THROVGH THE AGES

MAY, 1925

"A mount of marble, a
hundred spires."

—RUSKIN: *Lamp of Power*

THROVGH THE AGES

VOL. 3 MAY, 1925 NO. 1

CONTENTS

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A corner of the lobby of the General Motors Building, Detroit.
The main entrance doorways are of Tennessee marble
elaborately carved, after an old Roman design.

THROVGH THE AGES

A Monthly Magazine devoted to the uses of Marble - its universal adaptability, beauty, permanency and economy.

VOL. 3 MAY, 1925 NO. 1

THE FIRST NATIONAL BANK OF DETROIT

A Twenty-five Story Office Building that is the Tallest in Michigan

STAMPED indelibly against Detroit's skyline, there rears a gigantic white structure of stone and steel that reflects the sun's rays through the city's main arteries as they radiate outward like the spokes of a mammoth wheel. This building, the home of the First National Bank, stands as a finished monument to the living, enterprising spirit of commerce and citizenship in Detroit.

Years ago Oliver Wendell Holmes, that virile writer of the early nineteenth century, penned these lines:

"Build thee more stately mansions, O my soul,
As the swift seasons roll!
Leave thy low-vaulted past!
Let each new temple, nobler than the last,
Shut thee from heaven with a dome more vast,
Till thou at length art free,
Leaving thine outgrown shell by life's unresting sea!"

Like the chambered Nautilus, the First National Bank has outgrown its shell and has built for itself a home big and fine enough to enable it to fulfill its obligation to the community of which it has become so important a part.

Embodying the life effort of men who have pursued an ideal, and built upon historic ground, it is a tribute to men and motives, architect and artisan, science and success.

The streets of Detroit were originally laid out from the Campus Martius as a hub. Along one of these spokes, to the eastward, was left a market place, named Cadillac Square, in honor of that hardy explorer Count de la Mothe Cadillac, the founder of the city. From the day when gun and arrow fought for supremacy, to the era of barter between traders and merchants, and down to the present time, Cadillac Square has been the commercial heart of Detroit.

Upon the half-acre at the corner of Woodward Avenue and Cadillac Square stood the famous old Russell House, a hostelry that entertained the celebrities of the past. About the time that the motor car industry began to spread out the city's boundaries, and thriving manufacturing plants and increas-

The First National Bank Building is in the heart of business Detroit.

ing population gave a new importance to Detroit, a new hotel was erected on the site —the Pontchartrain.

With the passing of a decade, this hotel found that the standards of modern inn keeping had changed and it was no longer possible to continue on a profitable basis. Reconstruction was out of the question. The location was sold to the First and Old Detroit National Bank, and the present structure was completed in June of 1920.

The First National Bank in Detroit is the outcome of the amalgamation of several of the city's largest banks. The original First National opened its doors in 1863 in the Rotunda Building at Griswold and Larned Streets. Successive consolidation with the State Bank of Michigan, in 1864; the National Insurance Bank in 1869; the Old Detroit National Bank, in 1914; and finally, the Central Savings Bank, in 1920, gave an importance to the institution and an impetus to its resources that have placed it in the front rank of Michigan financial organizations.

The architect of the new building was Mr. Albert Kahn, of Detroit. The structure has an exterior of classic lines; the tip of the parapet on the twenty-fifth floor towers 312 feet above the street level, with graceful Corinthian columns supporting tier upon tier of stone blocks. It faces 161 feet on Woodward and 187 feet on Cadillac Square; its size, however, is difficult to realize be-

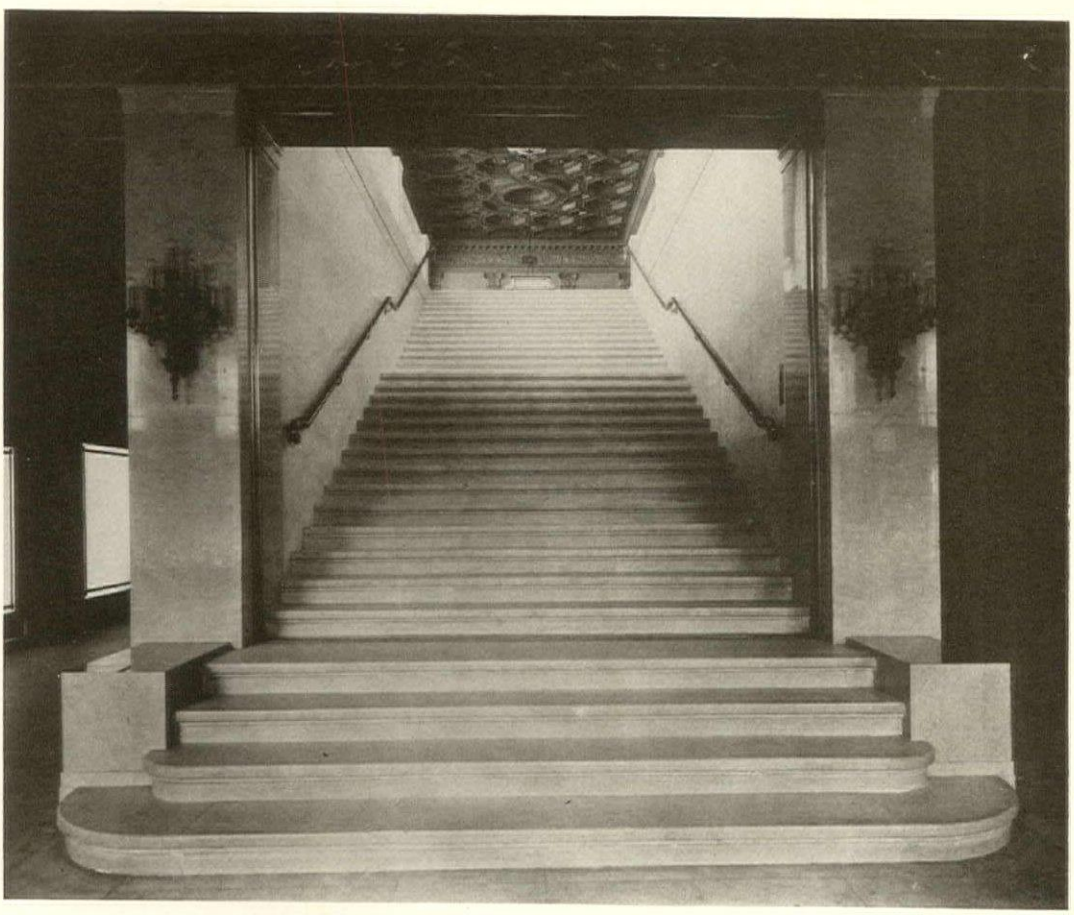
cause of the openness of its location. Seen from the sidewalk at its base, looking along the walls skyward, its huge bulk is more readily appreciated. Those who have gone to the roof on a clear day and viewed the city and country for miles around, have comprehended it even more fully.

Reaching down into the earth 84 feet, 74 bell-shaped concrete shafts, each 5 to 9 feet in diameter, form the rock-like foundation of this tallest building in Michigan. The lowest level of the building proper is 35 feet underground, there being three floors below street level.

Thousands of tons of steel columns and beams, fabricated as perfectly as a spider's web, hold rigid the mantle of stone, wood, marble, plaster, tile and brick.

Three entrances from Woodward Avenue open into the main lobby 40 feet in width and running back 85 feet to the Cadillac Square entrance on the left. At the far end of the lobby, doors lead into the Central Savings Bank and Foreign Department of the First National Bank. At the right is the U-shaped lobby from which a battery of ten passenger elevators operate at a lifting speed of 700 per minute.

From the center of the main entrance, a stately marble stairway leads to the banking chambers of the First National Bank. This stairway is 12 feet wide, of easy rise, with wainscoting and balustrades of Botticino, and the treads and risers of light gray Tennessee marble. In the banking room itself, Botticino Italian marble pillars rise to a



View up the main staircase, leading to the banking auditorium. Tennessee and Botticino marbles formed an effective combination.

The entrance from the elevators to the lobby of the main banking room.

height of 36 feet, supporting a handsome frieze blending in with the ceiling, which is artistically decorated in rich colors patterned into a Renaissance design.

A bronze grill fashioned into the same period design and mounted on a marble base forms the tellers' cages which flank the spacious room on three sides.

Mammoth windows, extending the entire height of the chamber, form the back wall of this lane. Flooded with daylight, the reception and disbursement of funds are thus carried on easily and efficiently.

There are eight main steel girders supporting the ceiling over the main banking auditorium. Each of these girders spans a length of 41 feet 8 inches from column to column. They measure 8 feet 4 inches in height from top to bottom. The weight of one of these beams alone is approximately 64,000 pounds. Each one separately will carry a load of approximately 1,400,000 pounds.

In the very center of this huge auditorium, an oval-shaped railing with marble spindles forms an island in which the operating officers are conveniently located to meet the bank's clients. At the east end, other officers have their desks on an elevation, to either side of which are the private offices of the president and senior vice-president.

The floor of the banking room is of Tennessee marble —some 64,000 square feet of it. The wainscoting of the walls, the panelling under the tellers' cages, as well as the columns, are of buff Botticino marble, of selected slabs.

The new business, advertising, legal, credit and service departments are located on the mezzanine floor, which is to the south of the main banking chambers. Here is also the bank library where reference may be made to the many volumes of books, magazines and literature pertaining to business subjects.

The second mezzanine or fourth floor is given over to the women of the affiliated

companies and provides a rest room, locker room, wash room and infirmary. Everything in the way of complete and sanitary equipment as well as comfortable furnishings makes this section a complement to the organization.

The fifth floor is the "workshop" of the bank; here is provided an ideal spot for hundreds of people and machines to handle almost noiselessly the records of this great financial institution. All the mail is sorted, books kept, statements prepared, audits made, checks handled and the bank's clearing house operated from this department.

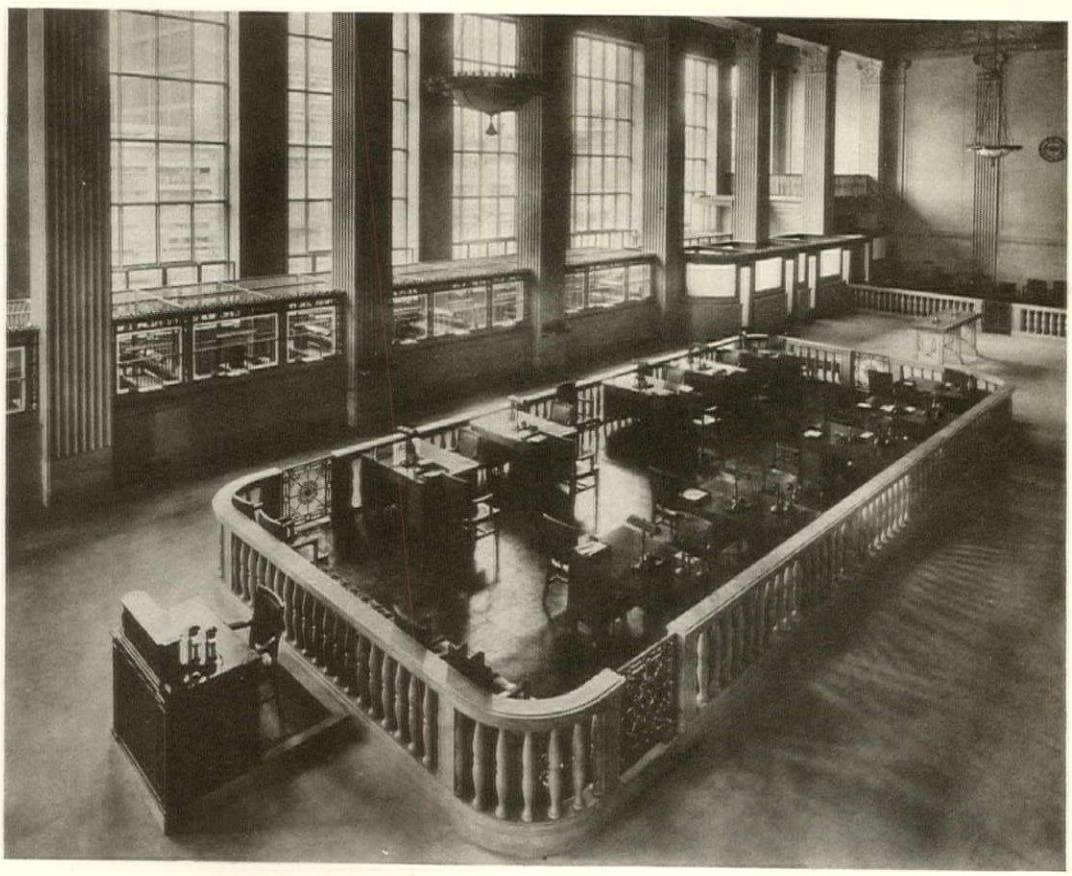
On the southeast corner of the sixth floor is located the directors' room. American walnut paneling, a beautiful marble fireplace and distinctive chandeliers make this one of the most beautiful rooms in the bank.

On the same floor is the officers' private dining-room; also a special dining-room, and two rooms which may be used as conference rooms by customers who may wish to hold meetings requiring such facilities. On the sixth floor are the offices of the building superintendent.

Up on the eighth floor are the offices of the First National Company of Detroit, which in every detail are in keeping with the executive quarters of the First National Bank.

Special elevators and two separate stairways are part of the provisions for rapid communication with the respective institutions and their departments.

There are eight vaults throughout the bank. In addition to the safe deposit and currency vaults, there are a late-deposit



Officers' island in the banking auditorium as seen from the mezzanine floor. The walls, floor and balusters are marble.

vault, an auditor's vault, a bookkeeping vault, a securities vault, an abstract vault and a bond department vault, all located conveniently for the use of those departments.

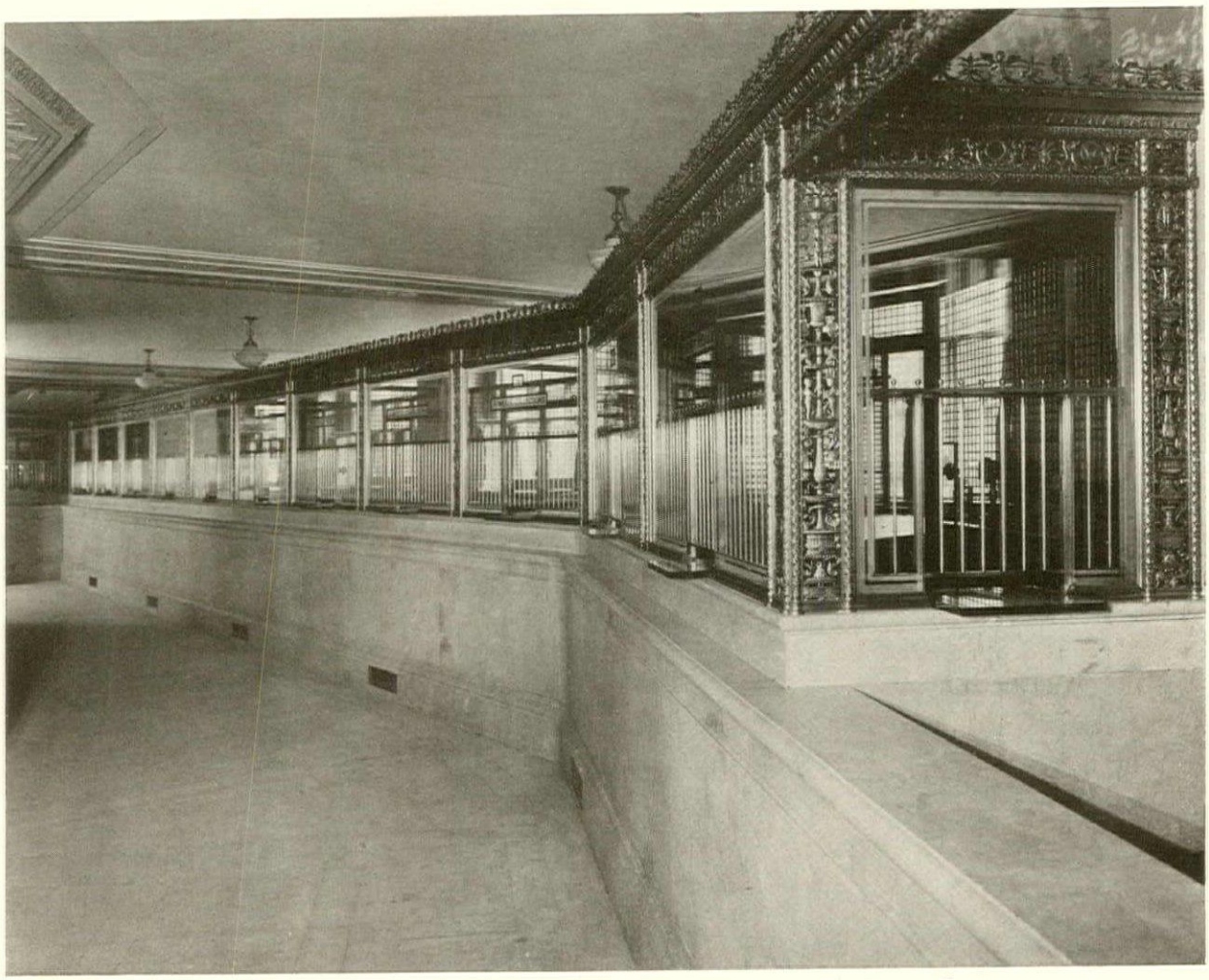
These vaults are the first in the West to be built in accordance with the findings of the Federal Reserve Board after months of experimental research and study resulting in the selection of the best type of construction. They are built of reinforced concrete and lined with armor plate. Seven miles of fine copper wire with a lead coating are woven throughout the side walls, ceiling and floor of the vaults.

This wire is charged with electricity so that the moment it is tampered with or broken by anyone seeking access through the wall, an extensive system of gongs is set ringing throughout the building and at police headquarters.

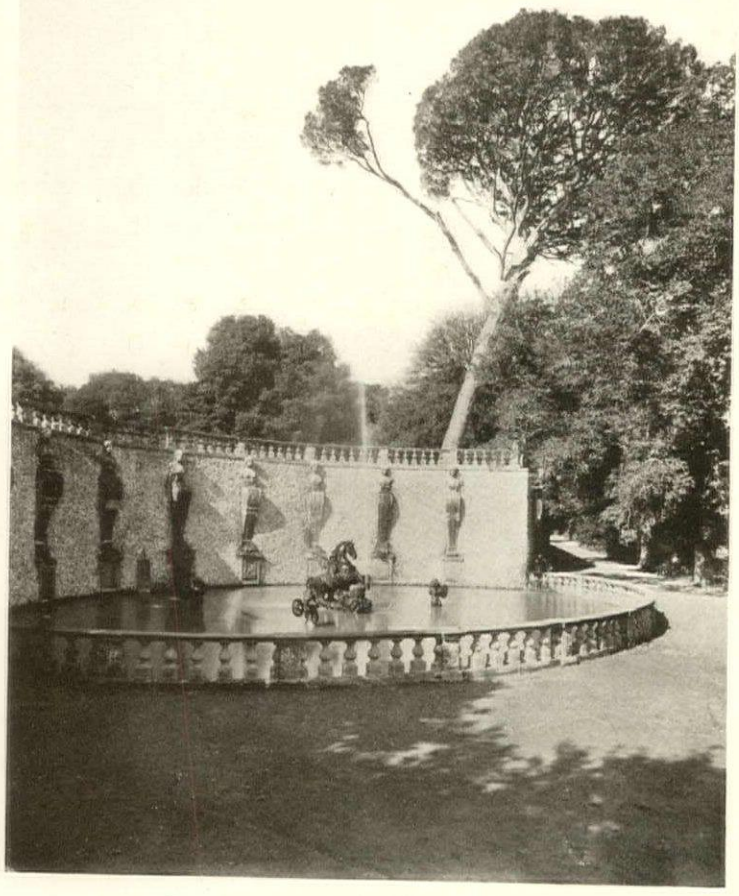
Washed air and a complete ventilating system make the basement floors as habitable as those above the street level.

Approximately 225,000 square feet of rentable area for general office purposes occupies the portion from the eighth to the twenty-fifth floors.

It is conservatively estimated that some 12,000 people enter and leave the First National Bank Building every week day—truly a sizable city in itself.



Detail showing tellers' cages in the First National Bank of Detroit. The floor is Tennessee; the panelling and wainscoting are of Botticino marble.



Fountain in the Villa d'Este, at Tivoli.

ITALIAN RENAISSANCE FOUNTAINS

IT has become fashionable of late years to be familiar with the old gardens and fountains of Italy, and there have appeared several elaborate volumes illustrating and describing them in detail. The architect can delve with profit into this phase of Italian art, for there is more to be learned by a careful study of the subject than is apparent at first sight.

The Romans built villas long before the sixteenth century. There was erected, for instance, more than 100 years before Christ, the Villa Adriana at Tivoli; almost on the site of the modern Frascati was Tusculum, a popular summer resort of classic times. Pliny and Mummius possessed villas of size and importance, and there were many others of an early date.

With the coming of the Dark and Mediæval Ages, there was developed the habit of fortifying the country house against enemies and this state of affairs was naturally reflected in the waning of the garden cult. The maintenance of a small vegetable patch was about all that was ever attempted and even this was a precarious matter. The massive

Illustrations courtesy of Thomas Machen, architect, Baltimore, Maryland.

Fountain delle Terme, Rome.
A Naiad.

Fountain dei Fiumi in the Piazza Navona, Rome.

Fountain delle Tartarughe, Rome, by Landini.

Fountain della Rocca, by Vignola, at Viterbo.

Fountain in the Villa Torlonia, at Frascati.

basements of the later Frascati villas, which were constantly subject to the raids of the hill bandits of the vicinage, were the outcome of such conditions.

The custom of erecting villas on the hills surrounding Rome was the logical result of the malarial conditions that prevailed in Rome during the summer months—and still persist to some extent in spite of the precautions of later day science. Since the disease is associated with low lying and marshy tracts, the villas were always built on the lofty slopes close by or on the more distant heights of Frascati.

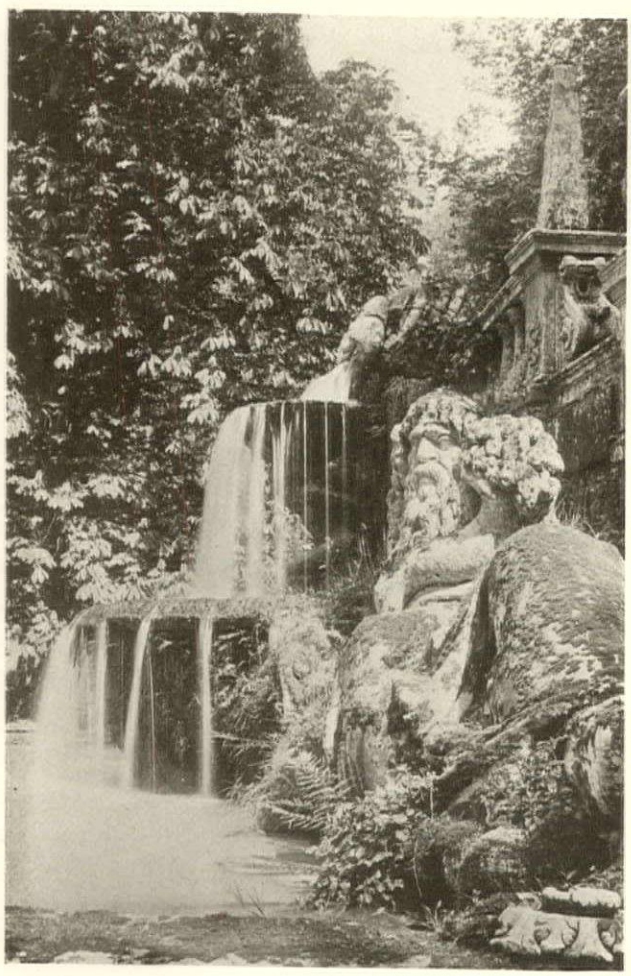
The position on the site was usually handled with considerable skill. "An axial line," says Briggs, "is usually taken from the main entrance to the grounds through the center of the house and beyond, and a formal treatment is adopted. But the whole triumph of this Italian garden design lies in its adaptation of nature to a conventional treatment, for . . . . the object of the Italians was not to create nature but to adorn it."

The architect led one by gentle stages from the saloons of the house to a formal terrace, adorned with statues and balustrades, and thence through a formal ilex-hedged walk to a rustic wilderness of woods beyond. As we have remarked in a previous article, the brilliant Italian sun was responsible for an almost complete absence of flowers. In their place were demanded two things in the garden—shade and running

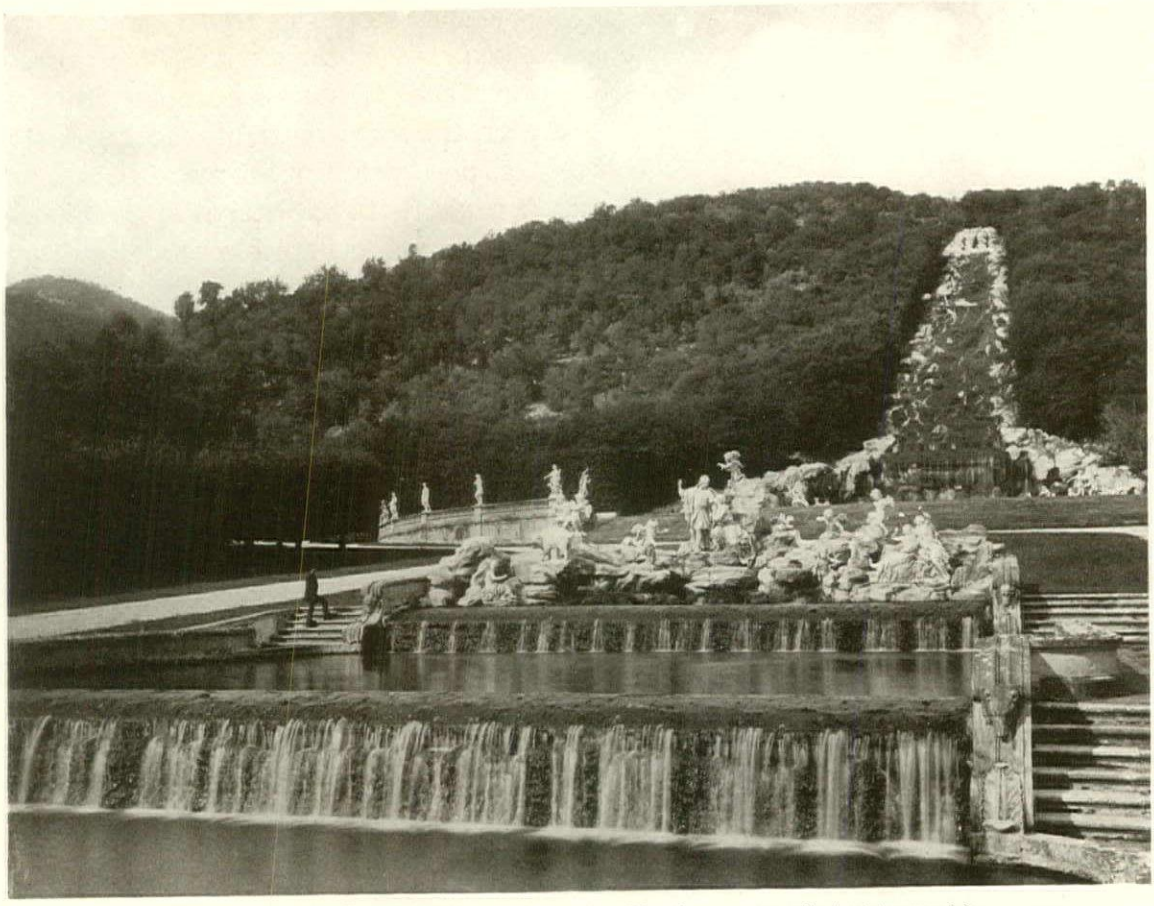
water. The first was not a difficult matter to provide, but the services of a hydraulic engineer was as much a necessity as the work of an architect.

The assignment of the water engineer was more than to supply water for the cascades and fountains of every kind, though these were prominent features in all the gardens; in many cases he was called upon to originate quaint conceits for the amusement and surprise of the delighted guests, oftimes resulting in generous dousings to the more unsuspicious. These wettings were taken without resentment, in keeping with the broad humor and slap-stick comedy of the day. Evelyn's diary at Tivoli some years later speaks of the "many devices to wet the unwary spectators, so that one can hardly walk a step without wetting to the skin." Montaigne tells us of organs played by water, the appearance of chirping birds and owls, and of many scientific tricks. Elsewhere we read of a house party, watching a sunset on a collapsible island near Isola Bella, which almost came to a tragic end when the whole group began sinking beneath the waters of the lake and drowning was imminent.

The many villas of Frascati form the best group in Italy and exhibit a variety of design. The Villa Aldobrandini we have already mentioned; others of importance are the Villa Torlonia, with its beautiful reservoir surrounded by balustrades, supplying a



Cascade in the Villa Lante, at Bagnaia; usually attributed to Vignola.



Cascade in the Royal Gardens at Caserta. The figures are all of white marble from the quarries at Carrara.

cascade that descends in curious ramps; the Villas Falconieri, Mondragone, Lancellotti and Mufti show excellent garden architecture. In all of them may be seen much that does not reflect glory on the Baroque architects, vulgarities and eccentricities that are inexcusable. We must bear in mind, however, that Italian Garden craft evolved about the time that the Baroque influence began.

The same thing may be said of the numberless fountains that are scattered so profusely about Italy and especially along the sun-scorched streets of Rome. No city anywhere has more of them and no city needs them more. Credit for most of these must be given to the seventeenth century Popes and their architects. Each new pontiff endeavored to surpass his predecessor in the size and magnificence of the aqueduct he brought into the city. The huge Aqua Paola on the Janiculum is the largest of these; it was designed by Domenicus Fontana and finished by Maderna in 1612.

The Fontana di Trevi, the work of Ferdinand Fuga, is so fine and so much bolder in its style than suggested by its date (1735-62) that it is sometimes attributed to Bernini. It is built of Travertine stone and when first planned, permission was actually secured to use the stone contained in the tomb of Cecilia Metella, which had already had a narrow escape, and which was only saved now by violent resistance on the part of the people of Rome.

Bernini was the author of several foun-

tains that are objects of interest to the tourist. The principal ones are the Fontana dei Fiumi in the Piazza Navona, the Acqua Acitosa, the group known as "La Barca" in the Piazzo di Spagna and the Fontana del Triton in the Piazzo Barberini. Symbolical figures arranged with a great deal of vigor and executed by different sculptors distinguish the first of these.

Similar to the Fontana del Tritone are the fountains by Giacomo della Porta, the Paola in the Piazzo della Verita, and the Tartarughe. These are more sculptural than architectural and represent very graceful treatments for isolated fountains in open squares.

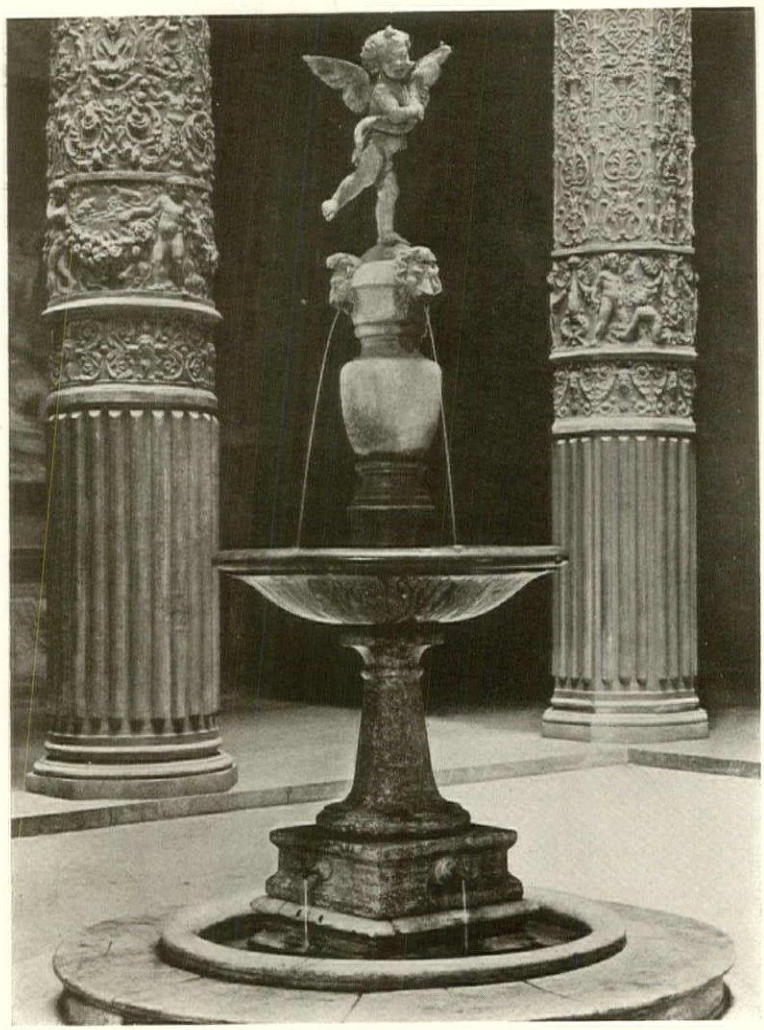
Many of the private palaces had in their courtyards and gardens treatments of another kind. Water was introduced in front of a wall surface and a different principle was involved. The famous Pitti Palace in Florence had, for instance, in the Boboli Gardens connected with it, many fountains, the designs of Buontalenti and Il Tribolo, who prepared the garden scheme jointly in 1549. The fountain by Ammannati, illustrated on another page, is at one end of the *piano terreno* of the palace itself, and is of the same school as Vignola's works.

About twenty miles north of Naples is the vast royal Palace of Caserta, bearing a similar relation to its larger neighbor as Versailles does to Paris. In 1752 Luigi Vanvitelli began his grandiose scheme that developed into the elegant architectural display that is now in existence. The palace

Another view of the Cascade at Caserta, about twenty miles from Naples. Luigi Vanvitelli (1700-73) was the architect.

forms a rectangle 600 feet by 800 feet, built around four quadrangles. On the south is a colonnade containing extensive stables; on the north are the gardens and a great cascade that extend the line of the axis upward for about two miles to the peak of the adjacent hills. The palace building is far less Baroque in character than the gardens, with its cascade containing numerous white marble figures. This statuary lacks the interest of connected architectural treatment and consequently suffers a loss in artistic values. Even so, the haphazard placing of these figures in natural poses in the formal pools of running water forms a scene of magnificent grandeur that is comparable even to the effect achieved at Versailles by André.

The plans of most of the Baroque gardens and fountains of Italy are worthy of high praise, but in many cases the details are too complicated, and the ornamentation either too trivial or too cumbersome. There is oftimes a want of harmony between the landscape and the treatment of the gardens, and the fountains seem tawdry when compared to the works of the great cinque-cento architects. Too many of the details are almost puerile—as in the case of the Villa d'Este, with its toy model of an ancient city, thought to be Rome—but even the most tawdry of these treatments have a certain charm.



Fountain in the cortile of the Palazzo Vechio.

THE CLEVELAND MUSEUM OF ART

Character

THE greatness of a statue or a building does not depend on what it has in common with other statues or buildings, but on what it has peculiar to itself. "We move too much in platoons; we march by sections," said Chapin, criticizing the lack of individuality prevalent in his day.

The architect who plans a structure of character and distinction almost invariably chooses marble as the medium for his expression.

THE PORTLAND ELKS' TEMPLE

PORTLAND, Oregon, has often been called America's most beautiful city and its inhabitants are as certain it deserves this as fully as it does its other title of the "Rose City." With a population already of something over a quarter of a million, and a location that is favorable for manufacturing and farming industries, it is not to be wondered at that Portland should be rapidly taking its place as one of the most thriving municipalities of the West.

Many new business buildings have been constructed in the past few years, and quite a number of handsome homes, too, but for beauty of design and sheer elegance of interior treatment, none of these can surpass the Elks' Temple recently completed. For that matter, few club buildings anywhere in this country are superior to this fine structure, and it is easily the finest Elks' Temple in the United States.

The building stands at the corner of Eleventh and Alder Streets. Construction was begun by lifting the first spadeful of earth for the foundation at 11 P.M., December 31, 1921. Nearly a year later, September

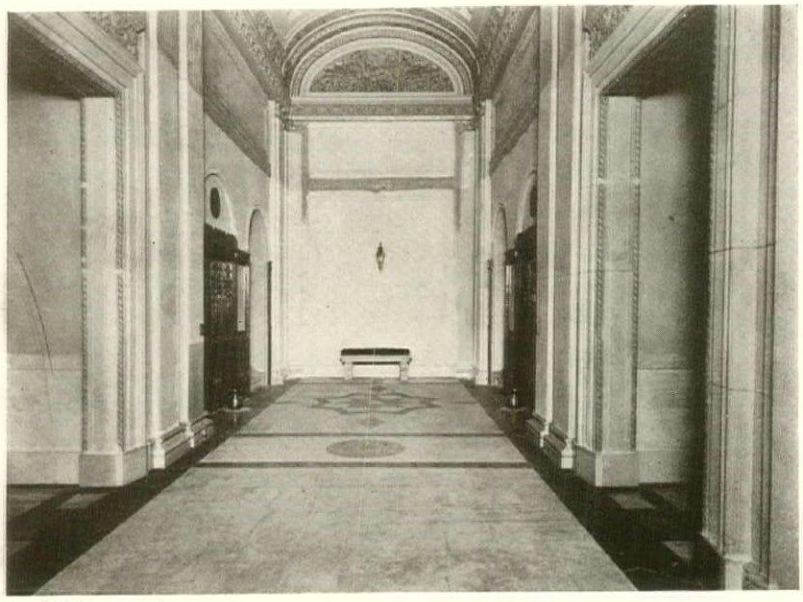
21, 1922, the cornerstone was laid, and the work was practically completed at the end of 1923. Oregon firms provided all the equipment and materials, wherever possible, and the design and construction were the work of local talent. The architects were Houghtaling and Dugan, of Portland.

Six stories in height, the exterior style is Italian Renaissance of the earlier period. The ground and mezzanine floors, of ample ceiling height, are given over to shops, except for the main entrance on the long dimension. This entrance is impressive; it is featured by two fluted columns that divide the vestibule into three parts, each of which has its individual doorway. The side portals are arched, and above each is a circular panel in relief. Between these and over the central door there is a larger rectangular panel to conform to the shape of the central portal.

A frieze extends around the building at the mezzanine floor, with a balcony just above it. The windows of the first upper story are square headed, with heavy cornices; the next two floors have alternate arched and pedimented dormer cornices, with the top floor showing almost square windows completely surrounded by heavy mouldings, with a touch of decoration at each side. Above is a frieze course of inscriptions, above which in turn is the main cornice, heavily projecting. The building is finished off by a pseudo-attic story. The whole façade depends mainly for its effect upon the distribution and adornment of the openings, of which there are seven on the width and thirteen on the length of each of the upper floors.

Through the large doorway described above, one enters immediately into the main lobby, with its creamy coloring and its columned treatment. From this lobby, elevators and stairways lead to the rest of the building, which is devoted exclusively to the varied activities of the Elks, except for the store spaces on the ground floor. One is immediately struck by the generous proportions of the rooms, and the warmth of atmosphere that has been achieved in spite of these large dimensions. The Italian influence manifest upon the exterior is readily perceived in the interior; and the size of the

Detail of Main Entrance Doorway.



The Elevator Lobby on the main floor, with its floor of Champville marble bordered with Blue Belgian. The inserts are Black and Gold marble.

chambers is apparently less than in fact, so snug and comfortable do they seem. There is, however, considerable variation in the individual rooms, and this deviation from the usual monotony enhances the effect of each part of the structure.

The floor of the first floor lobby is of Champville marble, with borders of Blue Belgian, inserts of Black and Gold marble and a base of Tranniville. Elaborate frescoes increase the general impression of richness. From the basement two stairways lead up to the fourth floor; the treads, risers and wainscoting of the stair hall are of Colonial Gray marble from Missouri. Until one sees this material in place, one would be inclined to think that such a dark gray stone would not be in harmony with the color scheme of the rest of the building. On the contrary, it not only looks well, but has the advantage of not showing the dirt, which is bound to accumulate at intervals, even though the building is kept particularly clean at all times. Over 6,500 square feet of this marble were used, not only in the stairs just mentioned, but in the lavatories and the office room.

A long hallway on the second floor leads through a succession of high archways to the club quarters. The floor is tiled, and has a base of Tavernelle Fleuri marble. The library offers an interesting deviation from the usual Renaissance treatment. It is finished in tall walnut-brown panelling of Tennessee gumwood, and running around the upper portion of the wall is a bronze frieze that symbolizes the initiation ceremonies of the Elks. A Black and Gold

The Buffet on the second floor has counters and shelves of Blue Belge marble.

The beautiful Dining-Room, a symphony in brown and gold. Yellow Siena and Black and Gold marbles are used here.

marble base and a yellow Siena mantel add to the effect. Near at hand is the billiard room, with its bright green-topped tables contrasting with the dark wall decorations, relieved by a medly of conventionalized lions, tigers, parrots and other exotic creatures done in splashes of color.

The Card Room adopts the Chinese for its motif, and every detail has been carefully worked out. The old palaces of the mandarins are suggested by the overhanging ceiling, and the frieze shows the unsuccessful but never-ending pursuit of the Goddess of Chance, remindful of one of the dominant traits of the Oriental character.

The Buffet is across the hall, and has all the charm of the ancient wine cellar, with modern appurtenances. The counters and shelves of this important compartment are of Blue Belge marble. Check rooms and ladies' rooms are convenient to this same floor, the latter rooms appropriately done in white, with rose hangings and background accentuating slender columns of Grecian design—the whole most gracefully feminine.

The third-story lobby has floors of Italian Blue Belge, with Black and Gold and yellow Siena, the design copied from the Pompeiian. This lobby leads to the Banquet Hall, one of the most luxuriant rooms in the entire temple. The Dining-Room will seat about 135 people and the furniture is upholstered in imported mohair tapestry. The hangings are brown and gold, and a color harmony is obtained by the use of yellow Siena marble for the wainscoting and pilaster facings, with bases of Black and Gold. The ceiling is hand painted in oil and suspended from it are

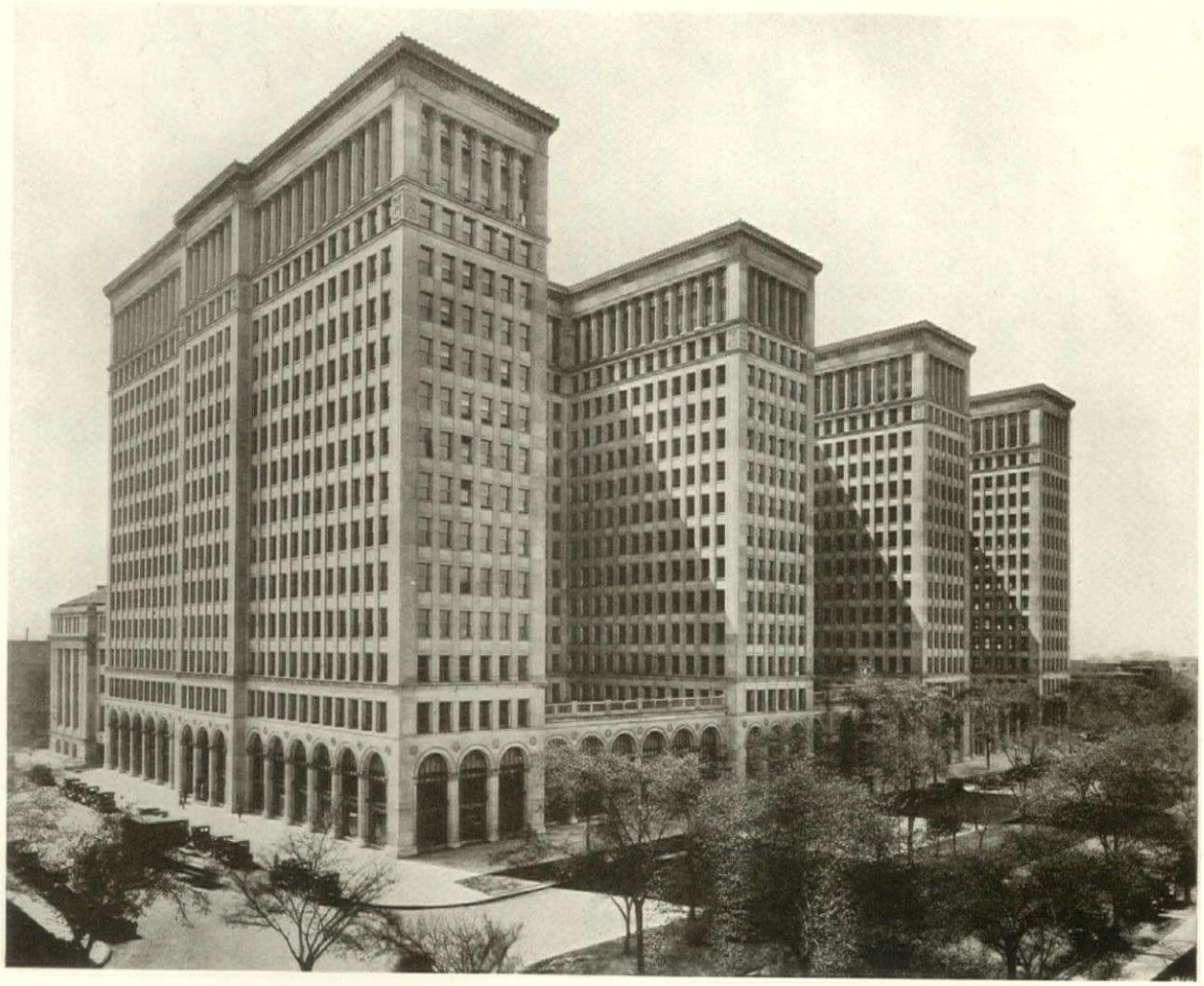
several elaborate crystal chandeliers.

Across the lobby is the Ballroom, with its base of Tavernelle Fleuri to carry out the buff tone that prevails throughout the chamber—a tint that is almost the same as the exterior of the building. Prominently displayed in the frieze and ceiling are figures emblematic of the various phases of the terpsichorean art. Large crystal chandeliers afford ample illumination. The fourth floor is given over to the Lodge Room, its anterooms and the necessary quarters for the candidates and various committees. The lodge room has a wainscoting of Champville and the same material appears in the platform floor and the steps leading to it. On the two main walls are illuminated tablets in honor of the deceased members, and enumerating the principles upon which the lodge is founded. Walnut colored furnishings and light-toned hangings contrast vividly with the cream-colored pillared walls and this is intensified by a system of illumination that can be varied at will from a soft radiance to a brilliant glare.

To care for the bachelor members of the lodge, there are fifty-two suites of rooms located on the mezzanine floor between the fourth and fifth floors and on the fifth floor itself. All these are sumptuously furnished with metal that stimulates wood finish; forty-one of these suites are equipped with shower baths of Italian marble. Besides these private showers there is a swimming pool some 60 feet long, and 9 feet deep at one end.

The general equipment of the building is very complete, from kitchen to heating plant. The air of the entire building changes completely every eight minutes, the new supply undergoing washing, filtering and heating. A refrigerating system with a capacity of 500 pounds a day manufactures all the ice used. Hand-ball courts and an exercise room add to the athletic entertainment of the members.

Ballroom entrance, Elks' Temple, Portland, Oregon.



THE GENERAL MOTORS BUILDING

Its Thirty Acres of Floor Area Contain Over Four and a Half Miles of Marble Corridors

ERECTED as the result of the good will created by superior workmanship, the General Motors Building stands as a monument to the permanence and stability of the motor industry. Primarily a business structure, it possesses in its mass, proportion, silhouette and detail, all the art and beauty of a public edifice. It looms superbly on one of Detroit's principal boulevards, covering the entire city block bounded by West Grand Boulevard, Cass Avenue, Second Avenue and Milwaukee Avenue; a block 500 feet long and 325 feet deep. With its thirty acres of floor space it is one of the largest office buildings in the world, and if it were devoted entirely to office purposes, it would house 11,000 tenants. For the maintenance of the huge structure, there is required a force of 460 men and women, working incessantly.

In design and execution the building presents many interesting points. The structure is fifteen stories high, made up of the ground floor arcade, a plain shaft consisting

The entrance lobby has a marble floor in two tones of Gray Tennessee; the walls up to the ceiling are of Tavernelle.

of a series of piers and uniform windows, and an attic above the shaft formed of a colonnade of the Corinthian order, all crowned by an ample cornice.

When it was originally decided to erect the building there arose the immediate problem of securing the required amount of land in the most suitable locality. Congestion of the downtown streets and lack of proper parking facilities, particularly in an industrial city with factories widely scattered, determined the locality in an accessible and geographically central spot. Fortunately, at this location land was comparatively inexpensive and instead of high values compressing such a building into a gigantic tower with a minimum of light courts, we have an office building in its normal free development with light courts 69 feet wide; a building surrounded by wide

streets and tree-lined boulevards, providing the necessary conditions for making work both efficient and pleasant. Owing to the ingenious plan on which the building was conceived, every office is an outside room and has the advantage of unobstructed daylight.

The chief architectural interest of the building lies in the masterly handling of its separate large units, and the application of classic detail to a modern commercial structure. This building in its beauty, its cheerfulness, its unity and its repose, is but a direct and normal development of the necessity which gave it birth. Its simple, straightforward lines and the noble material out of which it was constructed, lend dignity to the structure.

It can readily be seen from the accompanying illustrations that the first floor is devoted largely to showrooms; the balance of its fifteen stories consists mostly of offices. The arcaded show windows around three sides of the first floor of the building invite attention to its ample size and to the showrooms which run straight through to the interior corridors.

A feature of the design and ornamentation is the main entrance on West Grand Boulevard. This consists of a loggia of three arches carried on warmly colored and polished columns with Ionic capitals. The vaulting of the loggia is of stone elaborately carved. The main entrance doorways in the rear of the loggia are of Tennessee marble beautifully carved from a design suggested

East-and-west corridor, ground floor, looking east.

Typical upper floor east-and-west corridor. This is a view looking west from elevator lobby, thirteenth floor.

by an old Roman doorway. These portals establish the tone of the entire building. They are amply proportioned and, at the same time, not too large. They infuse into the tenants who daily pass through them, a feeling of importance in being housed in so magnificent a structure.

Over the main entrance is a monumental clock flanked by two symbolic female figures representing Chemistry and Mechanics. The main lobby, as well as the elevator lobby, and the imposing corridors leading both east and west, have floors finished with light gray and dark gray Tennessee marble worked into a simple yet pleasing pattern. The walls are finished to ceiling height with Tavernelle marble, monotone in color, but with sufficient variety in veining and texture to give interest to the surface.

The care with which small details have been handled is shown in the character of the lighting fixtures, directory boards, store fronts and corridor doorways. The delicately modeled bronze store fronts, finished to a light statuary bronze color, are relieved by the base of Verde Antique marble. The coffered plaster ceilings of the main corridor are richly decorated in colors and old gold in the style of the Italian Rennaissance. Carved oaken doors lead from the center of the main floor elevator lobby into the ballroom and an auditorium capable of seating some 1,300 people. The auditorium

has ample corridors, foyers, gentlemen's and ladies' retiring rooms, check room, etc.

The main staircase is formed of light veined gray Tennessee marble treads and risers, with wainscoting and base of Tavernelle marble. All the corridors above the main floor have wainscoting 7 feet high of Alabama marble—a total of about 90,000 square feet. As in the case of the main floor corridor, the floors of the upper corridors are finished with light gray and dark gray Tennessee. There are, all told, about 4½ miles of marble corridors from the second to the fifteenth floors. All the toilet rooms throughout the building are finished with Alabama marble.

The upper floors, from the second to the fourteenth inclusive, are all divided into offices thoroughly lighted. No space is more than 20 feet from an outside window. On the fifteenth floor an area of 30,000 square feet is set apart for a cafeteria, dining-room, kitchen, bake-shop, etc., probably the most extensive establishment of its kind in this part of the country. Every attempt has been made to provide the most modern and efficient equipment for this cafeteria. The large, airy kitchen is fitted with various mechanical aids for the rapid preparation and serving of food. The cafeteria has a capacity of 1,250 seats. The dining-rooms are so arranged that a banquet of any size up to 1,000 guests can be expeditiously handled. In addition to the main dining-room there are four large sized private dining-rooms for public use. Verde Antique

Façade of the Laboratories Building.

marble is used as a base both for the dining-rooms and for the Board Room on the floor below.

All resources of modern knowledge relating to the construction of office buildings were brought into play in designing and creating this business home of the General Motors Corporation. It is difficult to conceive of the many complex mechanical problems which presented themselves in its design. A high type motor car involves many complicated mechanical problems; but the modern office building is, in its way, an even more complicated piece of machinery. It is designed to effect certain definite results, and to house a special group of people. The plans are more complicated than those for an automobile because they cover a much wider range of service. It requires, therefore, more imagination, ingenuity and mechanical skill to design such an elaborate and huge creation, than to plan the most powerful automobile ever built.

The four essentials in modern shelter, namely, water, light, heat and ventilation, have in this building been provided for in an efficient and permanent manner. The bodily comfort of the tenants of the building is carefully looked after. Drinking fountains on each floor throughout the building provide specially filtered, ozonated, sterilized and sparkling water. The artificial lighting is laid out on scientific principles to provide, in the different portions of the building, the proper intensity of light for the purpose to which the space is put. A well-regulated temperature is maintained throughout the building by means of 5,000 steam radiators. The windows and transoms are ample in size and number for efficient ventilation.

The building contains 24 passenger and 2 freight elevators. The passenger elevators are big and roomy, having a speed of 600 feet per minute. They are all equipped with a micro self-levelling device which automatically levels the elevators at the floors, thus combining high speed efficiency with safety. The elevators are arranged in two banks of twelve each, facing each other on opposite sides of the corridor. These elevators are placed as near as possible to the main entrance, so that they afford the quickest means of entering and leaving the building without confusion.

A large power house two blocks away from the main building provides all the necessary heat, light and power required. An underground brick lined tunnel 8 feet high and 11 feet wide is constructed between the power house and the sub-basement of the main building. Through this tunnel are laid all the service mains, including steam lines with a sufficient capacity to furnish heat to a city of 25,000 inhabitants. The power house itself is a model of efficiency. There are four enormous boilers of 500 H.P. each. In the equipment of the boiler house all possible labor-saving devices were installed. Automatic conveyors transport the coal directly from the railway cars to the overhead coal bunkers and similar conveyors carry the ashes from the basement to an overhead hopper which, by means of gravity, discharges the ashes back into the railway cars. As a result of all these improvements it requires only three men to run the entire power plant.

The main building, with space and service for 6,000 people, enough to populate a thriving village, is equipped in such a complete manner that it becomes a self-contained and independent community. Here the citizen finds all that he needs for comfort and convenience. The shops in the lobbies include a cigar store, haberdashery, drug store and soda fountain, cafeteria, flower shop, barber shop, news stand, postal

and telegraph service, public telephones, a railroad ticket office and a branch bank. Even a branch of the stock exchange is found in the building. In other parts of the building are to be found a swimming pool of the regulation size, bowling and billiard parlors containing nineteen bowling alleys and twenty billiard tables, a miniature golf course, hard tennis courts and a gymnasium. Luxurious living quarters are provided for the various out-of-town officers of the General Motors Corp.

The Laboratories Building, in the rear of the main building and running the full length of the parent structure, has a special exterior treatment. Between the windows of the second, third and fourth stories are panels of Levanto marble from Italy, as shown by the illustration on page 27.

Besides housing the general executive offices of the Corporation, the General Motors Building contains many important organizations connected with the parent company. We here find located the general executive offices of the Fisher Body Corp., the largest builders of automobile bodies in the world; and the offices of the Chevrolet Motor Co., the world's largest maker of standard automobiles. United Motors Service, Inc., another subsidiary of General Motors, is a tenant of three bays on the eleventh floor.

In different parts of the building are display rooms for the products of all the subsidiary corporations. Such well-known makes as the Oakland, the Chevrolet, the Buick, the Cadillac and the Olds are represented by first floor show spaces. GMC trucks and Dayton Wright aeroplanes are also shown. Other parts of the main floor are devoted to the display of products of subsidiary companies like Frigidaire refrigerators, the ignition equipment made by the Dayton Engineering Laboratories Co., and the farm lighting and power plants of the Delco Light Company.

The General Motors Corporation were fortunate in the selection of their architect, Albert Kahn, of Detroit, who has had so extensive an experience in industrial and commercial architecture. In the design of this structure his work speaks for itself showing, as it does, a comprehensive understanding of the practical as well as architectural requirements of an office building.

A HANDBOOK OF MARBLE

It is the purpose of the National Association of Marble Dealers, to publish as soon as possible, a handbook on marble. The material contained in this book will be contributed by those best qualified to speak in an authoritative manner on the various matters treated. This is the twelfth installment and contains part of the fourth chapter, written by John Stephen Sewell, President of the Alabama Marble Company. These extracts will probably undergo some slight changes before appearing later in book form.

CHAPTER IV—Finishing Marble

It is convenient to divide this subject into two sections:

(1) Thin Stock—2 inches or less in thickness.
(2) Cubic Stock—more than 2 inches thick.

The first classification includes most of the so-called "plain work," *i.e.*, pieces or slabs which are nearly always rectangular and hone-finished or polished on one or more faces and sometimes on one or more edges.

The second classification includes most of the work which is cut, molded, carved, or turned and then usually hone-finished or polished.

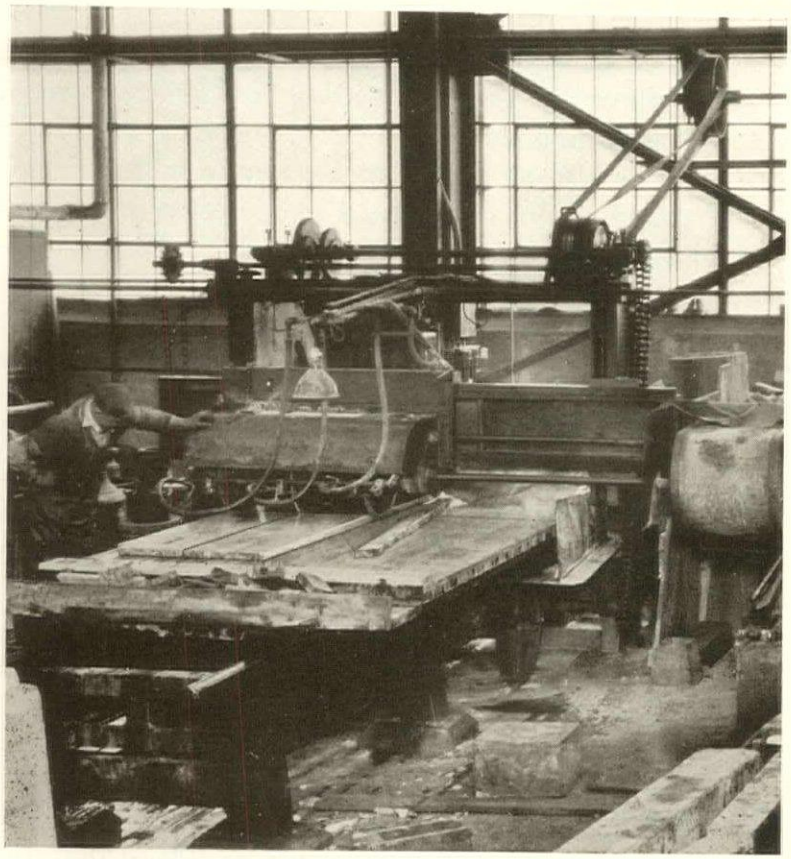
Some light moldings are made of stock less than 2 inches thick, and some pieces of thin stock require a certain amount of cutting; on the other hand, some pieces which are more than 2 inches thick do not differ in any other respect from ordinary plain work. So the two classifications overlap somewhat; but, in the main, they are quite distinct, as will appear.

THIN STOCK

Standard thicknesses of thin stock are 7/8 inch, 1 inch, 1 1/8 inches, 1 1/4 inches, 1 1/2 inches, 1 3/4 inches and 2 inches. By far the greater portion of the plain wainscoting used in the interior of buildings is made from slabs which are 7/8-inch thick as they came form the saws. The finishing processes diminish this thickness by an amount which varies from 1/16 inch to 1/8 inch—the former being more nearly an average value for the diminution in thickness.

Marble partitions, standing alone, as in toilet rooms, are made of slabs which are from 1 inch to 1 1/2 inches thick as they come from the saws. Counter tops, table tops, seats, floor slabs, stair treads and platforms are made of slabs from 1 inch up in thickness, depending upon circumstances. Slabs 1 inch thick and thicker are also used for door and window trim, stiles and rails in panelled wainscoting, for light moldings, pilasters, etc.

Probably the principal reason for drawing the line between thin stock and cubic stock at the 2-inch thickness is that, before the diamond saw and carborundum wheel were available, stock up to 2 inches in thickness was cut or "coped" to size by hand, while if it was thicker than 2 inches, it was sawed a second, and sometimes a third time, in the gangs. There is still a good reason for continuing the practice based on the cost of sawing. It costs appreciably more to saw a block into thin slabs than into thick ones; the determining factor is, of course, the number of blades in the gang. While the law that connects the number of cuts with the rate of sawing is not accurately known, experience indicates very clearly that the direct cost of sawing thin stock, is, in general, about 20 per cent greater than the cost of one sawing for cubic stock, and that, in es-



A carborundum coping machine used for cutting slabs to exact size. This machine is also known as a gang-coper, because extra wheels can be inserted and many strips cut at once.

timating costs, to make the change at the 2-inch thickness fits the facts accurately.

COPING TO SIZE

"Coping" is the term used in the marble trade to describe the process of securing pieces of the desired size from "full size" slabs of thin stock as it comes from the saws. Formerly, it was done by laying out the sizes required on the full size slab, scoring the lines with a chisel, then breaking the marble along the scored lines. Of course, this resulted in more or less ragged edges, which were, and are, subsequently trued up on the rubbing bed, or otherwise. From ½ inch to ¾ inch has to be allowed for this, depending upon the nature of the marble, in each case. Some marbles can be broken to almost a perfect straight line—others are quite erratic.

In the case of marbles like Tennessee and the ordinary grades of white Italian where there is no question of matching or otherwise specially considering the distribution of veining and clouding, and where the blocks are of advantageous size, the waste in coping is a minimum; it may be as little as 10 per cent. In extreme cases, where the "color," as the veining and clouding are known, occurs in a large scale pattern, the waste may be 50 per cent or more.

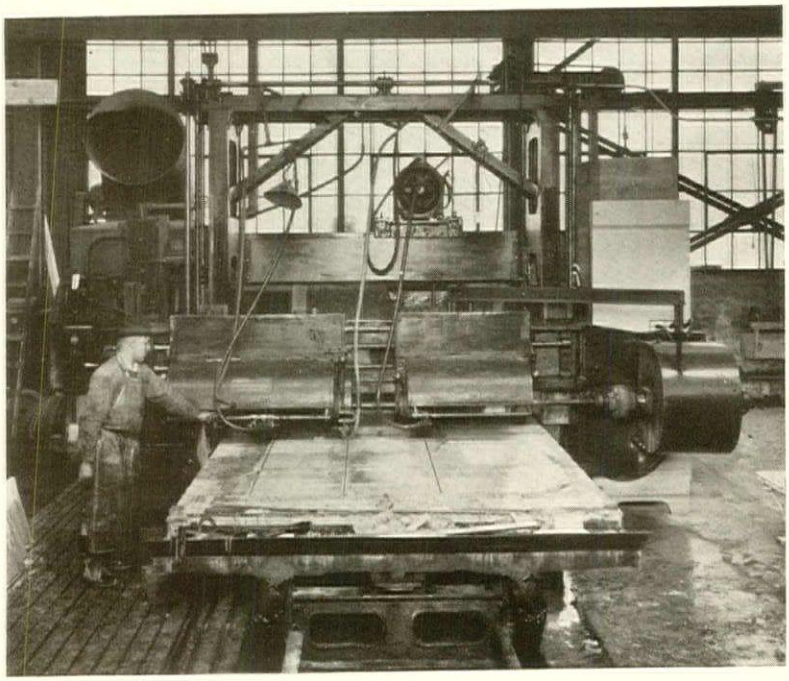
Since the introduction of carborundum, it is possible to put a slab on a carborundum machine and cut it accurately to size, with edges finished, and with a cut not more than ¼ inch wide. From one to six or more

wheels can be used at one time on some machines, and where the marble can be simply cut to size like sheets of metal, a great saving can be effected by finishing the full size slabs, then cutting them to the sizes desired on a carborundum machine. But where the color must be matched or otherwise considered, and where slabs have cracks running irregularly, but far enough apart to yield sound pieces of the desired size, it is still often more economical to cope by hand, in the old-fashioned way. In such cases, all the cuts may be oblique to the edges of the slab, and some of them may be oblique to each other. Changing the slab for cuts of varying directions on the carborundum machine may cost so much as to more than counterbalance the savings in other ways.

It costs from $2.50 to $3.50 per hour to operate a carborundum machine; it is, therefore, important to keep it cutting all the time. Idle time while running is very expensive. A hand coper's time is worth perhaps $1.00 per hour, counting his wages and the cost of maintaining a place for him to work. He can change the directions of his cuts with almost no loss of time. So the carborundum machine has, by no means, eliminated him from the trade.

The operation of coping is extremely important; if skillfully done, the waste is reduced to a minimum consistent with the best results. Of course, it is relatively simple in the case of marbles like Tennessee and ordinary white Italian. But where veining and clouding occur in any but a very small scale pattern, the use of the material to attain the best results is a real art.

If veins or clouds of color run through the block at a sharp oblique angle with the saw cuts—a condition which is often inevitable —the pattern will be offset from slab to slab, owing to the removal of the marble in the saw cut. The coper then has to shift the slabs accordingly to match the pattern. This leads to cutting off a strip from one end of one slab and from the opposite end of the other, to reduce two adjacent slabs to the



A combination coper, having a cross-cut head.

same size, with the color pattern matched. Such strips are often a total waste.

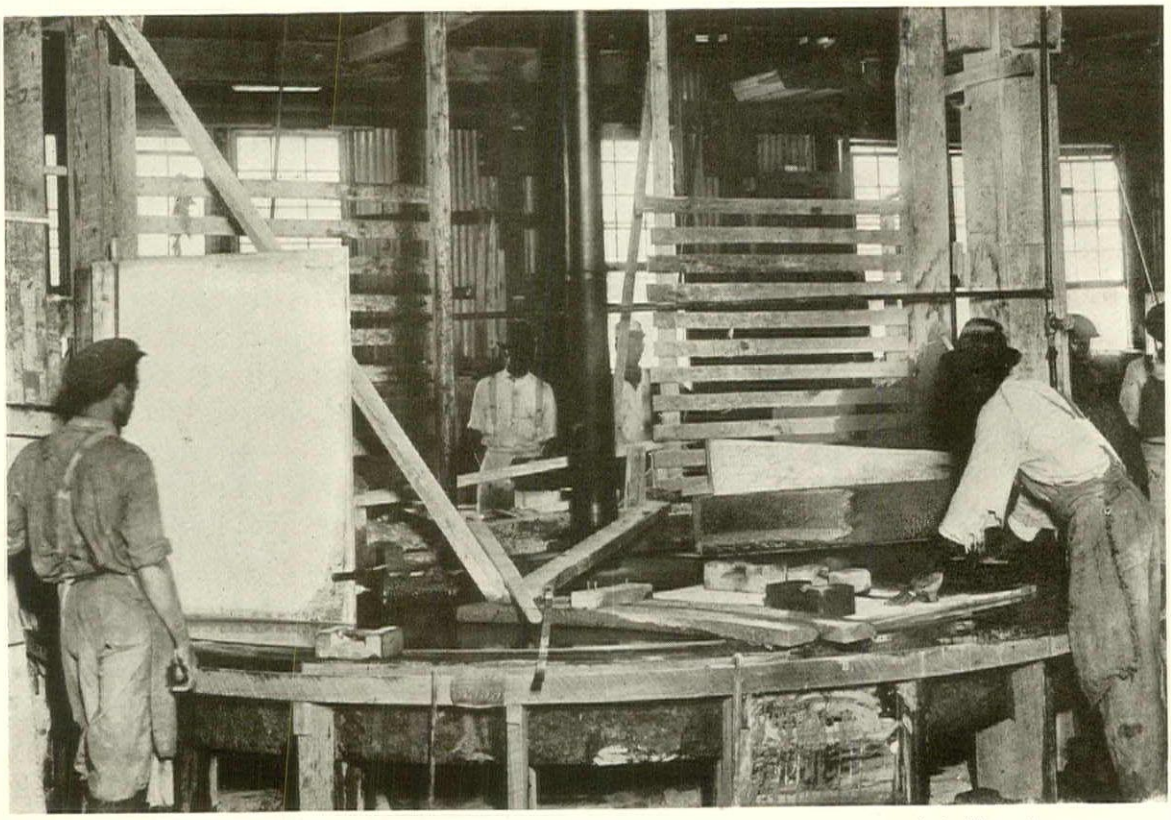
Where more has to be cut from each slab than is required by the above condition, the coper may do much to make the best possible job, by using those parts of the slabs which make the most beautiful pattern. The coper's task may be greatly facilitated, especially in the case of expensive and richly decorative marbles, if the block is sawed, to begin with, for certain pieces, considering in this connection their relative positions in the building and the distribution of color in the block. Tilting the block slightly in the gang and sawing it in a direction slightly oblique to its own principal dimensions may help the coper very materially; where thin stock and heavy pieces are in close juxtaposition in the final job, it is often necessary to saw a block in a very expensive and complicated fashion, in order to get adjacent pieces in the job out of the same part of the original block. Unless this is done, violent contrasts are often unavoidable. The best use of richly decorative marbles is really almost one of the fine arts—and the necessary skill comes only from long experience.

In all such cases, the job is made or marred, to begin with, in the sawing and coping. Subsequent processes can maintain a high standard already attained in sawing and coping—or they can greatly lower it. But no matter how well they may be carried out, they cannot make up for lack of skill in so sawing and coping the material as to bring out its greatest possibilities.

Some marbles—especially white marbles—are characterized by clouding which is not regularly distributed, nor of uniform amount and depth of color. In such cases, the coper should select neighboring pieces, first, with a view to a uniform background; this often requires using slabs from different blocks; second, with a view to having the clouding in any one group of adjacent slabs or pieces present the appearance that would have resulted if the group of pieces had all been one piece to begin with, and had been simply cut up into smaller sizes for convenience in handling or to conform to a scheme of jointing. When an architect who has been used to matched slabs is first confronted with marbles now under discussion, the irregular distribution of the color is often the first thing that strikes him, and he usually objects to it. But if the work is well done in the manner just described, the uniformity of the background soon asserts itself and becomes the dominant characteristic; in such cases, the material makes its own way into favor. It is perhaps a good thing that the nature of the marbles available compels us to use sometimes the one scheme, sometimes the other. Both are good—both have their spheres of usefulness—and each really gains in value from the existence of the other.

The next operation after coping to size, is rubbing. This is done on rubbing beds, consisting of large circular cast-iron plates revolving about a vertical axis. A thin stream of sand and water is fed onto the bed at the center and distributes itself by centrifugal force over the face of the plate. Pieces of marble to be rubbed are laid, face down, on the bed, and the face is ground smooth and true by the sand. Of course, the cast-iron plate wears away also. A plate 4½ inches thick will last about 9,000 hours. At present prices, this item represents a cost of about ten cents per hour.

If slabs have been coped by hand, the edges must be rubbed also. Usually, it is possible to have one slab edging and one facing at the same time. There must be across the bed one or more "head blocks"—usually heavy timbers—under which the bed revolves. As these have to clear the vertical axis, on one side or the other, the bed is



A rubbing bed, fitted with one principal head-block (seen just behind the vertical shaft) and one subordinate head-block, seen in foreground. On the right is a slab of waste marble, braced against the head-block, to equalize wear on the plate. On the left, just to the right of the slab being edged, is a piece of casting, used for the same purpose.

divided into two unequal parts when one head block is used, which is the usual case. When one block is used, two men can work on the same bed at the same time, but one of them can handle larger pieces than the other, as he has a greater area of the bed available.

The function of the head block is to enable the work to be held in one position while the plate revolves under it. Where a large number of small pieces are to be handled, more than one head block may be used, dividing the bed into three or four sections, and enabling more than two men to work at once.

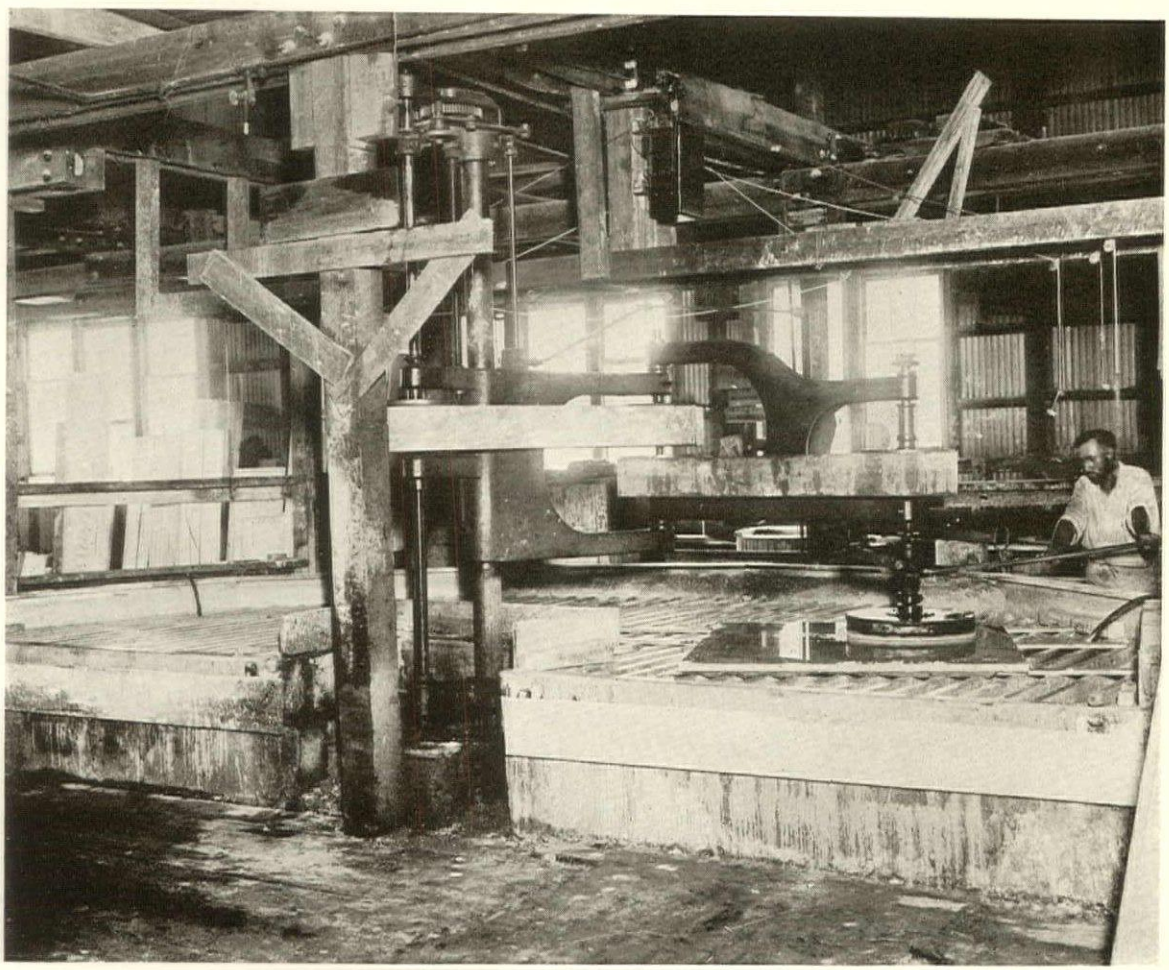
Rubbing bed plates are usually 12 or 14 feet in diameter. In large plants, it is well to have some of each size. Beds as small as 10 feet in diameter are used, but the other sizes are more generally useful.

Where a large number of narrow strips or small pieces are required, it has become customary to finish full size slabs and then cope them on a carborundum machine. This, within certain limits, is a great gain—not so much because of the reduction in direct cost, but because of the greater output from a given equipment, thus reducing indirect and overhead and increasing the rate of turnover of the invested capital, which, at the best, is rather slow in the interior marble business. If all these small pieces are first coped and then finished, one side of the rubbing beds is usually occupied with them; the other custom enables the beds to be filled on both sides with pieces as large as they will take. The output is thus considerably increased. Of course, many small

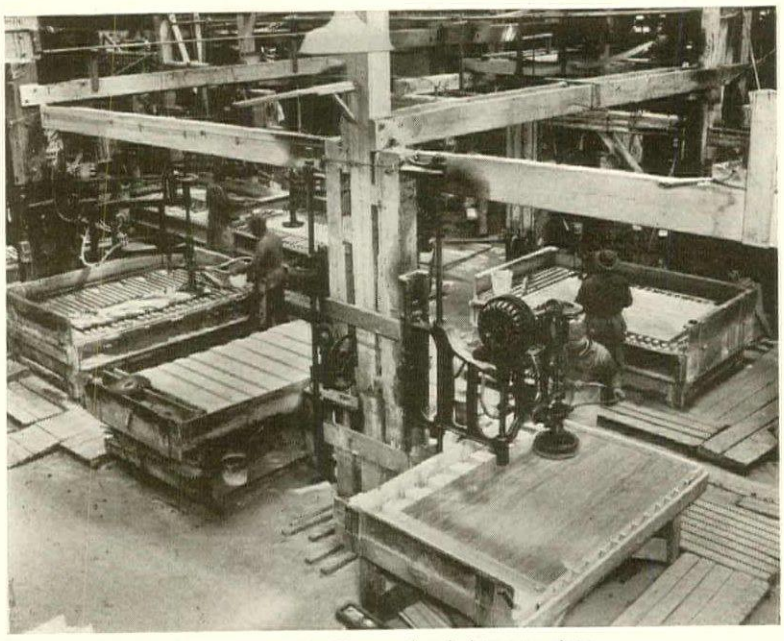
pieces must be handled in the old way, in spite of all that can be done—as when a lot of base or border is obtained from strips cut from larger slabs in previous work, or when such strips—or tiles—are obtained from cracked or unsound slabs which, because of the cracks, cannot be handled as a whole.

The rubbing bed, like the gang, looks like a rather crude tool; but a good "bed-rubber," as the workman is called, can easily work to a tolerance of one sixty-fourth of an inch—and probably to one-hundredth, if there were any need for it. He can square up pieces of marble so that they test perfectly with a steel square—and he can rub them with equal accuracy to any oblique angle, if he is furnished with a proper template.

It is necessary to keep the beds true; with pieces of varying sizes and shapes, which will naturally be kept on the part of the bed where they are most convenient to handle, the upper surfaces of the plates would soon be worn unevenly, if the matter were not constantly attended to. Pieces of scrap marble and rectangular blocks of cast iron are kept on the beds in positions where they will not interfere with the work, and so adjusted that they tend to equalize the wear. Of course, a good workman will so manage his work as to make the wear as uniform as possible; if he is a thoroughly skilled mechanic, his work will not often have to be interrupted in order to true up the bed. But with inexperienced workmen, this is a fruit-



A large gritting machine, used for buffing only.



A battery of buffing and polishing machines.

ful source of delay and expense.

Rubbing beds make a very disagreeable rumbling noise unless they are driven by gears with wooden teeth; with wooden gear teeth, if the beds are properly lined up, the beds are almost noiseless, except for the grinding of the work. They should produce no vibration at all. The best drive is an induction motor which ought to be mounted overhead at the same general level as the driving gears at the top of the shaft of the bed. A 12-foot or 14-foot bed may require nearly 25 horsepower to run it under some conditions of loading; the power required at starting may, for a few seconds, reach 35 horsepower. It is not a bad plan to drive two beds with one 50-horsepower motor, and, in starting up, bring one up to speed, empty, before starting the other. Both should be brought up to speed before any work is put on them. The proper speed is from 38 to 45 revolutions per minute.

It has been decided to incorporate in this series of articles, and in the handbook which will be the final result, a separate chapter on the subject of costs; mere statements of average costs for the various operations in finishing marble are misleading unless accompanied with detailed explanations, therefore this subject will be deferred to a proper time and place.

In the case of rubbing beds, as indeed of all marble working machinery, adequate provision must be made to carry off and get rid of the slush. Quite an elaborate system of underflow drainage is necessary; the fall must be rapid enough to keep the solid material moving, and it is well to have the drains large enough for a man to crawl through them so that in case of stoppage, they can be certainly and completely opened up without tearing up the floor. In one shop, 24-inch terra-cotta pipe was used, with a rapid fall. Of course, its capacity as a drain is greatly in excess of any actual requirements; but it has been a good investment, nevertheless, because of the ease with which it is kept clean. It carries the drainage from all the machines in one of the half-dozen largest shops in the country devoted to inte-

rior marble work exclusively, and as mere insurance against interruptions, it is worth more than its relatively small excess of cost over any other system that would work.

GRITTING AND BUFFING

These are the final operations in finishing interior marble, and, in the case of plain work, they follow immediately after the rubbing.

A gritting machine consists of a vertical shaft, belt or gear driven at the top, carrying a revolving head at the end of a horizontal jointed arm which is of such a length that it can cover the whole of any slab of ordinary dimensions. The slab is laid, face up, on top of a bench—or "banker," as it is called in the marble trade—which has a number of parallel strips of wood close together—*i.e.*, two or three inches apart—upon which the slab rests.

The revolving head is fitted with plates of gritting materials; it is brought into contact with the work and moved so as to cover, in succession, all parts of the surface to be finished. A stream of water is fed onto the work under the head, to avoid "burning" the marble. The gritting materials formerly used were natural sandstones of varying texture, from coarse to fine, followed by the application of a head fitted with pieces of hone. Some shops still use some of these natural grits, but most of them use heads made of artificial abrasives of suitable fineness made up into the proper shape by some sort of bond. Some shops make up their own gritting heads—others buy the abrasives already made up into proper shape.

The object of gritting is to reduce the surface of the marble to a finer texture than is possible on the rubbing bed. The last part of the gritting process—the "honing"—leaves the marble as smooth to the touch as if it were polished, and there is usually a dull gloss on it. When marble is to be "hone finished," this is the last finishing operation; in that case, the honing is carried to the limit, and somewhat farther than is necessary, if the marble is to be buffed or polished. It follows from this that there is no material difference in cost between hone-finished marble and polished marble.

The buffing or polishing is done on a gritting machine, fitted, for this purpose, with a revolving felt head. The stream of water is cut off, the polishing material is scattered on the face of the work, with enough water to keep the slab wet, but not enough to run off and carry away the polishing material.

The polishing material most commonly used is "putty powder," the essential ingredient of which is dioxide of tin (stannic oxide, SnO_2); it has the same chemical composition as cassiterite, the only important ore of tin, but, for use in the arts, it is artificially prepared. It is a rather interesting substance, because of its resistance to acids, and its great hardness, nearly equal to that of quartz. It is never used by itself in polishing marble, but is usually mixed with some other powder (usually oxide of lead), as a carrier; the operation of buffing is usually facilitated by using a little oxalic acid along with the putty powder. The action of the acid seems to be to render the superficial crystals slightly pasty, so that they readily spread out and fill up any microscopic spaces between adjacent crystals, and also yield more readily to the polishing action of the putty powder. It used to be customary to specify that marble should be polished with putty powder alone, in the best work—the idea being that the polish would be more lasting. But if the slab or other piece of work is thoroughly cleansed after polishing, there is reason to believe not only that the polish is just as permanent when a little oxalic acid is used, but also that the polished surface is impervious to the highest degree.

A LIST OF THE WORLD'S MARBLES

By J. J. McCLYMONT

Note—In a past issue, Mr. McClymont proposed, for the sake of convenience, to divide the different marbles into four groups. These arbitrary groupings were as follows:

GROUP A — Any marble or stone sold to the trade in fair-sized slabs or blocks of commercial size, rectangular shape and guaranteed by the seller to be sound, free from natural defects, that can be finished at a minimum cost, and sold to the consumer as sound marble.

GROUP B — Any marble or stone sold to the trade in slabs or blocks of fair or medium size, generally rectangular shape, guaranteed to be sound and free from natural defects, the finishing of which, because of texture, the size of slabs, the shape and size of blocks, is somewhat more expensive than those in Group A.

GROUP C — Any marble or stone that cannot be sold as sound but contains a minimum amount of natural defects, such as dry seams, old fractures, partially or completely healed surface voids, etc., to be treated by the manufacturer in the most approved manner, reinforced where necessary by liners on back or metal inlays and sold to the consumer as semi-sound marble.

GROUP D—All marble, stone and so-called serpentine marbles, and Onyx, which, by their peculiar formation are known to be fragile, such as Breccias and nearly all highly colored marbles and serpentines, and that are sold to the trade in irregular shaped blocks or slabs without a guarantee as to their soundness, treated by the manufacturer in the most approved manner, reinforced where necessary by liners on back or metal inlays and sold to the consumer as unsound marble.

Limestone

"The name limestone as commonly used is made to include a large and widely varying group of rocks, differing from one another in color, texture, structure, and origin, with but one property in common of consisting essentially of carbonate of lime. A pure limestone should consist only of carbonate of lime. In point of fact, however, none of our natural stones are chemically pure, but all contain a greater or less amount of foreign material either chemically combined or as admixed minerals." (George P. Merrill—Stone for Building and Decoration.) Most limestones were formed by the deposition of sediment on the bed of the sea, consisting of vegetable matter, gravel, sand, mud, shells, and remains of animals.

Limestone River

Quarried in Omeo Township, Benambra County, Victoria, Australia.

Brilliantly red mottled ground mass, in which are patches of white calcite.

Takes good polish. (Watson.)

Limonite

This is a hydrous oxide of iron, a hydrated hematite, which when scratched or powdered gives a brownish-rust color.

L'Improneta

Quarried at L'Improneta, near Florence, Italy.

Variegated clear green olive green and brown. (Blagrove.)

Lindewiese (Schwarz)

Nieder Lindewiese Quarries, Silesia, Austria.

Very dark gray (almost black) with occasional small light gray patches. (Watson.)

Takes medium polish.

Linghon

Quarried near Ambleteuse, Pas-de-Calais, France.

Gray with red veins. (Blagrove.)

Liniato di Arno

See Giallo Liniato di Arno.

Liniato di Arno
Quarried near the banks of the Arno, Italy.
Olive tint marked with lines of darker shade and reddish brown spots. (Blagrove.)

Liniato di Pratolino
Quarried near Pratolino Tuscany, Italy.
Grayish-green with bands and veins. (Blagrove.)

Lion Rock—See Cornish Serpentine from Good Castol Quarries.

Lios das Lameiras
Lameiras Quarries, Pero Pinheiro, Estremadura, Portugal.
Light fawn color, containing many fossils. (Watson.)

Lisbon—See Borba Red and Borba White.

Lisbon Red—Same as Empress Red.

Liseron—See Rose Liseron.

Lissourghter or Lissoughter Hill—See Connemara from Lissoughter Quarries.

Listato
Banded or veined.

Listato Alabaster—Same as Alabastro Listato.

Listato Marble—Same as Bigio Antico Listado.

Listato Verdiccio Alabaster—Same as Alabastro Listato Verdiccio.

Listavena—Group B.
Similar to Jackman and Light Smith.
Quarried at West Rutland, Vermont.
Veins of green or olive alternating with bands of white or pinkish white.
Takes medium polish.

Listellato—See Bardiglio Listellato.

Lithostrotion
One variety of the coral fossils found in marble.

Little Beltor (Pink) or Little Beltor marble.
Quarried at Ipplepen, Devonshire, England.
Pink and gray mottled with slender red markings.

Little Beltor (Yellow)
Quarried at Ipplepen, Devonshire, England.
Mottled yellow, pink and gray with white veins of calcite. (Watson.)

Little Island—Same as Victoria Red.

Livernon
Quarried at Livernon, Lot, France.
Reddish-pink.

Livido Marble—Group B.
Vermont Marble Company's Quarries, West Rutland, Vermont.
Bluish-gray of a not very dark shade with numerous veins and spots of much darker shade.
Takes medium polish.

Lizard Promontory
On this promontory in Cornwall, England, are located the quarries that produce Cornish Serpentine.

Lizard Promontory Serpentine—See Cornish Serpentine.

Lizzie Clay and Pulp Company's Quarry—See Jersey Green.

Llanfechell Serpentine
Quarried at Llanfechell, Anglesea.
Greenish serpentine, sometimes reddish-green. (Blagrove.)

L. M. Italian
Trade-mark for No. 2 White Italian.

Loch Kilchrist
To the south and southeast of this lake in the Island of Skye, the Skye marbles are found.

Loch Leven—See Ballachulish which takes its name from the town of Ballachulish, on the south shore of Loch Leven.

Lompnes or Lompines.
Quarried in France.
Dirty buff color with rust spots.
Takes medium polish.

Lonsdaleia Duplicata
A Madreporarian coral fossil found in many marbles.

Lorrain
Quarried at St. Catherine, near Nancy, France.
Variegated white, gray, yellow, red and black.
Takes a good polish. (Blagrove.)

Loubie
Quarried at Loubie, Eastern Alps.
White with occasional gray veins. (Blagrove.)

Lough Dunlewy—See Dunlewy.

Lourdes—See Lumachelle de Lourdes, St. Florent and Vielle-Violet.

Louverne—Same as Gris Louverne.

Louvie-Juzon Quarries—See Gris Tendre de Louvie.

Louvie-Soubiron—See Bleu Fleuri de Louvie.

Lower Austrian Marbles—See Engelsberger and Marbacher.

Lower California Onyx—Same as Pedrara Onyx.

Lucullan Marble (Ancient)
According to Pliny this marble takes its name from Lepidos L. Lucullus, and was quarried on the Island of Melos (Modern Milo) in the Ægean Sea.
Other authorities claim that this is but another name for Nero Antico from Cape Matapan, southern Greece.
The color is given by Miss Porter as blackish-gray, and by Pliny as entirely black.

Lucon Marble
Quarried in Vendee, France.
Red with spots of deeper red, black and pale gray. (Blagrove.)

Lucon Marbles
Quarried at Gochenee, Namur, Belgium.
Lucon Cailloute has a background of dark gray spotted with pale gray, white and red.
Lucon Chocolate has a background of chocolate mingled with red and occasional large gray veins and spots. (Blagrove.)

Lucs (Granite)
Quarried near Lucs, Vandee, France.
Various shades of gray, blue and red, with some fossils. (Blagrove.)

Luinachella—See Encrinital.
Italian name for marbles containing encrinitals.

Lumacato—See Bigio Antico Lumacato.
This name as applied to marble means the same as Lumchella or Shell marble.

Lumacato Chiaro—See Bigio Antico Lumacato Chiaro.

Lumachella
From Lumaca (snail), generally spelled Lumachelle.

Lumachellato—See Bigio Antico Lumachellato.

Lumachellato Piccolo—See Bigio Antico Lumachellato Piccolo.

Lumachelle Antico (probably modern).
Earthy gray, with large snails. (Pullen.)

Lumachelle Bigia (Ancient)
Light brown, densely crowded with very small fragments of black and transparent grayish-white. (Pullen)
Or gray, veined with brown and full of brown shells. (Pullen.)

Lumachelle Bigia Bruna (Ancient)
Black peppered with gray and crowded with large white snails, faint flush of rose. (Pullen.)

Lumachelle Bigia di Egitto
Densely crowded gray snails with few yellowish-white, flush of pinkish-brown, or gray, with white and blue snails and a little gold, or bluish-gray with yellowish-white snails. (Pullen.)

Lumachelle Bigia Gialastra
Gray tinged with yellow. (Pullen.)

Lumachelle Bigia Orienale
Bluish-gray, with numerous white snails. (Pullen.)

Lumachelle Bigia Rossastra
Gray flushed with pink. (Pullen.)

Lumachelle Bigio (probably modern)
Large gray snails and small white shells.

Lumachelle Bruna Rossastra
Brownish gray, flushed with pink. (Pullen.)

Lumachelle Champenoise
Quarried near Rheims, Marne, France.
Yellowish-gray with numerous fossils. (Blagrove.)

Lumachelle Degli Abruzzi (Ancient)
Light buff gray, crowded with tiny shells of the same hue and larger ones of slate blue. (Pullen.)

Lumachelle de Lourdes—Group C.
Quarried near Lourdes, Hautes, Pyrenees, France.
Reddish-fawn color, crowded with fossils. (Watson.)

Lumachelle des Argonne or Pierre Chaline or Racine de Buis.
Name given to marbles quarried in the Forest of Argonne at Avocourt, Brocourt, Parois, Rampont, Rubreville and Verdun, Meuse, France.
Consists mostly of blackish and bluish-gray backgrounds. Some are tinged with yellow and reddish hues and all have a tendency to turn yellow from exposure. (Blagrove.)

Lumachelle des Bossus
Quarried at Fontenelle, Aisne, France.
Bluish-gray with white cloudy veins and whitish translucent fossils. (Blagrove.)

Lumachelle di Calabria
Quarried near Pallizzi, Calabria, Italy.
Buff, peppered brownish-gray, with bluish snails and fragments of white round shells.

Lumachelle di Egito (An ancient stone.)
Golden yellow, with snails of bright yellow and bluish-gray.

Lumachelle Gialla (Ancient)
Large yellow snails with gray chips.

Lumachelle Gialla Bigiastra Minuta (Ancient)
Close-grained light brown, with gray and yellowish snails.

Lumachelle Gialla Pavonazza (Ancient)
Dark brown, with orange shells and snails, yellow chips and circlets having brown centers.

Lumachelle Lionata (Ancient)
Reddish-brown, blotched with pink, suspicion of white and yellow. (Pullen.)

Lumachelle Marble or Lumachella or Lumachello.
Is a fossiliferous limestone in which the shells still retain their nacre, or pearly lining, and which when polished gives off in spots a brilliant iridescent lustre with rainbow tints; the finer varieties being seemingly set with opals.
It is a beautiful stone for inlaid work and elaborate ornamentation, but is usually found in small slabs. (Merrill.)

Lumachelle Minuta (Ancient)
Red with tiny fragments. (Pullen.)

Lumachelle Nera (Ancient)
Bronze, with tiny streaks of yellowish-brown. (Pullen.)

Lumachelle Nera Minuta (Ancient)
Jet black, with numerous small curly white snails. (Pullen.)

Lumachelle Pavonazzo (Ancient)
Purple peppered with tiny white fragments and a few rosy flints. (Pullen.)

Lumachelle Pavonazzo Disfatta
Very much broken. (Pullen.)

Lumachelle Persichina (Ancient)
Lilac. (Pullen.)

Lumachelle Rosea (Ancient)
Pale chalky rose and yellow, crowded with small narrow slugs. (Pullen.)

Lumachelle Rossa (Ancient)
Uniform crimson and semi-transparent white. (Pullen.)
Or red with grayish-white madrepores.

Lumachelle Violetta (Ancient)
Violet, tinged with blood red, snails, white or gray, touched with gold.

Luna Marble or Luni Marble
Ancient name for marbles from the vicinity of Carrara, Italy.
The name Carrara is said to be derived from the Latin quareria which is sometimes spelled cariera.

Lunel
Quarried in the Valley of Heureuse, near Boulogne-sur-Mer, France.
Brownish-gray monotone.
Takes medium polish.

Lunel Fleuri
Quarried in the Valley of Heureuse, near Boulogne-sur-Mer, France.
Brownish-gray with flowered markings of darker shade.
Takes medium polish.

Lunense Antico—Group A.
Fantiscritti Quarries, at Carrara, Italy.
Pure ivory white statuary, no crystals, texture soapy, inclining to that of china.

Lunense Macchiato—Group A.
Originally from the Fantiscritti Quarries, at Carrara, but now quarried in abundance at Crestola, Zampona, Bettolia and Ravaccione.
White with bluish tinge, and streaks of black or black metallic spots.

DETAILS of the Stairway, Drinking Fountain and Bench in the Foreman National Bank, in Chicago. Charles S. Frost, the architect, selected Galena Siena marble in combination with Belgian Black. The treads and risers are of Pink Tennessee; the floor is of the same material, with borders of Belgian Black. These marbles were installed by the McClymont Marble Company.

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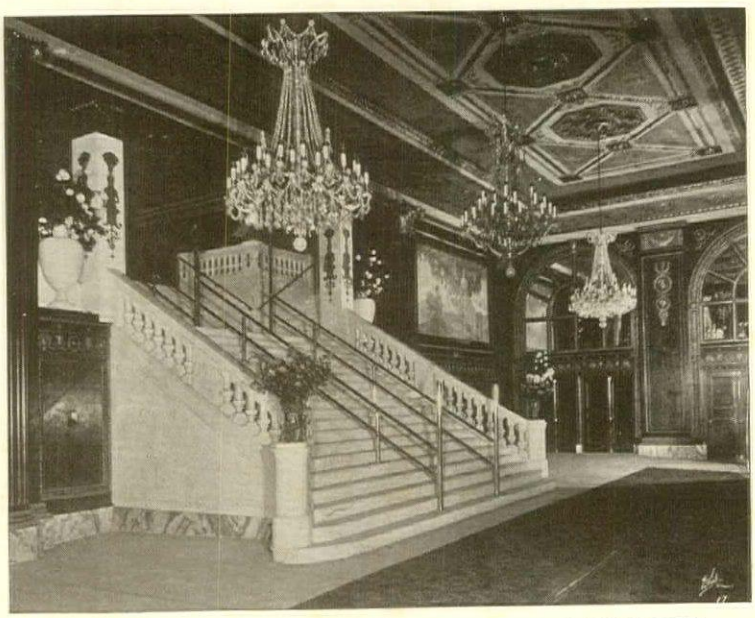

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