes additional in every 100,000. This gain should be considered when the comparative prices of different makes and types of stacks are being judged before choosing.

(b) The provision for electric wires and switch plates on the stack ends is a point to be observed.

(c) The method of support for the electric conduits along the stack ceiling is important. They should not be wired to small beams, but holes should be drilled through the beams to support conduits.

(d) Many stacks are finished green, the color baked on. It is possible, however, to have the stacks finished in cheerful, light tones, though they soil more easily with the constant use they receive.

(e) If several superimposed stack stories are required, some makes of stacks are to be preferred.

(f) The usual length of shelves is 3 feet, but there is an alternate length of 3 feet, 6 inches, which permits an appreciable increase in volume capacity.

(g) The shelves are usually made of solid sheet steel, but there is also a shelf consisting of a parallel series of inverted U-shaped sections, connected with separators, which is stiffer than the plate shelf and which is often used.

(h) The ventilating slit below the bottom shelf, at the floor, should be vertical, not horizontal, as it is in the older stack types.

(i) The shelves should be adjustable, every inch in height. The story height from floor to floor of each tier should be approximately 7 feet, 6 inches; in some cases it can be 7 feet. Less than that allows insufficient head-room for the ceiling lights in the gangways. The heights given admit of seven shelves with an average spacing of 11 inches and permit the lowest shelf to be raised above the floor with a vertical ventilating slit, and allow for thickness of supporting steel and flooring of the tier above, which are important details.

(j) For the stack flooring avoid glass, once much used from a fallacious idea that it admitted light to the upper shelves of the tier beneath. The light reflected from white marble, painted concrete or similar flooring is better.

In colleges where the upper classes and the honor men are allowed access to the stacks, it is well to provide small study alcoves, which will be much used.

These suggestions do not exhaust details to be considered in weighting the relative prices and qualities of the different makes and types of stacks. To repeat, the lowest bid is not always the most economical; the number of volumes shelved and the quality of workmanship and service should be considered as highly important factors.

Lighting. The lighting of the library is of paramount importance, and to accomplish a satisfactory result it is well to follow the school house requirements and make the total glass area of reading rooms equal to 20 per cent of their floor areas. The light from the windows will be effective in the room for a distance equal to about one and one-half times the height of the top of window from the floor. Ceiling lighting will be advisable for spaces not properly lighted by windows. The spacing of the bays or window openings is controlled, practically, by the ceiling heights and, aesthetically, by the effect to be produced. The classic proportions of a window are, height twice the width, or in some cases, one and one-half times the width. The height is limited in a reading room by the distance between the top of the wall shelving and the ceiling. In a room with a
15-foot ceiling and 7-foot high shelving, there will be only 8 feet above the shelving or, allowing one foot for a cornice, but 7 feet left for height of window, which should be either 3 feet, 6 inches or 4 feet, 3 inches wide. The spacing between window axes will need to approach 8 feet in order to insure sufficient light.

Here are two hypothetical developments of these suggestions:

(A) Reading Room, 61 feet long by 25 feet wide,—area 1,525 sq. ft.
Net glass area, one-fifth of 1,525, equals 305 sq. ft.
Ceiling of room, 15 feet high.
Windows 7 feet high by 4 feet, 8 inches wide, equals 32 2/3 sq. ft.
10 windows required, six on the side and two at each end.
Windows spaced approximately 8 feet, center to center.

(B) Reading Room, 141 feet by 35 feet,—4,935 sq. ft.
Net glass area, 987 sq. ft.
Ceiling of room, 20 ft. high.
Windows 12 ft. high by 6 ft. wide.
15 windows required, 11 at the side and two at each of the ends.
Windows spaced at distances approximately 12 ft. on centers.

Note that Room A will accommodate 14 tables, 3 ft. x 5 ft., in two rows of seven each, and that each table will seat four readers; a total of 56 in a room of 1525 sq. ft. or 27 sq. ft. per reader. Similarly, Room B will accommodate 51 tables in three rows of 17 each, and 204 readers in an area of 4,935 sq. ft., 24 sq. ft. per reader. It is preferable, however, to allow 30 sq. ft. per reader, since some of the tables will be omitted to allow room for a possible information desk, filing cabinets, dictionary stand, and similar items of equipment which the librarian may perhaps wish to install.

Objection is sometimes made to the "prison-like" aspect of a room lighted only by windows above the line of the 7-foot high wall shelving. To obviate this, it is possible to introduce occasional small "squeezer" windows framed in the shelving. If properly handled, these openings improve the exterior effect. Or, the window sills may be brought lower by sacrificing some small extent of the shelving.

Artificial illumination is produced by various types of electric lamps, of which the nitrogen is one of the more recent. The amount of light required may be roughly figured at a minimum of one watt for each square foot of floor area when a direct lighting system is used. Indirect or semi-indirect lighting will require more wattage per square foot. The net area inside the walls of approximately 9,500 square feet, that is, 10,000 less the walls, will require for proper direct illumination enough lamps to yield at least 9,500 watts. A number of small wattage lamps in a ceiling fixture is better for the eyes than fewer large wattage lamps. In general, the lighting should be arranged to produce an evenly distributed illumination and to avoid bright spots. Illumination by fixtures depending from the ceiling yields good practical results. Table lamps for readers are expensive, and the necessary floor receptacles prevent the ready shifting of tables. In a browsing room stand lamps with easy chairs make for comfort, but the combination is expensive. Candelabra or torcheres may be used effectively in the delivery room. In the catalog, work, staff and librarian's rooms, base receptacles must be conveniently distributed. The panel boards for the lighting circuits are well located when on or near the delivery desk, within easy reach.

To illustrate a method of computing the outlets, wattage and circuits required, we can refer to Room B, just described, with an area of 4,935 square feet.
Since we cannot foresee whether other than direct lighting may be demanded, it will be best to allow 1 1/4 to 1 1/2 watts per square foot. There are 11 windows on the side of the room and two at ends; therefore the ceiling outlets may be located on the window axes, making two rows of 11 each. -22 outlets at 300 equals 6,600 watts. If properly wired, these outlets may be included in five circuits (1,320 watts each) controlled by switches conveniently placed; although another determining factor is the number of lamps on each outlet. If we use 25-watt lamps, 12 will be required for each outlet to give a total wattage of 300, and local underwriters' regulations may require a separate circuit to each outlet. The stacks would be lighted by conduit boxes, 6 feet on centers, in the aisles between stacks controlled by switches at the ends of the stack tiers. In addition to the light wiring, allowances should be made for an interior telephone system, for public telephone connections, for call bells, clock system, vacuum cleaner, electric elevator and book lift, and, questionably, a pneumatic tube system.

**Heating.** Libraries are usually steam-heated, for which the square feet of radiation may be roughly calculated by the Mill's formula of 2-20-200, the sum of the glass area divided by 2; the solid wall area by 20; and the cubic feet content of the room, by 200. For example, our building, we assume, has a net area within the walls of 9,500 square feet by a height of approximately 40 feet under the roof, which gives 380,000 cubic feet. The glass area equals 1,900 square feet (or 20 per cent of flood area); the wall area equals the periphery of the building (150 plus 70 plus 150 plus 70); 440 lineal feet, by 40 feet height or 17,600 square feet less the 1,900 feet of glass, or 15,700 square feet. This formula will apply:

\[
x = \frac{1900 + 15700 + 380000}{2 + 20 + 200}
\]

\[
x = 3.625 \text{ square feet of radiation.}
\]

If the radiation be concealed behind shelving or seats, it should be increased by about one-third or say, 1,200 square feet, giving, say 4,800 square feet, to which add 50 per cent for piping and for reserve power on boilers; or 2,500 added to 4,800 yields 7,300, which indicates the requisite boiler rating. The cost of the installation may approximate $4 per square foot of the radiation, 4,800, or say $19,200. An additional percentage of radiation should be allowed for exposed walls on north sides and for ceilings under flat roofs.

**Ventilation.** The mechanical ventilation in an ordinary library may be limited to the lecture room and a possible small amount in the shape of "uni-vent" or "direct-indirect" for certain of the reading or work rooms. A "plenum" system for the entire building is expensive to operate, and experience shows that the use of the fan is likely to be discontinued. The writer has arranged a simple system, first tried in Cleveland and since installed in many buildings, by which the radiators or coils are concealed back of insulated shelving with openings at floors and at tops of cases to permit the circulation of air. When the shelving runs beneath windows, either high or low, there is an opportunity to arrange an effective method of ventilation by opening the window slightly and inserting a deflector. Even with closed windows there is a continual circulation of the room air engendered by the spaces containing radiators between the walls and the back of shelving which act like flues. Chilled by the windows, the air is kept moving, which is the secret of ventilation.

**Construction.** Statistics have indicated that but few modern libraries have been destroyed by fire. Therefore, in districts where fireproof construction is not compulsory and the moot question arises between more space if non-fireproof, or less, if fireproof, it is likely to be decided in favor of the former. The use of non-fireproof construction has increased, however, with the upward trend of prices, so that the difference between it and fireproof construction is much less than during pre-war years. Reinforced concrete with pan or slab system is suitable for library buildings and usually costs less than steel beams and terra cotta blocks.

**Decoration.** Planning is for the mathematical, practical mind that unifies the heterogeneous elements into a systematic whole. Design is for the artistic spirit that produces an exterior of beauty, symmetry and proportion. The architect should combine the ability to plan and to design, in order to produce an appealing result. Artistic decoration and mural painting enhance greatly the spiritual elevation which a library should propagate, like manna, to the hungry soul; but mediocre work is worse than plain walls. Appropriate planting enhances the beauty of the whole. Shrubs conceal the hard lines where the base of the building meets the ground. The construction resembles the human skeleton, similar in white, black and red man, child and adult, while the flesh covering of some may be beautiful and of others the reverse. The style may be Classic, Gothic or Renaissance, the materials may be marble or brick, but it is the spirit shining through that appeals.
The Librarian's Ideas of Library Design

By ARTHUR E. BOSTWICK

Librarian, St. Louis Public Library

The architect is the only artist who has to consider utility. His function is to produce a result that will be satisfactory for its intended purpose and that will also be beautiful and fitting. Not all architects have lived up to this program, as no one knows better than the architects themselves. In many cases this is by no means the fault of the architect but of those whose business it has been to advise him regarding the uses of the building. Librarians and library boards, I am afraid, will have to take their share of condemnation for faults of this kind. In the cases of some very notable library buildings, no working librarian was consulted at all in connection with the plans, and the result was that the library boards and the architects were both deprived of knowledge necessary to make a workable structure. In one case, indeed, this method of procedure cost the library board the tidy sum of $50,000, which was the amount necessary to fit the building to its proper uses. Following one or two cases of this kind, librarians who had the requisite influence with their boards have sometimes prepared complete programs covering the sizes, number and relative positions of all the rooms in the libraries and required the architects to work to these programs, a procedure that is really as unfair to the architects as the reverse is to the administrators. Obviously, the logical method is for the administrator and architect to work together, being in close consultation at every stage of the planning, so that the result will be both useful and beautiful, the utilities not interfering with the artistic effect, and the latter not hampering the former; only thus can success be had.

It has been my good fortune to plan a large number of library buildings with some very eminent and competent architects, and in no case, I believe, did any of us have occasion to find fault with the method employed. If this is the way things are done, the librarian's ideas of library design will certainly be incorporated therein, but I should dislike very much to feel that any architect would accept the personal views that I am about to put forward as being applicable in all cases. In fact I believe that if two libraries in different towns are exactly alike, one of them is probably a bad library. Buildings should be as individual as people and are necessarily so if they
fit conditions, local, climatic, social and economic. It is astounding, for instance, how little climatic conditions were regarded by architects of the older generation. In my own city, St. Louis, the older type of fine residence, designed mostly by eastern architects, was almost uniformly designed with apparently not the least knowledge that comfort here in the summer months is largely dependent on exposure to a south breeze. Librarians in the southern states tell me that they have there many Carnegie buildings designed by northern architects who were unfamiliar with the necessities of a summer climate. Discomfort results for both the staff of the library and its users,—and both are important to its development:

Modern Library Purposes. I am sometimes sorry that we have not adopted a more distinctive name for what we call “public libraries.” The word “library” connotes, in the minds of many, a mere storage place for books, and the modern public library, although it is this, is a great deal more. The book, to be sure, is just as important as ever, but its reader has become equally important, giving the librarian and the library two units that must be taken into account instead of one. A building intended to store books with safety and a reasonable degree of accessibility is one thing; to house the vast departments that are now necessary to bring about adequate contact between book and reader is quite another thing. The late Walter Cook of New York, one of the most human and appreciative architects that I have ever known, once said to me after I had described to him the uses that would probably be made of a branch library building that we were planning: “Why, this is not to be a library at all. It is to be a community reading club.” He was perfectly right, of course. That is what all public libraries have become in these modern days. The club features have become prominent, and this fact must be given its full weight in future in planning either a central library or a branch building. A branch library building designed by one of the most eminent of American architects is a striking example of his total misapprehension of what a library’s use and needs. Having his mind fixed on the day when all libraries were repositories of treasures which it was necessary to guard against theft, he fitted the front windows of this building with strong iron bars, such as one sees sometimes in a bank structure, while the rear windows were protected.
by heavy steel shutters. For a community reading club, such as this branch library building was intended to be, these things were, of course, grotesquely out of place, and they were ultimately removed.

Attracting Readers. There are two basic features of the modern library which are related to this closeness of contact between book and reader. The librarian's technical names for them are "free access" and "home use." Free access means that all or most of the books are where they can be seen and handled by the reader as freely as if they were on his own shelves at home. The latter means that their use is not limited to the library but that they may be borrowed and kept for a specified time at his house. Both these plans met at first with great objection from librarians and were for many years unjustly looked down upon. There are still some persons who think that a library where the books are carefully stored in a place inaccessible to the general reader is necessarily superior to one where the reader may see and handle them. It ought not to be necessary to say that neither of these opinions has any sound basis in fact. The old plan had its advantages and must still be used in libraries where the books are curiosities or treasures rather than the tools of education and progress. But the open shelf and free access are now so much the rule that they have been the basis of most of the changes that differentiate the new community reading club from the old library, and they are becoming more important.

The differences between the two, in fact, begin at the outside. The old library forbade, or at least discouraged, use by the general public. It was distinctly a place for the scholar, and for him alone. The new library invites the public, and it is not content with this; it strives to attract the public in very much the same way that a merchant strives to attract customers,—by making public the advantages of reading and by letting everyone know what it has to offer in the way of books and aids to their use and appreciation. To this end it is desirable that no one should pass a library without realizing thoroughly that it is a library and without seeing something that will interest him in it and its use, so that he will be tempted to enter. This method of attracting the public has, of course, been long familiar to merchants. We see their attractive shop windows on every street. No one can pass a shoe store without
knowing not only that it is a shoe store but what kinds of shoes are for sale there. But there are hundreds of libraries that are passed daily by citizens who do not know them to be libraries; or who, if they do, do not realize the advantages or pleasures of using them. Locating a library at a distance from the sidewalk and elevating the main floor above the head of a passer-by make any such plan as this absolutely impossible. It ought to be easy for a pedestrian to look through large windows directly into the library, so that, especially at night when the interior is lighted; everything that is going on is plainly visible to him. My experience leads me to believe that in this case, the number of persons who use the library will be very greatly multiplied. Advise the proprietor of a successful retail store to move to the second floor and take down all his signs, and note his response! Much the same is the librarian's view.

Interior Book Display. Coming now to the interior of the building, we find that the prevalence of free access has materially modified the method of book storage. Fifty years ago librarians were greatly divided in opinion regarding the merits of two methods,—the unified stack system and the departmental system. In the former, all the books were shelved in classified order in a separate part of the building, generally inaccessible to the public. In the departmental system, on the other hand, exemplified in the Newberry Library building of Chicago, the books were disposed in the centers of separate rooms, each devoted to a different form of literature and each presided over by an expert. Each of these plans has distinct advantages and compensating disadvantages. Of late, librarians have been striving to combine them in such a way as to obtain the former without the latter, and although success cannot be said to have been complete, these efforts have greatly modified the interior arrangement of library buildings. The most successful compromise is doubtless that made in the new central building of the Cleveland Public Library, where there is a unified stack arrangement, but a separate reading room is in close connection with each section of the stack, all the books being thus subject to free access. Other libraries have followed suit with more or less success. This plan is expensive to administer, and it has been most successful in libraries with large incomes. But no builder of a modern library should
neglect to study this problem and to conclude what modification of it is best adapted to his own purse and his own local conditions. It is safe to say that no completely departmentalized library, like the Newberry, and no library with a completely unified stack arrangement will be built anywhere in the future.

Providing for Expansion. The most important change, and one whose necessity can be looked forward to with confidence, is that of an extension of the building. Steady growth has been a marked feature of all our library work, and there are no signs that it will be lacking in the near future. Every library building should have adequate ground suitable for such extension. The fact that many large buildings are without such provision is making a great deal of trouble for them now or will do so very shortly. And when the building is planned its future extension should be taken into account, so that additional building will be in the nature of completion rather than of patchwork addition; but at the same time the original structure should not appear to be incomplete. Very few library buildings have yet been planned in this way, and yet experience everywhere is demonstrating the importance of this detail.

The first material extension that is likely to be needed is in the direction of book storage. Our libraries are adding to their stocks of books with great rapidity. My own library, completed in 1912, was provided with space which we estimated would last 20 years, but now, after 15 years’ use, we find our storage space already congested. Such space can be added either by lateral wings connecting with the original stack room, by vertical addition in the nature of a “book tower,” such as is contemplated in the new Yale Library or by digging into the earth for underground storage. There is, however, another plan, originally proposed many years ago by President Eliot of Harvard, which, it seems to me, is preferable in many cases. This involves the construction of an inexpensive storage building on cheap land, say a mile or so from the central building. All books not likely to be called for more than twice a year or so could be stored there, and with modern motor transportation it would not be much more difficult to obtain them at this distance than it is from a stack room in the same building. President Eliot’s position, that it is waste of money to use a building of expensive construction on the costliest
ground in the city merely for storage purposes, seems to me well taken. The plan seems to be practical.

The use of valuable space for corridors and staircases seems largely unjustifiable. I could name libraries where as much as 50 per cent of the ground floor area is occupied by halls and staircases, usually of expensive construction. Stairs, of course, will have to be provided, but they are used only when absolutely necessary and should not be featured architecturally. We go from one floor to another now by elevator, and the elevator service should be ample. Such service should not be limited to the first hallway but provided wherever the reader goes throughout the building, especially in the stack. Instead of using small lifts for books, it is better to wheel loaded book trucks directly into the elevator in the stack. An attendant can then accompany the truck to the level where it is needed, and time in loading and unloading can be saved. In small buildings, where there are not more than two levels and where passenger elevators are not needed, book elevators save much time and strength, but they should be large enough to admit a loaded book truck. This necessitates the use of electric power. If this is not available or considered too expensive, a hand-power lift is better than nothing, but in this case it cannot be made large enough to admit a book truck.

Staff Quarters. There are still employers,—and among these one must reckon the members of some library boards,—who cling to the idea that it is possible to make a working staff too comfortable. One may hear this argument today from many who think that a comfortable worker is a less thorough worker than one who is continually subject to a certain degree of discomfort and inconvenience. I believe, on the contrary, that the more thoroughly comfortable the worker is, the better work he will do, and that care taken for staff welfare in planning a building is not only human but economically profitable. The day when every library worker had to stand up all day, hard to get lunch by eating a sandwich in the cellar, had to climb stairs to go from the first to the sixth floor, and had no place to lie down when indisposed, is assuredly past. A library must have adequate staff accommodations, including a lunch room

with at least a kitchenette, a rest room, and possibly also an adequate recreation room to do its best work.

Beauty and Utility. Fashion, of course, has much to do with buildings as well as with other things, but whereas one may discard clothing that is out of style for more up-to-date garments, nothing of this kind is possible with a building. Period buildings are, of course, always in vogue,—too much so, it has always seemed to me. From a librarian’s point of view, an architect should strive to build something that is pleasing and impressive largely from its simplicity and fitting proportions and that will remain so through the ages. Librarians have been subject to the caprices of fashion rather than architects. They have often insisted on some detail of construction that is temporarily in vogue, thinking wrongly that it represents a permanent improvement in administration. Library buildings designed in such cast-off fashions are to be found in all parts of the United States. Agreement between the designer of the building and those who are to use it is absolutely necessary, as has been said, but both librarian and architect should be on their guard against mistaking temporary fads for permanent betterments, as many mistakes in building will testify.

In closing, I desire to emphasize my opinion that not only the entire building but every element of it must be a combination of beauty and utility. That it should have beauty alone or utility alone will not suffice. This rules out ornamental details added merely for the sake of ornament; but it rules out as well useful adjuncts employed merely because of their use without regard to their appearance, such as ventilating stacks that seem to have been added as an afterthought. These considerations, of course, apply to all buildings but in a special degree to a library structure, which is perhaps the one public building that is constantly used by the class of adults that has, or should have, due appreciation of what is fitting and proper. A public library building must necessarily serve its community for a considerable time,—it may cater to several generations of readers,—and its very permanency constitutes a particular claim upon the thoughtfulness and resourcefulness of architect and librarian if the public is to be well served.
DECEMBER, 1927

THE ARCHITECTURAL FORUM

PLATE 97

ENTRANCE FRONT

CHILDREN'S ROOM

LOS ANGELES PUBLIC LIBRARY

BERTRAM GROSVENOR GOODHUE, ARCHITECT; CARLETON MONROE WINSLOW, ASSOCIATED
PLANS, LOS ANGELES PUBLIC LIBRARY

BERTRAM GROSVENOR GOODHUE, ARCHITECT; CARLETON MONROE WINSLOW, ASSOCIATED
McGREGOR PUBLIC LIBRARY, HIGHLAND PARK, DETROIT
EDWARD L. TILTON, ALFRED M. GITHENS, ASSOCIATED, ARCHITECTS

PHOTOS: JOHN WALLACE GILLIES

CHILDREN'S ROOM

PLANS ON BACK
SECOND FLOOR

FIRST FLOOR

BASEMENT

PLANS, MCGREGOR PUBLIC LIBRARY, HIGHLAND PARK, DETROIT

EDWARD L. TILTON, ALFRED M. GITHENS, ASSOCIATED, ARCHITECTS.
PASADENA PUBLIC LIBRARY
MYRON HUNT AND H. C. CHAMBERS, ARCHITECTS

Photos, William Clark
Plans on Back
HENRY E. HUNTINGTON LIBRARY, SAN MARINO, CAL.
MYRON HUNT, ARCHITECT

Photo: Shirley Vance Martin
Plans on back
FIRST FLOOR

PLANS, HENRY E. HUNTINGTON LIBRARY, SAN MARINO, CAL.

MYRON HUNT, ARCHITECT
PHILADELPHIA PUBLIC LIBRARY
HORACE TRUMBauer, ARCHITECT
NORTH FACADE

MAIN READING ROOM

J. J. HILL REFERENCE LIBRARY AND ST. PAUL PUBLIC LIBRARY

ELECTUS D. LITCHFIELD, ARCHITECT
PLAN, J. J. HILL REFERENCE LIBRARY AND ST. PAUL PUBLIC LIBRARY

ELECTUS D. LITCHFIELD, ARCHITECT
PUBLIC LIBRARY, BIRMINGHAM, ALA.
MILLER & MARTIN, ARCHITECTS
THIRD FLOOR

SECOND FLOOR

FIRST FLOOR

PLANS, PUBLIC LIBRARY, BIRMINGHAM, ALA.

MILLER & MARTIN, ARCHITECTS
READING ROOM
CLEVELAND MEDICAL LIBRARY
WALKER & WEEKS, ARCHITECTS
527
PLANS, CLEVELAND MEDICAL LIBRARY

WALKER & WEEKS, ARCHITECTS
Librarians as a rule are open and in service long hours, frequently in our large cities 80 or more hours a week every week of the year, and on seven days of the week. During the scholastic year some of our university libraries are open even longer hours than public libraries. Churches, theaters, schools and other public places are rarely open half as many hours; many of them less than one-tenth as many as the library in the course of a year. These long hours with a variable load at different hours of the day and in different rooms at the same hour make the problem of library ventilation particularly difficult. The number of persons in the rooms to be ventilated might be termed the "ventilation load," and a variable load is always much more difficult to handle than a constant load. A special reading room, that is a room for a special class of readers, such as a medical reading room or a reading room for teachers, illustrates what is meant by a variable load. Such a room may have only one or two readers, or none for many hours of the day, whereas during the winter months, a newspaper or magazine room may be crowded to the limit all day long. The amount of air required for good ventilation in one room may be many times that in another.

Certain of our large city libraries have an additional problem in the winter months, particularly in newspaper reading rooms, which are frequented largely by unemployed persons who come from cheap lodging houses. Some of these people seem to go without a change of clothing for a whole season. This is also a problem in some children's rooms, where it is not unknown to librarians that certain children have their clothing sewed on in the fall, with no change until spring. Such persons bring to the library the problem of dealing with human odors. Besides the reading rooms and ordinary public rooms of the library, we have in many of our library buildings lecture rooms or auditoriums. A lecture room filled to capacity usually seats from three to four times as many persons as the same floor space when used as a reading room. This causes wholly different problems of ventilation in two rooms otherwise identical, and this difference must be duly considered.

In the main building of the Grand Rapids Public Library, we have a very good illustration of this, the reference room and the lecture room being on the same floor and identical in size. An audience that fills the lecture room will ordinarily raise the temperature at least 10 degrees in the course of an hour when it is freezing outside. The building is heated and ventilated by a plenum system, so that if the lecture room is comfortable the other rooms are entirely too cold. If, on the other hand, the other rooms are comfortable, the lecture room is hot and "stuffy." People have difficulty in keeping awake, and everybody feels and knows that the ventilation is bad. We have remedied this somewhat by shutting off the plenum fan for the lecture room for several hours before a lecture begins and by opening the windows wide, thus chilling the room and walls down to nearly 60°. The fan, which air that will keep the rest of the building comfortable, takes on the load of the lecture room half an hour before the lecture begins. Conditions of this sort make it absolutely necessary, in planning a library building, that the heating should be independent of the ventilating system. Furthermore, in a large library building it is most important that the ventilation be controlled in every room at every hour of the day, in accordance with the conditions in each room. This means fans, for it is impossible to control the ventilation of a large library building without use of a system of fans.

Ventilation is primarily a physiological problem, for the comfort or discomfort of persons in a room, because of air conditions, is a physiological condition. Heat, humidity, odors, lack of motion in the air all affect the action of the bodily organs, causing comfort or discomfort as the case may be, thus greatly affecting the amount and quality of their work, and ultimately bad conditions will injure the health of persons long exposed. A poor ventilation system is a physiological condition. Good ventilation produces comfort, we say the ventilation is good; if discomfort, bad. And psychology plays an important part in one's reactions to such conditions. Thirty-five years' experience in operating public library buildings and studying library buildings generally, has convinced me that psychology is a very important factor in successful ventilation. Different persons are affected differently by the same conditions. The heart beats of some people are much faster than those of others; for example, mine is about 20 beats per minute slower than my wife's. Usually persons with high pulse beats require very much less heat for comfort than persons with slow pulses. This is largely regulated by their clothing. However, if a person feels hot and uncomfortable, and sees the windows all closed and no evidence of air coming into the room, the psychological effect is bad; whereas if windows are partly open or ribbons or something colorful are placed at the vents through which the air comes into the room indicating air in vigorous motion, the psychological effect is good. In short, the whole problem of ventilation is essentially a "human" problem. It is a problem of ventilating people rather than ventilating buildings; and we know that people are more or less temperamental. For this reason one can never depend wholly on automatic mechanical devices,—thermostats, etc.,—to give entirely satisfactory results. Good horse sense
with an understanding of the whole problem must be used,—with some dependence placed upon diplomacy!

The public rooms of most library buildings are ordinarily too warm. People come into the building with their wraps on, while the women employees in the building, dressed in the present style, often have little clothing below the knees, with arms bare to the elbows or shoulders. How can we get satisfactory conditions for both these groups? When the building is too warm it affects the action of the skin and the heart of the individual, unless the air is in motion, and furthermore, in raising the temperature from 66 to 72 in a crowded room containing a considerable number of the unwashed, odors become very strong. The higher the temperature above 70 the greater the problem presented by odors from human bodies. Hence, keeping the temperature down reduces this very materially and improves the ventilation,—important, since many object to fresh air.

Securing good library ventilation, therefore, presents a problem of proper control so as to give the greatest amount of satisfaction possible under the varying conditions that exist in different parts of the building at different hours of the day, and to two groups,—the workers and the general public. It may be added with reference to the unwashed that as a rule they are very much opposed to any evidence of fresh air in a room, and my experience in public library buildings is that there is a great deal more criticism from this group about too much fresh air than from those who feel that there is not enough. When there is added to the unwashed the presence of a number of persons whose favorite dish is garlic, one can imagine the difficulty of the whole problem! The physiologists and the medical profession have not yet definitely agreed upon what is “optimum” ventilation, and what ventilation really does in a physiological way. The engineering profession could greatly improve conditions if once it were really known what is the best thing to do. Most ventilating systems have been unsatisfactory because they are based on the wrong theory of what ventilation must really accomplish to be satisfactory.

Most of the ventilating apparatus in library buildings, and in public buildings generally, until within recent years, was based on the carbon dioxide theory,—namely, that human beings in breathing give off a certain percentage of carbon dioxide which poisons the air. The functions of ventilation machinery according to this theory are to supply fresh air from the outside to dilute the polluted air in the building and to remove the vitiated air, so as to keep...
the carbon dioxide content of the air of a building as nearly as possible equal to that of good fresh air from the outside. It is this theory that is responsible for the laws in many of our states requiring 30 cubic feet of air per minute delivered into certain public rooms for each person in such rooms. This theory has been exploded by a number of studies and investigations, a description of which it is not possible to go into here. It is interesting on its own account.

As already indicated, the primary problem of ventilation is that of controlling the conditions of temperature, humidity, odors, and motion of the air so that the human body, especially the heart, the lungs and the skin, will function to the best advantage for health and efficiency. To bring this about with any kind of machinery requires constant observation and intelligence on the part of someone in every library building. In all too many of our libraries the ventilation service is a failure on account of improper operation on the part of the janitor or engineer in charge. Such machinery in its operation should be made as simple and as nearly fool-proof as possible. Every room in a library building should be equipped with an ordinary good thermometer, and there should be in the building in one or two places a hygrometer which in winter months should never be allowed to register much below 50°. A self-registering thermometer properly placed is also a good investment to check up on the work of the heating plant every minute of the 24 hours. In a large library building an anemometer should also be available to test occasionally the amount of air being delivered to the various rooms, so as to be sure that everything is functioning properly. Where there is a high degree of human intelligence used in looking after these things, even with relatively poor machinery or apparatus, excellent results may be achieved; whereas the most expensive and up-to-date apparatus may prove a failure because of lack of intelligent operation. In our main library building in Grand Rapids last winter we got better results than ever before by having the fireman in cold weather go through the building every hour during the busy part of the day, reading the thermometers and observing the conditions in every room. If one room went below or above par, he took steps to remedy such a condition, restoring it to normal.

Good ventilation means maintaining indoors a supply of air which causes the body to function as nearly as possible as it does in approximately pure air out of doors. To achieve this result in a library building, or any large structure for that matter, ventila-

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West Side Branch, Grand Rapids Public Library
Robinson & Campau, Architects
tion must be subject to control so as to meet the varying conditions or needs of the situation. And all this means machinery properly laid out and installed. Proper control also greatly reduces the cost of operation, for then there will not be tons of fuel wasted by heating air and forcing it through the building when it is not needed or used. Small library buildings, especially in neighborhoods that are not congested, may get good results from intelligently operated natural ventilation. But where there are large crowds in small buildings at certain hours of the day, natural ventilation will fail to give satisfaction, especially when the air outside is stagnant. Small electric fans, such as are in common use in hot weather, may then be used as an inexpensive solution of this problem, and sometimes with good results, by delivering a greater number of foot candles to the tables at one end of the reading room than at the other. Thus needs of readers of many classes are met.

The problem of lighting library buildings is in some respects less difficult than that of ventilation. However, we must take certain facts into consideration, facts which I believe have not yet been sufficiently considered in the planning for the lighting of library buildings. The first of these is that with the development of the electric light we have trained our eyes to require a great deal more light than was satisfactory to the average user 25 or 30 years ago. There was a time when 4- or 5-foot candles on the reading plane (that is to say, an ordinary library table) were considered adequate lighting. Today 10-foot is very generally required, and some of the newer library buildings have as high as 14- or 15, although they seem to me to be overlighted. I am convinced, however, that some eyes require a great deal more light than others. It is, therefore, necessary in a library building to provide different quantities of light to take care of the differences in the eyes of readers. There are libraries where this has already been done, with very interesting results, by delivering a greater number of foot candles to the tables at one end of the reading room than at the other. Thus needs of readers of many classes are met.
frequent cleaning is a most important part of
the work of the architect or lighting engineer. I am
of the opinion that the psychological effect in a
public reading room is very much better with
semi-indirect light than with either direct or in-
direct lighting. I regard it as more satisfactory
also in some other ways.

Natural light is, of
course, to be preferred
for reading rooms and
work rooms, but when
such rooms are open
many hours of the day,
artificial light must be
largely used. In our
cities very little can be
done with the orienta-
tion of buildings so as to get
into all the rooms the
greatest amount of day-
light possible, for so
many of our streets are
laid out according to the
four main points of the
compass. Orientation
can frequently be worked
out better on a college
campus. For instance, a
building facing one of
the four main points of
the compass will get less
sunshine in all its rooms
than if it were faced say
southeast. Latitude and
climate are also impor-
tant in the venti-
lation and lighting of li-
brary buildings, but these
cannot be gone into here.

Arrangement of stacks for the storage of books
in the library should, I believe, depend entirely on
artificial light. The windows in the average stack
room of a library are wholly inadequate for lighting
the center of the stacks, even on a bright and sun-
shiny day, so that artificial light must be used in any
event. By eliminating the windows and the aisles
that usually go along the walls, and by depending
on artificial light and mechanical ventilation entirely,
the capacity of the average stack room for book
storage would be increased by approximately 20 per
cent. The stack rooms are usually the most ineffi-
ciently lighted of any part of a library building. The
light source is at the ceiling, and the farther a book
is away from the lamp, say on a bottom shelf, the
smaller the angle of light incidence, so that both
distance and this angle increase the difficulty of read-
ing the numbers or the lettering on the backs of the
books, especially when the books are somewhat worn
from use. For the smooth running of the library
it is of the first importance that books may be found
readily and placed back on the shelves in the same
way. This means adequate lighting as the first
requisite for this work. It can be greatly helped by
having the floors of the stack rooms of white marble
or tile, or even painted white, so as to reflect the
light to the backs of books as they stand on the
shelves. A number of libraries have done this in
recent years, having the shelves, walls, floors, ceil-
ings, and everything about the stacks in white. In
the reading rooms the tables should be as free from
lighting fixtures as possible. The colors of the walls
and of the furniture have an important bearing on the general effect on the reader. The satisfactory combining of mere utility and lighting efficiency with general artistic effect presents an interesting problem for the library authorities and the architects to work out. It is a problem well worth the necessary study.

It has long seemed to me that it should be possible for the stacks to be wired so that an employe who is putting books back on the shelves or is getting a number of books for patrons should be able to throw a light switch with the foot rather than by hand, for it is extremely awkward to attend to these switches when one has an armful of books. This would enable such a person to have the hands entirely free for books. The lighting system should be installed so that it is easy to cut out light in the stacks when it is not needed, thus greatly reducing the cost of building maintenance. Large library stacks can easily waste more light than the rest of the building uses. In both ventilation and lighting, the cost of operation is an important factor. It is a well known fact that many elaborate and costly systems of ventilation are not being operated as designed because of the costs. Take the case of a large library building with one fan system for the ventilation of every room in the structure; all the air to be outside air,—no recirculation; the building heated with the same fan system that ventilates it; air heated in zero weather to keep the rooms at about 70° Fahrenheit; half the rooms used very slightly many hours of the day; air delivered to them the same as to the rooms with many people in them,—all this results in most expensive operation and waste, for much cold air will be heated to a high temperature only to be forced out of the building without being of the slightest use to anyone. It is conditions such as these that lead engineers and janitors in charge of buildings to begin "monkeying with the machinery," and often on instruction from the boards of trustees!

Here are 14 points most to be remembered in designing ventilating and lighting systems for library buildings, all very well worth considering:

1. Supply the fresh, invigorating air that most normal humans crave, without "cooking" the life out of it by heating it to a very high temperature, thus destroying its invigorating feeling of freshness.

2. Deliver air in the proper quantities, without waste through supplying much more than is needed in some rooms and at the same time not enough in other rooms, because of the variation in loads in the different rooms. This is a highly important detail.

3. Humidify the air for the sake of the people...
in the building and for the sake of the books, the humidity in the winter months to be about 50 per cent of saturation. An open steam jet in the fan room will produce fairly satisfactory results. Air washers not only humidify the air but they also free it from dirt. They are, however, expensive to operate and sometimes are troublesome in other respects.

4. Separate the heating system from the ventilation system,—use the "split" system. This makes possible the supplying of air in the quantity needed, and without heating it so as to destroy its freshness,—simply tempering it during cold weather.

5. Provide for easy, independent control from the room itself of the amount of air to be delivered into that particular room from the ventilating fan system.

6. In crowded rooms, especially rooms frequented by odoriferous persons, move the air in vertical rather than in horizontal or semi-horizontal lines. This will not cause the spread of odors across the room to the annoyance of persons along the way.

7. Provide for natural ventilation,—windows,—as much as possible when there are only a few people in the room, reducing the cost of operation of ventilation system. Use of windows is often sufficient.

8. Provide, especially in a crowded room such as a filled lecture hall, for sufficient motion in the air (without at the same time causing drafts) so that people have the sense of freshness in the air they breathe. This will keep them more alert and awake so that they will be able to get more or do more from their presence in such air. Such air ventilates the body and gives a sense of satisfaction akin to that which we feel when outdoors in a refreshing breeze.

9. In cities take the air for the fans from the roof of the building rather than from the street level, thus avoiding pumping into the building much dirt and dust. Air filters may be used to keep out much dirt, but their burden ordinarily will be less when the air is taken from the roof. Many library buildings are settling basins for the dirt in the air that is pumped into them. Air from a roof level is much cleaner.

10. Plan the lighting system to deliver without glare 10-foot candles to the reading plane, with provisions for more light for persons whose eyes require it. Use stronger lighting at one part of a room.

11. Plan a color scheme for the walls, windows, and draperies to give an artistic effect. It will attract readers and be more restful to all who use the room. Red is not a restful color to have in such a room, but there are other colors which possess just that quality.

12. Give special attention to the lighting of the book stacks. Here utility should be the first and
last consideration. It is of the highest importance.

13. Have all lighting fixtures, switches, apparatus, etc., easy of access to both janitors and workmen. Electric fixtures that can be cleaned or adjusted only from the top of a 20-foot ladder which does not reach the ceiling will not get the attention they need.

14. Architects, librarians, and library boards should always keep uppermost in mind that the function of a library building is to serve human needs, and that it must be operated by average human beings. We must, therefore, adapt to the fullest extent possible, ventilation, lighting and everything else about a library building to human beings rather than expect human beings always to adjust themselves to the building. When all this has been accomplished, we shall have "humanized" our libraries.

The 14 points here given cover the considerations of the ventilation and lighting more from the point of view of the readers and staff than from that of the technician. The human side is thus stressed in the hope that it may lead architects to bring this aspect of the problem to the attention of their consultant experts in either field so that each room will be considered as a special case, the comfort of the readers being the paramount objective. The scientific and technical attitude may need to be tempered with the human touch, and the cold factors of "cubic feet per minute" and "footcandles" should always be accompanied in the mind of the designer with the thought of the probable actual comfort of those who will use the building. Those who operate and control the ventilation and heating systems are not always as expert as could be wished, and it is therefore wise to consider them and to make their controls simple.
ENTRANCE FRONT

1788 WILMINGTON PUBLIC LIBRARY 1922

ENTRANCE DETAIL

PUBLIC LIBRARY, WILMINGTON, DEL.
EDWARD L. TILTON, ALFRED M. GITHENS, ASSOCIATED, ARCHITECTS

Photos, John Wallace Gillies
Plans on Back
READING ROOM
MT. PLEASANT BRANCH LIBRARY, WASHINGTON
EDWARD L. TILTON, ARCHITECT
539
ENTRANCE FRONT

CHILDREN’S READING ROOM

WILMINGTON BRANCH LIBRARY, LOS ANGELES
MARSTON, VAN PELT & MAYBURY, ARCHITECTS

Photos. Miles Berne
Plans on Back
FIRST FLOOR

PLANS, WILMINGTON BRANCH LIBRARY, LOS ANGELES
MARSTON, VAN PELT & MAYBURY, ARCHITECTS
HILL AVENUE BRANCH LIBRARY, PASADENA
MARSTON, VAN PELT & MAYBURY, ARCHITECTS

PATIO
FIRST FLOOR

PLAN, HILL AVENUE BRANCH LIBRARY, PASADENA
MARSTON, VAN PELT & MAYBURY, ARCHITECTS
GENERAL VIEW

DELIVERY ROOM
PUBLIC LIBRARY, LONGVIEW, WASH.
TORBITT, HOYT & HOYT, ARCHITECTS
545
FIRST FLOOR

BASEMENT

PLANS, LONGVIEW PUBLIC LIBRARY, LONGVIEW, WASH.

TORBITT, HOYT & HOYT, ARCHITECTS
INTERIOR
LIBRARY, KIMBALL UNION ACADEMY, MERIDEN, N. H.
JENS FREDERICK LARSON, DESIGNER

Plans on Back
PLANS, LIBRARY, KIMBALL UNION ACADEMY, MERIDEN, N. H.
JENS FREDERICK LARSON, DESIGNER
ENTRANCE FRONT

READING ROOM

CHILDREN'S LIBRARY, WESTBURY, N. Y.
PEABODY, WILSON & BROWN, ARCHITECTS
PLAN. CHILDREN'S LIBRARY, WESTBURY, N. Y.

PEABODY, WILSON & BROWN, ARCHITECTS
VAILSBURG BRANCH LIBRARY, NEWARK
JOHN H. & WILSON C. ELY, ARCHITECTS

Photo, Burpo Co.

PLATE 112

551
FIRST FLOOR

SECOND FLOOR

WORK ROOM

CHILDREN'S DEPT.

ADULT DEPT.

PLANS, VAILSBOURG BRANCH LIBRARY, NEWARK

JOHN H. & WILSON C. ELY, ARCHITECTS
Planning Art Museums

By LORIMER RICH
Of the Office of McKim, Mead & White

We are accustomed to thinking of the three major arts as painting, sculpture and architecture, and we hear repeatedly of the necessity for collaboration between the painter, the sculptor and the architect. What greater opportunity can an architect have for the exercise of collaborative ability than in the designing of an art museum? Here he is confronted with the designing and erection of a building the very name and purpose of which constitute a challenge to his artistic genius, and the successful accomplishment of which is a permanent contribution to the cause of the arts. Here, in a building of appropriate design, he must create a proper and pleasing setting for painting, sculpture and examples of the numerous and varied minor arts.

Museum Functions. In attacking the problem of museum design, it is necessary first to obtain a thorough knowledge of the exact functions of the particular museum. These functions and activities vary considerably, and it is only in the larger museums that they all will be found. With the growing recognition of the desirability of cultivating the fine arts, we find the museums called upon to perform a multitude of services quite distinct from the original purpose of maintaining exhibition galleries for the public. There is an increasing demand from our industries for help in the designing of textiles, furniture, metalwork, ceramics and innumerable other objects. Study rooms, where careful notes and sketches of museum pieces may be made, are desirable, and this need must be satisfied. It is hard to dispense with a library of books, photographs and lantern slides. The lantern slides are usually circulated for lectures at schools and other institutions, and adequate provision for this work should be made. An auditorium in the building will be used for general art lectures and will also be used in conjunction with public school excursions to the museum. Considerable revenue may be derived from renting the auditorium for other purposes. For this reason, and because any meeting here might be at hours other than those during which the museum is open, it is well to place the auditorium so that it will have an independent entrance. It is not necessary that the auditorium have outside light, since practically all lectures given there will include stereopticon views or else require use of motion pictures.

General Plan. Broadly speaking, the basement or ground floor may be given over to the receiving and unpacking rooms; storage rooms, both for things in boxes and things unpacked; picture storage rooms; superintendent's office; heating and ventilating equipment; workshops; repair room; and toilets. These units might properly be on the ground or basement floor or on the main floor, depending somewhat upon the size of the building and the ideas of the executives:—director's office, trustees' room, business offices, photographers' rooms, the docents' office, etc.

The chief problem, which must be faced first in designing a museum, is the general arrangement of the important units. In other words, the part. This, of course, refers directly to the manner in which it is intended that the public shall pass through the museum. The entrance vestibule, check rooms, information desk, retiring rooms and turnstiles do not vary much in requirements from those in many other public and semi-public buildings and will not be considered in detail here. A perusal of the bibliography of museum planning and a study of the more important museums built in recent years indicate three definite schemes of circulation. The museums, with few exceptions, have made use of these in various forms: (1) The Basilica Type; (2) The Gallery and Corridor Type; (3) The Continuous or "En Suite" Type. Each of them has its own particular merits.

The Basilica Type brings the visitor directly into a large, high room, usually treated with some degree of architectural importance. Doors on the sides of this room open directly into the individual galleries. The galleries are usually inter-communicating. This plan scheme is direct and pleasant and allows for an efficient grouping of galleries of kindred subjects or of contemporary periods. The lighting of the side galleries can be very well handled. In the case of a one-story building, high side lighting may be obtained in the large, connecting rooms. In case the building is of two stories, top light seems to be necessary, and as will be more fully explained later, the writer feels that top lighting has many disadvantages. The basilica type has been used in various units of the Metropolitan Museum,—in wings J, K and F, which are respectively for Greek and Roman sculpture, for the Pompeian court and modern sculpture gallery, and for the wings of decorative art (page 556). As will be noticed, the basilica type of plan is likely to lead to some waste in planning when expansion takes place, this being one of its demerits.

The Gallery and Corridor Type considers from the very beginning that a unit consists of a gallery and a corridor, instead of a gallery alone. This accessibility of each gallery to a corridor with the complete independence of each gallery from every other gallery has much to be said in its favor. When it is considered that a museum is a building to which the public comes to view various objects, one realizes how important it is that the approach directly to any particular room be kept clear. Often a class must be taken to a room, and possible confusion and annoyance may be spared adjoining galleries if it does not have to pass through them on its way to and
from its destination. With this type of plan it is also possible to close off easily any particular gallery for repairs or for re-arrangement. Where the corridors are adjacent to the galleries, the gallery sizes may be readily changed by moving partitions to suit some specific purpose without disrupting the general plan. The Freer Gallery in Washington is an example of this treatment (Plate 122). Here it will be noticed that, with the exception of two galleries, every gallery is entered directly from some corridor.

The Continuous Type plan, as its name indicates, refers to that plan which places one gallery next to another and forces the visitor to go through one or more galleries in order to reach any particular room. For a fairly small museum, such as the Cleveland Museum of Art or the museum proposed for Wilkes-Barre, this method undoubtedly works very well. Considerable space is saved, and there is practically no resultant loss of efficiency. In fact the very desirable "intimate" quality of the rooms is emphasized; but it must be remembered here that no great number of visitors is likely to come at once, and that there is no large percentage of strangers among them. In general, the writer feels that this "en suite" type of plan is best adapted to the smaller museum for several reasons. No matter how cleverly the units may be worked out, there always seems to be a possibility of a more or less serious blocking of the circulation in case some one gallery is closed for any reason. For strangers particularly, it is confusing to find one's way about, and without corridors it is difficult to direct people to a particular gallery. Also, if a visitor comes to the museum for the definite purpose of studying any particular exhibit and must traverse several other exhibition rooms first, he too often lingers by the way and either never reaches his goal or finally arrives so satiated with the other exhibits that his zest for examining the object of his original quest is gone.

Lighting. The problem of lighting in a museum must be answered for three different subjects—paintings, sculpture, and objects exhibited in cases. Ideal lighting for one might not be ideal for the others. The whole subject of the lighting of exhibition galleries is intricate and complicated, and a subject upon which there is no final agreement, even among those who have given much study to the question. Three methods of lighting generally used
PLANS, PROPOSED ART MUSEUM, WILKES-BARRE
CHARLES A. PLATT, ARCHITECT
in galleries are top lighting, side lighting, and attic or clerestory lighting. These three terms may best be understood by referring to the accompanying diagrams, which illustrate use of each of the types.

The great variety of lighting schemes used and the various relations of light or glass area to the area to be lighted indicate either that there is a conflict of opinion as to what is good light or that we have not reached a clear understanding of the subject. Given ideal conditions of control and source, it is probable that painters and sculptors would disagree as to the correct lighting of a given subject. It does seem, however, that in general, museum rooms have too much light. The glass area is likely to be too great, covering in some instances the entire ceiling. The color and texture of walls

Pompeian Court, Metropolitan Museum of Art, New York
McKim, Mead & White, Architects
and floor also affect directly the impression of light in a room. Usually the floor should be dark in tone, and the walls should not be much lighter than the pictures to be exhibited. Walls and floors which are light in tone or of a glossy surface will reflect instead of absorb light, and they detract from the comfort of the room. So far as is practicable, it should be decided in advance what particular exhibits are to be placed in the respective rooms. It is only in this way that satisfactory results can be obtained, since the use of a room determines its plan.

The most general method of lighting picture galleries at present is by means of top light. Usually there is a ceiling sash, and above that is a skylight which admits the light to the ceiling sash. Top light does allow for a maximum hanging capacity. If the ceiling light is carefully designed and equipped to control the light at all times of day, pictures can be very well lighted, and unpleasant reflections practically avoided. There does seem, however, to be unanimity of opinion that top-lighted rooms are more or less unpleasant and gloomy. Top light is not natural in a room supposedly composed of four walls and a ceiling. There is apparent an indescribable lack of cheerfulness which is somewhat deadening. The ceiling light, to be most efficient, must be at least 14 or 16 feet above the floor. This in itself makes the room high, and with only one row of pictures hung, it leaves much blank space above, which only tends to add to the mausoleum-like character of the top-lighted room. It should further be borne in mind that if a top-lighted gallery is too long, the glare from the ceiling will enter into the angle of vision of the visitor and give an uncomfortable feeling of there being rather too much light. Top-lighted galleries must, however, be used at times, and where such is the case, there are several points which should be carefully considered. The ceiling sash is generally suspended upon hanger rods, and these in turn are connected to trusses which also support the skylight. Care should be taken to keep the bottoms of these trusses at least 5 feet above the glass, as otherwise the shadows of the lower members of the trusses upon the glass will be visible from below. Provision must be made for the cleaning and replacing of the individual ceiling lights. This can best be done by providing tracks to the under sides of the trusses, on which there may be suspended movable platforms which will run along about 1 foot above the glass. The glass itself should be wire glass and should be made of white metal instead of the ordinary green with which most glass is tinted. It is usually of a slightly rippled surface—just enough so that one cannot see the trusses, etc., through it. The glass sections themselves should not be larger than 2

North Wing, Metropolitan Museum of Art, New York
McKim, Mead & White, Architects
feet square because of the difficulty of handling and the increased liability of breakage. The usual practice is to support this glass on a T-bar section and to insert small clips occasionally so that the glass will not rest directly on the T-bar flange but will be about 3/4-inch away. This gives a small opening for air to circulate into the space above, and it greatly helps the efficiency of the heating and ventilating system provided for the galleries.

The artificial lighting of a top-lighted gallery is accomplished by means of electric reflectors arranged above the ceiling sash and disposed of in such a way that an even, well-distributed light is secured in the room below. Correct results in this work can be obtained only with the aid of a competent lighting expert and actual field tests to determine the proper number and locations of lights in each gallery, since no two galleries are quite alike.

Side lighting is much used in museums, and unless the windows are too low, it is quite satisfactory. For the exhibition of sculpture and objects in cases, it is unmistakably the best system. With side-lighted galleries the light is strong and natural and comes from a very natural source which adds greatly to the cheerful atmosphere of the room. Contrary to general belief, it is perfectly possible to utilize the blank spaces on the window side of such a gallery, and paintings and sculpture may be well lighted here by means of the light reflected from the other walls and the ceiling. The best results with side lighting are obtained when the windows do not come too near the floor. They should stop well above the eye level. In the new galleries of modern sculpture at the Metropolitan Museum the exterior effect required that the sills of the windows be fairly near the floor. The writer has noticed, recently, however, that all of these windows are now kept curtained up to a height of about 8 or 10 feet from the floor, and that with this arrangement a very pleasant result is obtained. If side light is used, it should be from only one side of the room to obtain the greatest efficiency in lighting.

Attic or clerestory lighting is thought by many authorities to most nearly approach the ideal. It is high side light,—the same as used by the artist in his studio,—and as the light by which a work of art is produced, it most assuredly should be the best light in which to view the finished work. This method introduces the light near the ceiling, and at the same time has none of the disadvantages of top lighting. Many of the most successful and most beautifully lighted rooms of the Old World have attic lighting. In a room with high side light there is the least possible annoyance from glare. The sources of light are well above the range of the eye in any except the largest rooms, and even then
the depth of wall will largely obviate glare. It must be borne in mind, in an attic-lighted room, that the pictures should be hung low enough so that there will be no reflections from the high windows on the opposite wall. Attic lighting allows a maximum use of the wall space for the hanging of exhibits. Care must be taken, however, that cases with flat tops are so placed that there will be no awkward reflections from the high windows.

Interior Decoration.—Both side-lighted and attic-lighted rooms allow the ceilings to be developed in some artistic manner, which is naturally more difficult in a top-lighted room. The treatment of museum galleries from a decorative point of view seems to have been neglected in this country. Yet some of our most pleasant memories of European galleries are those of old Italian palaces with their rooms converted into galleries. Here we see exhibits of the different Italian periods set in rooms with painted ceilings, agreeably side-lighted, with plain, rich, light-absorbing materials on the walls, and we get a feeling that we are seeing the art treasures at their very best. After all, to give the most agreeable impression, a painting, piece of sculpture or a piece of furniture must be exhibited in as nearly its original surroundings as possible if it is to convey the impression that its maker intended. There has been some tendency on the part of museum curators to group exhibits of a like character together in order to create an air of unity and harmony, but this does not seem to have been carried into the architecture and decoration of the gallery itself. A very splendid example of paintings exhibited in their historical setting is that of the gallery of Italian paintings in the Cleveland Museum of Art (page 560). The visitor notices also the fine dark wall covering, which adds so much to the enjoyment of these pictures. Several plain wooden benches of Italian design, for the use of visitors, instead of the chairs, might help, giving atmosphere to this room.

Another very pleasant example of decoration which aims to give the exhibits a proper and historical background is the recently completed Pompeian court in the new wing of the Metropolitan Museum (page 556). Here a Pompeian court was created with all its brilliance of color. The large panel tones are a Pompeian red, as also are the lower parts of the columns. The wainscot and floor are black. This gives to the whole court the old Roman and Pompeian atmosphere which is so favorable to the exhibition of Greek and Roman bronzes and marbles. A very definite impression of a certain period of art is created here and to much greater advantage than if these various objects were exhibited in their usual cold, neutral backgrounds in a room utterly devoid of any memories of Greece.
of pictures in the corners of galleries is often trou-
exhibit, its form and location giving it importance.

Care should be taken to see that the positions of all push-buttons, thermostats, register faces, etc., are carefully studied in order that they do not interfere with the exhibits, and also that their positions may be such that they will look as well as possible. All windows should be equipped with blinds which roll up at the bottom, in order that the low light may be shut off when desired. Radiators should be enclosed or concealed wherever possible. They are unsightly and collect and circulate dust. The

most museums have many paintings which either for lack of hanging space or other reasons are not on exhibition. To have these paintings readily available for inspection has been a serious problem. Several museums have lately used a very ingenious method of storing these pictures and at the same time having them at hand for study. Metal screens, covered with heavy wire netting, are suspended vertically at right angles to the walls in the storage rooms. The pictures are fastened to these frames, which are on tracks, and placed as closely together as possible. When a picture is desired, the frame which carries it is pulled out and the painting is on view. With this installation in a lighted room, every picture in the collection is at once available.

Too much emphasis cannot be laid upon the subject of seats. Most museums do not provide enough comfortable seats. The pleasure of museum visiting will be greatly increased if plenty of benches and seats are provided in the centers of the various galleries. Light chairs that are easily movable should be provided also, so that they may be placed before any particular object that a visitor wishes to study.

Finally, it should be remembered that an art museum is a place to which people go for pleasure as well as for study. The whole sojourn of the visitor while in the building should be studied and made as enjoyable as possible. He should be conscious of small and intimate rooms, rooms which welcome him and make him feel at home. There should be no cold, forbidding, architectural halls in which one does not dare speak above a whisper. The light should be pleasant and soft, and the walls and floors should be rich and restful. In fact the entire interior of the building should be a background and setting worthy of properly displaying its art in a personal, satisfying, and friendly manner.
DECEMBER, 1927

THE ARCHITECTURAL FORUM

PLATE 113

ENTRANCE FRONT

CORRIDOR OF SCULPTURE

BROOKLYN INSTITUTE OF ARTS AND SCIENCES

McKIM, MEAD & WHITE, ARCHITECTS

561
PLAN, BROOKLYN INSTITUTE OF ARTS AND SCIENCES
McKIM, MEAD & WHITE, ARCHITECTS
SECOND FLOOR

FIRST FLOOR

PLANS, MUSEUM OF FINE ARTS, HOUSTON, TEX.

WILLIAM WARD WATKINS, ARCHITECT
DECEMBER, 1927

THE ARCHITECTURAL FORUM

PLATE 115

MAIN FACADE

AUDITORIUM ELEVATION
DETROIT INSTITUTE OF ARTS
PAUL PHILIPPE CRET AND ZANTZINGER, BORIE & MEDARY, ARCHITECTS
PLANS, DETROIT INSTITUTE OF ARTS
PAUL PHILIPPE CRET AND ZANTZINGER, BORIE & MEDARY, ARCHITECTS
SECOND FLOOR

PICTURES and PRINTS

FIRST FLOOR

MUSEUM OF FINE ARTS, BOSTON
GUY LOWELL, ARCHITECT
ENTRANCE FRONT

SCULPTURE COURT
TOLEDO MUSEUM OF ART
EDWARD B. GREEN & SONS, ARCHITECTS

Plans on Back
PLANS, TOLEDO MUSEUM OF ART
EDWARD B. GREEN & SONS, ARCHITECTS
A GALLERY
MINNEAPOLIS INSTITUTE OF ARTS
McKIM, MEAD & WHITE, ARCHITECTS

573
PLANS, MINNEAPOLIS INSTITUTE OF ARTS
McKIM, MEAD & WHITE, ARCHITECTS
PLANS, CLEVELAND MUSEUM OF ART

HUBBELL & BENES, ARCHITECTS
PLANS, NATIONAL GALLERY OF ART, WASHINGTON
CHARLES A. PLATT, ARCHITECT
A Trend in Museum Design

By CHARLES G. LORING

AMERICAN art museums have undergone a fundamental change during the last generation, a change in the very theory of their function, and yet one which has been scarcely noticed by the general public. From year to year newly presented features attract wide attention. An Egyptian tomb is opened, or the work of a French sculptor is imported, or Balkan embroideries are the rage, and kindred subjects in the permanent exhibitions attract careful inspection. The mass of the display seems about the same to out-of-town visitors, to the art students, and to pater familias with the children—but the background is being constantly modified. In the minds of art museum authorities, the trustees, directors, curators and experts in general, the major theorem is what to exhibit. Raising funds is hard work, but how best to expend them is fascinating. Technical details of construction, fenestration, circulation and humidification must be skillfully adjusted and above all adjusted to the theory of what is to be exhibited. The personification of the museum must be visualized by the authorities before the architects are commissioned to embody it in the building itself, and it is the museum authorities who must determine for what section of the public the exhibitions are primarily intended; or if not for the public, as in private galleries, what external expression is to be given it. The gradual revolution which has occurred in the theory of what to exhibit is therefore fundamental and concerns very largely the emphasis on quality as against quantity.

Fifty years ago objects of art of the first order were scarce in the United States, and foreign travel was indulged in by only a very few. The museum provokes his enthusiasm, although it be meaningless. Fifty years ago objects of art of the first order were scarce in the United States, and foreign travel was indulged in by only a very few. The museum provokes his enthusiasm, although it be meaningless. Fifty years ago objects of art of the first order were scarce in the United States, and foreign travel was indulged in by only a very few. The museum provokes his enthusiasm, although it be meaningless. Fifty years ago objects of art of the first order were scarce in the United States, and foreign travel was indulged in by only a very few. The museum provokes his enthusiasm, although it be meaningless. Fifty years ago objects of art of the first order were scarce in the United States, and foreign travel was indulged in by only a very few. The museum provokes his enthusiasm, although it be meaningless. Fifty years ago objects of art of the first order were scarce in the United States, and foreign travel was indulged in by only a very few. The museum provokes his enthusiasm, although it be meaningless. Fifty years ago objects of art of the first order were scarce in the United States, and foreign travel was indulged in by only a very few. The museum provokes his enthusiasm, although it be meaningless. Fifty years ago objects of art of the first order were scarce in the United States, and foreign travel was indulged in by only a very few. The museum provokes his enthusiasm, although it be meaningless. Fifty years ago objects of art of the first order were scarce in the United States, and foreign travel was indulged in by only a very few. The museum provokes his enthusiasm, although it be meaningless. Fifty years ago objects of art of the first order were scarce in the United States, and foreign travel was indulged in by only a very few. The museum provokes his enthusiasm, although it be meaningless. Fifty years ago objects of art of the first order were scarce in the United States, and foreign travel was indulged in by only a very few. The museum provokes his enthusiasm, although it be meaningless. Fifty years ago objects of art of the first order were scarce in the United States, and foreign travel was indulged in by only a very few. The museum provokes his enthusiasm, although it be meaningless. Fifty years ago objects of art of the first order were scarce in the United States, and foreign travel was indulged in by only a very few. The museum provokes his enthusiasm, although it be meaningless. Fifty years ago objects of art of the first order were scarce in the United States, and foreign travel was indulged in by only a very few. The museum provokes his enthusiasm, although it be meaningless. Fifty years ago objects of art of the first order were scarce in the United States, and foreign travel was indulged in by only a very few. The museum provokes his enthusiasm, although it be meaningless. Fifty years ago objects of art of the first order were scarce in the United States, and foreign travel was indulged in by only a very few. The museum provokes his enthusiasm, although it be meaningless. Fifty years ago objects of art of the first order were scarce in the United States, and foreign travel was indulged in by only a very few. The museum provokes his enthusiasm, although it be meaningless. Fifty years ago objects of art of the first order were scarce in the United States, and foreign travel was indulged in by only a very few. The museum provokes his enthusiasm, although it be meaningless. Fifty years ago objects of art of the first order were scarce in the United States, and foreign travel was indulged in by only a very few. The museum provokes his enthusiasm, although it be meaningless. Fifty years ago objects of art of the first order were scarce in the United States, and foreign travel was indu...
ENTRANCE DETAIL.

PARRISH ART MUSEUM, SOUTHAMPTON, N. Y.

GROSVENOR ATTERBURY, ARCHITECT
Museums of Art

By HENRY W. KENT

WHAT kind of building is suitable for a museum of art? is a question more often heard nowadays as the museum “idea” spreads in the country, and as small and large towns begin to bestir themselves in the creation of such institutions. Formerly when museum-building was considered, there were but two thoughts in the minds of the donors, trustees, or committees responsible for it, and of the architect entrusted with the task,—namely, to provide space for the display of the objects of art in hand, if there were any, and to give room for a reasonable growth in the number of similar objects. Galleries for paintings and a “sculpture court” were usually the result, with an office or two thrown in for the “director,” and the basement assigned to storage. It goes without saying that the exterior of the building was planned to be a credit to the town, of marble if funds permitted, in the manner with columns in front, and while it was usually considered that the site should be accessible, that need does not appear to have outweighed considerations in favor of a park or an outlying district, particularly if it cost nothing!

The Traditional Museum. There were plenty of traditions concerning all of these matters for the guidance of those who had the destinies of such institutions in their hands, and in fairness to these gentlemen it may not be amiss to consider briefly what they were. First, as to the objects to be collected by and housed in a museum of art. Until comparatively recently such museums were concerned only with the “fine arts,” and that meant painting and sculpture. The adjective, to be sure, was not added until the nineteenth century, but since all of the great museums of Europe contained such things, and particularly since the historians of art persistently applied themselves to these subjects to the neglect of the others, there seemed to be reason for believing that they should be “collected” to the exclusion of the other arts. The tradition, however, allowed the inclusion of the archaeological remains of Egypt and Greece; the Vatican, the Louvre, and the British Museum all included them, mummies and all, along with the “fine” arts,—so why should not these museums give us our ideas as to correctness in halls, galleries, rotundas, monumental flights of steps, lofty walls,—everything dignified and stately and, of course, all sky-lighted.

Broadening the Museum’s Scope. Thus we gained our traditions, and where could we go for better? Where, indeed, unless we were to put our minds upon it and work out for ourselves the solution of our own problems? For this there would be needed a little study of the histories of the Vatican and the Louvre, of why and how these places came to be used as the public repositories for collections of works of art, and why their galleries, rotundas, etc., were what they are, and why sky-lighted; a little consideration of the story of collecting and collectors,
and of the difference in conditions that existed in Rome and Paris in the seventeenth and eighteenth centuries as compared with those existing in ours; and a little reasoning as to the differences in public obligations involved in such possessions here and abroad. It is the conclusions which resulted from the study of these things which, after years of following traditions, have been responsible for our present idea as to what museums are for, what they ought to do, and what their buildings should be like—ideas which have been thought out in the last 20 years, while the old traditions mostly have gone by the board. We have outgrown them. This principle was responsible for the cutting out of that early Victorian snobbery, the word “fine,” to designate certain art, and the inclusion among the arts of the “lesser” or “smaller,” which were formerly debarred. These are the arts which have an intimate relation to the things of daily life, and to the industries; which claim a vital interest from those who make, those who buy, and those who sell. With the collecting and display of examples of these arts there came a change in the kind of service the museum rendered to its public; people were now sought out and gathered in, instead of being passively observed when they turned up to gaze—a service of personal relationship for giving assistance in the gaining of pleasure and profit—the museum was humanized.

The New Attitude. But how did all this affect the architecture? will be asked. Simply enough. The dignified and stately Louvre-Vatican salon and sala gave way to rooms adapted to the display of other things besides Renaissance paintings and Greek sculpture, to rooms so strictly adapted to needs that their specifications could be written only from a knowledge of them. The new attitude toward the public called attention, also, to the need for consideration of the people who frequent the museum, and from points of view other than as a queue coming in at one door, staring at things, and going out by another door. Their comfort, their convenience, their study, their work, were to be provided for, in rooms adapted to these needs—this in the new order.

All of these matters bring us to a definition; an art museum is a place where objects of art are collected for the purpose of their display to the best advantage, in order that people may get from them, with or without help, such enjoyment as the things can give and such practical help in solving their own problems as they may desire. The whole scheme of the modern museum and of its building is governed by this, and, briefly, in this way. Its functions are threefold: acquisition, exhibition, and exposition; and to carry them on adequate space is required for these functions; executive, administrative (and here should be included housekeeping), curatorial (here should be included the matter of exhibitions), educational, and public relations, all vitally necessary.

The Executive Needs. These requirements are obvious:—rooms for the boards of trustees and,
larger museums, for committees, for secretaries, and the treasurer, all preferably kept together. The administrative and curatorial needs include offices for heads of departments, secretaries, and clerks, which may be together in one group, or spread about in relation to the departmental exhibits. There should be a receiving office, a room for packing and unpacking, a registrar’s office, and a superintendent’s office; quarters for engineers and electricians, and shops for various groups of workmen, such as carpenters, painters, roofers, upholsterers, plaster workers, etc., with stock rooms and rooms for the storage of materials. Large museums require, also, quarters for printers and photographers. For the housekeeping service, there must be rooms for all of the shop men, and for the attendants or guards,—dressing rooms, rest rooms, lunch rooms, baths, toilets, etc. There must be space for operations such as cleaning and polishing (some museums have laundries), and there must be a telephone central office, and a post office wherever the needs of a museum warrant it.

Storage Requirements. Not the least important rooms devoted to the objects of art are those for their storage. Until quite recently, as has been said, these were usually in the basement, in dark corners. Here we have a curious contradiction on the part of museums in that while the greatest pains are taken when exhibiting objects for the public to gaze at, in dust-proof cases and with careful regulation of temperature of rooms, etc., these same objects off exhibition, in most museums, are given storage without provision for any of these protective influences. It is obvious that such things should receive the same care in storage as when on exhibition. For this purpose, well lighted rooms should be provided, and every attention should be given to temperature. Such rooms should be easily accessible, not only to the janitor but to the interested public. Some museums have awakened to this necessity, and progress is the order of the day. Storage rooms may be scattered, so as to fall into close relation with the departments to which they belong, or all housed in one building. Common sense dictates the latter, but curators often prefer the former arrangement, and architects’ plans usually compel it. On the whole it is preferable.

Exhibition Rooms. There still remain to be considered the rooms for exhibition, with all the details of size, light, temperature, proportions, trim, etc. During the past 20 years, especially in Germany, such rooms have received close attention, but the conclusions arrived at do not allow final pronouncements, since the whole question of collections and methods of showing them in these rooms is still in a debatable stage. The reason for this is easily found. The art or science, whichever it be called, of exhibition, and the principles governing such presentations, have never received the attention that eventually must be given to them. As yet they have not all been discussed even by museum people, our only thoughtful contribution, for instance, on the
Meeting Modern Requirements. A few more words of warning and of suggestion to architects may not be amiss. The public wants the entrances to its buildings on the street. It will not mount monumental stairs if it can find an elevator. The theaters found this out long ago,—the cheapest seats are upstairs. The rotunda,—so effective in Roman baths,—is useless in a museum, and large courts with the architect's embellishments, if they are provided for exhibition use, are a delusion and a snare, to be ripped off if possible when his back is turned. In a museum building the pressing problem for the architect to solve is the arrangement of the different kinds of rooms devoted to the different functions,—executive, administrative (not to forget housekeeping), and public service,—so that they shall be perfectly related and perfectly adapted to their work; and most important of all is the provision in the plans for the extension of all of these, appropriately, economically, and effectively, when the time to enlarge the building shall come. The building of the Cleveland Museum marked a turning point in this form of architecture. There the three-fold functions of the museum were recognized for the first time, and provision made for them, with the result that this museum has come to furnish principles in buildings of this kind. It would be a pity, however, if the success of that first embodiment of the idea should lead, as there are signs that it has, to the use of a stereotyped system. The Cleveland Museum, located in a large park for good and sufficient reasons, included in its plan a garden court, but it does not follow that all museums, especially if they have sufficient space around them, should have such courts. A court in a museum located in the heart of a crowded city is a good thing if it can be afforded. There should be no such thing as a stereotyped museum of art. Each presents its own problems, and should deal with them accordingly. A stereotyped museum structure means a cheap building.

Summary. The museum has made a new definition for itself, based upon a new understanding of its obligations to the community. It has assumed an active, even an aggressive, part in the public life. It has ceased to be a passive agent in artistic development with but two functions,—the acquisition of works of art and the display of them. It has taken to advertising its wares and services, as one who seeks to make a profit on an investment. These facts have changed its ideas of its architecture, and the problems of the building, once simple, have become complicated. These problems which, when simple, were thought to be easily solved by the architect who knew his Louvre and Vatican, now need wisdom and forethought in providing for the business of the other functions which can be given only by the man having experience in them. The plan must emanate from the museum man with the architect to help him. The Louvre-Vatican idea of museum functions is as dead as the dodo, and it follows as a matter of course that the Louvre-Vatican style of building is no longer adapted to the new ideas. The sooner it and the dignified and stately disasters resulting from too great devotion to the sacred principle of the fenestration of the facade are given over, the sooner we shall arrive at an appropriate style of museum architecture, a style beautiful and practical.
NEW Fogg MUSEUM, CAMBRIDGE, MASS.
COOLIDGE, SHEPLEY, BULFINCH & ABBOTT, ARCHITECTS
FIRST FLOOR

PLANS, NEW FOGG MUSEUM, CAMBRIDGE, MASS.
COOLIDGE, SHEPLEY, BULFINCH & ABBOTT, ARCHITECTS
MAIN ELEVATION

COURT LOGGIA
FREER GALLERY OF ART, WASHINGTON
CHARLES A. PLATT, ARCHITECT

Photos. Richard Southall Grant
Plans on Back
PLANS, FREER GALLERY OF ART, WASHINGTON

CHARLES A. PLATT, ARCHITECT
MAIN FACADE

CENTRAL COURT
NEWARK MUSEUM
JARVIS HUNT, ARCHITECT
PLANS, NEWARK MUSEUM
JARVIS HUNT, ARCHITECT
ENTRANCE FRONT

NORTH GALLERY

HORACE C. HENRY ART GALLERY, SEATTLE

BEBB & GOULD, ARCHITECTS

591
PLAN, HORACE C. HENRY ART GALLERY, SEATTLE

BEBB & GOULD, ARCHITECTS
ENTRANCE FRONT


A GALLERY
RHODE ISLAND SCHOOL OF DESIGN, PROVIDENCE
WILLIAM T. ALDRICH, ARCHITECT

593
PLAN, RHODE ISLAND SCHOOL OF DESIGN, PROVIDENCE

WILLIAM T. ALDRICH, ARCHITECT
BUTLER ART INSTITUTE, YOUNGSTOWN, O.
McKIM, MEAD & WHITE, ARCHITECTS

MULVANE ART MUSEUM, TOPEKA
THOMAS W. WILLIAMSON COMPANY, ARCHITECTS
ART MUSEUM, HECKSCHER PARK, HUNTINGTON, N. Y.
MAYNICK & FRANKE, ARCHITECTS

WALKER ART GALLERY, BRUNSWICK, ME.
MEKIM, MEAD & WHITE, ARCHITECTS
PLAN, ART MUSEUM, HECKSCHER PARK, HUNTINGTON, N. Y.
MAYNICKE & FRANKE, ARCHITECTS

PLAN, WALKER ART GALLERY, BRUNSWICK, ME.
MCKIM, MEAD & WHITE, ARCHITECTS
ENTRANCE FRONT

LOBBY
WALKER ART GALLERY, MINNEAPOLIS
LONG & THORSHOV, ARCHITECTS

Photos, Hibbard Studio
PLANS, WALKER ART GALLERY, MINNEAPOLIS

LONG & THORSHOV, ARCHITECTS
Modern Museum Design
AS ILLUSTRATED BY THE NEW FOGG MUSEUM, HARVARD UNIVERSITY

By MEYRIC R. ROGERS

For the past two decades there has been a growing realization, at least among those responsible for museum management, of the fact that the museum parti, as ground into members of the architectural profession during their student days, was responsible for a large share of their troubles. The idea of the monumental building,—something that would of itself adorn a municipality and memorialize its creator,—was, however, part and parcel of the professional credo, which it required more than vague, indefinite criticism to modify or eliminate. Of course the essential conception,—objects of beauty in a beautiful setting,—is not open to criticism, but the error lay in its interpretation, which emphasized the beautiful setting at the expense of the contents and showed practically no realization of how these contents were to be used thus enshrined.

It is particularly in this last particular that the growth of museum methodology has demonstrated the undesirability of the usual scheme. The nineteenth century and its predecessors, save in a few instances, regarded the museum as a mausoleum,—a casket,—beautiful, if you will, for the preservation of the artistic remains of dead ages. Safekeeping of these remains was the main object. Use was considered secondarily, if considered at all. It is strange how long it remained unrealized that works of art were only worth preserving if they were worth seeing, and that a museum building could rationally justify itself only on the ground that it made works of art easily and pleasantly accessible for inspection and enjoyment. It was, therefore, not long after this theory began to be put into practice by museum management that the inadequacy and wastefulness of existing buildings became evident, and the battle between the architect and the museum client was commenced.

The blame for this misunderstanding cannot however, be laid entirely at the door of the architect. Too often those responsible for new museums were too inarticulate or vague, when questions of structural organization arose, to be of much help, and were often themselves unable to escape from the mortmain of monumental design,—as indeed they sometimes still are. There were advanced, therefore, no cogent arguments which would lead the architect to change his mind and his method of attack.

A complete enumeration of the requirements of the museum as a functional organism would take too much space in this prologue, since most of the essentials will be brought out in later paragraphs. We can proceed on the hypothesis that today a museum cannot be regarded as a beautiful tomb but must be considered as representing an organization with somewhat complex functions, all turning upon the availability and display of its collections. This is the heart of the matter. A museum must be designed from the inside out; in its simplest terms, a museum building is merely an efficient and pleasing background. From this it is easy to see that museum designing requires at least a degree of the technological knowledge that planning of modern hospitals, hotels and business buildings has long demanded. To afford this, it comes as a corollary that museum management should not only be more explicit as to their requirements, but that they should also appreciate the architectural problems involved, so that their demands may be within the bounds of reason. In this country the fruits of such a realization as the basis for a scientific attack first appeared in the Cleveland Museum, as planned by Hubbell & Benes (Plate 120), and in the new building of the Rhode Island School of Design, by William T. Aldrich (Plate 125). Although somewhat complicated by additional functions necessary for the requirements of a university department, the new Fogg Museum of Harvard University is, perhaps, the most complete as well as the latest result of thoroughgoing cooperation between the architect and museum authorities. At any rate,
this will serve as a definite instance in which the requirements were explicitly stated and met four-square, with rather interesting results in many ways.

General Layout. The accompanying diagram will serve to bring out both similarities and differences between the simple museum problem and those which were set by the special requirements of the Fogg. In this instance the areas indicated above the dotted lines are considered as being available to the public.

It was taken as a cardinal principle that the building must meet squarely the requirements laid down, and as far as possible express the functions embodied in these requirements, as directly and simply as possible. Any preconceived monumental form was, therefore, rendered impossible. The building that resulted consists of a four-story structure surrounding three sides of an enclosed court, the fourth side being of two stories and extending about half its own length, with a longer and lower facade on the fourth side, which faces the street. The museum portion of the building, being that directly available to the public, finds itself, naturally, in this lower front portion;—that in the rear is devoted partially to space occupied by the teaching departments, though even in this section the first two floors are devoted to purposes which are a necessary part of any museum. The basement and sub-basement furnish in the main space for the workrooms of the operating staff, storage, and the mechanical plant. Only the two upper stories of the rear portion are used entirely for university purposes. It may be seen, then, that in the main, the Fogg Museum offers in its two main floors and basements a solution of the museum problem. It is this that concerns the present article, since it is of broad or general application.

First Floor. At the outset it was considered undesirable that the interior should bear the stamp of any particular architectural style, though in conformity with the exterior treatment, itself determined by surrounding buildings, the architectural detail used would necessarily be of a modified classical character. The most striking feature of the first floor plan,—the central court,—apparently violates this rule of non-stylistic simplicity. As a matter of fact, however, it is the exception that proves the rule, for it was particularly desired that this space should not be used for exhibition purposes, but should be what is known as a “rest-area,” to which visitors to the museum could constantly repair between periods of concentrated study of the collections. Since the scheme as developed logically called for a court with surrounding corridors, two treatments were possible,—on the one hand an open-air court, made attractive by growing plants, or on the other a glazed-in court, which would have to rely on its architectural treatment for interest. Climatic conditions made the success of the former plan extremely doubtful. The latter scheme, therefore, was adopted. For such a problem, Italian precedent was the obvious thing to follow, and the designers were fortunate enough to find that they could use, practically without change, the two-story arcaded motif designed by Antonio da Sangallo for his house at Montepulciano. This was developed and carried out in the material used in the original (Italian traver-
Gallery VIII, New Fogg Museum
tine) and so serves a secondary purpose as an example to the students of historical architectural excellence. It is hoped that a center fountain will eventually complete the design of the court. The plaster walls and groin vaults of the surrounding corridors have an extremely simple treatment, suggested by the original and quite in harmony with the general scheme of the building. The only other feature of this plan which could in any way be called monumental is the great hall, a two-story room of some 35 x 50 x 28 feet. This was intended to serve a double purpose, first as a gallery where large pieces of woodwork and tapestries could be shown and, second, as a concourse in connection with the lecture hall below. Again the treatment is of extreme simplicity, the walls being of plaster carefully toned and waxed, but having no architectural character except that derived from their proportions. What stylistic character it has is given to it by the sixteenth century French ceiling, which is itself one of the exhibits, installed at the time of the construction.

The remainder of the exhibition space on this floor consists of a series of small galleries, side-lighted, as in the case of the great hall, and intended for the display of the classical collections and for the use of the Oriental Department. Most of the objects in these collections are, of course, three-dimensional, for which side light is particularly desirable. The average size of the galleries is roughly 25 x 35 or 40 feet. They have a uniform height of 16 feet, and are lighted as far as possible from one side only by large windows reaching from a few inches below the ceiling to about 3 feet above the floor. The quality and quantity of the light admitted are controlled by adjustable opaque shades and by draw curtains of unbleached cotton. While the floors of the court, corridors, and great hall are of flagging, those of the galleries are of broad-board, solid teak left in its natural color and waxed. It is hoped that in the course of time these floors will darken naturally, and that to a large extent the curling consequent upon the dampness present in a new building will eventually straighten out. The galleries have a very simple plaster cornice and a narrow base of dark green terrazzo. Each gallery has a steel hanging rail concealed in the lower member of the cornice, and the walls are finished uniformly in a natural linen laid over waterproof building paper on a nailing surface of two-ply, cross-laid, 7/16-inch spruce, backed in turn by terra cotta. This wall construction affords complete flexibility for installation of works of art and has been used practically throughout the building. The wood backing has been treated with a salt solution for fire protection, but such a precaution is not really necessary, since the material is so compact that combustion is almost impossible. In conformity with the general scheme, the doorways and windows are simple openings without architectural trim. For artificial lighting the simplest possible enclosed bowl fixtures have been used, suspended in single units from the ceiling. Ample opportunity is given for special lighting and emergency use of electric current by numerous base outlets.

From experience so far it would seem that this extremely simple treatment, relying as it does upon good proportions and pleasant tones, is most satisfactory for the usual small gallery. The rooms used by the Department of Prints on the same floor are treated in a similar manner and have proved to be eminently satisfactory. The special nature of the problem necessitated for the library and its adjuncts a much greater space than would ordinarily have
been required in a museum of this size. In this instance special provision had to be made for use of this section of the building when the rest of the museum would be closed to the students and public, and facilities had to be afforded for large stack space and ample room for the cataloguing service. Furniture of the simplest possible type of natural oak, and tinted plaster walls, have proved satisfactory. For aiding study, different floor materials have been used, in both the print room and the library, from those used in the galleries. The floors of the print rooms are of fumed oak, and cork tile has been used in the library, and use of these materials is successful.

Second Floor. In the conventional museum scheme, derived as it is from the European palace, the second floor is usually given preëminence, and the fact is advertised by the use of a monumental staircase which faces the visitor immediately upon entering the building. In this particular instance, however, the two floors are of equal importance, and the stairway, so likely to inflict the visitor immediately with the anticipatory pains of muscular effort, has been relegated to a corner position where it is convenient but not conspicuous. Besides the main staircase for public use there are the service stairs in connection with the freight elevator, and an emergency stairway in the rear of the building. An automatic passenger elevator is also provided for the convenience of the staff and for the aged and infirm among the public. The second floor arrangement is essentially similar to that of the lower floor, where also the exhibition unit is considered to be the gallery and its adjacent corridor. This unit makes is possible to isolate any gallery without affecting the general circulation, and where the exigencies of the plan make its use impossible, the galleries have been so arranged that isolation is still obtainable. The finish of these corridors, in conformity with those on the first floor, is of plaster, but the floors are of reddish brown matt-glazed tile. The exhibition galleries correspond in size to those on the lower floor, and are for the most part top-lighted for the exhibition of paintings and prints.

Gallery Lighting. Top lighting, though rather expensive in construction and open to many objections, still seems to be the best method of lighting picture galleries. It is economical of wall space and is capable of giving equal light on all four walls as well as admitting the greatest possible amount of light. Clerestory lighting, which is a compromise between top lighting and side lighting, is practically impossible of application in small galleries, since it necessitates a disproportionate height and does not offer enough advantages in compensation. Monitor lighting has the disadvantage of eliminating by its very structure most of the light available, and in small rooms it creates an unpleasant appearance. By a process of elimination alone use of the skylight and flat sub-skylight holds the field. It has the great disadvantage of creating down glare and a tendency to throw most of the light upon the floor instead of upon the walls. A great deal of thought was given to this subject in connection with the Fogg, and all available experimental data were used in determining the exact method to be adopted in the treatment of the problem. As determined finally, the sub-skylights, some 15 feet from the floor, occupy practically the entire ceiling area, coming to within 18 inches of the walls. To get as even an illumination as possible, the diffusing chamber between the sky-
light and sub-skylight was made almost equal in height to the gallery proper, reckoning from the peak of the outer skylight. The glass used in the sub-skylight is plain white, hammered and wired plate, but the central panels have been acid ground to increase the diffusion and to lessen the vertical component. This in theory and in practice tends to equalize the light on floor and walls. Further adjustable control is given by the use of a louver system following the slope of the upper skylight. These louvers are of cloth and are operated by hand control from the gallery floor. The louvers govern the admission of direct sunlight and also tend to equalize the light on opposite walls. Unfortunately, the run of the galleries north and south somewhat lessens the effectiveness of this louver system, but any adjustment which tended to be more efficient in sunlight control tended to upset its equalizing qualities. The result is very satisfactory, since in spite of much greater illumination there is less glare than is usually found in the top-lighted gallery with deep coves. The interior finish of these galleries is the same in every practical respect as in those below.

Besides these top-lighted galleries, several small side-lighted rooms were devised for the exhibition of prints and drawings. Small cabinets offer the best background for small-scaled objects of this sort. These cabinets are arranged as a series of alcoves, their side walls canted to catch more directly the light from the windows. Artificial lighting in these alcoves is of the direct ceiling type, but in the top-lighted galleries the fixtures are installed above the sub-skylight. Considerable difficulty was encountered here because of the variation in the diffusing power of the sub-skylight glass, but it has been found that shadows are eliminated and an even light obtained when the fixtures are bunched directly above the center diffusing panel. Before leaving this subject, it should be noted as highly desirable that when such galleries are designed the diffusing spaces between the two skylights should be kept as open and free of structural members as possible, at least for a space of 6 feet above the skylight. This will result in economies in the upkeep of the museum as well as in greater flexibility in the installation of equipment. Self-supporting skylights of steel are desirable.

Unique Storage Facilities. A feature that is new in museum design is the placing of the picture storage rooms on the same floor as the exhibition galleries. This, while seemingly using valuable space for secondary purposes, has the great advantage of making those paintings not on exhibition readily and easily available for study under conditions largely similar to those afforded by the galleries. The storage of paintings in a basement without daylight is bad for the paintings as well as being a somewhat ignominious treatment for worthy works of art. This “painting study room,” as it is called in preference to “storage,” is equipped with a series of sliding screens of heavy wire mesh which convert the room into what is really a gigantic vertical file. The screens are supported from the ceiling on a double trolley, which prevents side swinging and makes it unnecessary to cut up the floor with rails. The appearance of this installation can be judged well from one of the accompanying illustrations (page 559). It is intended that this room should be kept in order and that it should be as pleasant a place as the galleries themselves. The room is, of course, equipped with the same facilities for heating, ventilating and
DOORWAY DETAIL
MUSEUM OF THE RHODE ISLAND SCHOOL OF DESIGN, PROVIDENCE
WILLIAM T. ALDRICH, ARCHITECT
MAIN ENTRANCE
MUSEUM OF THE RHODE ISLAND SCHOOL OF DESIGN, PROVIDENCE
WILLIAM T. ALDRICH, ARCHITECT
humidifying as are the galleries. The third and fourth floors are specially designed for use of the teaching staff’s university department, and are not vital parts of the museum itself; though the space furnished by a third floor would be useful for workrooms and additional offices in any art museum.

The Basement. With the exception of the areas occupied by library stacks and cataloguing room, the basement was designed mainly with the museum functions of the building in mind. A wide drive from the street gives access to the receiving room on the north side. The receiving room, occupied mainly with the receipt and shipping of works of art, is in direct connection with a room for packing and with the offices of the superintendent and registrar, the main storage space, and the freight elevator. A height of 12 feet in the clear has been kept throughout these areas, which are separated from one another by large double sliding fire doors. The walls are of hard plaster, and the granolithic floors are treated with a dust preventative. A large vault has been provided in connection with the main storage area, and it is needless to say that the latter can never be too large. Besides these facilities, the basement offers a special storage room, study room and curator’s office for the Oriental Department, a grouping particularly useful in the design of a departmentalized museum. In addition to these services there are additional work- or class-rooms and a darkroom and a workroom for a photographer. It is still a moot question whether daylight is necessary in this latter case. The public lavatories are also on this floor, connecting with the main circulation areas as well as with the lobby of the main lecture room, which is situated below the great hall.

The Lecture Room. It should be noted that the lecture room, where artificial light is all that is necessary, though daylight has been provided, can be opened to the public at times when the rest of the museum is closed. It has a separate entrance from the street which is also in direct connection with the great hall which can be used either with it or not at will. This feature, of course, is important in a university building, but it is even more valuable in the case of an ordinary museum plan, since many public lectures are given in the evenings when the galleries are closed. The lecture room seats about 400 and is equipped with projecting apparatus which makes it possible to throw two pictures side by side on the screen for purposes of comparative study. The floor of the lecture room is of cork tile, and it has an average slope of 1 foot in 20. The lecture platform is raised only about a foot above the floor and is in the form of a shallow recessed about 9 feet deep. The back of the stage, finished in plaster, is left unpainted to serve directly as a screen for the stereopticon. The lecture room walls are of plaster of medium density, and the ceiling, which is treated with shallow coffers, is partly of sound-absorbent plaster. The room is lighted by nine single direct units with dimmer attachments. Each unit has a parchment shade specially designed to eliminate side glare and to furnish sufficient direct downward light for note taking.

The Exterior. The exterior of the building developed directly from the fulfillment of plan requirements and, as such, offered a very difficult problem to the architects, since the solution had to conform with the accepted Georgian Colonial of the surrounding buildings. Use of the materials, brick with limestone trim, was dictated both by this and by questions of cost which, unfortunately, also made it necessary that most of the window trim be of wood rather than of stone. The architects met this problem, as well as many others, in an exceedingly able fashion, for though the resulting facades may be open to certain architectural criticisms from an a priori angle, no pretense was made of doing anything more than directly expressing what plan and section required. The effect, without and within, depends upon simplicity and on the qualities derived from studied proportions, careful fenestration, and an appropriate treatment of textures. The building is well within the well known “Harvard tradition.” It is in architectural accord with the oldest of the Harvard buildings, not far away, as well as in agreement with most of those built at different periods later.

EDITOR’S NOTE. In addition to being associated with Coolidge, Shepley, Bulfinch & Abbott as Consulting Architect in designing and planning the Fogg Museum, Mr. Rogers was Associate Professor of Fine Arts at Harvard. He was formerly a member of the staff of the Metropolitan Museum, and now has become Director of the Baltimore Museum of Art.
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THIS plate with Plate 16 suggests the advertising possibilities that lie in the ornamental treatment of enameled brick. The color possibilities range beyond our stock whites, greys and blacks into the more vivid colors. Slight irregularity in color, as indicated, is possible.

AMERICAN ENAMELED BRICK & TILE CO.
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What skintling does to a Common Brick Wall

Write for "Homes of Lasting Charm," an interesting book of twenty practical small homes, actually built and lived in by satisfied owners. It includes plans and suggestions for beautifying garden and grounds.

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SKINTLING adds a convincing touch of variety and interest to the dignity which is the inevitable heritage of a common brick wall. The flexibility of common brick, pliant in the architect's hands, is nowhere more conclusively demonstrated than in the many forms of skintling, which vary the surface effect, without increasing the cost. The broad expanse of the wall is relieved by shadows cast by projecting and irregularly placed individual bricks. It is an opportunity to achieve artistic values in the designing of the most modest dwellings.

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COMMON BRICK MANUFACTURERS' ASSOCIATION of AMERICA
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BRICK forever—
PREFERRED BY ARCHITECTS
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Architects, C. W. and Geo. L. Rapp
Builders, Thompson-Starrett Company

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Minor Buildings of Brittany and Normandy
A Review of Provincial French Types

As the author points out in his introduction, "the smaller buildings and particularly the smaller examples of domestic architecture of any district have a fascination due not alone to the fact that they are particular witnesses to the life of the times in which they were built, but even more to the fact that they have an intimate appeal to a great majority of people. The larger and more monumental work will be admired, but when the smaller and more picturesque work is at hand an intimate relation arises immediately, together with a certain desire to possess something similar. There are few persons, regardless of how formal may be their general mode of living, but have a latent desire for at least a period of simple informality, while for the vast majority, circumstances of one kind or another have imposed upon them more or less simplicity of living."

If Mr. Foster needed any convincing excuse for the publication of his book, that excuse could be found in his own words just quoted. As a matter of fact, he needs no excuse, and the existence of the volume is fully justified by the excellence and variety of the material it contains. Any book, indeed, is more than welcome if it tends to the betterment of small house design, whether the scope of such design be rural, suburban, or for the closer limits of the city. Despite all that has been done in this direction—and much substantial progress has been made within the past few years—a more general consciousness of opportunity and a keener sense of responsibility need still to be aroused in order to lessen the number of small house atrocities that continue to be perpetrated on every hand. From sheer force of numbers, the small house is bound to give the prevailing architectural tone to any given part of the country. It is vitally important, therefore, that the character of the small house should be a subject of concern, not to architects alone but also to the general lay public. Fortunately, Mr. Foster's volume, besides presenting abundant subject matter of immense suggestive value to the architect, is well calculated to excite both the interest and admiration of cultivated laymen with an intelligent outlook upon architectural affairs.

To design and execute creditably a house patterned in the picturesque, informal manner of any local traditional type,—whether French or British, Spanish or Italian,—is a far more difficult matter than it is to follow acceptably all the methods and peculiar niceties of some familiar and well established mode. It requires not only a broader knowledge of all manner of minutiae but also a peculiarly sympathetic grasp of all the conditions out of which the type chosen as a working basis was evolved. Furthermore, it calls for a clear perception of the essentials underlying the desired picturesque quality; otherwise the result is likely to bear the stamp of affectation and prove a source of satisfaction only less ephemeral than a piece of stage setting. As Mr. Foster aptly observes, "a good picturesque design is difficult to achieve because of the very anomaly of the two words. 'Picturesque' rather precludes 'design'. It is more accidental, with various parts added by chance and because of definite requirements; it depends for its charm more on mass and texture and color than on symmetry and detail. To be sure, there is always a certain amount of balance, but it is that balance which comes as a natural result of the instinctive desire for order and repose rather than as the result of studied design,"—and particularly true of French architecture.

With the foregoing considerations ever in mind, a close study of the churches, cottages, town groups, manor houses and farmhouses illustrated in this volume cannot fail to be immensely profitable. Every drawing and half-tone will bear repeated scrutiny and analysis; each inspection will yield a fresh store of stimulating suggestion. The 84 plates contain over 130 half-tones and ten drawings by Mr. Rosenberg, presented in his customary fascinating and convincing manner. The subjects illustrated are all in Normandy and Brittany and display a striking diversity of types not easily to be paralleled elsewhere in France within a like territorial compass. As might be expected, Normandy holds the majority of these varied types. The whole region, as the author indicates, is peculiarly rich in domestic architecture instinct with sincerity and simple straightforwardness,—architecture that is purely ingenious and not at all "on parade,"—but it is impossible to agree with his statement that Normandy contains but "few fine town houses and few real chateaux." The great chateaux of the Loire valley,—the chateau country, par excellence,—one does not expect to find multiplied over the face of the entire country, of course, but hidden away in secluded valleys are many chateaux that are veritable gems, and they can hold their own with anything in chateaudom, in quality if not in size. Much of the charm of Norman small domestic architecture depends upon the materials and the way they are used, the textures secured, and the colors shown in the ensemble. Mr. Foster's notes on materials, textures and colors, therefore, will prove an especially useful feature of the book and will materially aid the designer in catching the spirit which animates this particularly delightful and yet highly elusive type of domestic architecture.

GRADE SCHOOL BUILDINGS; BOOK II

IN no department of architecture have the last ten years seen quite the progress which has been made with schoolhouses, a class of buildings of the first importance, since they exert a strong influence upon their communities, and by their architectural excellence or the lack of excellence they elevate or lower the architectural standards of entire districts. Study of school structures, particularly at the hands of a group of well known architects, has resulted in their being given a high degree of architectural distinction and dignity in the way of design, while study directed toward their planning and equipment has led to their being practical and convenient far beyond what was regarded as an advanced standard of efficiency anywhere in America even a few years ago.

Kensington Schoolhouse, Great Neck, N. Y.
Wesley Sherwood Benson, Architect

THIS volume, a companion to another published in 1914, records the results of endless study and experiment in different parts of the country, summed up and presented. By illustrations of exteriors and interiors, by floor plans and carefully written descriptions and articles by well known architects and educators, the present high standard of schoolhouse design is made plain, and these results which have been achieved by a few architects and school boards are thus made possible to all architects who are interested in schoolhouse design.

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THE PRACTICAL BOOK OF DECORATIVE WALL TREATMENTS. By Nancy McClelland. 273 pp. 8 illustrations in color; 211 in black and white, 8½ x 6⅞ ins. Price $10.

In the modern revival of interest in the different arts, one of the most fascinating subjects is that which deals with decorative wall treatments, an art which has known its periods of inception and growth, dating back to the time of the Pharaohs, 4,000 or 5,000 years ago, until between the thirteenth and eighteenth centuries, wall treatments reached their highest development and were most important in aiding interior architectural expression. Research into the phases of interior wall decoration provides matter of interest and is of great importance to the modern world of architecture and decoration.

Among the various wall treatments which have been in use, wood paneling was greatly favored in England in Tudor and Stuart days, and became very popular here in America, as also was it the most important feature of Louis XV walls, usually made of oak or pine in curving panels, painted in delicate and vivacious colors. Mural painting, introduced to the modern world in the first half of the fifteenth century by such masters as Raphael, Veronese, Titian and Tintoretto, became architectonic in character. Mural paintings became huge pictures framed in architecture. The use of simul-architecture made its way into other countries. The first attempt at mural decoration in America came with the use of stenciled borders in simple designs followed by what are known as "American frescoes." These paintings were largely naive landscapes with many trees, birds, flowers and picture subjects. Although the art of fresco painting began before the Christian era, its greatest development for decorative purposes commenced in Italy in the thirteenth century, Giotto being the most eminent fresco painter of this age, followed by Masaccio, Fra Filippo Lippi and Botticelli in the fifteenth century. Marbleizing, the art of veining or graining in imitation of marble on plaster, slate, wood, iron and glass, was another form of wall treatment which was used extensively in Italy during the fourteenth and fifteenth centuries. The great master, Raphael, made use of marbleizing in the Stanze of the Vatican, where cost was not a matter of much consideration. In Italy in the seventeenth century, when real marble could not be procured or afforded, dadoes, cornices, pilasters, and other architectural features of wood and stucco were marbleized in a fashion to deceive the most critical eye. Much architecture was painted illusion, instead of being actual construction. Wherever there were great plaster wall spaces not covered with frescoes, figures or landscapes, painted architecture became common, especially in Tuscany, and so perfectly were these architectural schemes carried out that they seemed actually in relief. Cornices, pilasters, niches with figures and pediments over doors, were done in light and shadow in the most convincing and reassuring manner.

In this volume Miss McClelland has handled with the utmost deftness a fascinating subject, and far from being technical for the layman, it is, nevertheless, invaluable to the technician. The author has given us many elaborate schemes of decorative wall treatments, among which will be found certain elements capable of being transplanted into our own dwellings. Among these, use of tiles for wall decoration is perhaps the oldest, adopted in the Orient in the fifteenth century by Spain and
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Architect and Master of Many Arts

Perhaps no architect who ever lived in America built up more of a personal following than Bertram G. Goodhue. His was one of the two or three names which came instantly to mind when Gothic ecclesiastical architecture was mentioned, and his churches, many and prominent, have exerted their influence upon ecclesiastical architecture all over the world. But Mr. Goodhue was equally talented in other and quite different ways. He well knew how to handle architecture of entirely other kinds, and his drawings, book plates, illustrations and type faces were of such note that they all but compete with his work as an architect of Gothic churches.

This volume constitutes a record or review of Mr. Goodhue's achievements in many fields. Those who collaborated or worked with him have contributed to its text, and its illustrations set forth the excellence of his work in all the arts of which he was an acknowledged master. It is a magnificent and authoritative work, issued by the Press of the American Institute of Architects.

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Holland, countries which have made the most lavish use of tiles, and it is to these two countries that we owe many beautiful tile designs and practical suggestions for their employment. Both England and America favored use of the famous Delft tiles, which were made in Holland from the commencement of the seventeenth century, and which were generally white decorated with blue and yellow. Among the many illustrations in this volume may be seen one of an interesting arrangement of old Persian tiles; the skilful employment of the patterned wall surface and its combination with other materials is especially notable. The art of making decorated leather began with the Arabs or Moors; dating from the thirteenth century. Cordova in Spain was the seat of this industry in the fifteenth and sixteenth centuries, and so famous did the Spanish industry become that leather hangings are even today generally known as "Cordovanes."

Today, many signs point to the revival of the decorative idea. There is a live and healthy interest in architectural features, such as wood paneling. Mural painters are perhaps more busily occupied than they have been for years, and those who furnish us with wallpaper have been among the first to feel the stimulating reaction against monotone backgrounds that now prevails. Since wall paper was developed in the fifteenth century, there have not been so many fine designs as there are today, beginning with the handsome scenic papers, that combine vigor of color with fine motifs in panoramic variety, and ending with those showing minute dots and flower petals. Many wall papers which depict historical events do not cover the entire surface of the wall, but are used very effectively in panels, as may be seen in certain rooms at Fontainebleau. Scenic papers are delightfully called "story papers" in France because each is a variegated theme, either of some landscape or of some familiar fable.

Miss McClelland considers not only the various forms of fixed wall decoration that may be employed to give beauty to a room, but devotes an entire chapter to the many forms of movable wall decorations which include pictures, mirrors, wall lights and wall clocks, hanging shelves, carvings and textiles, whose functions are quite as important in their way as are the built-in decorations. Scale, balance and suitability are taken into consideration as well as color schemes. This volume is unusually well illustrated with interiors abroad as well as in America.


Study of the origins and development of interior architecture, decoration and furnishing in early American days received a decided impetus with the opening of the Early American Wing at the Metropolitan Museum. For the first time there was presented upon an adequate scale the development of the American interior, rooms being arranged in the ways which prevailed in different localities at different times; in most instances, in fact, actual interiors are used, and the furnishings are authentic pieces of the different periods. The guide to the Early American Wing, published by the Museum is helpful and complete, but something more than a guide book has been required for complete study of the Wing and its treasures. An excellent and concise history of early American furniture correlated to the contents of the Early American Wing is what this work is in effect, the numerous illustrations being largely from that source.
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One of several subjects related more or less closely to architecture which is just at present receiving considerable attention is concerned with the selection, planting and care of trees. Particularly in rural places the presence or the lack of suitable trees goes far toward either making or marring the effect of buildings which are in themselves good, and since streets in cities and towns are ordinarily planted with trees, the subject has its application to localities urban as well as to districts rural. And yet it is really amazing to see the stupidity with which the matter of tree culture is approached.

In New York one frequently sees young trees struggling for existence in places where they are surrounded by large areas of asphalt or granitoid pavements, where for them to secure moisture and air for their roots is absolutely out of the question, or else planted in places where, since a subway is but a foot of two below the surface, growth or even long continued life is quite impossible; and even in New York’s parks there seems to be utter indifference, or else complete ignorance, of the importance of cutting away from trees the dead wood which comes with neglect and which should be removed.

This work is a helpful survey or review of the entire subject of trees and their care. In addition to discussing the choice of the best varieties of trees for certain uses, it deals with their planting and care, the curing of their diseases, the extermination of moths or insects which threaten their lives and often kill them, the removal of fungi, and their proper treatment when they are so injured by wind, ice, or snow that their limbs must be amputated and wounds healed. It may well engage the attention of architects and engineers as well as of the landscape architects, to whom it is presumably primarily addressed.


The wide gulf fixed between public understanding and real appreciation of art in its various forms is largely the result of misunderstanding of just what art is and what it means. Our museums are thronged by people who are drawn thither not by curiosity but by a genuine yearning for a closer knowledge of art in its various forms, and the lectures and informal talks which thoughtful museum officials provide supply for many the interpretation of what the visitors see and unlock the door which for most people is shut between art and understanding. For many, however, if this door is to be opened at all it must be not so much by the aid of the spoken word as by that of the printed page, and this is what has been done by Professor Parker, of the Department of Philosophy in the University of Michigan, in a volume made up, as the preface points out, of material used in lectures given at the Metropolitan Museum during January, 1926. The work does not attempt to offer a complete survey of the large field of aesthetics, but rather to afford study of some of the basic problems of the philosophy of art, and to focus interest and attention.

Provincial Houses in Spain

By Arthur Byne & Mildred Stapley

Architects value Spanish types of domestic architecture because of their simplicity of design and plan and also because they are easily developed in materials inexpensive and easily had. Spain offers a choice of several kinds of residence architecture, types sufficiently different from one another to afford considerable range of selection, yet all possessing the same strength and virility, the excellent lines, the same graceful but unaffected grouping, and the discriminating use of detail which renders distinguished so many Spanish domestic buildings.

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Plate 15

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On a one-acre plot at Garden City, L. I., Dubois is being used in four separate and distinct ways: (1) a boundary fence, (2) a frame for the garden inside, (3) to hide service yard details, (4) to screen the garage.

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HE interior of the new Paramount Theatre, New York, is of the Louis XVI period of the French Renaissance. This interior was designed to reproduce as faithfully as possible the architecture and decoration of that period.

The decoration of the auditorium incorporates the typical ornate cream-and-gold color effects of the period. All architectural details are picked out sharply in gold.

The basic color is a delicate cream verging slightly upon gray. Not only does it serve the spirit of the decoration, but it forms a background well adapted to the colorful theatrical effects produced with artificial lighting.

This delicate cream was also used as the basic color throughout many of the other rooms in the theatre.

In the Peacock Promenade, for instance, this color is used as a background for other colors. A light blue gray is used in the sunken ceiling coffers, and a light grayish green in the lunettes. The fine striping on the pilasters is done in gold and greenish blue. The panels on these pilasters are treated with a Crumpled Roll finish in a grayish blue that is slightly warmer in tone.

These delicate tints were readily obtained with Dutch Boy white-lead and flatting oil. This paint can be tinted to any color desired. For that reason it is especially adapted to interior decorating work of any kind. And it produces a handsome flat finish which repeated soap-and-water washings will not mar.

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To the Egyptians, and after them the Greeks and Romans, we are indebted for the idea of producing Johnson's Liquid Wax Glaze. Retaining all the good qualities of Encaustic painting, it simplifies the process tremendously, and extends its range to cover every modern need for artistic wall treatment.

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How to Use Johnson's
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Johnson's Liquid Wax Glaze is specially prepared for use on wall surfaces. Like Johnson's Liquid Wax for floors, it is made from the best quality of raw materials, gathered from the four corners of the earth. For this purpose, a wax is required that combines all the following features—the highest percentage of fine, hard waxes; ease of application; smooth, uniform body; pleasing color and odor; hard drying and, above all, the capacity for a perfect finish.

Johnson's Liquid Wax Glaze combines all these qualities. Colorless in itself, it can be easily and quickly colored to any desired tint or tone with any standard, chemically pure oil color. This makes it very convenient and economical, since the decorator can mix his own colors in the quantity needed for each particular job.

Sizing

After the wall coating (Sand plaster, Textone, Craftex, Stucco, Muraltec, Rukkote or other coating) is thoroughly dry, apply one coat of a 50-50 mixture of Johnson's Permacote and Johnson's Wall Size to the whole surface. This sizing coat is absolutely necessary to stop the natural 'suction' of any wall coating. Allow the size to dry overnight before applying the coat of colored wax. On sand finish plaster, where there is a great deal of suction, we recommend one coat of white shellac (5 lb. cut) over the first size coat, or three coats of flat wall paint, allowing each coat to dry thoroughly.

One-Color or Two-Tone Finish

To obtain a one-color finish apply Johnson's Liquid Wax Glaze, colored to the desired shade with oil color, with an ordinary three-inch paint brush over a section of wall conveniently large for easy working. (Illustration 1.) Then, with a clean, soft cloth, pick up the Glaze until the desired effect is produced.

Rich, attractive two-tone effects can be easily secured by wiping more of the Glaze off the high spots, leaving the depressions darker. Finish by polishing as described below.

Finishes of Two or More Colors

To obtain a multi-colored finish, first apply the colored base coat of Johnson's Liquid Wall Glaze as for a one-color finish. (Illustration 1.)

Second—Spot the other colors to be used over the base coat. (Illustration 2.)

Third—With a clean, soft cloth pick up the colors, blending them until the desired effect is produced. (Illustration 3.)

(Note: On a wall surface which has been properly sized, Johnson's Liquid Wax Glaze can be worked for at least an hour after applying, without danger of laps or streaks.)

Fourth—Polish as directed below.

Gold or Silver Effects

To secure the effect of gold or silver over color, mix a small amount of gold or silver bronze powder in the natural Johnson's Liquid Wax Glaze and apply lightly with a soft cloth, touching only the high spots. Polish when dry as directed below.

Polishing — Important

Allow the Glaze to dry thoroughly (24 hours or more, depending upon the amount of Glaze applied and the temperature of the room). Then polish with a stiff bristle brush. A 3 x 9 inch wax polishing brush without weight or handle is ideal for this purpose. Johnson's Deluxe Electric Polisher can also be used to good advantage.

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The stipple glazed finishes are produced as follows: Prime with Eagle White Lead thinned with about 1/4 boiled linseed oil and 3/4 turpentine. Second coat: Eagle White Lead thinned with flatting oil or with turpentine. Third coat: Eagle White Lead with flatting oil or turpentine; brush on stout coat and stipple on the harmonious glaze color with wall stippling brush — do not paint the glaze color on. Finish with flat varnish to protect the surface.

Antique glazed finishes are best produced on two or three ground coats of Eagle White Lead mixed as for stipple glazed finishes, and tinted to the desired color. Mix glazing color of pigment (ground in oil) thinned with flatting oil; or with glazing liquid of one part turpentine, two parts boiled linseed oil and four parts flat varnish. Brush glazing color over the entire surface and immediately wipe with a clean cloth. Wipe out practically all the color, leaving a dark stain only in corners and along the moulding edges. Finish with flat varnish.

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Architects who stake their reputations on Pondosa Pine can have nothing to fear. Complaints don't camp on their doorstep. No danger of warped, twisted or sagging doors, sash or trim in the homes of your clients who use it. For Pondosa, the Pick o' the Pines, is quality wood in every plank and board.

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YOU ask: "Why mention Flagging in the same breath with Olde Stonesfield Roofs?"
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The weather forecast was "continued cold with temperatures down to zero and below." Yet, the concrete roof deck for the Studebaker Corporation's foundry (400,000 sq. ft.) had to go on. It did. Despite the cold and snow the roof was completed on schedule.

Winter weather cannot stop the erection of a Federal Cement Tile Roof. For instance, this last winter, a paper mill up north was roofed during a temperature of sixteen degrees below zero. No waiting for conditions to become suitable for pouring—no long and costly delays. These precast concrete slabs are factory made, fabricated to fit, hoisted to the job right from box cars. Specifying this type of roof insures on-time completion under all conditions.

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Federal Cement Tile brings to roof construction all the permanence of concrete—its fireproof qualities—its imperviousness to all destructive elements—and the light weight saves steel.

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The Christians were coming! With feverish haste the Moslems sprang to hold Castilian Toledo. Better weapons were the need!

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of flawless steel, beautifies as well as banishes radiator-soiled walls and heat-suggesting radiators that interfere with cool appearing Summer interiors. Now, after redecorating, is the time to install them. Ask for Booklet "K" No obligation.

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The new floor covering was linoleum—and Wild's Linoleum if you please. It had been recently manufactured in America for the first time, by Joseph Wild. He, it was, who brought from England, Frederick Walton, the inventor of the linoleum, to erect an American factory at Linoleumville, Staten Island. He it was who alone exhibited the linoleum that stirred the crowds at the Centennial in 1876. He it was in the ensuing years who promoted the linoleum industry in America and initiated every great advance in linoleum manufacture and design.

This leadership in style and quality characterizes the Wild's Linoleum you buy today. Thus, the variety of Wild patterns is $2^{1/2}$ times greater than any other high quality linoleum.

If you cannot visit Wild's enlarged showroom, we will help take our showroom to you by mailing you samples of several leading new patterns—Joseph Wild & Co., 230 Fifth Avenue, New York.
Effective Use of Linotile in Panel Design

The panel effect, which serves to break up the monotony of large floor areas, is very easily handled with Linotile. The sizes of both strips and tiles lend themselves readily to this treatment, and the great variety of colors make it possible to work out very pleasing decorative designs.

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THE FRINK CO., Inc.
241 Tenth Avenue
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Branches in Principal Cities
In Wellesley’s Newest Lecture Hall
—Non-Slip Steps of Alundum Tile

R-r-r-r-ing goes the closing bell. The girls swarm from their seats. They pour down the aisles. And the hustling feet are protected against slipping for each step in the lecture hall of the new Botany Building has a nosing of Alundum Stair Tile.

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"MISSISSIPPI WIRE GLASS"

MISSISSIPPI WIRE GLASS COMPANY, 220 Fifth Ave., NEW YORK
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ST. LOUIS
It's Never Too Late for Correct Lighting

Each of these three New York buildings was opened at some time within the past ten years. In each of them, tenants squinted, strained, looked closer, wiped tears from smarting eyes.

Light? There was plenty—that is, at the source, glaring, casting sharp shadows on desks and papers. Or, smothered in unscientifically designed globes, it only half-reached the desks, left corners dark and gloomy.

Recently, tenants noted a remarkable improvement—all lighting glassware had been replaced with MONAX Globes (the Ainsworth Archer Model, illustrated above). Offices and corridors were abundantly lighted, sharp shadows softened or entirely disappeared. Even the farthest corners were brightened by the generous flood of illumination. Glare had vanished, for MONAX diffuses light perfectly.

The building management is pleased, because, besides correcting a serious lighting defect, MONAX Globes are economical of wattage. They absorb scarcely any light, do not collect dust, and are easily cleaned. Their thanks to Macbeth-Evans Glass Company, who supplied the globes, and to George Ainsworth of New York who planned the installation.

The planning service of Macbeth Illuminating Engineers is available to any architect or building manager. Address Macbeth-Evans Glass Company, Dept. J., Charleroi, Pennsylvania.

MONAX GLOBES
for Better Lighting
Every Window a Source of Health

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Ultra-Violet Ray Glass

QUARTZ-LITE is a clear, flat glass of high quality and brilliant lustre, appropriate for the finest residences. It will enhance the attractiveness of any building in which it is used.

And yet QUARTZ-LITE costs less than plate glass and but little more than ordinary window glass. It is so low in price that it can be used for general glazing purposes—only 50c a square foot.

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Windows glazed with QUARTZ-LITE GLASS transmit a greater volume of ultra-violet rays—the health rays of sunlight—more daylight and more of the warmth of sunlight than is possible with other window or plate glass.

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There is no finer glass for windows than LIBBEEY-OWENS “A” quality flat-drawn sheet glass.

Made by an exclusive process, it is uniform in thickness, beautifully clear, with a brilliant sparkling lustre, and absolutely without bow.

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A Quality Product
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Strong Uniform in Thickness
A brand you
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Write for name of Adamston Jobber in your vicinity.

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Celestialite, the three layer lighting globe, throws a soft, white light that accentuates all of the minute niceties that the architect so carefully specifies.

The three individual layers of glass (see illustration on left) diffuse and soften the light rays so that you can work for hours and hours without straining the eyes.

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The Scientific American organization made a study of the lighting problem. Their tests convincingly proved that CELESTIALITE illuminates interiors better than any lighting glass obtainable today.

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Used by an average of 3700 men a day, these washstands, twelve in all, are exposed to constant handling. One month’s use of a single set of their metal fittings is equivalent to a year’s use in the average home.

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

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PERMANENTLY BEAUTIFUL - DOES NOT TARNISH - WEARS INDEFINITELY
Win-Dor Series 25 Casement Operator

Particularly suited to steel casements

This handsome new addition to the Win-Dor line offers advantages never before available. So compact that it does not project above the sight-line, and designed in lines of real architectural beauty. Only four turns of the crank are needed to swing the casement full open. The action is exceptionally powerful, easy and free from play. Bearings and gears are completely enclosed and cannot “freeze” because one member of any two working parts is always made of non-corroding bronze. The most compact, the most beautiful and the longest-wearing geared operator now on the market.

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BED ROOM SUITE IN THE RITZ TOWER  METALACE RADIATOR ENCLOSURE
Mr. L. H. Kaiser, Pres.,
The John Van Range Co.,
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The Tiffany in the Kitchen Equipment Line.

The above tells the story of John Van Range. For the past several years I have had the pleasure of doing business with you in different parts of the country, and particularly since my coming here completely remodelling the Coffee Shop Kitchen, and installing the new Sandwich Grill. As each job has been completed, I have marvelled at the finished, efficient appearance and the quality of the material and workmanship.

My reason for writing you at this time is to particularly commend the close co-operation and efficient manner in which the installation was handled by your Chief Engineer, Mr. Forringer.

Assuring you it will always be a pleasure to recommend "The Tiffany of the Kitchen Equipment, World's" to my friends and other hotel managers, I am

Very truly yours,
Ralph Hitz
Manager.

The HOTEL GIBSON
Cincinnati, Ohio
Mr. RALPH HITZ, Manager

Cincinnati's famous hotel has long been a user of Van Equipment.
faction of Every Van User
Expressed by Mr. Hitz

If you are considering buying kitchen equipment . . . . Mr. Hitz' letter will interest you. He says about Van Equipment what you will want to say about the equipment you buy! You are sure to enjoy this same enthusiasm if you bring your equipment problem, large or small, to the House of Van.

For many, many years now we have been building Van Equipment to our own high standard. We have engineered it with the most expert skill available and installed it with every care for the interest of the owner. The result is a record of satisfied users that stretches back through the years, and continues to multiply as days go on.

We urge you to try Van Equipment for yourself. If not a whole kitchen, then any item will prove the dependability and economy of the Van line. We'll gladly send specifications for anything that interests you.

Providing the equipment when, where and how it is wanted is a guiding principle with Van Engineers. They serve you as you wish to be served—providing the right equipment to meet your needs—cooperating with you to secure the utmost efficiency and economy.

This Sandwich Grill of the Hotel Gibson, Cincinnati, is a recent example of their work.
"Tenants are demanding Smoothtops"

— John A. Olson

His demand is again answered in The Manor, the new Tudor City Second Unit apartment group. The Manor is another towering proof that "the smarter East Side" of New York City is expanding farther eastward. It embodies throughout the latest advances in apartment house design.

"It therefore embodies Smoothtops," said John A. Olson, President of the famous Fred F. French Company, Architects, Engineers and Builders, who planned and constructed The Manor. "More and more prospective tenants for French-designed dwellings are demanding Smoothtops in the kitchens. Happily, this is in accordance with the French plan—which is to bring about the utmost in dwelling convenience and comfort."

Authoritative opinion, such as Mr. Olson's, knows that a Smoothtop does "dress up" the kitchen. That it does save space and allow more light to enter. That it does give the best in cooking service. Which is undoubtedly the reason why Smoothtops are fast becoming standard in all French kitchen specifications.

To meet this general demand our Building Service Department has collected data which is of practical help in all problems of kitchen planning. Please feel free to make any inquiry.


There is only one Smoothtop and it is fully protected by patents.

The reason why Smoothtop "works so well" is the aeration plate attached to each burner.
CON-TEX Treated Roadways have the permanence and stability of concrete plus the appearance and color harmonies of clean compacted stone.

Con-Tex is a material that “improves and extends the uses of concrete.” The Con-Tex Surface Treatment is simple and inexpensive, whether for finished surfaces or for bond surfaces.

Tell us your problems and let us send you detailed information.

CONCRETE SURFACE CORPORATION
342 Madison Ave., New York
When it comes to getting final approval of plans and specifications for the home or apartment building, and then keeping the client sold, it's largely a matter of pleasing the woman. And the surest way to do that is to design a kitchen that meets the modern demand for built-in beauty, convenience and space economy.

Designed and constructed by specialists in kitchen planning, McDougall Domestic Science Built-in units are unexcelled in high quality of material and workmanship, and their installation is guaranteed to meet your most exacting requirements. In fact, McDougall has never lost, during all its thirty-five years of pioneering leadership, a single customer because of inadequate service.

Write today for detailed information about our Architectural Service Bureau. A copy of our illustrated catalogue will also be sent on request. There is no obligation.

McDOUGALL COMPANY
Frankfort, Indiana

McDOUGALL
DOMESTIC SCIENCE BUILT-IN
Kitchen Units
100,000 Dollars
worth of electric refrigerators
and
every one a Frigidaire

Here we picture a section of Tudor City—one of the world's largest and most famous dwelling projects. A magnificent development structure covering several New York blocks. Into Tudor City go one hundred thousand dollars' worth of Frigidaires!

Why was Frigidaire the choice of Fred F. French Company, Tudor City builders, over the many other makes of electric refrigerators?

Not by chance. An investment of one hundred thousand dollars is not made lightly. Competing makes were tested and compared. Intensive research was conducted by leading engineers. Laboratory methods of investigation were employed. All proved Frigidaire superior to the others. Its absolute dependability. Its longer life. Its lower operating cost.

Fred. F. French Company and Others Investigate for You

Your problem, in proportion to investment, is no different than the Tudor City problem. When you buy a single electric refrigerator you want the greatest value for the least expenditure—and the Fred F. French Company did when they bought one hundred thousand dollars' worth of Frigidaires.

But you can't employ skilled talent to carry on exhaustive research and to make detailed comparisons of various makes. Nor is it necessary. Organizations like Fred F. French Company, great industrial concerns like Carnegie Steel, the largest ice cream manufacturers, apartment building owners—all have done this research for you. So well have their findings been followed that, today, more Frigidaires are in use than all other makes combined.

An Investment That Pays Big Returns

The investment in Frigidaire equipment for the apartment buildings you plan pays big returns to the owner. Returns in the form of better satisfied and better paying tenants—lower tenant turnover—lower property depreciation—reduced building and maintenance costs.

New, Low Prices

Huge production effects economies that are passed along in lower Frigidaire prices. Now a new Frigidaire, ready to operate from any electric outlet, for only $180 f. o. b. Dayton. Also reduced prices on other models.

Call at the nearby showroom today. Or write for new booklet and complete information.

Frigidaire Corporation
Subsidiary of General Motors Corporation
Dept. A-209, Dayton, Ohio

Frigidaire
A PRODUCT OF GENERAL MOTORS
What is the Price of a MODERN Step-Saving Kitchen?

WHAT is the price of scientifically developed, soundly built, beautiful kitchen equipment? We invite you to figure it out for yourself—item for item:

Set down the cost of lumber for ordinary cupboards, the cost of their hardware, paint, etc., the cost of labor on them. Then compare the total with the cost of Napanee Kitchen Equipment. You will find the figures to be practically the same. But—

Consider these extras: All hardwood lumber—every inch of it—which protects Napanee Equipment against humid kitchen atmosphere; rust-proof hardware; porcelain top work table; patented easy-fill flour bin; complete 10 piece set of crystal glassware; patented metal bread drawer; handy shelves; sliding trays, sturdy racks, convenient hooks and holders—all arranged to centralize operations and systematize movements as no set of cupboards can.

Is it any wonder that architects and builders are keeping us busy night and day with orders for their fine apartments and lovely homes? They tell us time and again that such apartments and homes rent more readily and sell more quickly because of Napanee equipment.

COPPES BROS. & ZOOK, Nappanee, Indiana.

The combination illustrated at the top is made up with a Refrigerator-cabinet 40% in. wide, a Broom Closet 16% in. wide and a Dish Cupboard with four drawers, 16% in. wide. The combination in the middle is made up with a 48% in. Cabinet, and the same Broom Closet and Dish Cupboard shown in the top combination.

The combination shown here (at the bottom) is made up of the following Units: a 40% in. Cabinet, a 24 in. Refrigerator with a 40% in. Top-Cupboard of the same width, a 16% in. Broom Closet and a 16% in. Dish Cupboard. The height is 85% in. The depth is 21 in. except the Cabinet Top which is 12 in., and the Porcelain Top which is 25% in.
THE Keith Palace, Cleveland, Ohio.

It is significant that this "big time" 3,200-seat theatre has installed the York Carbon Dioxide system of air cooling and conditioning—a system which enables it to guarantee the theatre-goer entertainment plus comfort.

The Keith is one of thirty York air conditioned jobs.

The demand for air conditioning, and cooling systems in theatres, hospitals, hotels, industrial institutions, etc., is increasing. On every hand it is conceded that pure, humidified and properly tempered air is conducive to efficiency as well as comfort. The York organization specializes on this distinct phase of engineering and will gladly cooperate with and furnish pertinent data to architects interested in installations of this character. Return the attached coupon for complete information.
Architects praise the flexibility and construction of these units

To the architect, the wide variety and flexibility of Kitchen Maid Units are vitally helpful factors. No matter what type or size of kitchen is being planned, there are units to cover all its equipment needs. Each unit is complete in itself—may be used alone or in a unit combination.

These units are built to the architect’s highest ideals of design and craftsmanship. Of carefully selected, carefully kiln-dried woods. With rounded inside corners, smooth doors of five-ply construction, concealed hinges, triple suspension-metal-trolley drawers.

Kitchen Maid Units offer a large list of other important advantages over ordinary kitchen equipment methods. Yet standardization renders their cost installed surprisingly low. Write for catalogue fully describing all the units with dimensional drawings and prices.

WASMUTH-ENDICOTT CO., 1812 Snowden St., Andrews, Ind.

"Let the Kitchen Maid Be Your Kitchen Aid"

KITCHEN MAID
STANDARD UNIT SYSTEMS

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

Let Colt Engineers help you plan that Dishwashing Pantry!

No matter what the capacity or size of the kitchen you are planning, Colt Engineers are at your service—ready to advise you, not only which particular Colt Autoasan is best suited for your requirements, but also how the pantry and table layout may be planned for maximum efficiency. May we send you our "Architect's Packet" which gives facts and figures about the entire Colt line from Model "B-1" to the giant "C-3"?

Hartford, Conn. U.S.A.
PROBLEM IX

Waterproofing Expansion Joints and Cracks
In Concrete Floor Slabs

Leakage through Expansion Joints and Cracks in Concrete Floor Slabs, and consequent damage to property, results from failure to seal these openings with a permanently efficient material.

Solution

The solution of this problem is expressed in the following specifications which meet the requirements of modern building design and construction practice with respect to both methods and materials.

SPECIFICATIONS

1. **Waterproofing Expansion Joints:**
   - Picked oakum shall be driven into the expansion joint for a depth of 4 inches after which the sides of the joint above the oakum shall be coated with Dehydratine No. 1, brush coating. The joint shall then be filled with Horn's Expansion Joint Cement which shall be poured hot.

2. **Waterproofing Cracks in Concrete Slabs:**
   - All cracks in floor slabs shall be cut out 3/4-inch wide and for a depth of at least 1 inch. The sides of the cracks, for the depth cut out shall then be coated with Dehydratine No. 1, brush coating after which the cracks shall be filled with Horn's Expansion Joint Cement which shall be poured hot.

**NOTE:** HORN'S EXPANSION JOINT CEMENT is a solid asphalt in conjunction with vulcanized oils that must be melted to be used. It is thoroughly waterproof; adheres perfectly to the sides of the joint and remains permanently efficient. This material remains tough and elastic from 0 deg. F. to 160 deg. F.; and will not dry out nor run in summer heat, maintaining a waterproof joint at all times.
"It takes nine tailors to make a man." It takes many types of men to plan and build a building. Particularly is this true when that building is a store. It must be architecturally perfect but deeper than this, it must have "beauty with a business sense." This brings into play the necessity for specialized talent. This need has been created by circumstances and is supplied by our staff of store planners who have 25 years experience as a background. They are ready to serve architects as part of their staff or in any other capacity the architect may elect. They are always available upon request.

GRAND RAPIDS STORE EQUIPMENT CORPORATION
GRAND RAPIDS, MICHIGAN

THE GRAND RAPIDS SHOW CASE COMPANY

Succeeding

WELCH-WILMARTH CORPORATION

Branch offices and representatives in most principal cities

Factories: GRAND RAPIDS; PORTLAND, ORE.; BALTIMORE; NEW YORK CITY
Makeshift Kitchens Will Not Do

MODERN KITCHENS must be planned for beauty and for convenient use. Home-making women insist upon kitchens small enough for step-saving and large enough for the correct placing of adequate labor-saving equipment, including a Gas Range with Lorain Self-regulating Oven.

The Lorain Red Wheel makes successful cooking easy, because it measures and automatically maintains the heat of the oven at any desired temperature.

Lorain is the first thermostat ever designed for the automatic control of gas range oven heat. Women know about the Lorain Red Wheel. They have seen the Lorain advertisements in their favorite magazines for more than eight years. In more than 2200 schools and colleges, Red Wheel Gas Ranges are used in home economics laboratories to teach time and temperature oven cookery.

Lorain Red Wheel Self-regulating Ovens are built only in the following six famous makes of Gas Ranges: Reliable, Clark Jewel, Dangler, Direct Action, New Process and Quick Meal. Each of these lines offers a wide variety of sizes, styles and finishes, designed for beauty and utility.

For specifications see Sweet's Catalogue, 22nd Edition, or send for our Handbook on Gas Ranges for Architects and Builders.

AMERICAN STOVE COMPANY, 444 Chouteau Avenue, St. Louis, Mo.
Largest Makers of Gas Ranges in the World
WHERE MONEL METAL SHINES

GIRARD COLLEGE
PHILADELPHIA

Where kitchens gleam with
Monel Metal surfaces

The more-than-ample endowment, and consequent financial position of Girard College enables this institution to select the very finest equipment for every department.

It is significant, therefore, that the kitchens and food service departments of this famous Philadelphia school are equipped with Monel Metal.

With many different materials to choose from—with financial resources that permit the use of the finest materials—Girard College specified Monel Metal. Monel Metal is the most economical as well as the most attractive of the materials available for food service equipment. It is easy to clean. It will not rust, it resists corrosion. It stands up for years and years under the use and abuse of rigorous service.

Monel Metal is the accepted metal for clinical and laundry as well as food service equipment. It is the logical material for you to use when planning new installations. You can best protect the interests of your clients by specifying long-lasting Monel Metal, wherever cleanliness must be combined with long life.
R-U-V is keeping the swimming water pure in the pools of:

U. S. Naval Academy (new pool), Annapolis, Md.
University of Colorado, Boulder, Colo.
Vassar College, Poughkeepsie, N. Y.
Catholic University, Washington, D. C.
4 Public School Pools.
Tulsa, Okla.
9 Public School Pools.
Kansas City, Mo.
University of Chicago, Chicago, Ill.
Culver Military Academy, Culver, Indiana
Kansas City Athletic Club, Kansas City, Mo.
United Israel Nurses' Home, 40th Street, Brooklyn, N. Y.
Penn Athletic Club, Philadelphia, Penn.
Union League Club, Chicago, Ill.
And Many Others

And the drinking water supplies for:

Arkansas, Topeka & Santa Fe R. R., Albuquerque, N. M.
Carnegie Steel Co., Pittsburgh, Penn.
General Electric Co., Association Island, Sackett's Harbor, N. Y.
Goodfellow Tire & Rubber Co., Akron, Ohio
Goodrich Transit Co., Chicago, Ill.
Miller Hotel Co., Fort Des Moines, Iowa
Fleet National Bank Building, Detroit, Mich.
General Motors, Remy Electric Division, Anderson, Ind.
And Many Others

The quartz mercury vapor lamp used to produce "concentrated sunlight"—ultra violet rays—inside the R-U-V Sterilizer.

R-U-V is keeping the swimming water pure in the pools of:

U. S. Naval Academy (new pool), Annapolis, Md.
University of Colorado, Boulder, Colo.
Vassar College, Poughkeepsie, N. Y.
Catholic University, Washington, D. C.
4 Public School Pools.
Tulsa, Okla.
9 Public School Pools.
Kansas City, Mo.
University of Chicago, Chicago, Ill.
Culver Military Academy, Culver, Indiana
Kansas City Athletic Club, Kansas City, Mo.
United Israel Nurses' Home, 40th Street, Brooklyn, N. Y.
Penn Athletic Club, Philadelphia, Penn.
Union League Club, Chicago, Ill.
And Many Others

Purifying Water with "Concentrated Sunlight"

Sunlight kills disease germs because it contains ultra violet light. R-U-V Sterilizers use ultra violet light to kill disease germs in recirculating systems for swimming pool water or drinking water.

A quartz mercury-vapor lamp inside the R-U-V Sterilizer floods each drop with concentrated ultra violet.

R-U-V Sterilizers can be hooked into an electric circuit. Their operation is automatic and as simple as turning on and off an electric light. There is no dosing of the water, no constant regulating of apparatus.

Corrosion and the resulting rapid replacements are eliminated. Results are positive.

Write to any of the installations listed in the side column. They will tell you what R-U-V does in actual operation.

Purifying Water with "Concentrated Sunlight"

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Corrosion and the resulting rapid replacements are eliminated. Results are positive.

Write to any of the installations listed in the side column. They will tell you what R-U-V does in actual operation.
Will These Forgetful

Do they control your

Children are forgetful. They don’t realize that the water closet is the most important school sanitation fixture. Children don’t know how health is endangered when the closet stands unflushed—sending forth disease-bearing flies, and bad odors.

Their forgetful control, is a gamble as to whether the toilet room will be a healthful—or a breeding place for contamination and disease.

The Clow Automatic Closet takes the hygiene responsibility—and makes good. After every occupa-

CLOW

Never,
Forty-Eight Styles.
Childish Hands Remember?

school sanitation?

tion it flushes itself with the pressure of a forty foot standpipe. And only the Clow bowl distributes equally to rim and trap, this high pressure flush.

The Clow-Madden valve is simple. So simple that virtually nothing can go wrong. It never forgets. With but two moving parts it has no complicated valves or floats to wear out or break.

Let the Clow school plumbing booklet tell you how to remove school sanitation from the forgetful hands of children.

James B. Clow & Sons, 201-299 N. Talman Ave., Chicago.

AUTOMATIC
never forgets
Heights and Types to Meet Your Requirements
Re-lamp without Re-globing!

JUST to replace a burned-out lamp in the ordinary globe may let your client in for quite a bit of expense. The set screws must be loosened, the globe must be removed, the dead lamp taken out, the new one inserted, the globe replaced, and, finally, the set screws tightened. Not surprising if, somewhere along the line, the globe is dropped or cracked.

Specify Sol-Lux and the globe need not be handled at all. Merely tilt out the special cap, take out the lamp, put in another, and tilt the cap back. That's all there is to it. Minutes are saved; glass is preserved.

The globe needn't be removed for cleaning, either. A washing of the outside surface keeps everything shipshape, for dirt or insects can't get inside.

Ask the lighting experts at the nearest Westinghouse office.

WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY
MERCHANDISING DEPARTMENT, SOUTH BEND WORKS, SOUTH BEND, IND.
Selected List of Manufacturers' Publications

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

The publications listed in these columns are the most important of those issued by leading manufacturers identified with the building industry. They may be had without charge, unless otherwise noted, by applying on your business stationery to The Architectural Forum, 363 Madison Ave., New York, or the manufacturer direct, in which case kindly mention this publication.

ACOUSTICS

The Celotex Co., Chicago. Acousti-Ceiling. 16 pp., 9" x 11". Illustrated brochure on a sound-absorbent panel." Specifications and details for application and decoration of Acousti-Ceiling, 11 pp., 9" x 11".


ASH HOISTS—ELECTRIC AND HAND POWER

Gillie & Geoghan, 535 West Broadway, New York, N. Y. General Literature. Xerox film. Contains specifications in two forms (with manufacturers' name and without), and general information.

BASEMENT WINDOWS


BATHROOM FITTINGS


Building Contractors for Homes, Apartments, etc. General Catalog. 24 pp., 8½ x 11 in. Illustrated. A series of 48 photogravures showing architectural designs rendered in Acme brick. Illustrations show the various types of buildings erected in the Southwest in recent years. Sent free to architects applying on their office letterhead.

American Face Brick Association, 1751 Peoples Life Bldg., Chicago. Brickwork in Italy. 298 pages size 7½ x 10¼ in., an attractive book illustrated with 300 line drawings, 300 half-tones, and 20 colored plates with a map of modern and XII century Italy. Bound in linen will be sent postpaid upon request for $6.00. Hallo Munic, $2.00.

BRICK


Solvay Calcium Chloride in Concrete Construction. Brochure, 8 pp., 8 x 11 ins. Illustrated. Contains complete technical description of BRIEFS for brick, tile and stone masonry, specifications, data and tests.

Pennsylvania-Dixie Cement Corp., 131 East 46th St., New York. Celluloid Computing Scale for Concrete and Lumber, 4½ x 2¾ ins. Useful for securing accurate computations of aggregates and cement; also for measuring number of different sizes.

CONCRETE BUILDING MATERIALS

Cellite Products Co., 1230 South Hope St., Los Angeles. Better Concrete; Engineering Specimens and Bulletins. Booklet, 16 pp., 8½ x 11 ins. Illustrated. On use of Cellite for building skins, to prevent segregation and to secure water-tightness.

The Heart of the Home. Booklet, 24 pp., 8½ x 11 ins. Illustrated. Complete data to aid in specifying number of different sizes.


Kosmoортand Cement Company, Louisville, Ky. Early Strength Concrete. Using Standard Kosmoort Cement. Folder, 1 pp., 8½ x 11 in. Complete data on securing high strength concrete in about 24 hours.


Solvay Process Co., Syracuse, N. Y. Solvay Calcium Chloride in Concrete Construction. Brochure, 14 pp., 8½ x 11 in. Illustrated. Complete data to aid in specifying number of different sizes.

CONCRETE COLORINGS

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

CONSTRUCTION, FIREPROOF


Northwestern Expanded Metal Co., 1234 Old Colony Building, Chicago, Ill. Northwestern Expanded Metal Products. Booklet, 8½ x 10¾ in. 16 pp. Fully illustrated, and describes different products of this company, such as Kno-burn metal lath, 20th Century Corrugated. Price list, 4 pp., 8½ x 11 ins. Illustrated. Data on a system of anchoring masonry to concrete.

A. I. A. Sample Book. Bound volume, 8½ x 11 ins., gives actual samples of several materials and complete data regarding their use.

DAMPPROOFING


Carey Built-Up Roofing for Modern School Buildings. Booklet, 8½ x 10¾ in. 32 pp. Illustrated. A study of school buildings of a number of different kinds and the roofing materials adapted for each.
SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—Continued from page 145

**FIREPROOFING—See also Construction, Fireproof**


Gかもしれ Stein Company, Youngstown, Ohio.

Fireproofing Handbook, 8½ x 11 in. 64 pp. Illustrated. Gives methods of construction, specifications for materials, etc., for fireproofing metal metal, steel tile, Trusolid solid partitions, steel lumber, self-centering fireproofing, etc.

North Western Expanded Metal Co., 407 South Dearborn Street, Chicago.

A. I. A. Sample Book. Bound volume, 8½ x 11 ins. Contains actual samples of several materials and complete data regarding their use.

**FLOOR HARDENERS (CHEMICAL)**


**DOORS AND TRIM, METAL**

The American Brass Company, Waterbury, Conn.

Armstrong Cork Company, 208 West Randolph St., Chicago, Ill.

DAMPPROOFING—Continued


Dunnikins, Inc., 116 Fifth Ave., New York, N. Y.

DAMPPROOFING—Continued

The Vortex Mfg. Co., Cleveland, Ohio.

Far Look Specification "Forms A and B" for dampproofing and plaster key over concrete and masonry surfaces.

FAR Look Specification "Form J" for dampproofing tile wall surfaces that are to be plastered.

Specimen Sheets, 8½ x 11 ins. Illustrations and specifications of dampproofing interior and exterior surfaces.

The Pyrobar Mfg. Co., Aurora, Ill.

Pyrobar Mfg. Co., Aurora, III.

Truscon Floretyle Construction. Booklet, 8½ x 11 in. 16 pp. Illustrated. Describes uses and adaptability of Floretyle to construction.

North Western Expanded Metal Co., 407 South Dearborn Street, Chicago, III.

A. I. A. Sample Book. Bound volume, 8½ x 11 ins. Contains actual samples of several materials and complete data regarding their use.

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Specimen Sheets, 8½ x 11 ins. Illustrations and specifications of dampproofing interior and exterior surfaces.

The Pyrobar Mfg. Co., Cleveland, Ohio.
No intricate air valves
in these sewage plants

Throughout the Jennings Sewage Ejector you will notice a simplicity and sturdiness in construction that make possible two outstanding advantages in pneumatic equipment of this kind — trustworthy performance, at the least cost.

Intricate air valves and similar complicated mechanisms have been avoided. There are no inaccessible parts. Nor any devices likely to get out of order and require attention.

Let us send you further details before you lay out your next sewage ejector plant.

NASH ENGINEERING COMPANY
12 WILSON ROAD
SO. NORWALK, CONN.


Jennings Pumps
A Standard
All Along the Line

Sylphon Damper Regulators have been selected as standard equipment by the majority of leading boiler manufacturers, because of the absolute dependability and durability furnished by their exclusively patented diaphragm—the Sylphon Bellows—which guarantees the smooth, continuous operation of dampers, sensitive to the slightest change of temperature.

Your selection of any of these boilers equipped with Sylphon automatic control gives to the user a guarantee of life-long, automatic damper control with resultant economies, whether the system be hot water or steam. Sylphon Damper Regulators also can be quickly and easily installed on old heating systems with the same degree of heating satisfaction and economy of coal consumption.

Ask for Bulletin FDR — 8

The Fulton Sylphon Company
Originators and Patentees of the Sylphon Bellows
Knoxville, Tennessee, U.S.A.

Peerless-Heater Co.
Pierce-Pelco
Purser
Richardson & Boynton
Richmond
Ross
Spencer
Star
Thatcher
Utica
West Coast

For Coal-Fired, Gas or Oil-burning Systems
HEATING EQUIPMENT—Continued

Williams Oil-O-Matic Heating Corp., Bloomington, Ill.

Oil Heating at its Best. Brochure, 24 pp., 5 x 8 inches. Illustrated description of the advantages of using oil for heating.

Williams Oil-O-Matic Heating Corp., Bloomington, Ill.

Oil Heating and What It Means to the Architect. Booklet, 24 pp., 8% x 11 ins. Illustrated. Use of oil from an architect's point of view.

HOSPITAL EQUIPMENT

The Frueh Co., Inc., 24th St. and Tenth Ave., New York City. Catalog 450. 7 x 10 in., 16 pp. A booklet illustrated with photographs and drawings, showing the types of light for use in hospitals, as operating table reflectors, linoleum and multilite concentrators, ward reflectors, bed lights and microscopic reflectors, giving sizes and dimensions, explaining their particular fitness for special uses.

The International Nickel Company, 67 Wall St., New York, N. Y.

Hospital Applications of Monel Metal. Booklet. 8% x 11% in., 8 pp. Illustrated. For hospital sterilizer installations.

Johns-Manville Corp., Madison Ave. & 41st St., New York, N. Y.

Insulation of Roofs to Prevent Condensation. Illustrated booklet, 8% x 11% in., 16 pp. Illustrated. A beautifully printed brochure describing in detail with architects' specifications THE PFAUDLER GLASS LINE OF HEATING EQUIPMENT, containing valuable data on all forms of insulation, packings, steam traps, high temperature cements, brake blocks, linings, flooring, roofing, asbestos specialties, water-proofing and dampproofing, also general technical data.


JOISTS

Bates Expanded Steel Truss Co., East Chicago, Ind.

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

Truscon Steel Co., Youngstown, Ohio

Truscon Steel Joists. Booklet, 8% x 11 in., 16 pp. Illustrated with typical buildings and showing details of construction. Tables of sizes and safe loads.

Truscon Steel Joint Buildings. Illustrated 32-page brochure, attractively illustrated, showing types of buildings equipped with Truscon Steel Joist.

Strip Steel Joint Construction. 14-page booklet, with illustrations. Reprint of paper presented to Building Officials' Conference, Madison, Wis., 1923, by J. J. Calvin, Secretary, Strip Steel Joint Association.

KITCHEN EQUIPMENT

The International Nickel Company, 67 Wall St., New York, N. Y.

HOTEL EQUIPMENT

American Laundry Machinery Co., Norwood Station, Cincinnati, Ohio.


Laundry MACHINERY

American Laundry Machinery Co., Norwood Station, Cincinnati, Ohio.

Features of the Hotel and Hospital Laundry. Brochure, 8% x 11 ins. Valuable data regarding an important subject.
Less Radiation is Required when you Insulate the Roof with Cork

The economy of insulating the roof of a new building with Armstrong's Corkboard is immediately apparent when you figure the radiation for the top floor. An adequate thickness of Armstrong's Corkboard materially reduces the heat loss through the roof, and decreases in the same proportion the radiation requirements for the top story.

In many cases, also, a smaller heating plant can be safely used and a part of the investment in corkboard thus immediately charged off. The amount of reduction for any specific building depends, of course, on the proportion of roof exposure to wall exposure. It will be more for low buildings of extensive roof area than for tall buildings of small roof area.

In addition to the saving in the cost of the heating plant, there is a saving in the consumption of fuel which continues throughout the life of the building.

The allowance for reduction of heat losses can be definitely calculated when Armstrong's Corkboard is used. Its insulating value is a known and dependable quantity which is not subject to deterioration in service. Armstrong Engineers will gladly assist architects in making these calculations on any specific job. There is no charge for this service.

Armstrong's Corkboard Insulation for the Roofs of All Kinds of Buildings

Every Roof Needs Insulation

Insulating the roof of 'Nurses' Home, St. Mary's Hospital, Kansas City, Mo., with Armstrong's Corkboard, 8 inches thick. Wilkinson and Cranes, Architects.
SELECTED LIST OF MANUFACTURERS' PUBLICATIONS—Continued from page 150

LIBRARY EQUIPMENT

Art Metal Construction Co., Jamestown, N. Y.

For more information on the Protection and Service. Brochure. 82 pp., 8 1/2 x 11 in. Illustrated. Describes library fittings of different kinds.

Library Bureau Division, Remington Rand, N. Tomawanda, N. Y.

Like stepping into a Story Book. Brochure. 24 pp., 9 x 12 ins. Illustrated. Describes Library Bureau equipment.

Sound & Motion, Jersey City, N. J.


LIGHTING EQUIPMENT

The specialities of 85th St. and 10th Ave., New York City.

Catalog No. 487. 48 x 11 in. 40 pp. Photographs and scaled cross-sections, annotated back-lighting, screen and partition re- deposits, double and single desk reflectors and Polarlite Signs.

Glazen-Tint Sheet Glass Co. (Consolidated Division), 200 Fifth Avenue, New York.

Next to Daylight Brochure. 19 pp., 4 x 8 1/2 ins. Illustrated. Deals with a valuable type of lighting fixture.


Guth Company, the Edwin F., 220 Washington Ave., St. Louis, Mo.


Forge Craft (Catalog No. 16). Booklet, 16 pp., 8 1/2 x 10 1/2 ins. In particular, with general instructions for the installation of the so-called "bungalow" type.

A description of various Illuminators. Folder, 4 pp., 8 1/2 x 11 in. on a new and improved type of lighting equipment.

MAIL

Curtis Mail Chute Company, Rochester, N. Y.

Curtis Mail Chute Model F. Booklet, 4 x 9 3/4 in. 8 pp. Illustrated.

MANUFACTURERS

Arthur T. Holthusen, 119 E. 57th St., New York, N. Y.


MARBLE


What Atlanta Marble is Better. Booklet. 36 x 4 in. Given analysis, physical qualities, comparison of absorption with other marbles, advantages of marble. Folders.

Convincing Proof. 34 x 6 in. 8 pp. Classified list of buildings and structures in which Atlanta Marble has been used, with descriptions of Architects and Sculptors.

METALS

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


Apollo and Apollo-Keystone Galvanized Sheets. Catalog. 8 x 11 in. 20 pp., illustrated. Research on the Corrosion Resistance of Copper Steel. Booklet. 8 1/2 x 11 in. 8 pp. Illustrated. Technical information on results of atmospheric corrosion tests of various sheets under standard conditions.


Monel Metal—its qualities, use and commercial forms.

MILL WORK—See also Wood

Curtis Companies Service Bureau, Clinton, Iowa.


The Perlite Catalog. 75 x 10 in. 48 pp. Illustrated. Contains prices on columns 6 to 36 in. diameter, various designs and colors, and installation areas.

Curtis Details. Booklet. 195 x 235/ in. 20 pp. Illustrated. Complete details of all items of Curtis millwork, the woodwork, for the use of architects.

Hammontford & Venable Co., Chicago, III.

Column Catalog. 75 x 10 in. 48 pp. Illustrated. Contains prices on columns 6 to 36 in. diameter, various designs and colors, and installation areas.

The Perlite Catalog. 75 x 10 in. 48 pp. Illustrated. Contains prices on columns 6 to 36 in. diameter, various designs and colors, and installation areas.

Roddis Doors, 150 S. Halsted St., Marshall, Wis.

Roddis Brochure, 24 pp., 5 x 8 1/2 in. Illustrated price list of all products, prices of all products.

Roddis Doors, Catalog G. Booklet, 183 pp., 8 1/2 x 11 in. Complete literature book on all doors for all purposes. Folders.

Roddis Doors for Hospitals. Brochure, 13 pp., 8 1/2 x 11 in. Illustrated catalog of all products for all types of hospitals.

Roddis Doors for Hotels. Brochure, 15 pp., 8 1/2 x 11 in. Illustrated catalog of all products for hotel and apartment buildings.

MORTAR COLORS

Clinton Metallic Paint Co., Clinton, N. Y.

Craft Color Catalog. 80 x 12 in. 4 pp. Illustrated. In color, gives full information concerning Clinton Mortar Colors. Describes new in stucco. Folder, 3 1/2 x 6 ins. An interesting folder on the use of coloring matter for stucco-coated walls.

PAINTS, STAINS, VARNISHES AND WOOD FINISHES


Cabot's Creosote Stains. Booklet. 4 x 8 1/2 in. 16 pp. Illustrated.

The Glidden Company, Cleveland, Ohio.

More Daylight. 6 x 10 1/2 in. 20 pp. Portraying by illustrations the quality of Glidden paints and varnishes.


A. C. Horn Company, Long Island City, N. Y.


The Ripolin Company, Cleveland, Ohio.

Ripolin Specifications. Book. 8 x 10 1/2 in. 12 pp. Complete specifications and illustrations for use of all the important products. Folders.

Pratt & Lambert, Inc., Buffalo, N. Y.

Specification Manual for Paint, Varnishing and Enameling. Booklet, 38 pp., 9 x 10 1/4 ins. Complete specifications for use of Pratt & Lambert paints, varnish and enamels, which are made in several colors for interior and exterior painting, and in several grades, for flat and gloss finishes. Folders.

The Ripolin Company, Cleveland, Ohio.

Ripolin Specifications. Book. 8 x 10 1/2 in. 12 pp. Complete specifications and illustrations for use of all the important products. Folders.

National Lead Company, 111 Broadway, New York, N. Y.

Handy Book on Painting. Brochure. 25 1/2 x 3 1/2 in. 100 pp. Gives directions and formulas for painting various surfaces of wood, plaster, metal, etc., both interior and exterior.

National Lead in Plate Form. Booklet, 35 x 7 1/2 in. 16 pp. Illustrated. Directions and formulae for painting metals.

Camel Lead. Booklet, 8 x 13 in. 12 pp. Illustrated. Describes various styles of lead came.

Cinch Anchoring Specialties. Booklet. 6 x 9 1/2 in. 20 pp. Illustrated. Describes complete line of expansion bolts.

U. S. Gypsum Co., Chicago.

Partitions. Booklet. 7 x 10 in. 32 pp. Illustrated. Describes complete line of partition materials.

Hollow Steel Standard Partitions. Various folders, 8 1/2 x 11. Illustrated. Describes complete line of track and hangers for all styles of sliding, folding, and partitioned walls.

U.S. Gypsum Co., Chicago.

Handy Book of Paint Specifications. Booklet. 8 x 10 1/2 in. 12 pp. Illustrated. Describes how to paint and varnish, and how to select the proper type of paint and varnish for any given surface.


Valentine & Co., 454 Fourth Avenue, New York.

How to Use Valspar. Illustrated book. 34 x 9 1/2 in. 60 pp. Illustrated. Describes the complete line of paints and varnishes for all purposes.

How to Keep Your House Young. Illustrated book, 23 pp., 7 1/2 x 9 1/2 in. A useful work on the upkeep of residences.

Zapon Co., The, 247 Park Ave., New York, N. Y.

Zapon Architectural Specifications. Booklet, 28 pp., 8 1/2 x 11 in. describes odorless oil varnish and spray lacquers and lacquer enamels.

PAPER

U. S. Paper Co., Albany, N. Y.

"Here's a Towel Built for Its Job." Folder, 8 pp., 4 x 9 3/4 ins. Illustrated. Describes the "Oshion" paper towels.

PARTITIONS

Circle A Products Corporations, New Castle, Ind.

Circle A Partitions Sectional and Moveable. Brochure. Illustrated. 8 1/2 x 11 in. 32 pp. Illustrated. Describes partitions of a special design, which can be erected.

Hanserman Company, E. F., Cleveland, Ohio.

Hollow Steel Standard Partitions. Various folders, 8 1/2 x 11 in. Illustrated. Gives full data on different types of steel partitions, together with details of various kinds of wood, metal, and other materials.

U. S. Gypsum Co., Chicago.

Pyrodyne Partition and Finishing Tile. Booklet. 8 x 11 in. 24 pp. Illustrated. Describes use and advantages of hollow tile for interior partitions.
SNEAD BOOKSTACKS

Library of Congress

The stack (see above) in the Northeast Court, a fourteen-tier stack which supports its own roof, accommodates over one and one-half million volumes. The library of Congress also contains four other great stacks and several small ones—all Snead stacks. These stacks are structural units and would stand independently if the building were removed from around them.

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We began the manufacture of metal bookstacks when they first came into use and have equipped libraries throughout the United States and in many foreign countries. Whether your requirement be caring for a few hundred books or several million books we shall be glad to submit a plan indicating which type of standard stack is most suitable and most economical.

To Architects, Librarians, and owners who must provide for book storage in any building, we shall be glad to send our book “LIBRARY PLANNING, BOOKSTACKS AND SHELVING.” (Cloth bound, 9½ x 12, 272 pages, illustrated.)

SNEAD & COMPANY

Established 1849

General Office and Factory, Jersey City, N. J.

We also manufacture SNEAD STEEL PARTITIONS in both “office” and “industrial” types, and maintain a Partition Sales Office at 101 Park Ave., N. Y.
SELECTED LIST OF MANUFACTURERS’ PUBLICATIONS—continued from page 152

PIE
American Brass Company, Waterbury, Conn.
Bull. 112 for Water Service. 8½ x 11 in. 26 pp. Illustrated. Gives schedule of weights and sizes (I.P.S.) for seamless brass and copper pipe, shows typical installations of pipe, and gives general discussion of the corrosive effect of water on iron, steel and brass pipe.

American Brass Company, Middletown, Ohio
How ARMOCO Dredging Products Cut Costs. Booklet. 16 pp., 6 x 9 in.

Cement Lined Pipe Company, Lynn, Mass.
Concrete Lined Pipe for Con estudioous Services. Booklet. 20 pp., 6 x 9 in. Illustrated. Data on cement lining to prevent corrosion in pipe.

Clow & Sons, James B., 354 S. Franklin St., Chicago, Ill.
Catalog. 2 x 4½ in. 700 pp. Illustrated. Shows a full line of steam, gas and water works supplies.

Cohoes Rolling Mill Company, Cohoes, N. Y.
Cohoes Pipe Handbook. Booklet, 40 pp., 5 x 7½ in. Data on various types of iron pipe.

Duriron Company, Inc., Dayton, Ohio.
Duriron Acid, Alkal, Brass-proof Drain Pipe and Fittings. Booklet, 20 pp., 8½ x 11 in., illustrated. Important data on a valuable line of piping.

National Tube Co., Frick Building, Pittsburgh, Pa.
"National" Bulletin No. 2. Corrosion of Hot Water Pipe (8½ x 11 in. 22 pp. Illustrated). Discusses causes of corrosion, and details are given of the deactivating and desalting systems for eliminating or retarding corrosion. Hot water supply line.

"National" Bulletin No. 25. "National" Pipe in Large Buildings. This booklet contains 26 illustrations of prominent buildings of all types, containing "National" Pipe. Also gives data and specifications for work to architects, engineers, etc.

Millco Steel Pipe. Book of 88 pp. (8½ x 11 in.), profusely illustrated with half-tone and line engravings of the important operations in the manufacture of pipe.

PLUMBING
Clow & Sons, James B., 354 S. Franklin Street, Chicago, Ill.
Catalo: 2 x 4½ in. 84 pp. Illustrated. Shows complete line of plumbing fixtures for Schools, Railroads and Industrial use.

Crane Company, 836 S. Michigan Avenue, Chicago, Ill.
Plumbing Suggestions for Home Builders. Catalog. 3 x 6 in. 80 pp. Illustrated.

Plumbing Suggestions for Industrial Plants. Catalog. 4 x 6½ in. 43 pp. Illustrated.

Planning the Small Bathroom. Booklet. 5 x 8 in. Illustrated.

Duriron Company, Dayton, Ohio.

Eljer Company, Fort City, Pa.
Complete Catalog. 24 x 34 in. 104 pp. Illustrated. Describes completely the full line of standardized vitreous china and steel sanitary fixtures for commercial and institutional use, with weights and measurements.

Standardized Nineteen, 24 x 34 in. 188 pp. Illustrated.

Installation of Seamless Brass and Copper Pipe. Illustrated.


McCune, H. S., 311 W. Jackson Blvd., Chicago, Ill.
Catalog K. 105 x 176 in. 242 pp. Illustrated. Complete data on plumbing and fixing tiling with brief history of Sanitary Pottery.

Spencer Company, Wabash, Ind.
Catalog 263 x 347 in. 150 pp. Illustrated. Catalog of Modern Showers and Brass Plumbing Fixtures, with drawings showing layouts, measurements, etc.

Tuned Up in Ten Minutes. Booklet. 7½ x 10½ in. 16 pp. Illustrated. Modern Showers and Washbasins for Industrial Plants, showing the sanitary method of washing in running water.

PUMPS
Chicago Pump Company, 2300 Wolfram Street, Chicago, Ill.
The Centrifugal Pump to Use. Container containing handy data. Individual bulletins, 8½ x 11 in., on bilge, sewage, condensation, draining, house boiler feed and fire pumps.

Kewanee Private Utilities Co., 442 Franklin St., Kewanee, Ill.

RAMS
Rams Building Corporation, 21 East 60th Street, New York.

Discusses the need for modern mid-city parking garages, and describes the d'Humy Motoramp system of installation, which operates on the basis of its own space economy and features of operating convenience. Gives cost analyses of garages of different sizes, and calculates probable earnings.

Graphs of intergrade loads. Series of illustrative bulletins issued in loose-leaf form, with monthly supplements.

The General Pump Co., Wilmington, Del.
Trane Small Centrifugal Pumps. 35 x 8 in. 16 pp. Illustrated. Data on a very important type of pump.

REFRIGERATION
The American Brass Company, Knoxville, Ten.
Temperature Control of Refrigeration Systems. Booklet, 8 pp., 8½ x 11 in. Illustrated. Deals with cold storage, chilling of water, etc.

REINFORCED CONCRETE—See also Construction, Concrete
Genfore Steel Company, Youngstown, Ohio.
RCI's 20th-Anniversary Handbook. 8½ x 11 in. 36 pp. Illustrated. Methods and specifications on reinforced concrete roofs and floors with a combined form and reinforced material.

Truscon Steel Company, Youngstown, Ohio.
Shearing Stress in Reinforced Concrete Beams. Booklet. 8½ x 11 in.

North Western Expanded Metal Company, Chicago, Ill.

Longspan 36" Rib Lath. Folder 4 pp. 8½ x 11 in. Illustrated. Deals with a new type of V-rail expanded metal.

ROOFING
Better Buildings. Catalog. 9 x 12 in. 34 pp. Illustrated. Describes the Coated and Formed Steel Roofing and siding Products, black painted and galvanized, and describes directions for application of various patterns of Sheet Steel Roofing in various types of construction.

Copper—Its Effect Upon Steel for Roofing Tin. Catalog. 8½ x 11 in. 28 pp. Illustrated. Describes the merits of high-grade roofing tin plates and the advantages of the copper-steel alloy.

The Testimony of a Decade. Booklet. 8½ x 11 in. 16 pp. with Frogs Chart and other data showing losses in exchange of Iron and Steel Sheets for roofing, from atmosphere corrosion.

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

The Barrett Company, Bridgeport, Conn.
Architects’ and Engineers’ Built-up Roofing Reference Series; Vol. I Roof Drainage System. Brochure, 63 x 8½ x 11¾ in. Gives complete data and specifications for many details of roofing.

Philip Carey Co., Lockland, Conn.
Architects Specifications for Carey, Built-up Roofing. Booklet. 8 x 10½ in. 24 pp. Illustrated. Complete data on using the various different types of built-up roofing to suit the kind of roof construction to be covered. Carey Built-up Roofing for Modern School Buildings. Booklet. 8 x 10½ in. 37 pp. Illustrated. Describes the use of this material in a number of different kinds and the roofing materials adapted for each.

Federal Cement Tile Co., 608 So. Dearborn St., Chicago, Ill.
Series of Folders, 4 x 8½ x 11 in. in folder. Describes the installation of permanent concrete interlocking tile, tile with glass insets, tile and channel tile, on all types of industrial plants, public and other buildings with flat and pitched surfaces. Standards. Booklet. 8½ x 11 in. 40 pp. Illustrated with tile-page drawings. Gives full details of all forms of roof construction of steel structure, ridge and gutter construction, purline arrangement, spacing, etc., for standard roofs. The Ideal Retaining Wall. Leaflet, 4 x 8½ in. 11½ in. Illustrated. Valuable data on use of Federal Embodied Liner, and illustrates retaining walls.


Heinz Roofing Tile Co., 1730 Champa St. Denver.

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

Milwaukee Corrugating Co., Milwaukee, Wis.

Ruberoid Co., The (formerly the Standard Paint Co.), 95 Madison Avenue, New York, N. Y.
Instructions for Laying Built-up Roofs. Booklet. 8½ x 11 in. Illustrated.

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

Ruberoid Asbestos Slates. Folder. Illustrated. Information and specifications for using asbestos slate.

U. S. Gypsum Co., Chicago.

SEASCH
Smith & Sage Mfg. Co., The, Bridgeport, Conn.
Catalog. 8½ x 11 in. 24 pp. Illustrated. Covers complete list of chains.

SEWAGE DISPOSAL
Chicago Pump Co., 2316 Wolfram St., Chicago, Ill.
Flush-Kleen Dry Basin Sewage Ejector. Booklet, 8½ x 11 in. 16 pp. Illustrated and data on an important detail of equipment.

SCREENS
American Brass Co., The, Waterbury, Conn.
Facts for Architects About Screening. Illustrated folder, 8½ x 11½ in., giving actual samples of metal screen cloth and data on by screens and screen doors.

THE ARCHITECTURAL FORUM December, 1927
Do you know that when Carney Cement is used for the mortar, the mixing crew is cut in two, and that masonry costs drop decidedly? Water and sand is all that Carney needs in mixing. The very plastic quality of the mortar, together with the fact that tamping and retempering are done away with, increases the capacity of the masons immensely.

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A Marble Front for Beauty
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NOTE TO ARCHITECTS:
Send for our Architects' Specification Book.

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DESpite the fact that the cheeriness of the hearth fire is one of the most attractive features of a home, most fireplaces lie cold and dead owing to the inconvenience and untidiness of carrying fuel up the stairs from the cellar and across clean floors and rugs.

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- **Firing periods** less frequent, due to the depth of the fire-pot with its large coal carrying capacity;
- **Low Installation Cost**, due to construction of the boiler; making erection easy;
- **The large feed door** which permits easy firing and spreading of fuel to all parts of the fire;
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Sales Offices in All Principal Cities of the United States and Foreign Countries

Quality Panelboards
Switch and Outlet Plates
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Celite “makes the most of concrete” by keeping the mix fat and workable throughout handling and placing. If you are not familiar with its use call in a concrete engineer from our nearest office. Or write for our free service bulletin X-325 on workability in concrete.
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Architects—Associated Architects, Little Rock.

General Contractor—Gordon Walker, Little Rock.

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CECO Reinforcing Bars are rolled only from new billet steel and are furnished in deformed rounds and squares. The deformations are at right angles to the axes of the bar and thus provide a more positive bond. CECO Reinforcing Bars and CECO Column Spirals are tested and inspected by the Robert W. Hunt & Co. and are kept in stock at all warehouses listed below.

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Adjustable All-Steel Shores and Adjustable Column Clamps. CECO Reinforcing Bars, Column Spirals, Bar Chairs and Spacers, Triangle Mesh and Electrically Welded Fabric. CECO Metal Lath, Hook Hangers, Furring Channels, Beads and Moulding. CECO Metal Weather Strips and Screens. Send for Handbook of Fireproof Construction. Address our Omaha Office, Dept. 272.

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are handled on a rental basis only, and are leased to contractors or owners for use on specific work. Ordinarily the labor of installing and removing the steelforms by our skilled workmen is included with the rental charge. The economy in the re-use of MEYER Steelforms on a rental basis, is readily apparent.

As in Little Rock, so in hundreds of other cities from Canada to the Gulf and from Ohio to the Pacific Coast, Meyer and Ceco Products are assisting architects, contractors and engineers in lowering reinforced concrete building costs.

MEYER Steelform construction in common with other types of concrete joint construction, is most economical for buildings with lighter loads and longer spans, such as apartments and hotels, residences, schools, hospitals, office buildings, garages, light manufacturing buildings, etc. In this class of structure, the dead weight of construction is a considerable factor in the total load, so that the saving in dead load effected by MEYER Steelform construction affords a considerable saving in cost.

The concrete joint floor, like its predecessor, the wood joint floor, has always required less material for ordinary conditions of loading than other types of design. This economy of concrete and steel was never apparent until the cost of formwork was reduced by using a permanent equipment of MEYER Removable Steelforms, by means of which re-use was secured.

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Waterproofed with Cow Bay Waterproofing Cement by the Waterproofing Company

The basement of this building, on the edge of the Atlantic Ocean, is being waterproofed by us with Cow Bay Waterproof Cement. Large jobs such as this one do not divert us from our plan of keeping a goodly number of small jobs going. But large or small, the quality of our workmanship is the same,—the best.

If you are inclined to specify Cow Bay Cement Waterproofing, please let us give you our figure on the work before general bids are called for. Then you can specify us knowing what the job will cost and can make a proper allowance for our work in the expense budget.

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The Waterproofing Co.

Engineers and Contractors for Waterproofing

345 E. 33rd St., New York
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Your clients will ask you

Is oil heating expensive?

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

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

MAY OIL BURNER CORPORATION, Baltimore, Md.
THE ARCHITECTURAL FORUM


A typical stack of VENTO Cast Iron Heaters

An uncommonly effective ventilating system is provided for the new paint shop of the mammoth automobile body plant of the Briggs Manufacturing Company on Mack Ave., Detroit. The ventilating equipment consists at present of six units, each composed principally of a motor-driven fan and 11,000 square feet of VENTO Blast Heaters. The equipment is placed on the roof of the 5-story factory, and no reinforcement to the building was required. The air in the paint shop is changed every 2½ minutes, and the blast temperature averages 70 degrees F. This installation gives further proof of the high rate of heat transfer through VENTO cast iron blast heaters. The stacks are exposed almost entirely to the outside. Four to six times the volume of air usually required in industrial systems is instantly warmed in the passage through stacks of VENTO heaters arranged 19 long, 2 high and 3 deep.

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

Our Engineers’ Data Book and other illustrated literature on ventilation should be in the hands of Architects, Engineers and Contractors for public buildings and factories. These books are sent free on request.

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Makers of IDEAL Boilers, AMERICAN Radiators, ARCO Tank Heaters, VENTO Ventilating Heaters, AIRID Air Valves, MERCOID Controls and devices for drying, humidifying, cooling and refrigeration.

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“GLOBE” ventilators are efficient for every Building Type.

The ventilating requirements for schools are very exacting. "Globes" have been rendering exceptionally good service in this field for over 50 years.

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Jet Unit Heater

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

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Write for your
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HEN SOlbNMRIS
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A De Luxe Cabinet, entirely concealed by the beautiful etched mirror. The last word in bath room furnishing. Made in three sizes. See Sweet’s Index; or write for illustrated booklet.

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Spencer steam, vapor or hot water Heaters

A size and type for every heating purpose and every kind of building

SPENCER HEATER COMPANY
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General Offices:
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Spencer Junior Hot Water Heater—capacity in direct cast iron radiation equivalent, water, 300 to 600 square feet.

Spencer No. 1 Single Grate Heater, capacity in direct cast iron radiation equivalent, water, 800 to 1450 square feet; steam or vapor, 500 to 900 square feet.

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Spencer Tubular Steam Heater—15 to 21 Series—capacity in direct cast iron radiation equivalent—1900 to 3600 square feet.

Spencer Tubular Steam Heater—50 Series—capacity in direct cast iron radiation equivalent—4500 to 7000 square feet.

Left—Spencer Tubular Steam Heater—100 Series—capacity in direct cast iron radiation equivalent 7500 to 15000 square feet.

Right—Interior view showing construction principle.

All Spencer Heaters may be hooked up in battery where a flexible supply of heat is needed, or where the total radiation tax is greater than the capacity of a single boiler.
A new small Venturafin Unit (Size No. 2) for stores, offices, shops, garages, factories, showrooms, warehouses, depots, and countless other places.

Five times as efficient as ordinary radiation. Delivers from 450 to 900 cubic feet of hot air per minute. Cheaper to buy, install and operate.

Ventilates as it heats—gives positive heat control and more even distribution of heat in working areas—and is pleasing in appearance.

One-quarter the weight of an equivalent amount of radiators, wall coils, etc., and occupies only one-tenth the space.

Heats up in a jiffy in the morning. Reduces heat losses to a minimum. Forces heat where you want it, when you want it.

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VENTILATING, HEATING, AIR CONDITIONING, DRYING, MECHANICAL DRAFT
Manufacturers of all Types of Air-Handling Equipment—Since 1881
To try to ventilate the office building through open windows has proven futile. On still days little air comes in. On other days blustering winds bring in smoke, soot, snow and the distracting noise of a great city. As the lesser of two evils windows are closed, and the workers suffer the inevitable results of stuffy air: lassitude and lowered efficiency.

The Univent solves the problem. It brings into the office outdoor air, cleans it, heats it when necessary, and diffuses it to every nook and cranny of the room—with invigorating air motion, but without draft.

No 4 o’clock let down, no fluttering papers, no cold inducing drafts—winter or summer—in the Univent-ilated room.

Labor—either mental or physical—is the most expensive thing in the world. Eliminate mistakes—keep employees healthy and productive by giving them the invigorating air conditions that keep everyone from executive to office boy mentally and physically alert.

The Univent is not an exhaust system—it is real outdoor ventilation indoors—with dust and noise left out.

Architect and heating engineer should know why the Univent is endorsed by building managers, business executives, and school authorities as the most economical, flexible, and easiest controlled ventilating system known. A request on your letterhead for Architect’s Edition of “Univent Ventilation” will bring you some interesting facts.

Manufactured only by THE HERMAN NELSON CORPORATION, Moline, Ill.

UNIVENT and Glass—make the difference
Anybody would like this
Tico Boiler installation

Just notice the neat and compact design of these two TICO Boilers recently installed for the new Seybolt Bakery in Tampa, Florida, by the A. W. Dovel Company, and you'll agree that TICO builds 'em right.

These boilers are gas-fired. The tubing is seamless and the general design and construction more than meets the strict A.S.M.E. code.

No matter what fuel you use there's a TICO Boiler scientifically designed to meet your exact requirements best.

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Now see what WILLIAMS has done to OIL-O-MATIC

A NEW Oil-O-Matic is now available. One that surpasses even the former model which brought world leadership. For the past three years more than twice as many home-owners selected it as any other make.

Better than ever, the complete range of oil fuels may be used with equal facility. And notably cheap Fuel Oil—so rich in heat value—that makes Oil-O-Matic the lowest in operating cost. This exceptionally wide choice of fuel assures a never-failing supply.

In design and workmanship, Model J sets a new standard in oil burner excellence. Of course, the fundamental principles that have kept Oil-O-Matic so far in advance of the front ranks, are all rigidly followed. Built with watch-like precision and finished in effective French blue, it lends distinction to any heating equipment.

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After 8 years of success
Now • a new improved
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Model J Especially designed for fine residences, apartments, theatres, stores, clubs, schools, hospitals, churches, banks, offices, garages, greenhouses, etc.
THE OPERATING principle upon which the Dunham Differential Vacuum Heating System is established is a bed-rock law of physics.

Engineers know this law as the Steam Table. Simply stated, it is that "the boiling point of a liquid is the temperature at which the pressure of the saturated vapor first becomes equal to the pressure existing outside." (Millikan.) Professor Millikan further states: "Since the boiling point has been defined as the temperature at which the pressure of the saturated vapor is equal to the outside pressure, and since the pressure of a saturated vapor varies rapidly with the temperature, it follows that the boiling point must vary as the outside pressure varies."

Due to the workings of this law it is possible to produce steam of greatly varying temperatures in a Dunham Differential Vacuum Heating System simply by varying the pressure to which the water in the boiler is subjected. This is mechanically accomplished by means of the Dunham Differential Vacuum Pump.

The importance of the Dunham application of this basic law of physics to the solution of one of the greatest problems of heating cannot be overestimated. During 95% of the heating season ordinary steam heating systems overheat because steam at 212 degrees or higher is circulated in the radiators and piping. No provision is made, nor can any be made, in such heating systems, to regulate the heat emission from the radiators to conform to the heat loss from the building. Consequently, windows are thrown open to cool the overheated rooms, and a heavy fuel waste results.

The Dunham Differential Vacuum Heating System combats this waste by utilizing steam produced at varying sub-atmospheric pressures. This sub-atmospheric steam is maintained at the proper pressure, and temperature, to provide comforting warmth in every room, with an input of heat into the radiators sufficient to compensate for the heat loss from the building, but without the overheating common to ordinary heating systems.

No new principle is used to attain this long-sought goal. The principle is as old as the very atmosphere which surrounds our earth. The Dunham devices which utilize this important principle are, however, new, attention-compelling and revolutionary.

They have made the Dunham Differential Vacuum Heating System the outstanding heating development of the decade, and one destined to work as radical a change in present-day heating methods as did the Dunham Thermostatic Radiator Trap when it revolutionized steam heating a quarter century ago.

Look for the Name DUNHAM of the heating season ordinary steam heating systems overheat because steam at 212 degrees or higher is circulated in the radiators and piping. No provision is made, nor can any be made, in such heating systems, to regulate the heat emission from the radiators to conform to the heat loss from the building. Consequently, windows are thrown open to cool the overheated rooms, and a heavy fuel waste results.

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

C. A. DUNHAM CO.
DUNHAM BUILDING
450 East Ohio Street, Chicago
The Battle Creek Sanitarium

DUNHAM HEATING SERVICE is a national service. Also it services many national institutions. Among such is the Battle Creek Sanitarium which, from its beginning in a two-story house sixty-one years ago, has developed into the group of buildings shown in the oval and having a worldwide recognition of leadership in the science of "artificial sunlight" for therapeutic purposes. To the six-story Main Building, Main Annex, Hospital, Dormitories, Gymnasium and Recreational Centre, Maintenance Buildings, etc., is now added the magnificent New 15 Story "Central Building" here shown. If not already in operation as you read this page, it will be in occupancy very shortly. The new structure will harmonize with the other buildings and is located at the south end (right) of the main building shown in oval. The ground floor, to be used for lobbies, offices and other purposes, is two stories in height. The next floor on a level with the first floor of the present main building will be used for parlors, lounges and writing rooms; the remaining twelve stories will be the guest floors.

Devoted to scientific health training, the Sanitarium very analytically investigated the "heat" question for the new Central Building and selected and installed a Dunham Differential Vacuum Heating System. With expert physical and dietary direction the Sanitarium offers a delightful environment as a vacation spot. It is so used by an ever increasing number of congenial folks from all sections of the country. Already this year no less than 7,000 persons have been registered as guests.

The name of Dr. John Harvey Kellogg, who has actively managed the Sanitarium for half a century, is a synonym of "Battle Creek." With him are associated Dr. Charles E. Stewart and M. W. Wentworth, with a corps of able assistants and 1,500 employees.

C. A. DUNHAM CO.

450 East Ohio Street - - Chicago

Over seventy branch and local sales offices in the United States, Canada, and the United Kingdom bring Dunham Heating Service as close to you as your telephone.

Consult your telephone directory for the address of our office in your city. An engineer will counsel with you on any project.
51 Years of Use
Shows No Deterioration

Pipe in use underground in Lynn, Mass., from 1874 to 1925. Removed when building was torn down. Exterior badly corroded, interior clean and of original diameter.

Typical of what may be expected of
CEMENT LINED PIPE
Costs one-half as much as brass.

Used by ninety-four cities and towns with corrosive waters for service lines under permanent streets.

CEMENT LINING now furnished by Cast Iron Pipe manufacturers in pipe to be used for corrosive waters.

Standard Fittings only are used. Furnished with a special shaped lead lining for making perfect contact with cement lining in pipe.

CEMENT LINED PIPE in buildings for cold water lines is economical and permanent. It serves equally well for hot water and most acids.

CEMENT LINED PIPE CO.
LYNN, MASS.

Backed up by four great manufacturing plants in a nation-wide service system, Walworth stands ready to meet specifications of architects and engineers for valves and fittings for piping installations of every description.

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VALVES, FITTINGS, TOOLS for STEAM, WATER, GAS, OIL and AIR


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When the "Ventadoor" is used the tops of all doors can be made to "line up," yet cross ventilation is not sacrificed.

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155 EAST 42nd ST.
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Only Genuine Wrought-Iron Pipe Is Dependable

If the wrought-iron pipe is Genuine it will be durable, long lasting; for Genuine distinguishes the formula of puddling and Cohoes has never deviated from the original. Therefore Cohoes — Guaranteed Genuine Wrought Iron Pipe since 1854.

The Handbook, Pipe Facts contains valuable information. We have a copy for you; send for it.

COHOES ROLLING MILL CO., COHOES, N. Y.

BRANCH OFFICES:

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MINNEAPOLIS  BOSTON  NORFOLK  FORT WORTH  FORT WAYNE
Where millions are invested—

In ultra modern structures such as this—a monument to architectural and engineering skill—no chance can be taken in specifications—dependability only can be considered! Towering with magnificent lines over twenty stories from the street, this charming hotel-apartment is the result of care and precision in the selection of materials of proven worth—equipment of lasting durability and quality.

Thus, "NATIONAL" Pipe, as in other great buildings, was specified for the major pipe tonnage. Back of all the many luxuries and comforts which this fine housing will offer will be miles and miles of "NATIONAL"—to serve faithfully for many years to come.

NATIONAL TUBE COMPANY
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Since 1921

Over six hundred Architects and Engineers have specified Duriron Drain Pipe for the acid waste systems of hospital, school, college, industrial and commercial structures.

The Duriron Company, Inc.
Dayton, Ohio.

Gentlemen:

We have specified Duriron for laboratory wastes in all the schools which we have designed since 1921. It has been very satisfactory.

Duriron was specified by us for three high schools and a hospital which are now under construction.

Yours truly,

W. G. ECKLES COMPANY

August 19, 1927

Duriron is produced only by

The DURIRON COMPANY
DAYTON, OHIO
The Exact Length of Flush for Every Make of closet is assured with the Watrous FLUSH VALVE.

THE Watrous flush valve is the only design that makes proper provision for adapting the quantity of water consumed to the needs of any bowl with which it is used. The result is maximum flushing efficiency and economy in water consumption.

A Simple Turn of a Screw
By merely turning the screw A (see sketch), the valve is adjusted to the requirements of the bowl. It is not necessary to turn off the water, or remove any of the working parts of the valve to make this adjustment.

The adjustment, once made, remains permanent.

Clogging Prevented
Every time the valve is flushed, the plunger (B) is raised off its seat (C), leaving an opening through which grains of sand, etc., can be washed out of the port. No type of flush valve, without this or a similar safeguard, is immune from obstruction.

No Regulation Required
The feature just described—control of the quantity of water supplied to the bowl—should not be confused with regulation for varying degrees of pressure. The Watrous Valve requires no regulation, from highest pressure down to approximately 5 lbs.

Write for full details.

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Sold by leading plumbing jobbers throughout the U. S.

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Wm. P. Horn Co., 88 Federal St., San Francisco, Cal.
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Above is pictured the new 2440 Lake View Apartment Building, Chicago, Ill. Practical knowledge and careful consideration on the part of the entire building personnel dictated that Milvaco equipment be used.

Heating Specialties:
Milvaco Traps, Dole Milvaco Packless Valves—all types. Air Vents, Air Eliminators, Drip Traps, Blast Traps, Direct Return Traps.

Standard Valves:
Packed Type Radiator Valves, Gate Valves, Globe Valves, Angle Valves, Check Valves.

MILWAUKEE VALVE CO.
Milwaukee, Wisconsin
Winding up a year of Achievement in the Heating Field

The year now closing has proved more than ever, the value of the Trane policy of engineering development in the specialized branches of heating covered by the Trane line.

Last year, and again this year, The Trane Company has brought forward one improvement after another, in every department. Trane Heat Cabinets and Concealed Heaters have entered their second heating season, securely entrenched in the estimation of heating men as "Successors to the Radiator." The same principle has been applied to unit heaters of unique design and exceptional efficiency. The Type "VM" Multi-Stage Centrifugal Pump has been added to the Trane-built line. New-type traps have been perfected for special uses. Many architects find that the simplest way to be sure of obtaining the most advanced type of equipment is to specify "Trane."

Write for A. I. A. — Indexed Material.

THE TRANE COMPANY, (Established 1885)
276 CAMERON AVENUE
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HEAT CABINETS
TRANE CONCEALED HEATERS

PUMPS AND HEATING SPECIALTIES
Specified — for its outstanding superiority

Architects are showing an increasing preference for the "Madera" because it combines striking beauty with the most perfect sanitation possible in a fine water closet.

Its very large water surface and extra long seat opening prevent the soiling of dry surfaces by people of any stature. Its glistening white vitreous china DUROCK bowl and tank, with glass-hard, fused-in surface, can never crack, craze or stain, or offer obstinate lodging places for bacteria. All debris, even including the sanitary pad, is positively carried off through the Madera's greater trapway by its powerful twin siphon-jets.

THOMAS MADDOCK'S SONS COMPANY
DUROCK Bathroom Equipment
TRENTON, N.J.

MADDOCK
Since 1859 — No Name has stood for HIGHER QUALITY

The "Madera" is ideal for installation in residences, hotels, office buildings, apartments and building developments.
IDEAL SPECIFICATION

Where hard usage is to be expected and long-term economy is important
UNCONDITIONALLY GUARANTEED

The patented Evernu process by which these handsome hard rubber seats are formed, can’t be duplicated. It gives them unsurpassed ability to keep their good looks through long years of severest service—no scarring, chipping or cracking that smooth, glossy surface; no warping, no loosening of hinges. The hollow center gives unusual lightness and unequaled strength.

No wonder leading architects are specifying Evernu Seats for big installations all over the country—schools, hospitals, clubs, office buildings—with perfect confidence that they are giving their clients the best possible value for their money.

Our new catalogs covering all Never-Split Seats—the only complete line on the market—should be in your files. A post-card request will bring them promptly.

NEVER SPLIT SEAT COMPANY
Founded 1905
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Varnished Wood
Patented Construction
The Improved, QUIET SI-WEL-CLO

Not Only Sanitary but Hygienic

The Si-wel-clo, like all Te-pe-co closets, has always embodied the latest advances of sanitary engineering. The quietness of its operation has always been an acceptable attribute of this closet de luxe. The Improved Si-wel-clo is unquestionably the greatest advance in water closet construction of recent years. It is the most comfortable, hygienic, sanitary and quiet closet that has ever been devised. The decided dip in the rim elevates the front and rear of the bowl opening, minimizing the possibility of soiling.

The Si-wel-clo is typical of the entire line of Te-pe-co All-Clay Plumbing Fixtures—closets, baths, lavatories, etc.—sanitary, durable and of irreproachable distinction.

Folders describing this closet combination in detail will be forwarded on request.

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OUR GUARANTEE
The Trenton Potteries Company makes but one grade of ware—the best that we can produce—and sells it at reasonable prices. Our ware is guaranteed to be equal in quality and durability to any sanitary ware in the world. The Te-pe-co Trade Mark is found on all goods manufactured by this company and is your guarantee that you have received what you have paid for.

TE-PE-CO ALL-CLAY PLUMBING FIXTURES
Jenkins Iron Body Gate Valves, and
Iron Body Globe Valves on main steam
lines, boiler room, Fred F. French Building.

Below: Fred F. French Bldg., 551 Fifth Ave.,
New York City, Fred F. French Co.,
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A far-sighted valve investment

The Fred F. French Co. is an organization
of investment specialists. And one of the
most far-sighted of their investments is
the choice of Jenkins Valves for the new
Fred French Building on Fifth Avenue,
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Jenkins Valves were used by the hundred
on the large steam lines in the boiler room,
in the heating system, and throughout the
fire protection work. They are a far-
sighted choice, since they can be depended
on for long term low cost service free
from frequent repairs and replacements.

Make sure that your specification writers
are making your preference clear—"Valves
marked with the Jenkins Diamond."
Ordering by figure number puts substitu-
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Always marked with the "Diamond"
Jenkins Valves
SINCE 1864
What's the Difference Between a Genuine Vitreous China Urinal Stall and an Ordinary One?

The same difference that you would understand in considering a water closet or lavatory made of anything but Genuine Vitreous China.

The superiority of vitreous china over other materials being well known—the advantages of specifying Douglas urinal stalls are apparent.—Bear in mind they will not craze or discolor, that they are easily kept clean and absolutely impervious.

Although urinals of this kind have been manufactured comparatively a short time, you will find them installed in the better buildings throughout the U. S.

Write for catalogue and list of buildings where the Genuine Douglas Vitreous China Urinal Stalls are being used.

Manufactured By

The John Douglas Co.
Makers of High Grade Plumbing Fixtures

General Office: Cincinnati
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Now a Choice

FOR ANY TYPE OF INSTALLATION

Speakman Chromium Plate—the non-tarnishing finish has made it possible for your clients to install a choice of Speakman Showers and Fixtures with escutcheons and handles of china, metal and of the new Speakman all-metal Artline design.

All Have the Same Quality Features

These showers and fixtures are all similar in construction and have:

High seat valves
Renewable seats
Swivel discs and encased washers
Full-size waterways

Folders describing individual types of Speakman Showers and Fixtures are always available. We also shall be glad to send you a pocket-piece finished in Speakman Chromium Plate—the Lifetime Finish.

SPEAKMAN COMPANY, Wilmington, Delaware

SPEAKMAN SHOWERS and FIXTURES

"Safe to build in the wall"
THE ENCHANTMENT OF COLOR

A tiny bathroom, or one as big as a double bedroom; both are given beauty by the wizardry of color. Color that makes the room bright in the morning, color that keeps it cheerful all day, color that soothes like a long remembered melody.

The crisp whiteness of the fixtures is like china, and as easy to clean. The lines are those of easy flowing grace with a utility in every inch unknown in old designs. And every valve and fitting, improved by modern engineering, serves more dependably.

Are you planning new bathrooms, for small homes or large? Then you ought to have New Ideas for Bathrooms and Homes of Comfort. Two new Crane books, not booklets, that contain many new and valuable suggestions for planning and decorating . . . . Any responsible plumbing contractor will assure you that a complete Crane installation costs no more.
Why Is This Tile Fixture Called "Twinpax"?

Because it contains not one but two packs of toilet tissue, thus absolutely preventing the inconvenience of the supply giving out. There is always the second packet of paper in reserve in the other compartment. The Twinpax fixture gives great satisfaction wherever used. Besides this utility feature, the fixture is very attractive in appearance; it can be supplied in any color of tile. The Twinpax tissue furnished with it is of highest quality.

The Twinpax Fixture is recessed (as above) or a projecting type may be had. Ask for details.

NATIONAL PAPER PRODUCTS COMPANY
CARTHAGE, N. Y.
Architectural Service Division

Our A. I. A. filing catalog will be mailed on request
Reviews of Manufacturers' Publications


The concealing of heating radiators in ways which do not interfere with their operate is often a matter of some importance to architects and interior decorators. These folders illustrate and describe Acme Radiator Shields and Enclosures, fitted over radiators, preventing walls or draperies from becoming soiled, and aiding in the diffusing of heat by throwing the hot air out into a room. For use with a low radiator the top panel or shelf, which is likely to be used as a seat, is lined with asbestos board to prevent overheating. When it is to be used with a taller radiator, a galvanized water pan running the full length of the radiator is provided to supply proper humidity to the air. The shield or enclosure is to be had in any of the finishes desired.


The treatment of floors has been so carefully studied that there has been developed a material which is the best and most appropriate for almost every imaginable purpose. Growth in popularity of bathing pools and their being built in large numbers have of course directed attention to study of flooring materials for use with them. This issue of the Norton Company's bi-monthly house organ covers the use for such purposes of Alundum Ceramic Mosaic Tile in combination with vitreous tile for the new swimming pool at the Worcester Polytechnic Institute. Several illustrations show the excellent appearance of the floors and of the Pre-cast Alundum Aggregate Treads with marble risers to match which have been used on the stairs.


The noiseless and smoothly functioning service which renders the operation of the large American hotel or department store so notable is due to careful planning in which the best and most appropriate apparatus is provided. Asking or receiving data from a cashier's or a bookkeeper's office by telephone, for example, when it can be done at all, is far less satisfactory than securing it in written form which leaves no opportunity for argument when responsibility for issuing data must be fixed or some discrepancy straightened out, and change for a guest or a customer can be had far more quickly and easily than by sending a bell boy or a "cash girl" to a distant desk. These are among the reasons for the development of the highly useful pneumatic tube installations in use all over the country. The "Venus" eraser is to be had in any of the finishes desired. Different sizes in which the "Venus" eraser is to be had.

INTERNATIONAL HEATER COMPANY, Utica, N. Y. "The International Economy Warm Air Furnace."

The hot air furnace, which was, of course, the earliest of devices for heating an entire building from one source of heat, possesses certain advantages which procure and probably always will procure its wide use. Much of the success with which this type of heating is used depends upon the design and installation of the furnace itself, and this booklet illustrates and describes the "International Economy," dealing with each of its many parts and giving a two-page illustration of such a furnace when duly installed and ready for use. It also gives in full the standard code regulating the installation of warm air heating furnaces in residences, data which are of course of universal value. This brochure should be had by every architect.


The most successful lighting equipment is naturally that which gives at the minimum of cost the maximum in lighting efficiency, this last meaning of course the best distribution of the light. Illuminating engineers have devoted their highest skill to solving problems connected with lighting, and so complete has been their success that one wonders if there are further improvements which could possibly be made. The data presented in this publication have been compiled by the Holophane Engineering Department from investigations, study and practice in the illumination field. On request, the authority for any statement or illumination value as shown will be furnished. For this reason, the accuracy of these data may be absolutely relied upon for all practical illumination design work as applied to Holophane reflectors. The Holophane Company believes that the maximum service from any lighting installation requires careful engineering design and planning in advance of the installation of equipment. To this end, the company maintains a competent engineering department which will draw up complete illumination specifications on a lighting project.

AMERICAN LEAD PENCIL CO., New York. "Venus Pencils" and "Unique Thin Lead Colored Pencils."

The importance which is given by constant use is attached to a detail of work as small pencils, and of its particular interest are the folders or leaflets issued by the American Lead Pencil Co. Especially in the drafting room of an architect or engineer, continual use is made of many grades of pencils, from the extremely hard to the extremely soft, and it is often necessary to use pencils of different thicknesses of leads and of various colors, thin colored pencils being much used for marking blue prints, making layout sketches, etc. The folders give full data regarding the "Ever-Pointed" pencil, which of course requires no sharpening, since re-fill leads are used, and they state as well, the different sizes in which the "Venus" eraser is to be had.

PORTLAND CEMENT ASSOCIATION, Chicago. "Town and Country Houses of Concrete Masonry."

That many architects are now fully familiar with the use of what is known as "concrete masonry" is amply proved by countless illustrations appearing in the publications devoted to architecture and building. Asking or receiving the structural value of this type of building was realized, it was felt by many that structures so built presented a certain awkwardness of design—perhaps a lack of grace and delicacy. It was plainly evident that use of concrete masonry was not fully understood. This booklet proves that such is no longer the case. It is replete with illustrations of residence structures in quite a number of architectural types, notably the Italian and Spanish, built of concrete masonry units and trimmed with stucco. The houses, designed by a number of well known architects, afford a new idea of the possibilities presented by use of this valuable and important material, particularly for residences.

MURPHY VARNISH CO., Newark. "Two Painters, Three Minutes Apart." A booklet concerning a finishing process.

There are buildings of many types which must be obtained from such extremely limited appropriations that every possible device for saving must be resorted to if they are to be built at all. Among the details of building upon which saving is often possible is that of finishing interior woodwork, and this folder is useful in giving data regarding a material which by completely finishing woodwork in one operation makes possible saving of both material and time. "One painter applies a coat of Murphy Brushing Lacquer—say, a silver gray or mahogany—towards the woodwork. A second painter follows him in three minutes and rubs off the Lacquer across the grain with tow or burlap. The three minutes' wait does not allow the brushing Lacquer to dry thoroughly, but gives it time to penetrate deeply into the softer portions of the grain. The harder portions do not absorb the Lacquer and are wiped clean. The result is a smooth, impervious stain finish of remarkable beauty, showing the grain. The surface is dry to the touch in five minutes, and ready for use in an hour or so. If desired, a coat of clear brushing Lacquer may be applied a little later.
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A.P.W. PAPER CO. ALBANY, N. Y.
THE NATIONAL LIME ASSOCIATION, Washington. “Out of the Malt with Lime—Bulletin 313.” The importance of lime in the modern world is great. As with various other spheres of effort, the manufacturing and marketing of lime have been organized, systematized and correlated, and the different “bulletins” issued by the National Lime Association are accepted as the official publications of the industry. This particular bulletin deals with the use of lime for roads. It discusses the types of lime required for the purpose, the necessary qualities of such lime, and the quantities likely to be required for building roadways of different depths and widths. Many of the Association’s bulletins have a distinct value to architects and builders, such as those entitled: “Lime and Lime-Cement Brick Mortar”; Watertight Concrete”; “Whitewash and Cold Water Paints”; “Shake Stucco”; “Building Code Requirements for Lime”; and “Standard Specifications for Lime Plaster.” All these publications are easily to be had.


Provision of filtered and refrigerated drinking water throughout buildings of many types has made rapid strides during the last few years. In structures of certain kinds it is very nearly as important as the circulation of hot water, which of course is universal. Take for example, a hotel where a guest must either drink water from the bathroom faucet, water often tepid by reason of the nearness of the cold water pipes to those carrying the hot, or else call for a bell boy who after a time brings in the old fashioned cold water pipes to those carrying the hot, or else call for hot water, but for mills, factories, hospitals, schools, institutions. Detailed drawings show the method of their construction.

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The ILLINOIS Thermo Trap
ordinarily used on low pressures, but built strong enough to operate on pressures up to 100 pounds without damage to the sensitive diaphragm

All Illinois Heating Systems whether vacuum or vapor, use this trap on all radiators. It has many exclusive advantages that have been largely responsible for the outstanding success of these systems.

The proven advantages of Illinois Heating Systems are:
—operation below atmospheric steam pressure—at vacuum vapor pressures.
—a moderate, healthful heat during mild weather, avoiding overheating common to ordinary steam jobs.
—all the heat you want in winter weather by adjusting firing periods.
—operation four-fifths of the time with banked fires.
—easy control of room temperatures.
—a remarkable fuel economy.
—durability of apparatus.
—noiseless operation.

Write for Vapor Details Bulletin 22

ILLINOIS ENGINEERING COMPANY
ROBT. L. GIFFORD. PRES.
INCORPORATED 1900
BRANCHES AND REPRESENTATIVES IN 40 CITIES
CHICAGO
This graph demonstrates visually the value of Eljer "curved top" lavatories in battery installations. The tops of the straight backs are clearly out of alignment. The high points of the curved backs are equally varied—but the eye is outwitted by the curve. The curved top is another safeguard to a satisfactory installation.

New Detroit, No. 251

THE curved back of an Eljer New Detroit Lavatory, No. 251, has more than looks to recommend it. When a battery installation is to be made, it's the best guarantee of satisfactory alignment one could wish!

Given straight top backs as shown in the upper graph, the slightest discrepancy in height of backs shows up like the irregular top of a fence silhouetted in the moonlight. A quarter-inch variation isn't much to the Eiffel Tower, but it's too much on a battery of lavatories.

But the curved back—there's the trick! The eye cannot estimate how high or low the high-points are, and a uniform end-to-end battery is the visual result.

Look over the New Detroit design and note its features: Oval basin, anti-splash rim, integral depressed soap holder, integral back with hangers concealed. Made of the finest Eljer vitreous china that ever came out of a kiln, pure white and harder than rock. It's a fixture to delight the heart of any man who appreciates fine work.

The Eljer catalog has the New Detroit and many others, fully described. And Eljer on-the-job deliveries help to smooth away wrinkles from furrowed brows. If the brow is already furrowed, send for the Eljer catalog as the first step toward a cure. Eljer Company, Ford City, Pa. Plants at Ford City, Pa., and Cameron W. Va.

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VITREOUS CHINA PLUMBING FIXTURES
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