



THROUGH THE AGES

NOVEMBER, 1924

He, like Amphion, makes those quarries leap
Into fair figures from a confused heap.

—WALLER



THROUGH THE AGES



VOL. 2

NOVEMBER, 1924

NO. 7

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Published Monthly by the
NATIONAL ASSOCIATION OF MARBLE DEALERS

GAY AND WATER STREETS, BALTIMORE, MD.

Executive Offices: 242 ROCKEFELLER BUILDING, CLEVELAND, OHIO.

Application for Second-Class Mailing Privilege has been filed at Baltimore, Md.

Subscription Price \$3.00 per year

Single Copies 35 cents



Marble mosaic pavement in the early Byzantine church at Antioch.

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

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DR. ROBINSON'S IMPORTANT DISCOVERIES AT ANTIOCH

Ancient Temple Recently Unearthed in Asia Minor
Reveals Remarkable Marble Carving

THE return to the United States of a party of scientists, sent out under the auspices of the University of Michigan, has disclosed the fact that discoveries of great importance were made during the summer of 1924 at Antioch, in Asia Minor. There were uncovered, among other things, a temple, built in the first century A.D., which shows a workmanship that will astonish architects and archaeologists; a temple which was decorated externally with marble reliefs and floral designs that were thought, heretofore, to have originated some 1300 years later; a temple which had its upper part built of solid blocks of beautiful white marble, with a frieze that consisted of wonderfully carved bulls' heads bound together with garlands of leaves and fruits.

The expedition went into Asia Minor in the early spring of 1924 under the direction of Dr. David Moore Robinson, Professor of Archaeology at Johns Hopkins University. An unnamed donor furnished the money to finance the undertaking.

The site of the discoveries is one made

famous by history and scripture. It is not over 35 miles from Ak-Shehr, the nearest railway station, and about 1 mile from Yalivadj, the nearest modern town. Antioch was built upon a gently sloping hill. The upper part of the town extended to a gorge over 200 feet deep. The site was roughly rectangular and two highways that met in the civic center probably divided the town into four parts.

This civic square when uncovered proved to be paved with marble blocks and in the middle of this broad expanse was one block carved in such fashion that a huge convex circle, 6 feet in diameter, protruded above the pavement surface. This block bore, originally, in bronze letters, the name of T. Paebius Asiaticus, an ædile, who had paved the square at his own expense. Several Latin crosses cut into the nearby stones proved that the square was still in use after the advent of Christianity.

The civic center was lined with shops and into one of these was built an important marble inscription. "This inscription," said

Photographs by G. R. Swain; loaned by Dr. David M. Robinson.



A general view of the site of the excavations, looking from the Byzantine church up the square of Tiberius and the great stairway, towards the Temple of Augustus and the semicircular colonnade, seen in the background.

Dr. Robinson, "gives the name of the square as the Square of Tiberius, who probably erected this impressive memorial to his great predecessor, Augustus. The same stone contains in capital letters a long list of the honors conferred on Galerius Rusticus, the consul of the Emperor Domitian, whose name has been erased. There is also a Latin epistle in small Latin letters of forty-four lines in which L. Antistius Rusticus, the consular legate of Domitian, writes a personal letter to the people of Antioch to prevent profiteering, to control the price of grain after a severe winter and to provide sufficient seed for the next harvest."

On this square were also found parts of several statues, one a beautiful female draped figure of pure Greek workmanship, suggesting the "Victory of Pænonius" and

of the "Nereids" on the Nereid monument from Asia Minor now in the British Museum. Dr. Robinson said that the works of art discovered showed very strongly the Greek rather than the Roman influence.

On the north side of the Square of Tiberius were shops and at this point were discovered "pithoi" or large jars for storage such as are still made in Yalivadji, and a score or more bottoms of small glass goblets, many coins and a large stone plate.

The Square of Tiberius sloped gently upward toward a flight of covered steps, 70 feet in width, that led to the Augustus Platea. The roof of the stairway was of barrel vaulting supported by triple arches, the whole built of marble and finely sculptured. Dr. Robinson, in speaking of this part of the remains, says: "There were enor-

mous cornices and architraves which would tax the skill of the best modern engineers to move. There were about forty voussoirs from the arched passageways. One long section of an architrave had holes for bronze letters which seem to mention the name of Augustus and show that this was a memorial to him. Many slabs of sculptured reliefs were found. Several represented winged genii, some draped and female, others nude and male, holding swags or festoons. Two enormous reliefs represent Pisidian captive chiefs with their hands tied behind their backs."

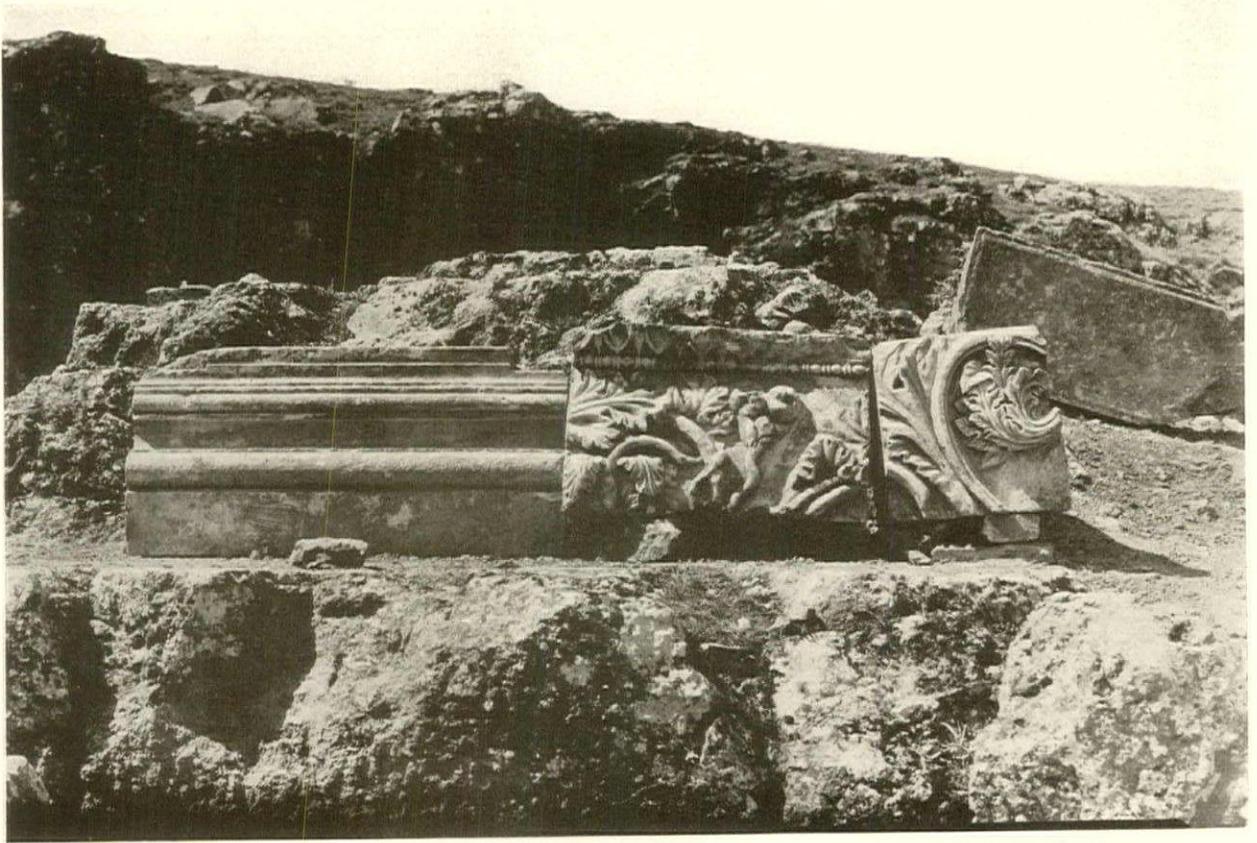
The façade of the triple-arched stairway was also decorated with four Corinthian marble columns, with the frieze of sculptured captives mentioned above and all kinds of armor representing land victories; and with marine symbols, including tritons,

dolphins, war boats and similar subjects, signifying triumphs on the sea. Before each of the four piers were marble fountains. The pipes that supplied the water were still in place.

There was found in front of the grand stairway more than two hundred fragments of the "Res Gestæ" of Augustus, a lengthy record of that worthy's achievements. Dr. Robinson considered this one of the most interesting of his discoveries. He says of it: "This was carved by many different hands, as the styles of the letters differ widely in different sections. The original was engraved on two bronze tablets set up in Rome at the entrance of the Mausoleum of Augustus. The latter have perished long ago, but a marble copy in both Latin and Greek is still preserved on the walls of a temple at Ancyra, the modern Angora.



The marble square of Tiberius, showing the steps on the left leading to the Temple of Augustus. Before the excavation, this was buried under an avalanche of huge sculptured blocks and tremendous marble beams.



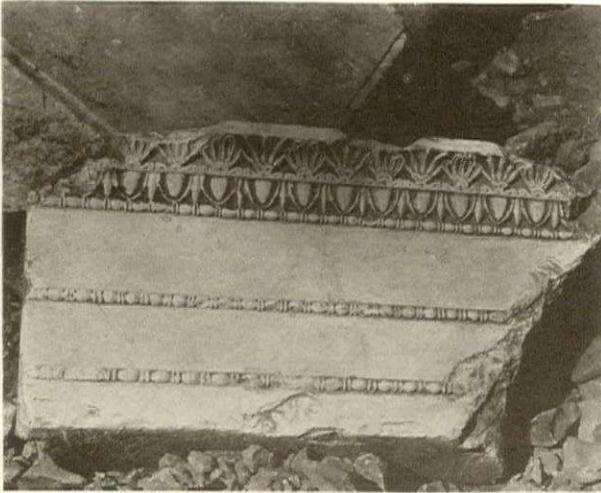
Marble fragments from the Temple of Augustus, built in the first century A.D.
Notice the floral design, anticipating by many years similar
patterns of early Renaissance work.

Only a Latin copy was put up at Antioch, as our excavations have shown."

The Platea Augusta led directly to the chief feature of the discoveries—the beautiful temple erected to the memory of Augustus, whose name was associated with Men, the great god of this very fertile country. The base of the temple was natural rock, while behind was a vast semicircle formed by cutting away the rock cliff, as shown in the illustration.

The face of the native rock was ornamented with regular courses of cut masonry and screened by a huge colonnade partly encircling the rear of the temple itself. This was two stories in height, the lower story Doric and the upper Ionic. The lower portions of more than 15 feet of the original

beautiful Doric columns, very rare in Roman architecture, were still standing in their original positions, and finely carved fragments of the Ionic order used in the upper tier were found. The kind of marble used for the body of the temple has not yet been determined. Most of the huge stones used to face the original temple were found, lying where they had fallen. The structure had a portico of four Corinthian columns across the front. The blocks of the architraves were unusually long, some measuring thirty or more feet in length and one originally having been about 50 feet. The architrave had delicately carved astragals at the top of each band. The frieze of bulls' heads showed a Bucranium of a type more elaborate than any yet found, and containing considerably



A typical section showing the unusual and artistic Greek workmanship on the marble architrave.

more detail of fruits and flowers, as shown by the accompanying illustration. A frieze of scroll and floral ornaments carried the line of the pilaster capitals around the cella wall, and the design on this ranceau, as it appears at the top of the wall above the architrave, is conclusive proof that this type of ornamentation was not invented at the time of the early Renaissance, as popularly supposed. Some of the carving on the blocks found showed a degree of perfection unequalled by anything that has yet come to light in Roman architecture. A marble head of Emperor Augustus was found at the lower end of Tiberius Platea. It required two days of cleaning to remove the dirt from the white marble, but when finally finished it proved to be a valuable find. Dr. Robinson declared afterwards that "in respect to technical skill, exquisite realism and impressive portraiture, it rivals the best of the remarkable series of sculptured portraits of the great emperor in American and European galleries."

In addition to the Temple of Augustus, the great stairs and the squares, there were also uncovered by the party two Christian churches, one situated at the lower end of

the Tiberius square; the other a considerable distance to the northwest on a lower level. The latter was of a basilican type and was over 200 feet long, with a nave 35 feet wide with side aisles each 15 feet wide separated by columns of beautiful variegated colored Phrygian marble. Below the later floor level was found a marble mosaic floor that apparently belonged to a church of even earlier times. The mosaic was laid in conventional patterns of red, white, blue, yellow and rose. Several skeletons were unearthed beneath the mosaic floor and mosaic inscriptions were found, written in the Greek language. Two of them mention Bishop Optimus, who was bishop of Antioch about 375 A.D.

The other church, a Byzantine structure, was in the form of a Latin cross and is shown in the foreground of the illustration on page 4.

Built into the southwest gate of the city walls, which can be traced all around the city was discovered a magnificent entrance of three arched passage-ways, ornamented with beautiful marble sculptures. The style was of the Corinthian order and the cornice had rain spouts in the form of very lifelike lions' heads in marble, as shown in the



The Bucranium above the architrave on the frieze of the temple.



Sculpture of a Pisidian Captive on the frieze of the Temple.



Native workmen raising the circular block in the floor of the Civic Center.

illustration at the bottom of this page.

The Turks of the lower class consider it an act of virtue to tear down or despoil anything that suggests Christianity. For this reason there has no doubt been lost considerable material that would have been of inestimable value to the archaeologist. Strangely enough, the research party found very little of this spirit of religious fervor in the group of more than two hundred laborers who were engaged as helpers. Offers of a special bonus to anyone making a worthwhile find kept their interest at fever heat and even incited a friendly rivalry.

"There was little or no difficulty in getting labor," Dr. Robinson said. "There had been a bad yield in crops and the people of the village of Yalivadj were eager to work

for us at the rate of forty cents a day. When we arrived we sent a crier down to the village to announce that we were on hand and wanted help and the next morning we had all the prominent citizens of the village with us. These laborers were very picturesque in their gayly colored costumes."

The importance of the discoveries made this summer is not as yet fully appreciated. It is probable that, provided sufficient funds are available, further search would uncover equally valuable data concerning Pisidian Antioch which would probably prove it to be the most important Roman city on the frontier of the ancient Roman Empire. Hundreds of fragments of arches, columns, statues, colonnades, fountains, pavements and the like had previously been unearthed and had found their way into the houses and walls of Yalivadj. What has been accomplished so far is amply sufficient to establish the fact that marble played a dominant part in the original construction of these ancient ruins, and that the Romans employed the artistic Greeks, with their familiarity with marble and its methods of working, to build for them this magnificent city. The beauty of the sculptures and the architecture and the methods employed equal, and perhaps even surpass, those used in modern structures.



Lion's-head water spout on the cornice of the triple-arched gateway.



ST. PETER'S, AT ROME

A Monumental Edifice that has Passed Through
Many Strange Vicissitudes

ON the site which was in olden times the circus of Nero, the scene of so many Christian martyrdoms, St. Anacletus caused a sanctuary to be erected. Two hundred years later, Constantine, who had been converted to Christianity, desiring to show himself worthy of the baptism he had just received, constructed on the ruins of this sanctuary of Anacletus a sumptuous basilica, rectangular in form. The nave had two aisles on either side formed by four rows of columns, each aisle having its own separate door in the façade. In front was an open square court surrounded by porticos, of which no trace remains.

In the middle of the fifteenth century Nicholas V, because of the threatened ruin to this basilica of Constantine, decided to build a new metropolitan church. He called in Bernardino Rosellini and Leon Alberti

and ordered plans made for the building. Work was begun at the western end, but Nicholas died in 1454 when the western apse was but a few feet above ground, and the project, for a time, was abandoned. According to Vasari, Rosellini's plan would have been given us a church "so large, so rich, and so ornate that it is better to be silent than to attempt an impossible description, even of the least part of it." If we are to believe Manetti, it was to be a basilica with seven naves, the two outer containing chapels. At the west end was to be a transept with an apse, and at the east end a cloistered atrium. The whole was to be in the style of the early Renaissance. Paul II, Nicholas' successor, continued the designs, but Julius II, upon his accession, found it was advancing very slowly, and determined, with characteristic boldness, to



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A view of St. Peter's taken from above the entrance to the Vatican grounds, showing the obelisk, fountains, and one of the two semi-circular colonnades designed by Bernini.

start the structure anew, paying no regard to the existing new foundation and walls. His plan was to fuse the old and the new buildings into one grand mass that would astound the world. He entrusted his designs to Bramante, one of the architects whose works contributed to enhance the reputation of the epoch to which he belonged. Other men, notably Guiliano de San Gallo, submitted plans and ideas to the Pope, but the choice fell on Bramante, whose imagination rose to the occasion. We are told that "he resolved to do nothing common; to dare something beyond anything ever done before; something that would strike admiration and even terror to the beholder." (T.G. Jackson.) He it was who suggested the dome, but, unfortunately, after his death, men of

less taste and ability were allowed to tamper with his design, and St. Peter's is very different in plan from what it would have been had Bramante lived to complete it.

Michelangelo speaks, in one of his letters, of the laying of the corner stone in April 1506, "not after an obscure or confused plan, but in accordance with a design which was clear, comprehensive and luminous." Strangely enough, it was Michelangelo himself who departed from this original design in the end, as we shall presently see.

Bramante made many sketches, but the one finally settled upon showed a great cross with equal arms, and this seems borne out by the medals struck for Julius II by Caradosso, the most famous goldsmith of his day. Half the area of the old basilica lay

outside the plan of the new one, and this fact undoubtedly proves that the idea of a long nave was abandoned.

The impatience of the Pope over what seemed to him a needless waste of time in the erection of the building caused Bramante to hurry things along with such haste that "many fine things in St. Peter's were ruined by him; tombs of Popes, pictures, mosaics, and portraits of great men were scattered about the church; only the altar of St. Peter was preserved, and the old Tribune which is enclosed with a beautiful Doric order in Pepperino stone." Many columns of precious marble, which might have been replaced in the new building, were overthrown and broken.

Bramante carried the work up to the level of the cornice that runs above the four large piers and their arches which support the dome. The gigantic order of the body of the church, 108 feet high to the top of the cornice, was Bramante's. His scheme for a barrel roof enriched with coffering was extraordinarily impressive in its simplicity, and his dome would have been different from what was actually built. It would have been more like that of the Pantheon, but surrounded by a colonnade and crowned with a lantern. "In constructing the four great arches of the crossing, Bramante formed the centring with coffering so that when it was removed the ornament remained in stucco on the soffit." (Anderson.)



Illustration courtesy Thomas Machen, architect, Balto., Md.

The Vatican Palace. Goats are allowed to ramble at leisure around the famous grounds, as shown in the picture.



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A panoramic view of Rome taken from the dome of St. Peter's. In the background is the Tiber—the Tiber that Horatius swam, a river celebrated in Latin history. In the foreground is the entrance to the Vatican grounds.

After Bramante's death, there followed Raffaele and San Gallo, who changed the plan from a Greek cross to a Latin cross, and even altered parts already newly erected. About this time cracks appeared in the great piers, due to faulty construction. The Pope's hurry was to be repented at leisure. The piers began to yield to the pressure of the arches. It was necessary to sink large square wells between them and fill these with stones "well compacted with lime."

Then came Baldassare Peruzzi, who wished to pull down the entire building and start afresh. He reverted to the Greek cross hoping to reduce the cost. Peruzzi also retained Bramante's dome over the crossing, and in "the corners of the plan between the arms of the cross he put four sacristies fit to carry campaniles, and there were four doors to the four apses." The Pope at this period was driven, in order to secure funds, to that traffic in Indulgences which was the cause of the German Reformation.

After the death of Leo X came thirteen years of inactivity as far as St. Peter's was concerned, until the time of Paul III in 1534. Antonio San Gallo was called in and persuaded the Pope to change Bramante's facing of Pepperino stone to Travertine, saying the Pepperino would not stand the weather. A sort of anti-church was added, flanked by two tall campaniles. San Gallo's design for the exterior has two orders with a mezzanine between them—Doric be-

low, Ionic above. His dome had two stages of colonnades with a massive lantern too heavy for the supports, according to his successor, Michelangelo.

Michelangelo was put in charge in 1546. "He cut down San Gallo's plan without the least compunction, abandoned the vestibule, made a clean sweep of everything in the shape of aisles or flanking chapels (things, it should be remembered, which were essential for use and indispensable to a complete plan) and cut down the scheme to one of the greatest simplicity." (T. F. Bumpus.) The dimensions were vast and fine detail would have made the interior impressive; but, even so, there would never have been attained the beauty and dignity of Bramante's or even the younger San Gallo. As it was, when Michelangelo died, in 1564, the dome was partly finished and the Greek cross completed. Jacopo della Porta brought the dome to its present state in 1590. The curve of the dome was set out and engraved



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Details of the façade of the portico.



Illustration courtesy Thomas Machen, architect, Balto., Md.

Church of St. Paul's-Outside-the-Walls where the curve of St. Peter's dome was set out.

full size on the floor of St. Paul's-Outside-the-Walls, on the Ostian Way, the only place of sufficient size to accommodate so vast a plan. Six hundred men worked day and night for twenty-two months.

The façade was to be less ordinary than the one we see now. Michelangelo intended the columns to be detached, forming a portico, instead of being planted against the wall and extending their huge length from top to bottom.

The present façade was built of Travertine from designs of Carlo Maderno in the beginning of the seventeenth century. The rest of Constantine's basilica was pulled down and the new church built over the site, the whole being finished in 1614. The lengthened nave as well as the balcony (a seeming necessity, however, since it is from this that Papal Benediction is given) was due to this same Maderno.

One view of St. Peter's from a score of miles away, and a few other views from more or less miles off, are all the really striking sights of the highest dome in the world. It is sunk beneath the parapet of an ugly façade and this façade in turn is overtopped by the shapeless masses of the Vatican which looks like a huge factory built on top of an English railway station. The dome itself is a fine one. Had it been lifted into the air as Wren has lifted the dome of St. Paul's, it would

have been sublime. Viewed from within, it seems beyond all other architectural creations. Vast as it is, it is yet so graceful that it seems to have been lifted to its supporting piers by the elastic force of the air it compresses.

The great oval colonnade of quadruple rows of Doric columns, so marked a feature of the external effect, was begun in 1655 by Bernini, who was responsible for the statuary and decoration of the interior. The removal and re-erection of the obelisk in the

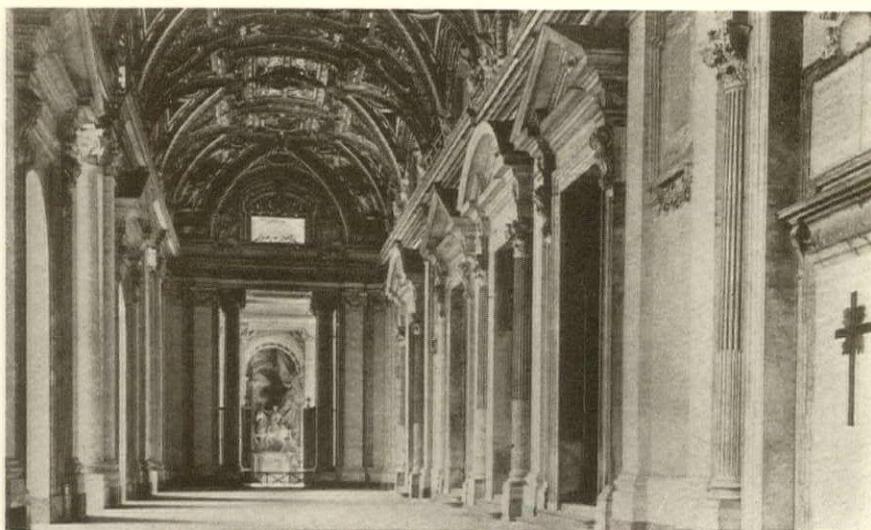


Illustration courtesy Thomas Machen, architect, Balto., Md.

Portico and Sacred Door of St. Peter's.

center brought the whole scheme of the church and its surroundings to a conclusion. This colonnade extends in curved form, like wings, from each side of the building and serves materially to relieve the ungainly heaviness of that monotonous piece of ugliness, the façade.

The obelisk in the piazza was brought by Caligula from Egypt to adorn his baths, and Sixtus V placed it in front of St. Peter's. On each side of it is a fountain, flinging its column of water skyward, to fall again in a porphyry basin.

The vestibule is 400 feet wide and three entrances lead from it into the nave. Entering the church, there stretches ahead a field of marble. High over head, the figures in the spandrels of the nave arches seem scarcely more than life size and yet Ferguson tells us that they are 20 feet long. It is by these and

similar details that you scale the building, which only gradually impresses you with its vastness. There is a sense of great empty space, almost as if you were still out of doors.

Jackson, in speaking of the interior, says: "The effect of the dome when you reach it is no doubt very noble, but it would have been much finer had the Greek cross plan been kept as Bramante and Michelangelo intended. The dome would then have struck the eye at once on entering as it does at S. Sophia, whereas now coming in at the end of a long nave you do not get the effect until you have advanced some distance."

St. Peter's also is cheapened by the vulgarity of the later decoration. One is made to think how differently Rosellini's or Bramante's St. Peter's would have appeared, treated in the refined manner of the early Florentine Renaissance.

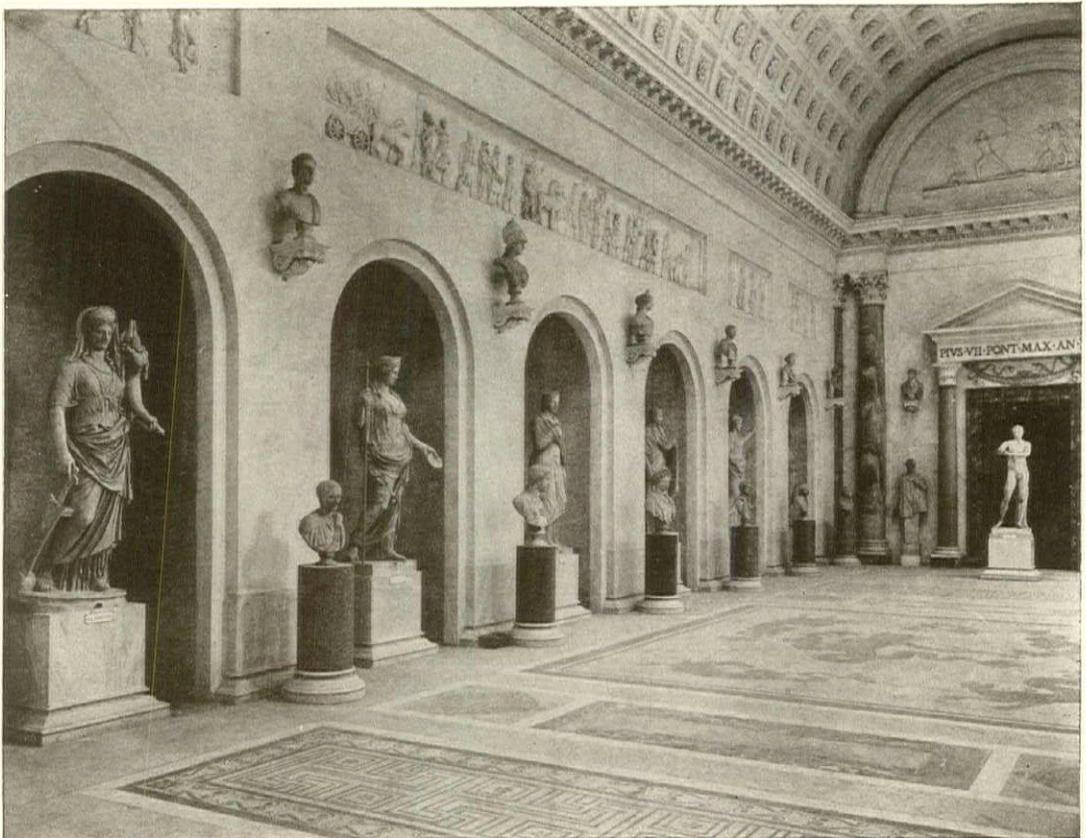


Illustration courtesy "Pencil Points"

Braccio Nuovo Gallery, Vatican Museum, Rome.



Marble porch and steps leading to the garden in the rear of a residence at Canandaigua, New York. Allen & Collens, architects.

STAIRWAYS

A Brief History of Their Development and Uses

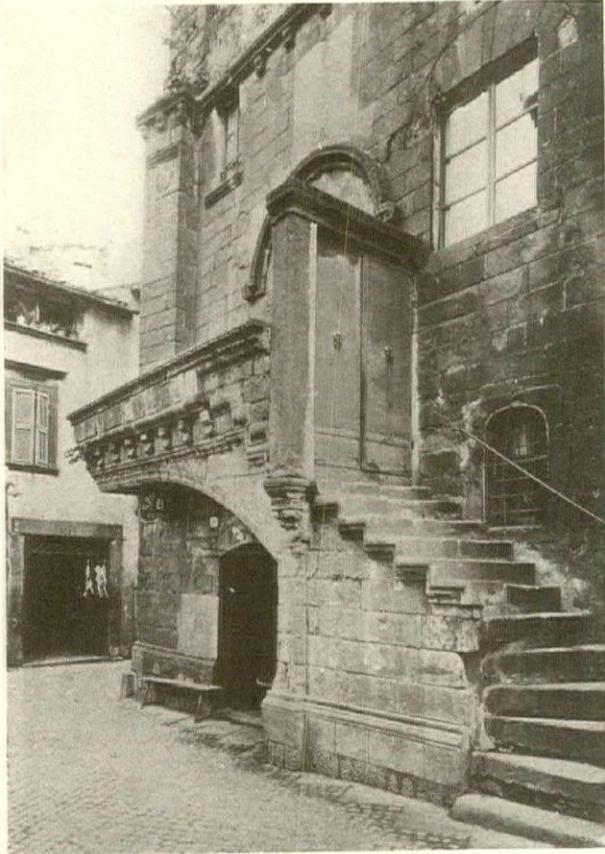
A STAIRWAY is generally the most distinctive feature of the interior of a building, since it is the first object that meets the eye of the visitor, and the first to claim his attention. There are exceptions to this condition, of course, as in certain office buildings that tower to such altitudinous heights that the lobby must be planned primarily to give ready access to elevators; but even in such structures, it frequently happens that the architect incorporates into the first-floor plans a grand stairway as the main feature of his design, as for instance, in the Woolworth Building in New York, the tallest commercial building in the world.

The building of staircases dates back to the dim past. In Babylonia we find traces of well-designed stairs constructed at least as

long ago as 6000 B.C. The architects of that time provided huge platforms of baked clay, often staged, on which they erected a palace, a temple or a group of dwellings clustering in orderly array around the public edifices. These platforms were usually many feet above the ground, as, for instance, at Tel-lo, where it stood 36 feet high. Access was had by means of both inclined planes and broad ranges of steps. Tall towers of many stories were also a feature of the architecture and these floors were connected by short flights of stairs, usually clinging to the side of the walls.

In ancient Egypt outside stairways were used for domestic purposes, placed inside the courts against the dwellings. Rothery says that "sometimes there were two flights, right and left, flanking the building from one

NOTE.—Illustrations on pages 18 to 21 courtesy Thomas Machen, architect, Baltimore, Maryland.



Outside stairway and balcony of the Di Vico in Viterbo, built in the fourteenth century.

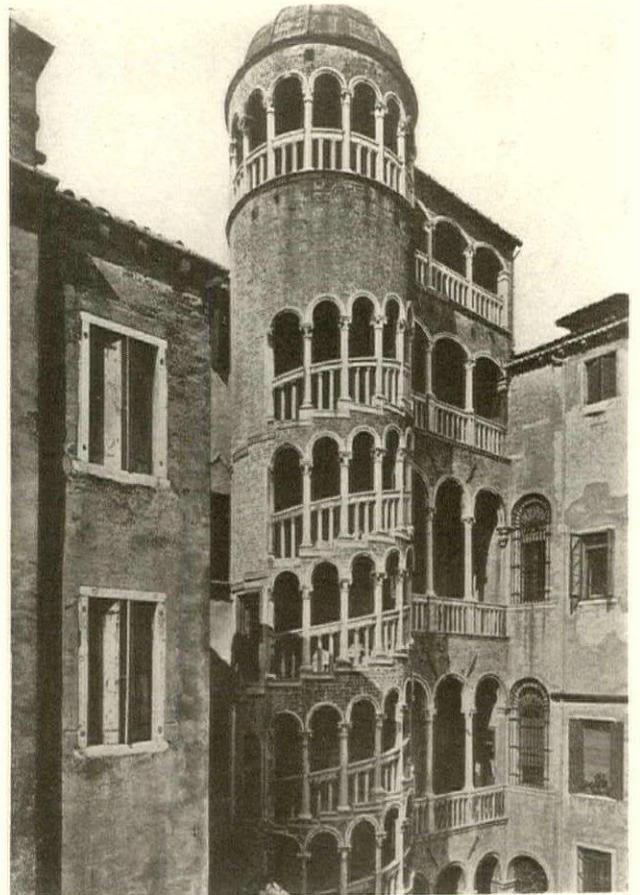
side to the other, meeting in the middle of the first floor on a common platform. In many cases the stairs steep and at right angles were interrupted by frequent small square landings."

In other sections, various conditions led to the evolution of many different modes of ascent. Arboreal dwellings resorted to the ladder, suggested by intertwined leaves. Cave dwellers profited by nature's stratification of rocks or the pitting of the cliffs' surface, which he imitated and improved upon by carving the crevices deeper and providing toe and hand holds at regular intervals.

The Rev. S. Baring Gould describes in his "Cliff Castles" both prehistoric and historic cave dwellings, side by side in the Pyrenees and Dordogne. He tells of the castle belong-

ing to the Bishop of Sarlat, a stronghold of the Middle Ages, which was reached by "a series of posts serving as steps driven into sockets in this rock, with only here and there a sustaining iron bar." It was also customary for greater security against attack to build outside stairways supported on successive arches and clinging to the wall, but broken abruptly, the void of the unfinished arch being bridged by a removable wooden platform.

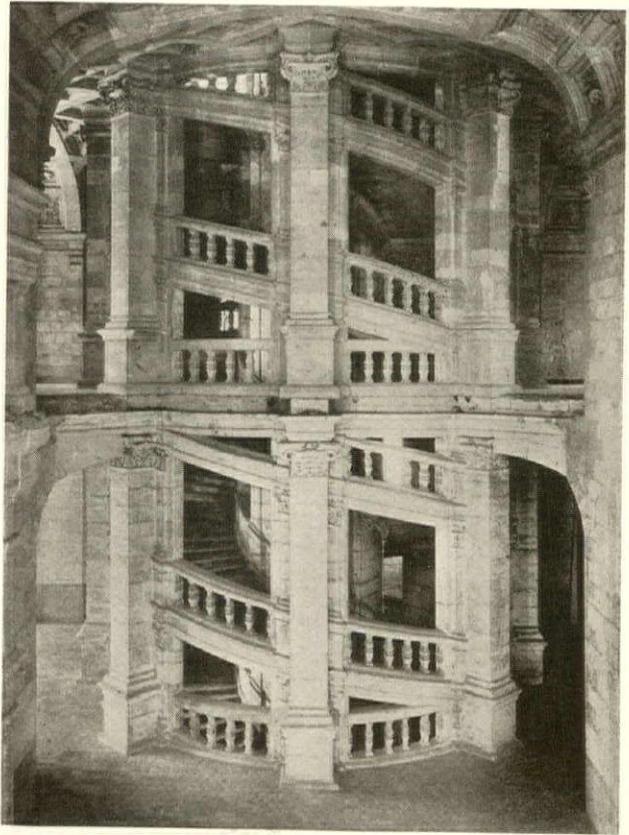
In the valley of the Hindu Kush, underground dwellings on a steep hillside were connected with each other by ladders placed flat on the ground. Vertical notched poles were another means of ascent, and this method probably brought about a recognition of the advantages of gyratory ad-



Outside spiral stairway of brick and marble in an early Venetian building.

vance, or, in other words, our spiral stairway.

In Greece the idea of the stairway as an outside accession prevailed. In Rome, more attention was paid to staircases. It is probable that some were used in such palaces as Nero's Golden House. Some domestic buildings undoubtedly contained them, though they were narrow and steep. Both the Romans and the Greeks well understood the charm of nobly proportioned flights of steps as a setting for their temples and public buildings. In Norman castles and those built as recently as the thirteenth century in England, it was, as with the Greeks and Romans, a question of exterior ascension, the ground floor having no means of direct communication with the open and being practically a dungeon. The main



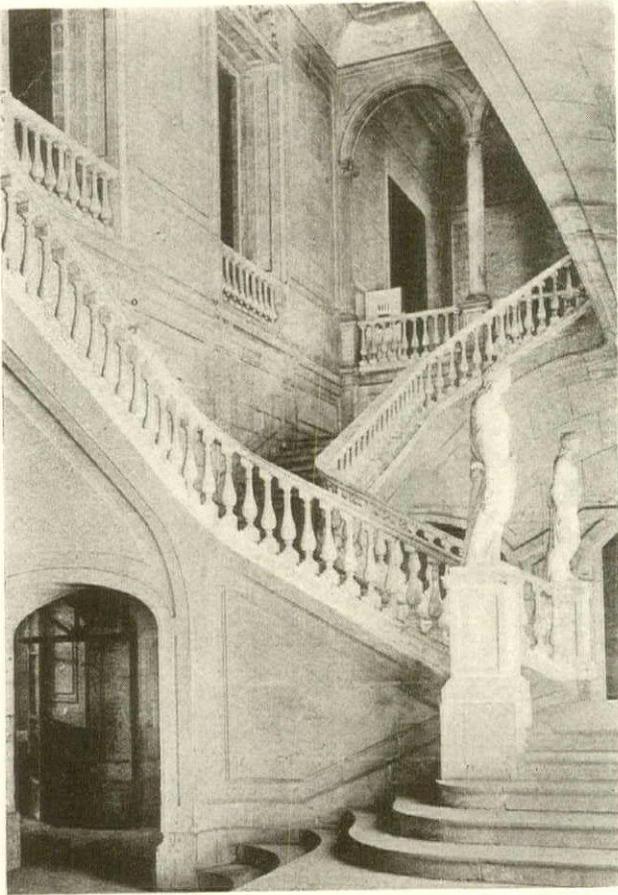
Inside spiral stairway of white marble in the Chateau de Chambord.



The famous marble stairway of honor in the Hôtel de Ville, Nancy, France.

consideration was to render them impregnable.

Various methods of constructing these outside stairways were to be seen, both in England and on the Continent. In some cases they were built at right angles to the castle, though more often parallel. At Carpentras Castle in the Tour d'Orange, they are protruding stones, each step flat on top and rounded at the back, the whole stairway taking the form of a diagonal band of four courses of corbelling. At St. Nazaire, Carcassonne, and in the galleries of the transept at Notre Dame, Paris, are wedge-shaped or zig-zag steps, formed by cutting away half of each step diagonally in alternate directions. When the buildings were not of a military nature, the stairways were built with more regard for convenience and ap-



This main stairway of the Lonja, in Barcelona, Spain, is of Italian marble.

pearance, as was the case in the external stairway to Strangers' Hall, in the precincts of Canterbury Cathedral, and at the old *Chambre des Comptes*, in Paris.

Later we come to the spiral staircases of the Gothic and Renaissance periods, with their superb balance, and graceful curving lines, such as we find in the Tattershall Castle, Chateau Blois or in the Palazzo Contarini at Venice. These spirals were mostly destral, or turning toward the right in ascending, the natural inclination of a right-handed man.

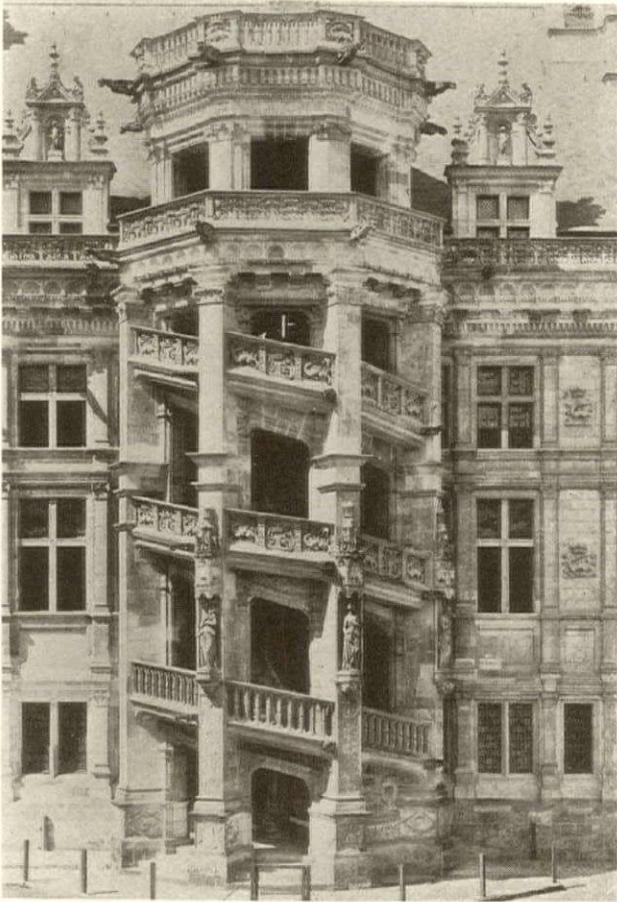
"In Gothic architecture, for stairs other than spirals we find mostly solid parapet walls with copings and occasionally stepped, as at the Bargello of Florence, or otherwise made up of exquisitely pierced panels, full of

geometrical or floral tracery, as on the library staircase at Rouen Cathedral" (Rothery). Tudor and Jacobean constructors made use of this modified panel form, as did the Renaissance as well. Since need for defense was no longer the dominant factor in domestic architecture, the nobility began building more spacious country mansions, sprawling more and more over greater area and rarely more than two stories high. Stairways were forced into greater prominence. The spiral type no longer sufficed and the state stairway came into existence.

The Georgian era, practically introduced by Inigo Jones, became in America the Colonial style. The stairs had "broad, deep steps with low risers, wainscoted, with good square landings at frequent intervals, square newels with mitred tops, heavy handrail and



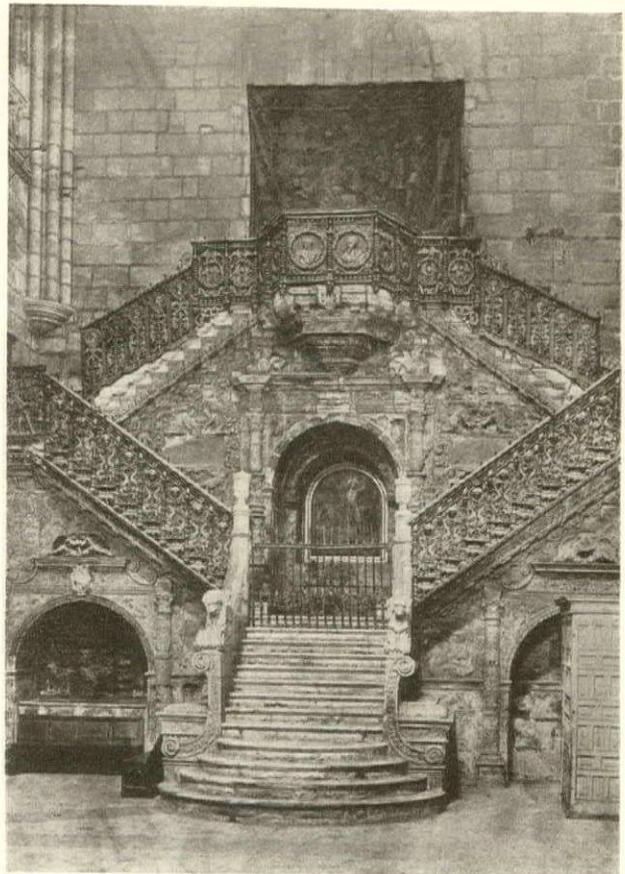
Stairway of Travertine in the cortile of the Palazzo de Bargello, Florence.



An elaborately decorated marble stairway in France, in the Renaissance style.

ceived staircase in this structure, composed of a broad flight of marble steps leading upwards from the main hall to a landing, with right and left reversed flights protected by a handsome gilded balustrade. The fine marble stairway in Dorchester House, Park Lane, London, built about 1850 by Villiamy, has steps with broad treads, moderate nosings and very low risers. G. C. Rothery, in his "Staircases and Garden Steps," describes it as follows: "A flight runs parallel to one side of the gallery to the angle of the wall, where there is a landing and then another flight parallel to the other side to the first floor, with an intermediate landing supported on small open arches. The balustrade is of marble, with broad flat handrail and dwarf pillars with swelling

rather plain balusters." They were well lighted by large windows, generally long and arched and deeply recessed. The later work of the Georgian era was characterized by a tendency toward the commonplace. "So we had the plain steps, steep straight flights, plain balusters and stereotyped round polished handrail; the whole combination a thing as devoid of grace of design as it was of the life of true craftsmanship." Gothic revivalists hardly added to the architectural harmony. Efforts at classic revival fared but little better at first. Smirke managed to make his Doric and Ionic designs terribly solemn, almost sombre. His British Museum staircase, while honest and dignified, is certainly heavy. Benjamin Wyatt, who built Stafford House, designed a well-con-



The famous "Golden Staircase" leading to the Puerta de la Coronaria in Burgos Cathedral. An early thirteenth-century creation.



Stairway in the Government Printing Office, Washington, D.C. The treads, risers, railings and the columns in the room are of striped Brocadillo marble.



The ornate marble stairway in the Elben D'Or Apartments, Omaha, Nebraska.

should be so placed as to be well lighted. Equally important is it that it should be harmonious with the style of the structure. It should be planned, however, to strike a note that will individualize the edifice, be it a public building or a modest dwelling. This can be accomplished by means of the material used as well as by the design.

The tendency nowadays in the larger buildings, as well as in those of smaller size, where the architect is intent on expressing permanence, or dignity, or opulence, combined with beauty, is towards the use of marble. The wide range of choice in the

bases. Square pillars with shaped bases and corniced caps break up the balustrade at the landings, the handrail joining below the cornice where there is scrolled leaf. The string is marked out by plain raised mouldings, and beneath this is a band of delicate carving."

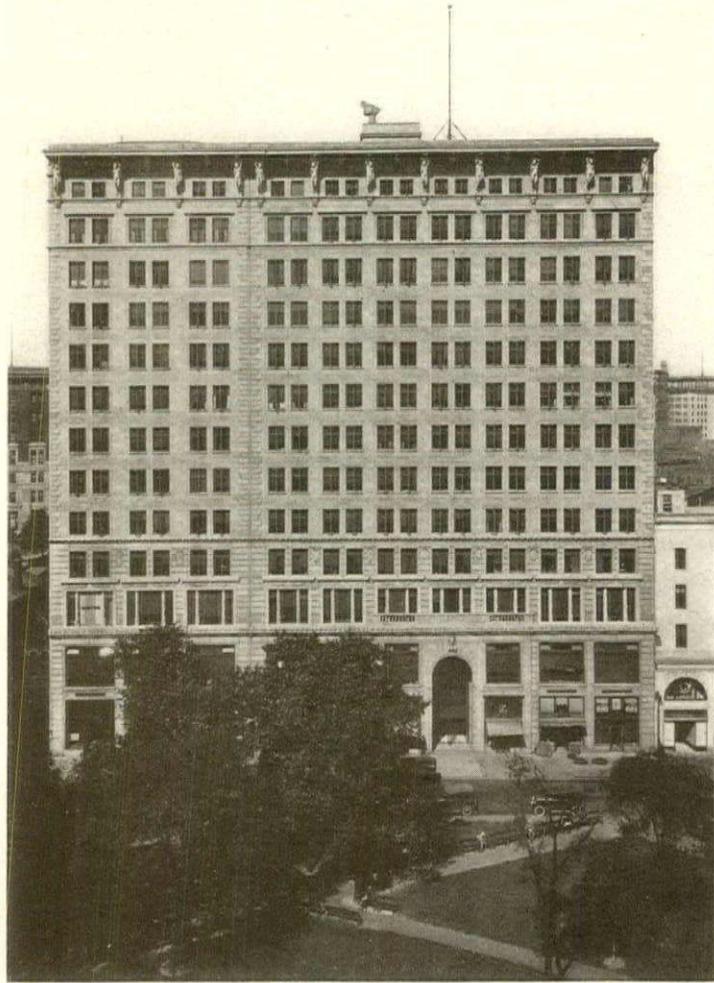
selection of colors offered him by the hundreds of hues in which marble may be obtained in this country, and the unlimited combinations that are possible, give to this material a decided advantage as a structural medium.

A feature introduced in stair building in England about this time for homes of medium size was the conversion of the intermediate landing into a kind of ante-chamber with alcove, seats and ferneries. The use of color and the admission of broken surfaces were innovations that came after 1860, due to the activities of Ruskin, Crane, Morris and the Rosettis.

While present-day practice in staircase building is as incoherent as is architecture in general, nevertheless, there are certain fixed rules that must be followed. It is recognized that the stairway must be made comfortable. It



Venoso stairway and die in the Masten Park High School, Buffalo, N.Y. Esenwein and Johnson, architects.



THE SHOPS OF THE BOOK BUILDING, IN DETROIT

WHAT Fifth Avenue is to New York, Washington Boulevard is to Detroit—the most important shopping thoroughfare of the city, a street of specialty stores and establishments catering largely to people of means. Piercing the heart of downtown, from Grand Circus Park to Michigan Avenue, Washington Boulevard forms a natural artery of trade that appeals particularly to those shoppers

who are buying the better things. There is, as a matter of fact, very little on this boulevard to attract the cheaper class of trade. It is the center of the city's only exclusive shopping district.

This point was borne in mind when, some years ago, the Book Estate decided upon the erection of a large office building upon this avenue, and commissioned Louis Kamper, of Detroit, to draw up plans for a

thirteen-story structure that would combine the practical elements of a business edifice with the specific features demanded by the environment.

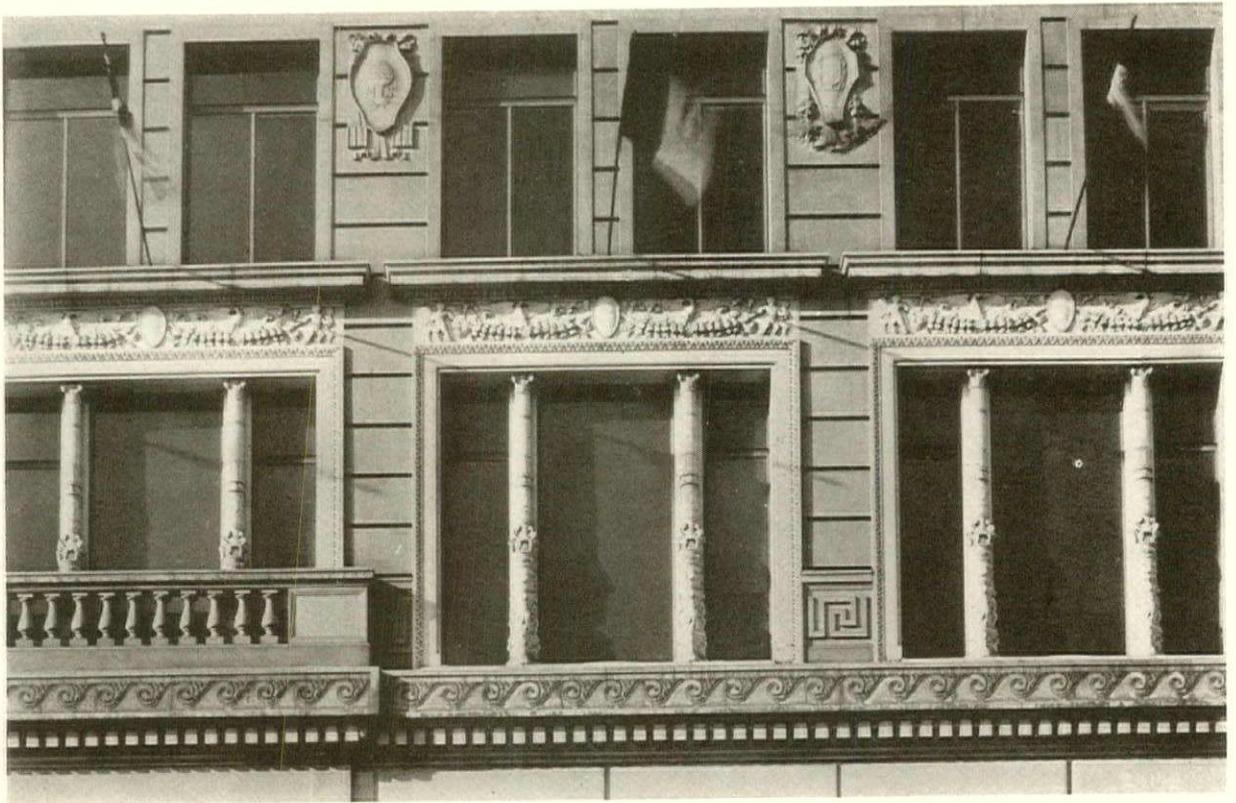
That Mr. Kamper successfully solved the problem of combining what would, at first thought, be considered radically opposed styles of treatment, is evidenced by the illustrations herewith.

The Book Building commands attention, even in that rapidly growing city of fine buildings. The design of the exterior follows the Italian Renaissance. The base is of granite, and part of the façade is of limestone, but the finest work on the wall is in marble. This latter material is used with a degree of skill that is rarely equalled in

present-day structures. The third floor, in particular, depends for its effectiveness upon the columnar treatment that extends across the entire front. The architect found inspiration for this treatment in a famous building built in the last part of the fifteenth century, the Certosa di Pavia. The façade of that beautiful church in the Milan district showed a screen of wonderfully carved marbles, with the columns designed by Borgognani forming a conspicuous feature. Great care was taken to have the columns of white Vermont marble in the Book Building striking replicas of these historical shafts and they are arranged in pairs so as to divide the window openings into three parts. Above each



Carvers working on columns for the exterior of the Book Building. These were faithful reproductions of those in the Certosa of Pavia, Italy. Many of the marble-working shops in America have master craftsmen whose lives have been spent in transforming shapeless pieces of marble into things of beauty.



Part of the third floor showing detail of marble treatment. The first three floors are devoted to specialty shops.

opening is an elaborately sculptured frieze surmounted by a classic cornice, and a conventional border extending around three-fourths of the window binds together the whole design. The fourth floor contains a series of shields, one between each window, while at the top of the building are large carved figures of women standing with arms upstretched, directly beneath the cornice and supporting this member.

The lower story was planned to meet the conditions imposed by location. That is to say, the shop idea was encouraged, and the stores on the street level were arranged primarily for specialty merchandising. These shops were interrelated, and yet each retained its individuality. Every detail was calculated to facilitate the transaction of business under ideal, almost luxurious, conditions. The business of retail buying was

made a dignified pleasure instead of an irksome duty.

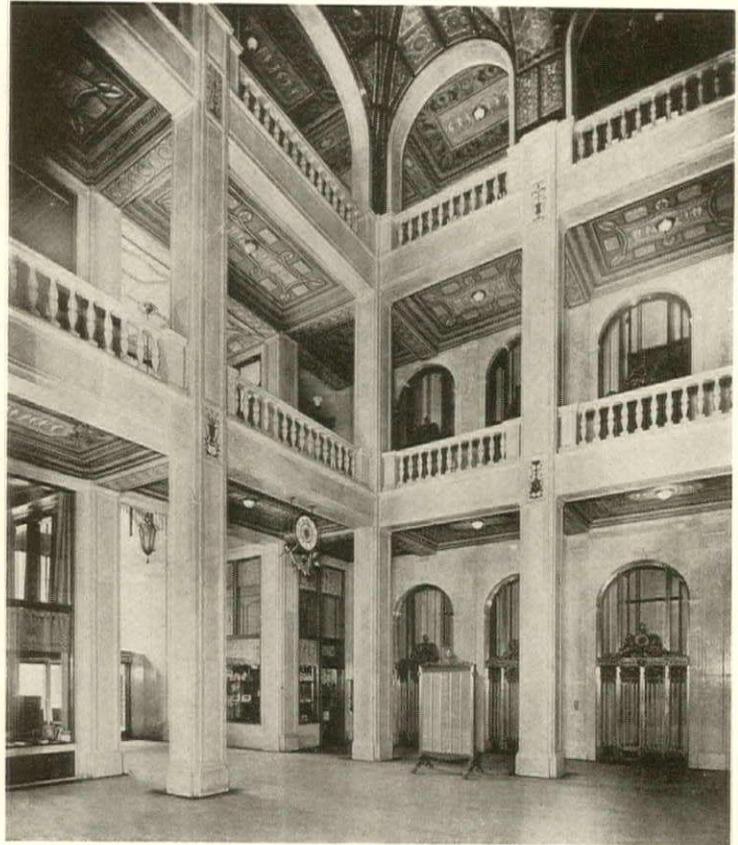
The general atmosphere of refinement which surrounds and permeates the shops of the Book Building, is in itself a factor toward successful merchandising. This air of distinctiveness and exclusiveness is not confined, however, to the shops themselves, but is communicated as well to the rest of the building.

The rotunda and the spacious promenade corridors on the first three floors are of Botticino marble with floors of Travertine stone. The floors of the stores and the lower corridors are of Travertine, while those of the corridors of the ten office floors are of Tennessee marble. The wainscotings throughout the latter are of Vermont marble, the same material that was used in the wall bases, window sills and the carved col-

umns of the third floor exterior.

The rotunda, with its magnificent Keppler glass dome supported on marble columns, radiates refinement and furnishes a most successful background for the artistry of the shops. Two of the elevators, ascending from the rotunda, have been set aside for the sole use of the patrons of the shops on the second and third floors. They are of the gearless type, smooth running and artistically enamelled. Just such attention to detail as this is seen throughout the entire building. The interior decorations, too, are striking, in perfect harmony with the ensemble.

There is, perhaps, no other building in America just like the Book Building. Other cities, it is true, have large structures which house small stores on and above the



The Rotunda is of Botticino marble with floors of Travertine stone.



A typical upper-floor corridor. The floor is Tennessee, the wainscoting Vermont marble.

first floor, but none of them are planned to exploit these shops in the manner of this fine Detroit building. Individuality, refinement, prestige — these qualities are emphatically expressed, and it is significant that in accomplishing this result marble played a most important part.

THE DEVELOPMENT AND OPERATION OF A MARBLE QUARRY

By J. P. McCLUSKEY, *Quarry Superintendent*
Gray Knox Marble Co., Knoxville, Tenn.

THE first step that may or may not lead to a marble quarrying operation is the period devoted to prospecting. The first object in prospecting should be to determine whether or not there is sufficient evidence to warrant an opening, and second, the proper location for the opening. We have frequently observed prospecting being done with the second object only in view, it not seeming to occur to the would-be operator that he may not have any worth-while marble.

To accomplish the first of the objectives mentioned it is desirable to secure geological maps of the area and, if at all possible, the personal help of the geologist most familiar with the area under observation. Our experience is that the state geologists are more than willing to co-operate at any time with the quarrymen of their state. A practical quarryman should be present and co-operate with the geologist and enter into all the discussions that may arise at this time, as his experience will be needed to determine where to open a quarry should it become evident that an opening is justified. If the overburden is light, resort may be had to open pits, a series of which should be across the deposit or strike. Open trenches at frequent intervals are better, the object being to expose as much surface as possible, the new surface under the clay having even more value for observing unsoundness and colors than the surfaces that have been exposed to the weather for ages. These exposed marbles have frequently lost their

attractiveness for several feet in from the surface.

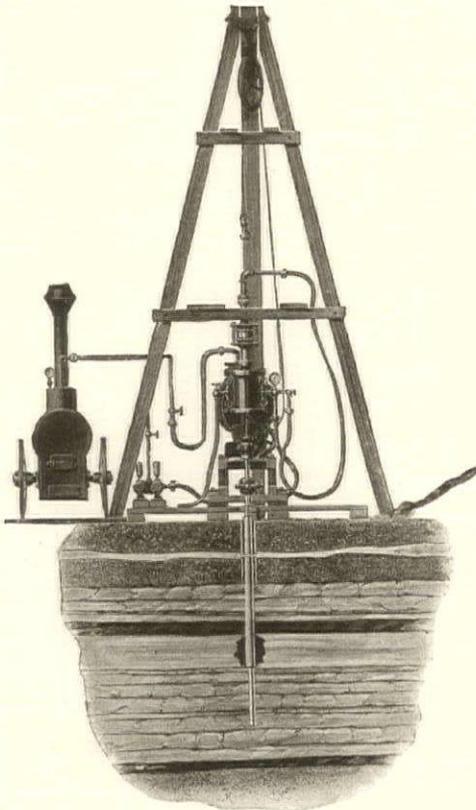
If the marble outcrops enough to expose the full thickness of the beds, it is possible that enough information may be gathered



Three thousand four hundred feet of 2-inch drill cores. Each piece should be carefully marked to show the piece number and the number of the hole from which it came. The cores from each hole should be kept in proper alignment in properly marked boxes. Cores are records and should not run the risk of being lost.

from breaking off projecting masses of the marble for the prospector to determine that an opening is justified, but it is not final enough for him to be able to say where the

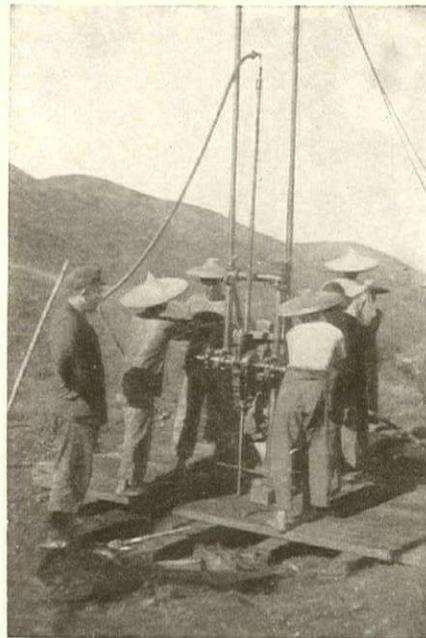
NOTE: Illustrations, excepting cross section, courtesy Sullivan Machinery Co., Chicago.



Arrangement of diamond drill outfit, as set up for prospecting, showing the principle of operation.

easily pay larger returns than any such sum invested at any future time in the life of the company. Recently one of the oldest quarries in Tennessee was thoroughly core drilled and the results caused a far-reaching change in the policy of the company. This was done after the quarry had been in continuous operation for close to forty years and had been a consistent producer of fine marble throughout its history, but it had never been prospected as it should have been. Out of a total thickness of nearly 400 feet of marble on the property only about 280 of it outcrop. Now it so happens that the lowest stratum of the outcrop consists of 18 feet of marble that is not so attractive as the general run of the quarry, so for years it had been assumed that the foot-wall or "bottom" had been reached. A core hole put in this "bottom" developed the 18 feet of unattractive marble and then over 100 feet of marble that is as attractive as any marble in the quarry, and as it is in the bottom of the several quarries, and no de-

opening had best be made, and is not best practice for any purpose. The writer has in mind the experiences of a well-known marble company within the last two years. They had an option on a piece of marble property and were more than pleased with the outlook. They had acres of marble in sight, situated ideally for quarrying and transportation. Now core drilling has not been used to any considerable extent by the marble companies as a whole, but, although these people's minds were about made up as to what course they would follow, they had it core drilled. The results changed their minds entirely and saved them thousands of dollars. They probably made more money out of that quarry that they did not open than they have out of others that have taken years to develop. A few cores taken at well-selected points on the property may



Sullivan hand power core drill at work in Honan District, China.

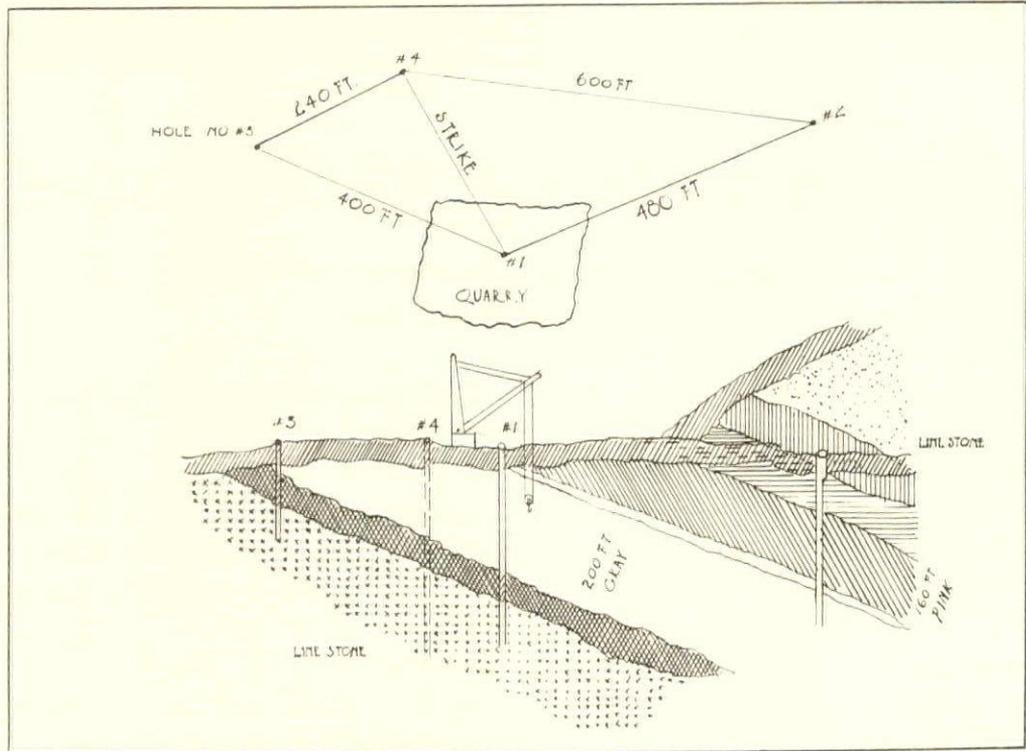
velopment work has to be done in order to quarry it, they are very fortunate indeed.

The cost of core drilling with a double core barrel, which is the proper kind to use, varies from \$2.00 to \$3.50 per lineal foot for a 2-inch core, depending upon local conditions to some extent, but largely upon the amount of drilling to be done. It should be possible to secure a better price for a total of 500 feet or more of drilling than for 100 or 200 feet. Cores taken out will show conclusively the thickness of the deposit, the colors of the marble and, what is of equal importance, any strata of limestone or off-colored material will be shown up in striking contrast to the good material. This is the chief value of cores.

From our experience we would consider it unsafe to reach definite conclusions in regard to the degree of unsoundness in the deposit from the soundness or unsoundness

of the cores. Frequently unsoundness is in zones and it therefore follows that if the core should encounter a zone of soundness or a zone of unsoundness an opinion based on either would be unsafe. Core drilling has been done for the express purpose of determining the unsoundness in a given area and although the work was done most painstakingly it was later found that the unsoundness was so erratic that the conclusions reached were not borne out by the facts.

It is believed to be a conservative estimate to place the number of failures among those who try their fortunes at quarrying marble at from 50 per cent to possibly a much higher figure. This number could be greatly reduced by taking plenty of time and sufficient money to prospect the property thoroughly before deciding to open a quarry, thus saving large sums of money and untold quantities of aches and pains.



An example of core drilling intelligently done. As a result of this drilling the quarry was turned directly across, or at right angles to the strike, the object being to develop a cross-section of the deposit as rapidly as possible.



BOSTON'S TEMPLE TO DENTISTRY

The Magnificent Forsyth Infirmary in the Fenway
is a Beautiful Mass of Marble

ONE of New England's noblest architectural creations, a building that houses a charity unique in character and as far-reaching in beneficence as any ever projected, owed its origin to a chance conversation that occurred in a dentist's chair. The Forsyth Dental Infirmary, whose white marble exterior arose on the Fenway almost overnight, was the direct result of a fateful visit that was paid by one of the four Forsyth brothers of Boston to a dentist in that city. Mr. Forsyth had occasion, at that

time, to remark that he purposed leaving a portion of his considerable fortune to some charity as yet undetermined. The practitioner, presumably with professional zeal, told the layman how much of the sin, crime, inertia and crass stupidity of society is due to uncorrected defects of the mouth. The story is, of course, a familiar one to specialists. It made such an impression on the dentist's client that a course of investigation was started leading to a determination to insure that all children of Greater Boston

not otherwise provided for shall have adequate treatment for the oral diseases which are the most prevalent of all maladies of the young, and broadly considered, the most disastrous to their future efficiency, their physical and moral uprightness.

Thence came the train of events which need not be rehearsed in detail, but which led to the present impressive installation on a tract of land close to the Museum of Fine Arts—the resolution of the surviving brothers, John Hamilton and Thomas Alexander Forsyth, to execute, as a memorial to James Bennet and George Henry Forsyth, a project, which as talked over in family councils, had seemed to be more needed than any other discussed; the incorporation in 1910 by a special act of the Legislature of the Forsyth Dental Infirmary for Children and the establishment of a foundation with a board of trustees composed of the following gentlemen: Thomas Alexander Forsyth, President; Edward Hamlin, Vice-President; Harold Williams, John F. Dowsley, Nelson Curtis, Ervin A. Johnson, Gordon R. McKay, Harold DeW. Cross, Chester B. Humphrey and Timothy Leary, all of them names to conjure with in Boston over a decade ago.

The great white "University of the Fenway" as a consequence of the chain of happenings just noted, had a resplendent addition, whose progress from the ground upward had been watched by passers-by with increasing enthusiasm. It has been called the most beautiful building in Boston. The superlative is unnecessary. It is at once a striking memorial and an obviously practical architectural creation. One sees that much more than a copy of a classical temple has been achieved by the architect, E. T. P. Graham.

Adequate light, cheerfulness of aspect, easy access and egress are prime considera-

tions in a dental hospital. The operating chairs must be next to windows and skylights that so admit illumination as to get all the daylight there is and avoid the necessity of using artificial light even on the gloomiest of winter days. There must be nothing grim or prison-like about a structure in which, of necessity, little people have not exactly the pleasantest time of their young lives. Again the ways of getting into and out of such a building should be simple and direct. The reception room should give a pleasant impression. The rooms in which possibly painful operations occur should be away from the sight and hearing of this place of reception, and the plan of exit should evolve no return of patients to the section in which other children are awaiting their seances with the operating force.

These requirements explain the architectural layout of the building, with a long front on the Fenway and two lateral wings partially enclosing a court with sunken garden effect that opens upon Hemenway Street. The stream of children seeking the hospital's services had been conceived as entering at a side door of the northern wing, there to be received and distributed to operating rooms ranged in the full light admitted through the windows of the long front and of the opposite wing, in which latter part the more painful operations are performed, and finally emerging whether happy or still sore, from a door in the south wing.

How thoroughly logical this arrangement was, hardly need be said. The uses of the building had predetermined its architectural form. The scheme makes the series of eleven large windows on the front and of five on each wing of the main or infirmary floor seem to be as inevitable, as structurally right, as the entrances and exits and ramps of the Cambridge subway stations or the



Doorway of Forsyth Building, Boston. The exterior is of Imperial marble, quarried at Danby, Vermont. The interior contains a large quantity of Pittsford Italian X, a creamy marble with gray markings.

Edward T. P. Graham was the architect.

circulatory system of galleries at the nearby Art Museum.

Technically described, the Dental Infirmary comprises three stories and two partial mezzanine floors. The first floor is accessible from the Fenway by a central entrance leading from a broad marble terrace into a spacious vestibule with mosaic flooring and marble wainscot. Thence appears a main staircase leading to the infirmary above. This staircase, it should be noted, runs parallel to the façade in order not to encroach on the space available for well-lighted operation.

The ease of entering the basement floor is increased by the fact that the children descend from the street in reaching the waiting room. This section of the north wing is of obvious importance. It is finished in impervious tiling which can be frequently washed and disinfected. In tiled panels are executed the pictures descriptive of children's familiar stories, which were the subject of a prize competition. Close by the waiting room are toilet and mouth disinfecting rooms and a checking room which, like the others, is disinfected daily. The children while waiting are not required to sit tiresomely on benches, as at some clinics, for whenever the weather permits, they are allowed to play in the adjacent park until their turns are reached.

Visiting practitioners, nurses and employees of the Infirmary enter from Hemenway Street through the sunken garden by way of a circular visiting dentist's room. This is supplemented with and adjacent to locker rooms and a cloak room. For the permanent staff a room has been provided in the south front of this basement floor, which, for the rest, contains the janitor's apartments, laundry, small storeroom and a reserve room. The boiler, engine and filtering rooms are situated in a sub-basement.

The first floor contains a lecture room, with seats for 250, in which are given popular lectures on dental hygiene, after the style of the Sunday afternoon Harvard medical school lectures. A portion of this room, which may be cut off by a folding partition, is used for trustees' meetings and committees' meetings.

The northeast corner of this floor is a memorial room for assembling the memorials of the Forsyth family and the library of Thomas A. Forsyth. Adjoining it is a reception room. At the other end of the corridor is the museum and research room. Important results come from this research department. Publications of both technical and popular interest are also issued from it.

The right wing contains extracting and anaesthesia rooms, while the rear of the central portion of the floor shows the lower part of the amphitheater and various consulting anaesthesia, mouth sterilizing and recovery rooms related to it.

The infirmary floor above the floor just described is the most vital part of the building. It is thus comparable to the main floor at the Museum of Fine Arts. The windows, of the square headed or lintel type, are 9 feet wide and 5 feet high. They come within 3 feet of the floor. Two chairs are arranged for each window. The rear row of chairs receives light both from the upper portion of the windows and from skylights which are arranged to transmit north light only.

This great infirmary room, covering the entire front and part of the wings, is 27 feet high. The flooring and wainscoting are of waterproof material. The operating chairs are especially constructed with waterproof surfaces. All corners have been eliminated in accordance with hospital practice, in order that hot water and steam may be applied freely in maintaining a condition of absolute cleanliness. Sterile instruments

are sent to each operator on call in outfits contained in metal trays suitable for counting on the operating chair. After use these trays are collected in trucks and taken to the cleaning and sterilizing rooms. No outer clothing is worn in the room, both patients and operators being provided with special covering. The ventilation is by means of humid air brought in by means of fans. Impure air goes out through the skylight. Accessory rooms are provided at the end of either wing; an orthodontia laboratory, one for plastic work and one for porcelain. Above these is a mezzanine floor with large reserve rooms and an X-ray room.

Such, in brief, is the architectural layout of a monumental infirmary, the marble building which cost \$300,000 and which is supported by the endowment fund of about two million dollars generously provided by the Messrs. Forsyth. The construction is in a style of greater magnificence than is by some believed appropriate to a hospital, but the architect considered that the building is also a memorial, and that its work will be aided by attractive surroundings.

The infirmary is primarily a hospital and not a school, even though some of the social service work is of an educational

character. There is a permanent staff of fifteen to twenty-five recent graduates in dentistry. They receive compensation much as the medical internes of other hospitals are paid. A visiting staff of older men come to the Infirmary by appointment. The scope of the service is broadly interpreted. Work on adenoids and other affections of the mouth is included, as well as the hygiene and care of the teeth. The foundation is for the benefit of children of Boston under sixteen years old, but that specification is not understood to mean of municipal Boston only. The benefits apply to the entire metropolitan district, though in case the facilities are overcrowded (which is not usual, since every effort was made to make them ample), first preference has to be given to the urban cases.

Charitable the work is, but, except in extreme instances, not gratuitous. Boys and girls are not permitted to remember in later years that they once had their dentistry done for nothing. Even if the fee is not more than five cents for a minor operation, the young person will recall, that he or his parents made a contribution toward the expense. The charity is one that takes its place among those who help people to help themselves.



Rear view of the Forsyth Building, Boston, Mass.

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.

Griotte D'Italie Fleuri

Quarried near Carcassonne, Aude, France.
Dark brown, nearly black, with rich cherry colored patches. (Watson.)
Takes high polish.

Griotte De Sost

Quarried in the Valley of the Barousse, Hautes-Pyrenees.
Bright red, slightly variegated with fine white veins.
Takes high polish.

Griotte des Pyrenees

Quarried in Esbareich, Hautes-Pyrenees, France.
Bright red, slightly variegated, with fine white veins.

Griotte Oeil de Perdrix (Partridge-Eye)

This name is given to any Griotte marble in which the white spots are uniformly small.

Griotte St. Remy

Quarry near St. Remy in the Commune of Rochefort, Namur, Belgium.
Dull brownish-red with a few small spots of white.
Takes high polish.

Gris—Gray.

Grisatre—Grayish.

Gris Bois Jourdon—Group C.

Quarried at Argentre, near Bouere, Mayenne, France.
Gray mottled, with red lines and patches.
Takes good polish.

Gris De St. Beat

Quarried near St. Beat, Haute-Garonne, France.
Blue-gray, banded.
Takes high polish.

Gris Louverne—Group C.

Quarried at Louverne, not far from Laval and Argentre, Mayenne, France.
Black, veined with white.
Takes good polish.

Gris Panache or streaky gray.

Quarried at Le Paychaguay in Isere, France.
Black with gray veins. (Blagrove.)

Gris Penache

Quarried near Arudy, Basses-Pyrenees, France.
Dove color with white spots and veins.
Takes high polish.

- Gris Rouge*
Quarried in Hainaut, Belgium.
Gray with red and white mottling and veins.
- Gris St. Michel*
Quarried in France.
Variegated medium-toned gray with pronounced markings of deeper shade and thin crystalline veins. (Renwick.)
- Gris Tendre De Louvie*
Louvie-Juzon Quarries near Louvie, Basses-Pyrenees, France.
Delicate dove color with slender white markings. (Watson.)
Takes high polish.
- Grun Troppf*
Quarries at Adnet, Salzburg, Austria.
Greenish-gray with white veins and mottles.
Takes high polish.
- Guatemala Marbles*
Quarried near the village of San Rosalia, northwest of Zacapa, Guatemala, by the Gray Knox Marble Company. Marble obtainable in three varieties:
Guatemala Cloud—Group A—Bluish-white, clouded.
Guatemala Statuary White—Group A—Bluish-white slightly marked.
Guatemala Statuary Vein—Group A—White with veins of a bluish cast.
- Guillaume*
Quarried at Landellas in Hainaut, Belgium.
Pale whitish-brown with clouds of a darker shade of the same tint. (Blagrove.)
A darker variety of this marble is quarried at Chenu near Dinant.
- Guillestre or Puddingstone.*
Quarried near Embrun in Hautes-Pyrenees, France.
Red with rounded spots of white, gray and yellow.
- Guipuzcoa Province Marbles*—See Griotte D'Espagne, Rouge St. Isidoro and St. Katharines.
- Gunnison County Marbles*—See Colorado marbles.
- Gwalior*—See Sabalgarh.
- Gwendreath Quarries*—See Cornish Serpentine.
- Gypsum*
According to Merrill, "This can scarcely be considered a building stone, and it is used only to a small extent for ornamental purposes." Comparatively speaking, the above is true; nevertheless, under the name of Alabaster which is but another name for Gypsum, it is used quite extensively.
- Gypsum Marble*—See Alabaster.
- Haddingtonshire(Scotch)*—See Dunbar.
- Hadjadja Quarries*—See Moroccan Onyx.
- Hainault, Province of Belgium*—See Feluy-Arquenne, Frasnès Gris Rouge, Guillaume, Noir Belge and Petit Granit.
- Half Statuary*—See Second Statuary Italian.
- Hall*
Quarried near Hall in the Austrian Tyrol. Grayish-brown with occasional brilliantly iridescent spots, and streaks like those of fire opal. (Merrill)
- Ham Hill Stone (Freestone)*
Quarried near Yeovil, Somersetshire, England.
Richly toned yellow-brown, turning grayer after exposure.
Takes no polish.
- Hancock Marble*
A dolomite quarried in Hancock Township, Addison County, Vermont.
Not available for interior work.
- Happaway Quarries*—See Dove Happaway.

Hard Layer—Same as Verdoso.

Harpenden Puddingstone

Quarried at Harpenden, Hertfordshire, England.

Large round spots of orange with red centers and brown edges held in place with a gray and yellow filler.

Harper's Ferry Quarries — See Potomac Black and Gold, and Potomac Yellow.

Hartham Park Stone—Fine grained.

Quarried near Bath, Somersetshire, England.

Yellowish-brown. (Freestone.)

Takes no polish.

Hassock (Limestone)

Quarry near Maidstone, Kent, England. Not suitable for interior work.

Hastieres Quarries—See Breche De Waulsort and Breche Francaise.

Hastings County, Ontario, Canada, Marbles:

Banded Pink	Imperial Green
Breche Rose	Laurentian
Byzantine	Pink Clouded
Cipollino Green	Veined White

Haut—Height, top, summit, upper part.

Haute-Garonne Marbles—See Blanc De St. Beat, Gris De St. Beat and Vert D'Estour.

Hautes-Pyrenees Marbles—See:

Bise African	Campan Melange
Bise Rose	Campan Rose
Bise Violet	Campan Rouge
Breche D'Aste	Campan Vert
Breche De Salut	Griotte Campan
Breche De Smyrne	Griotte De Sost
Breche Jaune De Baudean	Griotte Des Pyrenees
Breche Medoux	Hechettes
Breche Noir De Baudean	Lumachelle De Lourdes
Breche Porter	Medoux Gris
Campan Isabelle	Pousingue De Tournay

St. Florent	Sarrancolin Ilhet
Sarrancolin Beyrede	Vert de Grezain
	Vielle Violet

Hautes-Pyrenees Onyx—See Stalactite Du Bedat and Stalagmite Du Beat.

Hauteville—Group C.

Chateau Hauteville Quarries, near Hauteville, Ain, France.

Buff color, fairly uniform.

Takes good polish.

In America, Hauteville from this quarry takes the trade-mark of C.H. and is also known as Genuine Hauteville.

Hautpoul—See Felines d'Hautpoul.

Hawkins County

Quarried near Knoxville, Tennessee.

Variegated brown, reddish-brown and white.

Takes good polish.

This is one of the best known Tennessee marbles but is not always available.

Heches Commune or Hechettes Marble.

Quarry at Hechettes, Com. Heches, Hautes Pyrenees, France.

Dark gray with network of white veins and spots.

Takes high polish.

Hecourt

Quarried near Hecourt, Oise, France.

Gray with black fossils.

Heer

Quarried near Heer, Namur, Belgium.

Reddish-gray with occasional yellowish-white veins.

Hegge Quarries

Traces of abandoned quarries are found at Hegge, on the southern extremity of Fjord, Norway.

- Heidleberg Green*
Eastman's Quarry, West Rutland, Vermont.
Waves of dark to medium dark green.
Takes medium polish.
- Hellblau*—See Gray Kunzendorfer.
- Hellbunt*—See Gray Kunzendorfer.
- Hell Marble*—See Gray Kunzendorfer.
- Herault* (Dept. of France.)—See Felines d'Hautpoul.
- Herbosum*
An ancient marble of grass-green color from an unknown quarry.
- Hers*—See Jaune Uni des Pyrenees.
- Hertfordshire English Marbles*—See Harpenden Puddingstone.
- Hippurite Limestone*
Geological name for certain limestones or marbles of the lower Cretaceous series.
- Hitachi*—See Black and White (Japan).
- Hof Gaisteins Quarries*—See Vert Gastein.
- Hertfordshire Puddingstone*—See Harpenden Puddingstone.
- Heureuse Vallee Quarries*
Joinville and Napoleon (French) are quarried in this valley.
- Higher Piganto Mountains*
Near these mountains on the Island of Knio, the Ancient Porta Santa was quarried.
- Highland Blue*
Quarry located at Brandon, Vermont. (Not in operation.)
Dark blue with occasional waves or bands of lighter shade. Some slabs may have white dots.
Takes medium polish.
- High Street* (Brandon Italian)—See Pittsford Valley H.
- Hispania*—Ancient name for Spain and Portugal.
- Holestrow Quarries*—See Cornish Serpentine.
- Holland Blue*
Quarried at Florence, Vermont.
Moderately dark blue-gray veined by darker and often almost black narrow waving lines and veins, with spots of white.
Takes medium polish.
Sold in three grades: Average Blue, Holland Blue and Mottled Blue.
- Holly Springs Marble* or *Holly springs Verde Antique*—See Georgia Verde Antique.
- Holmestrand*
A marble deposit of considerable importance occurs near this town in Norway.
- Holston Marble*
Original name for Tennessee marbles. Name taken from the Holston River which joins the French Broad River near Knoxville, thus forming the head waters of the Tennessee River.
- Holston Pink*
Godfrey Quarries near Friendsville, Blount County, Tennessee.
Delicate pink with occasional white spots.
Takes high polish.
- Holyhead Island Serpentine*—See Anglesey Serpentine.
- Hooe Lake Marble*
Hooe Lake Quarries, Plymstock, Devonshire, England.
Deep black with interlacing veins of white. (Watson)
Takes medium polish.
- Hop* or *Marble Island*—See Marble Island.

Hopton Wood Stone (Dark)

Hopton Wood Quarries, Middleton, Derbyshire, England.

Brownish-gray with white fossils.

Takes high polish.

Hopton Wood Stone (Light)

Hopton Wood Quarries, Middleton, Derbyshire, England

Light cream with white fossils.

Takes medium polish.

Hornblende

Greenish-black and black of ferrous magnesium, calcium, aluminum amphibole.

Hornblende Rock

A rock containing Hornblende with either feldspar, quartz or mica.

Houdain Quarries—See Noir Francais.

Hrubschitz Serpentine

Quarried at Hrubschitz, Silesia.

Huddleston Marble—Dolomite.

Quarried near Sherburn, Yorkshire, England.

Pale whitish-yellow.

Hundsheimer Lime Stones

Quarried at Hundsheimer, Lower Austria. Chalky white, buff and gray suitable for building and carved work.

Does not take a polish.

Similar stones are quarried at Mannersdorfer, Margarethen and Oszlopp, all in lower Austria.

Hungarian Gray—See Ungarisch Grau.

Hungarian Marbles—See Almas, Ungarisch Grau, Piszko Sutto Rot, Ruzzikaer.

Huntingdonshire Marble—See Alwalton.

Huntley Quarry

Located at Leicester Junction, near Brandon, Vermont.

Light buff-pinkish.

Not available.

Huronian or Huronian Conglomerate

Quarried on the shores of Lake Superior. Canada.

Light mottled gray with large spots of slate blue, brown and bright dark and light red.

Hydrequent Quarries—See Napoleon (French) and Joinville.

Hymettian or Hymettus Marble (Gray)

Quarried on Mount Hymettus, near Athens, Attica, Greece.

Grayish-white or bluish-white crowded with spots like Sago, and banded with straight parallel lines of gray in various shades with occasional indications of green.

Not available.

Hymettian or Hymettus or Marmor Hymettian.

Quarried on Mount Hymettus, near Athens, Attica, Greece.

White, coarse grained.

This quarry was worked by the ancients but long since abandoned.

Iberian Agate

Quarried near Villa Nova d'Ourem, Portugal.

Variegated dark red, yellow and slate color.

Ibn-Son-Abed Quarries—See Mizzeh Akhbar

Idaho

A small amount of marble for local use is quarried at Spring Basin, Cassia County, Idaho; and a deposit of dark gray with dull yellow lines, with an occasional white vein, is mentioned by Merrill as occurring near Paris, Bear Lake County.

Idar State (Steatite)—See Steatite (Soap Stone)

Igneous Rock

This is a rock formed by the action of heat intense enough to produce fusion.

Igvara Mander Jaisalmer State—See Abur Stone.

Ilhet—See Sarrancolin

Illinois Limestone

No siliceous crystalline rocks of any kind are to be found within the state limits. (Merrill)

A stone known as Athens Stone from the Washington Ledge Quarry near Joliet was used extensively for floors, etc., but is no longer available. See Joilet Limestone.

Ilman Mountains (Amazonite)

Found among the granite rocks in the neighborhood of Miyask on the Ilman Mountains, in the southern part of the Ural Range, Russia.

The Amazonite used in the making of small ornaments was until recent years almost exclusively from this district. The present supply is chiefly from the United States. See Amazonite.

Image Stone of India

Indian Steatite is used locally for all kinds of decorative work. The finer varieties are used almost exclusively for the carving of idols, hence the name Pratima Culler (Image Stone); while the coarser varieties are known as Pot Stone, and are frequently used in making vessels or pots. See Steatite.

Imezio-Colonnare

Imezio-Fasciato Schietto and Imezio-Zonale are names sometimes given to Hymettian.

Imperial Gray—See Carthage Imperial Gray.

Imperial Green

Bancroft Quarries, Hastings County, S. Ontario, Canada.

Banded with dull white and green waves. Takes medium polish.

Imperial Marble—See Fleur De Pech, violet and gold.

Imperial Porphyry—Same as Red Porphyry.

Imperial Quarry—See Danby.

Imported Verde Antique

A vague term used by American importers which may well apply to any Verde Antique not produced in America.

I.M.V.—*Industria De Marmor Venezia*—See Tavernelle.

Incarnat—Carnation.

India Dolerite—See Black Dolerite.

India Felsite—See Green Felsite.

Indian Gray—Another gray marble from India is known as Gray Bichia.

Quarries in Patiala, Punjab District, India.

Black and white mottling.

Takes high polish.

Indian Marbles and Stones or Marbles of India:

Abri	Krimchi
Abur Stone	Kurkura
Badal Stone	Nowshera
Black Bichia	Pink Makrana
Gray Bichia	Sabalgarh
Gray Makrana	Sangkhutoo
Green Felsite	Steatite
Indian Gray	Sungmosa

Indiano Olano Onyx—Group D

Quarried at Indiano Olona, Como, Italy.

Banded dark yellow and white.

Takes good polish.

Indian Pipestone—See Catlinite.

India Quartzite—See Green Quartzite.

India Steatite—See Steatite (Soap Stone)

Indurated Stone

An artificial stone used in England.

Indwenha Hills—See Port Shepstone marble.

LIST OF QUARRIES AND MARBLE MANUFACTURERS

REPRESENTED IN THE MEMBERSHIP OF THE
NATIONAL ASSOCIATION OF MARBLE DEALERS

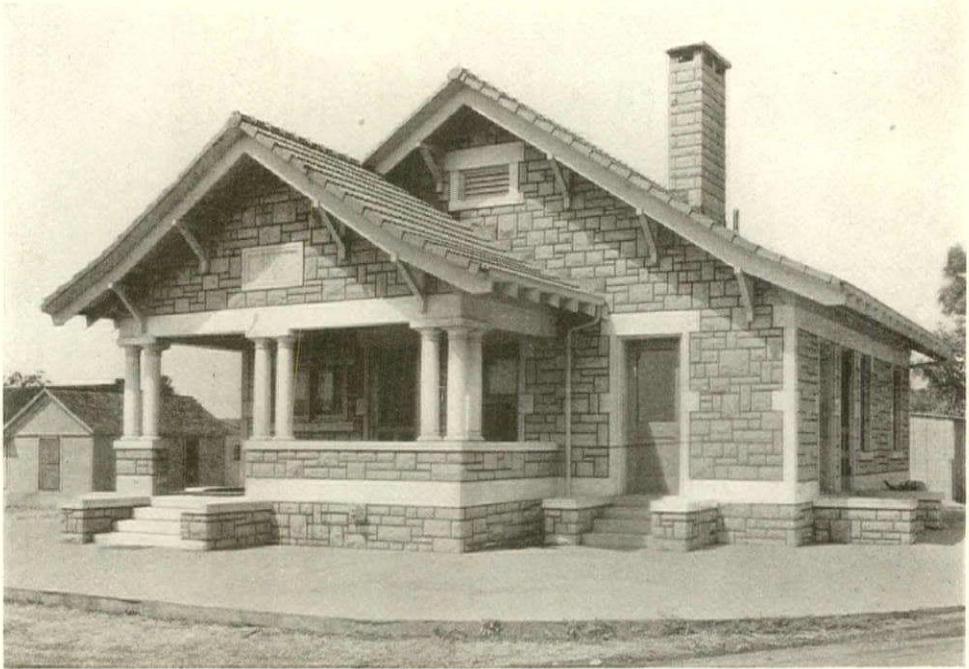
<i>City and State</i>	<i>Company</i>	<i>Representative</i>
Akron, Ohio.	Flower Marble and Tile Company	Jas. T. Flower
Atlanta, Ga.	Reeves Marble Company	Alex. Reeves
Baltimore, Md.	Hilgartner Marble Company	A. H. Hilgartner
Baltimore, Md.	Jos. B. Dunn & Sons, Inc.	Chas. Scheidt
Baltimore, Md.	P. B. and W. Marble and Tile Co., Inc.	Richard T. Salter
Birmingham, Ala.	Alabama Marble Company	John S. Sewell
Boston, Mass.	Troy Bros. & Company	M. W. O'Brien
Buffalo, N.Y.	Geo. W. Maltby & Son Company	Wm. C. Maltby
Buffalo, N.Y.	Lautz Marble Corporation	R. K. Glass
Carthage, Mo.	Arnosti Marble Company	A. Arnosti
Carthage, Mo.	Carthage Marble and White Lime Co.	Geo. S. Beimdiek
Carthage, Mo.	Consolidated Marble and Stone Co.	Millard Bryan
Carthage, Mo.	Ozark Quarries Co.	T. R. Givens
Carthage, Mo.	F. W. Steadley & Company, Inc.	K. D. Steadley
Carthage, Mo.	Lautz Missouri Marble Company	John B. Robertson
Carthage, Mo.	Spring River Stone Company	John E. O'Keefe
Chicago, Ill.	American Marble Mill Company	T. J. Murphy
Chicago, Ill.	Black & Gold Marble Company	J. J. Bauer
Chicago, Ill.	C. N. Marthens Marble Company	C. N. Marthens
Chicago, Ill.	Corley-Meservey Marble Company	B. F. Meservey
Chicago, Ill.	Davia Bros. Marble Company	Humbert Davia
Chicago, Ill.	Enterprise Marble Company	Thos. A. Knudson
Chicago, Ill.	Flavin Marble Mill	F. A. Flavin
Chicago, Ill.	Frank P. Bauer Marble Company	Frank P. Bauer
Chicago, Ill.	Henry Marble Company	H. K. Townsend
Chicago, Ill.	Jas. B. Clow & Sons Company	A. Bunz
Chicago, Ill.	M. Keating & Sons Company	Thos. F. Keating
Chicago, Ill.	Naughton Marble Company	Thos. Naughton
Chicago, Ill.	Peerling Marble Company	Frank J. Peerling
Chicago, Ill.	Standard Mosaic Tile Company	C. R. Borchardt
Chicago, Ill.	Taylor Marble Company	Geo. W. Bower
Cicero, Ill.	National Mosaic Tile Company	George Wilde
Cincinnati, Ohio	Cincinnati Marble Company	H. L. Pike
Cleveland, Ohio	Allen Marble Company	R. M. Allen
Cleveland, Ohio	Empire Marble Company	—
Cleveland, Ohio	Haworth Marble Company	W. J. Haworth
Cleveland, Ohio	Interior Marble and Stone Co.	E. M. Fritz
Cleveland, Ohio	Prospect Mantel and Tile Company	S. J. Weingarten
Cleveland, Ohio	Roy-Cliff Marble Company	L. G. Yeau
Columbus, Ohio	Wege Marble and Tile Company	C. F. Wege
Dallas, Texas	J. Desco & Son	J. C. Bruggen
Dallas, Texas	Southwest Marble Company	J. Desco
Dallas, Texas	McElhinney Tile and Marble Co.	William Jessop
Denver, Col.	Denver Mantel and Tile Company	D. C. McElhinney
Denver, Col.	Des Moines Marble and Mantel Co.	W. D. Watson
Des Moines, Iowa	Holbrook Marble and Tile Company	J. R. Golden
Des Moines, Iowa	Christa-Batchelder Marble Co	H. F. McAdow
Detroit, Mich.	Detroit Marble Company	E. L. Leavenworth
Detroit, Mich.		B. L. Cummins

THROUGH THE AGES

<i>City and State</i>	<i>Company</i>	<i>Representative</i>
East Cambridge, Mass.	Johnson Marble Company	T. J. Johnson
Fort Worth, Texas	Good Marble Company	H. G. Good
Houston, Texas	Salt Lake Marble and Supply Co.	Geo. E. Rieder
Indianapolis, Ind.	F. E. Gates Marble and Tile Co.	F. E. Gates
Kansas City, Mo.	Kansas City Marble and Tile Co.	G. F. Keller
Kansas City, Mo.	Phenix Marble Company	Mastin Simpson
Kansas City, Mo.	Sutermeister Stone Company	C. O. Sutermeister
Kasota, Minn.	Babcock & Willcox	Tyrell S. Willcox
Kasota, Minn.	Breen Stone and Marble Co.	Tyrell S. Willcox
Knoxville, Tenn.	Candoro Marble Company	Craig C. Day
Knoxville, Tenn.	Gray Eagle Marble Company	E. F. Klein
Knoxville, Tenn.	Gray Knox Marble Company	J. B. Jones
Knoxville, Tenn.	John J. Craig Company	John J. Craig
Knoxville, Tenn.	Knoxville Marble Co.	John M. Ross
Knoxville, Tenn.	Ross & Republic Marble Co.	W. E. Moses
Knoxville, Tenn.	Salomone-O'Brien Marble Company	Walter O'Brien
Knoxville, Tenn.	Tennessee Producers Marble Co.	B. L. Pease
Little Rock, Ark.	Southwestern Tile Company	R. E. Overman
Long Island City, N.Y.	Clarendon Marble Company	Alexander Thomson
Louisville, Ky.	Peter & Burghard Stone Co.	Jos. E. Burghard
Memphis, Tenn.	Central Mosaic and Tile Co.	Louis B. Marus
Milwaukee, Wis.	Andres Stone and Marble Company	Edgar Andres
Milwaukee, Wis.	Breidster Marble Company	Fred. W. Breidster
Milwaukee, Wis.	McClymont Marble Company	J. J. McClymont
Minneapolis, Minn.	Twin City Tile and Marble Co.	F. O. Streed
Minneapolis, Minn.	Northwestern Marble and Tile Co.	Chas. Gramling
New Orleans, La.	Albert Weiblen Marble and Granite Co.	Albert Weiblen
Oklahoma City, Okla.	Taylor Marble and Tile Company	G. W. Taylor
Omaha, Neb.	Sunderland Bros. Company	J. P. Williams
Peoria, Ill.	Peoria Stone and Marble Works	H. A. Farley
Pittsburgh, Pa.	American Marble Company	Max Weiner
Pittsburgh, Pa.	Iron City Marble Company	George L. Sibel
Pittsburgh, Pa.	Pennsylvania Marble and Mosaic Co.	John A. Fiore
Somerville, Mass.	Phil. H. Butler & Son Company	P. H. Butler
St. Louis, Mo.	Bradbury Marble Company	I. P. Morton
St. Louis, Mo.	Pickel Marble and Granite Co.	H. A. Feldman
St. Louis, Mo.	St. Louis Marble and Tile Co.	R. C. McDonald
St. Louis, Mo.	Shaw Marble and Tile Company	A. Coerver
St. Louis, Mo.	Union Marble and Tile Company	W. C. Fox
St. Louis, Mo.	Weis & Jennett Marble Company	Joseph Weis
St. Paul, Minn.	Drake Marble and Tile Company	W. E. Andrews
Tate, Ga.	Georgia Marble Company	Sam Tate
Wichita, Kan.	Hawkins Interior Marble Company	M. K. Hawkins
Wilmington, Del.	Geo. W. McCaulley & Sons, Inc.	C. W. McCaulley
Winchester, Mass.	Puffer Mfg. Company	A. W. Puffer

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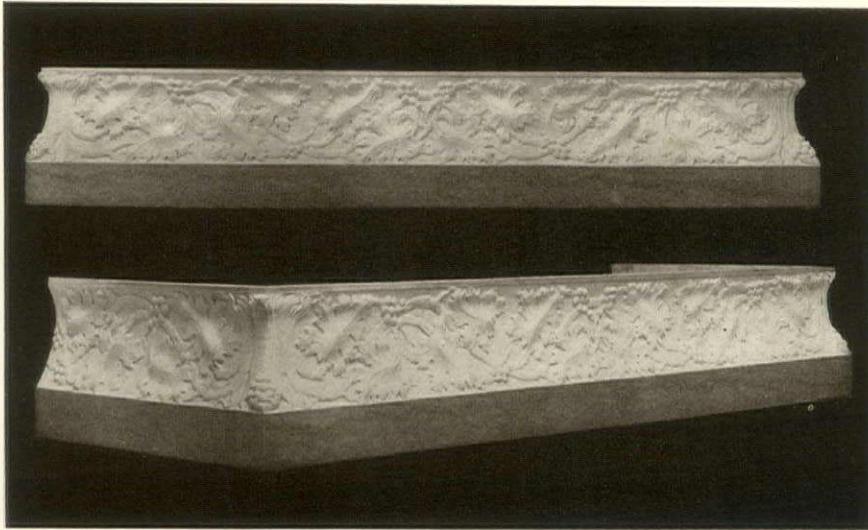
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