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king the simplest design to provide maximum areas of well lighted, freely tilted, unpartitioned rental space within the legal cubage limits for office buildings proposed by architect Rino Levi and Roberto Cerqueira Cesar, Associate Architect, for the site between thoroughfares that would be covered by a mall (right) serving as an anterior shopping street.

was decided to erect two vertical slabs, placed at right angles to the streets atop a submerged block containing a two-level parking garage. This scheme would create three courts for light and air—above the shopping mall through the center of the project, and above the projections at either side containing ramped entrances to the garage. The window walls would face these courts.

Accepting the setback limits as the governing maximum, the architects described within those limits a parabolic curve which would become the structural arch of the two buildings. This curve is somewhat asymmetrical, as the widths of the bordering streets differ and hence the angles of façade setback differ. The elevator stacks are also off-center, as they are located at the peak of the curves. It is proposed to surface the steel-and-concrete arches with copper. The enclosed walls would be composed entirely of windows protected by structural sunshades.

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sound-conditioning materials  by Paul J. Washburn*

some of the recurring problems which concern the architect is the specification of particular type of acoustical material for a particular job. When the architect specifies an acoustical material, he is interested, primarily, in the reduction or control of sound. However, a selection of acoustical materials is sometimes be a needlessly expensive n. A factor that occasionally goes undetected is that a difference in noise reduction of .05 between materials cannot be detected by the unaided ear, while the cost difference might be quite significant.

As the architect knows, no one material will solve every architectural problem. For this reason there are available by many acoustical materials, each with its own important characteristics. It is an aid to the architect, we will summarize, generally, in this article the different kinds of materials and where they will be installed to produce the best results. Due to the fact that so many variables are involved, such as noise coefficients, thickness, light reflection, moisture resistance, insulation value, installability, maintenance, and fire resistance, it is air and incorrect to say that one size of tile is best suited for a particular job. Nevertheless we will try to sends a comprehensive generalization as accurately as possible.

what are acoustical materials?

acoustical materials are made from a variety of substances and combinations of ingredients. Very efficient sound-absorbers have been made from vegetable res such as bagasse or wood.

Bagasse is the fiber residue of sugar after the juice has been extracted. Cellulose fibers are produced from various trees in the south and the north. Hair felt is still used, but not to the extent of former years.

Mineral fibers, such as asbestos, glass, mineral wool, enter into many combinations, as do the vermiculite, pumice, perlite aggregates. The binding agent can often contribute considerably to the sound absorption of a product; the porosity of materials is often increased by adding a foaming agent to the mix.

Practically all products listed and used as acoustical materials can be classified into three groups. In the order of use, they are:

1. Monolithic tiles, with or without perforations extending into the material.
2. Assembled units, consisting of perforated facings over an absorptive element.
3. Plaster compositions with acoustical properties.

The monolithic prefabric tiles are by far the most widely used. For general application, this type has a number of advantages. Through adequate control of density, thickness, dimensions, and finishes during the manufacturing process, tiles with uniform absorptive characteristics and matching appearance can be produced in large quantities. Absorption capacities and characteristics are inherent in the tiles. Due to this possible precision in manufacture, their performance after installation can be relied upon to match that indicated by the standard test data on which they are rated.

Assembled units include the various combinations of sound-absorbing elements, such as rock-wool and glass-wool blankets, pads, or other materials with acoustically transparent facings, most of which are perforated. While a great many of these combinations are used in offices, some are designed primarily for broadcasting and recording studios, special music rooms, etc., where some controlled variation of sound-absorptive characteristics may be desirable. They are also used in general sound conditioning where the greatest possible sound-absorbing capacity may be required. By varying the thickness of the sound-absorbing element and the spacings between the element, the wall, and the facing, some variation in the over-all absorption and the absorption at the different frequencies can be obtained. In practically all instances today, the facings used are some form of durable, perforated panel such as metal, asbestos board, or hard board. The original use of cloth, usually muslin, has been discontinued because of difficulties and expense in maintenance.

Plaster compositions broadly include the acoustical plasters and the various kinds of “sprayed-on” materials. The plasters are built up on the wall and ceiling surfaces in the usual way. The sprayed-on types are applied by special guns. These materials are characterized by their smooth, unbroken surfaces. Their limitations lie in the indeterminate absorptive characteristics and difficult maintenance. With this type, absorption depends critically on proper application and, due to their fine surface porosity, paintability is narrowly restricted.

Practically all sound-absorbing materials owe their efficiency to the fact that they are highly porous. The absorption coefficient of a porous material depends, in a rather complicated manner, on the thickness, the size of the pores, the ratio of pore volume to total volume, and the frequency of the sound. Although it is quite difficult to evaluate all of these factors with a view to predicting the absorption ability of a material, several approximate statements may be made. In the first place, so that the pores of a material can absorb sound effectively, they must communicate with each other and with the surface of the material. Secondly, the absorption increases with the thickness, particularly at low frequencies. At high frequencies, for some materials, an increase in thickness has little or no effect on absorption. Thirdly, the absorption increases up to a certain point with the degree of porosity, as measured by the rate at which air can be forced through. For a given type of material, the lower the density, the more porosity as measured by the rate at which air can be forced through it. If the size of the pores is increased beyond a certain point, however, producing an extremely loose-textured material, the absorption decreases. Fourthly, the absorption of practically all materials is greater for high frequencies than for low frequencies.

October 1952 73
## TYPES OF TILES AND THEIR CHARACTERISTICS

<table>
<thead>
<tr>
<th>Description</th>
<th>Cellulose-Fiber Tile</th>
<th>Mineral Tile</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>description</strong></td>
<td>Most fiber tiles are made from the long, tough sugar-cane fibers called bagasse, or from wood fibers. After fabrication, there are myriad minute interstices between the fibers throughout the entire tile. These tiny voids exposed by perforations give the tile its sound-absorbing qualities. All tile can be made termite-, fungi-, and dry-rot proof by special manufacturing processes.</td>
<td>Rock wool is the general component of mineral tiles. It is felted in a manner similar to that used in the manufacture of wood fiber, but with the addition of a suitable binder. This binder is added to provide strength and toughness in the finished product. Mineral fiber tiles are available with fissured surfaces or with perforated faces. Like the wood-fiber tile, sound is dissipated by the minute interstices between the fibers, posed by the fissures or perforations.</td>
</tr>
<tr>
<td><strong>efficiency</strong></td>
<td>Most efficient at high frequencies and has a noise reduction coefficient in the range of .55 to .75.</td>
<td>Has high sound absorption for the middle and high frequencies. Noise reduction coefficient, from .65 to .78.</td>
</tr>
<tr>
<td><strong>cost</strong></td>
<td>Low initial and installation cost. Varies from low to medium, depending upon method of installation.</td>
<td>Medium initial and installation cost.</td>
</tr>
<tr>
<td><strong>moisture resistance</strong></td>
<td>Has a moderate moisture resistance and can be used except where conditions of excess humidity prevail for long periods. Excessive moisture tends to destroy cement bond and warps most fibrous acoustical materials.</td>
<td>Moderate moisture resistance with safe margin for use under all normal humidity conditions. Not recommended for use in washing rooms or where it will be exposed to steam or constant high humidity.</td>
</tr>
<tr>
<td><strong>light reflection</strong></td>
<td>Has a rating of .76 to .80.</td>
<td>Good light reflection with a range of .78 to .84.</td>
</tr>
<tr>
<td><strong>insulation value</strong></td>
<td>Thermal conductivity ranges from about 0.30 to 0.40 Btu/hr/sq ft/in., thickness/degree F temperature difference.</td>
<td>Thermal conductivity ranges from about 0.40 to 0.53 Btu/hr/sq ft/in., thickness/degree F temperature difference.</td>
</tr>
<tr>
<td><strong>fire resistance</strong></td>
<td>It is a combustible tile but, when ordered with special paint finish, it is classified as slow burning.</td>
<td>It is classified as an incombustible tile.</td>
</tr>
<tr>
<td><strong>maintenance</strong></td>
<td>Easy to maintain, needs occasional cleaning. Can be repainted without loss of efficiency. Either oil- or water-based paints can be used and no special equipment is necessary. Brush or spray can be used.</td>
<td>May be cleaned with damp cloth or vacuum. Car spray or brush painting will not affect efficiency of the material. Perforated material may be repaired repeatedly, without loss of efficiency, by spray or brush. Neither type should be used below wainscot height where subject to impact or abrasion.</td>
</tr>
<tr>
<td><strong>installation</strong></td>
<td>Can be cemented to existing surfaces, nailed or screwed to furring strips, and can be mechanically suspended.</td>
<td>Can be cemented to existing ceiling or mechanically suspended. Nailing is not recommended.</td>
</tr>
<tr>
<td><strong>general use</strong></td>
<td>The low tile and installation costs of this material create a demand for its use, especially where a large area of ceiling space must be treated. Although it is one of the most widely used materials and can be found in almost every type of installation, commercial buildings and various types of institutional buildings are the principal users. A large variety of sizes, thicknesses, and efficiencies are available in the cellulose fiber type of acoustical tile; it is the low-price work horse of the industry.</td>
<td>Because of their mineral composition, these tiles will support combustion when exposed to conventional resistance tests. For this reason, they are used in theatres, restaurants, night clubs, and other places of business where the public gathers and where fire safety requirements must be met. Fissured material is less frequently used when appearance is a primary consideration. Porous materials are used in commercial and institutional buildings and other areas requiring continued maintenance.</td>
</tr>
</tbody>
</table>

**Perforated, wood-fiber tiles (as well as lightweight concrete masonry units) are the sound-absorbing materials specified for a laboratory (left).**

**Fissured, mineral-wool tiles that will not support combustion are appropriate for an automobile display room (right).**

glass-fiber tile

In the manufacturing process of glass-fiber tile, molten glass is drawn into fine fibers under controlled techniques. When combined with a small percentage of a stable binding agent, the glass fibers are compressed and bonded into board form. The boards are then cut into tiles of desired sizes and thickness and finished to required specifications.

- Most efficient in the middle and high frequencies. Has a noise reduction coefficient between .75 and .85.
- Medium initial and installation cost.
- Excellent moisture resistance. Useful in places where continued high humidity and varying conditions exist.
- Unpainted.
- Thermal conductivity about 0.24 Btu/hr/sq ft/in. thickness/degree F temperature difference.
- It is classified as an incombustible tile.
- Easily cleaned and can be painted numerous times without loss of efficiency. Can be used where physical wear is present, as tiles will withstand hard usage.
- Can be mounted on wood or applied with metal suspension system. Screwed or nailed to a framework of wood furring strips.

cause this tile has an incombustible rating, it will be used in all types of installations that require flame resistance. Schools, public places, and offices are major users. Its good moisture resistance also permits use in areas where humidity and dampness are prevalent. It is recommended where physical wear will be encountered, such as gymnasiums or below wainscot height.

perforated-asbestos tile

Perforated, asbestos-board-type tile is made of asbestos and cement and is backed with an inorganic wool acoustical backing. It is manufactured in several thicknesses and the panels are perforated with small holes to allow the sound to be absorbed by the acoustical backing.

- Most efficient in the middle and high frequencies. Has a noise reduction coefficient between .75 and .85.
- Medium initial and installation cost.
- Excellent moisture resistance. Useful in places where continued high humidity and varying conditions exist.
- Unpainted.
- Thermal conductivity about 0.24 Btu/hr/sq ft/in. thickness/degree F temperature difference.
- It is classified as an incombustible tile.
- Easily cleaned and can be painted numerous times without loss of efficiency. Can be used where physical wear is present, as tiles will withstand hard usage.
- Can be mounted on wood or applied with metal suspension system. Screwed or nailed to a framework of wood furring strips.

Because it does not retain moisture, it is especially useful in installations like swimming pool areas or restaurant kitchens. Its high acoustical efficiency has made it widely popular for scientific acoustical treatment in radio and television studios, concert halls, auditoriums, and in gymnasiums, music rooms, and on wall surfaces where hard wear or abuse will occur.
perforated-metal tile

description
The metal-type acoustical material consists of perforated metal with supporting flanges which provide structural strength, and a mineral-wool pad which absorbs sound. This tile is usually made of 26-gage steel or aluminum, with perforations to permit sound to reach the pad. It usually has a baked-on white enamel finish.

efficiency
Highly efficient over entire frequency range although most efficient in low middle; has a noise reduction coefficient between .75 and .85.

cost
Generally higher initial and installation cost, compensated by high efficiency and removability features.

moisture resistance
Has moderate moisture resistance.

light reflection
Has a rating from .74 to .76.

insulation value
Thermal conductivity about 0.22 Btu/hr/sq ft/in. thickness of insulating material/degree F temperature difference.

fire resistance
It is classified as an incombustible tile.

maintenance
Easily repainted and washed; low maintenance cost.

installation
Usually comes in only one size, 12" x 24", but bevel in middle gives appearance of two 12" x 12" units.

general use
The perforated, metal-type has the highest acoustical efficiency of commercial acoustical tile; however, it may also cost more than other types. It is used in installations where severe service may be encountered. As it is mechanically suspended, it can be taken down and moved to other areas. It is used quite frequently in large office and industrial plants. Office buildings use this material because it is particularly adaptable to air-conditioning systems, since special air-flow channels can be installed which allow cooled air to pass through the perforations into the room below.

Perforated-metal tiles backed with sound-absorbing material have the highest degree of acoustical efficiency. Easily combined with other mechanical services (below), they are especially suitable for large office areas. Photos: courtesy of Armstrong Cork Co.

cork tile
Cork tile is made entirely from selected cork particles ground to specific particle size, baked under heat and pressure to form blocks. While cork tile has excellent insulation value and moisture resistance, its use as an acoustical tile is limited for it has lower noise reduction qualities. However, because of its resistance to extreme conditions of moisture, it is used in swimming pools, commercial kitchens, high humidity test rooms, and special manufacturing areas. Its high insulation properties make it possible to apply the tile to the top story of a building that has no roof insulation. Except in cases mentioned above, where other factors beside noise reduction are primary, its use is restricted to special type projects.

Extreme resistance to moisture favors cork tile for swimming pool ceilings (right).
Photo: courtesy of Armstrong Cork Co.
INSTALLATION OF ACOUSTICAL MATERIALS

As there is sometimes a best type of acoustical material for a particular job, there is usually a preferred method for installing that material. Therefore, the system of installing an acoustical ceiling should be chosen with care, as a wise choice of method will mean not only a saving in time and money but will also result in a more serviceable installation. As each structure has its special structural problems, it will sometimes be necessary to employ different methods of attaching the acoustical tile or a combination of several methods. These methods are suggested as possibilities rather than standard operating procedures, and are arranged in the general order of their cost, from lowest to highest.

**cementing**

Remodeling work it is very often possible to cement acoustical tile directly to plaster ceiling. This is the most common of all methods and usually the least expensive. The plaster, however, must be in good condition since cementing requires a smooth, solid-base surface to which the tile can be applied. Where the ceiling has been painted, tests should be made to determine if the adhesive will bond satisfactorily. The recommended test is to install a single tile, leave it in place for 48 hours, then remove it. If the paint is not softened, it is considered safe to the cement method.

**all to wood furring**

"D"-furring strips, 1" x 2", may be used as a base for nailing or screwing the acoustical material where the ceiling surface is rough and uneven. The strips, however, should be shimmed so that they are level. In new construction, it is possible to fur across the joists. Furring methods have the advantage of maintaining higher absorption efficiency. Lining paper as a backing between the furring is used to avoid "hanging" through the joints of abutting acoustical material.

**screwing to gypsum board**

The best method of applying a perforated, fiber tile material is accomplished by screwing the material to a base of gypsum board. The use of screws is one of the most secure methods of attaching an acoustical material.

**cementing to brown coat plaster**

For an acoustical ceiling requiring rigidity and a dependable fire stop, tiles can be cemented to the brown coat of plaster. This method will also reduce sound transmission through the ceiling.

**mechanical suspension**

Mechanical suspension systems do much to eliminate problems of ceiling design, and are adaptable to both old and new construction. They conceal overhead pipes, air-conditioning ducts, and electrical conduits, and produce a clean, modern appearance. Mechanically suspended ceilings are often used where old ceilings are too high. They are suited to receive troffer-type lighting fixtures and the extra space made available above the ceiling simplifies the installation or repair of these concealed fixtures. In addition, overall lighting in the room is often improved by a lower ceiling with good light-reflecting properties. Suspended ceilings usually do a better sound-conditioning job because the absorbent surface of the material is brought closer to the source of sound. In many cases, they make heating systems more efficient by reducing the volume of the room.

Mechanical suspension methods in old construction are likely to be more expensive because of the extra time and material necessary for each job. In new construction, however, money may be saved by eliminating plastering and other finishing. For example, ducts are concealed by the suspended ceiling for appearance.

**H-runner system**

There are several good ways of suspending acoustical materials mechanically. One of the most economical is the H-runner system which is rapidly erected because the materials are attached directly to the supporting members. Acoustical materials must be kerfed and back-cut to fit in the runner.

**cementing to suspended gypsum board**

Sometimes it is desirable to suspend gypsum board as a cementing base for the acoustical material to be used. This provides a nonbreathing ceiling and additional fire resistance. In the case of suspended mineral wool materials, this is probably the most desirable system to use.

**cementing to dropped plaster ceiling**

The use of a dropped ceiling of brown-coat plaster and cement application of acoustical tile is approximately in the same cost range as the preceding system. This method provides a solid base, a nonbreathing ceiling, and an excellent fire stop, as well as reducing sound transmission.

**metal pan suspension system**

Generally speaking, the suspension of metal pan materials is more costly than other methods but it has practical advantages for many installations. Quite often it is the most efficient for acoustical sound conditioning.

Combined acoustical baffles and luminous ceiling provide a high degree of hearing and seeing comfort in this conference room (above).

Photo: courtesy of F. W. Wakefield Brass Co.
After receiving a description of the respective sound-conditioning products available—their size, efficiencies, appearance, etc.—the architect must then select one for his particular job. The factors which govern his decision depend largely upon the type of building designed and the amount of noise expected. For example, the acoustical materials to be selected for a school building should be based largely upon their efficiency, cost, and maintenance characteristics. The more efficient materials must be used in areas that contribute most to the noise problem of the school. Corridors, for example, can carry the noise throughout the building (especially into the adjacent classrooms) unless highly efficient acoustical materials are installed. Other noise centers include type-writer rooms, band rooms, music rooms, etc.; there, too, a material of greatest efficiency must be installed. On the other hand, a ½"- or ⅜"-thick material can be used in classrooms where modest absorption is desired. Thus, by using more efficient materials in the classrooms, it will be easier to keep this part of the construction within the budget. In commercial buildings, the materials that provide the greatest efficiencies, best light reflection, and ease of maintenance should be specified for general offices and type-writer rooms; the more decorative materials are used for reception rooms, executive offices, conference rooms, etc.

The effect of various mounting systems on acoustical efficiency can be obtained from each manufacturer or from the Acoustical Materials Association. If a suspended ceiling is not required, it is usually more economical to install acoustical tiles directly against the ceiling surface. If suspension is desired, the architect can take advantage of the additional 5 percent in acoustical efficiency contributed by the air space.

Acoustical tiles that are suitable for proper maintenance should always be considered. Materials that contain holes are usually the easiest to maintain over a period of years; all types of perforated tile (including perforated metal with baked-enamel finish) may be repainted repeatedly without affecting their acoustical efficiency. Where severe maintenance problems are anticipated, the situation should be discussed with the manufacturers of the respective products. Air-conditioning systems with inadequate filtering systems tend to increase acoustical ceiling maintenance problems; rooms where considerable smoking takes place must be cleaned and repainted more frequently than other types.

There is a number of additional products available. Most have limited sales, though they are adaptable for specific uses. Among these are products made of asbestos fibers for fire-retardant features, as well as a flexible duct lining and other sound-inhibiting materials. Materials, such as glass fibers and rock wool products in both rigid and flexible types, are conventionally used for both the inside and outside of air-conditioning ducts, to reduce noise that otherwise would exist in these systems. All acoustical ceiling tiles, however, are rigid in character and normally come in the conventional 12" x 12" size.
Rare in this country is architecture that comes into being as a result of a national design competition. The headquarters building for the U.S. Junior Chamber of Commerce in Tulsa, Oklahoma, is not only one such instance, but encouraging proof that this approach can produce progressive work. Architects for the building were selected in a competition conducted in 1949 by P/A, with Jedd Stow Reisser as Professional Advisor, and Servel, Inc. and General Portland Cement Company as sponsors. The competition was limited to those between the ages of 21 and 35. Jury for the selection of the winning design (rendering, left) were: Pietro Belluschi; Karl Fred Kamrath; Hugh Stubbins; J. Robert F. Swanson, and Robert Law Weed.

Photos: Hawks-Trell, Inc.
The program called for a fireproof, air-conditioned building to serve as the national headquarters for the U.S. Junior Chamber of Commerce and also as a memorial to World War II Jaycee heroes. Major requirements were a memorial lobby; offices for the president and administrative staff; offices for the compiling, editing, and distribution of the organization's voluminous printed matter; business offices; file and storage rooms; work space for the efficient handling of purchases and supplies; receiving, addressing, and mailing rooms.

The site is a rectangular corner lot, with a depth of 140 feet and a 200-foot frontage (to the north) overlooking a park and the city skyline. Fine trees on the south and west, with an irregular slope from southeast to northwest.

The two-level plan solution consists of an interior core of storage, utility, and toilet rooms, with the perimeter allocated to offices and work spaces. On the upper level, the memorial lobby occupies the entire east end of the building, with the main entrance on the north and doors out to a landscaped terrace at the rear. At some later date, a penthouse floor with a series of lively free-form roofs will be added to house the president's office, a conference room, lounge, etc. The building is of reinforced-concrete construction with portions of exterior walls of brick, stone, or structural glass; a grout of Trinity White Cement surfaces all exposed concrete. Interior walls are either plaster, or prefabricated, flush-metal partitioning. Floors are surfaced with asphalt tile or terrazzo, and acoustic tile is used on ceilings. The fixed plate-glass window areas have spandrels of structural glass.

The building is year-round air conditioned with a system using equipment manufactured by Servel, Inc. Because of the large sealed window areas, and wide variations in solar load, a zoned system was adopted to provide accurate temperature control of individual areas. Five zones, located in different parts of the building, are operated as individual units and have their separate air-distribution systems. Thus, on an Indian Summer day in fall, if the sun's heat on the south wall is strong while it is cool on the north, the system serving the south zone can cool while the one serving the north zone heats, keeping the entire building within a one-half degree plus or minus variance.

Control of natural lighting includes deep structural sunshade on the south, freestanding louver in the projecting face on the west face, and the stone wall on the east. Both incandescent and fluorescent fixtures are used for artificial lighting.

We asked the members of the original design-competition jury and Jedd Reif, the Professional Advisor, for their comments on the actual building. Excerpts:

Belluschi: "The plan as carried seems to have the fine qualities of fit economy and efficiency for which the original design earned the prize . . . As a memorial, it is no better than expected, yet may not be quite enough. As a piece of architecture, I cannot help being somewhat disappointed by its detailing and execution and by certain tricky feats; nevertheless, it is a distinguished piece of architecture, which may contribute to the country's general standards."

Kamrath: "A good simple plan logically in arrangement. As I recall, it is better than the original competition.
Present roof penthouses will soon be joined with a temporary enclosure, which later (when funds allow) will become part of permanent rooftop executive suite. Exterior color is limited to black, natural glass spandrels, white concrete, aluminum-sash members, red-brown sandstone.
"I do not care for the architectural character of either."

Stubbins: "The plan seems orderly, efficient in the office and work section, and does not have the strength and simplicity that a design must have to last. However, it is interesting for me to see a building executed on the basis of a national competition."

Webb: "I feel that the plan solution is a good one and the accommodation to the sloping site well handled. I think the building has the basis of a good memorial area."

"Jaycee headquart..."
The memorial lobby (acrosspage, top) the roof floor is dark blue; the editorial suite (acrosspage, bottom) is protected from western by an exterior louver device. The main editorial office (right, above) is at the northcorner of the upper floor. Panels of glass separate stair hall (right) and floor.

There is a certain follow-through in detail and handling . . . The 'nubs' at the eave line the north elevation bother me. All in all, I think it is a swell little building even though it misses in detail and therefore some of the cleanliness I anticipated.

Sner: “My reaction is generally favorable; the building is in good scale, well ged, and has a restrained monumental . . . . It is compactly arranged with a service core that makes the most of storage and mechanical space with interference with office space.” On point of memorial character, “I feel building does well by itself . . . It man-memorial atmosphere without shouting it.” Compared with the original competition design, “I would say that it is as good in plan or elevation . . . but certain that the Jaycees have a build- which they may be proud and which improve with time . . . I am proud to have been connected with this work.”
construction
Flooring: 2" glass fiber, semi-rigid material—Gustin-Bacon Manufacturing Corporation.
Roof drains: cast iron drains—Josam Manufacturing Company.
Partitions: 3" flush metal—Mills Company; flush metal toilet partitions—Symetal Products Company, Inc.
equipment
Floor duct—Walker Duct Company; cable duct—Triangle Conduit & Cable Corporation.
Wiring devices—General Electric Corporation.
Plumbing and sanitation: syphon-jet closets, tubs and lavatories, water heater—Crane Company; rubber toilet seats—C. F. Church Manufacturing Company.
Furnishings: walnut beige Micarta tops, and walnut storage bittersweet fronts; benches, chairs, etc.—man Miller Furniture Co.; executive ch- Knoll Associates, Inc.; lobby drapery—Adler.

In the northeast corner of the lower level is the efficient mailing and printing room (top). Private offices (two lower photos) line the north wall of the upper floor. Color schemes upstairs are built around yellow, silver-gray, blue, and white; downstairs, Swedish yellow and blue are used. Washrooms are painted in varying schemes, including apple green, tangerine-pumpkin, and blue-gray.
Steel design economy by Julian Smariga*

Steel conservation practices are a must in building design today. The high standards of design currently used make efficient application of structural material, therefore a great reduction in the weight of steel-framed buildings is generally possible. However, an appreciable saving in some elements of framing can be achieved by certain design and construction techniques which have proven economically feasible.

Continuity of framing presents one of the greatest opportunities for using steel advantageously. Complete continuity is readily achieved by welding. This method is widely used in those areas of the country blessed with progressive building teams. A modified form of continuity (described as cantilever steel construction) is economically feasible without welding, as demonstrated by several examples. Another way of achieving controlled continuity without welding, known as the overlapping-splice method, is illustrated (Figure 1). This method achieves substantial weight savings at a corresponding increase in fabrication or erection costs, and has been used in roof construction of several buildings.

Overlapping-splice construction

The web splice connection of the overlapping-splice method of construction (Figure 1, a typical detail) should be decided for a shear force of 0.425 wL. For severe conditions, this connection will usually require only one or two bolts; for normal spans and heavier loading conditions, rivet bolts may be used to reduce the number of connecting units required. The dimensions of the overlap indicated are used for uniform loading conditions and are generally applicable to roof construction. Isolated conditions of concentrated loading could be taken care of by strengthening the individual units.

*Assistant Engineer, Division of Hospital Facilities, Health Service.

### Materials and Methods

#### Steel Design Economy

Several commonly used design schemes were selected for comparative study (Figure 2). The stress pattern for uniform loading in each scheme is shown (Figure 3), where the relative stress economy is clearly evident. It is believed that the overlappingsplice detail provides the best possible balance in positive and negative moments for rolled structural-steel members.

A comparative study of the performance of each design scheme was made and the results tabulated (left). An examination of the sections, weights, and deflections will show that the theoretical advantage of design moments for the overlapping splice is reflected in an appreciable weight saving without penalizing the deflection characteristics.

The technique of overlapping is especially suited to purlin or girt sections supporting a surface subjected principally to uniformly distributed loads, such as roof or large wall areas. For main frames and supporting girders, individual design and proportioning is desirable to distribute the required material in an efficient manner.

The comparative summary does not include fabricated joist members, since considerations other than weight economy may enter into the decision to use steel joist construction. However, in comparing the relative weights of steel-joist construction with overlapping-splice construction, span length appears to be the controlling feature. It seems that for spans up to about 22 feet, rolled steel with an overlappingsplice detail is more economical in weight of material than bar joists, while for spans over 22 feet long, bar-joist construction will be lighter.

---

#### Table: Comparative Study

<table>
<thead>
<tr>
<th>Type of Framing</th>
<th>Design Moment</th>
<th>Comparative Section Required*</th>
<th>Relative Weight Factor Excluding Connections</th>
<th>Maximum Deflection Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>.1250 wL²</td>
<td>10 WF 21</td>
<td>1.00</td>
<td>5 wL²</td>
</tr>
<tr>
<td>II</td>
<td>.0833 wL²</td>
<td>8 WF 17</td>
<td>.81</td>
<td>384 Ei wL²</td>
</tr>
<tr>
<td>III</td>
<td>.0625 wL²</td>
<td>10 [ 15.3</td>
<td>.73</td>
<td>192 Ei wL²</td>
</tr>
<tr>
<td>IV</td>
<td>.0450 wL²</td>
<td>8 [ 11.5</td>
<td>.65</td>
<td>542 Ei</td>
</tr>
</tbody>
</table>

*Assume that the net section modulus of the critical section is reduced by having one hole punched in each flange.
bank planning

Where formerly temples of finance catered only to the chosen few with large sums of money, today banks all over the country conduct lively campaigns to lure anyone with a dollar un­
resent. Indicative of this trend are such relatively new services as Christmas Clubs, and the special’ checking accounts with no minimum balance required. One finds, too, that big-city
banks are building more and more branches in the suburbs, quite literally bringing banking
services “close to home.” With the greatly increased patronage that this implies, the approach
by bank design has altered radically.

In planning to simplify and expedite the new customers’ use of the bank’s facilities, tellers’ windows are almost invariably grouped together so that there is a minimum of con­
susion for the customers. The formidable cages and grilles have all but vanished, so that cus­
tomer and banker now meet on common ground. Even the creature comfort of those who bank
is become a matter of concern, and more and more banks—all those shown in this study, for
example—have summer cooling systems as well as winter heating.

What of the architectural form that has been developed to express these broadened func­
tions? More and more banks have opened their façades, as well as their doors, in a wel­
coming gesture. Inside, in place of the impressiveness of a palatial hall or the aura of a
hallowed sanctuary, a light and airy room is found, one that is pleasant rather than challenging
enter. And with construction of branch banks in residential areas, the scale of design tends
become more intimate—less intimidating.
Cleveland, Oh

Ground Floor Plan
The bank occupies the basement, ground, and second floors of this new six-level structure. Admittedly less efficient than a layout on a single floor, the three-level solution was dictated by the limits of the building site—41 feet wide and 130 feet deep. The safe-deposit department—vaults, lobby, coupon booths, and conference room—is located in the basement. On the ground floor is the savings department (where most customers make but a single transaction; hence, turnover is fast), facilities for opening accounts, paying loans and utility bills, and a travel service. The second floor, practically identical with the ground floor, except for an officers' platform at front of the floor, is the commercial banking floor, including checking and loan facilities, offices, and conference rooms. The building is served by two passenger elevators at the front and one combination passenger-freight elevator at the rear, addition to electric stairways joining the ground and second floors.

Because of a familiar Cleveland soil condition—water-bearing sand from -5 feet to -221 feet—the foundations were designed with support on floating footing pads. Frame is structural steel, with brick curtain walls and a cellular-steel floor system, which also is used for electrical distribution. The front of the building is surfaced with a one-inch veneer of Swedish "Imperial Red" polished granite, with frames, lettering, and spandrel areas in stainless steel. Interior walls are surfaced with oak paneling, marble, or painted plaster.

Floors in public spaces are dark-gray-green terrazzo, with aluminum screeds; asphalt tile in offices. Complete air conditioning includes cleaning, heating, cooling, humidifying, and dehumidifying, with individual controls for each floor; all glazing is heat-absorbing plate glass.

Architects | Conrad, Hays, Simpson & Ruth
---|---
Designed by | J. Byers Hays
Structural Engineer | John F. Fierbaugh
Mechanical Engineer | Vincent Eaton
General Contractor | Hunkin-Conkey Construction Company

On both the second floor (top) and ground floor (left, and immediately above) lighting is handled with a combination of fluorescent and incandescent lamps with over-all ceiling light consisting of fluorescent tubes spaced 2 feet on centers, above an aluminum eggcrate. This, plus recessed spotlights above officers' desks and tellers' counters, produces 50 foot-candles at desk-top heights. (See page 139 for selected detail, teller's counter.)

Photos: R. Marvin Wilson
Phoenix, Arizona

Ground Floor Plan

bank planning
A highly original expression of bank function is perhaps the highlight of this remarkable bank which, according to the architects, was designed "to produce a building with a character of financial security and informal reception for men accustomed to big thinking and rugged outdoor activity." Built in the heart of a cattle-raising area, it makes a bold design statement of the two basic functions of a bank—the safekeeping of money and records, and the conduct of business transactions.

The reinforced-concrete circular vault, with a rugged veneer of native stone, projects through the north corner of the many-windowed, high-ceilinged banking room, the openness of which provides a sweeping panorama of herds, desert, and mountains. Random-laid stone is used for flooring, while counters and other wood furnishings are rough-sawn wood. Brand marks are used for wall decoration. The ceiling is finished with acoustic plaster. To shield the bank from the intense afternoon sun, louvers are used outside the glass of the northwest wall. A small mezzanine at the southeast corner accommodates offices, a conference room, and rest rooms.

Built on reinforced-concrete foundations, a modular steel and concrete framing system is employed that, in conjunction with exterior walls of demountable crenellated steel decking, allows for future expansion with minimum basic change. The concrete roof, supported on bar joists, is surfaced with built-up gravel. Plate-glass windows are fixed in aluminum frames. The completely air-conditioned building has a forced-air heating system serviced from a gas-fired furnace.

Architects & Engineers | Pereira & Luckman
---|---
General Contractor | Perry Brignell Construction Company

The steps leading up to the mezzanine (right) are of solid Douglas fir. An eggcrate ceiling lights the circular masonry vault (right, below). The ceiling of the banking room is painted green; otherwise, color derives from the subtle tones of natural materials. Photos: Julius Shulman
Providence, Rhode Island
A continuing trend is establishment of branch banks in residential districts, away from downtown confusion. This particular branch was built on the site of the oldest house in the neighborhood. Hence, the carefully preserved fine trees and adoption of a design scale that does no offense to a residential environment. Carrying even further this bow to the domestic surround is the open fireplace that is kept burning through the winter.

Framed with concrete-filled steel columns and steel lintels, the bank has a floor of concrete-joist construction with removable pan forms; embedded in this floor is wrought-iron piping for a forced hot-water radiant-heating system; the floor surface is terrazzo. Exterior walls of 4-inch shot-sawed limestone are backed by 8-inch brick walls. The roof uses long-span open-rib steel joists with precast-concrete slabs. The hung ceiling has a float finish of vermiculite plaster.

The radiant-heating system is supplemented by cast-iron radiators in vestibules, toilets, and basement lounge rooms, the entire system being served by an oil-fired boiler. There is also a summer air-conditioning system. Sash are bronze or steel, with double insulating glazing.

For ease of snow removal, the sidewalks, entrance steps, and platform are equipped with radiant-heating coils. The large windows provide excellent daylighting for the bank, with summer sun tempered by tree foliage and light glass curtains. Artificial lighting in the banking area is provided by 6-foot square fluorescent ceiling panels, with metal-eggcrate grilles; teller counters have individual, 24-inch fluorescent lamps.

Photos: Laurence E. Tilley
Winslow, Arizona

Ground Floor Plan

Scale: 5" = 25'

Vault
Safe Depot
Club Room
Util
Work Space
Officers
Conference
Located in northern Arizona, in a town at the edge of the Navajo-Hopi Indian Reservation, this branch bank serves both the town’s year-round residents and a lively tourist business. While the basic consideration was to design a thoroughly modern banking establishment, the client specifically requested that the building in some manner echo the environment. This requirement was met in such choices as use of native sandstone in color range from light buff to dark earth-red, and familiar Indian motifs for decorative emphasis. The architect wished to have the finished design express the structure. Hence exposed rigid concrete frames at 20-foot intervals, and the lightweight precast concrete plank for roof decking. The fire east wall of the public space is surfaced with turquoise-blue tile with a textured face. Against this wall are mounted four half-relief Hopi dancer groups symbolizing the four seasons. The work of Phillips Sanderson, these sculptures are in polychromed Spanish cedar. The club room, with separate street entrance, is used for meetings of civic groups. In the basement are storage rooms, mechanical equipment, and employees’ lounge.

The floor of the public space is terrazzo; elsewhere, flooring is rubber tile. Low ceilings are surfaced with acoustic tile. Directional glass block is used on the west wall of the work space, with heat-absorbing glass in the clerestory above. Due to the extension of the canopy above the counter, direct sunlight strikes the east wall above head height. Heating is a combination of copper radiant floor coils with tempered air delivered through duct space in the canopy, that also distributes cool air from air washers in summer.

Photos: Julius Shulman
The architect had a most remarkable client, in the Building Committee for the County Commissioners. Not only did the committee expressly state it did not want a monument to itself (one special request was that the building not have a tower and a clock), but the architect was asked to write his own program, so long as the result would be a courthouse and up-to-date office building, "with emphasis on economy and the housing of the County's working needs so that the functions of a modern and progressive community would be carried on efficiently."

Throwing out all preconceived ideas of government-building design, the architect conducted exhaustive interviews with all the personnel who would use the building—from judges to janitors—to determine actual working needs. As a result, the new building contains 31,514 square feet of space, whereas the old quarters it replaced had a wasteful 60,000.

The site has a slope of 10 feet from front to back, a situation that was capital to provide a secondary entrance for Home Demonstration offices at the level. To avoid a ground-water cond near the center of the site, the plan developed in a U-shape.

Since Crisp County owns its own pump installation for complete sun-and-winter air conditioning. Alth
er in initial cost than more conven-

tional systems, it proved actually to be an

tomy, since fixed glass was used

oughout, boiler-room space was saved,

no smoke stack was needed. It also

wed use of thinner floor-slab construc-

and resulted in a per diem heat-cost

ng of $5 compared to coal ($10 to $12

pared to butane or propane gas). Not

least remarkable by-product of this in-

ation was a fully air-conditioned jail!
A bench-lined covered passage leads directly to the public service offices at one end (left) and to the courtroom (bottom, both pages) at the other. The assembly-dining room (top, across page) occurs at the lower level, directly under the courtroom. In the main, the building is of reinforced concrete construction; in the assembly-dining room area, lally columns were used to minimize obstruction, while junior beams span the courtroom ceiling. Exterior walls are of red brick, with white brick and cast-stone trim.

Photos: Gabriel Benzur
Mullions for the fixed plate glazing are aluminum. Interior partitions (in general) are 2" solid plaster on metal lath—"space saving and easily moveable." Flooring is asphalt tile, and ceilings are finished with acoustic tile. Ceiling-mounted fluorescent fixtures are supplemented by both incandescent units and tubular lamps in coves.
Since the Power Commission is a prime producer of electric power, and as fairly high-temperature well-water is available, a heat-pump air-conditioning system was selected. The conditioning system was zoned geographically—northeast, south, and west—as the heat gain from human occupancy in those areas was fairly constant and only the solar load factor was variable. A fourth zone, comprising the courtroom-assembly room which would be subject to wide occupancy variations, was zoned separately.

Equipment includes: four air-distribution units (one for each zone), equip with both hot-water heating and chilled water cooling coils; two 40-ton reciprocating-type condensing units; an expansion chiller; and two circulation pumps—one located in the chiller circuit, the other in the condensing circuit. A pneumatic control system was selected, for adaptability for heat-pump operation.
What the architect should know about the heat pump

by Robert H. Emerick

The economic of the heat pump is based on our ability to get a certain amount of heat for nothing, to abstract heat from the air, earth or water around us. We do this by permitting liquid refrigerant to evaporate in the air, earth, or water, exactly as permit it to evaporate in our domestic refrigerators. The value of this heat harvest is illustrated by the following example:

A compressor with its fractional horsepower motor, we have multiplied jobs driven by motors of any practical size. For home installation, the standard cabinet package is being built in 3, 5 hp, 7½ hp, 10 hp, and 15 hp units. Larger cabinets for commercial applications also are available.

The commercial heat pump, as we know it today, does not operate at the same time.

Here is how it works: (a) the liquid refrigerant, usually Freon 12, evaporates in the refrigerator coils, obtaining the heat needed for evaporation from the nearby foodstuffs; (b) the gas warmed by this evaporation is withdrawn from the coils by the suction of a motor-driven compressor; (c) the gas is compressed to condensing temperature, usually around 110 F, the compressor “pumping up” the heat content as necessary to produce the condensing temperature; (d) in the condenser, usually coil on the exterior back panel of the refrigerator where the room air can reach it, the gas yields its heat to the room air, id, resuming its original liquid form, is ready to repeat the cycle. In short, if we had enough hot gas we could heat the whole house simply by passing the room air over the condenser.

The commercial heat pump, as we know it today, does not operate at the same time.

The commercial heat pump, as we know it today, does not operate at the same time.

The comparative effects of these two conditions show up most startlingly in figures, like those shown (Table 1).

Obviously, those 20 Btu per cubic foot which never reach the condenser is 80.49—33.65 = 46.84 Btu per pound, or (46.84/55.78) = 83.7 percent approximately of all the heat we use for heating.

Any scheme that appears to produce 80 percent of our heating needs, free, is of universal interest but, unfortunately, the theory is subject to certain practical factors which shrink the apparent advantages. First of these factors is the problem of selecting a suitable heat source for our theoretically free supply. Here are the pros and cons we meet:

**Air as a source of heat**

Commercial designs of heat pumps, using air as the source of heat, generally deliver the air to the evaporator coil by means of a duct which begins at a louvered opening in the outside wall. After giving up its heat to the refrigerant in the evaporator coil, the cooled air is discharged outdoors through a companion duct. Obviously, the architect is faced with problems of louver location, complicated by the necessity for discharging the cooler air at a level lower than the intake, or at a point safely distant to avoid recirculation.

Next, an air-source design almost inevitably must be augmented by supplemental heating of some sort during severe weather, the usual practice being to provide resistance heaters in the warm-air duct. Resistance heaters in large numbers are not viewed happily by the power company, since they impose heavy demands on the system for comparatively short periods. Their use is not viewed happily by their owners, either, as the cost of operation is considerable.

Clients generally are puzzled by these limitations of the air-source design, which result from two characteristics of the refrigerating system. First, the compressors operate at a constant speed, thereby definitely fixing the volumetric capacity of the machine; and second, the volume of the refrigerant gas fluctuates widely as the suction temperature fluctuates. Because of these characteristics, a heat pump that does a satisfactory job on air at 30 F, becomes totally inadequate at 0 F.

For example, with a 20 F suction temperature, common for a 30 F atmosphere, one pound of Freon 12 gas occupies 1.121 cubic feet, and reaches the compressor with a heat load of 80.49 Btu. At 0 F, our suction temperature becomes —10 F, and the one pound of Freon 12 expands into a volume of 2.003 cubic feet, while reducing its heat load to 77.05 Btu.

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Table I

A. Suction temperature of 20°F (ambient 30°F)

| Heat in gas going to compressor, Btu/lb | 80.49 |
| Heat in liquid from condenser, 110°F, Btu/lb | 33.65 |
| Heat picked up in evaporator, Btu/lb | 46.84 |
| Gas volume at 20°F, cu ft/lb | 1.121 |
| Btu/cu ft, picked up, 46.84/1.121 | 41.78 |

B. Suction temperature of -10°F (ambient 0°F)

| Heat in gas going to compressor, Btu/lb | 77.05 |
| Heat in liquid from condenser, 110°F, Btu/lb | 33.65 |
| Heat picked up in evaporator, Btu/lb | 43.40 |
| Gas volume at -10°F, cu ft/lb | 2.003 |
| Btu/cu ft, picked up, 43.40/2.003 | 21.67 |

Table II

- Heat in gas going to compressor, Btu/lb | 83.25
- Heat in liquid from condenser, Btu/lb | 33.65
- Heat picked up in evaporator, Btu/lb | 49.60
- Gas volume at 45°F, cu ft/lb | 0.730
- Btu/cu ft picked up, 49.60/0.730 | 67.94

Table III

<table>
<thead>
<tr>
<th>Temp. of heat source</th>
<th>Temp. of suction</th>
<th>Heat per cu ft, Btu</th>
</tr>
</thead>
<tbody>
<tr>
<td>55°F</td>
<td>45°F</td>
<td>67.94</td>
</tr>
<tr>
<td>30°F</td>
<td>20°F</td>
<td>41.78</td>
</tr>
<tr>
<td>0°F</td>
<td>-10°F</td>
<td>21.67</td>
</tr>
</tbody>
</table>

—and that is when the resistance heaters are called into action.

We might note that faster compressor operation or additional volumetric capacity, while possible, adds so much to the cost that resistance heaters are much the lesser evil.

Falling temperatures not only affect our compressor volumes unfavorably, they introduce certain dangerous potentials insofar as loading the outside air fan is concerned. For example, if we pass 2000 cfm over the evaporator coil, the total weight of this air at 20°F is approximately 165 pounds. At 0°F, the weight grows to 174 pounds, not a serious increase unless, at the same time, the coil becomes badly frosted and thereby injects a strong resistance against the fan. If the fan is of the nonoverloading design, no damage is done, but the heat harvest from the frosted coil is an exceedingly sparse one, and comfort in the house shrinks.

This frosting of the coil is one of the major discouraging features of the air design. Some form of periodic and efficient defrosting is a must.

Here is the balance sheet for air:

For—
1. Air is all around us, available for the using.
2. The system design is simple.
3. The initial investment is less than for any other source of heat.
4. As a heat reservoir, the atmosphere is practically inexhaustible.

Against—
1. Defrosting can be inconvenient.
2. Sizing of the equipment is a critical problem. We must decide at what temperature economic requirements bring on the supplementary heating equipment.

3. An unsupported air evaporator should not be considered in climates where the temperature goes below 20°F as a source of heat

Unless our building enjoys a fairly large plot of ground, the installation of ground coils can pose a difficult problem. For instance, the ground coil provided for a 7½-ton heat pump in a home near Philadelphia, used up 2218 feet of 1½" iron pipe laid horizontally in 1109 lineal feet of trench. A similar arrangement for a 5-ton installation employed 1390 feet of pipe in 600 feet of trench.

The situation is easier with vertical pipes driven into the ground, a practice seen in a number of cases, but obviously will find vertical coils impractical in rocky earth.

In any event, before deciding on a ground coil, we should obtain data on the earth's conductivity in the area of the projected installation. Unless tests are run, we may find our heat pump withdrawing heat from the coil faster than nature can replace it; the cure for such a condition is more coil, spread out to lessen the concentration of draw.

In general, moist earth shows greater heat conductivity than dry earth, but should the moisture freeze, our coil is insulated as effectively as an air evaporator is insulated by frost. From time to time in northern latitudes, injection of an antifreeze solution into the ground around the coil is suggested as a safety measure.

With ground coils, an auxiliary liquid is used, such as glycol, which circulates through the coil and meets the refrigerant in a heat exchanger where the transfer of ground heat to the refrigerant takes place. Pumping the ground coil liquid introduces another auxiliary into the heat pump design, but
A heat pump usually is small and inexpensive. The balance sheet of the earth source looks like this:

**For—**
1. Ground temperatures remain fairly high below the frost line, even in winter. This condition is favorable to the heat pump operating economy.
2. The earth is generally convenient.

**Against—**
1. Installation of a ground coil can be expensive.
2. Locating the coils of separate systems in close proximity to each other, as in a city where ground area is limited, possibly may spread out the yield of heat so thinly that none of the systems will perform satisfactorily. Local ground conductivity is critical here.
3. When rocky ground is met, adequate coil bury may become impossible.
4. The coils are subject to the corrosion attacks commonly suffered by piping buried in the earth.

**Water as a heat source**

In Myrtle Beach, South Carolina, a 5-ton heat pump, which harvests heat from a flowing supply of city water, reports average monthly water bills of $55. In Minnesota, a Rural Electrical Administration co-operative operates a 7½-ton system on well water at a cost of approximately $100 per month, maximum.

Water is not obtained free unless we are located on a lake, river, or ocean, and even then we must sink the refrigerant evaporator in the water or accept a cost for pumping.

Water has some highly desirable characteristics as a heat source. For instance, its temperature is never lower than 32°F, and nearly always is much higher. In Minnesota, with temperatures 35 degrees below zero, well water reaches the surface at 38°F to 40°F. In the southern states, 60°F is common. Even New England produces 50°F water.

The importance of a high temperature heat source becomes clear the moment we examine some figures. For example, with 55°F water and an appropriate 45°F suction temperature, the total heat of the gas entering the compressor is 83.25 Btu per pound, and its volume is 0.730. What the evaporator can do with this 55°F water, is shown (Table II).

Compare this with the heat content per cubic foot which reaches the compressor, when suction temperatures are lower (Table III).

This comparison illustrates an important characteristic of heat pump systems: the higher the temperature of the heat...
source, the more of nature's heat is garnered by the machine. Engineers and salesmen refer to this characteristic when they talk of the “COP,” or coefficient of performance. The coefficient of performance is simply a ratio of the total useful heat required to run it.

This writer considers the “COP” to be a significant measure of results accomplished, after the system is in operation, but does not use it to predict a system’s behavior, since the “COP” varies with the weather, changes in temperature of the heat source, and fluctuations in the efficiency of the system components. In general, a high coefficient is essential if economy of operation is to be realized.

One problem that can be exceedingly troublesome with water heat sources, concerns disposal of the water after the heat has been extracted. City installations naturally look to the sewers, but sooner or later municipalities will take cognizance of such practices as producing sewer overloading hazards. In the southern states, running the water to dry wells is a fairly common practice, particularly if local wells produced the water in the first place. The problem is far more acute in northern latitudes, being complicated by freezing.

Just where the water is going is a question that the architect will be required to answer, and should be able to answer, before a heat pump installation is approved.

There is also the question of water sources. City water is expensive, and a water bill of perhaps $2 a day for a 5-ton system can make the owner loudly unhappy. There is also a strong possibility of the city's refusing to sell water for such usage particularly where the supply is critical, as in New York. A complication which arises from the use of a well as a source of supply, is that some areas tend to limit or prohibit withdrawal from wells, as such practice may deplete the water table. This means that legal blessings on a well project should be secured before the well is driven, and perhaps before a decision is made to use water from any source, as convenience for a heat pump.

If we set up a balance sheet for the water plan, we have:

**Table IV: Approx. Cabinet Dimensions, Air-Source Units**

<table>
<thead>
<tr>
<th>Standard size, horsepower</th>
<th>Over-all length, inches</th>
<th>Over-all width, inches</th>
<th>Over-all height, inches</th>
<th>Weight, pounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>62</td>
<td>48</td>
<td>74</td>
<td>1930</td>
</tr>
<tr>
<td>5</td>
<td>78</td>
<td>54</td>
<td>74</td>
<td>2890</td>
</tr>
<tr>
<td>7/2</td>
<td>90</td>
<td>66</td>
<td>80</td>
<td>3880</td>
</tr>
<tr>
<td>10</td>
<td>99</td>
<td>76 1/2</td>
<td>83</td>
<td>4750</td>
</tr>
</tbody>
</table>

**Table V: Approx. Cabinet Dimensions, Water-Source Units**

<table>
<thead>
<tr>
<th>Standard size, horsepower</th>
<th>Over-all length, inches</th>
<th>Over-all width, inches</th>
<th>Over-all height, inches</th>
<th>Weight, pounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>70</td>
<td>58</td>
<td>69 1/2</td>
<td>1288</td>
</tr>
<tr>
<td>5</td>
<td>70</td>
<td>58</td>
<td>69 1/2</td>
<td>1691</td>
</tr>
<tr>
<td>7/2</td>
<td>83</td>
<td>61 1/2</td>
<td>76</td>
<td>1809</td>
</tr>
<tr>
<td>10</td>
<td>99</td>
<td>79 1/2</td>
<td>80 1/2</td>
<td>2800</td>
</tr>
</tbody>
</table>

**Table VI: Heat Production, Air-Source Units**

<table>
<thead>
<tr>
<th>Standard size, horsepower</th>
<th>Heat produced, Btu per hour, various air temps.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>20°F</td>
</tr>
<tr>
<td>3</td>
<td>30,400</td>
</tr>
<tr>
<td>5</td>
<td>50,600</td>
</tr>
<tr>
<td>7/2</td>
<td>75,000</td>
</tr>
<tr>
<td>10</td>
<td>101,000</td>
</tr>
</tbody>
</table>

**Table VII: Heat Production, Water-Source Units**

<table>
<thead>
<tr>
<th>Standard size, horsepower</th>
<th>Heat produced, Btu per hour based on 50°F water</th>
<th>Water required*, gpm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>48,000</td>
<td>16</td>
</tr>
<tr>
<td>5</td>
<td>80,000</td>
<td>20</td>
</tr>
<tr>
<td>7/2</td>
<td>110,000</td>
<td>25</td>
</tr>
<tr>
<td>10</td>
<td>160,000</td>
<td>25</td>
</tr>
</tbody>
</table>

* Less water is needed if temperature of water is higher than 50°F; more water, if temperature is lower.

**For—**

1. The temperature of water from any source, never falls below 32°F (or it ceases to be water).
2. Water temperatures remain quite constant throughout the heating season. These temperatures are pleasingly high in most sections of the country.

**Against—**

1. Buying water in a city is expensive, and it may not be available at any price.
2. Obtaining water from wells imposes a substantial expense for driving the wells, and is followed forever after by a pumping cost.
3. Disposal of the water can become a difficult and disagreeable problem.

Since the obtaining and handling of water is likely to be somewhat expensive, the decision to use it or not to use it depends largely on its temperature. If its temperature is high enough, say 55°F to 60°F, the resulting economy in compressor operation may justify our selecting it. Each case must be weighed on its merits, another worry for the architect or engineer.

For reasons of economy, we sometimes can arrange a combination of heat sources, for example, air and ground coils, or air and water. In Indiana, air and ground coils function successfully in a small residence, while air and well water are as efficient in Virginia. In Ohio, at Portsmouth, the Ohio Power Company uses air for their office building until the outside temperature drops below freezing, at which time a switch is made automatically to city water. On a rising mercury, the city water stops and the air evaporator resumes the function of furnishing heat.

These combination systems are interesting and effective, but the mixing of heating agents into a co-ordinated design is not always accomplished without architectural headaches. Perhaps the more simple way, though possibly more costly, is to have the heat pump designed for an outside 20°F, and supplement its output with resistance heaters.

(This discussion is continued on page 142)
duplex apartment

The problem was to alter the two lower floors ("English basement" and first floor of a typical, pre-Civil War, five-story townhouse into a self-contained duplex apartment. Since the house faces north on a heavily traveled cross-street, it was impractical to think of employing extensive clear glass on the street-front. However, it was desired to introduce as much north daylight as possible and somehow to open up some of the interior space to the natural light source.

Flush-mounted light fixtures occur in the balcony soffit (above); the brick of the fireplace wall (above, right) is the masonry of the party wall; the ceiling of the dining area (right) is finished with acoustic plaster. The bedroom balcony and view down from it (across page) illustrate the warm effect gained by simple use of simple materials. "The best compliment I have received from the client," the architect reports, "is that he cannot remember who designed the house — himself or the architect — for it is so close to the solution and feeling he desired."

Photos: Gottsch-Schleisner
To solve this, the architect removed a portion of the upper floor, providing a full two-story height at the front for the living room, the upper-level master bedroom becoming, in effect, a deep balcony above it. The entire north wall, except for the portion below grade, is a huge window, glazed with obscured, patterned glass. The only added structural elements were two steel beams and two angles.

The party wall of the house, toward the west, was cleaned to the original brick by removing the plaster, steaming the brickwork, and repointing where necessary. Living and dining spaces are treated essentially as one area, the only divisions being a low cabinet unit and the lower ceiling of the dining area.

The combination of plain brick and the new cedar woodwork (for built-in elements, balcony railing, and ceiling of the big room and bed balcony) result, in the architect's words, in a "warmth not expected in this locale."
display techniques
The three drawings here are excerpts from Chapman's display-design research: the Paris Opera House ("vanity of humans showing off before humans"); a Japanese garden of Shin Dynasty ("progressive and continuous merging of one space into another"); and the 1938 Zurich Exhibition, wherein "a flume and boats provide visitors with a moving panorama" in a directional, controlled path, in addition to pedestrian circulation.

Salient factors involved in design for display are (1) dramatization of the characteristics of objects on display; (2) organization of components in an arresting sequence; and (3) provision for movement of visitors within or around the exhibit. To highlight these criteria, we borrow from an exhaustive thesis developed at Princeton University by Donald E. Chapman, M. Arch. '49. He proceeded from a study of display fundamentals to their application in the design of a remarkable zoological garden (pages 111-113). To link theory with practice, we supplement Chapman's thesis with photographs of a few actual recent exhibits.

The retrospective exhibition of work by Dr. Walter Gropius, planned for its major opening at the Boston Institute of Contemporary Art (left) but adaptable for knock-down, shipment, and rearrangement in numerous other places, was designed by Gyorgy Kepes, Professor of Visual Design at the M. I. T. School of Architecture and Planning. It not only provides an architectonic background that echoes qualities of the work displayed, but organizes the work in a rhythmic, horizontal flow-sequence of photographs, with occasional vertical emphasis. This, plus the left-right "rail for the eye" that the textual matter provides and slight directional changes in wall panels and baffle panels, tempts visitors in and around the exhibit.

Photo: Fred Stone
display techniques

In developing the setting for the “Good Design” show at the Merchandise Mart in Chicago (plan and photo across page), Architect Paul Rudolph brought visitors almost into the center of the exhibit between curved, transparent screens made of plastic cord strung between floor and ceiling frames. While allowing the spectator complete freedom of movement, his subtle use of lighting, alternating shadowy areas with brilliant pools of light flooding exhibit groups, established a predetermined path which most visitors actually followed. Freely placed wall panels and the peek-a-boo circular room were further devices introduced to maintain interest and lead the visitor from exhibit to exhibit.

The zoological garden designed by Donald Chapman aims “to forward the premise that a zoo is a condensed garden community of animals in which the spectator is a tolerated intruder.” Chapman’s analysis first isolated the two main components—the static and the dynamic. Among the former are the particular animal environments—terrestrial, aquatic, airborne, or polar; the scale of the habitat (with large animals, needing large dwellings, generally placed on the perimeter and the numerous small animals in the center, so that the spectator can view a number of small animals as readily as one large one); topographical considerations, and organization of major vistas. Dynamic elements include the movement of the animals themselves and two types of locomotion provided for visitors—pedestrian and vehicular.

Since Chapman reasoned that most pedestrians would follow a casual path, changing their course as whim dictated, walks are arranged as a series of tangential circles, allowing a free, meandering movement. For those who wish to view the zoo with a minimum of effort, Chapman worked out a flume system, whereby small, flat-bottomed boats (like those in “tunnels of love” at amusement parks) glide through a shallow waterway, between and through the various animal dwellings, in a controlled, continuous movement. The system allows visitors to disembark at any point and proceed on foot, if they so choose.

At the end of the ride, both water and boats are raised on Archimedes screw mechanisms (displays in themselves, advertising the fluid nature of the flume device) to their starting point, ready for the next trip. The path followed by this continuous flume is punctuated by two climaxes (see “spatial sequence chart” above). The flow is from land animals (bears, lions, giraffes, elephants, etc.), to reptile and water creatures (turtles, alligators, hippos, etc.), to birds and tree-leaping monkeys, to the polar group. The two climaxes occur in the giraffe-elephant area, where sheer size and bulk are impressive, and in the monkey-bird-house area, where altitude and maximum spatial awareness constitute the most striking contrast.

Photo: Carl Ullrich, Inc.
he model of the zoo Chapman designed clearly indicates the “animal world” environment provided. The designer emphasizes that the “architectural expression” derives from his effort to find the appropriate “animal expression,” resulting in “the emancipation not alone of the animals but of the architecture itself.” All the houses emulate aspects of their occupants. To look at just a few, close up: the house for small mammals is small, and “it expresses the multiplicity of its small occupants through the multiplicity of its supports, placed outside its walls so that the spectator may count them.” The elephant house “expresses bulk and solidity through the monolithic nature of its construction.” Water comes from an overhead canopy tumbles down into the pools of the polar group, with the animals able to enjoy and penetrate the falls, while the spectator feels somewhat cooler himself, “just from viewing much cascading water.” And the reptile house “creeps across its pools, just as do crocodiles and snakes and alligators. Reptiles sport in concrete tubs standing in the same water that surrounds their house.”

*Model photos: Richard Garrison*
For the architect specializing in industrial, school, or mass housing design, publicity on a national scale can pay dividends in the form of widespread recognition and potential commissions. An interested reader today may be a client tomorrow.

Thus, when publicizing a project, make certain that it has outstanding merit. Editors are discriminating; so are readers. Make sure that a job has one or more strong focal points of interest—appearance, construction economy, or unusual function. If it doesn't, forget it and choose another. Weak publicity is worse than none.

Always study a project carefully from the standpoint of story (or pictorial) interest before launching a publicity venture. To determine whether a job is newsworthy is not difficult if the architect can learn to regard his project impersonally. Nothing clouds vision like ego.

Say the project is a school or industrial plant. Ask yourself whether it is different in appearance from a thousand others, whether functional design has solved a problem efficiently, whether these specific benefits will be of real service to other school boards or manufacturers.

determining news value

In appraising the newsworthiness of a project, either for national or local publicity, bear in mind that fresh ideas make news; clichés seldom do.

Most people have little conception of what constitutes news although they read, listen to, or view it daily. But while they may fail to define news, they do recognize an interesting story. They talk about it.

This provides a rough bench mark in appraising news value; if a building project excites favorable conversation, it may be potential news. It's not an infallible rule but generally reliable, provided the news is directed at an audience interested in the subject matter. In other words, aim carefully and make each publicity shot register.

The publication field is enormous, catering to a wide variety of appetites ranging from movie star worship to abstract technology. If an architect's field of vision has not extended much beyond the perimeter of his drawing board, he may be surprised at the tremendous scope of American publishing. In addition to the many thousands of daily and weekly newspapers and hundreds of general consumer magazines, there are better than 2000 major trade publications covering every conceivable phase of art, construction, retailing, science, and manufacturing.

trade magazines

This is a rich field, capable of yielding a bumper publicity crop, if you know where to plant seeds of interest.

For instance, magazines other than architectural publications are interested in architecture—or certain segments of it. Few architects see these periodicals; most don't even know they exist. They are the magazines concerned with component parts of building—roofing, air conditioning, engineering, illumination, and so forth. Most want and need good story material.

Let's examine a theoretical project, a modern textile plant, in relation to these building trade publications. Pretend that it is a fine functional job offering new ideas in the use of new materials, that it indicates smart money-saving engineering in addition to a pleasing and imaginative exterior.

In addition to the architectural periodicals, an obvious "market" for stories and pictures of this plant is the textile magazine field. Depending on the type and location of the project, the editorial welcome mat might well be out at Textile World, Textile Age, Textile Industries or Southern Textile News—the more "general" publications in this field.

But let's dissect the project piece by piece to determine how much more publicity mileage can be obtained.

Is the roof construction novel? Is a new type of insulation and surfacing specified? Does the air conditioning system show any fresh ideas in design or installation? What's unusual about the fenestration? Has it been integrated cleverly with a dramatic artificial illumination to provide continuous good lighting on work faces? What about floor arrangements? Has it provided a smart answer to cult traffic, equipment, and maintenance problems? In the basic construction, design and good engineering cut costs provided speedy construction, or overcame unusual site deficiencies?

There are a number of publics definitely interested in good copy on one of these components. Here's a partial list:

The roof:
- American Roofer and Siding Constructor; Journeyman Roofer and WP International Roofer; Roofing, Siding and Insulation.

The air conditioning:
- Air Conditioning and Refrigeration News; Heating, Piping and Air Conditioning; Domestic Engineering.

The fenestration and lighting:
- American Glass Review; Glass Industry; Illuminating Engineering; Electrical Engineering; Electric World.

The floor arrangement:
- Factory Management and Maintenance; Industrial Equipment News; Mechanical Engineering; Mill and Factory Plant Engineering.

The basic construction:
- Construction Methods and Equipment; Construction Constructor; Engineering News.

Remember, this is only a partial list of the more general trade magazine that would be interested in this theoretical textile mill; if it were tangible it could be expanded. There are many more periodicals in each of the above categories interested only in...
在全国宣传

...ts of their fields or concentrating on news from given geographical areas for his publicity, just how does one even find out about magazines they knew existed? A task is not easy but neither is it difficult. There are a number of books on the market that fill the needs of novice publicity planners more than any other: the business publications issue of the Standard Rate and Data Service, Inc., 1 Michigan Ave., Chicago 1, Ill. It has been a vital tool of the advertising profession but it can prove a handy tool for the uninitiated, picking a selective index from a number of publications available in public libraries.

The most valuable use of the directory is the careful breakdown of indexing of individual and related fields, the magazines that serve a common industry. The fact that the listing is based on one of the type of readers of a publication listed. These furnish clues in determining editorial value as well as the character of readership.

To approach an editor, most magazine editors are hungry for copy, they seldom snap at it. The average editor is friendly, and inclined to answer correspondence promptly. A story that fills the needs of the staff will be either wanted or he won't. Incidentally, if he understands he has exclusive rights to the story in his field, chances of acceptance may be enhanced.

If you have really sparked interest, the editor may request a prepared story of designated length, specify photographs needed and even forward a sample copy of his magazine to indicate "style." On the other hand, he may desire staff coverage of your project and assign either a staff writer or regional correspondent to gather the facts firsthand.

Don't despair, if you're a wizard with the lettering pen but a poor man of letters. Just get the facts down on paper, remembering to stress in detail all the points of apparent "conversational" interest.

Of course, editors of small-staffed trade magazines enjoy receiving copy that requires little or no editing. But such "outside" copy is the exception rather than the rule. Magazine staffs are fully prepared to rewrite copy to conform with policy or style and no good story is discarded merely because it fails to reveal literary genius.

Co-operative publicity

The personal approach is not the only way to get publicity results in these valuable trade publications. There's another method available to most architects, but seldom exploited by them.

Major makers of building materials already are involved in publicity, have experienced staffs or agencies ready and willing to lend a helping hand to the architect using their companies' products. A newspaper advertisement in the only entry fee.

The logical starting point of such a co-operative publicity venture is the company salesman. Some are alert to publicity possibilities, others need gentle prodding. In any event, sound them out. The company publicity staffs lean heavily on the salesman for story material; he is their field reporter. And it's to his advantage—as well as yours—to submit good publicity material from his territory. So prod him if you must.

For your own information, manufacturers of glass, cement, insulation, floor surface, electrical equipment all have extensive publicity setups that can reap a surprisingly rich publicity harvest for the architect in every conceivable type of publication. For example, a school architect specifying prismatic glass block fenestration for classroom daylighting may eventually read the story of his school plant in influential school magazines, in general consumer publications, in major Sunday newspaper magazine sections, and in farm papers as well as in the leading architectural journals, all as a result of a manufacturer's publicity activity.

There's still another possible—and profitable—aspect of such co-operative publicity: the use of an outstanding job (and credit to the architect) in the manufacturer's advertising. The word "profitable" is used advisedly; we mean the obvious value of receiving design credit in an attractive advertisement appearing in a large number of national-circulation magazines.

It cannot be stressed too strongly that the benefits accruing through this co-operative publicity and advertising should not be left to chance. Many company salesmen are vitally interested in such customer service but they must be told about your story. When such co-operative ventures are launched, be prepared to supply all the needs of the publicity staff. The same advice applies when using the personal approach to an editor. Prepare extra blueprints, arrange to have photographs taken by a competent photographer (snapshots seldom are adequate), answer all questions excepting confidential ones involving the client and, above all, make certain that all story copy and correspondence is neatly typewritten. Sloppy material and longhand scrawls are certainly out of character with the fine contemporary work the architect is trying to publicize.
trusses for story-and-a-half houses

Builders of one-and-a-half-story houses may soon benefit from the structural economies now possible with one-story houses through the use of roof trusses. A truss has been especially designed for the story-and-a-half house by the University of Illinois Small Homes Council, as part of an FFHA-sponsored research study on roof construction and wood-framing practices. Selected as the most successful design among others developed by the Council, the truss was found to be the easiest to fabricate and erect, and used materials most economically.

On a 24-ft span, the truss frame will support a second-floor space 12 ft in width, with a ceiling height of 7½ ft—a flexible living area which can be extended the full length of the house and divided into rooms without any necessity for load-bearing partitions and their costly supporting construction (see illustrations). The truss forms a prot overhang on both sides of the stru roof pitch is held to 8/12.

Upon completion of a concrete load test, which is expected to require several months, the findings will be submitted to the FFHA Division of Housing Research. These result then be made generally available through the FFHA, although no publication will be made until nex
air and temperature control
Type Ventilator: weatherproofed, quiet, power-driven fan ventilator with silhouette, for use either as exhaust or fresh-air supply unit; can be used with motor-driven fan or with t and pulley drive. Sizes range from 60" to 60". Construction is of galvanized steel; other materials available for special-purpose use. Burt Mfg. Co., PA, 44 E. South St., Akron 11, Ohio.

ir Grease Eliminator: inexpensive trap device for installation in restaurant ventilating systems reduces fire in exhaust ducts, helps protect motor and lower equipment, and provides better sanitation. In wide range of sizes and finite to match existing kitchen equipment. Co., P.O. Box 10187, Airport Station, Angeles 45, Calif.

Bilt Oil Burner: quiet, automatic oil-fired boiler-burner units; factory packed wired, connects only oil line to tank. Flush jacket, milled chamber, flange-mounted, with three Minneapolis-Honeywell control valves. May be installed into existing kitchen or type of house, whether built with metal or wood, or with crawl space. Lower diffusing-type registers and grilles provided for this unit are available. L. J. Schaefer Co., 2005 W. Oklahoma Milwaukee 15, Wis.

Bilt Light Unit: neomodern design for use with all types of forced air heating systems. May be installed into existing kitchen or type of house, whether built with metal or wood, or with crawl space. Lower diffusing-type registers and grilles provided for this unit are available. L. J. Schaefer Co., 2005 W. Oklahoma Milwaukee 15, Wis.

Red Unit Heaters: new line of heaters orating "heater-tube" design; horizontal tubes of heat exchanger staggered wide maximum areas of prime heat; curved louvers direct heated air to comfort zone. Burners, pilot, control valves combined in one removable assembly for easy maintenance. Capacities range from 30,000 to 200,000 BTU. Trane Co., La Crosse, Wis.


finishers and protectors

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finishers and protectors
1-199. Azitair Square and Rectangular Diffusers (RC 105), 4-p. bulletin giving dimensions and installation details for three types of square and rectangular air diffusers equipped with mounting frames and removable cores. Photos. Air Devices, Inc., 17 E. 42 St., New York 17, N. Y.

1-200. Manual for the Design of Box-Plenum Type Air-Conditioning Duct Systems (Project DGR-2-AC1), 18-p. booklet. Design procedure for inexpensive types of air-conditioning systems for winter, summer, or all-year-conditioning units, with efficiencies equal to some higher-cost systems now in use. Worksheets for supply and return-air duct sizing; tables, drawings. American Gas Assn., 429 Lexington Ave., New York 17, N. Y. ($1 per copy; make out check or money order directly to American Gas Assn.)


1-202. Kno-Draft (K-29), 4-p. folder describing several types of high-pressure air diffusers, made to handle static pressures ranging from 1 to 4 in. water gage, duct velocities up to 3000 fpm, and 25-degree temperature differentials; air volumes precisely regulated from full open to completely closed positions by unit's calibrated damper. Types, uses, advantages, photos. W. B. Conner Engineering Corp., Shelter Rock Lane, Danbury, Conn.


1-204. Water Tube Steam Generators, AIA 34-B1 (B-3275), 6-p. bulletin on completely shop-assembled water tube boilers available in capacities from 7500 to 27,500 lbs steam per hour; can be fired with light or heavy oil, combination light or heavy oil and gas, natural, manufactured, or coke oven gas; erection time and expense claimed to be substantially reduced over conventional field-assembled or semi-packaged units. Dimensions, elevation drawings, operating data. Titusville Iron Works Co., Titusville, Pa.


1-206. Package Air Conditioners, Madelec SCY-1050 and 1550 (C-1100-SBI), specification sheet describing two packaged air-conditioning systems, of 10-ton and 15.5-ton capacities, respectively; cooling, dehumidification, ventilation, circulation, air cleaning (and heating if desired) provided by both units in five sizes. Capacities, photo. Worthington Corp., Harrison, N. J.

construction


3-169. Trip-L-Grip Framing Anchors, 4-p. folder. Instructions on use of adjustable framing anchors as joist hangers for any construction, wood or metal, and as economizer for standard joists. Advantages, applications, photos. Timber Engineering Co., 1311-19 St., N.W., Washington 6, D. C.

doors and windows


4-205. Porch Enclosures, 4-p. folder illustrating uses of aluminum-framed, glass-paned jalousies. Advantages, photos. Lud Corp., P.O. Box 451, Miami, Fla.

Booklet and folder illustrating decorative door designs, applied to both single-slide centers-opening or two-speed passenger elevator entrance doors. Photos. Otis Elevator Co., 260 Eleventh Ave., New York, N. Y.

4-206. Ornamental Designs for Otis Elevator Entrance Doors (B-812)

4-207. Special Entrance Designs (B-813) electrical equipment, lighting


Two 4-p. catalogs, one describing se types of chrome-finished, recessed fixture all purposes; the other illustrating pot fixtures, portable table and pin-up lamps, all of contemporary design. P illustrations. Presco Steel Co., 800 Ban Way, Berkeley 2, Calif.

5-138. Prescolite Lighting, Recessed S (R-7)

5-139. Prescolite Lighting, Architectural Series (A-1) finishers and protectors

6-77. Mono-Alochroom (C-54-4), 4-p. phlet. Advantages of decorative, alum chromium coating that provides water protection for all surfaces; widely used in factories and office interiors; exteriors of water towers, bridges, fire escapes, gar workshops, machinery and equipment, etc.; heat resisting, impervious to corrosion. Uses of individual covering capacity. Monroe Co., Inc., Quebec Ave., Cleveland 6, Ohio.

6-78. Cuprisote, AIA 19-A-3, 4-p. fold over spray treatment with acid- chrome wood preservative. Types of cations, general data, consultation applicable to treatment and preservation wood. Protocol Corp., 81 Market St., worth, N. J.


9-81. Mono-Block and Powerhouse 52-333), 4-p. pamphlet. Description


- Insulations for Metal Buildings, 8-p. booklet offering complete lines of glass fiber acoustical and thermal insulations for metal building needs. Includes data, insulation design considerations, finish instructions, photos, drawings. Baldwin Co., 500 Brennig Ave., Trenton 2, N. J.


- Where and How To Use Stramit, 8-p. bulletin on rigid building board, manufactured from ordinary wheat straw, with high tensile and sound-deadening values, eliminating need for additional insulating materials. Properties, specifications, details. The Strawick Co., 1847 N.W. 5 St., Oklahoma City, Okla.

- Bathrooms, water supply, plumbing


- Fabricated Fittings by Nayler, 4-p. bulletin. Specifications and illustrations of standard, carbon-steel fittings for eight pipe—elbows, tees, laterals, wyes, unions, bungs, hoods, etc. Fittings also available in other metals. Nayler Pipe Co., 1230 St. Chicago, Ill.

- Symbols of the Modern Bath, 4-p. folder. Dimensions and illustrations of recessed, stainless-steel towel driers for light and heavy traffic areas in lavatories. Scott Paper Co., Chester, Pa.

- Specialized equipment


- 19-291. Bessler Disappearing Stairway (500), 4-p. bulletin offering seven models of disappearing stairway line, adaptable to new or old residential needs; units permit quick, easy access to upper areas that otherwise might not be used in homes, garages, etc. Dimensions, illustrations. Bessler Disappearing Stairway Co., 1900 E. Market St., Akron 5, Ohio.

- 19-292. Grant Cubicle Hardware, AIA 27-C, 4-p. bulletin showing construction features of hospital-cubicle curtain-track and assembly hardware. Typical plan views and other drawings, suggested specifications. Grant Pulley & Hardware Co., 31-83 White Stone Parkway, Flushing, N. Y.


- Surfacing materials


- Vertical traffic

- 20-10. OILIFT Elevators, AIA 33, 16-p. catalog presenting line of oil-hydraulic elevators for freight and passenger service; wide range of installations, from small apartment houses to large industrial units capable of lifting fully loaded motor trucks from floor to floor in factories, warehouses, etc. Types and sizes, requirements, construction data, illustrations. Globe Hoist Co., Mermaid Lane & Queen St., Philadelphia 18, Pa.

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(We request students to send their inquiries directly to the manufacturers.)

PROGRESSIVE ARCHITECTURE, 330 West 42nd Street, New York 36, N. Y.

I should like a copy of each piece of Manufacturers' Literature circled below.

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10/52
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In Canada: Arnold Banfield Co., Ltd., Oakville, Ontario
The provision of employee lounge and recreation space—even dining space—is no longer considered a luxury or a generous gesture in American business and industry, but is recognized as a functional necessity, contributing to personnel efficiency. These may range from facilities which include a huge dining room—as in the U.N. Conference Building (pages 124-125) where 4000 people are saved the trouble of scattering all over the adjoining neighborhood to find restaurants—to a simple resting place near the office work areas. But in all cases the standards for location, planning, and interior design are the same.

The facilities should be near the work space, so that no time is lost getting back and forth, but they should be sufficiently insulated from the sounds and the sights of the work itself so that a real change of scene is provided. If a pleasant outside aspect is available, it should obviously be used (as it has been in three of the four instances that follow).

In plan and in furnishings, a distinction should be made between quiet lounging places, where one may rest, and recreation areas, for those who want to play games as relaxation. Fabrics and furniture, as well as wall and floor finishes, should be selected with two thoughts in mind—creation of a gay, cheerful atmosphere, and resistance to the wear and tear of use and maintenance. (It interesting that three of the examples shown on the following pages have asphalt-tile floors; the urth—which includes an out-door terrace—uses stone. All four spaces are furnished with tables pped with laminated plastic.

Proper air conditioning is essential; carefully conceived lighting is equally necessary. Since asks” in these spaces vary from noise-making to somnolence, acoustical control is also of prime importance (the examples shown use four different acoustical materials, but they all recognize the ed for control). The problems here are interesting ones, and the solutions may be various, but e reigning criteria seem to be constant—cheerfulness, comfort, and durability.
**employee facilities**

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<th>Location</th>
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<td>Architect</td>
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<td>Interior Design</td>
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**acoustical plaster**

**asphalt tile**

**ceramic tile**
An outstanding fact about this employees' cafeteria is that it has a clientele of four thousand from more than sixty countries. It is equipped to serve four hundred at one time. The decoration has a sort of universal quality—the wall behind the service area is red over a white tile wainscot, the columns are blue-green, the draperies are panels of solid red, solid yellow, and solid green, and the wallpaper is a multi-colored print on a white ground. Every nation could find its own colors.

Most of the exterior wall is glass, but supplementing the natural light are spotlights recessed in the ceiling, which are trained over the individual tables, and stronger ones which highlight the food at the service tables.

Few dining places can boast the magnificent view this one has, nor can they afford a changing panorama of this scale.

*Photos: Gottscho-Schleisner*

data

Chairs: #1216/ solid saddle-seat, solid back/ walnut finish on hard-wood/ bent-plywood legs and supports for back/ Thonet Industries, Inc., 1 Park Ave., New York, N. Y.

Tables: #3163/ metal pedestal base, aluminum column/ 30" sq. top, tan linen formica/ Thonet.

Draperies: L/ Belgian linen/ Konwiser, Inc., 39 W. 17 St., New York, N. Y.

Cabinetwork designed by United Nations Headquarters Planning Office.

Wallpaper: "Trains"/ designed by Saul Steinberg/ Plaza Prints, Inc., 509 Madison Ave., New York, N. Y.

Flooring, dining area: asphalt tile/ Kentile, David E. Kennedy, Inc., 58 Second Ave., Brooklyn, N. Y.

Flooring: quarry tile/ Carlyle Mfg. Co., Ironon, Ohio

Ceiling: acoustic plaster/ "Kiln Oise"/ Kelley-Island Lime & Transport Co., Cleveland, Ohio

Windows: aluminum sash/ General Bronze Corporation, Garden City, Long Island.

Air conditioning: conventional comfort cooling/ ceiling diffusers/ Anewt Corp. of America, 10 E. 39 St., New York, N. Y.

Convectors: Vulcan Radiator Co., 50 Church St., New York, N. Y.

Paint: Mercatone Flat Finish, M. J. Merkin Paint Co., 1441 Broadway, New York, N. Y.
employee facilities

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<tr>
<th>location</th>
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<td>architects</td>
<td>Skidmore, Owings &amp; Merrill</td>
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<td>interior designers</td>
<td>The Raymond Loewy Corporation</td>
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**Louver screens**

**Draperies**

**Asphalt tile**
Various areas of the employees lounge at Lever House, those for lounging and those for game playing, are separated by louvered-screen walls and planted boxes which extend from the window wall. The decoration, mainly in greens and yellows and simple in execution, lends its part to the creation of an airy, informal atmosphere. Lighting, achieved by the uncluttered window wall overlooking the central court and by inconspicuous yet effective flush-fluorescent ceiling fixtures, has become a very real part of the decoration. The drapery fabric, a fine-lined abstract pattern in three values of green on a light ground, forms an effective frame and contributes to the lightness of the lounge.

*Photos: Don Morgan*

data


Card tables, cocktail tables: legs, black-painted metal/ topped with grass cloth Formica-treated/ designed by the Raymond Loewy Corporation/ executed by Advance Design, Inc.

Planting boxes: blond-wood trough/ brushed-brass pipe legs/ designed by the Raymond Loewy Corporation/ executed by Ebner & Raible, 319 E. 64 St., New York, N. Y.

Louver screens: designed by The Raymond Loewy Corporation/ executed by Ebner & Raible.

Drapery: "Busy Bye Ways"/ designed by Ruth Adler/ three-value green on light ground/ Creative Looms, Inc., 210 E. 51 St., New York, N. Y.

Fluorescent lighting: Ruby Philite Corp., 32-02 Queens Blvd., Long Island City, N. Y.

Flooring: green textured asphalt tile/ Tile-Tex Division of the Flintkote Co., 630 Fifth Ave., New York, N. Y.

Ceiling: "Softone" acoustical tile/ American Acoustics, Inc., Keyport, N. J.

This particular lounge fills a very real need—and admirably. Most of the employees bring their lunches to work, because there is no suitable nearby place to eat. A terrace and an air-conditioned lounge, apart from the busy workings of the organization, give the employees a pleasant, comfortable resting place where they may enjoy the out-of-doors. Normally, the terrace (which is semi-enclosed), is ideal, because the entire wall is louvered concrete block which gives privacy from the street, but ventilation in the direction of the prevailing wind.

The inner area needs no draperies because the surrounding grounds are shady, noise is absorbed by an acoustical ceiling, and Nature supplies the decoration.

Photo: Jack Holmes
In the basement of this office building is a combination recreation and dining room. Screens in varying textures—Masonite, bamboo, and fabric—divide the areas, but permit flexibility in arrangement. All fabrics and materials have been carefully chosen to be extremely durable and practical, with minimum housekeeping necessary. Many of the fabrics are plastic, and the table tops are both cigarette-proof and stainproof.

*Photos: Knoll Associates, Inc.*
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Side Chair: #512/ oak with Sunrise finish or Midnight Black lacquer legs, with or without cane/ designed by Edward D. Stone, Architect/ retail: $45/ Fulbright Industries, P.O. Box 417, Fayetteville, Ark.

Jute and Cotton Textile: designed by Jack Larsen/ has texture of tweed and looks handwoven/ available in taupe, gold, olive, orange, turquoise, and black-and-white/ width 54"/ retail: $13 a yd./ Thaiok Fabrics, Ltd., 37 E. 61 St., New York, N.Y.

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Ceiling Light Fixture: #4624/ linen-like textured glass with pewter disk/ diffuses light over large area/ 18" square, 4" deep/ retail: $20/ Lightolier, Inc., 11 E. 36 St., New York, N.Y.
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WALL LINE

WALL LINE

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WALL LINE

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Payer, Architect

October 1952
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Harrad, Hays, Simpson & Ruth, Architects

October 1952
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Since all functional parts of "Stilemaker" locks are precision-made, they are interchangeable. Consequently locks and latches in stock at the factory can be changed easily and quickly from one function to another by shifting parts. The specific parts required may be in stock or quickly manufactured. The most important advantage of precision-made parts, however, is reflected in the performance of the locks. "Stilemaker" locks and latches operate smoothly and easily for years. Parts offer no slack motion to cause premature wear. Ask your Russwin Distributor for complete details.

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### Heat Pump*

(Continued from page 104)

**Design thinking for heat pump installations**

When a client says, "Warm my new house with a heat pump," the architect must begin at once to orient his thinking toward the meeting of several special material and arrangement requirements.

First, appreciation is needed of the comparatively low heating temperatures with which the house will be heated. Warmed air emerging from grilles will range from 95°F to 110°F, and these temperatures obviously are not favorable to the rapid warming up of a cold structure. Heat stored in the building materials, therefore, should be maintained and augmented as the heating season waxes colder; the hours of operation must be increased and interruptions are to be avoided if continued comfort is to be maintained.

Second, realizing that heat loss is not easily recovered, the structure must be designed for heat tightness. This means providing insulation for the ground floor as well as for the walls and ceiling. It means double-glass windows, storm doors, and a thorough job of weatherstripping. In fact, heat conservation can be so critical that an apparently insignificant item, such as insulating the return air ducts, can change an uncomfortable complainer into a smug eulogizer. This writer has seen this happen.

Third, although the heat pump is a summer cooling system, the winter heating load determines the size of the plant. For example, 5 tons of calculated cooling is easily delivered by a system that will not warm the same building adequately in winter. If we install a 5-ton plant, we shall be obliged to augment its heat production on extra-cold days by resistance heat or some other source of supplementary heat.

The reason for this apparent discrepancy of capacity found in the simple fact of there being wide differences between the inside-outside temperatures of winter and summer operation. In summer, the machine must produce an inside-outside differential of 15 to 20 degrees maximum; in winter, the reverse outdoors calls for 70°F to 75°F, indoors. And whatever the differential happens to be, we must meet it with a constant-speed, fixed-volume compressor.

In short, we must design the system with heating as a basic objective; summer cooling is a pleasant bonus.

### Sizes and Capacities of Package Units

Since we must locate the heat pump in some part of the house the following tables of dimensions and weights will be helpful in early planning. These dimensions vary with equipment from different manufacturers, just as any other form of heating equipment varies, and final decisions on location should be based on accurate catalogue information (see Tables IV and V).

Tables on air and water capacities also provide useful data (Tables VI and VII).

**How much does a heat pump cost to buy?**

The answer to the above question: more than a conventional heating system of equal capacity; about the same or a little less.

* This is a continuation of Robert H. Emerick's discussion beginning on page 101.
than a conventional heating system plus a summer mechanical cooling system.

A 10-ton system installed during the past year cost the owner about $4500 for the heat pump cabinet and its controls; the wells for water supply and dry wells for water disposal added approximately $800 to his total investment.

The current price for a 5-ton, water-source unit is approximately $3000, installed. The water-supplying equipment, such as pumps, wells, disposal facilities, involves another $100 to $400 of outlay, depending on the complexities encountered.

The designs that harvest heat from the atmosphere, carry price tags approximately equal to those on the water-source units. For example, the asking price of a 3-ton job is about $2800; for a 5-ton installation, $3200; 10 tons around $4400. These quotations include the supplementary resistance heaters, and there is nothing else to buy—no pumps, no wells.

Ground-coil installations are the most expensive in many localities, involving as they do excavation, substantial weights of pipe, and extensive pipe fittings. The cabinet itself is equivalent to the water source arrangement, and pumps are needed to circulate the glycol through the coils.

By contrast, a five- or six-room house which would require a heat pump of from 5 to 7½ tons, depending on the heat tightness of the structure, can be heated by:

(a) A floor-type, space-heating furnace for a total installation cost of approximately $300,
(b) A warm-air duct system, oil- or gas-fired, for about $1500.
(c) A forced-circulation hot water system for $1800.
(d) A one-pipe steam system for $1900, more or less.

If we use any of these systems with a radiant-panel design, the investment will be a little higher, perhaps 10 percent.

However, and this is important to many people, the heat pump eliminates the need for a chimney, for fuel and ash handling, and substantially reduces fire hazards, since all temperatures are low. A true comparison of equivalent costs should consider these factors, and give each a valuation in dollars. To do this, is a responsibility of the architect or engineer.

Whether allowance should be made for summer cooling, depends on circumstances. Should the client consider summer cooling simply as a desirable by-product of the heating system, then no allowance is in order, or perhaps a limited one based on the client’s evaluation of what the cooling function means to him. Conversely, if the client plans on summer cooling, regardless, full allowance is correct, but the comparison of costs must be made with the heat pump on one side, and a conventional heating system plus conventional cooling equipment on the other. This latter comparison is obviously most advantageous to the heat pump.

**Operating costs and maintenance**

Operating costs vary with electric rates and the source of heat. Here are some typical reports:

(a) A 5-ton installation, air source, in a mid-Florida clothing store. Average winter monthly cost: $30.

(Continued on page 145)
Non-combustible Stran-Steel framing members were used for exterior walls, interior partitions, roof trusses, and floor joists in New York State Conservation Department building at Sherburne, N. Y.

Virginia Square Shopping Center in Arlington County, Va., uses Stran-Steel joists on the first and second floors and roof. Roof construction includes poured Pyrogyp deck plus built-up roofing.

Stran-Steel framing members bring twofold savings when specified for commercial and industrial construction. There's the initial saving of time and money during construction—and the permanent saving over fire hazards. With Stran-Steel roof systems and floor joists, the destructive effects of fire can be reduced to a minimum.

Stran-Steel framing is easily adapted to modern design, has great rigidity, and is precision pre-cut for rapid assembly. The nailable feature of Stran-Steel framing allows a wide choice of collateral materials and speeds building close-in. Interior work can proceed before exterior completion, thus saving delay in sub-trade work.

Write for complete literature and specifications data on Stran-Steel framing; or see Sweet's Architectural or Builders' files.
(b) A $1/2$-ton installation, well-water heat, serving an office building near the Canadian border. Maximum monthly cost: $100.

(c) A city water system, 5-ton capacity in South Carolina, averages $55.86 per month for water, plus the usual electric charges.

(d) By comparison with (c), a 5-ton residential installation in South Carolina, using well water, shows $25 for an average winter month as the total for all costs.

We might observe here, that statements are made in public from time to time, crediting the heat pump with providing cheaper heating in 80 percent of its installations. The experience of this writer does not verify these statements; in fact, shows quite the reverse, although conceivably in some sections of the country very low electric rates can result in cheap heating.

Maintenance tends to be higher for heat pump equipment than for conventional systems. A recurring trouble which probably can be eliminated with small difficulty by the designers, is the loss of lubricating oil from the compressor. When this happens, the compressor quickly burns out and must be replaced.

We encounter refrigerant leaks from time to time, apparently the result of poor workmanship, and possibly augmented by vibration. Another source of annoyance is observed in the automatic-control system. We should make allowance, however, for these difficulties, when we remember the machine runs both summer and winter; it is seldom without load.

Conventional systems probably would show no better records under such continuing burdens.

These matters should be pointed out to clients when they say, "I want a heat pump." The design is not perfect, and the owner who is led to expect miracles may meet with disappointment. He should be told the worst of it, as well as the best, before he buys one.

**summing up**

Prospective users of heat pumps should understand these facts of a general nature:

(a) For economy of installation and operation, extra money must be provided in the building design for heat tightness.

(b) Money is saved by the elimination of a chimney and by escaping the need for fuel-handling equipment.

(c) A heat pump installation is practical, even if electricity is not available. One standard manufacturer catalogues units powered by gasoline engines.

(d) Installation costs, operating costs, and maintenance troubles may be less favorable than with conventional equipment. Dependability of operation is not viewed by this writer as being equal to conventional systems.

(e) Since working temperatures are low, interruptions of service for any substantial period are followed by slow heat make-up, with resultant dislocations of comfort.

(f) The ultimate selection of any heat source, or combination of heat sources, must be predicated on a thorough evaluation of all contributing factors. Neither the air, the earth, nor the waters under the earth, is best suited to all local conditions.

---

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The full line of Case bathroom fixtures is available coast to coast in 26 colors, and white. See your Classified Telephone Directory, or write W. A. Case & Son Mfg. Co., 33 Main Street, Buffalo 3, N. Y. Founded 1853.
tion and layout of 23A (Le Corbusier's design) is not maintained.

After this history of troubles, UNESCO has chosen a different method in undertaking the erection of its new headquarters in Paris. At present, as is well-known, UNESCO is housed in a former palace-hotel on the avenue Kleber. In December, 1951, a single architect was invited to make a preliminary sketch for the new headquarters. He was assigned a most unfavorable site on a half-circle, just behind J.-A. Gabriel's Ecole Militaire (built 1751-82) on the axis of the Eiffel Tower. Here was made available a large slice that had been cut out from the almost completely built-up half-circle. Even the greatest architect would not have been able to design a decent building in the midst of this mosaic!

A jury was selected from lists supplied by the two international organizations of architects (The International Union of Architects and the International Congresses of Modern Architecture). This jury consisted of Walter Gropius (U. S. A.) Chairman, Lucia Costa (Brazil), Le Corbusier (France), Sven Markelius (Sweden), and Ernesto Rogers (Italy). They met in Paris in May, 1952. The Jury did not restrict itself to making the usual professional criticisms of the projects laid before them; they attacked the problem of the UNESCO headquarters in its entirety. The first result was that they come to the unanimous conclusion that the proposed building site was absolutely inadequate for the headquarters of a world-wide cultural organization. They spared no energy in making this clear, not only to the client but also to the donors of the site—the City of Paris and the French Republic. After careful investigation, a site was discovered on the fringe of the Bois de Boulogne, about five minutes by car from the Arc de Triomphe. The City of Paris agreed to grant this to UNESCO. This location, with the Bois de Boulogne before it and the City of Paris behind, is the most ideal building site that a contemporary architect could desire for the erection of a great edifice of an unusual nature.

The Jury felt it necessary to reject the preliminary scheme, because it did not fulfill present-day requirements for a building of this stature. Again the question arose: who should be the architect? It appeared natural, in this situation, to entrust the building to Le Corbusier, and this was the unanimous recommendation of his colleagues of the Jury. However their recommendation was rejected by UNESCO on grounds of professional ethics.

(Continued on page 148)
This smart suburban shopping center near Tacoma, Washington, furnishes complete shopping facilities for surrounding communities of nearly thirty thousand people. Nearly a carload of Simpson Acoustical Tile was installed in its 17 shops, stores and offices to provide comfortable quiet for patrons. Lea-Pearson & Richards, Tacoma were the architects who designed the center and specified Simpson Acoustical Tile. Installation was by Elliott Bay Lumber Company, Seattle and general contractors were Ketner Bros., Inc., Tacoma.
Countertops and accessories
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now fit every kitchen plan!

Now—Save up to 43% of the cost of a custom-built installation! Select the Lustertone Accessory Pieces designed to go with a new stock Lustertone Sink and complete any kitchen plan . . . now you can sell custom convenience at new low, standard prices. Choose from among these standard items—all available promptly from warehouse stocks:

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- Reversible Return Ends 25" front to back, 4" high.
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Now—Stainless Steel Sinks in 50 sizes available from stock! Select stock sinks from this list—add required accessories to complete any kitchen plan.

21 single bowl models—two styles in the following sizes:
39" x 42", 48" x 54", 60" x 66", 72", 78", 84", 90", 96".

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WRITE FOR INDEX B-1 GIVING COMPLETE DETAILS ON MODULAR METHOD SEE CATALOG IN SWEETS, ARCHITECTURAL: 25B, ELK.

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(Continued from page 146)

Now UNESCO searched the lists supplied by U. I. A. and C. I. A. M. for two architects and an engineer, and in July, 1951: Marcel Breuer (New York), Bernard H. Zehrfuss (Tunis-Paris), and Luigi Nervi (Rome) were assigned the task. Marcel Breuer, as is well known, belongs to the younger generation of contemporary architects, and it is important that this generation is now being offered the possibility of displaying its capabilities in a difficult problem. Bernard Zehrfuss is best known for his buildings in the Free Colonies. And the engineer, Luigi Nervi, whose genius approaches that of Maillart and Freyssinet, has the great advantage that in his buildings and huge airplane hangars he has become accustomed to working closely with architects. Drawings for the headquarters he is to be ready by mid-September, so that the could be printed and distributed before the meeting of the General Conference of UNESCO in November.

How will things work out this time after all the dismal experience of the past? No definite prediction can be made. The auspices are more favorable than ever before, though it is already certain that the building program outlined by UNESCO is far too large for the funds at present available. Also, no one can have any idea of the attitude that will be adopted by the General Conference of UNESCO in November, in whose hands lie the final decision. And after the experiences of Geneva and New York it is as well not to expect too much! It is a good sign that from the start the new team has felt the need of working in close contact with the Jury (whose members retain their position) Another very important factor is that the the partners share a similar outlook—which indeed the first requirement for real teamwork.

Up to now, the outcome can be regarded as a victory for the contemporary approach so that perhaps this time it really does lie in the hands of the architects to produce a scheme equal to the possibilities of the building and the possibilities of the site. A brilliant solution could do much to lighten the oppressive atmosphere which now weighs upon architectural development in so many countries.

elected

NEW HAMPSHIRE CHAPTER, A.I.A., re-elected EUGENE MAGENAU, Concord, as president of the 4th annual chapter meeting. This was a joint meeting of architects, engineers, and contractors.
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books received


Children and The City. Olga Adams. Sponsored by Michael Reese Hospital Planning Staff, 29 & Ellis Ave., Chicago 16, Ill., 1952. 29 pp., illus., $1

How to Plan a House. Gilbert Townsend, and J. Ralph Dalzell. American Technical Society, 848 E. 58 St., Chicago 37, Ill., 1952. 584 pp., illus. $3.95


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the contemporary arts


This is a well designed book in which author endeavors by words and pictures establish the level of artistic competence America and to explain the significance what is happening to the plastic arts at particular moment in our architectural history.

Mrs. Bittermann appraises the place that art and ornament hold in the hearts of men optimistically suggests that Architecture, traditionally the mother of all visual arts, again and with renewed concern drape it with the paraments of pure artistic creativeness to win back some of its age-old charm and what battered by the functional revolution.

It is encouraging to see fresh proof through architecture the creative fruits of a good society may be enjoyed by all people that Art is a living, ever-changing experiential which belongs in the market place as much as in the museum; and that new conditions, techniques, and new materials can be grist to the creative mill.

If the illustrations cannot be said to constitute yet the dawn of a new Golden Age they show nevertheless the seriousness of contemporary artist, a seriousness which is in sharp contrast to the imitative and superficial efforts of the artists of only a few generations ago. The modern artist seems to understand again what function art has in architecture, and he is slowly and patiently attempting to find his way through his discipline to a high standard of performance. Perhaps it may yet be necessary to have great many works of art before we can find good art at all, but we know that good art will soon invite more of it. The fact that government is now willing to spend a small percentage of the cost of a public building for works of art is encouraging. We learning that integration of art and architecture to be successful must come at an early stage.

I believe that this book can have a great influence, because it communicates important message at a crucial period of development as a nation—it invites not architects and artists, but all interested men, to cultivate and protect the seed.
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of our creative efforts from the cold climate of indifference. It is important because it is increasingly becoming apparent that only through a spiritual and cultural growth will America be able to retain the advantage it has gained over the world through mass production and armed strength.

PIETRO BELLUSCHI

sources listed

The A.I.A.’s librarian, George Pettengill, compiled this bibliography primarily to secure data about the sources of information on August Perret, in connection with the award by the A.I.A. of the Gold Medal, its highest honor, to M. Perret. Though the list is neither complete nor selective, it contains most, if not all, of the important references to this eminent French architect, whose design of buildings in reinforced concrete has brought him international recognition in the field. These references have been arranged in general groups, as follows:

- Writings of M. Perret
- Books References
- Biography and Criticism
- Honors
- Reinforced Concrete
- Miscellany
- Major Works Individually by Date
- Other Buildings
- Projects

characteristics of trees
Painting Trees & Landscapes in Watercolor. Ted Kautzky, N. A. Reinhold Publishing Corporation, 330 W. 42 St., New York 36, N. Y., 1952. 112 pp., illus., 16 full color plates. $9.95

To his widely admired previous books on drawing and watercoloring—Pencil Pictures, Pencil Broadside, and Ways With Watercolor—Ted Kautzky, well known artist and renderer, now adds this handsomely illustrated volume. Basic factors such as selection of papers, brushes, and palette; organization of the composition; and arrangement of values are again considered here in summary chapters. But the bulk of the book concerns itself with minute examination of the problems of painting elements of the landscape—trees, roads, and

(Continued on page 154)
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Herman Nelson Unit Heaters are suitable for the smallest service station or the largest factory. Each size unit does an extremely efficient job of heat transfer and distribution. This is because both heating element and fan are unique in design. Study the 7 points listed on the left and you’ll see that every part has been carefully engineered to do its particular job.
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Illustration shows driveway entrance on field level, lighted with Garcy recessed troffers and Garcy surface mounted cylindrical plastic-enclosed units to provide light-adaptation area for drivers coming into building from daylight.

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Illustration shows drive-in automobile area (banking) lighted with Garcy Slimline fixtures No. 7449-2 (background) with two 96" 430 ma. lamps, and Garcy No. 7895 4' x 4' square fixtures (foreground), providing high light intensity for effective lighting of drive-in banking area.

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GARCY
A Turquoise blue print speaks for itself:

"TURQUOISE pencils and leads made with 100% 'Electronic' graphite sure make life easier for draftsmen. And as for us blue prints ... we look snappier than ever before."

"Every line now stands out in clear contrast ... sharp-edged and uniform."

"Every figure is plainly legible. Erasures come clean, and leave no 'ghosts'. I'm so easy to read that guess-work and mistakes are eliminated."

"No wonder I say ... no wonder everyone is saying . . ."

Hoora for 100% 'Electronic' Graphite!

"ELECTRONIC' GRAPHITE is Eagle's trade name for a blend of purest crystalline graphites, reduced to micronic fineness in our exclusive Attrition Mill.

By compacting millions more of these tinier particles into every inch of lead, it makes smoother, stronger, NON-CRUMBLING NEEDLE POINTS . . . and denser, sharper, more uniform lines that reproduce to perfection.

PROVE IT YOURSELF. Write us for a sample of the new TURQUOISE in any degree you desire.
Gives lasting beauty—from Minneapolis to Miami

Sparkling white, like the new snow around it, stucco dramatizes the clean lines of this Minneapolis bungalow. And through winter cold and summer heat, the white, crisp beauty of the stucco made with a matrix of Atlas White Cement will endure.

Builders have known for many years that a stucco exterior, properly made with an Atlas White Cement, will stand up in any climate. With Atlas White Cements, you get the full beauty of stucco, because they are true white cements. They make white stucco snow-white and enhance the delicate tones and values of pigments in colored stucco. Original and upkeep costs are low.

Atlas White Cements are available in three types: Regular, Waterproofed and Duraplastic* air-entraining. Atlas White Duraplastic Cement gives increased plasticity for easier application. It results in an even more durable stucco, yet costs no more.

For further information see SWEET'S catalog, sections 4E/7a and 13C/5 or write to Atlas White Bureau, Universal Atlas Cement Company (United States Steel Corporation Subsidiary), 100 Park Avenue, New York 17, N. Y.

*“Duraplastic” is the registered trade mark of the air-entraining portland cement manufactured by Universal Atlas Cement Company.
RUST-OLEUM

All Colors, Aluminum and White—
Beautifies As It Protects!

This practical coating may be applied directly over surfaces already rusted without removing all the rust! Simply wirebrush and use sharp scrapers to remove rust scale and loose particles... sandblasting and chemical pre-cleaning are not usually required. Easy to apply by brush, dip, or spray... dries to a firm, pliable coating. Cut your maintenance costs, save metal — with RUST-OLEUM! Prompt delivery from Industrial Distributor stocks in principal cities.

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2521 Oakton Street, Evanston, Illinois

FREE SURVEY: A RUST-OLEUM specialist will gladly survey your rust problems. He'll make specific tests and recommendations. No cost or obligation. See Sweets for complete catalog and nearest RUST-OLEUM distributor, or write for literature on your company letterhead.
The trend is to small homes today. And with this trend comes the necessity of utilizing every available inch of space. That’s where the Richards-Wilcox Vanishing Door Hardware comes in. Specially designed for thin wall construction, noiseless operation and easy installation, they help make a room livable from wall to wall. R-W Silver Streak Vanishing Door Hangers and Aluminum Track are constructed for flexibility—for use on single or parallel wardrobe doors, or for sliding doors in any room.

**Check these important points!**

- Four types of hangers to accommodate various size doors and building requirements.
- Adapted to thin walls to save space and reduce building costs.
- No interference with room furnishings or decorations.
- Tight fit of door to floor avoids drafts, loss of heat.

- Adapted to single sliding and parallel sliding house doors.

For more information, contact our nearest office or request one of our illustrated folders describing in detail the uses and advantages of SILVER STREAK.
This Sloane Koroseal Tile Supreme floor provides low-cost, care-free service; beauty and quiet comfort in the display room of the Peoples Gas, Light and Coke Co., Chicago, Illinois.

Underfoot Beauty that Keeps Every Service Promise!

KOROSEAL TILE SUPREME

provides luxurious beauty and quiet underfoot comfort ... defies heavy traffic ... saves money through years of service and low-cost care.

A Sloane Koroseal Tile Supreme floor provides greater beauty ... more service and economy than any other resilient floor made. It's all virgin-vinyl composition, has unmatched color-clarity ... plus unequalled toughness that assures service long after most resilient floors require repair and replacement. Grease, oil, acid, alkalies and strong soaps will not affect Koroseal Tile Supreme ...

the through-and-through colors won't fade or stain ... it won't crack or break and tests show that its indentation recovery is far superior to any other type of resilient floor.

You save money year after year on maintenance because the nonporous surface of Koroseal Tile Supreme stays beautiful with a minimum of care ... dirt can't cling to it, or mar the smooth, tough surface ... soap and water mopping keeps it clean and bright ... even occasional waxing is optional.

Sloane Koroseal Tile Supreme comes in a beautiful range of 18 striking colors—either Marbletone or Crystal tone effect.

Send for complete details. Write Sloane-Blabon Corp., Dept. PA10, 295 Fifth Avenue, New York 16.

SLOANE * Koroseal TILE SUPREME

*Sloane is a registered trademark of The B. F. Goodrich Company.
REVIEWS

(Continued from page 158)

code interpretation

The State Building Code Commission of New York has issued a manual to assist building officials, architects, engineers, builders, and others in the interpretation, application, and enforcement of the State Building Construction Code. The primary significance of this manual lies in the fact that it describes methods and materials acceptable as meeting State Code requirements, without prescribing their use. All techniques, equipment, and products meeting the performance requirements are acceptable whether they are described or illustrated in the manual. Since the Commission’s technical staff will continue to study construction materials and methods, the manual has been published in loose-leaf form to permit insertion of new data pages supplementing or superseding the ones in the original book.

picture of a code

About a year or so ago, a committee representing the federal government plus numerous affected groups such as the National Association of Master Plumbers, the American Society of Mechanical Engineers, the U.S. Public Health Service, and many others, came out with a National Plumbing Code which has since been adopted by some 200 communities in the United States. The purpose of this book is to translate the technical and often legalistic language of the printed Code into mechanical design and construction of a plumbing system, for the benefit of engineers, contractors, manufacturers, and others. The author has, almost literally, drawn a picture of the National Plumbing Code, illustrating it with about 200 simple drawings so that the Code’s meaning can be crystal-clear to everyone.

fixture standards

Superseding an older standard of 1948, the newest edition provides minimum standards specifications, definitions, inspection rules, types and sizes of standard items, and test methods for enameled, cast-iron plumbing fixtures under the guidance of manufacturers, distributors, and buyers of these products. Minimum requirements include material, thickness, warp, enameling, acid resistance, inspection rules, marking. A list of associations, firms, and other organizations which have accepted this standard for use as far as practicable, is appended at the end.

(Continued on page 159)
for modern trim construction...

Stanley narrow width Butt Hinges

Today's trend toward having little or no trim around doors makes Stanley “Narrow Width” Butt Hinges the hinges to specify in any building you design—office, school, hospital, plant or warehouse.

The Stanley “Narrow Width” Butt Hinge hugs door and trim—reduces stress and strain in bringing the pivotal axis closer to the junction of door and trim.

Specify Stanley “Narrow Width” Butt Hinges for years of trouble-free, behind-the-scenes performance. Sizes: 5” x 4”, (as diagramed) 5” x 4 1/2” and 4 1/2” x 4”. Write for full details.

The Stanley Works, New Britain, Conn.
The most famous doors in the world swing on Stanley Hinges

HARDWARE • TOOLS • ELECTRIC TOOLS • STEEL STRAPPING • STEEL
You'll save with ARKWRIGHT

Arkwright Tracing Cloths are made to help you do your best work more easily.

Arkwright cloth saves time. There's never a pinhole, uneven yarn or other imperfection to slow you down.

Arkwright cloth saves trouble. You can draw over erasures time and again and not have an ink line "feather".

Arkwright cloth saves money. If needed, you can get clean, ghost-free reproduction from a drawing years after you make it—years after paper or inferior cloth would have turned brittle and opaque with age.

Wouldn't you like to see for yourself why Arkwright Tracing Cloth is best? Write for samples to Arkwright Finishing Co., Industrial Trust Bldg., Providence, R. I.

ARKWRIGHT
Tracing Cloths
AMERICA'S STANDARD FOR OVER 30 YEARS
You can work remodelling magic with architectural terra cotta

Old buildings can be given colorful new facades when you design in architectural terra cotta. It is custom-made to meet your most exacting requirements—individual units large or small, plain surfaces or decorative sculpture, brilliant colors or delicate tints. This versatile building material enables you to create attractive buildings with walls of lasting beauty, yet the cost is less than you would expect. Moreover, the original richness of terra cotta can be retained indefinitely by simple soap-and-water washings. When you consider the plasticity of form, color and texture, when you compare costs as well as creative achievement, architectural terra cotta clearly is in a class by itself.

Construction detail, data, color samples, estimates, advice on preliminary sketches, will be furnished promptly without charge. Send your inquiry today.

FEDERAL SEABOARD TERRA COTTA

CORPORATION
10 EAST 40th STREET, NEW YORK 16, N. Y.
Plants at Perth Amboy and South Amboy, N. J.
Remarkable primer takes the wet out of wet plaster ...
Newly plastered surfaces primed and ready for painting in 24 hours!

Contractor uses it ... overcomes unavoidable delays, meets rush deadline!

Plastering of ceiling was not yet finished ... Newly plastered ceilings and walls were still wet ...

But Nicholas Kramer & Sons, contractor, had got their orders: Scaffolding had to be set down by the following Wednesday!

What if it were raining and sleet ing outside? What if the Our Lady Queen of Peace R.C. Church, Maywood, N. J., had no windows, no heat yet? What if barely a week remained in which to do the job? This schedule had to be met!

Did Kramer & Sons meet it? They did!
Here's how ...

Wet Surfaces Quickly Made Ready for Paint

Starting late that gloomy October Thursday, Kramer & Sons flooded still wet walls and ceilings with a remarkable primer that solves the problem of painting over wet, new plaster.

Its name? Hydroban!

Even ceiling not plastered until Friday noon was quickly readied for painting by flooding on Hydroban only 24 hours later!

All Sunday, this unusual primer penetrated the new, wet plaster, emulsifying with the salts and water. Efficiently, it absorbed moisture, increased plaster density and hardness, neutralized hot spots and made surfaces moisture-resistant.

By Monday morning, all newly plastered areas were primed and ready for paint!

Gives Perfect Results in 2 Year Test

Monday and Tuesday, painting proceeded without delay. Wednesday night the scaffolding came down—right on schedule, thanks to Hydroban!

Windows were not installed for another month. There was no heat until mid-December. Yet, today, two years from the date Hydroban was used, walls and ceilings are in perfect condition!

Hydroban has many other important interior and exterior uses for moisture control on all types of building materials. For further information, in New York phone Ulster 5-4500 or mail coupon below.

HYDROBAN
59 PROSPECT ST., BKLYN 1, N. Y.

Mfg. by Central Paint & Varnish Wks., Inc.

Please send me a free copy of your booklet

BASIC INFORMATION ABOUT HYDROBAN.

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PA 10-52

new courses

The School of Architecture, GEORGIA INSTITUTE OF TECHNOLOGY, announces a two-year graduate course in City Planning to be inaugurated in September under the direction of HOWARD K. MENHINICK, Regents' Professor of City Planning, formerly director of Regional Studies at TVA. This course, housed in the new million-dollar architecture building, will be limited to 20 students. Applications are now being received from those holding a bachelor's degree.

A new college course in home building leading to a degree will be available to students next fall through co-operation of the nation's home builders. The course, carrying a B.S. degree in Business Administration, will be offered by TRINITY UNIVERSITY, San Antonio, according to the National Association of Home Builders. The course will offer college training in the various subjects making up the business of home building.

new slide series

The HERBERT E. BUDEK COMPANY, INC., 55 Poplar Ave., Hackensack, N. J., will act as distributor for black-and-white filmstrips and slides based on the photographic archive of the MUSEUM OF MODERN ART LIBRARY, New York. Prices obtainable from the distributor.

The material will be offered in four editions: Edition A—single-frame filmstrips; Edition B—double-frame filmstrips for self-mounting of 2x2 slides; Edition C—glass-mounted 2x2 slides; and Edition D—glass-mounted 3½x4 slides. Each strip or slide series will provide, in addition to 35 to 40 picture frames, a brief preface, essential captions, and a selected reading list.

Among titles to be offered are: M B 4—"MODERN ARCHITECTURE: The Development of Design in Space"; and M B 6—"INTERIOR DECORATION: Current Trends and Master Designers."

new addresses

A. EUGENE CELLAR, Architect, 502 Riverside Ave., Jacksonville, Fla.


ISADORE ROSENFIELD, Architect and Hospital Consultant, announces the change of his office address to 45 W. 45 St., New York 36, N. Y.
"I'll be hanged — another J-M Built-Up Roof!"

"Right ... and it's smooth-surfaced with no slag or gravel!"

"Then it gives full protection from fire, rot and weather!"

Yes—it's a Flexstone* Roof
Each ply is a flexible covering of stone!

- The secret of a Johns-Manville Flexstone Built-Up Roof is in the felts. They're made of fireproof, rotproof, weatherproof, enduring asbestos.

Flexstone Built-Up Roofs won't dry out from the sun ... need no periodic coating. They're smooth-surfaced, too—permit thorough drainage, make any damage easy to locate and repair. They are engineered to each job ... applied only by J-M Approved Roofers. J-M Asbestos felts are perforated to make application easier, give a smoother job, conform better to roof decks.


For your added protection, the Johns-Manville Asbestile* System of Flashing insures proper treatment of all critical areas. Asbestile is a heavy-bodied plastic cement designed for use with asbestos flashing felts to give thorough watertightness. As it sets, Asbestile becomes hard and forms an integral part of the wall itself.

Send for brochure BU-51A. Contains complete specifications for Flexstone Roofs and Asbestile Flashing System. Johns-Manville, Box 158, Dept. PA, N.Y. 16, N.Y.

Made of ASBESTOS

Johns-Manville FLEXSTONE Built-Up Roofs

ASBESTOS CORRUGATED TRANSITE • ACOUSTICAL Ceilings

DECORATIVE FLOORS • MOVABLE WALLS • ETC.

October 1952
250 years ago Sir Christopher Wren wrote:

"We architects are scrupulous in small things . . .

AND ARCHITECTS TODAY HEARTILY AGREE WITH THE GREAT ENGLISHMAN.
PAINSTAKING ATTENTION TO DETAIL HAS ALWAYS BEEN THE ARCHITECT'S TRADEMARK. To meet high contemporary standards, Kawneer Entrances are cleanly and handsomely styled to reflect the utmost simplicity in line and form. They are precision-engineered for maximum strength, smooth operation, and weather protection.

Transfiguration School in Tarrytown, New York, shows an excellent solution to an entrance problem that required panic exit devices. Architect—Robert A. Green.


Lanes Department Store in New York City uses two pairs of Kawneer doors within one frame. Architects—Cordes-Bartow and Mihnos.
"It is pathetic enough that a whitewashed castle, with turrets and things,—materials all unguenuine within and without, pretending to be what they are not,—should ever have been built" in this otherwise honorable place; but it is much more pathetic to see this architectural falsehood undergoing restoration and perpetuation in our day, when it would have been so easy to let dynamite finish what a charitable fire began, and then devote this restoration-money to the building of something genuine."

"Castles and Culture," Life on the Mississippi by Mark Twain

"The next house to the south, ladies and gentlemen, was built by Mr. E. T. Stotesbury of Philadelphia. It has recently been bought by the Town of Bahabah for a batout terminal for a new line to Nova Scotia." A cream-colored Grand Trianon have into sight through the pines above the rockbound coast. I didn't have my history book, but I guessed Charles A. Platt after Stanford White, but maybe I was wrong, because the stucco Villa Medici from Lago Maggiore, just north and next door, may have been from those same drafting boards. It's quite confusing. Fortunately, no one got around to putting a German castle on that serene granite monolith, Mt. Cadillac.

I had just flown over Tuxedo Park, that recently incorporated village of incredible mansions, into which Democracy has just filtered. According to The New York Times of August 8, incorporating the village means that it gets certain privileges, such as passing local "blue" laws, issuing dog licenses, and enabling it to receive from the state $3 per person for general operating expenses. (Undoubtedly a necessary form of Socialism, even for so Republican a community, these days).

Over Tuxedo Park to Saranac Lake, from there into the White Mountains, and then to Mt. Desert Island, passing by and looking down upon the seats of the mighty in the wilderness. Right behind our cottage at Hull's Cove is the famous Pot and Kettle Club where, at one time, according to our Barker on the Frenchman's Bay excursion boat (seats six! people for a three-hour cruise of the seaside mansions of Bar Harbor, at $2 a head), the small and exclusive membership controlled 82% of the wealth in the United States. The phenomenon of the great mansions of our coasts, from Bar Harbor to Newport to Palm Beach to Santa Barbara, and of our mountain resorts, from Asheville to Lenox to Colorado Springs, remains a historical wonder which, like the great English manor houses (of unquestionable authenticity), should and will continue to be a tourist attraction as long as they survive. Of course, Veblen was right. It is hard to believe that these houses were not built to be viewed by us gawkers, touring in droves to see the sights. Otherwise, why build with such conspicuous ostentation? Otherwise, why build with such obvious inappropriateness to the

(Continued on page 17)
Now! For The Very First Time!

SLIDING SIDE DOOR FOR HOME GARAGES

with Sterling in a Complete Packaged Set!

HINGED SIDE DOORS IN HOME GARAGES ARE ALWAYS IN THE WAY

Now, Sterling offers an easy solution to this problem. The new Sterling No. 890 Sliding Door Set is designed especially for sliding side doors in home garages. Here is a side door that is never in the way as it slides along the wall. The door can be made as wide as desired so lawn mowers and large equipment can be taken in and out of the garage easily.

Here Is The Package!
Sterling No. 890 Sliding Door Set

1. Adjustable Hangers with Track for doors up to 3' wide.
2. Edge Guide aligns door in closed position and makes it secure.
3. Floor Guide eliminates track on the floor. No grooving of door.
4. Back Stop permits full door opening, yet protects fingers and key.
5. Flush Pulls. Large for easy operation. Two furnished.

STERLING SLIDING DOOR LOCK
No. 1025 Rim Type Lock with Cylinder. This new lock is designed for sliding side doors. Not included in Set but available as an extra.

Write for complete information on Other STERLING PRODUCTS
- RESIDENTIAL SLIDING DOOR HARDWARE
- CASEMENT WINDOW HARDWARE
- PULL-TITE CLOSERS
- STORM SASH HARDWARE
- TRANSOM OPERATORS

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STERLING HARDWARE MFG. CO. Dept. SD-74
2345 W. Nelson St., Chicago 18, Illinois

Please rush complete information on new Sliding Door Set and Lock

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City
Zone State

Name
Address
City

October 1952
Illustrated: The CADET, a built-in Fiat Shower that does not look like steel, but becomes a beautiful part of the bathroom by concealing joint between wall and cabinet stiles.

See Sweets:
25c Architectural
75 Builders
or write for catalog and prices.

- 8% to 10% of the average home cost is in the plumbing contract—much of that goes into the bathroom! Now you can reduce that percentage and still deliver adequate and attractive bathing facilities by utilizing FIAT "package" showers. FIAT shower cabinets are designed to meet every architectural requirement, and always cost substantially less than built-on-the-job showers.

You save time, cost and confusion because a FIAT shower may be installed complete by a single tradesman! The plumber quickly assembles the FIAT cabinet, and fits it to the precast Terrazzo Receptor right while he is setting the drain. Shower head and valves (included in package) are connected at the same time. Sound simple? It really is!

MORE ARCHITECTS PREFER FIAT SHOWERS because:
all FIAT cabinets are rust-proofed—always made of bonderized, galvanized steel; never affected by building settlement; don’t depend on mortar joints for water-tightness; Terrazzo Receptors are permanently leakproof—eliminates lead pan and double drainage arrangements; deliver more quality for less money.

FIAT METAL MANUFACTURING COMPANY
Three Complete Plants—Economy • Convenience • Service
Long Island City 1, New York
Franklin Park, Ill. (Chicago suburb)
Los Angeles 63, California
in Canada: Fiat Products are made by Porcelain and Metal Products, Ltd., Orillia, Ontario

out of school

(Continued from page 168)

site—the sea, the forest and the mountain. The architect, enoying his ability to compete with God’s untutored esthetics, provides his client with the fruits of their mutual egotism. In so doing, he also provides a vicarious thrill to those of us who, as step-sisters to Cinderella, may never get to marry the Prince and live in the Golden Castle.

The curious thing to me about these grand houses is how ugly they are. The old draftsmen, with all the money in the world to waste, lacked two vital design faculties—one, the sense of three dimensions, which would have given their palaces and mansions the proper sculptural aspect; the other, the ability to land their buildings. This latter lacking results from a lack of sense of topography and site. The buildings hover just above the ground, not in a light and fantastic way which could be beautiful, but in a heavy indecision, as though about to be dropped a clumsy Djinn out of Aladdin’s lamp on the elaborate terraces and shrubbery design by the most ingenious landscape architects. They conceal the awkward gap between the house and the ground.

Be all that as it may, these are architectural concoctions to conjure with. As social exceptions they are receding, with the days gone by for many Scotch gardeners, uniformed chauffeurs and limitless house staffs. They still exist, for aging old ladies in grand old automobiles one still sees on Nantucket Drive beside the beautiful fjord at Northeast Harbor. What happens next is in the lap of also aging gods.

I was talking the matter over the other day with the Dean of the School of Architecture at Theleme, who was also on vacation here. I met at the Bar Harbor Laundromat, where was delousing the children’s blue jeans. He is staying at "Mon Repos," that beautiful house at Seal Cove. As we sat by the swaying waters, he confided to me that there is no longer laundresses at the big house, that guests had to see to their own "blanc mage du fin." He is after all an old Bâle Arts man like me, and we talk the same guage.

"What," I asked the Dean, "is going to be the design training of our boys as far as domestic architecture is concerned? Will they have to continue indefinitely in this preoccupation with minimal houses? Will they again splurge into palaces for exiled
out of school

(Continued from page 170)

road tycoons on rock-bound coasts? Will their imaginations never be taxed beyond the module for the miniscule?

"At Theleme," said the Dean, above the roar of the Surf in the enameled boxes, 'the matter is of serious debate among the design faculty. We see, on one hand, the requirements of our age; on the other, the loss of stimulus and excitement to the mind. Incidentally, we are also puzzled by this question of the module. Here on Mt. Desert Island we find that our forefathers were Gargantuas. Ceilings are fifteen feet high, bedrooms are a minimum of thirty by forty feet, windows rise six feet wide to a height of eleven feet. How we design for a ceiling of six-feet-eight or perhaps to a maximum of seven-feet-two. Our master bedroom is nine by ten, with a double decker which just permits a body to squeeze between top mattress and ceiling. And et, according to the latest statistics, our youths, stimulated by orange juice, breakfast foods, and lots of milk, are now averaging one and one-third inches more in height than our great-grandfathers. I have nightmares trying to figure how to fold an average six-feet-three basketball player into one of our prize-house accommodations. Maybe more frequent washing would shrink them—the basketball player, m thinking of, not the house—those could of be shrunk further.

"This is where the module problem arises. Le Corbusier has attempted through "Modular" to invent a dimension based on the human figure. But the human figure is not only infinitely variable, but also it is apparently enraging. While many of us attempt to reduce our horizontal dimension, our youngsters continue the vertical trend. Our architecture, being at present of horizontal design even for any of our vertical buildings, continues to bump the lid on us. Sometimes I wonder if we couldn't return to the Gothic. I'm getting a vertophobia which no picture window can alleviate. I feel like a worm looking out from under a fallen log.'

Dean had wandered far from the subject, is a Dean's prerogative, when on vacation. He changed the subject still further by asking:

"When are you coming to Theleme as a visiting critic? You have been writing about sign training for a long time. In fact, I allenge you to try out your theories in prac-

(Continued on page 174)
Cut drafting costs...  
Get better prints...  
with Kodagraph Reproduction Materials...  
created for use in your present equipment

Drafting costs go down when you use Kodagraph Reproduction Materials to protect valuable drawings from wear and tear... to reclaim old, soiled, faded originals... to revise or combine drawings... to copy prints.

And the legibility of your direct-process prints or blueprints goes up when you use Kodagraph reproductions of your drawings in print-making. For Kodagraph Materials are silver sensitized, photographic... have the ability to intensify weak detail... step up contrast... drop out stains, creases. And they pass on this improved quality to the final prints.

If you have a blueprint or direct-process machine or vacuum frame
You can produce positive photographic intermediates directly from your engineering drawings by reproducing them on any one of four types Kodagraph Autopositive Materials. To do the job—simply expose in your present equipment... at a process in standard photographic solutions. No negative step. No darkroom handling—a fast, convenient room-light operation all the way.

1. Kodagraph Autopositive Paper Extra Thin—all-purpose intermediate material for everyday use—gives you intermediates on a durable, white paper base. Intermediates which will turn crisp, clean blueprints and direct-process prints time after time... which will retain their legibility and sharpness... and which will remain photo-lasting in the files.

2. Kodagraph Autopositive Paper Translucent has an exceptionally durable and translucent paper base... and a print-back speed which is faster than regular Autopositive—an important advantage in large-volume print production.

3. Kodagraph Autopositive Film—with its high translucent Kodak safety film base—is especially valuable in reclaiming "hopelessly poor" tracings... and in reproducing extremely fine line detail. It is also widely used to reproduce catalog pages etc., including half-tone illustrations.

4. Kodagraph Autopositive Cloth—is recommended for producing the most durable prints (nearly exact in scale) from drawings in good condition. Its base is white fabric—tough, crease resistant, highly translucent.

Kodagraph Repro-Negative Paper, which processed in the same manner as the Autopositive Materials and with the same speed and convenience, enables you to produce positive intermediates directly from blueprints, Van Dykes, other negative "originals."
have any type of contact photocopying ma-
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Its high-contrast photographic emulsion produces
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ic blacks, clean whites. And its extremely wide
and amazing uniformity end the need for split-
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(Continued from page 171)

Out of school

lice! By the way, are you handicapped in your previous teaching experience?"

I had to admit that I was—some twelve

of it, the Dean shook his head.

"The students won't like it. They are

to practicing architects without teaching experience or training as critics. We call

critics at Thatleme every week. The very

known architects in the country are a
lists and they prove a very real attr

and keep our enrollment way up. You

have seen our bulletin advertising our ca

In it we have pictures of our critics, w

and of their best buildings. We have more names than any other school in

country. It is a very good system too beca

the boys by looking in the architect maga

can judge well in advance what the critic likes. This saves time, while educ

the student by stimulating him to do re

in the periodicals."

"That is going to constitute a proba

said. "I have no recent buildings t

credit. I am sort of an educator and s

of architecture and city planning at pr

There would be great difficulty in if

photographs of my work anywhere. I

think I could fit into your system too ea

"Well, it is something to worry about,

the Dean, checking on his wrist watch I

how much longer the laundry needed, "I

do pride ourselves on our flexibility. P

you might prove a challenge to the boys

would really have to guess hard to fir

what it is you like. It would mean c

of psychological research which, if y

willing to be subjected to it, could be

stimulating."

"I wouldn't mind that so much," I sai

why do the boys have to find out y

like?"

The Dean looked at me in astonis

"That isn't a serious question, is it? Ho

is a student to get the most out of a

After all, architecture is a personal art

student is to learn from the practition

must study everything the man has do

gains thereby a vocabulary—an alpha

his teacher's design skills. By continu

change our teachers we assist in th e en

of this vocabulary. It is a practical,

and obvious pedagogical system."

"Is it a system or is it an expedite

asked, not meaning to be critical—just

I

The Dean looked injured. " That is o

a double-barreled question, and I see n
Architect Henry Sprott Long of Long & Gatling says:

"We specified Truscon "O-T" Steel Joists for the Highland Tower Apartment Building to assure...

Hundreds of structures such as the Highland Tower Apartments in Birmingham, Alabama, indicate the trend toward lower cost per square foot construction while assuring adequate strength and safety with Truscon "O-T" Steel Joists.

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to answer it. The visiting critics have been enthusiastic about the system for years. One of them told me recently, 'I can hardly keep ahead of the students. They know everything about my work. I really enjoy sitting down over the boards with them and debating design with them.'"

"Do you choose your critics by any sequence or do you fit them into a selected set of problems and dovetail them with other courses in construction, theory, etc.?" I asked.

"Our system of design training has proven by the fine quality of student work that it does not need to be 'integrated.' Our critics like their independence of the more academic and less realistic part of our curriculum. And we occasionally introduce our visiting architects to the regular faculty at a faculty club lunch."

"Well, if you think I might fit in, I'll be glad to try my hand at your system," I said. "Do you want me to sketch out a problem in advance? If so, will you be kind enough to send me a list of subjects in sequence for the year so that I can see where to fit in?"

"Oh, that won't be necessary. We do not like to routinize things to that degree at Theleme. There'll be plenty of time to work up a problem after you arrive. Just leave it to the students. They'll tell you what they want . . ."

At this point there was a violent death rattle in the Dean's washing machine—and his laundry was done.

"Well, it was fun seeing you," he said, as he bundled it up. "I'll have to get back to the house for cocktails before I iron my collar. I can roll up my sleeves and save ironing the cuffs. I'll send you a letter, later, giving you an official invite. And I do hope you will try to conform, at least for once. Cheerio!"

I look forward to a return visit to Theleme with great pleasure.

To revert to my vacation trip, the most conspicuous new architecture of our touring day, and the most sought after come late afternoon, is the tourist camp or motel. Its design, if it can be called such, is a never-ending wonder. First, one takes a bulldozer, dynamite and other lethal weapons, and completely clears a space in a virgin forest, alongside the road. Then having prepared the soil, one plants sugar lumps of clapboard or insulating board, with red or white roofs, in rows equally spaced. Then one places in front, in the middle, a filling station and office, and

(Continued on page 178)
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clear, brilliant colors, blendable and
dilutable. In 1 oz. bottles, handy car­
tridgess and larger containers.

out of school

(Continued on page 176)

stands the ensemble for five miles in all direc­
tions with signs tacked to trees, advertising the
comforts and conveniences of home. This
all-pervading architecture seems to be accepted
by the American public without a murmur. It
is part of the rapidly developing blight which
is racing along our highways almost as fast as the
automobile itself.

Was it for this that our forefathers pioneered
this wilderness? Is this the American dream?
Let no one gainsay the owner’s right to earn
his living. Let no one for a moment doubt
the utility of these projects in our motor age.
They are a necessary adjunct to our travel, our
wanderlust. But who can justify for one
moment this hideous destruction of our birth­
right and this irreparable damage to our
soils? And why, oh why, is the American pub­
lic so completely impervious to these sights?
And where are the architects and planners? Or
isn’t any of this their business?

NOTICES

credit omitted

Credit to HOWARD T. FISHER & ASSOCIATES of
Chicago was omitted in the advertisement for
BRASCO MANUFACTURING COMPANY which
appeared in June 1952 P/A (Page 57).

The advertisement listed Holabird & Root &
Burgee as Architects for the Evergreen Park
Plaza Shopping Center; Sidney H. Morris &
Associates as Architects for the Lincoln Village
Shopping Center.

Howard T. Fisher & Associates should also
have been credited as Associated Architects
and Engineers for both projects. The shopping
centers and all three architectural organiza­
tions mentioned are located in Chicago.

new firm

Announcement is made of the formation of
"SCOPE: Interiors," an organization for com­
plete interior design service. MICHAEL M.
KANE, A.I.A., will be consulting architect.
The work will be entirely in the contemporary
idiom and cover all fields of interiors—com­
mercial, industrial, apartment houses, etc. Head­
quarters will be located at 12381 Cedar Rd.,
Cleveland Heights 6, Ohio.

(Continued on page 180)
Display is necessary in order to move merchandise in the retail business.

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Address ____________________________
DEPARTMENT OF ARCHITECTURE AND DEPARTMENT OF ENGINEERING at the UNIVERSITY OF ILLINOIS announce for this fall a short course in "HEATING, VENTILATING, and AIR CONDITIONING." This course is to be directed specifically to architectural practitioners and it will be given Oct. 29-31. Inquiries may be addressed to: R. K. Newton, Supervisor, Engineering Extensions, 715 S. Wright St., Champaign, Ill.

regional A.I.A. conference
The regional conference of the A.I.A. for the NORTH CENTRAL STATES DISTRICT will be held Nov. 7 and 8, 1952, at the St. Paul Hotel, St. Paul, Minn.

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new practices, partnerships

FREDERICK S. CATES, Architect, announces opening of his office at 334 St. Paul St., Baltimore, Md.

H owe & Foster, Architects, announce that J. ROWLAND SNYDER has joined their partnership. The firm now is HOWE, FOSTER & SNYDER, 1636 Connecticut Ave., Washington 9, D. C.

EPHRAIM F. HUBERT, Architect, announces the opening of his office for practice of architecture, at 55 W. 42 St., New York, N. Y.

JOSEPH T. GEMMI, A.I.A., announces his association with FRANK A. AMODIO and WILLIAM C. MARTUCCI for practice of architecture, 24 Walnut Street, Newark 2, N. J.

CHARLES HENRY CONRAD and GEORGE BAIN CUMMINGS announce that they have admitted to association their sons, CHARLES HENRY CONRAD, JR., Licensed Prof. Engineer, and JOHN BUTLER CUMMINGS, Registered Architect. The association will continue under the name of CONRAD & CUMMINGS, Associated Architects, at 99 Collier Street, Binghamton, N. Y.

HARRY MILTON GRIFFIN, Architect, announces partnership with WILLIAM RAWLE GOMON for practice of architecture under the name GRIFFIN & GOMON, Architects, at Bldg. No. 1, Municipal Airport, Daytona Beach, Fla.

Announcement is made of the formation of partnership under the name of CORROUGH WONG for practice of architecture, at 20 Pacific Ave., Stockton 4, Calif. The partners are DANA D. CORROUGH and WARREN C. WONG, both California certified architects.


The partnership of FRANCIS C. PUCKETT and AUSTIN D. JENKINS has been dissolved as of April 30, 1952. AUSTIN D. JENKINS and CLAUDE W. THOMASON announce formation of a partnership for practice of architecture, at Room 2100, Wrigley Bldg., Chicago, Ill.


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construction bids, private and public contract; withdrawal of bids on grounds of mistake (continued).

Last month's column discussed those elements which are essential, for a court to allow a bidder to withdraw his bid, as well as those cases disallowing such relief. This present column deals with those cases where the equitable relief of rescission was granted, as well as a discussion of the effect of legislation in this field.

withdrawal of bid allowed.

Where the Court has found the presence of one or more of the elements previously discussed, they have been inclined to grant to the bidder the relief he has requested. The result of the holdings have been to relieve a bidder, where he has incorporated some error into his bid, from the onerous position of forfeiting his deposit or performance of the contract at a substantial loss. In Kemper Const. Co. v. City of Los Angeles, 37 Cal. 2d 696, 235 P. 2d 7 (1951), the Supreme Court of California had before it a determination a claim of a bidder for cancellation of his bond, on the grounds of mistake fact. The plaintiff had been preparing his bid until 2:00 a.m. of the last night prior to the deadline and during the preparation an error in excess of $300,000 was made. The bid notified the city within hours after the bid was opened and prior to any award being made. In granting the relief requested, the court stated:

"The type of error here involved is one which will sometimes occur in the conduct of reasonable and cautious businessmen, a number of them, and there is no legal duty such as would bar the right to equitable relief.

"The evidence clearly supports the conclusion that it would be unconscionable to hold company to its bid at the mistaken figure, for the city had knowledge before the bid was accepted that the company had made a clerical error which resulted in the omission of an item amounting to nearly one-third of the amount intended to be bid, and, under all the circumstances, it appears that it would be unjust and unfair to permit the city to take advantage of the company's mistake. There is no record of denying relief on the ground that the city cannot be restored to status quo. It ample time in which to award the contract without readvertising, the contract was awarded to the next lowest bidder, and the city will not be heard to complain that it was placed in status quo because it not have the benefit of an inequitable bargain. Finally, the company gave notice promptly of discovering the facts entitling it to rescind, and no offer of restoration was necessary because it not be placed in status quo because it not have the benefit of an inequitable bargain. Finally, the company gave notice promptly of discovering the facts entitling it to rescind, and no offer of restoration was necessary because it not be placed in status quo because it not have the benefit of an inequitable bargain. Finally, the company gave notice promptly of discovering the facts entitling it to rescind, and no offer of restoration was necessary because it not be placed in status quo because it not have the benefit of an inequitable bargain.

In School District of Scottsbluff v. Constr. Co., 153 Neb. 451 45 N.W. 2d (1950), the Supreme Court of Nebraska considered the error so fundamental that the municipality receiving the bid must have been aware of the mistake when the bid was considered. The court further found no negligence on the part of the bidder and reasonable notice on his part. The Court stated:

"The record establishes that the claimed error of $23,600 in the amount of the bid a clerical mistake in tabulating and computing...(Continued on pag
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Making better products to make other products better

it's the law

(Continued from page 182)

the bid. It was not an error of judgment in computing the quantity or cost of materials and labor. The mistake was unilateral, there being no allegations or evidence of mutual mistake. The school district contends that under such circumstances a bidder may not be relieved of his bid except where it is shown that the party receiving the bid knew or ought to have known, because of the amount of the bid, or otherwise, that the bidder had made a mistake. While we think it could be said that the difference in the bids on the vocational agriculture and grandstand building was such as to indicate to the school district that a mistake had been made and thereby bring it within the rules applicable to mutual mistake, the bidder has the right under the facts shown by the record to withdraw his bid even though it was the result of unilateral error.

"The rule under such circumstances is: When the mistake is so fundamental in character that the minds of the parties have not, in fact, met or where an unconscionable advantage has been gained by mere mistake, equity will interfere to prevent intolerable injustice where there has been no failure to exercise reasonable care on the part of the bidder and where no intervening rights have accrued. In the case before us the mistake was discovered and notice thereof given to the school district within four days after the opening of the sale of bids. It was a fundamental mistake as distinguished from an incidental one. While the bid of the Olson Construction Company had been accepted and the contract awarded to it, no contract had been entered into; it was wholly executory. Failure to use reasonable care on the part of the Olson Construction Company is not shown and rights of third persons had not intervened. The parties could have been placed in status quo at the time of the withdrawal of the bid."

The Supreme Court of Oregon, in Rugh v. Automatic Sprinkler Co. v. City of Portland, 189 Ore. 268, 219 P. 2d 732 (1950), also allowed a bidder to withdraw where his error was the omission of the cost of steel for a construction project. The Court was of opinion that the error was not due to a negligence on the part of the bidder and that he had given timely notice of error to the municipality. Furthermore, the Court felt that the error was such as to apprise the municipality of the fact that a mistake had been made. The Court said:

"One who considers in the cloistered calm of appellate court chambers the mistake which the plaintiff made is prone to indict. Tragi
cquip repose magnifies mistakes made by those who work under stress and strain. It is ever inclined to condemn elation and insist upon such methodical care that error will be virtually eliminated. Courts, however, cannot create a Utopia and must deal with the realities of life. Contractors who compute estimates do not work under ideal conditions. The record shows that those who computed the plaintiff's bid..."
Economical, easy to handle, Keymesh provides strength, attractive appearance and durability for exterior or interior reinforcement of plaster or concrete—for commercial or residential buildings of all types. Write for complete information.
were compelled to cope with conditions which afforded error opportunity to steal in. The trial judge who saw the witnesses, and who himself questioned some of them, recited in his findings that the mistake was excusable and not culpable. We know no reason for rejecting that finding; we think that the evidence warrants it.

"We believe that it is manifest from the evidence that the difference between the plaintiff's bid and the next higher was so large that all of those concerned with the undertaking were rendered uneasy. The plaintiff's officers at once returned to their work sheets, fearing that they must have committed a mistake. The City Engineer, according to his own words, found the variation so great that it 'scared us to death.' A member of the Board of Engineers, who seemingly expressed himself in cloudy words, described the plaintiff's bid as 'a very low' one and termed the difference between it and the City's estimate 'a very decided difference.' The bid aroused suspicion in all minds. We think that the difference ap­prised the City that a mistake had probably occurred."

Knowledge of the error by the receiver of the bid is one element given a great deal of

---

**it's the law**

(Continued from page 184)

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The Difference (10,000,000 lbs.) Is Dunham Vari-Vac Heating

Yes, Dunham Heating makes a difference. In the Michigan Boulevard Building, Chicago—a medical building where temperatures must be precisely controlled, this Dunham difference amounted to—10,000,000 pounds of steam saved, during an unusually severe winter.

Substantial fuel savings are brought about regularly for all types of buildings, through Dunham's patented controls operating on high vacuum steam lines.

Dunham Heating can bring you greater comfort...far greater operating economy. Full cost-cutting facts are at your disposal...as are Dunham Sales Engineers, located in most principal cities. Why not call or write for a free heating survey?

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**new SOLA Dynatron BALLASTS**

for LAG LEAD OPERATION OF TWO INSTANT-START HOT CATHODE FLUORESCENT LAMPS

Here is the answer to your fluorescent lighting problems. A new line of premium performance ballasts that are outstanding. They are comparable to the present spec. #6 and the proposed A.S.A spec. C82.1. Now available for Sola Oynotron Ballasts provide these advantages:

- Independent lamp operation
- Small size, light weight
- High starting current
- Fast lamp starting
- Low wattage loss
- Low peak to R.M.S. current ratio

In addition, the Sola Dynatron is the only lead-lag ballast with the patented ventilated condenser compartment for extended ballast life. The cut-away illustration above illustrates this construction.

**WRITE FOR BULLETIN H-PFL-165 for specifications.**

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**it's the law**

(Continued from page 186)

recover the moneys or certified check forfeited as liquidated damages unless he shall prove before a court of competent jurisdiction, in an action brought for the recovery of the amount forfeited, that in making the mistake, error or omission he was free from carelessness, negligence or inexcusable neglect.' The three terms last above appearing as applied to the instant facts are synonymous. 'Carelessness' consists of the doing of some act or omitting to do some act. So as to negligence. The 'carelessness' or 'negligence' here involved, if any there was, consists of an omission to do some act. The 'neglect' involved, if any there was, consists of that same omission. The 'carelessness' or 'negligence' if any, was thus only 'neglect.' The only neglect that under the statute visits the penalty of forfeiture is 'inexcusable neglect.' Assuming that the legislature has power by its mere fiat to create a forfeiture by calling a penalty liquidated damages, a point which we do not here consider, unless the plaintiff's 'neglect,' if any there was, was 'inexcusable' there was no forfeiture under the language of subsec. (5) relied on as creating a forfeiture, and if such neglect did not create a forfeiture because it was excusable, neither did carelessness or negligence which consisted of the same thing as neglect."

The court was of the opinion that under the facts of this case, the bid, as corrected, should have been allowed to stand. The Court stated:

"Subsecs. (5) and (7) of the statute on which the defendant relies, so far as here material, are set out in the margin. Subsec. (5) is headed 'Corrections of Errors in Bids.' This heading manifestly contemplates that corrections of errors may be made in proper cases, and this would seem to imply that a bid when properly corrected may stand as a bid. Under this concept of the purpose of the statute, the Village should, under the facts found by the trial court, which are well supported by the evidence, have permitted substitution of the correct amount in the bid."

'Sec. 66.29(5) Corrections of errors in bids. Whenever any person shall submit a bid or proposal for the performance of public work under any public contract to be let by the municipality, board, public body, or officer thereof, who shall claim mistake, omission, or error in preparing his bid, the said person shall, before the bids are opened, make known the fact that he has made an error, omission, or mistake, and in such case his bid shall be returned to him unopened and the said person shall not be entitled to bid upon the contract unless the same is readvertised and relet upon such advertisement. In case any such person shall make an error or omission or mistake and shall discover the same after the bids are opened, he shall immediately and without delay give written notice and make known the fact of such mistake, omission, or error which has been committed and submit to the municipality, board, public body, or officers thereof, clear and satisfactory evidence of such mistake, omission, or error and that the same was not caused by any careless act or omission of his part in the exercise of ordinary care in examining the plans, specifications, and conforming with the provisions of this section, and in case of forfeiture shall not be entitled to recover the moneys or certified check forfeited as liquidated damages unless he shall prove before a court of competent jurisdiction in an action brought for the recovery of the amount forfeited, that in making the mistake, error, or omission he was free from carelessness, negligence, or inexcusable neglect."

'(7) On all contracts the bidder shall be in corporate and make a part of his proposal for the doing of any work or labor or furnishing of any material in or about any public work or contract of the municipality, a sworn statement that he has examined and carefully prepared his bid from the plans and specifications and has checked the same in detail before submitting the said proposal or bid to the municipality, board, department, or officer charged with the letting of bids, and also at the same time as a part of such said proposal, submit a full and complete list of all the subcontractors and the class of work to be performed by each.'