

THE INLAND ARCHITECT AND NEWS RECORD

VOL. LII

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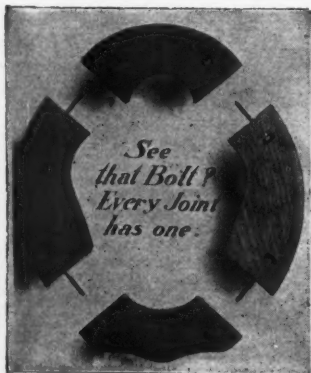


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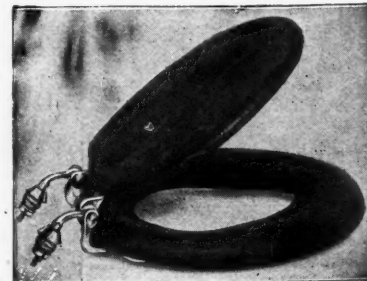


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Constructive, Decorative and Landscape

ISSUED ON THE 15TH

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AUGUST, 1908

No. 2

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Afflicted
With a
Monument.

In illustrating the handsome McKinley monument, dedicated in Buffalo last year, the INLAND ARCHITECT was moved to congratulate that city not only on what it had acquired, but on what it had escaped. For, unfortunately, when a monument is proposed, the city on which it is to be bestowed or inflicted is in danger. The latest sufferer in this way is the attractive little municipality of Worcester, Mass.

A monument to its most famous and most honored citizen, Senator George Frisbie Hoar, has been placed in front of Worcester's city hall. Unfortunately this work of art, which should be a joy forever to each citizen, is regarded with mixed feelings—in fact, is already the object of adverse comment.

To criticize intelligently and honestly a costly monument bestowed at his own expense by a well-meaning donor, is a delicate matter at best. It must be done, of course, if the public taste is not to be impaired by the erection of eye-sores; but the right and only time to do it is before the monument is set up, (if possible) before it is made, even, if a statue. Afterward the chagrined recipients may as well be silent, probably.

No monument should be allowed in any public place without a permit from some disinterested authority of undoubted integrity and competency to decide upon art questions. One explanation proposed for the marvelous attainments of the Greeks in sculpture is the multitude of works by the best masters which lined the streets and public places. These created an atmosphere of art in which the Greeks were enveloped from infancy, and unconsciously they grew up with a love for its noblest shapes and a critical taste formed on the best models. Monuments in public places are indispensable to our art development as a nation; no city can have too many. But let them be monuments of art, not of ignorance.

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Skilled Labor in
the Building
Trades.

It is often remarked how dependent we are in this country on foreign immigration for our skilled labor in the building trades. Very fortunately for us the tariff which shuts out foreign art does not shut out foreign artists nor artisans. Skilled workmen, carpenters, masons, stone workers, plumbers, plasterers, cabinetmakers, sheet metal workers, painters and decorators from the fine technical schools of France, Belgium, Germany and Switzerland flock to these shores, to find ready welcome and employment, often before they can speak English, while American youths are shoved aside as not available. So our houses are really foreign built, though we import the builders, not the buildings.

We claim to surpass the Old World in some of our

products and to equal it in almost everything else except in the production of skilled labor. We have fine professional schools for training artists, architects and engineers, but our skilled labor in the building trades is not home-grown, nor is there much prospect of improvement in the early future. If an American boy wants to become a master carpenter or stone cutter or metal worker he must go abroad. This is a matter which intimately concerns the architectural profession everywhere, for the success of a building depends on the skill of the workmen who construct it almost if not quite as much as on the skill of the architect who designed it.

**The Fate
of Building
Ordinances.**

In commenting upon the editorials in the July number, F. W. Fitzpatrick writes: "Upon my word, old fire-fighter as I am, they've given me a new view of the subject and almost started me off on another tack. Why not follow your suggestion—and secure fire prevention by doing all we can to cut down our fire departments? By the Eternal! something might be accomplished; it would be heroic treatment, but effective and rapid." Few realize how very much stupidity there is in cities and individuals upon the subject of fire losses. Wanton folly, and criminal extravagance, and cowardly pandering one could characterize them if addicted to strong adjectives. Calculated to make one gnash his teeth and wish to go into the temple and other places of public assembly and wield a cat-o'-nine-tails. Go before a city council and offer some wondrous water tower or other fire-fighting device, and it'll listen to you and buy: go before that same body and suggest a more rigid building ordinance and it will adjourn. If you do succeed in getting a decent ordinance passed that same council will make an exception of Joe Smith's proposed theater or Bill Jones' hotel fire-trap, and let him go ahead just about as murderously as he pleases. Disheartening? Yes.

Think of it, \$215,000,000 a year in smoke, hundreds of lives, and the daily danger to millions of others and thousands of millions of property! Nearly \$300,000,000 more a year in so-called fire-protection, fire-departments, water systems and what not. And on top of all that \$195,000,000 paid to our insurance companies, who metaphorically pat us on the back and tell us that they'll stand by us to the bitter end. Supposing the individual does get back his entire loss—less time, profits, etc., lost while rebuilding—as a whole, we only get back something like \$95,000,000 for all of that loss and cost from those same protectors of the "dear people." Ponder it, we've lost one million buildings in ten years and paid in insurance premiums \$1,610,885,000 in the same period!

**Losses
Beyond
Comparison.**

Talk of forest devastation and waste of our natural resources. Can one think of any such sinful waste as we allow fire to work day by day? Our state governors, lieutenant governors and the whole horde of state and federal public (and private) servants should in convention assemble to devise something to estop the horrid, wanton and cruel fire waste. To compare our losses with, or speak of them in the same breath as we mention those of old Europe is to insult our trans-aquatic cousins. The fire losses of the world are about \$600,000,000 a year.

We supply over one-third of them, though we number but one-twentieth of the people. To keep attuned to our losses the world's yearly tribute to fire would have to be \$3,600,000,000! With all our phenomenal building activity, we barely replace in value what we destroy annually. For against the total cost of fire, with all incidentals, something over \$600,000,000 in 1907, we built of new construction and repairs in that same period but \$615,000,000.

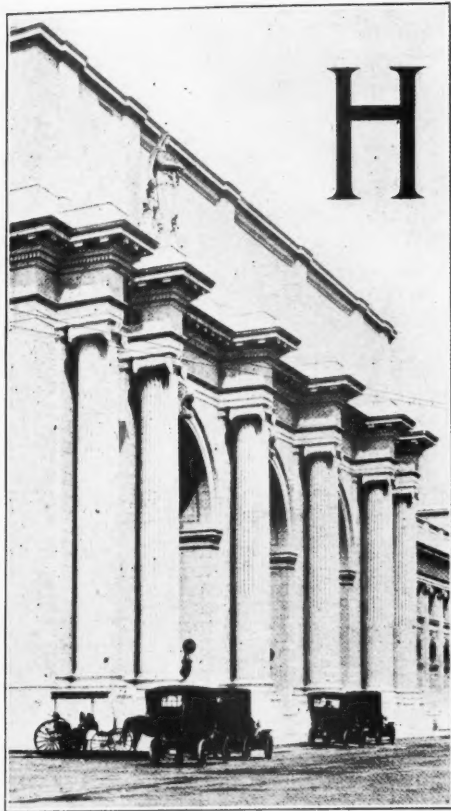
Boston has had fires that destroyed property to the tune of \$5,000,000 within the past few weeks. Rome, a city of almost equal size, goes in for loud lamentations when a year's fire losses reach \$50,000. In all of Great Britain in 1907 there were but 35 fires doing over \$50,000 damage and none that exceeded \$400,000, and the total of those of 35 fires but aggregated \$3,785,000. Here a city of any size at all feels really agrieved if it does not have at least one \$1,000,000 fire in a year! In Frederickstad, Norway, there was recently a fire that destroyed \$560,000 worth of property and all Europe is commenting upon it still, this "awful calamity." New York has 3,000 firemen and 11,000 horses and 160 steam fire engines, and spite of its wonderful efficiency the city suffers enormous losses every year. London, that almost appalling vast city, has but 3,843 fires a year; Berlin but 3,000 (with a loss of perhaps \$170,000!); Rome 270, Milan 786, Florence 160, and so on down the list with not one European city equaling, pro rata of population, one-fifth of the fire loss, or cost of fire fighting agencies, that any one of our American cities suffers. But over there they have understood and been made to appreciate and put into practice some of the rules of fire-prevention. Then too, they've not had the lumber that tempted us to do wrong.

**Some Hope
In the
Situation.**

Spite of the disappointments and the rebuffs, the cause of fire prevention HAS progressed. Over one hundred of our cities have revamped and bettered their building ordinances; in some cities new combustible buildings are not allowed in certain districts; the insurance companies are encouraging fire-proof construction; architects are giving the matter attention and do fewer foolish things in building and even the layman is beginning to see that in better construction is there ultimate economy and profit. These are hopeful signs. True there are yet something like 12,000,000 buildings, fire-traps, to be removed or burned down, old and poorly built affairs, but constituting a future ash-heap that it has cost us over \$14,000,000,000 to produce, but we are a rich nation, they tell us, so we may be able to look on without any emotional spasms while the destruction goes merrily ahead. Mr. Fitzpatrick suggests compelling cities to enact a regulation that the building departments conspicuously label all buildings in the congested districts and all others anywhere of a public nature, just as to what classes they belong, "fireproof," "ordinary" and "dangerous" and then making it a serious offense for an owner to advertise his building of a superior class than that to which it really belongs. That would help clear out a lot of old shacks that now parade under false colors and would certainly act as a deterrent to the addition of new fire-traps. A man would think twice before starting on a new building that he knew would be marked "dangerous." That word would keep out tenants he might otherwise have blandished into occupancy of his shoddy building. It's a good move.

NEW UNION STATION, WASHINGTON, D. C.

D. H. BURNHAM & CO., ARCHITECTS



It must indeed be hard to please who will not agree that the new Union Station is one of the most satisfying, stately, beautiful and appropriate buildings in America. Of noble, really huge proportions, it does not overpower one, for it fits so admirably into the massing, the "tone" of the city. Its three great arches tell one its story, its "raison

d'être," it is the portal to the city; its severe and classic lines and absence of domes or other "arrogantly dominant" features proclaim that spite of its grandeur, its size, its importance, it is subordinate to yet another structure, the central feature, the grand old Capitol that, rightly, towers above all else about it; and the beauty of its parts, its artistic simplicity, the air of thoroughness regardless of cost, make it as unmistakably evident that if it is but the gateway, the entrance to the city, then must this be a most magnificent capital of a very great and powerful nation.

Few building suit their purposes as admirably as this. It is a railway station—no one could mistake it for aught else. Others have been molded upon similar lines and are direct challenges to adverse criticism. Why are they of classic form? What sense was there in taking the Baths of Caracalla or the Temple of the Vestals or other antique as a prototype for so modern, so practical a building as a station? But that idea does not occur to one here; it is manifest that anything else would have been inappropriate, for this station is but one of a great group of buildings that must necessarily be attuned with the Capitol. It is a success, the happiest composition of a firm of architects who have accomplished much, who have noble monuments all over our land, and who, indeed, have set a standard in accomplishment that has not yet been reached by any of their contemporaries and, much less, by any individual or group of architects of any nation.

The general arrangement, its plan is perfect. There is nothing that is merely for show. All about it is for use, for the convenience and comfort of the people, but it is all done tastefully, and its influence upon the people is marked, it is elevating. The grand waiting room, the

state apartments are magnificent. All about it is impressive and one should be quite content to gaze and admire. There are no discords about it. We are proud of it and proud of the man, the Chicagoan, who, first of all, showed our legislators, our railway directors the necessity there was for its existence, persuaded them to make it a part of the great group, a feature of the "City Beautiful," and then actually made it a realization of our fondest hopes, an accomplished fact and in less time than it seemed even possible.

The site, although involving serious changes of street grades, is in every other respect an ideal one, being sufficiently near the business center (F and Ninth streets), while its tracks of approach affect only a small and relatively unimportant quarter of the town.

The advantage of the site as a center of distribution has been greatly enhanced by the provision of a plaza 500 feet wide by about 1,000 feet long. Into this space converge nine streets, three of which are new and two old, the directions of which have been slightly altered for a short distance by way of adjustment to the plaza. The station thus lies at the center of a system of radiating avenues. Through these converging streets large bodies of people can leave or enter the station without difficulty, while the plaza, with ample space for massing troops and spectators, affords adequate space for public ceremonials.

The station faces toward the dome over the center of the halls of Congress, half a mile distant, and is treated in an architectural style in keeping with its character as the vestibule of the Capital. So many of the government buildings in Washington have their architectural inspiration from Greece and Rome that a freely interpreted classic may be said to have become the recognized architecture for public buildings in Washington. It is in view of the function of the new Union Station as the one gateway of the Capital that its architectural motives have been drawn from the triumphal arches of Rome. The plaza itself, sloping gently away from the station, will be decorated with balustrades and fountains and a terrace separating it from the fore-court, about 100 feet wide, surrounding the building itself.

The station building proper, is 620 feet long and from 65 to 120 feet in height, and is built of white granite. The three entrance arches, 50 feet in height, far exceed in scale their Roman prototypes. These central doorways lead into a vaulted open-air vestibule and thence into the main waiting room. The 40-foot arches of the end pavilions are both carriage entrances. The one toward the east is for official use, and leads to a suite of apartments exclusively for the President and the guests of the nation. The central vestibule and End Pavilions are connected by an open-air portico or loggia with railway offices in the second story above. The portico and the vestibules together constitute a continuous covered porch running along the front of the entire building, affording at every point protection from the elements. No matter at what point one approaches the building, one can at once be under cover—an admirable provision in a building measuring 1,100 feet on the sidewalk line of the front and two ends.

The general waiting room, with a clear width of 130 feet and length of 220 feet, is covered with a Roman

barrel vault 90 feet high, decorated with sunken coffers or panels after the manner of the Baths of Diocletian. It is lighted by a semi-circular window 75 feet in diameter at each end, and by five semi-circular windows of 30 feet diameter on each side. Around this hall are grouped the dining room, lunch room, telephone, telegraph, parcel room, smoking room and women's waiting room. The ticket offices and baggage room are on opposite sides of a lobby 50 feet wide and 58 feet high opening directly from the waiting room. While virtually forming part of the waiting room, the ticket and baggage lobby serves also as a passageway for entrance to or exit from the carriage porch.

This close grouping of baggage and ticket service, and carriage porch is an unusual arrangement in larger American stations, and it will be convenient in operation, permitting the belated passengers to buy tickets and check baggage with the utmost dispatch. It has been made possible by the ingenious device of a double-deck baggage room, whereby the passenger, standing in a gallery on the waiting room level, is able to look down into an extensive baggage room on a somewhat lower level. Owing to differences in street grades which permit carriages to approach either main or basement floor, baggage will be delivered by wagon on the low level baggage room floor, whence after checking in plain view of the passenger it can be at once distributed on automobile trucks through low level runways, beneath the tracks, to elevators at heads of trains. In this way conflict between passenger and baggage currents is avoided, and baggage is delivered to trains with only one use of elevator service. The principle of avoiding conflict between baggage and passengers has been further carried out by providing independent train platforms devoted exclusively to the handling of baggage.

The smoking room and women's waiting room are large, attractive apartments, 30 by 85 feet, 28 feet high, with windows looking towards the plaza.

The dining room, 80 by 100, 35 feet high, is treated in Pompeian style. Its kitchen, for the sake of preventing odors, is in the second story.

The passenger concourse or train lobby is 130 feet wide, 760 feet long, and covered by an arched ceiling in a single span, decorated with panels, part of which transmit the light. As the figures indicate, this hall far exceeds in size anything ever built for a similar purpose. It is intended to be equal to any demands on the gateway to the capital of the country. The concourse is divided by the usual fence so as to allow a width of 85 feet, (instead of the customary 50 or 60) for handling the outgoing passengers and a width of 35 feet between fence and tracks for handling passengers arriving on trains. The concourse opens into the waiting room by fifteen doors, and in addition it has an exit to the carriage porch and several others opening directly on the plaza.

There are in all 33 tracks, of which 20 are "stub" tracks on the same level as the waiting room, and constitute a "terminal" station. The remaining 13 tracks are depressed 20 feet below the waiting room or street level, and 9 of them continue under the building into a tunnel leading southward, and constitute a "through" station. With the exception of the stairs leading to the depressed tracks, there are no steps anywhere in the station.

The Washington station has no large span train sheds which have not justified their enormous cost—as railway

men now argue. In this particular case, an enormous train-shed roof so near the Capitol would dwarf the dome of the most notable building in Washington and mar the beauty of the city. The type of shed adopted is a development of the ordinary platform shelter shed, which is, however, wide enough partially to overlap the trains and furnish protection from the weather. In a climate as mild as that of Washington it is believed that the shelter shed will offer the most satisfactory solution of the problem.

A number of minor necessities not commonly provided for have been taken care of. An invalids' room is located on the passenger concourse, so as to be immediately accessible from the trains, and is provided with all conveniences. Several mortuary chambers, for the use of people accompanying the remains of relatives and friends, are so located that a hearse or carriage can approach or leave without coming in contact with the public services.

The upper floors contain a number of offices for the usual operating force of railway employees, and in addition include reading and card rooms, library and baths for the use of trainmen, besides quarters for a railway branch of the Y. M. C. A. There are bunk rooms for 100 men, and the policy of the terminal company will be to induce as many employees as possible to live at the station. To this end, everything possible will be done for their comfort.

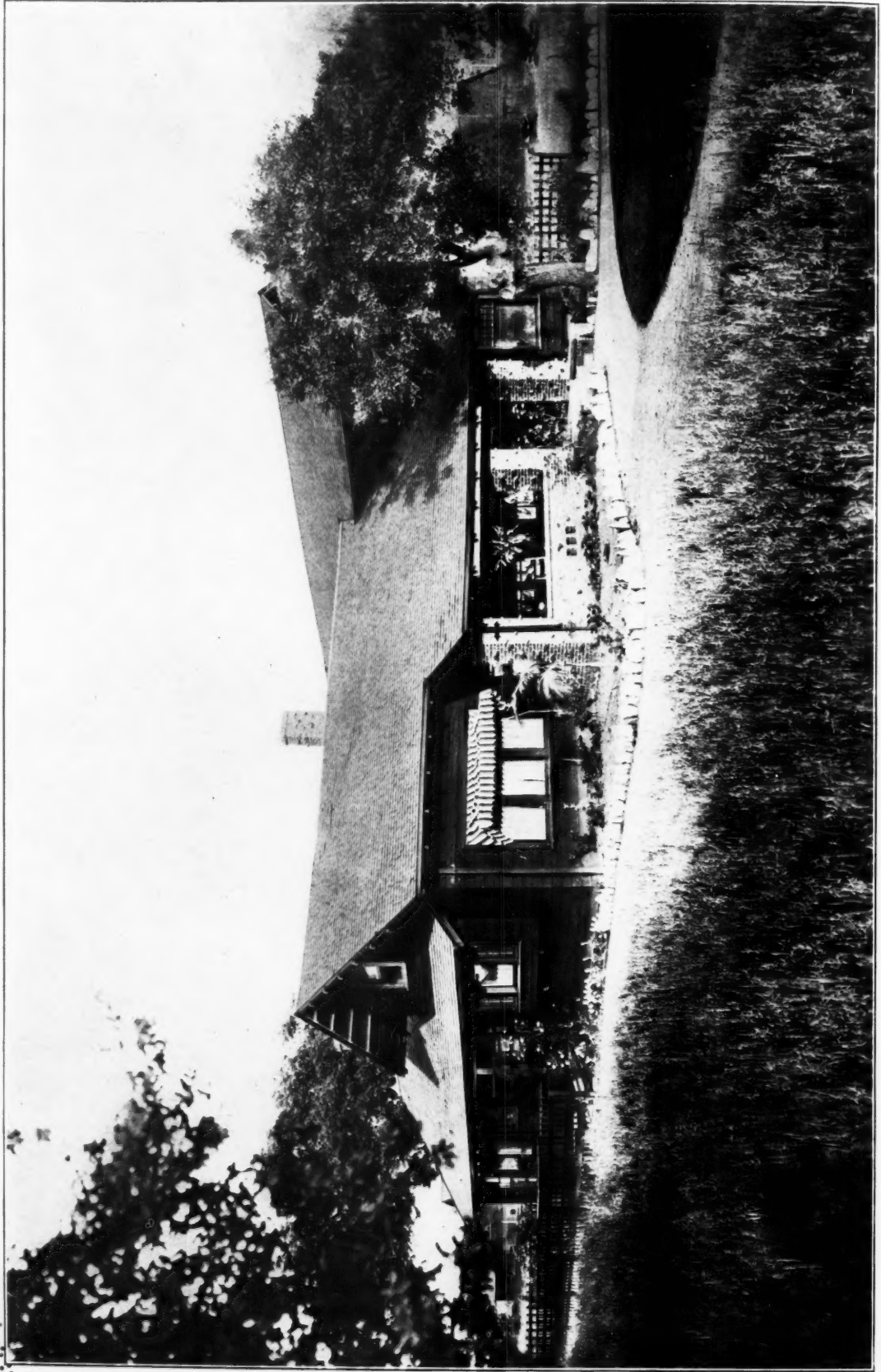
The railway approach to the station from the north is along the present Baltimore & Ohio right of way, down Delaware avenue on a masonry viaduct over all cross streets inside city limits. From the present Pennsylvania Railroad tracks south of the Capitol, the approach to the station is through a tunnel passing under Capitol Hill; First street northeast and the new plaza, and finally into the station on the lower level. The tunnel passes between the Capitol and the Congressional Library, about 56 feet below the summit of Capitol Hill.

The cost of the entire improvements will figure about \$18,000,000, of which the expense of the station proper was \$6,000,000. The government gives \$3,000,000 as its contribution toward the expense of abolishing grade crossings, and in addition, shares with the District of Columbia the cost of building the new plaza and establishing the new streets, for which work the estimates amount to \$1,600,000.

The station thus completed will leave nothing to be desired in the architecture and accessories.

"Modern Architecture," Herr Otto Wagner, Architect K. K. Overbaurath, professor of fine arts at the K. K. Academy at Vienna, Austria, corresponding member of the Royal Institute of British Architects, speaks very deprecatingly of the detrimental effect of the smoke, soot and dust nuisance on the facades of modern cities of Europe and suggests as a remedy the use of simple forms and smooth surfaces, the use of mosaics, porcelain, majolica, and other vitrified materials, which remedies, he says, have lately been successfully used. The "Architects and Builders Magazine of New York" (October, 1903), contains a very interesting article by Mr. Russell Sturgis, A. M., Ph. D., entitled "Modern Architecture in Europe," which is accompanied by an illustration of the front of a business house, in Vienna, Austria, by Max Fabiani, Architect.

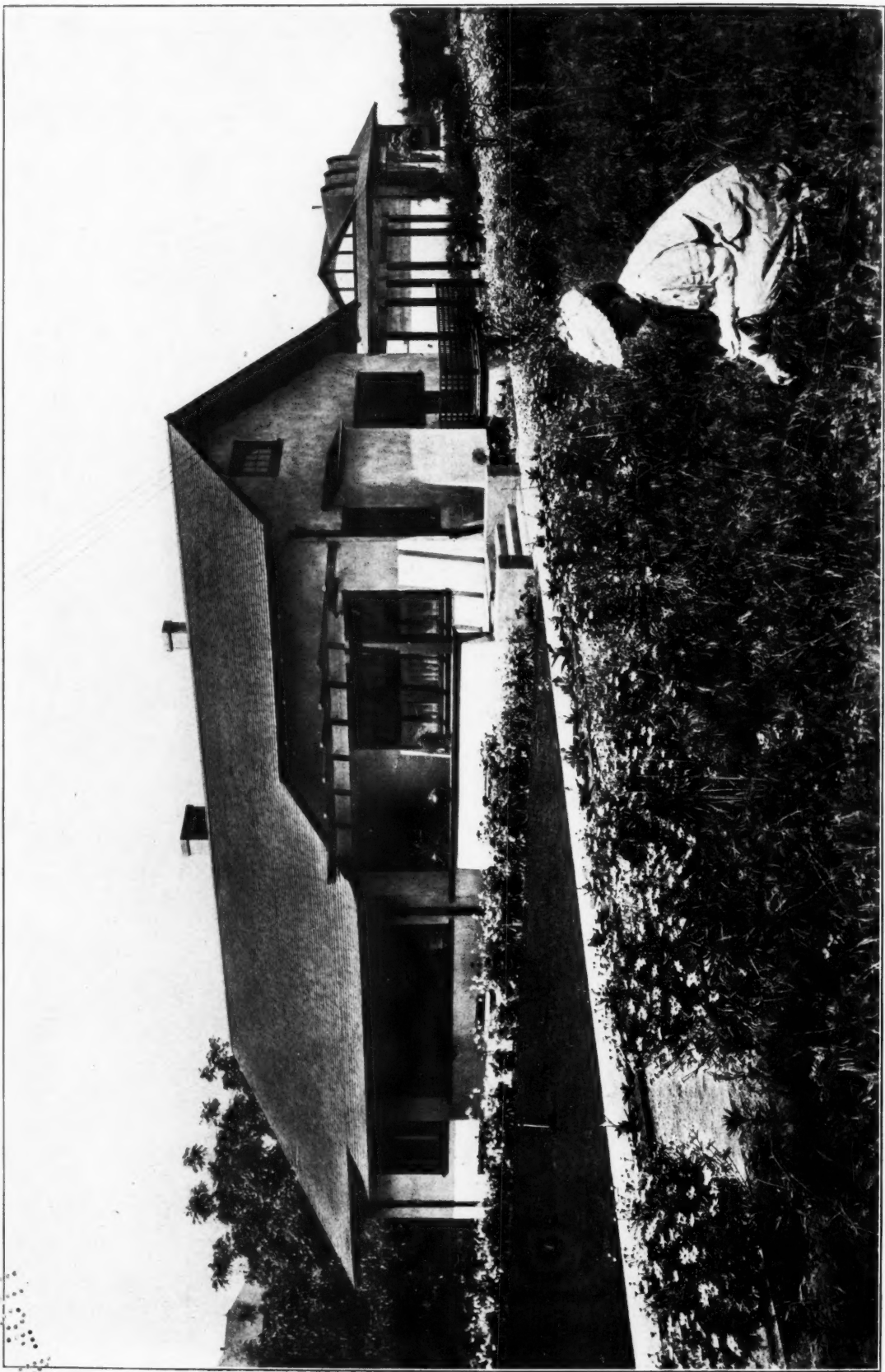
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Lester S. Moore, Architect

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BUNGALOW AND STUDIO OF FRANZ A. BISCHOFF, PASADENA, CAL.
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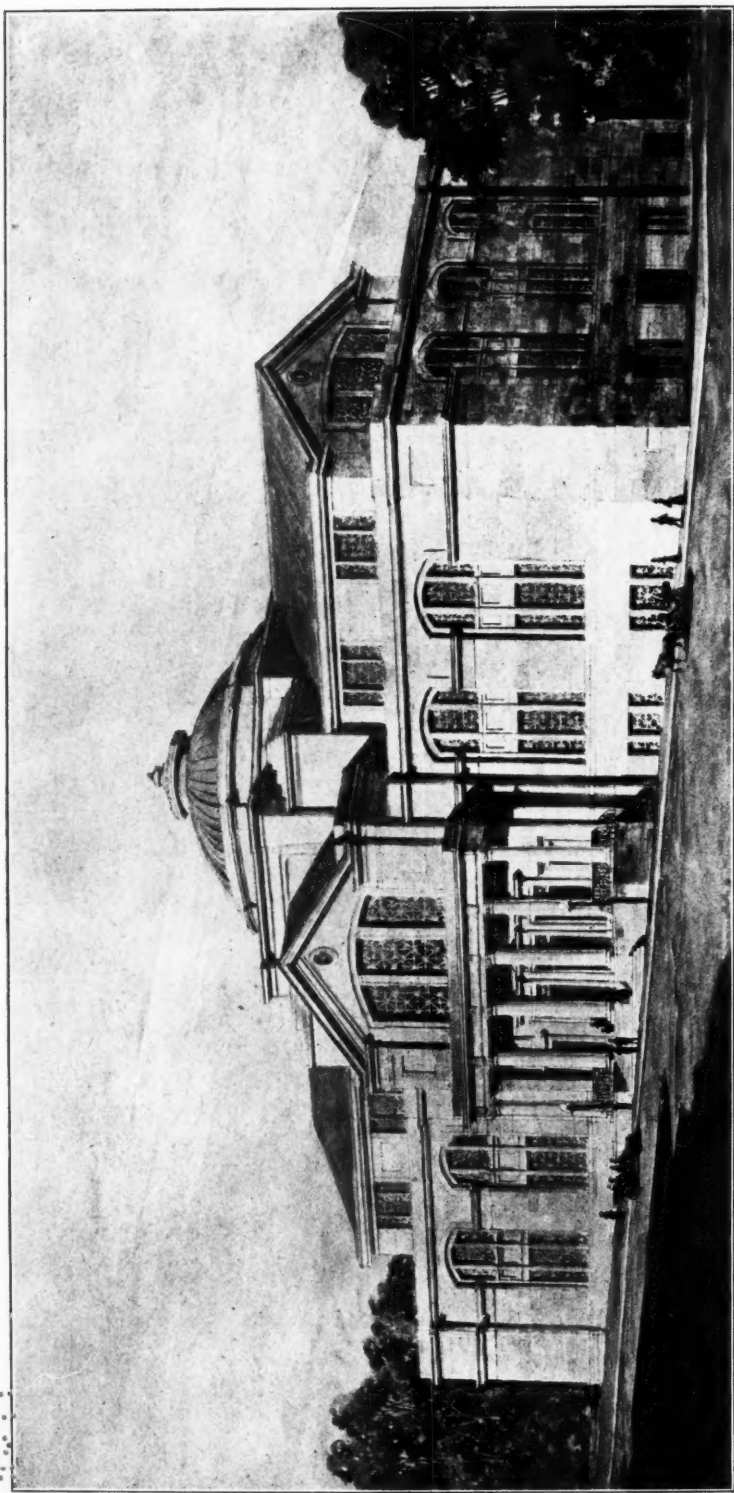
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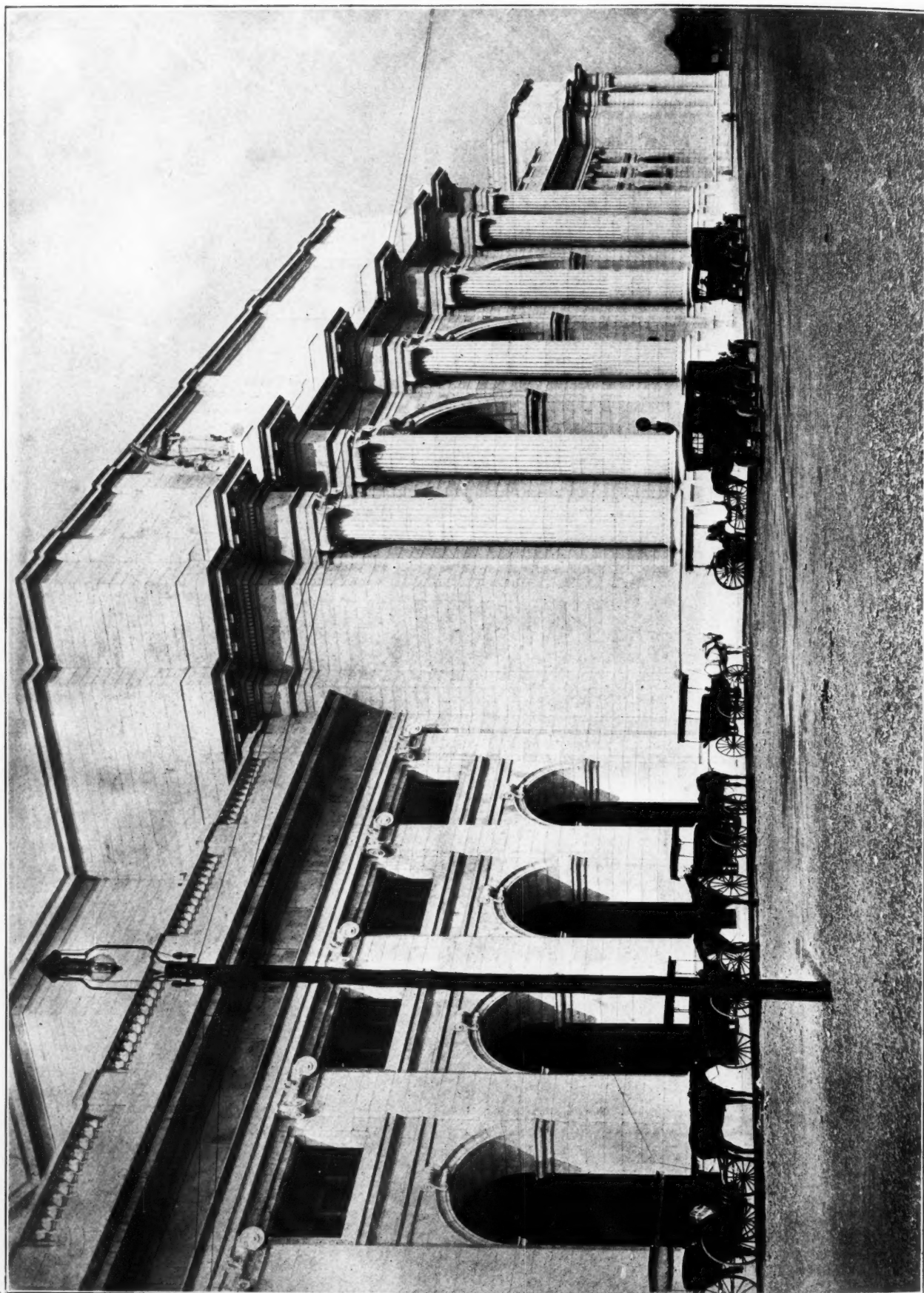
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FIRST CHURCH OF CHRIST, SCIENTIST, PORTLAND, OREGON
Solon S. Beman, Architect, Chicago

THE INLAND ARCHITECT
AND NEWS RECORD
AUGUST, 1908

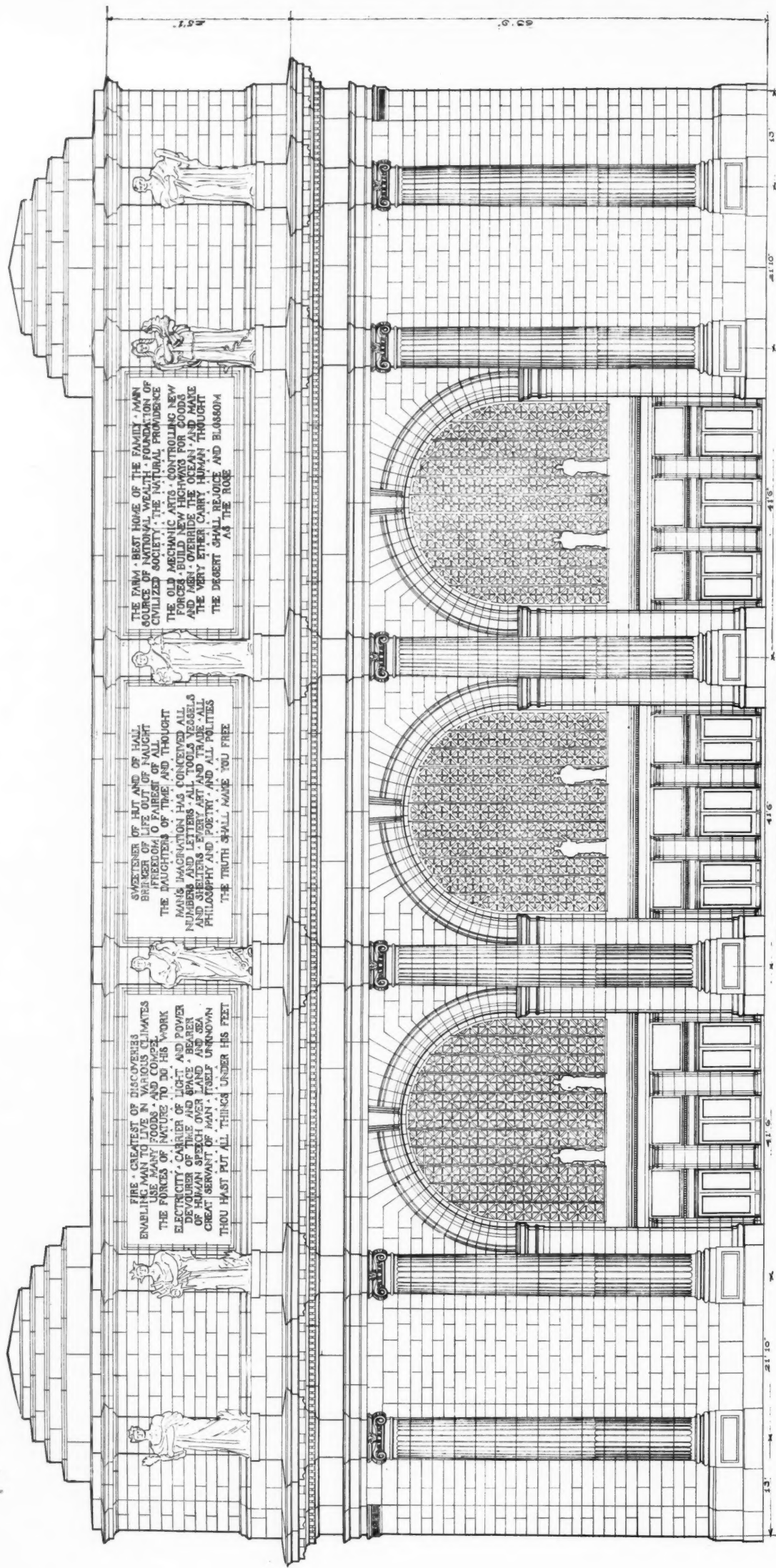
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THE MAIN FRONT. UNION STATION. WASHINGTON, D. C.
D. H. Burnham & Co., Architects

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CENTRAL PAVILION --- SOUTH ELEVATION

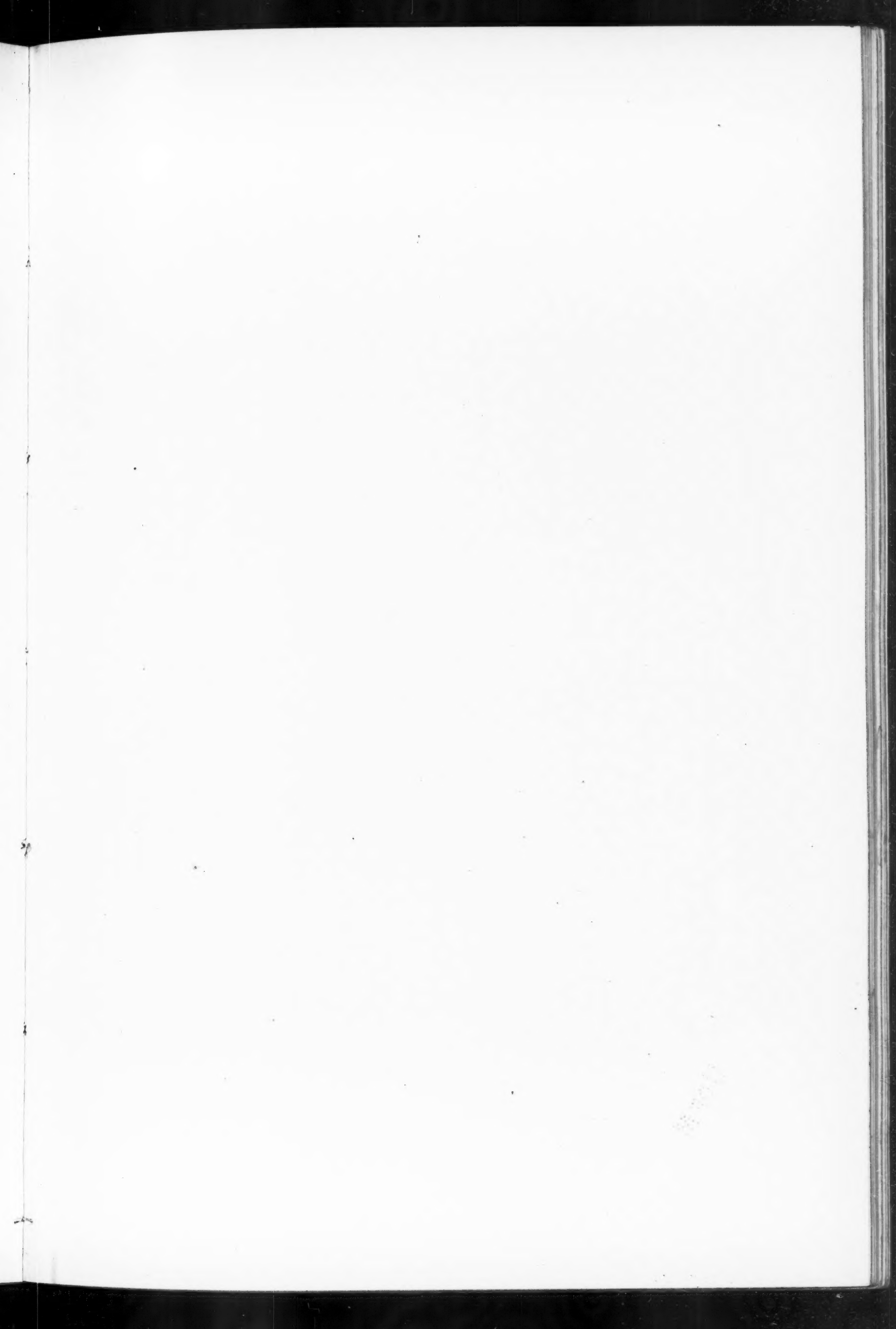
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D. H. Burnham & Co., Architects

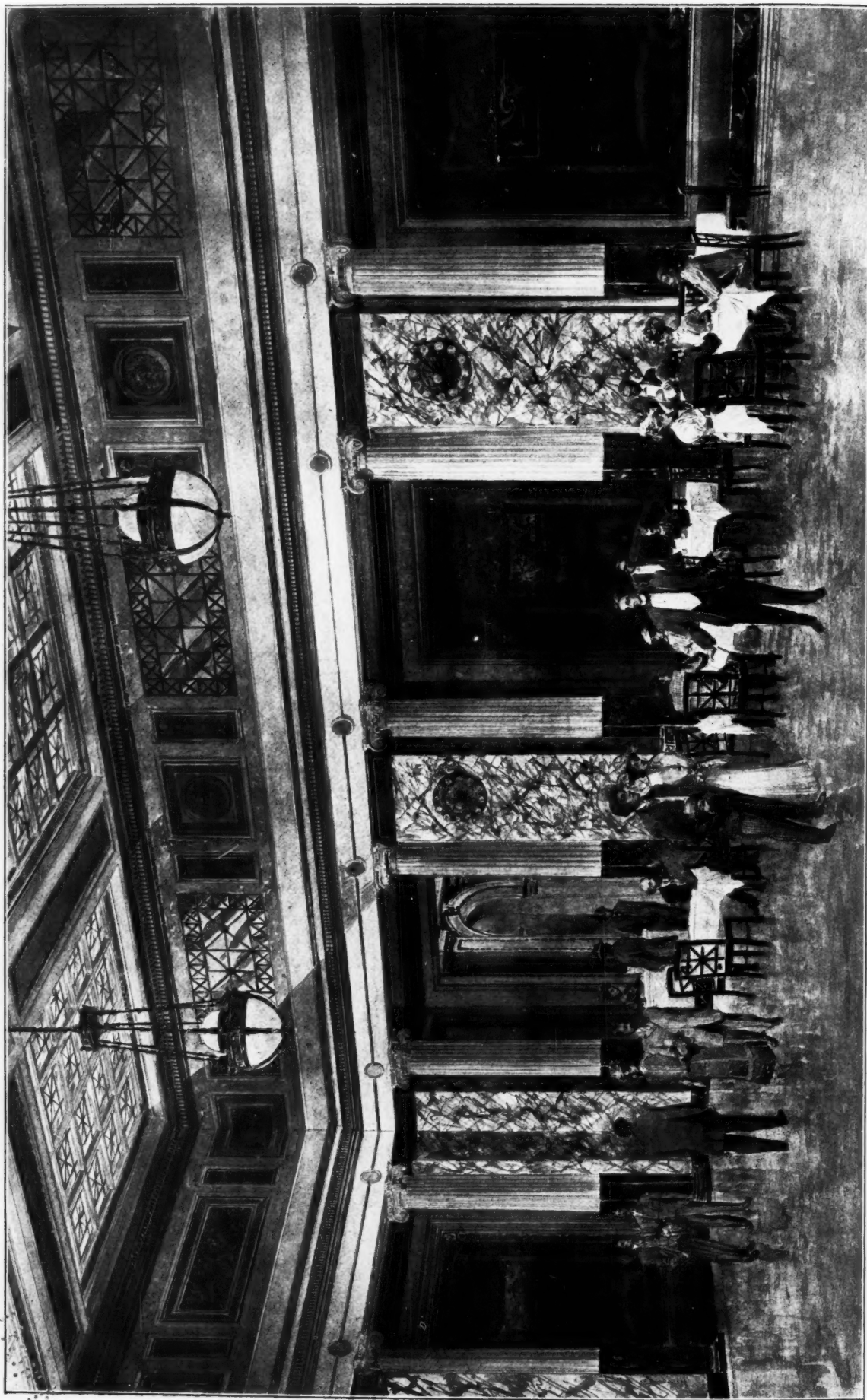
THE INLAND ARCHITECT
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AUGUST, 1908



GENERAL WAITING ROOM, UNION STATION, WASHINGTON, D. C.
D. H. Burnham & Co., Architects.

THE INLAND ARCHITECT
AND NEWS RECORD
AUGUST 1908

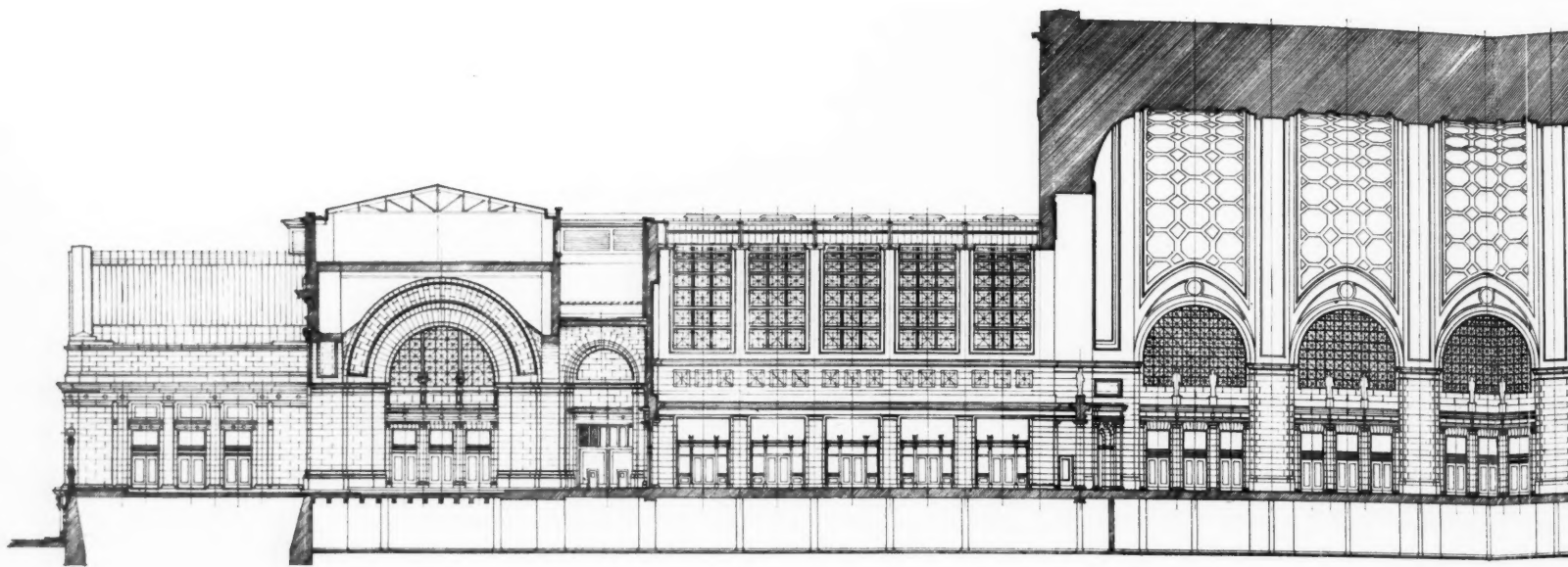




IN THE DINING ROOM, UNION STATION, WASHINGTON, D. C.

D. H. Burnham & Co., Architects

Color Decorations of this and all Principal Rooms by Joseph F. Stuedy, Chicago



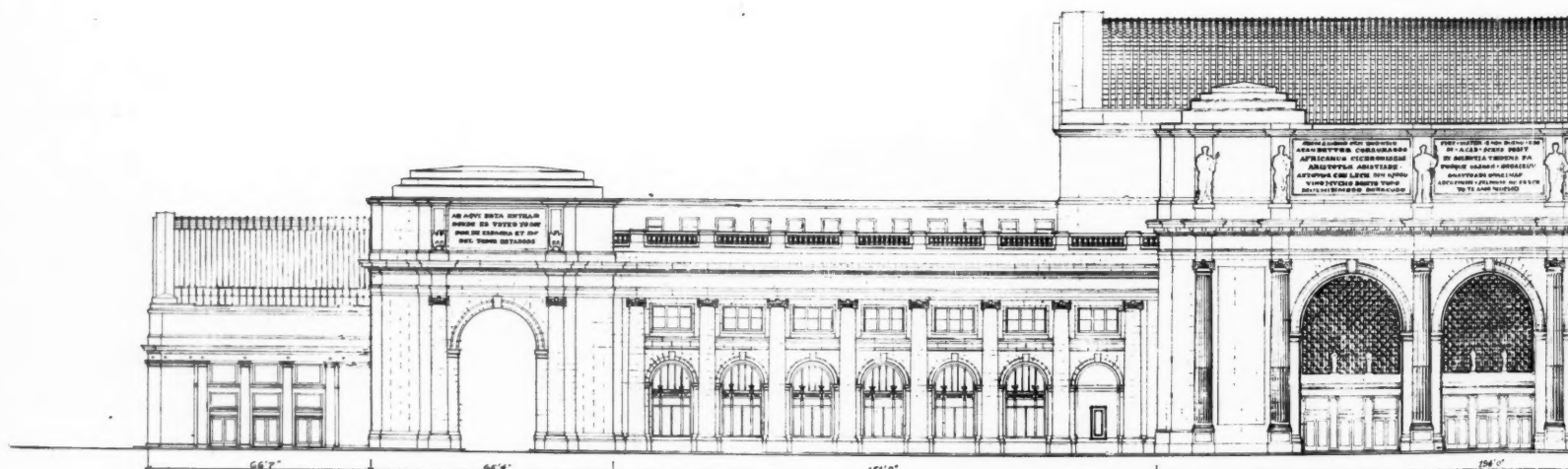
CARRIAGE PORCH

MAIN WAITING ROOM

LONGITUDINAL SECTION LO
UNION STATION
WASHINGTON, D.C.

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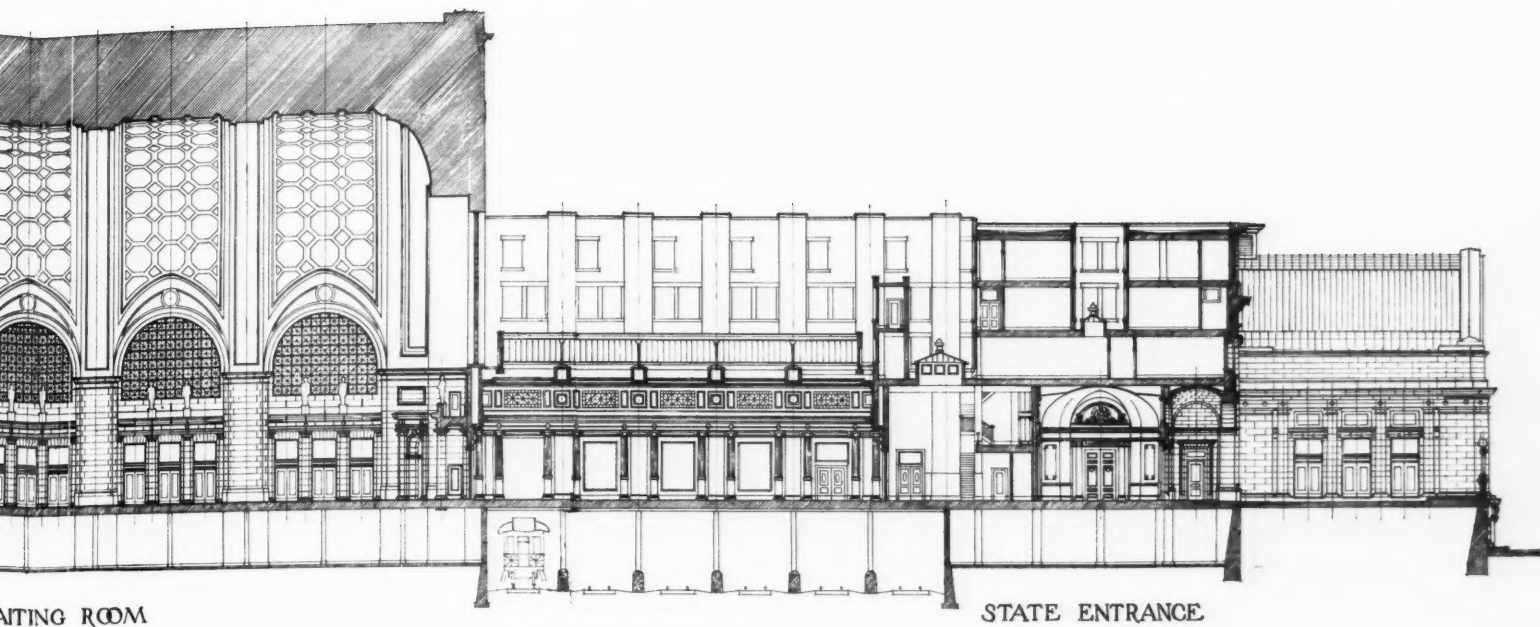


CARRIAGE PORCH

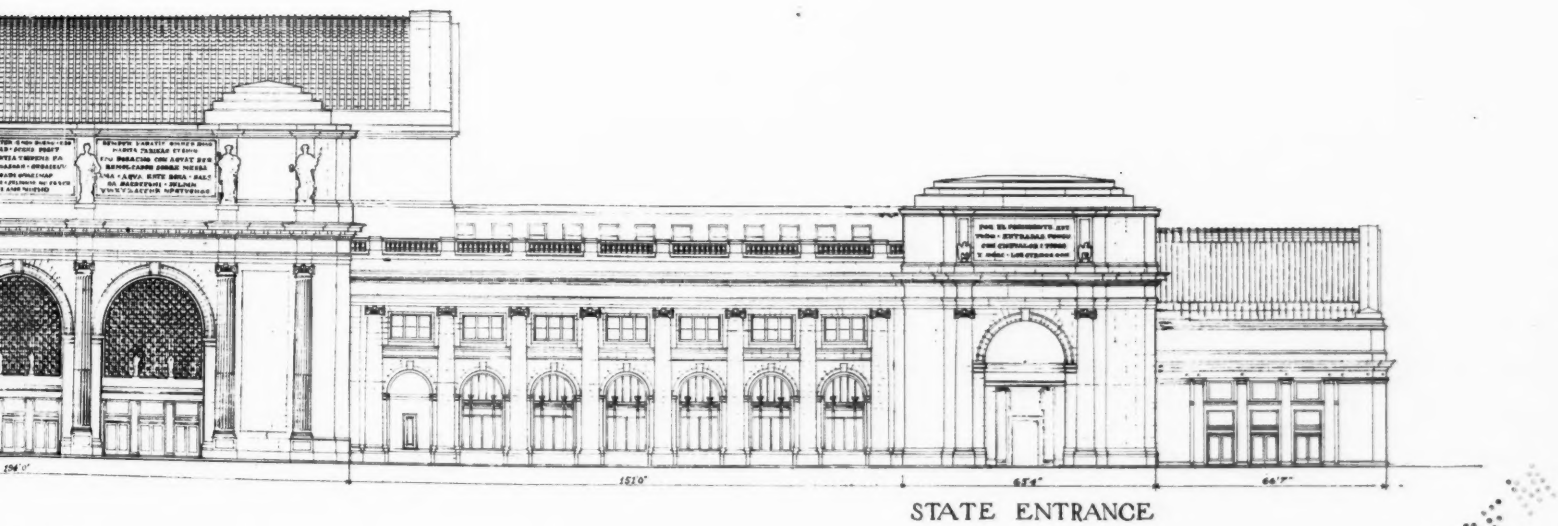
SOUTH ELEVATION
UNION STATION
WASHINGTON, D.C.

SCALE
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D.H.



SECTION LOOKING NORTH
STATION
 WASHINGTON, D. C.
 D. H. BURNHAM & CO.
 ARCHITECTS.



ELEVATION
STATION
 WASHINGTON, D. C.
 D. H. BURNHAM & CO.,
 ARCHITECTS.

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IN THE STATE SUITE, UNION STATION, WASHINGTON, D. C.
D. H. Burnham & Co., Architects

THE INLAND ARCHITECT
AND NEWS RECORD
AUGUST, 1908

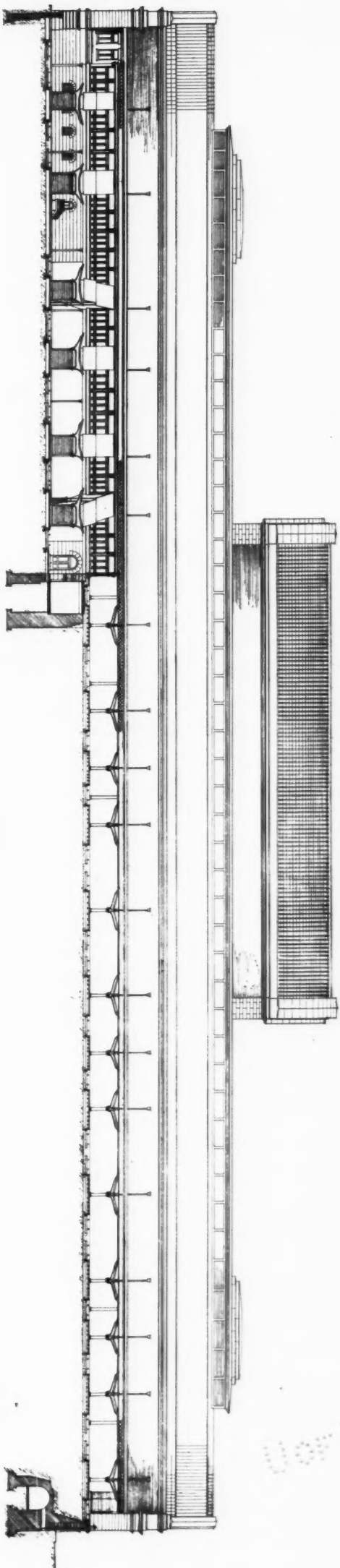
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VISTA IN ENTRANCE PORTICO, UNION STATION, WASHINGTON, D. C.
D. H. Burnham & Co., Architects.

THE INLAND ARCHITECT
AND NEWS RECORD
AUGUST, 1908

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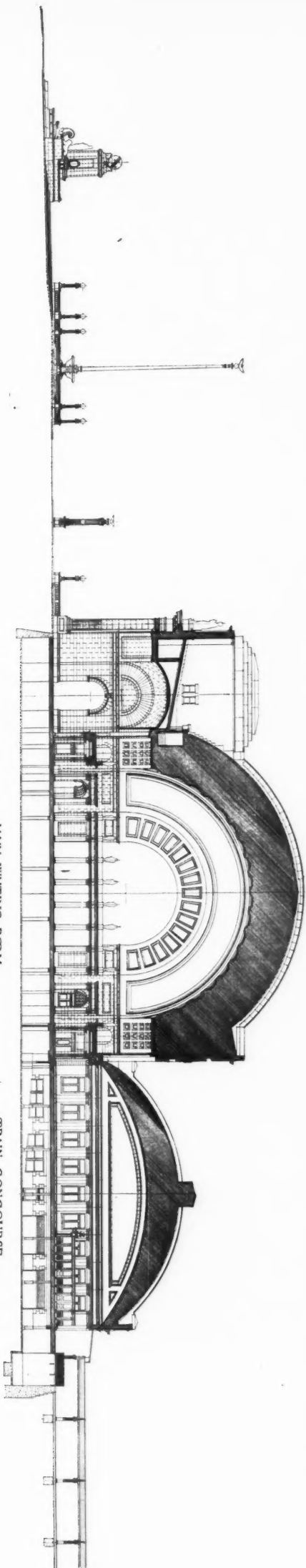


ELEVATION OF TRAIN CONCOURSE LOOKING SOUTH

UNION STATION

WASHINGTON, D. C.

D. H. BURNHAM & CO.
ARCHITECTS.



MAIN WAITING ROOM

SECTION ON MAIN AXIS
LOOKING TOWARD TICKET LOBBY & CARRIAGE PORCH

UNION STATION

WASHINGTON, D. C.

D. H. BURNHAM & CO.
ARCHITECTS.



TRAIN CONCOURSE

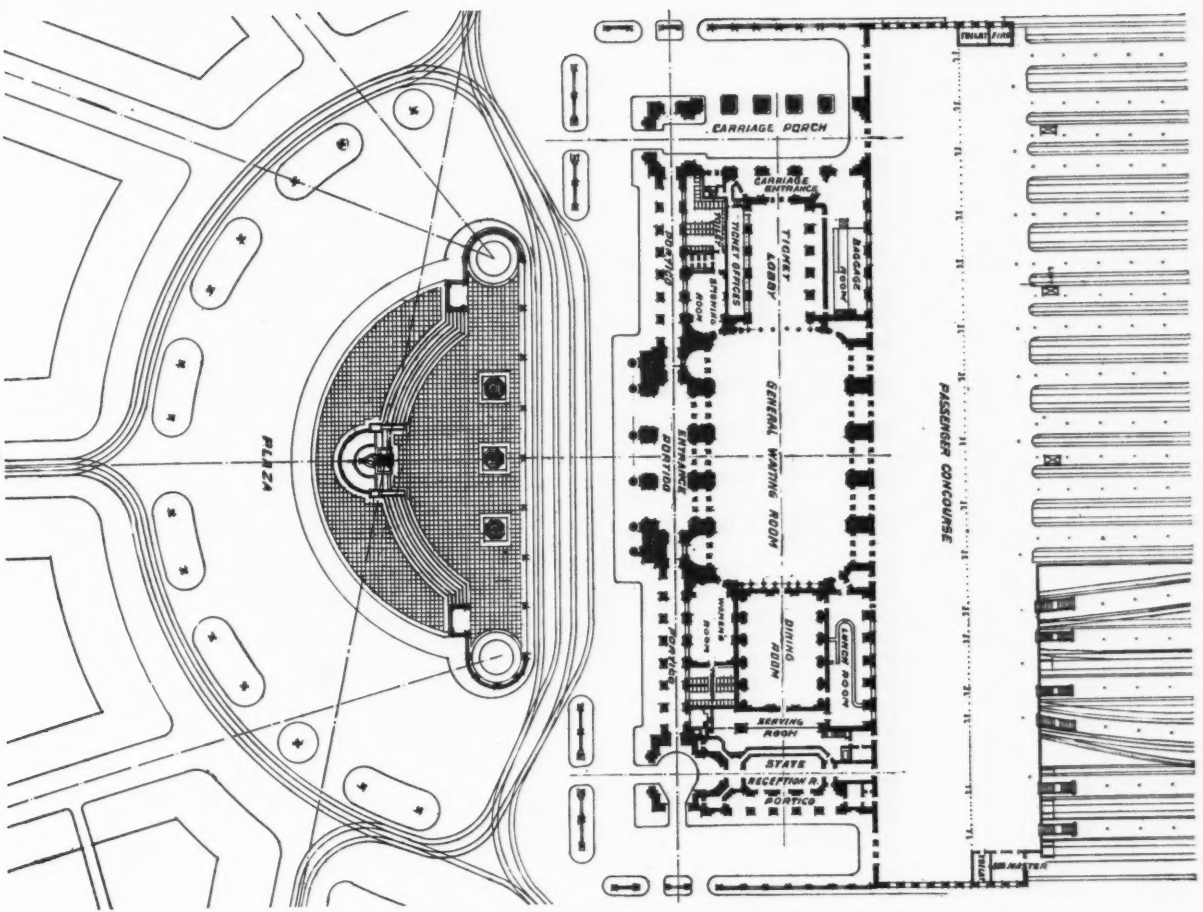
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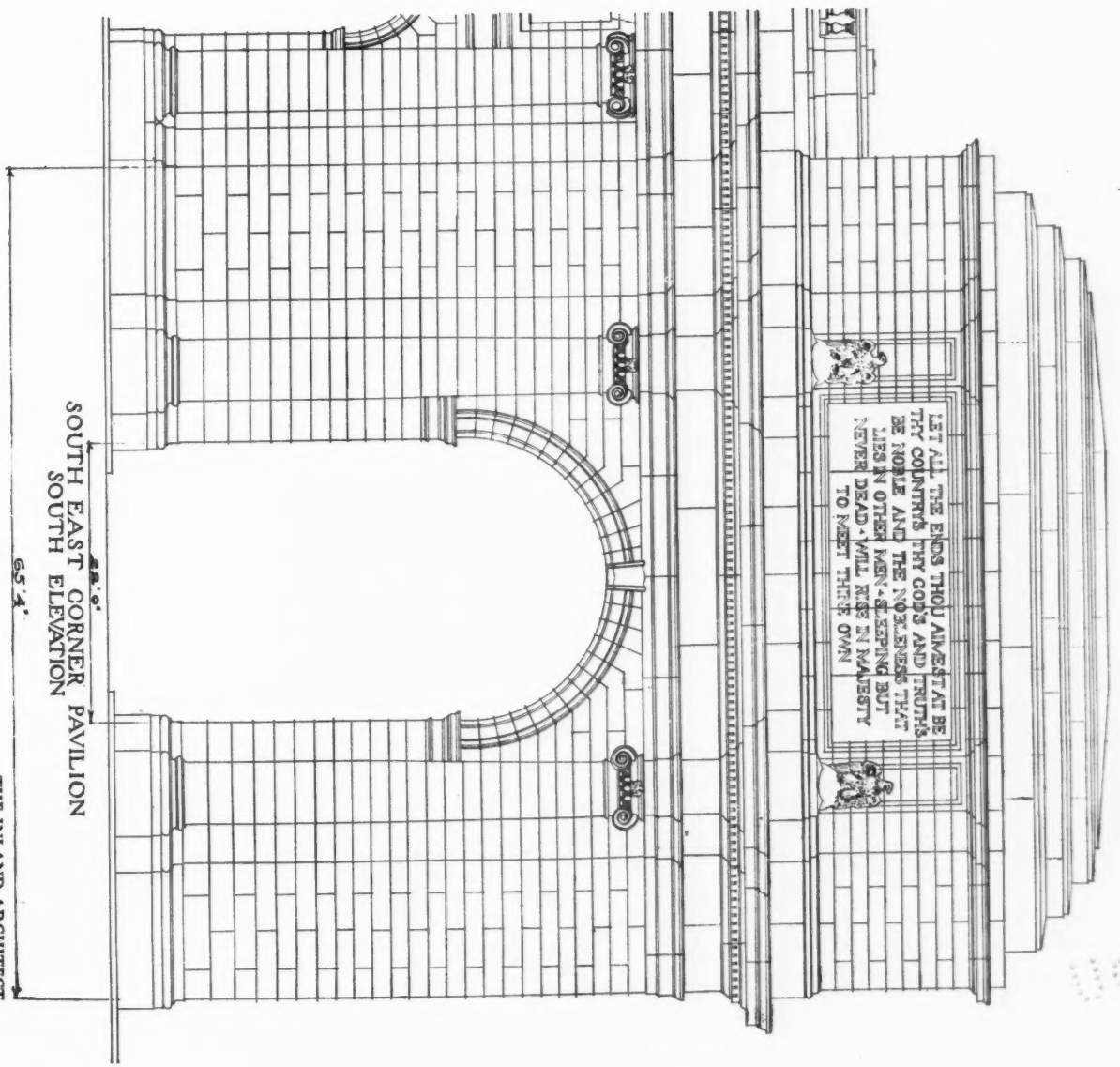
IN THE CONCOURSE, UNION STATION, WASHINGTON, D. C.
D. H. Burnham & Co., Architects

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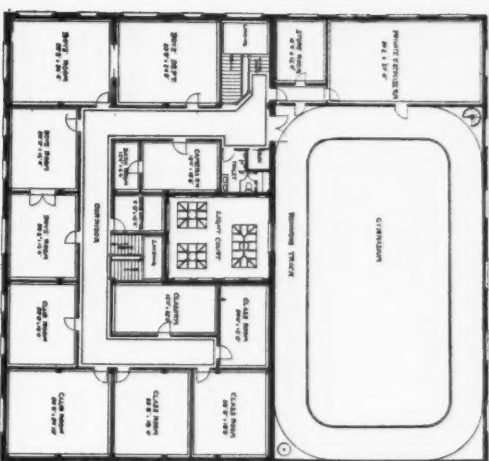


UNION STATION, WASHINGTON, D. C.
D. H. Burnham & Co., Architects

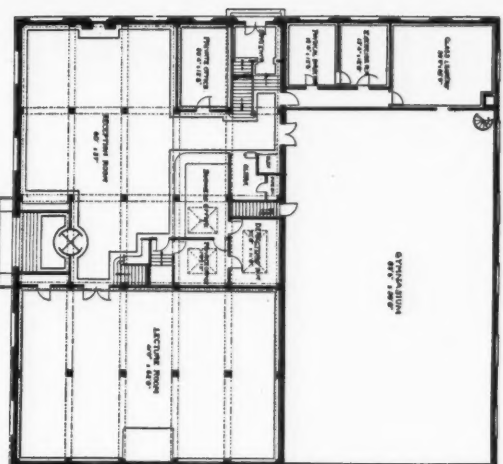


THE INLAND ARCHITECT
AND NEWS RECORD
AUGUST, 1908

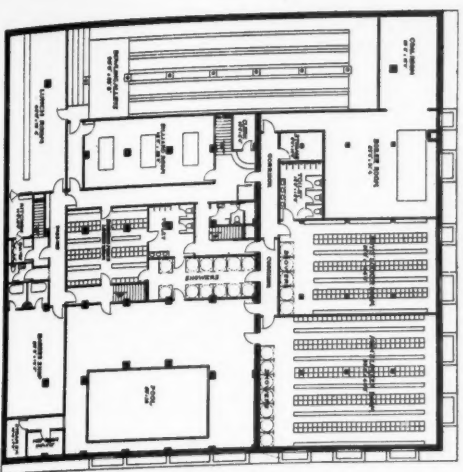
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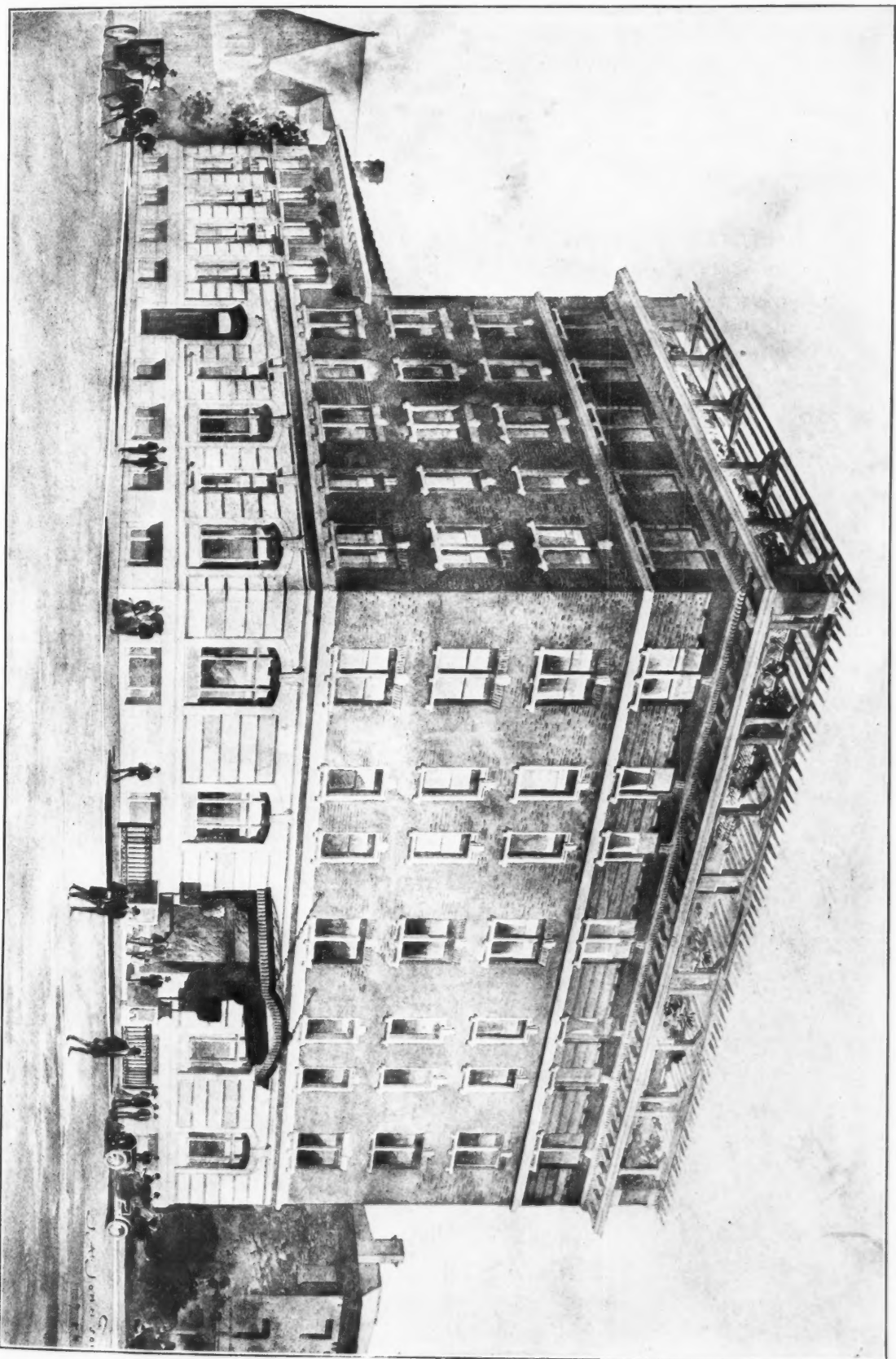
SECOND FLOOR PLAN



FIRST STORY PLAN



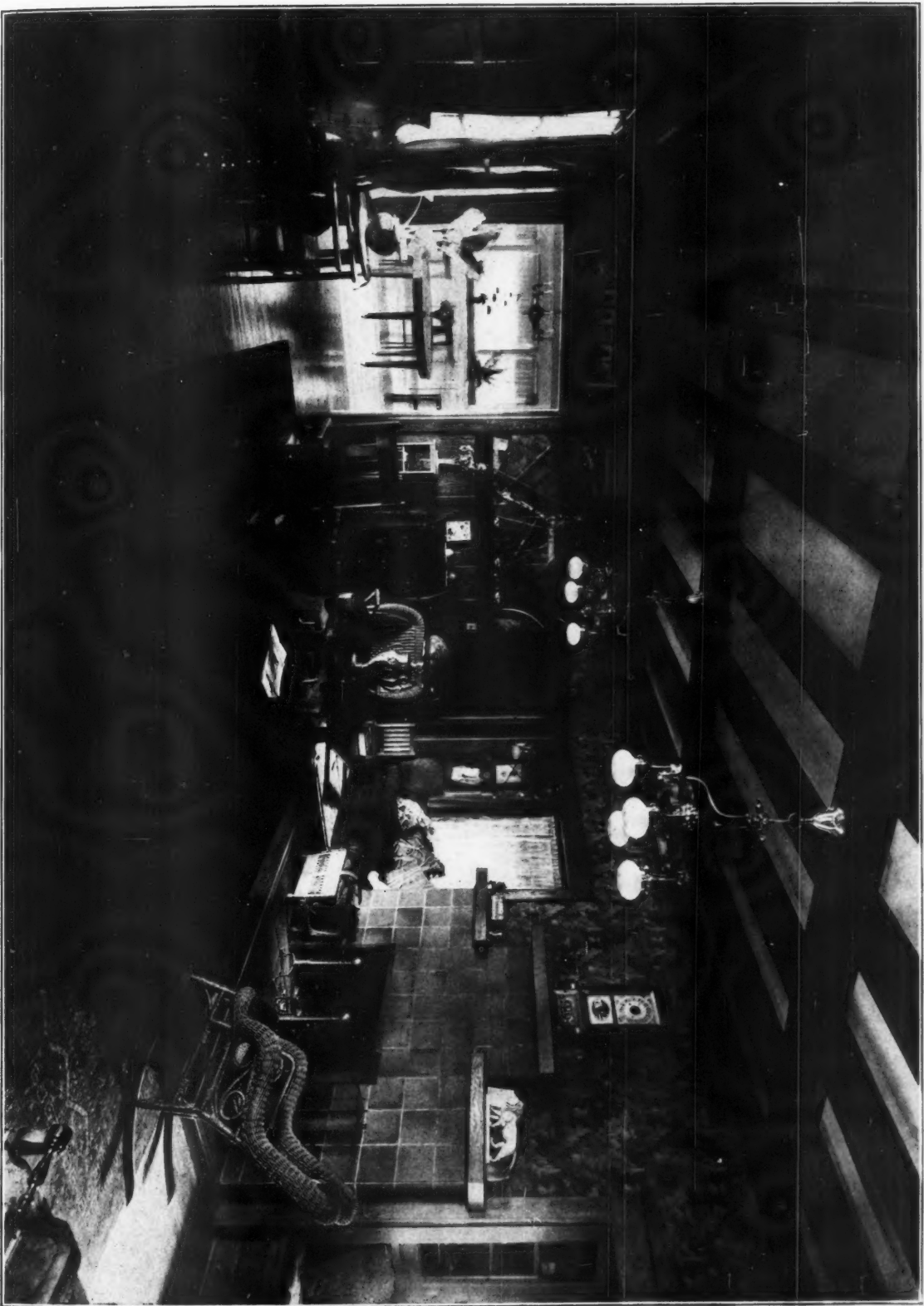
BASKETBALL PLAYERS



Y. M. C. A. BUILDING, HAMILTON, OHIO
F. G. Mueller, Architect

THE INLAND ARCHITECT
AND NEWS RECORD
AUGUST, 1908

202



LIVING ROOM, RESIDENCE OF MRS. JENNIE A. HOBART, PASADENA, CAL.
Lester S. Moore, Architect

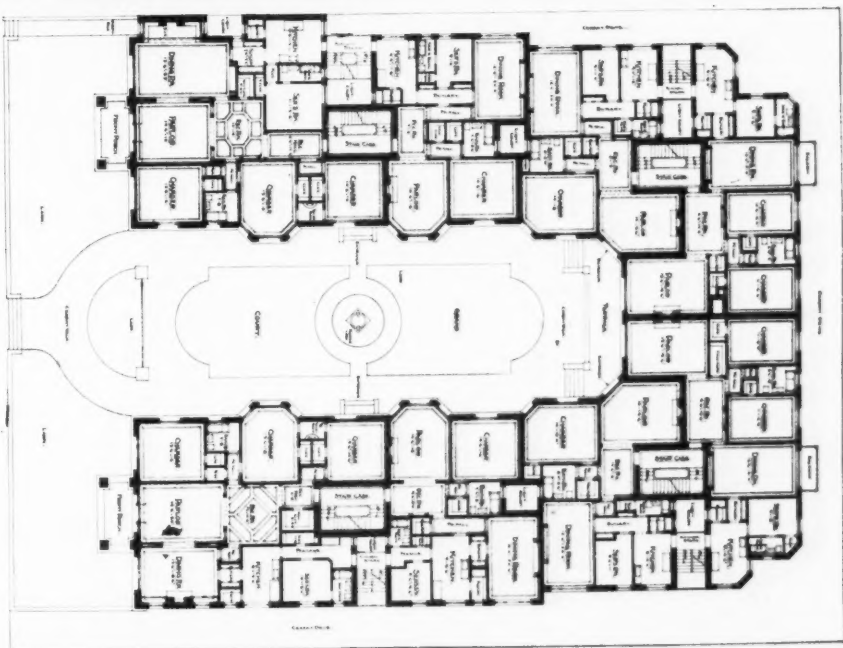
THE INLAND ARCHITECT
AND NEWS RECORD
AUGUST, 1908

200



APARTMENT BUILDING FOR C. A. CARLSON, CHICAGO
Andrew Sandgren, Architect

THE INLAND ARCHITECT
AND NEWS RECORD
AUGUST, 1908



CHAS. F. CARLSON

TOTAL FLOOR PLAN

ANDREW SANDGREN

100



PATIO, BUNGALOW OF MRS. JENNIE A. HOBART, PASADENA, CAL.
Lester S. Moore, Architect

THE INLAND ARCHITECT
AND NEWS RECORD,
AUGUST, 1908

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THE ORGAN ARCHITECTURALLY CONSIDERED

BY GEORGE ASHDOWN AUDSLEY, LL. D., ARCHITECT



IN providing for the reception of the organ, the architect must construct an absolutely rigid and strong floor on which the instrument can be safely erected. The flooring boards should be not less than two inches thick, securely spiked to the joists. It must not be forgotten that a large organ weighs many tons.

Finally, with respect to the position of the console, it is obviously desirable that it should be located at a distance from the organ; and when the organ is used with the orchestra the console should be as close as possible to, and in full view of the Conductor. This is now a simple matter, as the console can be made movable, and connected with the organ by the usual electric cable.

Not only is it desirable, and indeed necessary that the architect should become acquainted with essential matters connected with the construction of the organ to enable him to provide for the proper placing and accommodation of the instrument in his churches and other buildings, but also to give him confidence and freedom in the designing of the external case-work. The extreme poverty of design in this latter direction, in a large proportion of organ-cases—if cases they can be called—in the churches of this country, is surely a reflection on the taste and skill of the architects of America. It must be said, however, that in a great number of instances the architect has neglected his opportunity, and left the organ entirely to the tender mercies of the organ builder. Too often case-work of an artistic character is entirely dispensed with, and the abortion is produced which consists of a piece of flat-framed and paneled work, surmounted by a row of sham pipes, vulgarly painted, and innocent of any apparent support. Nothing more absolutely a negation of artistic propriety could well be conceived, yet architects, in their neglect of the organ, allow such objectionable things to mar their buildings, apparently without protest. We speak plainly, for the time has come for plain speaking in matters of art, and organ art in particular.

As we have said in part elsewhere, different opinions obtain among those who have given the subject of the organ-case consideration: some advocating a close-fitting and properly-ornamented case, extending to as great a height as the nature and locality of the instrument will permit; and others maintaining that little if any case-work should be introduced above the level of the Great Organ wind-chest; only standards with more or less ornamental staybars or pipe-rails of wood or iron being placed where necessary to support (or appear to support) the displayed pipe-work. There is much to be said in favor of the former treatment, which may be called the architect's method, and which is amply supported by the early practice in all the organ-building countries. It imparts great dignity and beauty to the exterior of the organ—correct design being understood—and protects its interior to a considerable extent from dust and extreme and sudden atmospheric changes. All the great organs, old and modern, in Europe are cased in this manner; notably those in St. Bavon's Haarlem; the Aegidien-Kirche, Lübeck, the Church of St. John, Bois le Duc, the church at Stralsund; the cathedrals of Seville and Tarragona, West-

minster Abbey, in all the large churches and cathedrals in France and in the concert rooms in England.

The latter treatment above alluded to may, on the other hand, be designated the modern organ builder's style. It is much less expensive, and demands consummate designing (which it too rarely gets) before even a seemly result can be attained. In this treatment nothing is carried above the displayed pipes, which stand completely exposed. The only position in which such a treatment can be pardoned is when the organ front is confined within an arched opening of moderate height, but even there, some attempt should be made to relieve the dead monotony of the pipe-work. If the front can be advanced a short distance from the opening, there can be no difficulty in treating the case in a truly artistic and seemly manner, and that without any serious expense.

When the organ is to stand in an open space, as on an end gallery, it is desirable to protect its internal mechanism and pipe-work to as great an extent as practicable by case-work throughout its entire height, and it unquestionably gains much in appearance by this treatment, providing that the visible portion of the case-work is artistically disposed in conjunction with the displayed pipes, and otherwise tastefully and correctly designed. It is obvious that when the organ occupies a more or less confined place, such as a chamber or deep recess, less case-work is required, and the architect, in designing the screen or front, must be careful to provide ample openings for the free egress of sound. Standards bearing between them graceful tracery-work or carved pipe-shades (so commonly found in old organ-cases) and inclosing symmetrical arrangements of slender pipes, will always meet the conditions and produce a satisfactory design. In such a design, the introduction of flats of large pipes should be studiously avoided. These usually characterize organ builders' essays in case designing. Large pipes should in all instances be sparingly used, and then only in towers and other salient features.

It is much to be regretted that so few old Gothic cases have been preserved to our day, for, judging by the other specimens of mediaeval woodwork that have been spared, they would have furnished valuable suggestions to the ecclesiastical architect and designer of church organs. The few mediaeval cases which have survived the ruthless hands of the religious fanatic and natural decay are so full of valuable teaching that one cannot help devoutly wishing that more had been spared for our edification. The organ-cases of the Renaissance, many fine examples of which remain on the Continent of Europe, furnish, notwithstanding their many meretricious and undesirable features, some valuable suggestions to the designer of today, and should be carefully studied by him.

"Periodically almost the feeling of impatient dissatisfaction with modern conditions of architectural design takes shape in new attempts to use self-colored material in external architecture and to abandon the now meaningless plastic design of old-time in favor of a flat pattern mosaic or inlay, which shall give interest to the smooth street fronts of our cities."

MANUFACTURING PLANTS*

BY GEORGE M. BRILL, M. W. S. E. (Concluded)



HE foundations are also more expensive per unit of floor area in one-story construction, for while they would be somewhat lighter than where supporting several stories, there is but little difference in the cost of excavating and the cost of forms does not increase in proportion to the number of stories. The comparison of costs in general would be affected by the loads for which the floors are designed, heavier loads tending toward one-story construction.

Careful study should be given to the heights of stories, and where there are several they may vary to meet the requirements of the operations which take place in them. However, the heights in any case are controlled largely by the unit width of building, the apparatus which will be installed, the methods of transmitting power and the character of the materials passing through the several departments. To minimize the waste of timber the market lengths should fix the exact heights and the size of bays.

In determining the width and deciding upon the general type of buildings to be constructed, as governed by the department requirements, due attention must be given to the resulting size of rooms and the manner in which they can be assembled so as to provide fire walls at logical points and to keep the areas within the specifications of the insurance underwriters.

The convenient location of space for the temporary storage of raw materials and manufactured parts is important in promoting economy in production. Coarse and bulky materials such as lumber, castings, steel, fuel and other stock may well be placed conveniently accessible to the several departments using them. Manufactured parts should be stored as near the path of travel of the goods in process as practicable, but if large numbers of small parts are used, making the unit expense for handling very small, this is not so important.

Basements of the proper construction afford useful space for the storage of a large variety of goods and should be considered favorably in the design of plants where the drainage conditions permit. The length of car floors tend to fix the first floor level of many buildings and incidentally about the same height is convenient for teaming. With the first floor fixed at this level buildings can be constructed with basements for a slight additional cost. To provide against frost, it is necessary to carry foundation walls from three to five feet below the surface of the ground. This depth with the distance up to the first floor added gives nearly the requisite height for the basement. Therefore, such space can generally be obtained for the expense of removing the soil and increasing the depth of the foundations. Dark basements are objectionable, often serve for the accumulation of rubbish and waste and are productive of fires through carelessness and negligence. With basements constructed so that nearly half their height is above the ground there is ample opportunity to obtain good natural light and good drainage can be provided at less expense because of the decreased depth. Space can therefore be provided which, being both light and dry, is well suited for the storage of goods of almost any character, easily accessible and consequently desirable and convenient

for use. While it may not be practicable, on account of the character and location of the operations, to store all heavy materials and parts in basements, the support which can naturally be provided for them should have some influence in arranging the departments at the time of making the preliminary study. Basements generally afford convenient space for carrying heating pipes, suitable provisions for which are often difficult or awkward to make when the first floor is on or just above the ground. Again many kinds of machinery which might naturally be placed on the first floor can be conveniently driven from below and thereby eliminate much of the transmission, with its objectionable features, from the working space.

Considering the types of buildings to be adopted there are two which fully meet modern requirements—"fire-proof" and "mill" or "slow-burning." The former, as implied by its name, contains little or nothing in its construction of a combustible nature and is limited to structures of monolithic concrete and those with brick walls, with or without protected steel frames, and floors and roofs of concrete or tile.

The use of concrete for building purposes generally has not become sufficiently common to permit of a true and conservative comparison with buildings of better known construction. While concrete buildings for a specific purpose may have thus far cost more than those of first-class mill construction, it is probable that with more general experience on the part of builders, and therefore improved methods and facilities and the natural competition which will follow, these conditions may materially change. It would appear at this time that with no local market influences affecting the cost of materials commonly used in building construction concrete may be used to advantage where the floor loads exceed 200 pounds per square foot. The reason for this tendency is apparent, for a considerable percentage of the cost of concrete construction is due to the cost of the necessary forms and the expense of handling them, which is but little greater for thick walls and floors than for thin ones.

There is a wide difference of opinion about the relative adaptability of concrete and the better-known materials to buildings for manufacturing purposes. Where large bays are desirable concrete construction should attract favor, for with given floor loads fewer columns are required than where the floors are constructed of wood.

The method used for transmitting power and the character of the transmission machinery, the facilities required for attaching the machinery to the floors and the necessity for changing its location, would have a bearing on the use of concrete for manufacturing buildings. With electrical transmission and the use of motors coupled or belted to the machines or to the shafts driving groups of machines, it is seldom necessary to run belts through the floors and to provide openings for that purpose. With some classes of machinery it is desirable to drive from the under side by a shaft or motor located in the story below. Usually, however, where openings through floors are necessary for belts it is in connection with mechanical trans-

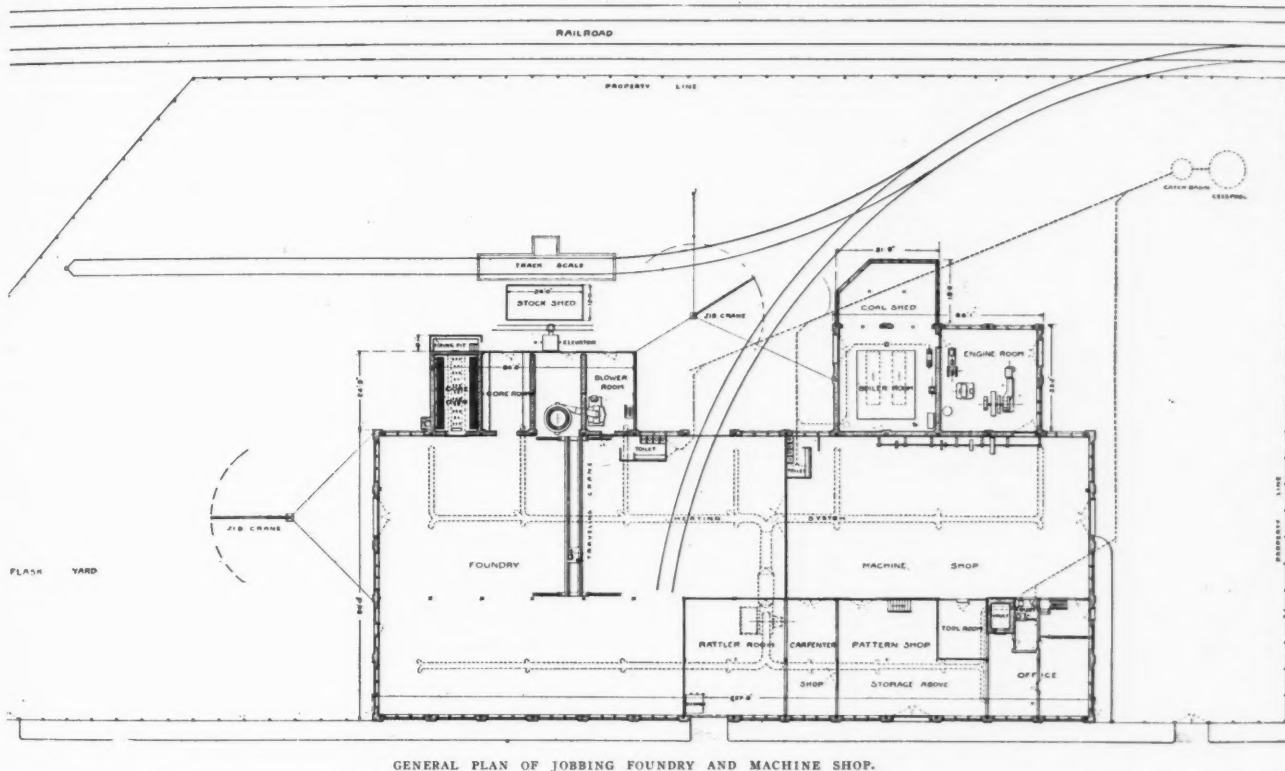
*Read before the Western Society of Engineers, March 4, 1908, and printed in the journal of the society.

mission, where the main lines of shafting are driven by heavy belts running from floor to floor. It may be possible to anticipate the location of all openings necessary for this purpose, but in the actual construction and operation of plants many conditions arise which necessitate changes in the location of apparatus and the means for operating it. Openings also have to be provided in the original construction or made later through floors and walls for pipes, drains, wiring conduits, conveyors, etc., the location of the greater portion of which can best be determined as the plans develop and the several features of the plant are executed in logical order. It is hardly to be expected that the location of all openings can be determined before or during the building construction, in fact, it would be impracticable to either anticipate all of them or to so handle the transmission, piping and wiring as to make them fit a pre-arranged set of conditions. Such openings wherever made tend to destroy the fireproof feature which forms an

support certain loads, especially where they are heavy.

Buildings constructed with self-supporting steel frames; brick, tile or concrete walls; tile, concrete or wooden floors and roofs are most suitable for certain classes of work and under some conditions and they approximate fireproof construction. Such buildings are especially adapted to the conditions generally found in shops, foundries and power plants, where large and unobstructed floor areas are requisite and traveling cranes are essential.

The "mill" or "slow-burning" type of buildings, though constructed to a large extent of combustible materials, is so designed and arranged that it is difficult for a fire to gain rapid headway. Buildings of this character are usually enclosed with self-supporting brick walls with columns, floors and roofs of wood. The columns and beams should have large cross sections with wide undivided spaces between them. The roofs and floors should be of plank, the former covered with a suitable roofing and the latter



GENERAL PLAN OF JOBBING FOUNDRY AND MACHINE SHOP.

essential consideration in the use of concrete buildings. Wood or steel strips can be placed in the floors for receiving lag screws or bolts to hold the machines in place. In a similar way shafting can be supported from ceilings, but to carry out these arrangements effectively the requirements must be known at the time of construction in order to suitably provide for them. If changes in location afterward become necessary, further provisions will have to be made. If all the requirements can be predetermined, the installation might be made with little or no inconvenience, but in practice the most carefully prepared plans are seldom carried out in all their details and those provisions which seem suitable and adequate are often subject to radical revision.

Comparing good mill construction with concrete, the former is much more adaptable to the various conditions and changing requirements in buildings used for manufacturing purposes. Concrete construction is admirably adapted for warehouses, where it is simply a matter of providing a given amount of space and floors which will

with a wearing surface of maple. The connections at the columns and the bearings in the walls should be so designed that the beams will be free to fall without causing the whole structure to give way. With the large spaces between beams, small pockets are avoided and fires which they would harbor are prevented because all parts are accessible to water from sprinkler heads or hose.

Buildings of mill construction have been found to be admirably suited to a large variety of manufacturing operations. With ordinary floor loads the construction can be such that bays of good size may be formed, large window openings provided and good light obtained, machinery readily fastened to and suspended from the floors and openings through floors easily made as required. Buildings of this type lend themselves so well to many manufacturing operations that changes can be made in the location of the equipment and departments or even other similar lines of manufacture substituted without materially impairing their usefulness.

Where stone or gravel is plentiful, concrete has come

to be recognized as the most suitable material for foundations. This has been brought about to a large extent by the increased supply of Portland cement and the greater cost of skilled labor necessary for the proper construction of stone foundations. With a small percentage of skilled labor, concrete foundations can be put in place rapidly and economically. It is to be expected that manufacturing plants will seldom be located where pile foundations are necessary. These cases are generally limited to locations adjacent to water, to made ground and where quicksand is encountered. In deciding upon the values to be used and the size of the footings for walls and columns, a thorough study and analysis should be made of the character of the loads to be supported. After providing for the weight of the building and other dead loads, it is not necessary to provide for the total live loads which come upon the several parts and for which they are designed, but the probable average.

By strictly observing the rules and requirements of the underwriters, the worth of the plant is increased. The available water supply for fire protection purposes and adequate and positive means for procuring it in sufficient quantities are primary considerations in plant location as well as in the character of construction.

In locating the buildings, room should be left between them to prevent fire being communicated from one to another, and to afford adequate space in which to safely fight fires which may have gained headway. Buildings used for the manufacture and storage of highly combustible materials should be isolated, so that a fire in one of them will not endanger the plant. Oil houses should have their floors below the yard level in order that in the event of fire the burning oil would be confined to a restricted area.

Where the buildings are close together, or where flues are formed by light shafts and elevator or stair wells, openings in walls should be protected by wire glass which permits light to enter but obstructs the passage of fire. Where the admittance of light is not essential, as between adjacent rooms which are independently lighted, automatic fire doors of wood, tin-clad, or steel should protect the openings. As a further safeguard for openings on the exposed sides of buildings, steel fire shutters are sometimes used. In the majority of such cases, these remain open, except in the event of fire, but should be so arranged that they can be closed automatically or by a fire stream. The matter of protecting all vertical openings is an important one, as a means of preventing the loss of life as well as property, and if effectively done a fire can be confined to the floor upon which it starts and its exact location readily determined. Brick walls are the most efficient for enclosing vertical shafts and should be used wherever possible, although wire glass in steel frames serves well where light is a governing factor.

When the buildings have been properly arranged and constructed, the fire protection equipment should receive due consideration. The three essential elements involved are the supply, distribution and dispensation of the water. Two independent sources of water supply should be provided and any two of the following will answer the purpose—a reservoir in connection with a fire pump, a stand pipe or gravity tank and a city pressure system. A fire pump should always be installed, even if city water under

pressure is available. The reservoir and the standpipe or gravity tank must have capacities governed by the areas of the plant between the fire walls and the standpipe or tank must have such an elevation as to hold the required volume of water at least twenty feet above the highest portion of any building. The capacity and design of the fire pump are also governed by fixed rules of the underwriters, the capacity depending upon the size of the plant. The distribution system, consisting of the piping, valves and hydrants, must be tested and made tight at a pressure of 150 pounds per square inch, but a pressure of 200 pounds is more desirable and is to be recommended. Hydrants and hose should be distributed about the premises in such a manner that, when required, lines can be quickly run to any part of the plant. Valves controlling the sprinkler systems should be equipped with indicator posts and placed at such a distance from the building whose equipment they control as to be accessible if that portion of the plant is on fire.

There are but few cases where sprinkler systems are not to be recommended, these being where neither the building nor its contents are of a combustible nature. The sprinklers must be so arranged that every part of the building can be reached by the water and so designed and constructed that they will act promptly and with certainty. This is true of the whole equipment since the successful prevention and extinguishment of fires is dependent upon the reliability of the apparatus. After providing the plant with the best modern fire preventing and controlling equipment, the owner should go one step further and install an automatic alarm system connecting all parts of the plant with the power house and the public fire department.

The protection of towers and chimneys by use of lightning conductors is not a myth but a reality and should be provided for all such structures. Care must be exercised, however, that the work shall be properly done and well maintained.

The importance of good natural light in manufacturing plants can not be overestimated and seldom does any set of conditions arise which prevent its being obtained. This must be supplemented by good artificial light in and about the buildings and as electricity best meets all requirements, and only introduces an element of danger when improperly installed, it should be the only form adopted in modern plants. Generally a system combining arc and incandescent lights best serves all needs, the arcs to be used for general illumination and the incandescents for detail lighting. A well lighted plant assists the workmen, facilitates the operations, prevents the accumulation of rubbish, decreases the danger from fires, improves the sanitary conditions and promotes general efficiency.

The size of the windows are determined by their height above the floor will be influenced by the methods of heating and the location of work benches. If heating coils or benches extend along the outer walls the windows will be higher from the floor than would be necessary under other circumstances. If heavy shafting is to be hung from the ceiling, provisions should be made in the girder arrangements for the proper placing of hangers. If motors are to be used without heavy shafting, the floor construction may be designed largely without regard to the methods of transmitting power, for if they are hung from the ceiling their locations will be at irregular intervals and

any extra provision for supporting them will necessarily have to be made to meet each requirement. The details of the floor construction and support should be governed not only by the weights which come upon the floors, but the character of the loads. If there are a large number of small machine tools they can be satisfactorily distributed in almost any manner, which the needs of the business indicate, without any especial supporting construction. Where the machines are large or impose severe shocks or vibrations upon the supports, especial provisions should be made for them in the building construction, if they can not be placed on the ground floors where suitable foundations can be provided. A large amount of such apparatus might influence the general character of the buildings.

The requirements for heating and methods to be adopted should be considered co-incident with the study of the general design and arrangement of the buildings and a decision reached as to the type of equipment best suited to the conditions. If the heating is done by direct radiation, precautionary provisions in the plans may be unnecessary; but if fan systems are used care must be exercised that the distributing ducts will not interfere with any of the other apparatus to be installed. The use of exhaust steam distributed through coils about the several departments forms one of the systems commonly used for factory heating, but it makes no provision for positive ventilation.

If the nature of the work is such that the employees will be crowded together or if the processes are such that noxious gases, dust, lint or other objectionable materials will be produced, it becomes necessary to provide frequent changes of the air. Where the opposite conditions prevail, little ventilation may be necessary. The heating and ventilating may be combined by using an indirect or blower system by which positive ventilation is provided. Where such systems are used and part of the air supply is taken from inside the buildings, it is essential that it be taken from those departments or rooms where the air is free from objectionable elements.

In almost all manufacturing plants there is some use for exhaust steam aside from heating the buildings, such as dry kilns, the heating of water for various purposes, enameling and japanning ovens, evaporating and distilling. These requirements and their location combined with the method selected for heating the buildings may go far towards determining the type of apparatus in and fixing the location of the power plant. The manner of transmitting power, whether electrical or mechanical, will modify the power plant location and equipment. It should be reasonably near the main plant and so placed that it will not interfere with the manufacturing, shipping or storage operations and as far as practicable not obstruct logical extensions which may be made to the more important buildings.

Adequate and suitable toilet accommodations should be provided throughout every manufacturing plant and if the buildings are of considerable size, it may be well to place closets on all the floors and in locations conveniently accessible without being obtrusive, and so arranged as not to obstruct the manufacturing operations or use valuable space. Lavatories may be placed on each floor, or perhaps still better, assembled in conjunction with a locker-room. Space convenient of access for employees entering and leaving the plant, may well be set aside for lockers where clothing, lunch baskets, etc., superfluous in the plant, can be

safely left and cared for. In many cases this has been found more satisfactory than corresponding conveniences distributed about the plant. To be considered modern, plants should be provided with a lunch-room and some concerns have found it expedient to furnish soup and coffee free, leaving the employees to provide the balance of the meal, while others have served a few well cooked foods practically at cost. The class of help, location of plant, in relation to centers of residence, and the outside facilities for procuring suitable refreshments may best indicate the provisions which should be made and will be appreciated. Self-cleansing drinking fountains, located about the plant, is a sanitary provision amply justified. Usually there need be no real waste incidental to their use; for the overflow can readily be used in the power plant, for flushing or for other purposes where water is required. Baths, especially showers, have been appreciated where installed. The lunch-room or dining-room may be so planned as to be easily convertible into a place for entertainment. Rooms suitable for club purposes and rest-rooms for girls are some times desirable adjuncts. Plants of any magnitude and especially those wherein the operations are hazardous should have something in the way of a hospital, with suitable accessories, where emergency cases can be treated. These matters, which in general may be classed under welfare, contribute much to the comfort of the employees and such tendency invariably should and generally does improve the character of the service rendered. While selfish considerations ought not to control in adopting provisions for betterment along these lines, a reasonable investment, properly made, should bring good returns. Of course the nature and extent of the welfare features depend largely upon the character of the work, the degree of skill required and consequently the class of people employed, but everything which tends towards better working conditions raises the standard of labor, improves the workmanship, increases the efficiency of the workmen and decreases the cost of production.

A small percentage of the total investment can be spent to good advantage in beautifying the grounds and providing attractive surroundings. The effect of this will be felt not only by those employed, but, in connection with a plant suitably designed, will serve as a good advertisement and be considered indicative of good products.

In conclusion it may be said that in all cases compromises in the arrangement and design of the buildings for a site should be avoided as fully as possible. The designer to thoroughly fulfill his obligations, must keep in mind all the conditions imposed by the manufacturing operations; recognize all building ordinances which may pertain to the undertaking; observe all reasonable requirements imposed by the insurance underwriters; give consideration to simplicity and with keen perception bring together all the elements which contribute to the success and integrity of the enterprise. By following these methods he should make every plant fully meet the requirements and therefore result in the highest efficiency of production.

A person building a house where there is gas in, has always insisted upon having the gas. That necessitated the fixture manufacturers putting the iron pipe to the ceiling for the gas. One feature in planning the lighting system should be kept in mind. Architects should insist upon their clients providing enough outlets.

IDEAL SYSTEM OF INDUSTRIAL EDUCATION (Concluded)

BY CHARLES H. MORSE, Secretary and Executive Officer, Massachusetts Commission of Industrial Education



WHAT I have in mind is a school where the foundations of the trade can be laid for him better than they can be laid at the bench in the shop. By means of such school training, the boy, by the time he reaches 16, will be able to specialize in the school for two years more, and he will go out with a much greater earning capacity, as well as a better citizen. The money spent in thus educating boys will be well invested in that it will have produced highly skilled mechanics, which are very much needed in our country, but more important, we will have developed a citizen who will be a credit to this great country.

If today you had a son and you wanted him to learn the whole of an industry, it would be necessary for him to start at the bottom and work up to the top of the position of foreman in one department. He would then have to resign his position as head of that department and go to another department and start at the foot and work up through it. This would have to be repeated perhaps half a dozen times, or even a dozen times, that he might learn all of the processes. It would in many cases take ten or fifteen years for the man to accomplish all this. The boy as a rule cannot afford to do it, and our industries today are suffering because of the difficulty of finding the all around trained man to take the supervisory positions. In this country a large per cent of the foremen in the manufacturing departments are foreign born and foreign educated, and the American boy is put at the machine and kept there because he hasn't the opportunity to get the all around training and skill. Schools should be provided which will develop men who will be a credit to any organization with which they choose to affiliate themselves; men who will inevitably raise wages, and not pull them down; men who will be welcomed by organizations of fellow workmen.

In addition to the development of the schools which I have outlined, it is the duty of the state and the community to provide for the men who are in the trade, so that these men may have an opportunity to learn in the evening schools that which they have not had an opportunity to learn in the shops. Nor must we neglect the rural sections. Agricultural schools of industry must be established that the boy on the farm may have an opportunity to understand all kinds of farm machinery and scientific farming, and today this question is being actively considered in Massachusetts.

I want to call your attention to the fact that the industrial schools of Europe are making a special effort to fit the boys for the industry of their own locality, and are apparently doing the work well. We saw last summer a technical school in Liverpool, England, providing for many industries. Liverpool is one of the largest commercial and shipping centers in Europe. As you might expect, there is a day school there which gives the seamen when they are on shore for a few weeks an opportunity to study navigation, that they may learn to become captains and mates, engineers and assistant engineers. There are, of course, other lines of industry taught in this school, but I mention this course only as indicating a special line of study for their day school. Their evening

school—the building is used largely for evening purposes—is filled with hundreds of men who are engaged in the day time in all lines of industry.

Going from Liverpool to Manchester, a great textile center, you would expect to find there a vocational school having for its main object the development of men for that particular industry, and such is the case—a technical school, corresponding in the day time to a very high grade manual training or low grade school of technology, with only 125 day pupils, but which at night has 5,000 men anxious to increase their efficiency in the industries, taking up all kinds of textile work as well as other lines of manufacture relating largely to the textile industry.

In Paris there are in operation two fine schools, devoted to the development of machinists, where several hundred boys are in attendance—a type of school which takes the boy at 14 and turns him out at 18 a young man well up in the theory and practice of his chosen occupation; not skilled to the same extent as the skilled mechanic who has had years of experience, and judgment, but it turns out a young man who becomes a thoroughly skilled mechanic in a shorter time than if he had worked only in the shop. He understands the theory of his trade; and he understands the use of the machines; he lacks, of course, in some particulars judgment and he lacks in a degree manipulative skill and rapidity of action, but in other respects he is a superior workman.

France leads the other countries in artistic printing. I visited their printing school in Paris, where the boy is educated, and there are about 300 in attendance. The boy enters at 14 years of age and graduates at 18. He learns all parts of the printing trade.

I will not go into all of the other lines taken up by the boy, but as you would expect, there is a thorough knowledge of spelling and language required, everything which can be taught to that boy to make him the best possible kind of a proofreader and printer, with the result that Paris is the most advanced center of the printing industry of Europe.

Going across to Geneva, we found a condition which was most interesting. In Switzerland it is illegal for the boy to be apprenticed to any master until that master will agree to send him a certain number of hours per week in the daytime to a vocational school, a school where he will have an opportunity to learn the theory of the trade as well as the practice. Furthermore, it is the duty of the state's inspectors to see that that boy in the shop is securing instruction in the whole of his trade. He is not permitted to go alone; he is not given over to a master alone. The boy is interviewed by the state inspector twice a year, who finds out how long the boy has been kept on each particular process of that trade. At the end of his apprenticeship he is examined and if successful is awarded a diploma. In Switzerland in all of those great mountains there is not a pound of coal, not a pound of iron. All the raw material which is used in Switzerland in her manufacturing establishments is brought in, and the finished product is shipped out. She is becoming more and more a manufacturing country in consequence of her system of industrial education.

They have two types of schools which are especially interesting in Geneva. They have a school of horology, where they teach the making and assembling of a watch. In the Geneva school the boy makes the whole of the watch, every part by hand.

In another school the manufacture of instruments of precision was taught. What is the result of such training, and how did it show itself in Switzerland only a few years ago? One-half the people of Geneva were engaged in the manufacture of music boxes. Edison invented the phonograph, and the manufacture of music boxes suddenly stopped because music boxes were not wanted in the home where the phonographs had taken their places. Now, if we had been manufacturing music boxes in this country, and had the men trained so that each man would have known one particular part, he would not have known the other parts of their manufacture. Not so in Switzerland. Every man knew every part; he was an all round skilled mechanic; the industry was killed in a day, and almost the next day they commenced the manufacture of motor bicycles; the men went right on with their work, there was no depression, because the men were trained mechanics, and not specialists.

Going up into Germany we went to Munich, where they have those continuation schools which we have heard so much about. Here was a school for the man who had worked at the bench, who desired an opportunity to prepare himself to become a skilled journeyman; and we also found a school for the journeyman who had learned his trade and now wished to study further, that he might become a superintendent or foreman in his particular industry. We found the manufacturer in many instances giving six months' time to the right man that he might go to school and come back and be of greater use in his factory. Over forty trades are taught in the Munich schools.

We visited Belgium. Now, Belgium has had the reputation for many years of making fine guns, and they had a beautiful school devoted to the teaching of the gun making. The girls' schools in Belgium were among the best we saw in Europe.

So we found, wherever we went, there was the same plan. We found wherever we went an independent industrial school which was adapted to the needs of that particular community. A school which taught the whole of a trade so far as it can be taught in a school. As a rule the schools have full day courses, part time courses and evening courses for men and boys at work during the day.

It is only by adopting, in part at least, the systems of schools now in successful operation in foreign countries that we can get a system adapted to the needs of all.

THE TYPICAL PLAN.

The plan of the building decides the type of floor construction, as it fixes the centers of the beams and girders, and also determines the general architectural subdivisions of the facades.

As the usual system of planning consists of walls following the property lines, and an entirely enclosed light well, or one opening upon one side, the typical floor plan consists of offices arranged around the sides of the building, and around the sides of the light well, with corridors extending between the two sets of exterior and interior offices.

The framing that follows this typical plan consists in beams, usually ranging at right angles with the street fronts, and supported upon girders which follow the line of the corridor partitions, it being convenient to arrange the columns in these partitions, and to use them to hide the girders by encasing these members in the finish of the corridor or office.

In the intelligent planning of the structural framework the designer must have in mind not only the typical, but all, floor plans, and the position of the columns with reference to the partitions and lay-out of each floor must be carefully considered, if troublesome and expensive mistakes are to be avoided.

A GREAT LANDSCAPE AND BUILDING PROJECT.

Consul A. G. Seyfert, writes that the crowning work of the first decade of the twentieth century for Canada will be the completion of the Dominion's second transcontinental railway, and gives the following account of the progress of this enterprise:

From Winnipeg to Edmonton the prairie section of the Grand Trunk Pacific is practically completed. From Edmonton to the coast, a distance of 700 miles, through the mountains, it will take three years more to finish. The work is exceedingly difficult and expensive, much of it being between mountain passes and along the gorges of the Skeena River.

Experience of the past has led the railway company to deal with great care about the future town sites along the new road. The company proposes to control as much as possible, not only the location of the sites for the towns, but also the laying out and building of the future cities. On the prairie section nearly a hundred of these sites have been located, and all but a few on the north side of the railway. The main street of each town is to run at right angles with the track of the main line. All the lots are rectangular blocks. Parallel with the railway and adjoining the depot right of way, a long strip of land 100 feet wide has been reserved by the company at each town site for the purpose of planting trees and shrubs to beautify the town.

The company will also impose building restrictions in all the towns. Along the main street and on the avenues close to the station on a given area no buildings will be allowed to cost less than \$1,000. No shops, livery stables, or other noisy and disagreeable businesses will be allowed near the station. All such will be grouped in one block in a place convenient to the town.

Prince Rupert, the Pacific terminal of the Grand Trunk Pacific, is an island. The town is to be built on the slope of a mountain, whose grade begins a few hundred yards back from the shore line. It is alleged that for a harbor Prince Rupert has no equal on the Pacific coast. It is sheltered; its approaches are easy and free from all impediments of navigation. The harbor is 1 to 1½ miles wide and extends inland a distance of 10 miles. Prince Rupert is the most exclusive place on the coast. People who have no business there are not allowed to land. The future city is not yet ready to receive any one unless he is directly connected with the railway company. The government and the Grand Trunk Pacific own all the water front, and no arrangements are completed for placing any property on the market. It is, however, announced semi-officially that the sale will take place in September next.

The promoters of Prince Rupert expect the town to become a great factor in the Pacific commerce. They predict that in a quarter of a century it will be one of the leading seaports on the Pacific Ocean. Prince Rupert will be a day and a half nearer the Orient than Vancouver, and the steamship concern now allied to the Grand Trunk Railway System has announced that the moment the transcontinental line is completed it is ready to inaugurate a Prince Rupert-Hongkong steamship service across the Pacific.

It is gratifying to observe that such a great financial interest as the railroads is alive to the importance of the adoption in advance of a complete, well considered plan for the development and beautifying of its right of way.

OUR ILLUSTRATIONS.

Y. M. C. A. Building, Hamilton, Ohio, F. G. Mueller, Architect.

Apartment Building for C. A. Carlson, Chicago, A. Sandegren, Architect.

First Church of Christ, Scientist, Portland, Ore., S. S. Beman, Architect, Chicago.

Bungalow of I. Surrier, Pasadena, Cal., Greene & Greene, Architects. Cost, \$5,500.

Buildings for the Millikin University, Decatur, Ill., Patton & Miller, Architects, Chicago.

Bungalow and Studio of the Artist, Franz A. Bischoff, Pasadena, Cal., Lester S. Moore, Architect.

Bungalow of Mrs. J. A. Hobart, Pasadena, Cal., Lester S. Moore Architect—Patio of same—also living room, Lester S. Moore, Architect.

Washington, D. C., Union Station, D. H. Burnham & Co., Architects. Several elevations, sections and photographic views are shown. Detailed description may be found in another column.

NEW PUBLICATIONS.

REINFORCED CONCRETE, A MANUAL OF PRACTICE. By Ernest McCullough, C. E., Cement Era Publishing Co., Chicago, 1908.

This work is written for men not technically educated, by a highly educated engineer. The author has personally erected many of the buildings he has designed. His conclusions are based on broad practical experience. Nearly all the matter is original, and not compiled. The author tells "how to do" things. Statements are reliable and in clear language. The book was prepared to meet the demand for a working manual, full of practical helps and with as little as possible of theoretical discussion. The price of the book is \$1.00, postpaid.

THE WASH METHOD OF HANDLING WATER-COLOR. By Frank Forrest Frederick. 20 pp., 7x10 inches, illustrated in color. The Manual Arts Press, Peoria.

At no time has water-coloring as applied to architectural subjects been so largely practiced in this country as now. In view of this, a work such as this that directs attention to the use of water-colors as handled by such artists as Claude and Turner is most timely. The architectural student who sketches in water-color will find this a helpful pamphlet. The present-day method of handling water-color places the laying of flat washes in a fair way to become a lost art. The introduction of "body color" and a technique simulating a work in oils has robbed water-color of much of its charm. This little book is a helpful guide and affords a stimulus to the use of water-color as practiced by the earlier painters, whose beautiful work is unexcelled.

THE ARCHITECT'S AND BUILDER'S POCKET-BOOK. By Frank E. Kidder, C. E., Ph. D. Fifteenth Edition, Revised. New York: John Wiley & Sons. London: Chapman & Hall, Ltd. 1908.

Kidder's Pocket-Book is of such general use that a revised edition is of much importance. This latest edition includes chapters on the "Fireproofing of Buildings" and "Reinforced Concrete," by Rudolph P. Miller, C. E. The department of "Paints and Varnishes" has been elaborated by Prof. A. H. Sabin. The handbook covers a large number of subjects coming within the province of architectural and engineering practice, and is of much value as a compendium of useful facts, rules, and tables presented in convenient form for reference. The subject matter fills 1,632 pages, and the index is responsible for twenty-nine double-column pages in addition. These figures serve to indicate the voluminous character of the book, whose quality is quite up to the standard set by its quantity.

ACADEMY ARCHITECTURE AND ARCHITECTURAL REVIEW, 1908. Volume 33. Alex. Koch, Architect, Editor. Published at "Academy Architecture," London, W. C. American and Canadian Agent, M. A. Vinson, Caxton Building, Cleveland, Ohio.

The book is divided into four main divisions: I, A selec-

tion of prominent architectural drawings hung at the exhibitions of the Royal Academy, London, and the Royal Glasgow Institute of Fine Arts; II, Sculptures; III, American Architecture; IV, A review of interesting architectural subjects carried out or designed during the last few years in England and abroad. No previous volume has contained more interesting plates of the domestic architecture of the present day in England than abound in design and plan in the present number. There are many interesting designs of churches and public buildings of England, Scotland and America. The least interesting division is that of the Review. As a whole the book is the largest and best yet issued in this series, and will be found exceedingly useful to architects and sculptors.

A COURSE IN MATHEMATICS FOR STUDENTS OF ENGINEERING AND APPLIED SCIENCE. By Frederick S. Woods and Frederick H. Bailey, Professors of Mathematics in the Massachusetts Institute of Technology. Volume 1 Algebraic Equations Functions of one Variable, Analytic Geometry, Differential Calculus. Ginn & Co., Boston, New York, Chicago, London.

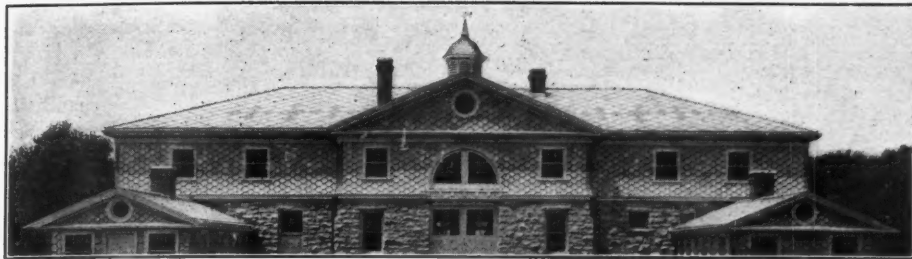
This is the first volume of a course in mathematics designed to present in consecutive manner material usually given in distinct courses including algebra, geometry, calculus and differential equations. This volume covers the first year's work of the student in an engineering school. The student is given a lucid grasp of mathematics by the arrangement adopted, which disregards the usual division of subjects, and introduces at an early stage the principles of analytic geometry and calculus as an aid in the logical development of the study. The book meets the needs of the student who wishes to make practical application of mathematics, and is adapted also to one who studies the subject for its mental benefit. The work easily takes its place as a standard authority.

MIXED PAINTS, COLOR PIGMENTS AND VARNISHES. By Clifford Dyer Holley, M.S., Ph.D., Professor of Industrial Chemistry, North Dakota Agricultural College, and Chemist on the Staff of the North Dakota Experiment Station, and E. F. Ladd, B.S., Professor of Chemistry, North Dakota Agricultural College, State Chemist for North Dakota. 238 pages. Illustrated. Cloth, \$2.50. New York, John Wiley & Sons. London, Chapman & Hall, Limited, 1908.

This book is designed for those wishing a concise work on the analysis of paints and paint products. It serves as a guide to the chemist of ordinary training in making a complete analysis of paint of practically any shade. He is given also sufficient data, derived from a large number of analyses, to enable him to interpret in a rational manner the results of his analysis. The work is dependable in the methods advocated, as they are based upon actual laboratory tests by the author.

SAFE BUILDING CONSTRUCTION. A treatise giving in simplest forms possible practical and theoretical rules and formula used in construction of buildings and general construction, by Louis De Coppet Bergh, F. A. I. A. Member of American Society Civil Engineers; author of Safe Building, Iron Construction in New York City, etc. New edition thoroughly revised throughout. New York: The Macmillan Company, 1908. All rights reserved. Price, \$5.00 net.

This new edition of a work that has been a standard authority on construction for a score of years adds much of value to the subject. The tables, formulæ and other information contained in the former editions have been completely revised in the light of present day knowledge, and to conform to present practice. Much new material has been added that enhances the usefulness of the volume. The contents are grouped under the following chapters: Strength of Materials; Foundations; Cellar and Retaining Walls; Walls and Piers; Arches; Floor-Beams and Girders; Graphical Analysis of Transverse Strains; Reinforced Concrete Construction; Rivets, Riveting and Pins; Plate and Box Girders; Graphical Analysis of Strains in Trusses; Wooden and Iron Trusses; Columns; Tables. It is somewhat of a disappointment that the subject of Reinforced Concrete is not more fully treated. With this exception, the book is wonderfully complete concerning the best practice in safe building.



ASBESTOS "CENTURY" SHINGLE ROOF AND SHEATHING—ESTATE OF DR. R. V. MATTISON, NEWPORT, R. I.
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The columns, cornices and general trimmings to the concourse of the New Union Station in Washington, D. C., illustrated and described in this issue of the Inland Architect, are of Full White Glaze Terra Cotta. The ceilings of the domes to the entrance arcade are in terra cotta of granite color, executed by

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See Sweet's Index, 1907-8 Edition, pages 108-110

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