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AMERICAN COLORTYPE CO.'S BUILDING, NEWARK, N. J.
Messrs. TRACY, SWARTWOUT & LITCHFIELD, *Architects*

THE GROWTH AND DEVELOPMENT OF MODERN MANUFACTURING BUILDINGS

By EVARTS TRACY

THE growth and development of modern manufacturing buildings is naturally the result of the growth and development of manufacturing.

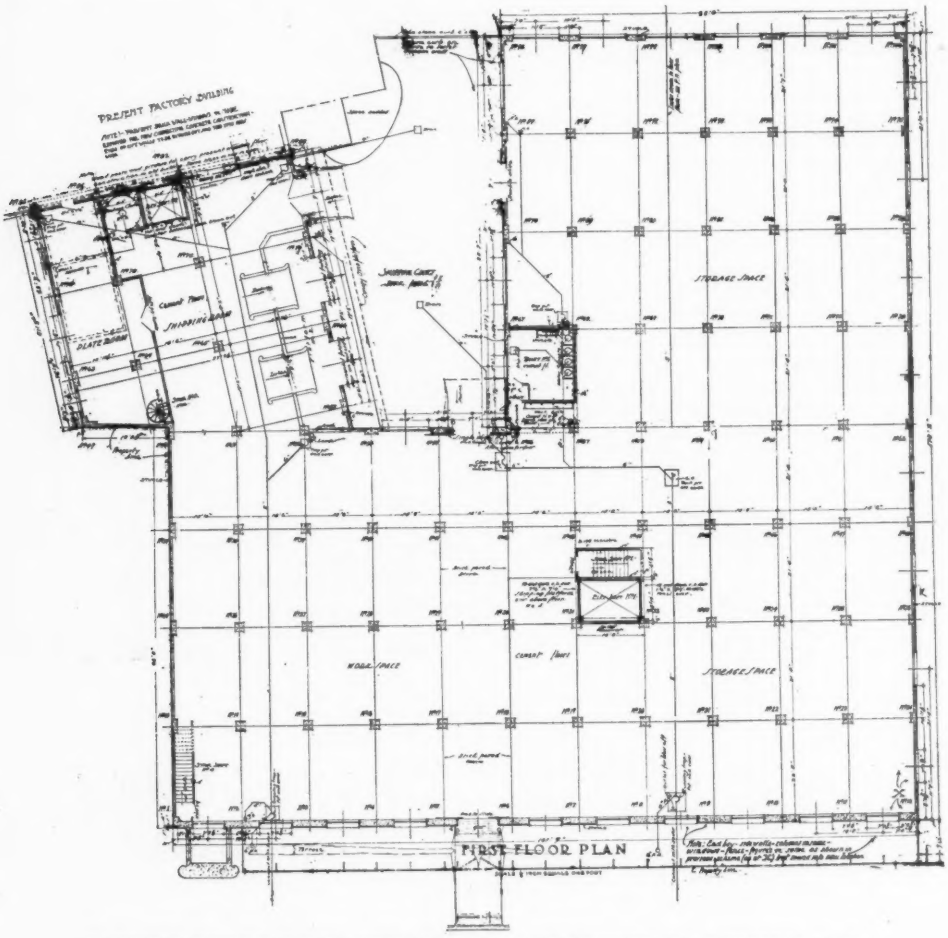
The earliest manufacturing buildings were, as the business to be conducted in them, small, and there was no arrangement for future expansion, so that we still see many large businesses carried on in factories which have, like Topsy, "just growed." As one department increased it was added to, and as another department was introduced, it was placed so that it shut off future expansion of another, and so a motley collection of buildings arose through which the natural sequence of work from raw material to finished product flowed, not in an unbroken, direct stream, but doubled on itself, retraced its steps and zigzagged and jumped hither and thither until somehow it reached the shipping department, at a loss of time and labor almost incalculable.

It took many years before the idea be-

came firmly fixed that there was economy in intelligent planning, and that it was a wiser thing to pay an expert a fee of one thousand dollars at the beginning than to pay five hundred dollars a year for the life of the building in useless labor and time.

The two fundamentals in a manufacturing layout are: First, that there must be no backward step at any point in the work, that the nearer a straight line the progress from raw materials to finished product is, the nearer we come to the ideal. "The shortest distance between two points" is what the manufacturer wants; his two points are the receiving department for raw materials, and the shipping department for finished products. Second, provision for expansion. No one starts a manufacturing plant with the idea that it will never grow, but many do with no idea where or in what direction it will grow, and when the time for expansion arrives, find their plant, complete in itself, so arranged that economic enlargement of the buildings is absolutely blocked on every side.

These two for the broad conception—next come light, fireproof qualities and economy, which includes speedy construction. If all of these problems are completely solved you will have an ideal building, because they include other details such as sanitation and welfare of the workmen. It also includes the æsthetic side, because if you increase the efficiency of the workers through their feeling of wellbeing, or their pride in the establishment with which they are connected, you shorten still more the time between



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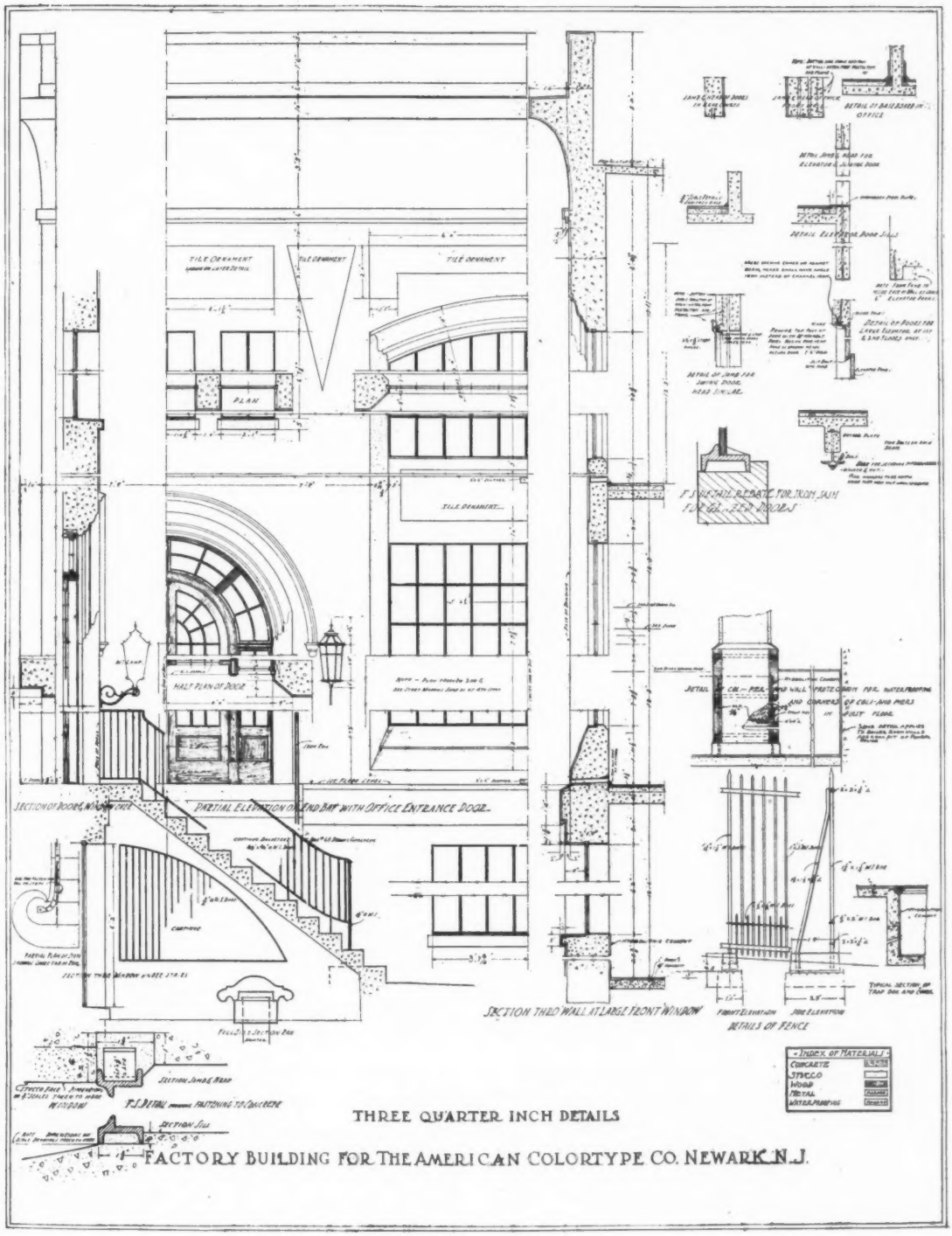
Messrs TRACY, SWARTWOUT & LITCHFIELD, *Architects*



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your payments for material and your receipts for products.

All of the points above mentioned have developed wonderfully since the beginning of this century. The science of economic planning in this country is of comparatively recent date. Few buildings, from residences to Federal buildings, thirty years ago would stand the test of economic analysis in regard to planning, which is demanded today. Manufacturing buildings must stand this test now, for if costs, due to lack of proper planning, are too high, owners know that they will fall by the way, while their up-to-date competitors pass them in the race.

The use of fireproof materials in manufacturing buildings is practically universal. Modern methods of fireproof construction have been a wonderful boon to manufacturers, and the reduction of insurance on fireproof buildings in nearly all cases more than pays for the slight additional cost, if any.

The question of adequate light is now fully appreciated. By the manufacture of improved metal sash, areas of light can be had which were impossible in former times. This item alone, sometimes almost pays for a new factory building. I know of one old manufacturing plant employing twelve hundred men. The parts of the product are small, the assembling and finishing are a large part of the labor cost. In many parts of this plant it is difficult to see to read on a dark day. Time is lost in fitting and assembling, defects do not appear until final inspection, much labor is therefore waste.

In a perfectly lighted building I believe one-quarter hour per man could be saved, or 300 hours per day. At 30 cents per hour this is $90.00 per day, or $27,000 per year of 300 working days. A new building could be built for $175,000, on which interest at 6 per cent would be $10,500, leaving $16,500 a year for a sinking fund. All this for nothing but sunlight.

The question of beauty is the last development that has been entered upon in many manufacturing buildings, first in England and on the continent, and now in this country. Its value lies in two direct results—first in its psychological effect on the workers, which is not a fancy, but a very real one, promoting their efficiency both through their pride and their feeling of wellbeing, and second in advertising value. There is a third value also, which is indirect, and that is the general appreciation of values in the locality, city, and the whole country, which arises from order, neatness and beauty.

The dirty, bedraggled, hopeless neighborhood is always the lowest in the value scale, the dull, monotonous but clean one is better, but the attractive and beautiful tells of higher civilization, and the state, and the individual through it is the gainer.

It is an inspiring thought to find that important manufacturers are employing architects of high standing in the profession to design their buildings, architects who are not so-called "factory architects," but who know how to design and build factories, and who are willing to give the same skill and knowledge which they apply to their more monumental buildings to those buildings which produce the wealth rendering the others possible.

AMERICA is rapidly accepting the idea of the value of beautifying the surroundings of factory workers, with the gratifying result that factory architecture and equipment are receiving the serious attention of artists. It only remains for manufacturers in general to appreciate the fact that æsthetic surroundings constitute an economic force which can be applied to their own particular business, before every factory, no matter how modest in structure, throughout the length and breadth of the land will begin to show signs of a higher life, with the result—an improved product.

R. L. TWEEDY.

AMERICAN ELECTRICAL HEATER CO.'S BUILDING, DETROIT, MICH.
Mr. ALBERT KAHN, *Architect*—Mr. ERNEST WILBY, *Associate*

VENTILATION
AND ITS INTEREST TO THE ARCHITECT

By D. D. KIMBALL

GRANTING for the moment that the necessity and efficiency of artificial ventilating systems are being seriously questioned, and questioned by persons of recognized authority in their line, it may be well worth while to investigate the basis and justness of the criticisms.

That there are many criticisms, the basis of which may be traced to improperly designed and installed, or worse, improperly operated, systems is a fact known to every ventilating engineer, but nevertheless it may be positively asserted that, so far as known, no convincing or valuable data can be produced by those who criticize ventilation substantiating their assertions. Many of these attacks are as baseless as that of the physician who claims to have found air delivered by a ventilating system at 400 degrees temperature, a manifest impossibility, for this would require a steam pressure in excess of 250 pounds per square inch in the heating coils, and this, as every architect knows, is beyond the range of possibilities. Not a shred of scientific data supports these objections to the artificial ventilating system. Nor may it be contended that all, or even a majority, of the acknowledged authorities among Physicians are opposed to the installation and use of ventilating systems.

The old idea that the windows of a ventilated building should never be opened for fear that the ventilating system would become "unbalanced" is now regarded as absurd. Let the windows be used whenever possible, but by all means provide a ventilating system for use during the night and whenever weather conditions prohibit

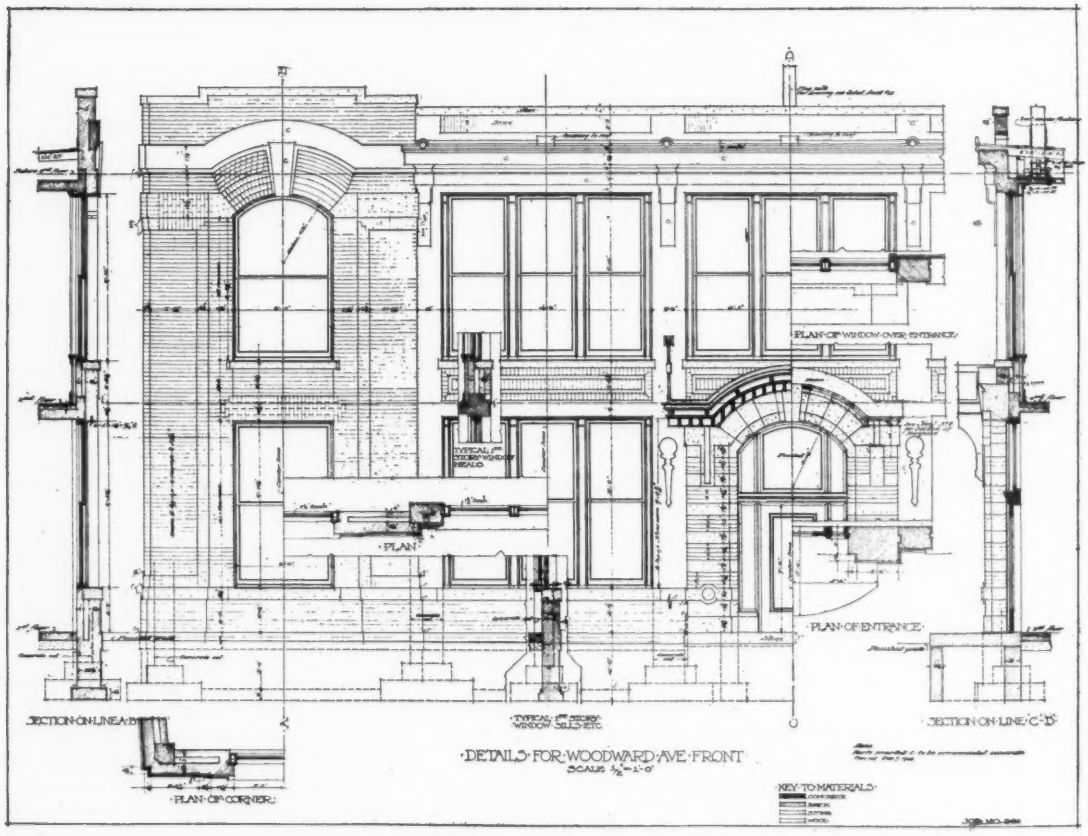
the use of windows, or when still or dull atmospheric conditions make for the failure of window ventilation. Artificial ventilating systems were developed because of the failure of natural or window ventilation more than forty years ago.

With all the prevailing objections to, and criticisms of the artificial ventilating system in mind, it remains a fact that any factory, school, hospital or public building without an efficient modern ventilating system is incomplete and in itself limited in its efficiency.

Extensive investigations are under way, aiming to determine wherein ventilation has failed, or to what extent it has failed, and to determine the essential elements of ventilation. None of these investigations have thus far given any justification to the claim that ventilating systems should be eliminated, but they do lead to the belief that some of the essentials of ventilation have been in some measure neglected.

Until recently, the design of nearly all ventilating systems proceeded upon the theory that it was necessary only to supply a certain amount of fresh air and exhaust a corresponding amount of vitiated air. Discussions on ventilation work were largely limited to details, such as whether the upward or downward flow of the air was best. Now it is realized that with properly conditioned air such details as this are incidentals to be determined largely by the building construction, its use and other conditions. Air volume while essential is not in itself sufficient to constitute efficient ventilation.

One of the first problems of air conditioning, the solution of which was undertaken, was the dust problem. Air filters, of varying, and often very questionable, efficiency have been used in a small portion of the ventilating systems installed in recent years. But with a growing realization of the seriousness of the effect of dust it is to be hoped that



AMERICAN ELECTRICAL HEATER CO., DETROIT, MICH.

Mr. ALBERT KAHN, *Architect*—Mr. ERNEST WILBY, *Associate*

TURNER-CARTER CO. BUILDING, BROOKLYN, N. Y.
Mr. FRANK J. HELME, *Architect*

the time is near when an efficient air filter will constitute a part of every ventilating plant. As is the case universally, the cheapest is not the best. Any old cloth-covered wood frame will not prove an efficient air filter for the best of the cloth filters is far from as efficient as the better makes of air washers.

The cost of the best possible air filter is entirely justified by the elimination of the evil effects of dust. Dust is an irritant and disease carrier. Breathed into the respiratory tract it may cause an irritation or even an abrasion in which the dust-carried germ may find lodgment or entrance into the system. That it is largely the cause of colds is the opinion of many Physicians whose observations have demonstrated that there is a large increase in colds during dry, dusty weather.

Recent experiments also give some basis for the belief that dust coming into contact with very hot surfaces distills ammonia, carbonmonoxide and possibly other harmful gases.

To eliminate the baneful effects of dust the air should be taken into the building as high as possible and it should be filtered by means of an air washer.

For many years 70 degrees has been considered the most desirable temperature for nearly all occupied apartments. Recently 68 degrees has come largely into favor. By many it is believed that this temperature may well be placed at a lower point, possibly as low as 60 degrees, as in England. Doubtless, however, to bring about comfort at this lower temperature will make necessary artificial humidification within doors by the use of humidifying devices as a part of the heating or ventilating system.

A fixed or stationary temperature is desirable as long as one is inactive, but it is quite likely that when possible a variation in temperature is desirable, for it is known that such a variation of temperature affects the blood pressure, tones up the system and that it is helpful in the treatment of some diseases.

The common demands of comfort may be more reliably depended upon to prevent too low a temperature than too high a temperature, but the latter is more apt to result in harm. The temperature in an occupied room may rise unobserved to a point which will cause a rise of body temperature and result in serious functional disorders, or the blood which should be serving the brain or the stomach may be forced to the surface of the skin to radiate heat, lassitude and dullness resulting. Thus a failure of but one feature of the ventilating system may bring about a general condemnation of the entire system, and such a condition is only too often the result of a penny-saving policy which prevented the installation of a first-class, or

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perhaps any, system of automatic temperature regulation.

The true worth of the artificial humidifying system is becoming generally recognized, as is the seriousness of the effect of extremely dry air. While there may be but little agreement as to the exact degree of humidity desirable within doors the extremes of the limits set by all of the authorities will be included within the points of thirty per cent relative humidity minimum and eighty per cent maximum, while the opinions of most authorities agree on approximately fifty per cent, except that in extreme cold weather forty per cent maximum may be desirable in order that the windows may not become frosted, and eighty per cent should be avoided with either high or low temperatures.

No desert has an atmosphere having as low as thirty per cent relative humidity, and Colorado's "dry" climate approximates forty-two per cent, but it is not uncommon to find less than thirty per cent, or even twenty per cent and under, in our homes, schools, hospitals, office buildings and other habitations. An atmosphere as dry as this, which will dry the furniture, walls and floors until they develop cracks, will also dry the eyelids, skin, hair, membranes of the respiratory tract and cause nervousness and sleeplessness, while contrariwise a moist atmosphere prevents all of these uncomfortable conditions, soothes the nervous system, promotes sleep and prevents colds.

For the large ventilating system the air washer provides the best method of humidification, evaporating pans, and sometimes steam jets, being sufficient for small systems.

There are other details, or possible essentials, of ventilation which are of interest to engineers and physicians but less important than those above mentioned. Air movement, which serves to carry away the envelope of air immediately surrounding the body with its excess of moisture and heat, is worthy of consideration. A ventilating system can accomplish much in this direction while remaining within the limits of uncomfortable drafts. Again a frequent "flushing out" or "perflation" is doubtless desirable and should not interfere with, nor will it obviate, the necessity of a ventilating plant.

The question of organic matter in the expired air is one of more interest possibly to the biologist and physician than to the architect and engineer although it may have a very definite value in determining the importance of the work of the ventilating system. The earlier investigations along this line lead to the belief that such poisons existed. Later experiments lead to the general belief that no such poisons existed. Recent studies by Prof. Rosenau, using more delicate methods of testing, give substantial foundation for the belief that toxic substances are to be found in expired air, and if such is the case it is proper to conclude that they should be removed from occupied apartments by means of a ventilating system.

A ventilating system to be efficient should be as simply designed and installed as pos-

sible for unfortunately the men employed to operate the plants are not usually well paid and hence they are not as intelligent as they should be. At the same time nothing essential to a complete ventilating system should be omitted nor may any one feature be omitted without endangering the success of the plant as a whole, or at least bringing about such criticisms as to cause a feeling that the installation is a failure.

The success and worth of artificial ventilation is established beyond question by general observation of the Engineers and investigating Physicians. (See Ventilation and the Public Health, by the writer, pages 207 to 219 inclusive, in the Public Health Movement, issued by the American Society for the Advancement of Political Science, March 1911.) It has been authoritatively stated that a classification of the schools in two Boroughs of the City of New York into two classes, one without modern ventilating system, and the other with, the class and condition of the pupils being approximately the same in both divisions, showed a loss to the city of approximately a million dollars annually, due to the longer period required for the pupils to do the same work, and it is also authoritatively stated that the same investigation extended over the entire city would prove the total amount of the loss to the City to be nearly three million dollars a year.

The ventilating system as designed by the best Engineers today will fulfill all of the requirements of good ventilation if sufficient appropriations are provided for the purpose. But where the air washer, temperature control system, or humidifying system must be omitted that the owner shall have his way in attempting to secure a few more cubic feet of space, or that the building may be embellished with columns, elaborate cornices or marble stairways, etc., criticisms of the ventilating system will doubtless be justified.

It may be that there have been cases where a more elaborate ventilating system than was required was installed, but no reliable investigator can state that the ventilating system may properly be omitted from factory buildings, schools, hospitals, auditoriums and other densely populated buildings.

Such co-operation between the architect and engineer as will insure proper appropriations for the ventilating plant and proper spaces for its installation will do much to overcome the objections and prevent the criticisms now directed towards the artificial ventilating system.

EVERY one needs inspiration and he needs it not once in awhile, but constantly. Æsthetic surroundings supply this inspiration in one of its most useful, necessary and adaptable forms. Monotonous and ugly surroundings may deaden the æsthetic sense of the worker and lower the quality of his product.

R. L. TWEEDY.

SECTION OF ONE OF THE FLOORS
NEW YORK BUILDING, NATIONAL BISCUIT CO.
Mr. A. G. ZIMMERMAN, *Architect*

THE BUILDINGS OF THE NATIONAL BISCUIT COMPANY

By W. F. WILMOTH

THE old-time manufacturer was the architect alike of his building and of his fortune, and the product of his dual genius is to be seen in all of our factory towns—the long, rectangular brick boxes lining the streams, and the huts of the operatives dotting the surrounding hills. With these scenes of ugliness all are familiar.

A few manufacturers have latterly become patrons of the arts and they now deign to counsel with the architect, along with the erstwhile many-sided genius, the millwright. And the consolidation and concentration in many lines of business which have been effected in recent years is bringing a different class of men into control—men who brush aside the makeshift methods of the past and construct solidly and permanently for the future as far as it is possible for human foresight to provide.

Probably one of the first companies to inaugurate this policy was the National Biscuit Company. It began by dismissing all question of cost and asked what was the ideal location, size, and arrangement for its business; what would give the highest efficiency as a manufacturing unit; minimum cost of maintenance; greatest safety for employees and freedom from interruption of business; best light, ventilation, and san-

itary conditions; and, lastly, a building of such pleasing architectural quality and dignity as would not only be a source of pride to its directors, stockholders, and employees, but would, in a measure, express to the public the purpose and ideals of the Company.

On this principle the Company has built large manufacturing plants in the principal cities of the country. The same general architectural treatment is followed in all these buildings.

On account of the heavy concentrated loads of the ovens on the upper floors and the desirability of keeping the columns small, steel with tile fireproofing for floor and column construction was adopted in preference to reinforced concrete.

The stories average fourteen feet from floor to floor, except on the baking floors where they average twenty-two feet.

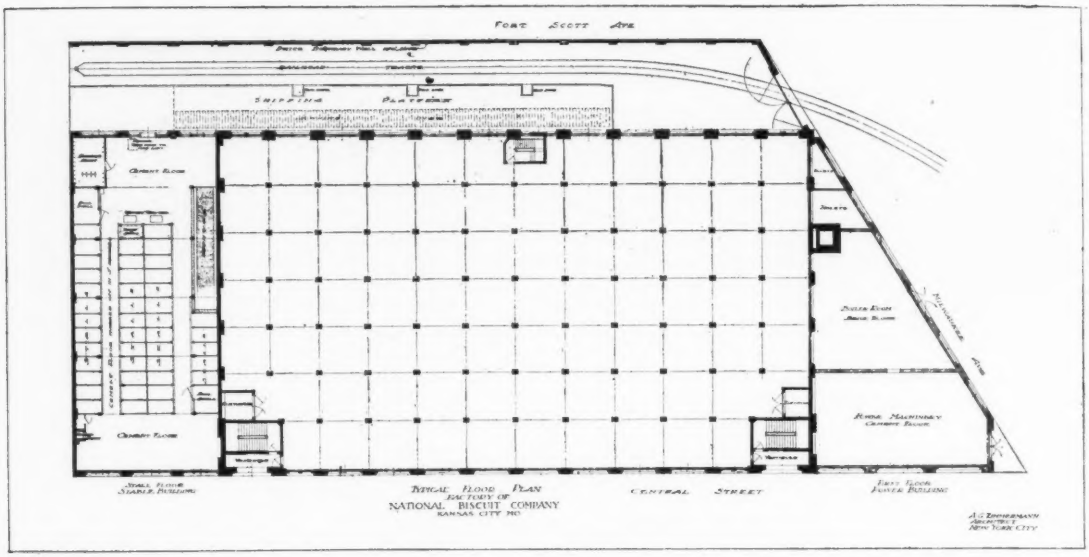
Every particle of the structural steel is thoroughly protected with specially moulded tile with double air spaces, the exposed tile being plastered in all cases, giving the buildings a smooth and finished appearance.

All division walls are of brick, with all openings protected on both sides with standard Underwriters' fire doors.

The floors are all of best quality maple, one and one-half inches in thickness, laid on beveled strips bedded flush and smooth in good concrete. The elevators and stairs are placed along the walls so as to interfere as little as possible with the machinery and the use of the floors.

The smoke-proof fire-escape stairway towers used in these buildings represent unquestionably the most efficient type of fire exit that has yet been devised. These are large stairways enclosed in towers in the corners of the building, communicating with the building through open loggias or balconies in each story, this arrangement preventing any possibility of smoke—the breeder of panic—entering the stairways;

CAR LOADING PLATFORM
NEW YORK BUILDING, NATIONAL BISCUIT CO.
Mr. A. G. ZIMMERMAN, *Architect*



TYPICAL FLOOR PLAN, FACTORY OF NATIONAL BISCUIT COMPANY, KANSAS CITY, MO.
Mr. A. G. ZIMMERMAN, *Architect*

and as these stairways are used daily by the employees in entering and leaving the buildings, there is no chance of confusion, in case of fire, in finding the means of exit. These towers, in addition to serving as stairs and fire exits, are carried above the roofs where are placed the pressure tanks for the automatic sprinkler system, as well as tanks for the house supply and for the water used in manufacturing. Here the tanks are protected from the weather and can be easily inspected and cared for. No open sprinkler or exposed house tanks are used, thus avoiding unsafe and unsightly tank structures.

The exteriors of the buildings are faced with a vitreous brown-colored brick, the window sills, lintels, band courses, cornices, and ornamental features being in dull enameled light buff terra cotta. The light vertical lines on the towers are vitreous white brick.

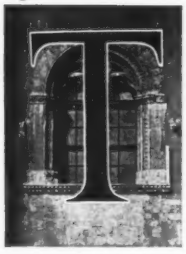
No expense or pains has been spared in these buildings to reduce the upkeep to the minimum and to make them secure against destruction by fire.

SOMEONE has said—"The more man a man is the more valuable he will be to any concern, and the more he can do and will do to aid its success." Certain it is that breadth of view, depth of character, imagination in foreseeing results and initiative in action make men more valuable as workmen.

R. L. TWEEDY.

PLANT OF BOWER ROLLER BEARING CO., DETROIT, MICH.
Mr. ALBERT KAHN, *Architect* — Mr. ERNEST WILBY, *Associate*

THE MODERN MANUFACTURING BUILDING AND ITS OUTPUT



HE results of the Census of Manufactures, taken in 1909, are available in a final summary issued by the Census Department at Washington. With these figures at hand, we are able to study the progress that the United States is making in manufactures. The grand aggregate value of the manufacturing output in 1909, the census year, reaches the enormous total of $21,000,000,000, an increase of about forty per cent. over 1904, when the last previous census of manufactures was taken. This practically amounts to a doubling of output in ten years, the total for 1889 having been $11,000,000,000. It is interesting to observe the order of importance of the various manufacturing industries. The figures given in the final summary are as follows:

Slaughtering and meat packing	$1,400,000,000
Foundry work	1,200,000,000
Lumber	1,156,000,000
Iron and steel	985,000,000
Flour products	883,000,000
Printing (this includes books, papers, and all kinds of printing and publishing)	787,000,000
Cotton goods	628,000,000
Liquors, malt and distilled	578,000,000
Clothing (Men's)	568,000,000
Boots and shoes	512,000,000
Woolen goods	435,000,000
Tobacco	416,000,000
Sugar	279,000,000
Butter	274,000,000
Paper and wood pulp	267,000,000
Petroleum	236,000,000
Carriages and wagons	159,000,000
Agricultural implements	146,000,000
Patent medicines	141,000,000
Confectionery	134,000,000
Chemicals	116,000,000

The above twenty-one manufactures make a total of $11,300,000,000, or approximately one-half of the grand total.

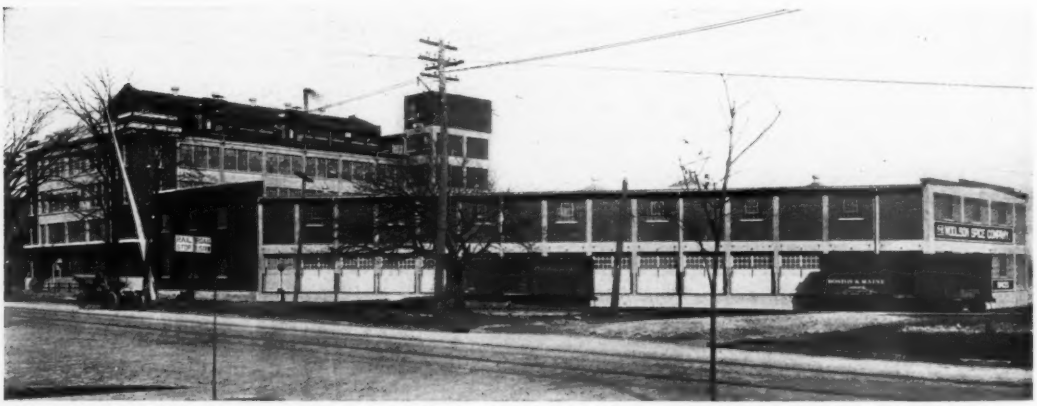
In the production of goods, amounting in value to the enormous sum given, there was employed a vast army of wage earners, approximating 7,000,000, or about eight per cent. of the entire population of the country. This is an increase in the number of persons employed in manufacturing of twenty-one per cent. over 1904. The number of manufacturing establishments was 268,491. It will be noted that while the value of the output is increased forty per cent., the increase in the number of people employed has been but twenty-one per cent. It is probably fair to assume that this very material increase of production, with a much smaller increase in the number of persons employed, is due to the improvements in modern machinery, combined with the greater efficiency of labor by reason of better manufacturing buildings providing better sanitary conditions and a pleasanter environment generally.

In the distribution of the total amount of manufactures, the three Middle States, New York, New Jersey and Pennsylvania, have to their credit over one-third of the entire value of manufactured products of the country. The New England States manufactured one-eighth of the total.

These accurate estimates of our material prosperity show how important a place is held in building operations by the modern manufacturing building. In order to supply the enormous demand and to solve the all-important question, of economical production, buildings especially designed to meet certain conditions have become imperative. Where thirty years ago a standard type of building was used with but few changes to meet varying needs, today the successful architect brings to his task in the design of the manufacturing building a wide technical knowledge. It is significant of the growing appreciation of the value of good architecture as a commercial asset, that in addition to perfect equipment, the most advanced sanitary conditions and the introduction of other necessary utilities, the promoters of these buildings have in many instances consented to such additional expenditure as will permit the introduction of features of design that have taken the manufacturing building out of the ranks of the commonplace and made them attractive.

While the growth of manufactures in this country may be calculated in figures, it is not possible to state as definitely the advance made in methods employed in the construction of the buildings. These may only be noted by visual comparison. The result is unquestionably more marked than in many other types of structures where the æsthetic aspect is considered of the first importance. The materials employed have in fact revolutionized methods and made it possible to impart certain features of designs not previously possible. These materials, all selected with a view to permanence of construction, have opened up new markets and been responsible for the establishment of many new industries.

In all this advancement the architect has played a conspicuous part in meeting the conditions imposed and at the same time evolving a building that would be something more than a mere hive to hold the busy crowd of workers that throng it. That he has been more than moderately successful is shown all over the country where manufacturing buildings exist. Corporations now wisely use their buildings as witnesses to their prosperity, and exploit their architectural excellence as evidence of the very advanced methods employed throughout to produce the best of wares.



BUILDING FOR THE WOOLSON SPICE CO., TOLEDO, OHIO
Mr GEORGE S. MILLS, *Architect*

FACTORY AND WAREHOUSE

By H. W. FROHNE

CO-ORDINATE with the dwelling in its influence for human welfare is the place where the day's work is done, and especially is this true where the work is manual, in the workshop as distinguished from the office. Where people work manually the conditions cannot be too favorable at best. The degree of discomfort and of unwholesomeness ordinarily varies directly with the nature of the industry pursued as well as with the measure of attention that has been paid to providing a sanitary workshop; one that provides ample natural light for all operatives, and gives the quantity of pure air their physical exertions demand. These factors for health are dependent to a large extent, upon the planning and designing of the building. Sanitation and ventilation, of course, depend as well, up to a certain point, upon the management as upon the surroundings. As a general proposition, however, it may safely be maintained that the building itself exerts the predominating influence for better or worse conditions in a manufactory or workshop. The largest share of the improvement, therefore, that has been brought about in structures devoted to manufacturing is attributable to the increased attention paid by manufacturers to the subject of their buildings and to the improved manner in which the technical problems have been solved by the architects with the able co-operation of the engineers, and the purveyors of improved materials, processes and devices for the work.

Fifteen years ago, or even ten, the percentage of manufacturing buildings planned and designed with a knowledge of requirements and skill to meet them were rare, and the desirability of employing competent architectural services in the erection of such buildings was not recognized, except in such cases where, perhaps, the nature of the business demanded an attractive external appearance in the building or group of buildings. To-day the point of view of the manufacturer is found so changed that it has become the rule to employ competent architects to design the

PLANT OF THE AMERICAN CAN COMPANY, TOLEDO, OHIO

Mr. GEORGE S. MILLS, *Architect*

workshops, factories and warehouses in most progressive mercantile lines, and the matter of external appearance deemed at first the sole province of the architect has been found to be but one of the features of the problem whose solution is now left almost entirely to him.

The necessity for a suitable and far-seeing plan has been, perhaps, the determining factor in the manufacturer's decision to depart from his former practice of merely providing for his workers the amount of floor area deemed necessary to turn out the goods in the manufacture of which he is engaged. Experience and keen competition have since taught him that the highest efficiency can be obtained from his force only by so arranging his plant that each operation in the work of fabrication is accomplished with the least lost motion and with the maximum degree of convenience it is practicable to afford the operatives. In other words, he has been convinced that a building planned to secure these ends and arranged for future growth is as absolutely essential to his financial success as are specialization of his labor for the work to be performed and ability to obtain economically the raw material and sell economically the finished product. With characteristic vigor the manufacturer has not been slow to act according to his best judgment by securing competent architectural services in erecting his buildings where architectural services before were unknown. Perhaps the most striking example of a new industry in which the architect's handling of the problem of the manufacturing building has ably assisted an unprecedented development of profitable fabrication is the manufacture of automobiles and their accessories. Almost without exception, the plants of such concerns have been designed by architects who have found it worth their while to give their most conscientious attention to the work. A retrospective view of our issue of June 14 last year on manufacturing buildings will bear out this assertion. The same is true of warehouses for our large mail order houses, as well of our storage warehouses which safeguard the merchandise of many thousands throughout the large cities of the country. On the other hand, there are industries in the building of which the hand of the architect is yet scarcely visible, *e.g.*, breweries, refineries, textile mills, steel foundries and others readily called to mind. Here lies a fruitful field and one in which the present tendencies of business point to an evolution that cannot afford to neglect the architect as a factor of more than ordinary importance.

FACTORY BUILDING FOR AMERICAN LADY CORSET CO., DETROIT, MICH.
Mr. ALBERT KAHN, *Architect* — Mr. ERNEST WILBY, *Associate*

Among warehouses that recently completed for the Great Northern Implement Company at Minneapolis from designs by Messrs. Kees & Colburn is a fair example of what the architect has been able to accomplish in this field. The plan, a necessarily simple one, from the nature of its purpose, and the interior and exterior, necessarily serviceable and substantial for the same reason and perhaps equally on the score of economy, have nevertheless

been given that degree of intelligent consideration that makes for those general factors of success already alluded to and, at the same time, results in a structure of which the community where it is situated may, with reason, feel proud. This is especially true of the exterior in which the maximum effect of refined substantiality has been achieved with economy of means to the end of eminent respectability and unmistakable distinction.

In no industry of the present day have the methods of manufacture undergone a more radical transformation than in the baking business. In a process which, fifteen years ago, was accomplished almost entirely by hand labor, machinery has completely changed the conditions, making possible a volume of production, it is claimed, of distinctly superior quality. The introduction of machinery into this field has not, however, unaided, made possible such strides in baking. With the changed conditions it became necessary to provide buildings to make the expensive machines produce to their best advantage; a new problem presented itself for solution and the architect has claimed and won the right to solve it. The buildings devoted to this industry illustrated in this issue indicate the methods adopted and the progress made. The consideration of one feature will serve to show the care and study that have been bestowed on all. For example, in planning for safety against fire the adoption of the enclosed stair shaft is typical of the degree of attention that has been bestowed upon every essential of the plan in all cases. The towers which architecturally accentuate these fire stairs have been utilized to screen the sprinkler and supply tanks, further evidence of the effort to build not only practically and safely, but attractively as well.

On the whole the buildings illustrated in this issue have been selected more with view of being representative than of presenting the most successful efforts of the designers of utilitarian structures. This method will serve it is hoped, to picture, as faithfully as possible, the present attitude of clients in such instances towards reputable members of the architectural profession. The results, as far as results may be gleaned from photographs and plans, will strongly bear out the assertion that the architect has made good and is continuing to do so in the estimation of the manufacturer, giving him excellent value for the fees he must charge for conscientious services and, in the end, justifying his employment by wise economies and judicious handling of the funds to be expended in construction. In accomplishing results, the architect has not attacked the problem of the utilitarian building from the standpoint of

BUILDING FOR THE WARNER MANUFACTURING CO., TOLEDO, OHIO
Mr. GEORGE S. MILLS, *Architect*

BUILDING FOR THE WOOLSON SPICE CO., TOLEDO, OHIO
Mr. GEORGE S. MILLS, *Architect*

lowest first cost but rather from that of highest efficiency and, therefore, of lowest ultimate cost. In a great many instances the money expended annually in manufacturing a given article so far exceeds the capital invested in ground and buildings that the difference between the greatest economy possible in a properly planned and designed building and the waste inseparable from an ill-suited plant many times offsets the additional capital invested in the more valuable building. The architect has possessed himself of the facts in each case and has succeeded in gaining the attention of the manufacturer. Having succeeded thus far he has found but little difficulty in widely extending the influence of his progressive ideas among individuals and concerns that contemplate the erection of the most economical and efficient utilitarian buildings.

In the same way that the conscientious architect in certain other types of buildings created by our rapid commercial growth has exercised a highly beneficial influence on the standard of American architecture in the monumental sense, through the smaller government buildings, post-offices, courthouses and public libraries, so has the awakening of the manufacturing interests begun to exert through its buildings of the past decade and a half a wide influence for better housing conditions for the laboring class. This influence has, in a number of conspicuous instances, borne fruit in the shape of securing the direct interest of the manufacturer himself to provide better dwellings for his employees, as had already been extensively done in England and Germany.

CONTINENTAL MOTOR MFG. CO.'S PLANT

THE city of Detroit has become world famous for the character of its manufacturing plants, and is recognized as containing a number of the finest examples of architectural and engineering industrial construction.

Undoubtedly, Detroit's pre-eminence in the manufacture of automobiles and automobile parts and accessories has had much to do in bringing about this condition. This is a logical result, since the automobile industry is the latest large and new industry to be developed and, for whatever may be the reason, has centered itself largely in the city in question.

Among the latest examples to be found by those seeking the last word in factory construction is the group of buildings just completed and now being occupied by the Continental Motor Mfg. Co. The business of this concern is the manufacture of automobile motors, and they supply

many of the well known automobile builders. Their plant is probably the largest of its kind in the country.

The general arrangement of the buildings can be seen on the plan. In general, the buildings have been so designed that the plant as a whole is compact and calls for a minimum travel of materials and assembled parts, etc., during the process of manufacture, and yet as the requirements of the building demand the same, permits an expansion of the various departments with a minimum disturbance of the general arrangement.

The central mass of the building, being the Machine Shop, is of one story "saw tooth" construction. The Rough Stock Room is also of one story construction, with an approximately flat roof. Since the stock as received is of a very heavy nature and practically all of it has to go through the machine shop, the rough stock room is also located on the ground floor, and immediately adjacent to the shop in question. The assembling buildings, which lie to the east and to the south of the one story structures just mentioned, are at present two stories in height, but so designed that two additional stories can be put on in the future.

The progress of the work through the factory can be readily made out from the plot plan. The material taken from the rough stores, passes from the machine shop to the finished stock room in the west side of the plant, then to the final assembling room, from where the assembled motors are passed to the motor test room and then to the shipping room. This arrangement lands the material again at the railroad tracks for shipment.

On the second floor in the two story section is located the sub-assembling room which is supplied from the finished stock room by one elevator, and which feeds the final assembling room by means of another. The pattern room, tool room, factory offices, etc., are also located on this second floor. Other details of the arrangement are evident from the drawing.

It will be noticed that the heat treatment and power buildings, because of their nature, are isolated from the rest of the plant. These buildings, as well as the other departments, have a definite arrangement for future additions to take care of any increased demands.

The construction of the buildings in general is of reinforced concrete, the two story portions being all of that type of construction with ceilings of flat slab construction entirely without beams, while the saw tooth section (the machine shop), motor test room, heat treatment and power buildings have structural steel framing. In the machine shop the steel channels used to support the counter shafting are so arranged that they form a part of the roof framing itself.

Throughout the building, the most advanced ideas have been used with reference to details. In the office portion metal and glass partitions are used, made up in four foot sections so that any piece can be moved or rearranged; metal stock bins are made up with adjustable shelving; sanitary drinking fountains are provided at many convenient places, while the individual wash bowls and lockers are arranged for throughout. The finished floors in the main building, excepting in the stock rooms, are maple. The lubricating oils, etc., of which considerable quantities are used, are stored in tanks buried under ground and piped to central distributing points throughout the factory. Steel sash are used everywhere so as to give a maximum amount of daylight.

The heat treatment room has its pumps and blower in a basement, while the first floor contains the furnace, quenching tanks, packing tables, etc.

In the motor test room a unique and economical method is employed. Each motor to be tested is directly connected to a dynamo arranged to run either as a motor or a generator. It is started off at half speed as a motor, until the gasoline motor under test is limbered up. Then the gasoline motor is run under its own power at a speed slightly above the synchronizing speed of the dynamo, when the gasoline motor automatically runs the latter as a generator, and the power generated is fed into the main switchboard, from where it is utilized for general purposes.

The power plant consists of three 250 H.P. Wickes vertical water tube boilers with Murphy Automatic Stokers. The coal

(*Continued on page 281*)

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MANUFACTURERS who have reached in the manufacture of their product the *ultima Thule* of their efforts are now beginning to realize that to maintain this state of perfection they must not only carefully watch the quality of their raw material, but must be equally solicitous as to the welfare of their employees and provide them with an environment that will tend towards their health and contentment. The early attempts to make a manufacturing building something more than a mere shell were often regarded by self-styled conservative manufacturers as a sheer waste of money. With the erection and equipment of more modern buildings it was found that labor sought out and contentedly remained where their comfort was conserved and their labor dignified. Manufacturers began to encourage the consumer to visit their factories, and by personal experience learn how carefully each process was worked out. Then the value of a perfect plant became realized and the necessity for a thoroughly up-to-date equipment understood. Naturally the part that the architect has been called upon to act in this insistent movement is large. He is not only now expected to "lay out" the building to meet the requirements of the new machinery that has crowded out of place the methods previously employed, but he has been given certain latitude to add features of design that when wisely used produce a structure proclaiming the artistic as well as practical perceptions of the men behind the enterprise.

It is within the last decade that the manufacturing building—as we now understand the term—has had its birth. Its growth has been rapid and its improvement marked. It has become in some instances a civic center, for around it is often grouped the community that draws from it its support.

Whether an isolated "plant," or a group of buildings representing a large industry, it is now well understood that the artistic unities must be preserved if the greatest measure of value is to be returned and that the dignity of the product is in a measure added to by the character of the buildings in which it is produced. In fact, the plant behind the product is a matter of real importance under present conditions.

THREATENED REPEAL OF TARSNEY ACT.

IT is earnestly hoped that the provision of the Sundry Civil Bill now before Congress, which repeals the so-called Tarsney Act, will fail of enactment. As is generally known the Tarsney law permits the Secretary of the Treasury to select architects for Government work under the Treasury Department, by means of architectural competitions.

There would seem to be only two grounds upon which the repeal of this law could be justified; either because it is not efficient or because it is not economical. The improvement in Treasury Department architecture that has been coincident with the operation of the law is a matter of common knowledge and effectually disposes of the first ground. As to the second, it has been stated upon responsible authority that the cost to the Government of performing architectural service through the office of the Supervising architect of the Treasury, where buildings of any considerable cost are considered, is at least 50 per cent more than by the employment of architects in private practice at the usual professional fees.

It appears therefore that the threatened blow to Federal architecture is the result either of oversight or misapprehension, and in either case it should not be difficult to avert it when the facts are marshaled and presented. Since the American Institute of Architects was instrumental in securing the passage of the Tarsney Act originally it is

probably safe to assume that it will now render a further service to the profession and the country by endeavoring to prevent its repeal.

Lenox Library Removal.

So insistent has become the efforts of various societies in New York to prevent the removal of the Lenox Library building to Central Park, a general call has been issued for a mass meeting and the organization of a Central Park Safety Committee.

The matter of the proposed gift by Mr. Frick to the City of the Library building was discussed in these columns last week. We stated then that we were of the same opinion as that held by a large body of people in this city against any further encroachment on our park space. The Municipal Art Commission has since then passed a resolution, favoring the acceptance of Mr. Frick's offer, and it is this action that has called forth the many protests and the vigorous movement to prevent the transference of the building.

The situation is an embarrassing one, as the consensus of opinion appears to be a unanimous appreciation of Mr. Frick's offer and an equally unanimous determination to prevent its acceptance so far as the location of the building in Central Park is concerned.

Mr. Philbin, of the Parks and Playground Association, in a letter sent out to many municipal societies states concretely the best sentiment on the subject:

> "Although in sympathy with the views expressed by the members of the Art Commission and in no way opposed to the preservation of the structure or lacking in appreciation of its artistic value, we have felt it absolutely essential that every inch of space in Central Park be protected from encroachment in the way of building."

The present situation is one that will force the issue of park encroachments and in such an emphatic manner that it is hoped the question will be for all times set at rest.

Central Park has not received that solicitous care from the Park Department that its importance deserves, and when once its freedom from the possibility of any buildings being erected there is assured, it is to be hoped that this laxness will no longer be evident.

Continental Motor Mfg. Co.'s Plant

(*Continued from page 279*)

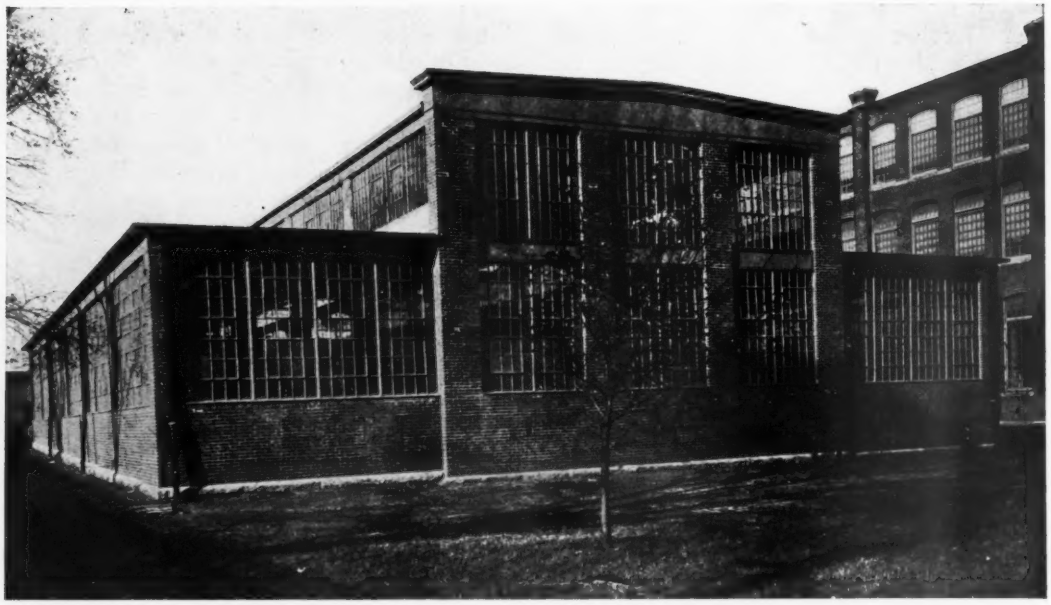
is handled direct from car by means of an overhead trolley with traveling crane, delivering the coal into hoppers directly over stoker settings. The same crane is used to remove ash and deliver it to cars on railroad track.

Electric power is generated by means of a Westinghouse three-phase Generator of 600 K.V.A., direct connected to a Hamilton cross compound Corliss engine. The main switchboard is so arranged that not only the total amount of power is constantly registered, but also the power factor for each department. All motors in the Machine Shop are started from a central point, but each one can be stopped at the machine itself.

The two pipe system of vacuum steam heating is used throughout the plant. In the Machine Room the heating is a combination of the blower system and direct heating coils; i. e., direct heating coils are placed along the outside walls and heated air is forced into the room through overhead heat ducts, with branch outlets taken off in each saw tooth bay.

The main steam lines and electric cables for general distribution are run in underground tunnels connecting Power House with Factory proper.

In general, the method of construction, arrangement, lighting and equipment employed in the building of this group may be considered fairly representative of methods and materials now employed in the construction of the highest type of manufacturing building.



BUILDING FOR GORHAM MFG. CO., PROVIDENCE, R. I.
DESIGNED BY THE COMPANY'S ARCHITECT

STREET NAME PLATES

NEW YORK, in common with many other important cities in this country, lacks a proper and adequate method of designating street names. Not only is the stranger put to much annoyance on account of this deficiency, but even city residents, especially during the night hours, are often uncertain of the names or numbers of streets when in neighborhoods with which they are not familiar. That this lack of proper street signs is as common abroad as it is in this country is indicated by the article printed below, which appeared as an editorial in a recent issue of our contemporary, *The Architects and Builders Journal* of London.

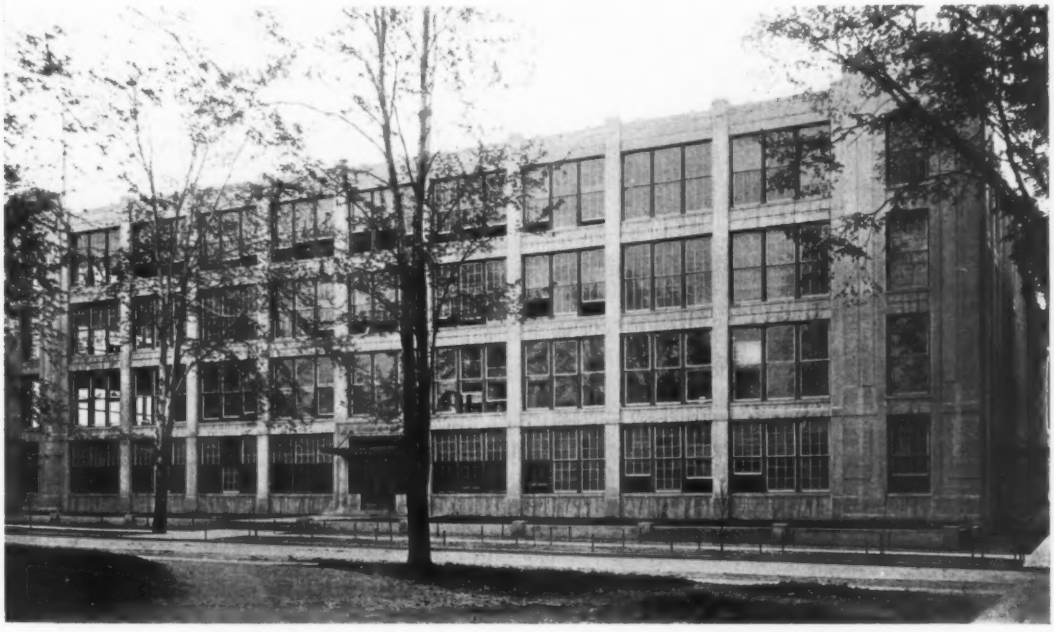
It will be noted that the Institute of Architects have taken the matter up, and it would seem to be a legitimate subject for action by architectural societies in this country:

The method or want of method in the display of the names of streets in London has long been a discredit to us. The Institute of Architects have taken the matter up, and have invited a conference of representatives of the various borough councils to consider the subject; and we believe that this invitation has in most cases been responded to in friendly spirit. It appears to us that there are three main points for consideration in connection with this subject. The first is, the necessity of having the naming universal, at the corners of all streets. At present this has been most capriciously done; there are numbers of streets in London in which one can find no name till after going some distance along the street. Such carelessness is absurd, and is the occasion of serious public inconvenience. In Paris, the names are at every street corner, and there is no reason why they should not be so in London, except that of indifference and neglect on the part of borough authorities. The second requirement should be uniformity in design and lettering. At present the name-boards are of all kinds of material and design; a fact which does not speak of a well-governed city. And when we say uniformity, we mean uniformity over the whole of London. Some of the borough authorities seem possessed with the idea that each borough should have its own distinctive name-plate to be used within its own jurisdiction. The obvious objection to this, which will occur at once, is that in some cases the borough boundary runs down the centre of a street, and then the two name-plates would differ on opposite sides of the street. But independently of that objection, it is far better for appearance and convenience that all London streets should be named and lettered in the same manner; there is no sense or advantage whatever in having so many different designs of name-plates in the different boroughs of London, especially as in that case they will certainly not be all equally good. Let the best possible one be selected, and be introduced for the whole of London. The desire of borough authorities to have their own special lettering is a kind of vestryman's policy, narrow-minded and egotistical. Thirdly, we want to see a really well-designed but perfectly legible lettering, in a form and material that will be durable; and of course it must not be too costly in either material or method of construction. No doubt specimens will be produced and discussed at the proposed conference. Probably the best material, for combining economy with appearance, would be cast-iron

plates with the lettering in relief; in that case the lettering can always be painted up by an ordinary painter, without requiring the employment of skilled labor. Letters flush with the general surface of the plate, in whatever material, are apt to get soon dulled in a smoky atmosphere.

THE CORROSION OF STRUCTURES

IN considering the design of structures it is usual to base the first estimate of strength upon the assumption that the materials will remain unaltered, and afterward to allow a factor of safety to take account of the ravages of time. If the structures contain iron or steel exposed to wind or water, corrosion is to be expected sooner or later, and the designer is forced to face the difficulty in one or more of three ways. He can increase the weight of the metal to provide for surface changes, he can prepare the surfaces and apply preservatives, or in certain cases he can allow for the cost of a staff to keep the structure under observation and to maintain the surfaces. The causes of corrosion are now fairly well known, but the best way to prevent corrosion is not so well understood, and a great deal of research is necessary before the conditions giving the best chances of durability can be regarded as settled. In many instances it is impossible to avoid exposure of iron and steel surfaces, but engineers would do well to consider whether special precautions cannot be taken at reasonable first cost with vital parts of such structures. For example, although it may be difficult to protect the interior of iron pipes it may be quite practicable to replace iron valves in the pipe-line by a more durable metal. Again it is often possible to reduce the evil of corrosion considerably by employing cast iron instead of wrought iron, and there is no doubt that reinforced concrete is destined to be increasingly adopted in specific cases where corrosion is to be expected with bare or painted metal. Among the most curious instances of corrosion must be included the complete decay in some localities of imperfect alloys of the German silver group, and it is well known that copper wire in some circumstances fails in an obscure manner.—Engineering Supplement, London *Times*.



FACTORY BUILDING FOR L. ADLER BROS. & CO., ROCHESTER, N. Y.
Mr. ALBERT KAHN, *Architect*—Mr. ERNEST WILBY, *Associate*

"NÉO GREC" ADVERSELY CRITICISED

IN a recent lecture on "Néo-Grec," Mr. Alan Snow, A.R.I.B.A., contended that a purely Greek style, with colonnades, pediments, etc., is absolutely unfitted for our uses and requirements, and that the manner of building at present known as "Néo-Grec" is not Greek at all, neither in the spirit of its design nor in the actuality of its appearance. "Most past styles, as they have been left to us, are in themselves unsuited to modern conditions in England, but of them all it seems to me that Greek is the most unsuitable. The charm of Greek buildings is in their shape as much as in their detail—in their long and low proportion. How can we transplant this into the tall modern building? We may maintain the same general proportion in the building, although its size is greatly increased. But it is too much to imagine that, by adopting in our large edifices a similar treatment in detail to that which the Greeks gave to their smaller ones, we are perpetuating Greek architecture. We are doing nothing of the sort. Sometimes, perhaps, we may fitly use Greek forms for details, unless we can think of better; but even then they can only be used as a basis to work upon, not as a copy. We are doing quite wrong in increasing the size of the details as we increase that of the building; in enlarging things that were only meant to be small; in using them as our professed models, as the Greeks never used them, and in combining them with features which they either did not know or did not use. This reads like a summing up of the architectural fronts which the Romans applied to their buildings, and the case is indeed an exactly similar one. The attempt to adapt them leads to their entirely losing their Greek character. These new buildings of which we are so proud are Roman. To me the most exasperating thing about these buildings of the latest Greek revival is the almost complete neglect of the splendid opportunities that await the truly *modern* architect. Can we do *nothing* with these? Must we fall back on engineers for our construction and the Romans for our clothing of it? Have we no wit or imagination? It is the great fault of the average architect that he does not take advantage of his opportunities as an artist. That is, he does not set out to *create* something, but at the first opportunity harks back to what someone else has done. How can his art improve if he accepts the conclusion that the best has been done, that there is nothing left for him to do but adopt and adapt the ideas of other men? We are not free to do as we like—far from it—but there is no need to so imprison our intellects. That is what seems to me most missing in modern English architecture—intellect—the mental grappling with and overcoming of our problems." *The Architectural Review* (London).

NEW YORK CITY BUILDING, NATIONAL BISCUIT COMPANY

Mr. A. G. ZIMMERMAN, *Architect*

DETAIL 15TH STREET FRONT

NEW YORK BUILDING, NATIONAL BISCUIT COMPANY

Mr. A. G. ZIMMERMAN, *Architect*

AT LEFT, A STAIRWAY SHOWING EXIT BALCONY THROUGH DOOR AND WINDOW
AT RIGHT, INSIDE OF BALCONY, SHOWING ENTRANCE TO STAIRS

NEW YORK BUILDING, NATIONAL BISCUIT CO.

Mr. A. G. ZIMMERMAN, *Architect*

KANSAS CITY, MO., BUILDING, NATIONAL BISCUIT COMPANY

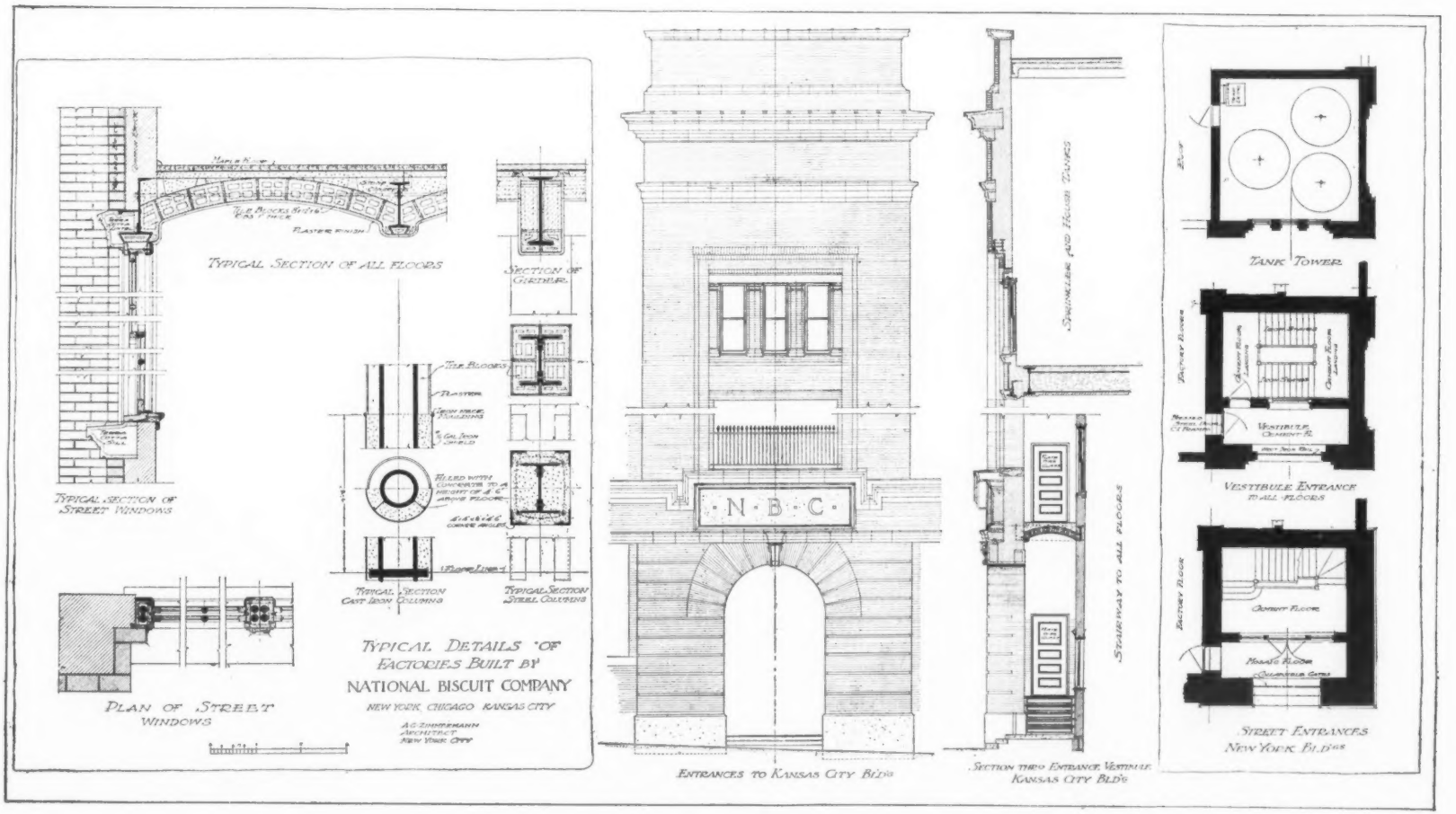
Mr. A. G. ZIMMERMAN, *Architect*

AT LEFT, MAIN FRONT

AT RIGHT, DETAILS OF MAIN FRONT

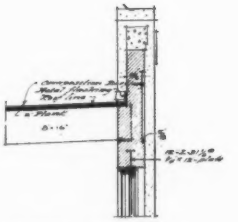
CHICAGO BUILDING, NATIONAL BISCUIT CO.

Mr. A. G. ZIMMERMAN, *Architect*



DETAILS, NATIONAL BISCUIT COMPANY

Mr. A. G. ZIMMERMAN, *Architect*



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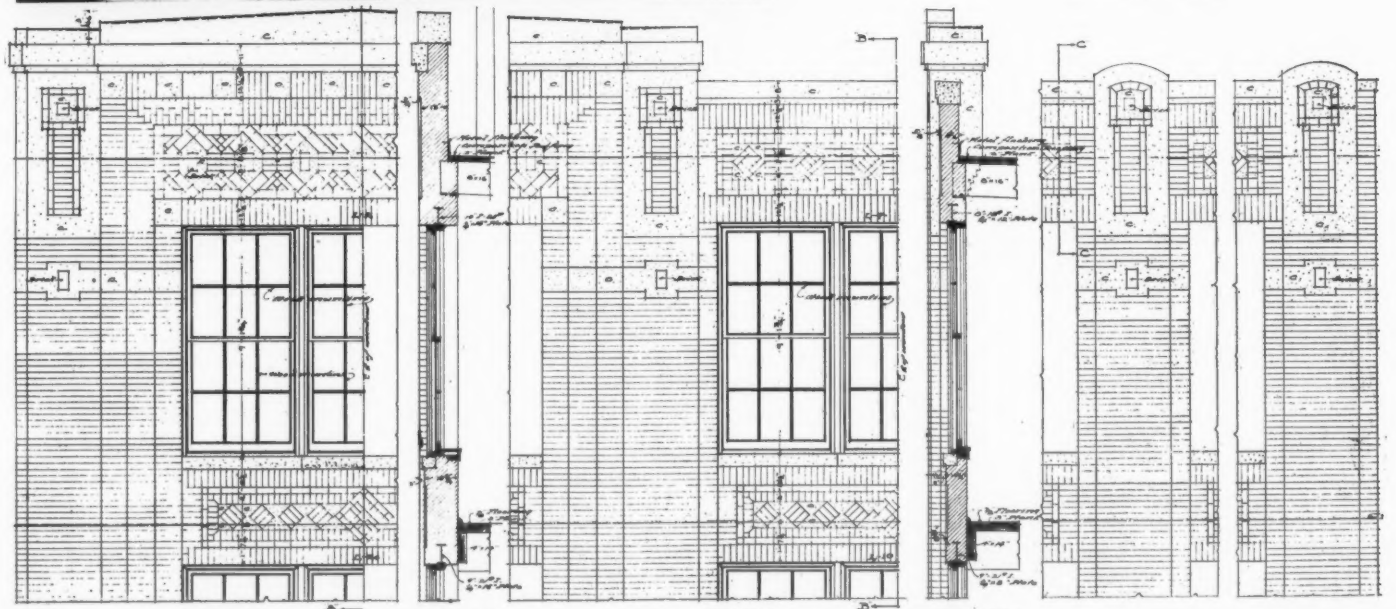
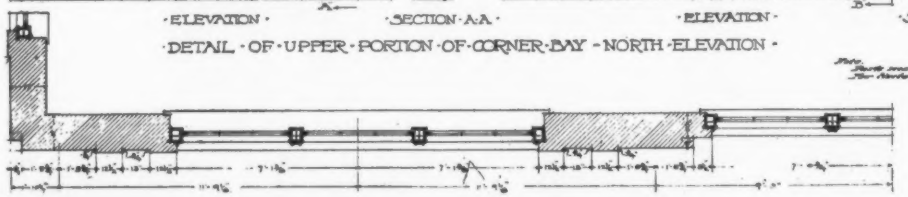
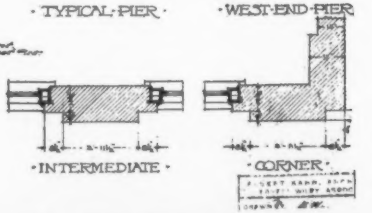


ELEVATION SECTION A-A ELEVATION SECTION B-B TYPICAL PIER WEST END PIER

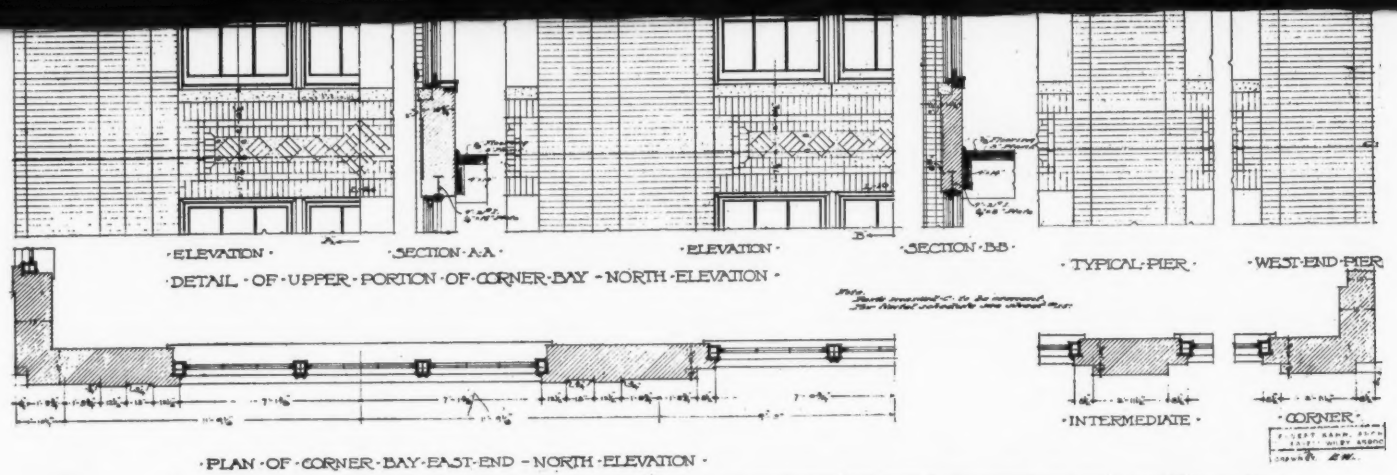
DETAIL OF UPPER PORTION OF CORNER BAY - NORTH ELEVATION





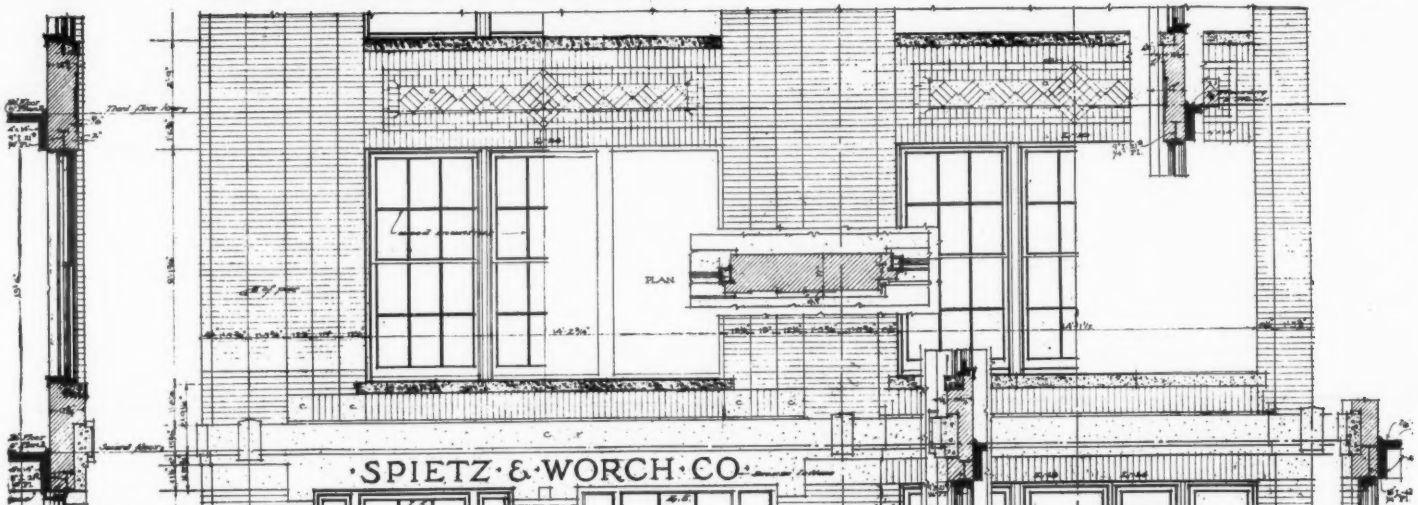
INTERMEDIATE CORNER

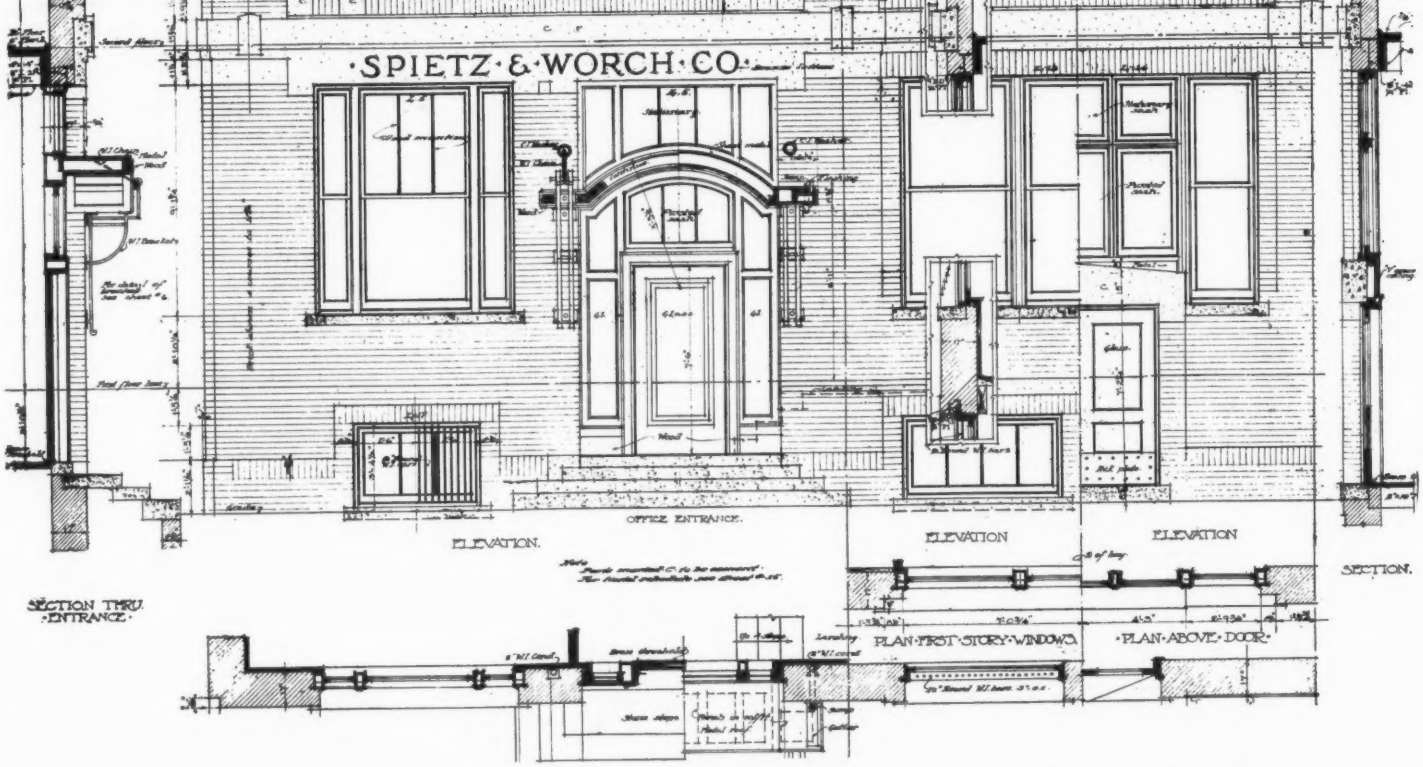
PLAN OF CORNER BAY EAST END - NORTH ELEVATION



DETAIL OF UPPER PORTION OF CORNER BAY - NORTH ELEVATION

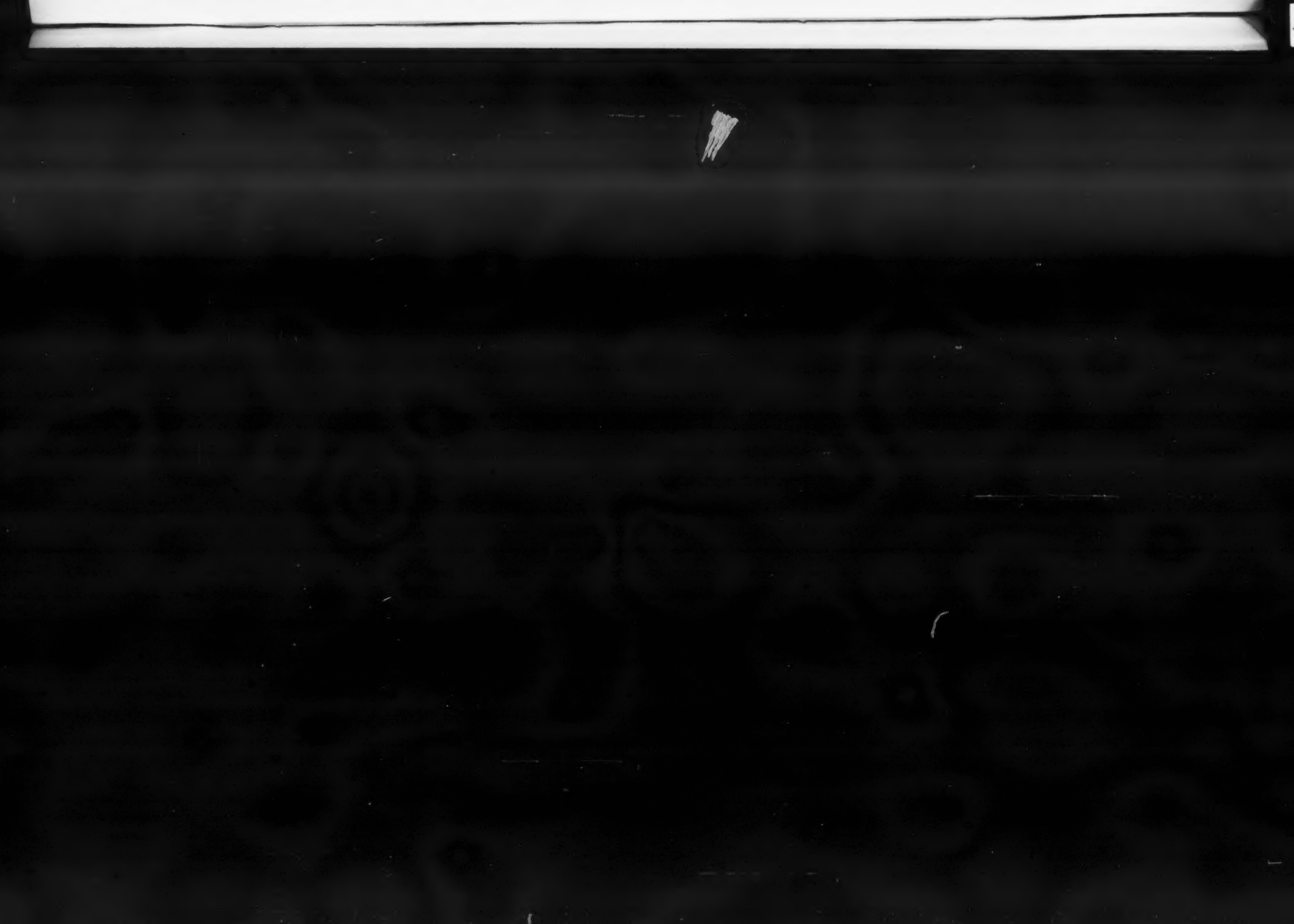
PLAN OF CORNER BAY EAST END - NORTH ELEVATION





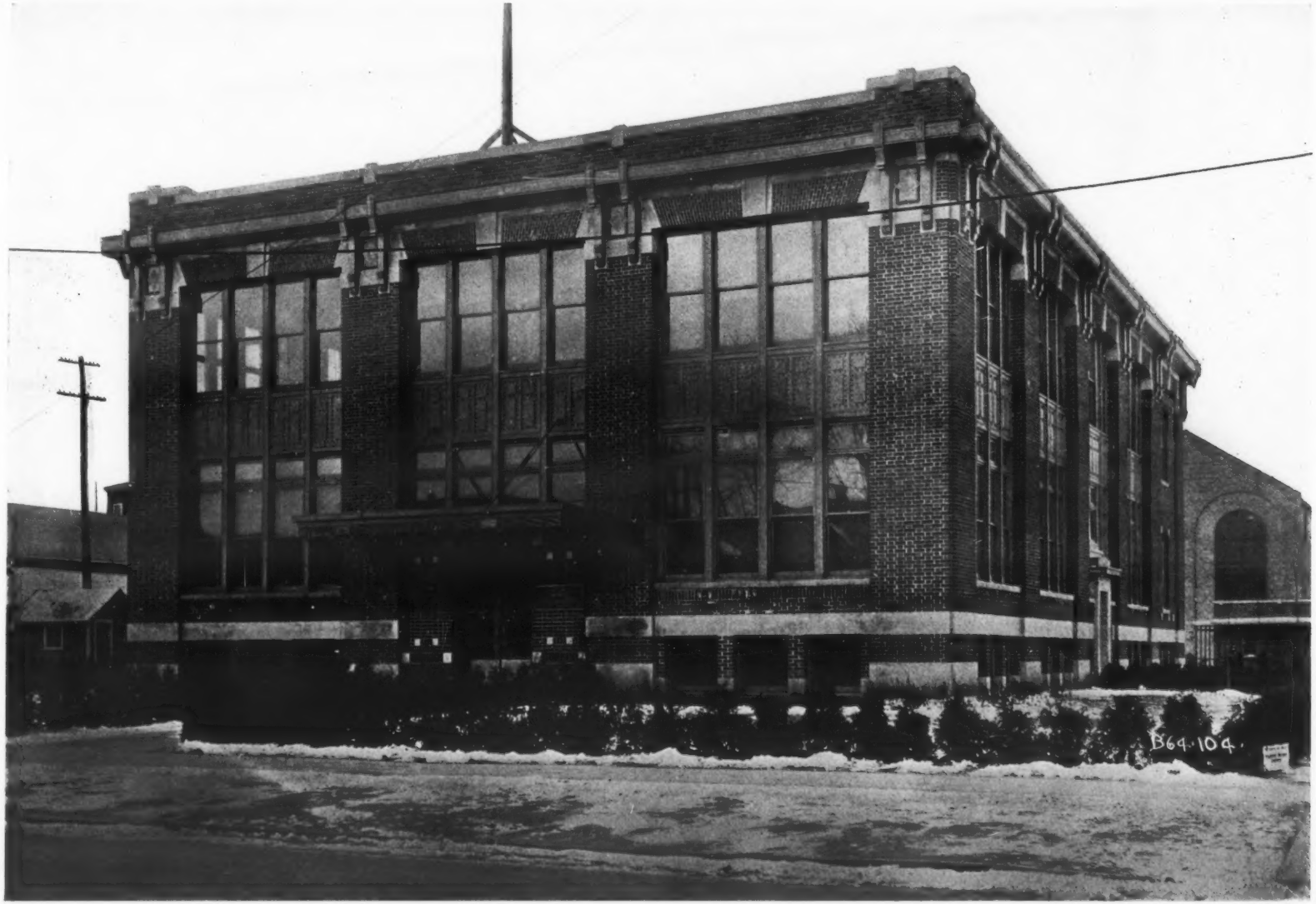
BUILDING FOR SPIETZ & WORCH CO. (BRANCH OF U. S. CIGAR MFG. CO.), DETROIT, MICH.

Mr. ALBERT KAHN, *Architect*—Mr. ERNEST WILBY, *Associate*



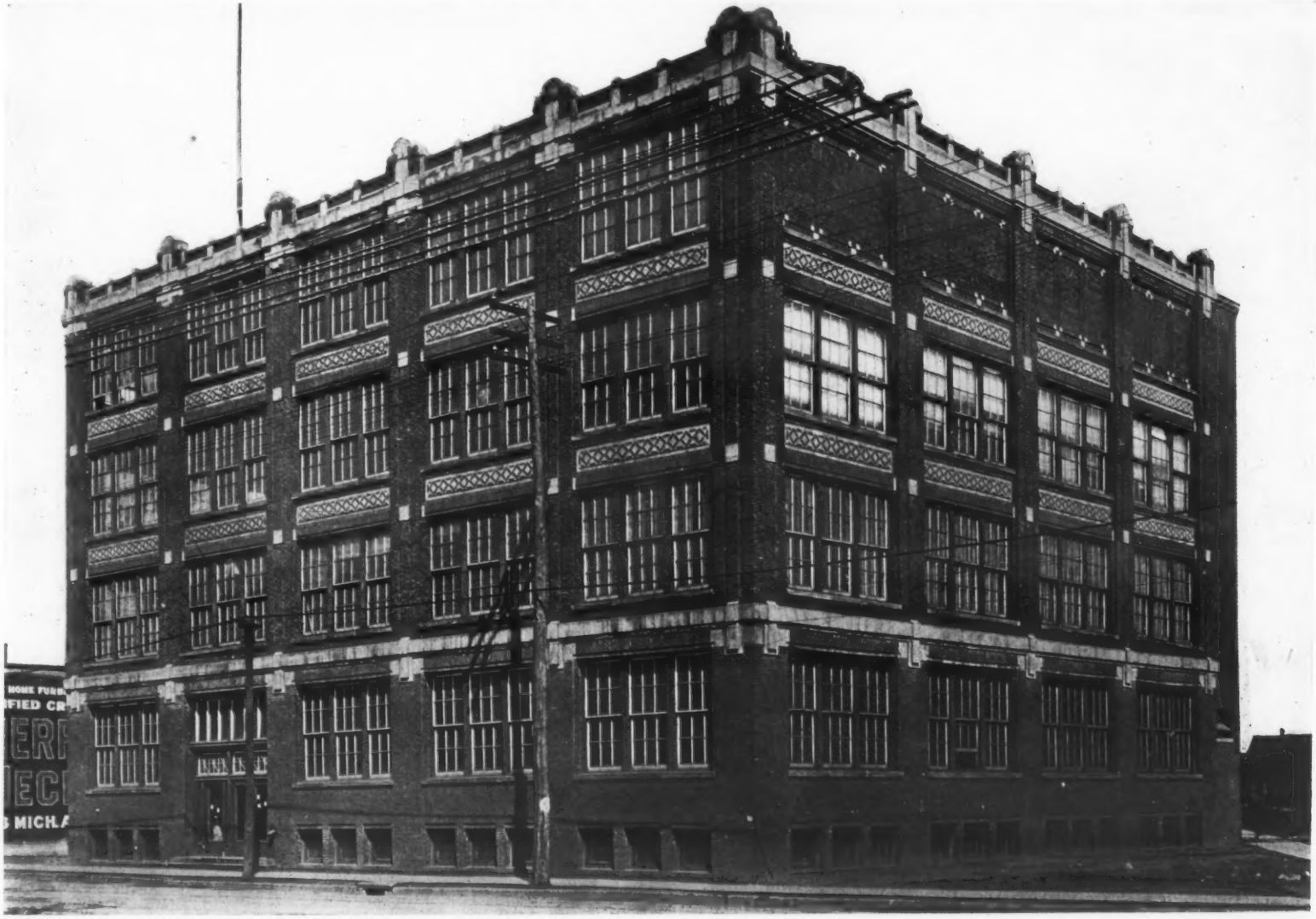
SERVICE BUILDING FOR PACKARD MOTOR CAR CO., CHICAGO, ILL.

Mr. ALBERT KAHN, *Architect*—Mr. ERNEST WILBY, *Associate*



OFFICE BUILDING, INDUSTRIAL WORKS, BAY CITY, MICHIGAN

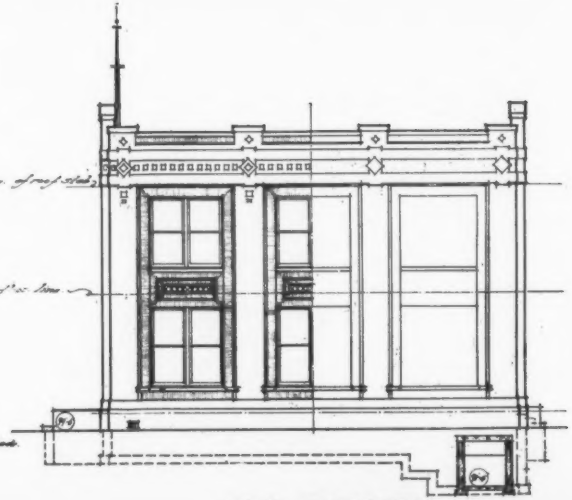
Mr. ALBERT KAHN, *Architect* — Mr. ERNEST WILBY, *Associate*



FACTORY BUILDING FOR THE SAN TELMO CIGAR CO., DETROIT, MICH.

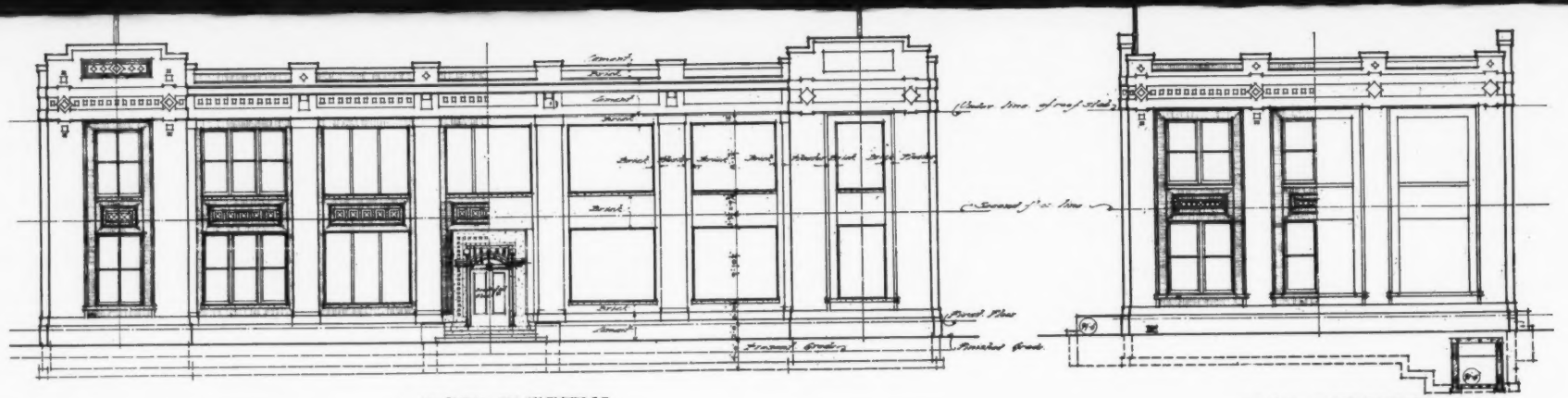
Mr. ALBERT KAHN, *Architect* — Mr. ERNEST WILBY, *Associate*

SOUTH ELEVATION



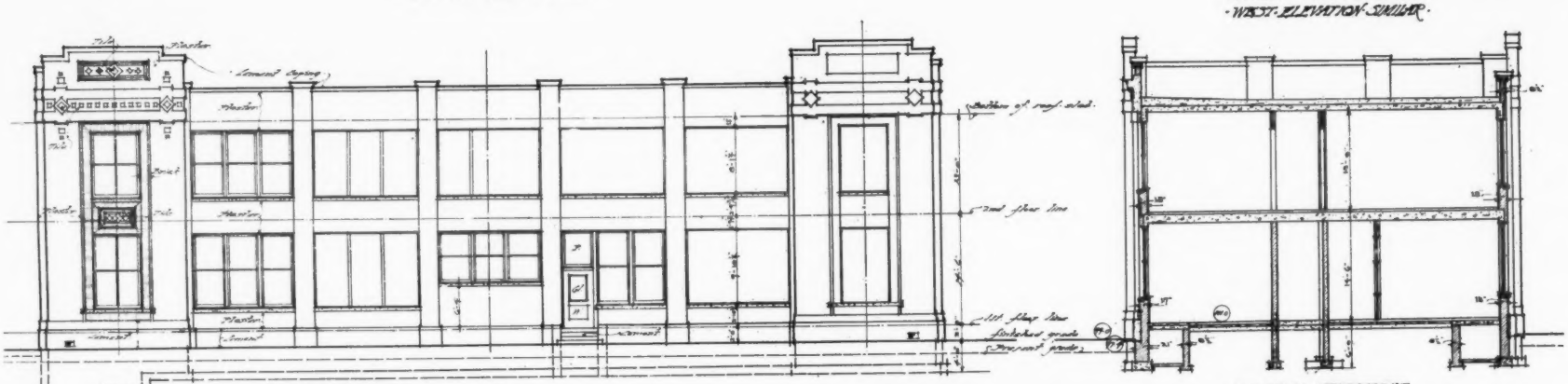
EAST ELEVATION

WEST ELEVATION SIMILAR



· SOUTH · ELEVATION ·

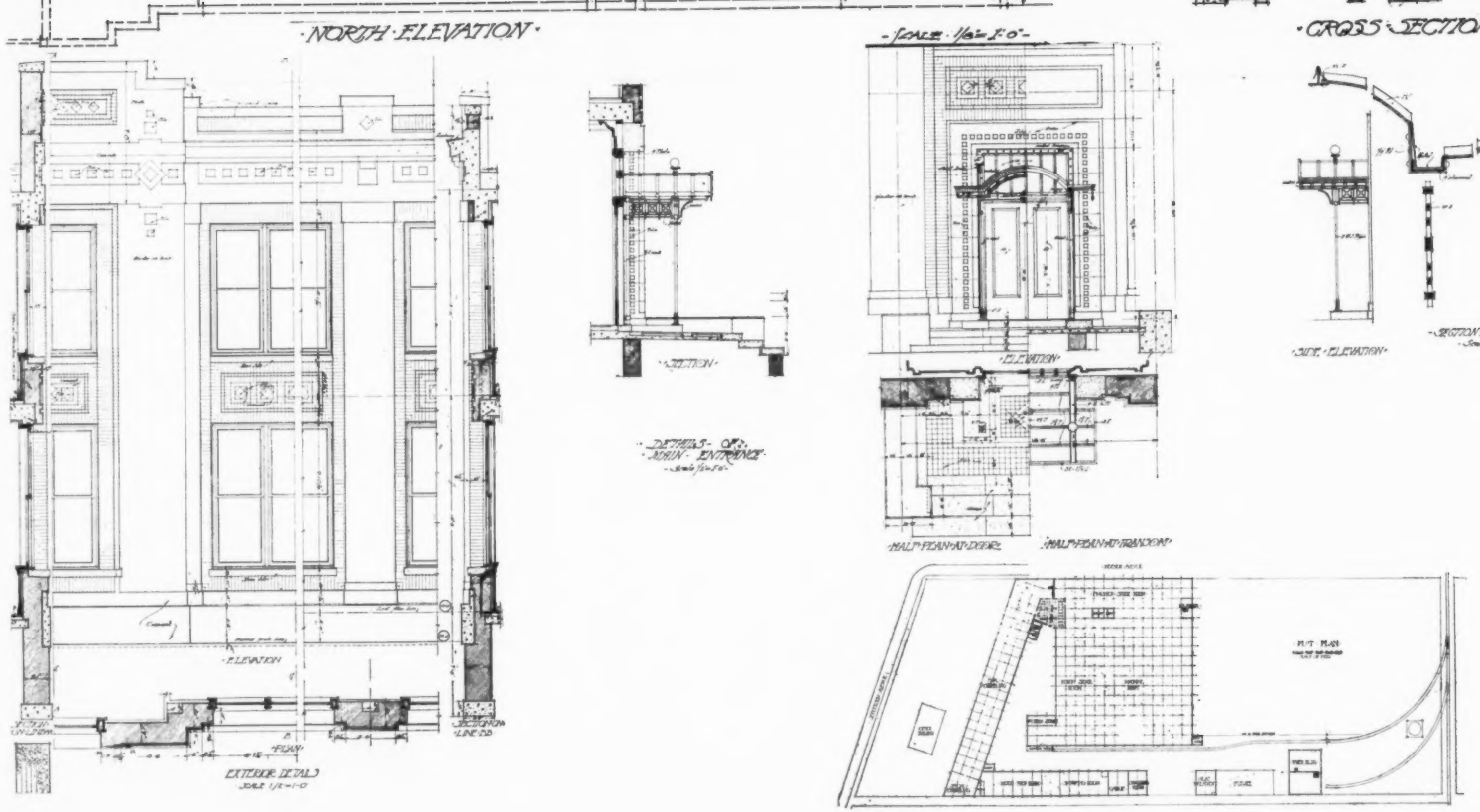
· EAST · ELEVATION ·
· WEST · ELEVATION · SIMILAR ·



· NORTH · ELEVATION ·

· CROSS · SECTION ·

· SCALE · 1/8" = 1'-0" ·



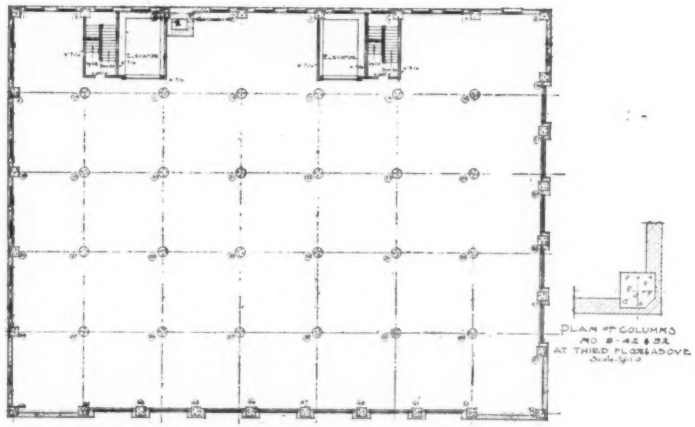
MAIN BUILDING, CONTINENTAL MOTOR MFG. CO., DETROIT, MICH.

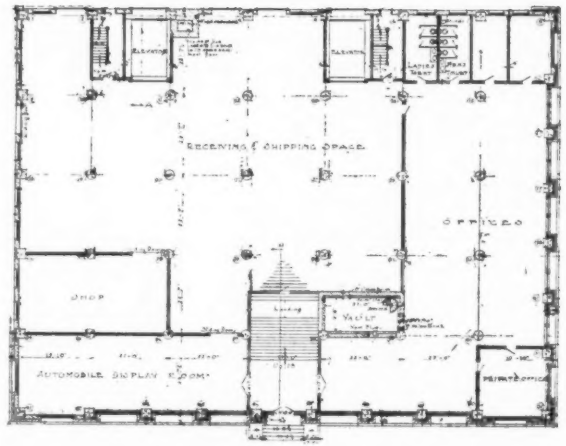
Mr. ALBERT KAHN, *Architect*—Mr. ERNEST WILBY, *Associate*

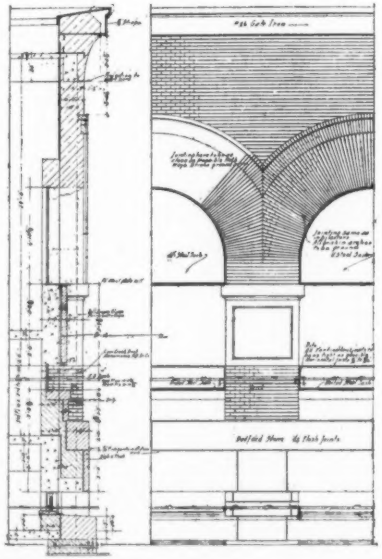
(See text for description of this building)

WAREHOUSE, GREAT NORTHERN IMPLEMENT CO., MINNEAPOLIS, MINN.

Messrs. KEES & COLBURN, *Architects*







WAREHOUSE

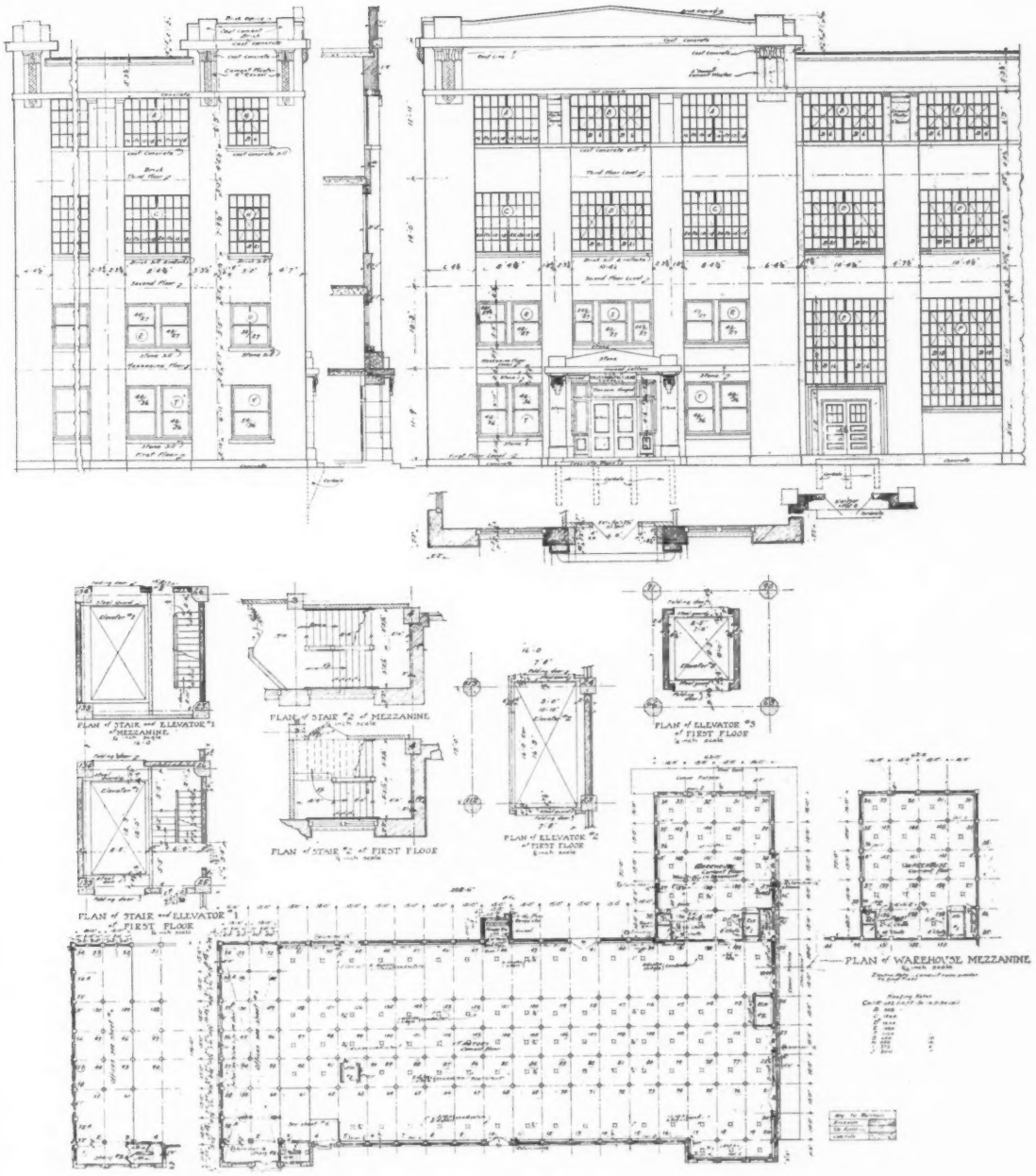
GREAT NORTHERN IMPLEMENT CO.

MINNEAPOLIS, MINN.

Messrs. KEES & COLBURN, *Architects*

BUILDING FOR THE KINSEY MFG. CO., TOLEDO, OHIO

Mr. GEORGE S. MILLS, *Architect*



BUILDING FOR THE KINSEY MFG. CO., TOLEDO, OHIO

Mr. GEORGE S. MILLS, *Architect*

LOTUS BUILDING, MEMPHIS, TENN.
WEATHERS-FOLEY CO., *Architects*

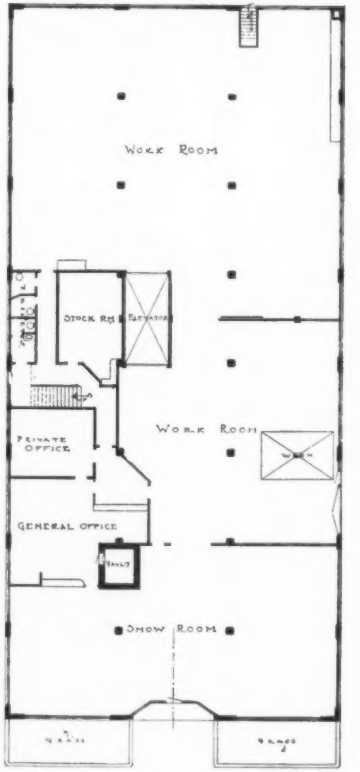
MONOTTI-LARIMER BUILDING, SAN FRANCISCO, CAL.
Messrs. McDONALD & APPLEGARTH, *Architects*

Above, MACHINE SHOP, PLANT OF MISSISSIPPI GLASS CO., ST. LOUIS, MO.
Messrs. BRENNECKE & FAY, *Architects*

Below, BUILDING FOR THE BEAVER POWER CO., DAYTON, OHIO
Messrs. SCHENCK & WILLIAMS, *Architects*

HUME CARRIAGE CO. BUILDING, COMMONWEALTH AVENUE, BOSTON, MASS.

Messrs. GAY & PROCTOR, *Architects*



PLAN OF FIRST FLOOR

PALAZZO PODESTA, GENOA, ITALY