PRICE 15 CENTS.

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ILLUSTRATIONS.

Additional Illustrations in the International Edition.

THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. L

Copyright, 1895, by the AMERICAN ARCHITECT AND BUILDING NEWS COMPANY, Boston, Mass.

No. 1043.

Entered at the Post-Office at Boston as second-class matter.

DECEMBER 21, 1895.

CONTENTS.

THE labor troubles in the building-trades have been somewhat assuaged by the unconditional surrender of the housesmiths, who, finding that their late employers were rapidly filling up their shops with competent new men, were only too happy to have the Board of Walking Delegates of the Central Labor Union intervene, and declare the strike off, in time for the best of them to get back into their original places, on the same terms that prevailed at the time of the strike. The principal employers of such labor, the Cornells, and Milliken Brothers, seem to have acted very considerately toward their old men, as well as fairly toward their new ones, retaining all of the latter who were competent workmen, and taking back such of the former as they still had places for. It is understood that Leary, who incited and directed the strike on the part of the housesmiths, obstinately refused to order its termination, and that the Board of Walking Delegates declared it off against his wish, and in virtue of their paramount authority. Just as the housesmiths concluded to go back to work, about a thousand stone-masons, not connected, as it appears, with the Central Labor Union, struck, as is asserted, to enforce the compliance of the masters with an agreement by which the latter promised for the present year to pay their men three dollars a day for eight hours' work. The strike was soon over, the masters, it is said, yielding at once.

PROFESSOR S. H. WOODBRIDGE, of the Massachusetts Institute of Technology, whose reputation as a designer of heating and ventilating apparatus is familiar to our readers, was recently asked, after the queer fashion prevalent among the authorities of counties and small cities, to furnish a bond, in the sum of three thousand dollars, that the heating and ventilating apparatus designed by him for a school-house in the City of Holyoke would "fulfil the requirements of the State law, and warm the building in zero weather to 70 degrees"; and, in his letter declining to accede to the request, made some extremely judicious observations. After pointing out the difference between a contractor, who undertakes to do a definite piece of work, at a definite price, and may, without impropriety, be required to give security for the fulfilment of his agreement, and the professional man, who is engaged to devote his time and skill to devising a plan for meeting certain known, and various unknown, contingencies, and who obtains employment on account of his experience and skill, he suggests that, if the designing engineer is required to furnish bonds that the apparatus designed by him will heat the proposed building to a given degree, the owners ought, in return, to warrant to him, under bonds, that the building will be as well-constructed, and tight against currents of air, as those buildings on which his calculations have been based, or, in other words, that it "shall be so constructed as to come up to some fixed and reasonable standard of tightness and air-leakage."

THIS is certainly a reasonable argument; and Professor Woodbridge enforces it by showing, as we have so often done in similar instances, that the effect of putting engineers and architects under bonds is simply and solely to increase the cost of the work. If, by any chance, a competent and self-respecting professional man should be willing to give such a bond, he will do so only when he is assured that the price to be paid for the work is large enough to cover amply the risk that he runs; but, in the vast majority of cases, the requirement of a bond simply repels all skilful and responsible professional advisers, and throws the work into the hands of reckless, ignorant and dishonest persons, who are willing to sign anything for the sake of obtaining employment; and, as a corollary, are willing to do anything to escape from their engagements or fill their pockets. It is, therefore, as Professor Woodbridge says, "wholly incompatible with an engineer's best service toward his clients to put him under bonds to furnish, at his own cost, whatever beyond his plans and specifications might be found needed for the satisfactory completion of his undertaking." "The city," he goes on to say, "cannot escape the obligation of paying for what it acquires. Its utmost claim can be only for the increased cost to which, by the engineer's error, it is put in obtaining that which it finally possesses; and the equity of even such a claim upon an engineer chosen for his skill and integrity may be reasonably questioned." In these latter clauses, which apply to architects even more than to engineers, for the reason that engineers often take contracts for the execution of their designs, and their professional responsibility may sometimes be complicated by a suggestion of a contractor's responsibility, while the strictly professional standing of architects would admit of no question whatever, Professor Woodbridge states the law, as it is now laid down by the Courts of all our civilized States, with admirable clearness.

THE first of the State Associations of Master Builders, the formation of which was suggested last year at the Convention of the National Association, in Baltimore, held its first annual convention in New York last week. Thirty-five delegates were sent by the local associations of New York City, Brooklyn, Buffalo, Rochester, Utica, Batavia and Little Falls; and communications were received from several other cities, where local exchanges do not yet exist. Mr. John L. Hamilton, of New York, acted as temporary President, and Mr. J. C. Almendinger, of Buffalo, as temporary Secretary. The President of the New York Board of Aldermen, Mr. John J. Jeroloman, addressed the Convention in behalf of the Mayor, and a constitution and by-laws, after the models proposed by the National Association, were adopted.

THE Trustees of the Metropolitan Museum of Art have declined the bequest made by the late Mr. Renwick of ninety out of his collection of about three hundred and fifty pictures. The matter was referred by the Trustees to their Committee on Paintings, and it was in accordance with their report that the gift was declined. No reasons have publicly been given for this action, but it is commonly presumed in New York that the committee, of which Mr. S. P. Avery is chairman, assisted in their examination by several experts, came to the conclusion that the genuineness of the pictures attributed to the old masters was too doubtful to make it advisable to give the collection the important place in the Museum that the terms of the bequest required. No one can doubt Mr. Avery's competence in matters relating to paintings, and the Trustees undoubtedly had excellent expert advice, so that the decision will probably meet with the approval of the public; but it is something of a disappointment to think that the Museum is not, after all, to have the Murillos and Correggios and Titians and Paul Veroneses that Mr. Renwick thought he was bequeathing to it.

THE incident of the Heine monument in New York has passed off, the owners having withdrawn their offer to present it to the city. It is understood that they have received several requests from other cities to be allowed to furnish a site for it; so that the public may, after all, be able to judge whether Herr Herter's work was rightly or wrongly condemned by the jury of the Sculpture Society. This jury, by the way, instead of being made up of rival sculptors, as Mr. Alexander Doyle seemed to suppose, was, as we are told, constituted partly of sculptors, partly of painters, and partly of architects; so that there could hardly have been any personal feeling in the decision.

EVERY one who has seen the splendid light of the Welsbach gas-burner must look forward with anxious anticipation to the time when it will be applied to street-lighting. Apparently, that time is near. Already, two French engineers, MM. Borias and Dutertre, have constructed a street-lantern for incandescent gas-burners, which is described in the *Revue Industrielle*, and appears to be simple and practicable. The principal difficulty in using the incandescent burners is found in the fragility of the mantle, which, after the cotton fibres are burnt out of it, consists virtually of an ashy skeleton, easily shaken to pieces. In private use, this catastrophe is quite common, but MM. Borias and Dutertre arrange the mantle in their lamp so that the wind cannot reach it, and the lamp-lighter cannot touch it with his torch, the flame for lighting it being conveyed by a secondary flame, or "leader," as our gas-fitters would call it. The torch is pushed against a movable plate, which opens a valve, and turns on the gas in the leader, so that it can be lighted. A further push directs the leader flame to the jet of the incandescent burner, and turns the gas on the latter; and, finally, the plate continuing to revolve, the leader is shut off, and the main jet left burning.

AMONG the new mining enterprises which have come recently into existence, several have taken for their object the metal thorium, which, a few years ago, was simply a chemical curiosity, like cerium, lanthanum, zirconium and other substances of the same class. Within the last few years, however, the introduction of the Welsbach and other lights, depending for their power on the incandescence of a "mantle" of infusible earthy substance, heated in a gas-flame, has led to the investigation of the comparative value of different substances for giving out light, when heated to the temperature of the Welsbach flame. These investigations have shown that the oxide of thorium, used as a mantle, gives out more light than any other of the earths, the radiation being more than double that obtained from zirconium, which was once considered the best material for the purpose. As a substance capable of doubling the brilliancy of the original Welsbach burner, without increasing the consumption of gas, is evidently valuable, a search has been made for the ores of thorium in this country, as well as Europe; and considerable quantities have been found here of monazite, which is a phosphate of thorium, mixed with cerium, lanthanum and didymium. Unfortunately, it is difficult to separate these metals, so that the extraction of thorium from the American ore is an expensive process. In Norway, on the other hand, especially on the southern coast, are found veins of thorite and orangite, both of which are very rich in thorium, the former containing about fifty-eight per cent of thorium, mixed with iron, lime, manganese, and so on; while the latter is a nearly pure hydrate of thorium, containing seventy-five per cent of the metal. The demand for thorium for the Welsbach burners is already so great that the orangite ore has been sold in Norway for forty-five dollars a pound and, even at that price, it is cheaper to use than the American ore. It seems however, according to *Le Génie Civil*, that the first sales of orangite created a profound sensation on the Norway coast. For many years, this district has exported large quantities of feldspar, probably for use in making porcelain. In getting the feldspar out of the veins in which it lies, pieces of orangite and thorite are often found, and have been hitherto cast aside as useless, so that, as the inhabitants discovered, they had been dumping on the waste-heap a substance worth forty-five dollars a pound. A rush took place for the refuse piles about the feldspar quarries, and the thorite and orangite, or what the natives took to be those substances, were soon in process of separation. At the same time, the richer and more enterprising inhabitants began searching for veins which could be profitably worked for thorium ores alone. While the men were prospecting and blasting for new deposits, the women and children devoted themselves to picking over the rubbish piles, with such success that within a few months of the present year nearly seven thousand pounds of thorium ores have been exported from this small district. Now, however, troubles have arisen. The Germans, who have a fine eye for a speculation, soon made their appearance at the new mines, and some of them succeeded in making contracts with the local mine-owners, under which they advanced the money for carrying on operations, on condition of receiving all the product at an agreed price. The Norwegian rustics, notwithstanding their honest intentions, did not always know just how thorite and orangite ought to look, and their German friends knew still less about them; so that, as it turned out, shipments were made to the German speculators of considerable quantities of quartz, and other minerals, containing no trace whatever of thorium. The speculators, on discovering the nature of these "ores," were not only disgusted, but angry, and several suits at law for damages are now hanging over the heads of the unfortunate Norwegians. Moreover, when the Government heard of these valuable discoveries, it sent engineers, who inspected the workings, and then announced that as thorium was a valuable metal, like gold and silver, the mines producing it were, like gold and silver mines, legally the property of the Government, and could only be worked by private individuals on such terms as the Government might impose. A protest was made against this view, the natives contending that as the ore of thorium was used for producing the oxide only, the metallic base being of no value in the arts, a thorium mine should be regarded like a coal-mine, or like the feldspar mines which had long been worked in the district, as being exempt from the operation of a law intended to apply only to mines of gold and silver. Each side of the matter found advocates among scientific men, and the question is still before Parliament; but, meanwhile, the mines have been taken possession of by the Government officials, and "claims" of all sorts are being recorded, and quarrelled over, just as in a gold-mining region. If the application of the royalty law to the mines is upheld, the owners of the land will have just reason to grieve; and if it is abandoned, a host of people who have acquired rights in the mines under the law will suffer heavy loss.

THE eleventh Annual Exhibition of the New York Architectural League opens on Saturday, February 15, 1896, and continues until March 7. Works intended for exhibition will be collected in Philadelphia and Boston on Saturday and Monday, February 1 and 3; in Brooklyn on the two following days, and in New York City on February 5 and 6. Drawings properly entered will be collected and returned in these cities, free of charge to exhibitors. This year the novel plan for League exhibitions has been adopted of making no charge for admission, except on Tuesdays and Thursdays, when fifty cents will be charged.

AN extraordinary accident took place in Paris recently. Every one knows the Montparnasse Station, from which trains start for Brest, for Chartres, Bordeaux and many other places. The station fronts on a wide street, the Boulevard Montparnasse, opposite the Rue de Rennes, which joins the Boulevard by an open, triangular space. As the railway tracks in that part of Paris are all elevated above the streets, the station platforms are about thirty feet higher than the pavement of the Boulevard Montparnasse. A locomotive, attached to an inward-bound train, became unmanageable, just before it reached Paris. The brakes refused to act, and the whole train dashed at full speed into the station, flew along the station tracks, tore away the posts at the end of the tracks, and plunged across the platform, through the front wall of the building, across a balcony and into the street. Fortunately the passenger cars broke loose just before they reached the wall of the building; but the locomotive, followed by the tender, dived into the street. As it happened, there were few people in the street at the time, and no one was hurt except a little girl who was selling newspapers, and who was crushed by the falling mass.

A CHURCHYARD OF PALACES.

GERMANY has been too often and too thoroughly devastated by war to afford such surprises to the artist-tourist as do the more fortunate and richer countries of the South. But even Germany has its undiscovered treasures of old art, and even German by-ways their marvels.

In the giant mountains of North Germany, in the province of Silesia, whose history is generally summed up to foreigners in the fact that Frederick the Great wrested it from Maria Theresa, there lies a group of towns whose names all end in "berg": Löwenberg, Schmiedeberg and Hirschberg. The railway trains that carry native excursionists into the heart of the mountains, pass through the towns, which lie on open plains at the valley mouth. All three places are market-towns and all three have "rings," or old market-places, surrounded by patrician houses, the ground-floors of which are open and arched. You walk about the spot under these clumsy arcades, and step almost at every stride upon some of the wares of the merchants that occupy them. And if you purchase something for a souvenir, you carry the thing first to the light, in order to be sure what it is: for permanent twilight reigns under the picturesque old stone arcades. The middle of the "ring" is the site of the church-like town-hall, whose shadow is cast aslant the cobble-paved open square and adds a double darkness to one side.

In former times, you think, the towns must have been flourishing communities, for the architecture of the public and private buildings is uncommonly rich. And this impression grows the more one investigates; everywhere in Schmiedeberg and Löwenberg are bits of rich stucco, and carving, and fine ironwork. In Hirschberg, the largest of the three towns, remains of a mighty town wall, sumptuous interiors in private houses, a Catholic church overladen with sculptures, and a mighty domed Protestant church, are found; and — what is spoken of in no art-work and what no inhabitant has ever thought of mentioning — a churchyard walled-in by palatial tombs!

For one, I shall never forget the excitement that electrified me as I strolled into the large space from the street, and made the discovery. I had been in the town half a dozen times, but this time I remained in it. It seemed to me that the wrought-iron doors of these marble and stucco tombs were well worthy of being studied and published.

Fig. 5. Grille to Tomb of the Merchant Kosche, Hirschberg, Silesia.

Through the kindness of a professor in the local *Gymnasium*, the little literature that exists about the history of the town was put into my hands; a few of the finest tombs were photographed; and the meagre details known to the families possessing the tombs, respecting their age, their designers, and so forth, were collected and transcribed. Very few original manuscripts remain, for the town has been burned repeatedly and its old families ruined and dispersed.

It appeared, however, that the date of the earliest tomb must be 1709, that being the year when the Gnaden Kirche was built, around whose precincts is the wall against which the tombs are constructed. The latest tomb is supposed to be a hundred years old,[1] and that, as it seems to me, for a very good reason. For Hirschberg, as it ought to interest us Americans to know, was the centre of the flourishing manufacture of the cotton and linen material known as *Schleier* (veiling), and the thicker material known briefly to dressmakers as "silesia." A great number of looms were kept busy and the value of the export of goods to America alone amounted to hundreds of thousands of thalers yearly. Hirschberg manufacturers became millionaires. By the middle of the sixteenth century their wealth and luxury were such as to astonish even such a man as King Frederick, a prince who had seen the luxury of the munificent Augustus of Saxony and the wasteful courts of his fellow-sovereigns. Happening to be in Hirschberg on his little private business of pocketing the province, as an old chronicler relates, he gazed out of the windows of the mansion which the town-elders had placed at his disposal, and seeing marble and sculptures glisten through the foliage over the street, he asked of a citizen, "What are those palaces, and to whom do they belong?"

"Ah! Majesty," was the response, "those are not palaces; they are tombs." "Tombs!" cried the monarch, with a great oath of wonderment. "And *you* can afford handsomer tombs to bury your dead in than I can afford walls to house myself in! Reckon on paying a million more indemnity."

And two hundred thousand thalers more they had to pay; though, as they declared in one of their many protests, the troops of his Majesty had devoured already their last loaf, and his officers had collected their last pence.

But Frederick took the results of their labors only. He left them the cause of their wealth. In the long run he even increased it, for the public highways which he ordered built in the captured province facilitated transportation while reducing its cost.

The blight that rests on the industry of the town to the present day fell on it through an act of a foreign ruler, namely, Napoleon Bonaparte. His edicts of embargo stopped the exportation of the goods manufactured for the American market, while the wars he carried on prevented the finding or opening-up of home markets to replace them. And before the prostration that followed these wars had ceased, the new inventions of machinery that had meanwhile been made in Great Britain and America had triumphantly displaced the hand-looms of the valley. Hirschberg veiling was heard of no more, and, one after another, its merchants gave up manufacturing it, broken in fortune and hope.

This commercial catastrophe in the heart of the great mountains does not concern us, however, any more than the political fate of the Italian republics of the Renaissance. What is of interest to artists is the odd direction which the love of display of the Hirschberg merchants took so long as they had means; and the fashion they set. For surely in this their peculiar passion for surpassing their neighbors in the magnificence of their family tombs, this obscure Hirschberger patriarchy outdid all others in Germany; or can another example like the Gnadenkirchhof be pointed to? I have never seen or read of its like. Nor could it be accounted for, to my mind, save by the fact that Silesia lies alongside Bohemia, a Roman Catholic country, in which the Jesuits have developed much pompousness of church decoration. The wealth of the Hirschberg patricians might have been never so great, it would hardly, I think, have been expended in chapel-like tombs around a church, unless

[1] An exception should, perhaps, be made in the case of the Hess tomb, which a member of the family told me was built by her grandfather, who was still alive in 1868. Thus it may be that the time I set for the age of the latest tomb is incorrect. In such places, tradition and example hold sway longer than we think.

similar chapels had impressed their imagination and incited their emulation. For be it observed, the tombs, various as they are in style, are similar in their general construction, and this construction resembles that of the side-chapels of Catholic churches. Their counterparts are legion, to mention only one or two of the most famous: St. Wenzel's chapel in the Cathedral of St. Veit, in Prague, and the Czernin chapel in the same church.

Every great family of Catholic lands, in fact, has somewhere in some church its own chapel. Up to within modern days it served as a burial place for the members of the family. The altar was consecrated to a saint; the pavement of the sacred precinct to the bodies of the founder's kin, forever.

Now when the Hirschbergers turned Protestant and contributed money to build a Protestant temple of worship, this traditionary duty of families who could afford it, of building burial chapels, was still cherished; and formerly, it would have been within the church itself that they would have erected their chapels. But not only their Protestant abhorrence of founding altars to saints prevented them; a law of the land prohibited the interment of the bodies of laymen within church walls.

So outside they had to go and build their family tombs amongst the vulgar multitude of the dead; but in every other particular, save that of situation, their funereal chapels were made as like those of the greatest magnates as could be — like them in appearance, at least. Not in every case are they really like their rivals in the old

Fig. 6. Grille to Tomb of the Merchant Kunze, Hirschberg, Silesia.

cathedrals, for the latter are nearly all faced and adorned with marble, while most of the Hirschberg chapel-tombs are of stone, and a few are of common brick covered with stucco. But the richest of them, it is true, are likewise of marble. The sculptures, also, that adorn several in profusion, are of this imported costly material, and it is impossible to describe what a quaint, delightful note the native rudely-made red roof-tiles strikes in the picture; like a bit of honest dialect in artificial diction. I give an example in Figure 1, [See Illustrations] which is the tomb of the family von Schweinichen — the same family to which the jolly boon companion of the jolly Duke Frederick of Liegnitz belonged. Every reader of Freytag's "*Pictures from the German Past*," will remember von Schweinichen, the German Pepys and Greville combined, and will be as glad as I was to find his family tomb so precisely like himself: baroque and pompous, with an amusing and winning mixture of natural rusticity.

A few of the sculptures are said by common report to be the work of Canova and his pupils; several tombs — and this seems more probable — are attributed to E. Pettrich of Dresden, and Gottfried Schadow. Some earnest, patient and learned student will turn up on the spot some day and unravel these reports, as well as the mystery that envelops the whole origin and history of the tomb-doors.

These, almost without exception, are of wrought-iron, and compose the most artistic and precious element of the tombs. Yet not the name of the maker of a single grille is known. All that the family papers of the owner of the tomb shown in Figure 11 unfold, are the facts that the doors were wrought in Löwenberg, and cost twelve hundred dollars.

So Löwenberg, the second little town in the neighborhood, was the birthplace of these iron marvels! Iron of finest quality was formerly mined in Schmiedeberg, and to this day, when an old house is torn down in either Löwenberg or Schmiedeberg, people flock together to bid for its nails, hinges and other metal-work, because the old hardware is so good. And the reason why the smelting-works have disappeared from the two towns, where they used to be, is because the forests round about have been consumed: the ore goes farther, into Upper Silesia, where coal is found and may be used in place of timber in the smelting-furnaces.

But even after hearing these facts, which explain why workers in iron should have established themselves round about Hirschberg, the query is not answered, How did such artistic and elaborate designs happen to come out of their workshops? I think the most likely explanation is, that the masters of the smithies and their apprentices had travelled, as was the custom of the time, and were acquainted with the Augsburg prints, or some of the numerous books of patterns that were published in rivalry of those celebrated prints.

The examples of the wrought-iron portals which I am able to give

Fig. 7. Grille to Tomb of the Merchant Franz, Hirschberg, Silesia.

are few in number, but are typical, I think, of the several styles displayed, except of the very simplest. I remember among these last a masterpiece which I wish I had. It consisted of upright round staves, with curved stems semicircling between them. Each curved stem, in its turn, branched out into a single leaf that lay horizontally — a simplicity of pattern that could hardly be outdone. Yet this very simplicity, with its recurring motive of horizontal and perpendicular, gave to the little mausoleum a certain monumental air, and the technique was admirable. From an original thickness in the round upright staves of sixteen millimetres, the iron was brought down in the horizontal leaves to three millimetres.

The leaf-work of the tomb-grilles, represented in Figures 8 and 11, is rounded, being in this particular unlike the ironwork of the Renaissance in Germany, or that of other Silesian examples of rococo of the same century with this [the XVIIIth], wherein the leaf-work is always flat. The stem-work, too, differs from Renaissance patterns of wrought-iron, in being thicker by two or three millimetres. For the rest, however, there is still in the two designs the Renaissance sense of construction and distribution into orderly sections. Each leaf of the double portal has a backbone, so to speak, a solid, strong central staff and cross-stave.

But in the portals of what I consider (without proof, however) of

the following period, the ornamentation fills the entire space of each door-leaf, and is without any constructive support save a foot cross-stave (See Figures 5 and 6). These late rococo specimens are rich, almost over-luxuriant, in design, and the varied fullness of motives betray a designer's hand of experience and adroitness and a well-stored fancy. The technique is skilful. The doors, in fact, resemble a composition of the Liszt School of music, for sheer exuberance of variation and decoration: it is hard to discover the underlying constructive idea. The line chiselling of the scalloped, waved, leaf-hung stems and flamboyant finials is as sharp and clear as could be done in brass or wood or stone. There is left but a minimum of the original alpha and omega of the iron-workers' original element, the round staff.

As for the rest, the size of the gates remains nearly the same as those of simpler patterns; the breadth of the portal, Figure 5, is 1.81 metres, the height 2.40 metres.

The masterpieces of the whole collection are the Renaissance-like portals of tombs, number 12 and 56, the family mausoleums of the Merchant Franz and Justice Hess (Figures 7 and 9). They are evidently works from the same smithy. They are admirably open and clear in construction, and while the sculpture is still baroque in style, the portals themselves show an advance of taste towards simplicity, though not without backsliding, for the crown of the portal (Figure 9), as will be observed, is predominantly rococo still. There is, moreover, a readaptation of the mediæval custom of hiding the jointings behind a fig-leaf, so to speak, of delicate ornament. The locks, on the other hand, are placed inside the doors, after the fashion of the Renaissance.

No other portals surpass these gems of beauty, but I add one illustration more, Figure 4, in order to perfect my typical exhibition, this portal being in the transitional style, a mixture of rococo and Renaissance.

L. VON KROCKOW.

Fig. 8. Grille to Tomb of the Van Schweinichen Family, Hirschberg, Silesia.

THE SALON OF MUNICH.

THE Royal Glass Palace of Munich, with its fifty entry-halls, galleries and rooms, contains a great amount of well-lighted hanging-space and the catalogue of this year's exhibition has about thirteen hundred numbers. Mingled, therefore, with agreeable anticipations, one takes to this feast of art an uneasy sense of work to be done, if the show is to be fairly seen.

These desultory notes, which pretend to little value of comparative criticism, were made while drifting about with little or no method but that of looking at what one liked.

Where there are so many good things in the black-and-white section as here, it is as well, perhaps, to see them first, while one is fresh, the eye yet unsated with color, the imagination untired and ready to respond to the suggestion of line.

When Mr. Whistler last winter uttered that remarkable dictum, reported of him and not denied, "Black-and-white is Phil May," he must have forgotten Zorn and — among many others — himself. Or was he only trying to forget Mr. du Maurier? Not that the three have much in common. If "black-and-white" meant comic newspaper cuts, Mr. May's rendering certainly goes far on simple means; but, fortunately, there is more to it, we must in all modesty submit.

Force, directness of purpose and marvellous suggestiveness are in the etched line of Anders Zorn. In one small plate he has rendered, with unvarying downward strokes of the needle, a simple subject in which color and atmosphere are strongly felt: a man and woman are leaning over a wall and looking down into a quiet bit of harbor where some fishing-boats ride at anchor. The rough cap and knit shirt of the man, who is evidently of the sea, the flowered cotton gown and white cap and apron of the girl, the stones in the wall, the water and the boats in the bay, the grassy shore beyond, the sky above and the evening light over all, are rendered in one and the same line, and we cannot see how they are there. If you look at that little print a moment, the strong slashing lines are gone, and through them one sees the peaceful evening time with its quiet tints.

Storm van's Gravesande is an etcher of a different sort, or rather of other things, whom the world also knows. Guiette, another Brussels etcher, does a lot of different things with dainty finish. Am Ende gives us landscapes. Renouard, of Paris, and Raffaëlli show good things, each in his way.

Among the charcoal drawings is a strong bit by Josselin de Jong, of the Hague, bold in mass and full of movement — a stoker, tugging with bent back and tense muscles at the great stoking-iron, in the glare of the furnace door — a glimpse of stern, sad life.

Some drawings by Jan Wysmuller, interesting on account of their individual rendering, are done on light-toned hemp papers in black and red chalks, the high lights blocked-in sparingly in white chalk. His line is clean and sure, and there is little fussing with tones and shadows, these being lightly suggested. Among the more ambitious drawings in chalks Eduard Frankfort has one called "The Synagogue." A group of Israelitish gentlemen in hats, and the architectural details of the interior, are well drawn; the subdued color-effects in dim light are strongly suggested with the skilful use of a few simple chalks. The Dutchmen have a number of good things in this medium, which is excellent for making rapid color-notes from nature.

There is a clever little drawing in brown wash, "The Sick Child," by Arthur Briët, of Nimsput, in which the brush-work is admirable. One regrets that such a charming sense of delicate tonality has not expressed itself rather in color.

Mr. Walter Crane has two drawings on brown paper, in brown line and wash, from the story of the "Goose with the Golden Eggs," and his sketch for his painting in oils, "The Race of the Hours."

Twenty-four illustrations to "*Grimm's Fairy Tales*," by Hermann Vogel, of Dresden, have deservedly won a second medal. Mr. Crane's painting of the "Hours" has received the same award, by the way. Everyone knows Mr. Vogel's work in the pages of *Fliegende Blätter*.

In the same room are six *gouache* drawings from the great

illustrator Daniel Vierge. That master's wonderful power of catching with rapid brush the rush and quickly varied groupings of a crowd, were never better expressed than in two of these, the one a night orgie in Paris, of people drinking and dancing and scuffling under the smoke of flaring lanterns, the other a panic in a Spanish town, the people flying down a narrow street before the onslaught of a great long-horned Andalusian bull. The dash and vigor of these two pieces are quite beyond words.

Lunois of Paris, Thoma and Steinhausen, of Frankfort, and Van Hoytema of Voorburg, show interesting lithographs. There might have been more of this art, which has made such strides of late. A great quantity of first-rate lithographic color-printing is done in Munich, and much very beautiful and original work in designs for lithography is turned out by Munich artists. Some of their posters are very clever.

In the exhibit of the Munich Etching Society one is struck by some very forcible work of Fritz Erler's, for illustration in color, and for ceramic decorations. Naager's book-marks and *ex-libris* are also noteworthy. His rendering is not unlike that of Josef Sattler, whose work in that line certainly has no equal in Germany to-day. A Berlin publisher has gotten out a book of color-prints from Sattler's drawings of *ex-libris*, an admirable work and well worth its price, forty marks, to lovers of the Old German style of prints. It is in this direction especially, that of decorative printing, that the Munich school of to-day is distinctly original and effective. Their work, while founded frankly upon the models set them by the Old

Fig. 9. Grille to Tomb of Justice Hess, Hirschberg, Silesia.

German Masters of the fifteenth and sixteenth centuries, has developed beautiful solutions of the modern questions of book decorations and poster-printing.

Among the aquarellists the greatest name is easily, to my mind, that of Hendrick Willem Mesdag, of the Hague. Of his two large subjects here, that called "Fisherboats Homeward Bound" is the more striking, in its powerful rendering of the storm-swept sea; but one must not miss, in enjoyment of it, the subtilety and the glorious color feeling shown in the "Sunset on the Scheveningen Beach." The soft grays and browns with which the great Dutchman usually makes a drawing give place in this sunset to a Turneresque gorgeousness of color. Perhaps no painter has fewer colors in his box than Mesdag. Analyze one of his drawings and you will see that he uses not much more than a half dozen. Reserve in interpreting nature is a strength which he possesses in high degree.

Other Hollanders have strong work among the water-colors.

The Scotchmen exhibit work which suggests analogy with that of the Dutch School, they possessing the same force of reserve, and expressing their thoughts, as they see things, in the cool gray light of the North Sea. Terris, Nisbet and Laing among them, and, say, Valkenburg and Van der Waay, of the Hollanders, are not far apart in their aims. Belgium is represented by Van Leemputten, of Antwerp, and Uytterschaut, de Burlet and Hagermans, of Brussels.

Zetsche, of Vienna, has sent two or three small drawings, mostly of picturesque groups of houses, which are bright and clever.

The great thing in water-color, as in all art, of course, is not to do too much. Italian water-colorists have always seemed to me to demand too much of their medium.

A pair of figures in large size by Puig Roda, of Rome, done dashingly on a sheet of coarse paper, of which much is agreeably left, are in the right way, the rich stuffs of the costumes being not so strongly insisted upon as is usual in the work of this school, and yet sufficiently expressed.

In the art world of Munich the cult of the Queer has not a few adherents, and among the work of those who are sacrificing reasonableness and beauty in misdirected attempts at originality and mysticism, a couple of water-colors by Karl Strathmann, "A Dream" and "Maria," are most unutterably strange. The exhibitions of last year, particularly that of the Secession, were, however, much more over the heads of ordinary folk in respect of aberrations than are this year's; whence we may, perhaps, hopefully infer a tendency to come back to rational, intelligible painting. There is still no lack of pictures glorious in purple meads and scarlet trees, among which wanders humanity in various stages of decay, but they do not crowd the walls of the Secession as they used.

It is a pleasure to turn from this kind of thing to the charmingly dainty and decorative little color-drawing by Karl Arends; or to the frankly painted "Galician Motive" of Anton Kosakilwicz, both Munich men; or to Alfred Parsons's Japanese scenes; or to a fresh bit of nature, by Vierge, a mere study from a window looking across the roofs to a cloud, breaking in rain upon the distant hills; or to the same master's sketchy transcript of a couple of Spanish peasants.

Among the oils, a big canvas by the Russian Ilja Repin, "Answer of Free Cossacks to an Ultimatum of the Sultan," has taken one of the two first medals. The other medal is held by Mackensen's "Gottesdienst," a picture quite at the other end of the scale from Repin's gorgeous color and coarse realism. Repin's Cossacks are those fierce, wild-riding, fearless devils who belong to the southwestern part of Asiatic Russia, the region about the northern half of the Caspian Sea and the great Kirgis Steppes: coppery yellow chaps with a look of the Mongol about their shaved heads.

In the group of chiefs gathered about a table in the open air, the figures are crowded down to the front of the picture, so that the foremost are painted boldly in large scale. Inflamed with feasting, they are composing their cartel of defiance. The lust of fighting is on the barbarous faces. From the onlookers crowding round one almost hears the hoarse clamor and laughter they are raising over some well barbed taunt for the ancient enemy who would make them his slaves. In the background the tribesmen tend their horses or move about in the smoke of the camp fires. The tanned, greased and grimy skin of neck and half-bared arm and chest, the swollen, wild, brutal eyes, the dress and trappings show masterly knowledge of brush-work; the barbaric richness of tissue, dagger and mat are not forced; there is no suggestion of studio properties and the curiosity-shop.

Mackensen's prize picture is all of peace. On a fresh morning of early summer in North Germany, a little group of country-folk is at divine service in the open field. From a rude pulpit, set up under an apple tree, an elderly minister in gown and surplice is reading or preaching to the earnest upturned faces of the peasants. Some of these are hard and seamed by age and toil, some with the fresh beauty of youth upon them. The color is quiet and cool, the brush-work very restrained throughout.

Mesdag's three sea pictures merit more attention than they seem to have had from the jury. One rather feels that the Dutchmen have not fared so well in the matter of prizes as they seem to have deserved, for, beside Mesdag's, they have a lot of other good things here. The work of the Düsseldorf men also makes a strong exhibit.

Anton Henke's "Waldeinsamkeit" — Forest Loneliness — takes second medal. Olof Jernberg shows a strong fresh bit of landscape, "After Rain."

Arthur Kampf's portrait of a little boy is done in the right way, Bretz's canvases are well painted, and Marx, Wendling, Harzog and Munthe have sent in work of merit and interest. From Antwerp comes Frans van Leemputten's big canvas, the "Jahrmarkt," one of the few horse-pictures in the exhibition. It is full of truthful rendering of the life of such a scene as Rosa Bonheur has immortalized in her great picture, with a pleasant setting of the quaint houses of a little Flemish village.

There is a military picture by Abry, with horses standing, which excites rather less critical objection than the ramping beasts by Rocholl of Düsseldorf. It is not given to many to paint the horse in action. There is no lack of brush-men who attempt it, but, remembering Meissonier, Fromentin, Detaille or Aimé Morot, the measure of their success seems small. Kowalski-Wierusz has done well with the horses pulling some wagon-loads of peasants, "Going to Church." Paul Tavernier, who lives at Fontainebleau on the edge of the great forest, has painted hunters, hacks and hounds to the life in his "Stag Hunt."

"Ein Ritter," by Fritz Boehle, of Munich, is an armed knight who rides with his great red lance into the shadows of a wood. His good steed is a gray stallion of Flanders, such as Dürer loved to draw, and our Howard Pyle has lovingly learned from the master.

Dürer's two knights of Nuremberg, in the old Pinakothek at Munich, recall themselves with their grim dark faces and their slim muscular forms in steel over red cloth. The painting of the armor, the leather trappings and the great Flemish war-horse is marvellous in its realism, as is the bit of mediæval landscape behind, full of mysterious suggestiveness. Their great contemporaries having done them this ample justice, we ask why should modern painters waste time evoking these iron-clad phantoms out of the past?

After all, there will be not more than one or two men, in a generation of art, gifted with real mediævalism of feeling. They say Puvis de Chavannes has it. Classicism is less rare. For example, there are Mr. Alma Tadema's English Greeks; and Tadema's imitators are numerous. But Mr. Tadema's skill and erudition are giving us graphic histories of a life not fully or well recorded in the pictorial art of its day.

Mythology, too, still has its charm for the painters. The rest of us have rather tired of it. Karl Strathmann, of Munich, has a picture in this line, the "Cranes of Ibycus," somewhat wild and weird in treatment, and rather more of a tapestry design, perhaps, than an easel picture, but, as mere color, richly decorative.

And Böcklin's centaurs are conceived less coarsely than Stuck's in the Secession. But is the centaur an engaging subject? As a circus-poster freak he might draw, but he is not "Art." Böcklin is revered in Germany. His gloomy compositions are more effective in monotone print than in color, where he is harsh. His female figures — he is fond of a lone one against the sky — are wooden and stiffly draped.

Gabriel Max, another of the great lights of Munich art, sends an uninteresting "Pandora." His "Old and New World," apes of the East scraping acquaintance with their long-tailed western brothers, a strong bit of animal painting, is more to our minds.

Laurens, of Paris, gives us Pasiphaë and the famous white bull, though not quite as Virgil told it.

Some young ladies in their skins, seen in landscape by a bit of water, are down in the catalogue as "Nymphs." Generally speaking they seem not to the manner born, and have an air of waiting for their clothes. But even Titian's Venus of Urbino — it was the Duchess herself — in the Uffizi, looks a little anxious about the robes her tiring-women are frankly getting ready in the background.

To be quite candid one must admit that there are too many pictures in this collection. At least one-third less should be there. Naturally, the proportion of pictures sold is appallingly small. I read somewhere not long ago that the money paid in a year in Paris for pictures bought would not buy canvas and paint for the pictures painted; and I have no doubt it is true in Munich as well.

A. B. BIBB.

HOUSES OF WOOD PULP. — You can build a house out of sheets of wood pulp now if you incorporate sheet-wire gauze in the material. It can be made waterproof, fireproof, coldproof and stronger than planking. Moreover, the material can be made to represent almost any other material, and can be moulded into almost any shape. Great is wood pulp. — *Paper Mill.*

UNDERGROUND LONDON.

THE commercial prosperity of large cities depends so much upon the facilities afforded to their inhabitants for rapid and convenient travelling, that such an important and novel undertaking as the construction of the Central London Electrical Railway must naturally be regarded more as a public benefit than as a public enterprise.

When we remember that at the beginning of the present century the stage-coach was considered not only a luxurious, but even a speedy mode of travelling, the opportunities of which we are now able to avail ourselves are so numerous, that we are lost in admiration at what has been accomplished in recent years for our welfare and comfort. Carriages, cabs and omnibuses are now to be found everywhere, and horseless carriages threaten to give a new aspect to road-traffic, already diversified by the ubiquitous bicycle. And our islands are covered with a network of railways, the construction and maintenance of which are alone able to give continual employment to a vast number of people.

Fig. 10. Tomb of the Merchant Kunze, Hirschberg, Silesia.

The principal object of the new underground line, which is about to be made, is to provide a means of travelling which the Metropolitan and Metropolitan District Railways are unable to offer, since these, while encircling the busiest portion of London, leave the general traffic along the main thoroughfares to be dealt with by the omnibus and tramway companies. Recognizing the importance of travelling in a straight rather than in a circuitous route, the promoters of the Central London Railway have naturally decided to adhere to this principle wherever possible; and thus commencing at Shepherd's Bush, at the extreme west of London, their line runs nearly due east, passing under Uxbridge Road, Oxford Street, Holborn and Cheapside, to the Bank of England.

There being no railway in this country along a route so crowded as that between the Marble Arch and the Bank, it is almost impossible to estimate the number of people that will be likely to avail themselves of the great convenience offered by this line; but the development of passenger traffic on the Metropolitan Railway during the last thirty years would seem to indicate that at least sixty million people will use the new railway annually.

The first attempt to construct underground railways was made in London in 1853, when Parliament sanctioned a scheme to construct a line from the Edgeware Road to King's Cross, a distance of two and a quarter miles, and from this small commencement grew the two lines now known as the Metropolitan and Metropolitan District. It was at first intended that these lines should be confined exclusively to a local business, much in the same way as the elevated-railways in New York — that is, without direct communication with other lines. This arrangement, however, did not prove to be very profitable, and it was then sought to obtain additional revenue by making connections with various main lines for the interchange of passengers, and to enable these railways to run their trains into the central portions of the city, while at the same time the new company, by making various extensions, began to develop a suburban business.

The construction of all these early underground lines is similar in principle, although subject to considerable variations, necessitated

by the different localities through which they pass. They are worked by steam-locomotives which discharge the product of combustion directly into the tunnel, and no method of artificial ventilation is attempted. The evil consequences attending this system are minimized as much as possible by burning the best quality of coal, which is practically free from sulphur, and which makes but little smoke. The engines employed on these railways are of a condensing type, so that the steam, instead of being exhausted through the chimney, as in the case of an ordinary locomotive, is conveyed into a water-tank and condensed, by which means the air in the tunnels is kept drier, and is therefore less disagreeable than it would be were this precaution not adopted.

The cost of making a double line of railway of this kind may be assumed generally to be about a quarter of a million pounds per mile; but where great difficulties are experienced, such as were met with on the portion under Cannon Street, and the immediate neighborhood, where the work had to be carried on below one of the busiest thoroughfares in London, the cost per mile amounted to four hundred thousand pounds; and it is probable that, when all other expenses are included, the cost for such a portion as that would not be much less than one million pounds.

It is unfortunate that the earnings of these two companies cannot be regarded as entirely satisfactory. The immense capital required to construct such railways, and the low fares they are obliged to charge, owing to the keen competition with which they have to contend, are the two principal reasons why the profits appear comparatively small; and, although such a state of affairs is to be regretted, it does not necessarily indicate that underground railways generally are unremunerative.

The City and South London Railway, which, commencing at the Monument and passing under the Thames, terminates at Stockwell, is one of the most interesting lines that have been recently constructed. This railway, which was opened to the public only in 1890, consists of two cast-iron tubular tunnels, generally placed side by side, at a depth varying between forty and eighty feet beneath the surface of the streets. These were built by means of the "Greathead shield," a method of construction now being so successfully employed at the tunnel which the London County Council are making under the Thames at Blackwall, and one which it is also proposed to adopt for carrying out the work in connection with the Central London Railway.

Between the Monument and Stockwell there are only four stations, and these being generally some fifty feet below the ground, hydraulic lifts are provided for the convenience of the passengers using the line; the cost of working these lifts is, however, considerable, amounting to about five per cent of the earnings of the company.

A uniform fare of two-pence is charged for any distance, and there being but one class, no tickets are issued, the payment being made on passing through the turnstiles on entering the stations. During last year nearly seven million people travelled by this railway, and the financial prospects of the company are now considerably brighter than during the early days of its existence. Ventilation is secured automatically by the piston action of the trains, each train propelling in front of it a column of air, which ultimately finds its way to the streets through the shafts provided for the stairs and lifts; meanwhile the train draws down a supply of fresh air through the similar openings behind it.

As electrical locomotion is adopted, the air in the tunnels is comparatively fresh, the carbonic-acid gas exhaled by the passengers being the chief source of vitiation; but although in this respect it is considerably better than at various places on other underground railways, it will be generally admitted that the quality of the atmosphere is yet susceptible of further improvement. This railway has received both the warmest commendation and the most stringent criticism. It offers to the public a direct route to many places on the south side of the Thames, and does not suffocate it during the journey; but at the same time the inconvenience of small carriages, and several other minor defects, are very apparent. It must be remembered, however, that the company experienced considerable difficulties in making the line at reasonable cost; and when the work was undertaken, one of the objects was to demonstrate the feasibility of this method of construction, but as financial resources were limited, the smallest practical tunnel was adopted in order to reduce the expense as much as possible.

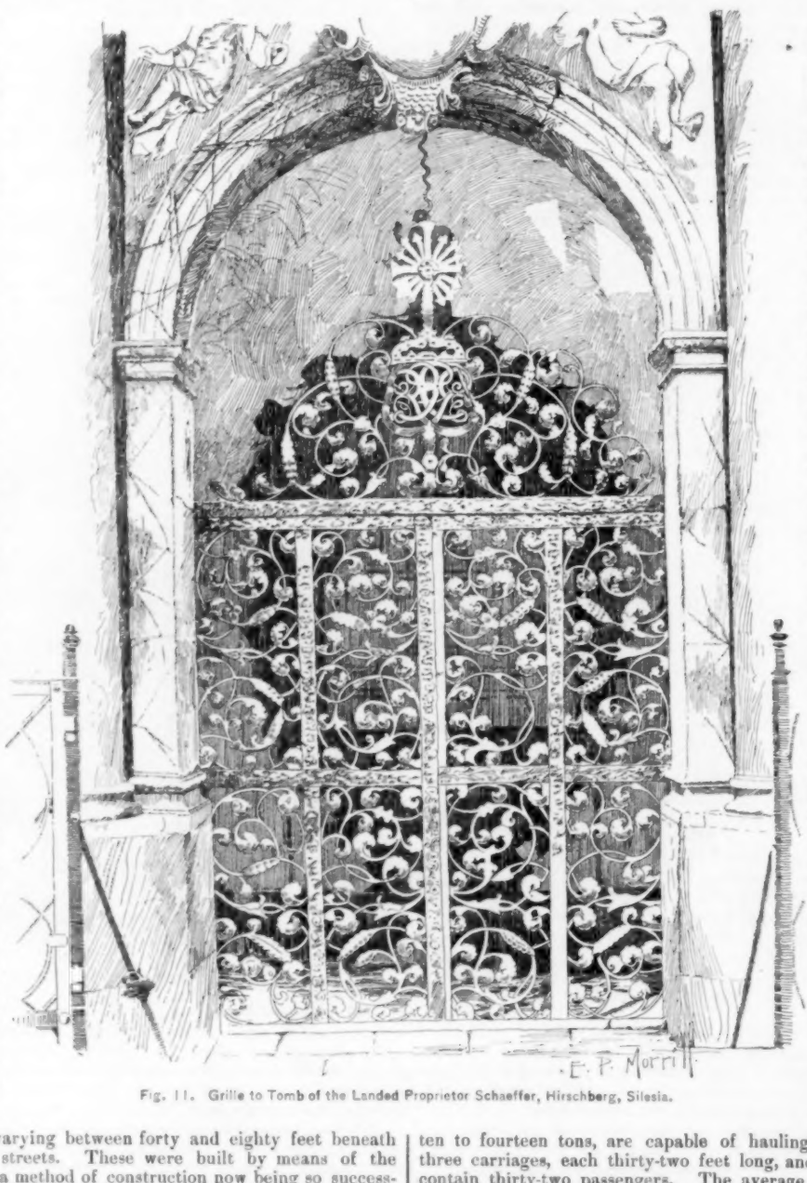


Fig. 11. Grille to Tomb of the Landed Proprietor Schaeffer, Hirschberg, Silesia.

Any carriage that can be run in a tube which is only a trifle over ten feet in diameter cannot easily be made very comfortable, while its restricted dimensions are also responsible for the air in the tunnel not always remaining as fresh as it might be. In all future railways that will be built of this type, these drawbacks will, no doubt, be either wholly obviated, or at least much reduced, by making the tunnels of considerably larger diameter, thus allowing both the volume of air and the size of the carriages to be increased.

As will be readily understood, the electrical locomotion on this line is of a very interesting character. The engines, which weigh from ten to fourteen tons, are capable of hauling trains consisting of three carriages, each thirty-two feet long, and of sufficient size to contain thirty-two passengers. The average speed from terminus to terminus, including stoppages, is eleven miles per hour, or, excluding these stoppages, thirteen miles per hour. Between the stations, however, from twenty to twenty-five miles per hour is attained. — *Chambers's Journal.*

The Results of Forest Devastation. — Ten years ago the logs from the Menominee River, Wis., lumber region ran four or five to the 1,000 feet of lumber; in 1890 they averaged six to the 1,000 feet, and now twelve, fifteen and even twenty logs are required to furnish as much. In five years the decrease in diameter of pine trees has been 35 per cent. — *Exchange.*

OLD PULPITS.

"EVEN in the thickest crowd," Dean Swift remarks, "there is plenty of room overhead"; "but the difficulty is to get there," says the London *Standard*. Philosophers, he tells us, have managed it by building various edifices in the air; and of these the pulpit is chief. In very early times there were no pulpits; the preacher stood — as St. Augustine says he himself did — on the altar steps. His next ascent was to the "ambo," a raised station in the choir, from which, at one period, the gospel and the epistles were read. The erection of pulpits in the nave was a later idea. Abbot Samson, whom Carlyle has celebrated in "*Past and Present*," had one placed in his church at Bury St. Edmunds, and thence, as his chronicler Jocelin relates, "he used to sermonize the people in English." This was about the time of Richard I, but pulpits did not grow common in England till long afterwards.

Though a few of the thirteenth century still remain, most of our Gothic ones, unless they are quite modern, were put up between 1350 and 1550. In 1603 a pulpit was ordered to be placed in every church not already so furnished. Stone, at this date, seems to have gone out of fashion; and the new pulpits were generally made of "that excrescence of the earth," as a seventeenth-century nobleman called it, "which Providence has provided for the payment of debts," namely, oak timber. With this alteration the drum ecclesiastic became more resonant than ever. Sometimes it lent itself to quite illegitimate effects. At Twywell in Northamptonshire, for instance, there is, or recently was, a wooden pulpit with the front panel split. The village tradition is that a preacher in Cromwell's time purposely kicked it out to impress a particular text on his hearers. A hundred years later the zeal of the Puritans had given place to the drowsiness of the Georgian clergy. It was then, according to the poet Cowper, that pulpits were first covered with crimson velvet. The local squire, though he could generally cut the sermon short by standing up in the pew, did not like to have his nap disturbed while it lasted; and he guarded himself against unexpected noises under pretence of beautifying the structure from which they might have come.

Many outdoor pulpits remain. There is one looking into the court of Magdalen College, Oxford. It is entered by a door at the back, and covered by a stone tester or canopy, which shelters the occupant from rain and rough weather. There is a still finer one at the Cathedral of St. Lô, in Normandy, another at Notre Dame, Vitré, and a small one recessed in the wall, at Pistoja, in Italy. Perhaps the most striking is at Prato, in the same country. It is circular in plan; it stands out bodily from an angle of the church, and is protected by what, if it were of wood instead of marble, might be called a great coffered sounding-board. Being very large, its general effect is remarkable enough, but it is also noticeable for five or six beautiful groups of winged boys, with which Donatello sculptured its panels. Refectories, in monkish times, often had pulpits of their own. There is a picturesque one at Shrewsbury Abbey, and others at Great Walsingham and at Wells. Granite pulpits, covered with fanciful ornaments incised with a pointed hammer, and of course unpolished, may be found in Devonshire and Cornwall. There was formerly a wrought-iron pulpit in Durham Cathedral, and there are one or two modern ones in London. For really fine specimens in this metal, however, we must go to Spain, and especially to Burgos and Avila.

Old English stone pulpits were generally small, so small that some of them may even yet be unknown, having been hidden away under later additions. This was the case with one of much beauty, discovered about thirty years ago during a restoration at Shipton-under-Wychwood. Being very diminutive, it has been shaped out of a single block and, like Merlin in the hollow tree, it had been long afterwards enclosed for generations in the once fashionable "three-decker." This fate could hardly have overtaken our largest examples, such as that in Trinity Church, Coventry. But mediæval Italy was the place for immense and magnificent pulpits; so magnificent that, as Mr. Ruskin remarks, even the clergy for whom they were built seldom cared to use them. As Beatrice says of Don Pedro, they were "too costly for everyday wear," and the preacher who was in earnest preferred a humbler standing-place. The cast of one of them in the South Kensington Museum is familiar enough; but few people who pass it know that for ages its original has ceased to exist, except in scattered fragments. Sculptured for Pisa Cathedral by Giovanni Pisano about the year 1302, it remained there till 1596. Then came a great fire, in which the roof of the church was destroyed. The pulpit was much injured. Its panels were removed to the crypt, other portions were placed in the Campo Santo, and out of the rest was made a smaller and plainer structure, which is still in use.

There is a specimen at Pistoja little inferior to what it was when perfect. The Pisan one is round, while this is oblong in plan. It is attributed to Guglielmo d'Agnello, and its archaic looking sculptures of Scriptural subjects have a quaintness not easily forgotten. The sculptures are the glory of early Italian pulpits, though sometimes, as at Ravello, near Naples, geometrical patterns in mosaic take their place. Variations of this sort, however, are almost confined to the parapet or enclosing wall. In whatever way it is treated, the mediæval artists of Italy nearly always supported it on a number of light and graceful marble columns, and each column, again, usually erected on the back of some such beast as a lion. Our English pulpits were satisfied with less ambitious ornaments. We have native marbles of much beauty, but, with the exception of the dull bluish-gray one which is quarried at Purbeck, they were neglected in the Middle Ages. Instead of mosaics, we had tracery; instead of figures, we had carved foliage; and instead of costly materials, we had colored decoration. Sacred emblems were also introduced, and sometimes royal or national ones. The pulpit at St. Savior's, Dartmouth, for instance, is carved with the Tudor rose and portcullis.

In the autumn of 1634 three adventurous officers from Norwich set out to see the cities of their native land. The manuscript journal of their seven weeks' ride is preserved in the British Museum. At Bristol, they say, "Wee found eighteen churches, which are all fayrely beautiful, richly adorned, and sweetly kept. Their pulpits are most curious, which the citizens have spared no cost nor forwardnesse to beautify." Many of these, perhaps, had been recently set up, under the order of 1603. Though Gothic had then died out, and wood instead of stone had come in, some works of this late date are artistic as well as elaborate. St. John's Church, Leeds, has one to which the description of the Bristol pulpits would apply. It is singular, and must have been costly. There is little to mark it out for any religious use. The details profusely lavished on it are those with which everybody is familiar in Jacobean chimney-pieces and wainscotings. Above, a vast sounding-board, which effects a massiveness it does not possess, projects from the wall in a preternatural-looking way, without visible means of support. This was the fashion of the period. It loved long sermons, and put up sounding boards that not a word might be wasted. Whether they had much effect is doubtful. When they are really shaped on scientific principles, they are apt to work both ways — not only making the speaker audible to the congregation, but bringing back to him their faintest whispers in return. They did not reach this perfection in olden times, or they would not have been tolerated so long. North of the Tweed they were once held indispensable, and only the hour-glass vied with them in importance. Experience seems to have shown the desireableness of keeping this out of the preacher's reach. Some Scottish pulpits stood on a low platform — much as a teacup stands in a saucer. Then the hour-glass was fixed in a little cage attached to this lower structure. When this could not be, it was placed against the pulpit front, but in nearly inaccessible positions under the book-board. Yet even there it was not secure. Preachers arose whose arms were as long as their sermons, and tradition tells how, at the risk of overbalancing themselves, they would stoop and turn the hour-glass just as their audience were looking for a happy release.

BOOKS AND PAPERS.

THE Lord Mayors were always mixed up in the doings of the Cathedral of *Paules* or *Powles*, as we glean from the most interesting books of Dr. Sparrow Simpson,[1] upon the Old World life in and about the great church. They went there upon their election, praying at the various shrines, and joined in the processions and rejoicings celebrating divers auspicious events. To wit: when Edward III was born, they accompanied the commonalty to the cathedral and "led carols to the sound of trumpets," and the following Monday they assisted at a pageant where the "conduit in Cheap ran with nothing but wine," for a pavilion was erected over a tierce of wine for all passers-by to drink thereof.

The first idea of a strike seems to have been born in 1327, when a day of love was appointed in St. Paul's for the reconciliation of the disputants, a saddler and a painter. The latter seems to have behaved ill, and got the joiners and gilders to join him, and so compel the saddler to give way; but the aldermen interfered, and compelled the two Williams and their friends to end the strife, appointing the Feast of St. Dunstan, the day of love.

Here is another ill-mannered citizen, a baker, one John Brid, who in the same year for his own gains made a hole on his "molding borde" after the manner of a mouse-trap; and when his neighbors brought their bread and cakes to be baked, he put the dough upon the board *over the hole*. Then having a servant underneath, the latter craftily collected great quantities of dough "falsely, wickedly and maliciously to the great loss of his neighbours." But John Brid was not the only representative of this sharp practice. Other bakers and bakeresses were found guilty of a like offence, and they were condemned to be put upon the pillory with lumps of dough about their necks, and "so remain until vespers at St. Paul's in London shall be ended." The tables were destroyed, "for it is neither consonant with right, nor pleasing to God, that such falsehood, deceit and malice shall go unpunished.

Is the origin of Paternoster Row known to all men? It appears that in 1379 there were stalls about the "Brokencros," which were let to divers women: to three at 10 pence and to four at 6 pence yearly rent. The *Broken Cross* was erected by the Earl of Gloucester in the reign of Henry III; but in 1390 it was removed, and these *stationers*, who dealt in various wares, retired into Paternoster Row, and became the forerunners of the present stationers and booksellers.

[1] "*S. Paul's Cathedral and Old City Life*." W. Sparrow Simpson, D.D. (Stock).

On the Feast of Penticost, it was the custom of the mayor and aldermen to attend St. Paul's, the latter in cloaks of green lined with green taffata, or *tartaryn*, a thin silk. But in 1382, one John Sely, alderman, appeared in a cloak *without a lining*, hence much deliberation as to the measures to be taken in view of so grievous an offence. The mayor and aldermen discussed, and decreed that they should all dine with the said John, at his proper costs; "and, further, the said John was to line his cloak in manner aforesaid, and so it was done."

Wrestling was not permitted within the "*boundes of Poules, ne in non other open place within the Citee of Londone.*" But lawyers and other persons seem to have been allowed to do business in and about the church, the men of law taking up their station at a particular pillar, there to receive clients or payment of debts.

The christening of Edward VI must have caused as much suffering to nervous citizens as our German bands and grinding-organs. Fancy the shooting of guns *day and night*, and the burning of fires in the streets! The lighting of the streets was done cheaply in those days for the *prestes of Pawles* were bound to "fynde a lanthorne lyght all this wynter season, upon payne of imprisonment," even "as the cytezens and inhabitantes of this Cytie comenly doo." But there was little respect paid to "S. Pawle." In 1554, it was a mere passage for the "comen caryage of greate vessells full of ale and Beare, greate Basketts full of Bread, fyshe, fruyte and such other things," which was very "unsemelye and unreverent." They even lead "moylls, horses and other beasts thuroughe the same unreverentlye to the greate dyshoner and dyspleasure of almyghtie god and the greate grefe also and offence of all good and well dysposed persones." These offences the mayor and aldermen punished by various fines, part of which went to the poor at Christes Hospital within Newgate.

Sanitary measures are noticed in 1567, the "gutter whereby the rayne water falleth uppon the offycers of the Cytie and other attendinge uppon my Lord Maior and the aldermen in the sermon tyme at Paules Crosse," was ordered to be "turned and diverted from the place where yt now falleth into the este ende of the same place." The bench upon which these officers sat seems not to have been overcomfortable, for at the same time it was ordered to be "enlarged as muche as yt convenyently may be so that they may quyetly syt there duringe the tyme of the sermons there."

Those who are occupied with the history of decoration will find Mr. Petrie's new book[1] an eminently practical manual; practical both in the sense that it is small and packed with information given in the most concise form of statement, and also because of its notable lack of theoretical speculations on the origin of the many motives he discusses. His object is to trace each of the familiar types used in Egyptian decoration back to its earliest appearance in extant works of art, and then to note the developments and transformations it underwent in the course of Egyptian history, with the dates of these so far as they can be determined. Beginning with the line, he follows this through its various geometric evolutions, the zigzag, wave, spiral, fret, and their combinations; then takes the natural forms, such as the feather, rosette, lotus, papyrus, and other vegetable and animal types; following which is a brief but suggestive chapter on the origin of certain structural forms which are peculiar to Egypt and a chapter on symbolic decoration. Scattered through the text are many small cuts which, though unpretentious, are of great assistance in making the author's meaning clear without too much explanation.

For work of this kind no one is better equipped than Mr. Petrie, both by experience and temperament. Within the last few years he has won himself a place in the first rank of Egyptologists, and to his knowledge he has added a remarkable ability in the collation of data bearing upon his argument, as he has shown more than once. This ability is strikingly displayed in the present book, and his conclusions may be accepted as coming from one of the safest of authorities upon this subject. Some of these conclusions will, doubtless, be a surprise to many of our readers, as, for example, the long interval of time which elapsed between the introduction of the zigzag and the wavy line. The former appears in the oldest tombs, dating about 4000 B. C. "So simple is this, that it might be supposed that every possible variety of it would be soon played out," as Mr. Petrie says, yet the wavy line does not occur for about 2,500 years, its earliest examples being found in works of the eighteenth dynasty, about 1500 B. C. And the spiral, although the earliest instance of it is on a scarab of the fifth dynasty, was apparently not developed into a continuous design until the twelfth, a thousand years later. Even then it is rarely found on walls and furniture, and as a border it does not appear until the eighteenth dynasty, reaching the highest point of its development in that and the two dynasties following. The fret or meander is also a late development, and according to the author, the fret patterns are all modifications of corresponding spirals. "The cause of such change is obviously the influence of weaving," he says, "frets in general are very rare until a late period, and they doubtless depend on the adaptation of spirals to textiles." This may be true in Egyptian art, but it cannot be laid down as a general principle, because, to take the example of Greek art, which he cites, although it is true that the angular fret does not occur on works of the Mycenæan period, it is a characteristic ornament of the early "geometric" vases, which, though later in date, represent an equally primitive condition of Greek art; and we find it scratched on the pre-historic vases of Italy, in a rudimentary form, where it appears as a natural development of the straight line.

Another interesting point Mr. Petrie brings out, convincingly, as it seems to us, namely, that the feather is a much more common motive of Egyptian decoration than is generally supposed, and that many of the so-called scale-patterns are really derived from feathers. On some royal coffins of the eleventh dynasty he finds several types of these patterns on the wings which envelop the mummy. Here it is obvious that they are feathers, and of different design according to the place they occupy on the wings; and finding the same patterns on the belts of kings, and on the sides of thrones, he concludes that in the one case it was a belt or band of feathers worn as a protection against chills — as it occurs in peaceful scenes, not battles — and in the other a feather rug. Later, it became conventionalized into an ornament in which all sense of its original significance was lost. The convolvulus is another decorative motive which "has scarcely, if at all, been acknowledged as an Egyptian ornament," yet it is common in the fields of Egypt, and Mr. Petrie finds that it often occurs in the eighteenth and nineteenth dynasties, the great period of Egyptian decoration, though its leaves have been miscalled lotus-buds or "tabs."

As will be seen from what we have quoted, Mr. Petrie's pages are full of suggestiveness. We cannot notice all they contain of interest to the student of design and will select as a last example his ingenious contribution to the much-vexed question of the origin of the Greek anthemion or "palmetto." Starting from the established fact that the Egyptian frequently drew the interior of an object above its profile — a cup or dish, for instance, being drawn in a side-view, with its contents rising in a cone above it, though they were really supposed to be inside — he applies this principle to flowers, especially the lotus, and concludes that the projection which we see rising between the two sepals in the conventionalized flower is the third or back sepal, while the fourth, to avoid confusion was so foreshortened as to disappear almost entirely. Then the inner petals were introduced into the design, generally three, but somtimes five or seven, spreading in a fan-shaped cluster, and gradually these became the important part of the design, crowding the sepals down to a comparatively insignificant base. In the eighteenth dynasty a schematic diagonal view was introduced, in which all four sepals were given equal importance, the front two being curled down, and the rear two up, with the petals rising from them as before. By this time the flower had become entirely mechanical, and it was in this form that it was adopted and developed by the Assyrians, and as he thinks by the Greeks. "In the Greek designs, however barbarous they may seem in comparison, owing to their hopeless divergence from any rational type, yet the same elements remain. . . . Thus the Greek anthemion with its double curves is fully accounted for, the lower and upper sepals being still distinguishable in the two spirals on each side at the base of it."

[1] "*Egyptian Decorative Art.*" A course of lectures delivered at the Royal Institution by W. M. Flinders Petrie, D. C. L. New York: G. P. Putnam's Sons, 1895.

SOCIETIES

ENGINEERING ASSOCIATION OF THE SOUTH.

The annual meeting for 1895 was held at headquarters on the 14th inst., President Dudley in the chair. "Present" were: Messrs. H. McDonald, Blackie, Leftwich, Ruhm, Picton, Kirkpatrick and Brown.

Messrs. Blackie and Brown were appointed tellers to canvass the ballots, and while this was in progress the Secretary and Treasurer presented their annual reports, which were accepted and ordered filed.

The Canvassing Committee then reported that the following were declared elected: *President*, Mr. Hunter McDonald; *First Vice-President*, Mr. W. G. Kirkpatrick; *Second Vice-President*, Mr. J. J. Ormsbee; *Secretary*, Lucius P. Brown; *Treasurer*, Mr. W. M. Leftwich; *Directors for Tennessee*, Maj. E. C. Lewis, Dr. W. L. Dudley, Mr. Herman D. Ruhm; *Director for Kentucky*, Mr. John B. Atkinson.

On suggestion of the present Secretary he was instructed to extend to the American Institute of Mining Engineers an invitation to hold their October meeting of 1896 in Nashville, and to tender them the use of our rooms.

The retiring President delivered his annual address on the subject, "Development of Technical Education in the United States," of which a brief synopsis follows. He referred to the series of articles which had appeared in the *Engineering News*, giving valuable statistics on the subject, of which, he said, he had freely made use:

The first school in the United States to give a course in engineering was the United States Military Academy at West Point. The first two students who graduated as engineers graduated there in 1802. The Military Academy continued to graduate the only engineers in this country until 1840, when the Rensselaer Polytechnic Institute graduated its first class of thirteen civil engineers, being

the first graduates in civil engineering in any English-speaking country. The Rensselaer Polytechnic Institute was founded in 1824 by Stephen Van Rensselaer as a "School of Theoretical and Applied Science." In 1849 it was reorganized as a general polytechnic institute, and it still devotes itself to civil engineering, dividing the course into general and sanitary engineering.

The total number of engineering schools or the schools giving engineering degrees, in 1889 was ninety-four.

Previous to 1802 engineers were self-taught, and from 1802 they were either trained in the office of some engineer or graduated at West Point.

Until recently in New England and at present in old England, "students" or pupils were apprenticed — so to speak — to practicing engineers. This custom, however, has never prevailed to any very great extent in the West. No articles were signed by the "pupil," but he was supposed to pay $100 per year for three years to the engineer in whose office he was serving, and he was paid twelve and one-half cents per hour for his work in the field, which was credited on his tuition account. "After the war," this system began to die out, and the pupil was paid twelve and one-half cents for his office-work, as well as field-work, and in this way he could frequently more than pay his tuition. This, however, did not cause any loss to his "instructor," because his services were charged at a rate of from $2 to $6 per day, according to the skill of the pupil. By this system the pupil learned much or little, as he chose. He asked such questions as he pleased, and got such answers as he could, but what he learned he usually learned well, because he put into practice immediately and constantly what he learned.

Up to 1830 the word "engineer" conveyed to the minds of the vast majority only the idea of a military officer. The phrase "civil engineer" had been but lately coined. In 1828 the Institution of Civil Engineers was incorporated in England, and when civilians assumed the title they incurred the wrath of the military men. In 1835 the Rensselaer Institute first resolved to form a distinct "Engineer Corps," receiving on graduation the "Rensselaer Degree of Civil Engineer." As we have seen, their first class graduated in 1840.

The School of Engineering of Union College at Schenectady, N. Y., founded in 1845, was the second in the United States. The third was the Lawrence Scientific School at Harvard, founded in 1846. The fourth, the Sheffield Scientific School at Yale, founded in 1847, nominally, but was not a live and active school until 1861. The fifth was the Engineering Department of the University of Michigan, founded in 1852. The sixth, the Brooklyn Polytechnic Institute, founded nominally in 1845, but did not begin graduating until 1866. The Columbia College School of Mines was founded in 1863 and opened in 1864. It was the first school in the United States in which mining was taught as a science. Here the college course in Mining Engineering started in the United States.

The Massachusetts Institute of Technology was incorporated in 1861 and began operations in 1865. In 1868 the first class, composed of thirteen, graduated.

The first degrees in Mechanical Engineering were conferred in 1868 by three institutions — Rensselaer conferring five, Yale one and Massachusetts Institute of Technology one.

Stevens' Institute was founded in 1870; its electrical course was instituted in 1880. Sibley College, Cornell, was also founded in 1870. The first Civil Engineering degree was given in 1871. In 1875 the course in Electrical Engineering was instituted, as well as a course in Marine Engineering.

The latest course in engineering is Chemical Engineering, which is given at the Massachusetts Institute of Technology.

After thanks from the retiring President for the honor conferred upon him, and his expression of best wishes for, and interest in, the Association, and the passage of a vote of thanks to him for his excellent and instructive address, and to all the retiring officers for their zeal and faithful discharge of their duties, the Association adjourned.

Members and their friends will take a trip to Atlanta on the 12th inst., and the next meeting will be held there.

LUCIUS P. BROWN, *Secretary.*

ILLUSTRATIONS

[Contributors of drawings are requested to send also plans and a full and adequate description of the buildings, including a statement of cost.]

WEST ENTRANCE TO WESTMORELAND PLACE, ST. LOUIS, MO. MR. T. C. LINK, ARCHITECT, ST. LOUIS, MO.

[Heliochrome issued with the International and Imperial Editions only.]

THE CLOISTER: MONT ST. MICHEL, NORMANDY, FRANCE.

NOT the least interesting and by far the most beautiful portion of that singular fortress, monastery, asylum that used to lie in mid-sea off the coast of Normandy is this cloister which practically rests on the top of the living rock and beneath which lies the famous Salle des Chevaliers, which has below itself the equally well-known subterranean crypt. The cloister was finished in 1228 by Raoul de Villedieu. It measures 14m. x 25m. and its vaulting is supported by 220 columns, most of which are of granite, so disposed as to give but seventy openings on the atrium. The windows which open to the west are more than three hundred feet above the waves that wash the foot of this portion of the structure which is known as "La Merveille."

THE CLOISTER OF SAN MARTINO, NAPLES, ITALY.

THE Carthusian Monastery of San Martino, which was begun by Duke Charles, of Calabria, in 1325 and wholly rebuilt in the seventeenth century, is now used as a show place and museum, under the control of the Museo Nazionale. The arcading of the cloister is carried on sixty white marble columns.

CLOISTER OF SAN ZENO MAGGIORE, VERONA, ITALY.

THIS cloister, which adjoins the famous twelfth and thirteenth century church, is utilized as a museum for Christian antiquities.

CLOISTER OF ST. TROPHIME, ARLES, FRANCE.

CLOISTER IN THE MUSEUM, TOULOUSE, FRANCE.

CLOISTER, FONTFROIDE, FRANCE.

FOUR TOMBS IN A CHURCHYARD AT HIRSCHBERG, SILESIA.

SEE article "A Churchyard of Palaces," elsewhere in this issue.

[Additional Illustrations in the International Edition.]

WEST ENTRANCE TO VANDEVENTER PLACE, ST. LOUIS, MO. MESSRS. STEWART, MCCLURE & MULLGARDT, ARCHITECTS, ST. LOUIS, MO.

[Gelatine Print.]

EAST ENTRANCE TO WESTMORELAND PLACE, ST. LOUIS, MO. MESSRS. EAMES & YOUNG, ARCHITECTS, ST. LOUIS, MO.

[Gelatine Print.]

THE BANK OF BOLTON, LIMITED, BOLTON, ENG. MESSRS. BRADSHAW & GASS, ARCHITECTS.

EXHIBITIONS

ATLANTA, GA.— *Cotton States and International Exposition:* September 18 to December 31.

BOSTON, MASS.— *Paintings recently purchased; Japanese Paintings; Line Engravings, Mezzotints and Etchings by Rembrandt:* at the Museum of Fine Arts.

Paintings from the Paris Salons of 1895: at the Jordan Art Gallery, 450 Washington St.

Pictures by William Adam: at the Boston Art Club, December 16 to 23.

Water-color Exhibition: at the Unity Art Club, 711 Boylston St., December 10 to 24.

Paintings by Wilton Lockwood: at the St. Botolph Club, December 2 to 21.

CHICAGO, ILL.— *Paintings by Glasgow and Danish Artists:* at the Art Institute, November 19 to December 22.

Paintings by the Chicago Palette Club and Chicago Art Students League: at the Art Institute, December 12 to 29.

NEW YORK, N. Y.— *Twenty-ninth Semi-annual Exhibition, including Loan Exhibition of Early American Paintings, Old English Paintings, and the Cullum Collection of Classic Sculptures:* at the Metropolitan Museum of Art.

Fourteenth Autumn Exhibition of the National Academy of Design: December 23 to January 11.

R. Caton Woodville's "1815": at the Schaus Gallery, 204 Fifth Ave.

Pastel Portraits by J. Wells Champney: at the Knoedler Gallery, 170 Fifth Ave.

Flowers in Water-color, by Paul de Longpré, also, Butterflies of all Nations: at the American Art Galleries, Madison Square South.

Drawings by George du Maurier: at Wunderlich & Co.'s Gallery, 868 Broadway, November 23 to December 21.

PHILADELPHIA, PA.— *Sixty-fifth Annual Exhibition of the Pennsylvania Academy of Fine Arts:* opens December 23, closes February 22. The Architectural Section of the Exhibition closes February 1.

SPRINGFIELD, MASS.— *First Annual Exhibition of Society of Springfield Artists:* at Rude's Gallery, December 4 to 25.

NOTES AND CLIPPINGS

The Diamond Shoal Lighthouse. — A difficult and costly piece of engineering has been undertaken by the United States Government in the projected establishment of a great light-house in the open ocean off Diamond Shoal, seven miles from the present Hatteras Light and bearing almost due east. This is one of the most daring schemes that Army officers have dealt with since General Casey, chief of engineers, successfully undermined the great Washington monument and placed there a solid foundation expected to support that structure for ages to come. Surrounding this new plan, however, there is foreboding of failure, and it is predicted thus early that $1,000,000 is to be sunk literally as well as metaphorically in the sea. If such a structure is placed there and stands without serious damage the onslaught of the seas for five years, according to a leading army engineer, this Government will have accomplished its greatest triumph in this branch of science. The height of the focal plane above water in the prospectus is given as 100 feet, and the structure is to stand in 33 feet of water and to be supported on disc piles sunk to a depth of 30 feet in the sand. The diameter from centre to centre of vertical members of the foundation series is to be 60 feet, and the height of the floor of the house above water 47 feet. The main portion of the structure is to be constructed of forged steel members, with principal joints and connections formed of steel castings. A special feature of the design is to make all essential parts below the water-line of massive dimensions, as well as all those parts above the water-line which will be subject to the action of wind and waves. The use of bolts, keys, screws and other small sections or dimensions which would be rapidly weakened by corrosion, will be avoided as far as possible. Joints and connections are to be made absolutely rigid to all possible strains and to be as strong as the members themselves. This is to be effected by joining ends of members to steel cast hubs by the use of massive steel rings shrunk on in a manner approximating that followed in "built-up" gun construction. In the foundation series, besides the massive members necessary for the strength of the tower when in place, there will be certain other tie-rods of lighter section, which are added for greater security to stiffen the framework while it is floated and while being placed and grounded on the shoal. It is proposed by the Board to construct the screw-pile structure in the harbor and float it out by steel cylindrical caissons calculated to give a draught of 30 feet when at sea. This part of the light is then to be sunk probably 50 feet down in the bottom by hydraulics, until a firm hold is secured. It is then proposed to build up from the skeleton arrangement until the lightkeeper's apartments have been completed and the height secured for the great lens which is to throw its light 25 miles in all directions. The work is to begin this winter, and it is proposed to complete the light in two or three years. — *Washington Times.*

Solidified-oil Fuel. — According to the Leeds *Mercury*, M. Paul d'Humy, a French naval engineer living in Liverpool, has succeeded in converting petroleum and other oils into a hard, homogeneous mass, suitable for use as fuel on board war-ships and other large ocean-going boats. He claims that this material is affected neither by heat nor cold, and is absolutely smokeless and odorless. The cakes, he says, when set on fire, burn only on the surface, and give off an intense heat. They can be made in any size or shape, and can be stored anywhere without danger, as they cannot evaporate or cause an explosion. They require very little draught, and make not more than from 2 to 3 per cent of ashes. M. d'Humy declares that a man-of-war having 1,000 tons of this solidified oil could sail round the world, or remain at sea for months together. A ton of his fuel, M. d'Humy says, represents at least thirty tons of coal, and the cost is not more than from $5 to $10 per ton. In the manufacture of steel, he says, five hundredweight of solidified petroleum, costing 6s., would melt a ton of metal. The new fuel can also be used with perfect safety for domestic purposes. If the half of this story is true, and M. d'Humy really has got a substitute for coal, which is less dirty, bulky and costly, while equally safe and powerful, he has opened the way to all sorts of marine possibilities. But discoveries of this kind have been made, on paper, a good many times before, and it will be well to await results before growing enthusiastic. — *N. Y. Evening Post.*

Fake Proposals Illegal. — Some property-owners in St. Louis have evaded payment of assessment for street-paving by a novel proceeding at law. The ordinance under which the pavement was laid required that it be of Lake Trinidad asphalt. One paving company has a monopoly of this kind of asphalt and, consequently, as the protesting citizens pointed out, the ordinance was in violation of the city charter, which provides that all contracts be let to the "lowest responsible bidder." The contention was sustained by the Supreme Court of the State, which used strong language in condemnation of monopoly contracts. "To advertise," the Court said, "for sealed proposals when there can be but one bidder, to open them in open session, to examine and publicly declare them, and thereupon to award the work to the lowest responsible bidder, when there is and can be but one, would be to play as broad a farce as was ever enacted behind the footlights. The law does not permit itself to be thus trifled with, nor allow its ministers to thus substitute pretence for performance." Under the decision the entire cost of the pavement in question must be paid by the city out of general taxation. — *Boston Transcript.*

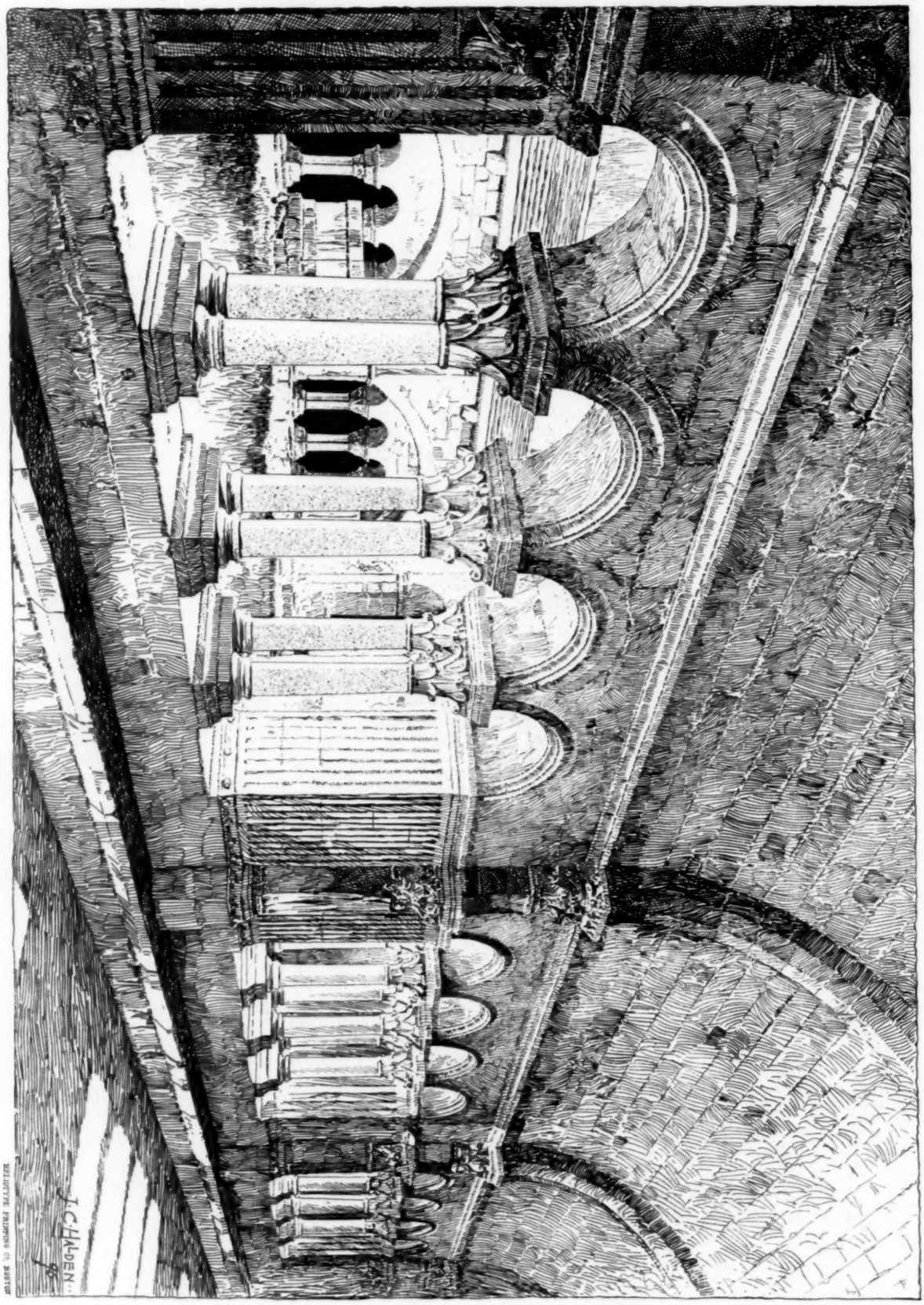
Another Wren Building in Peril. — It is gratifying to the archæological instinct to find that the proposals of the Trinity Brethren to pull down a fine Wren building in the East End has become one of the leading topics of the day for the London press. The London spirit is not always so vigilant or so wisely conservative as in this instance. This time it has proclaimed itself at the eleventh hour, but still when there is a chance of stopping the ruinous work. The building condemned by the Trinity Brethren has been in use as a hospital for pensioned seamen and their wives since the days of James II. It is a beautiful and most characteristic bit of architecture, yet the Trinity House thinks it may very well make way for a brewery which covets the site. Sir Walter Besant is leading the outcry against this vandalism. It can hardly be doubted it will be loud enough to save the almshouses. The plea of the Trinity Brethren is childish. It is that the London County Council requires that the drains shall be put in order, and that they have no funds with which to do the work. This was at first understood to mean that the building was in a thoroughly insanitary condition, and that the only practical way of dealing with it was to pull it down. It turns out, however, that the inspectors' demands go no farther than the expenditure of £150. If the impecunious brethren cannot find that sum out of their £300,000 a year, it is to be presented to them by public subscription. — *The Scotsman.*

Vastness of Blenheim. — In the new home of the new Duchess of Marlborough there are said to be twenty staircases leading from the main floor to the second. And so complicated is the arrangement of the rooms that people can visit for weeks without ever meeting each other except at dinner. It is said that a former Duke, famed for hospitality, was frequently imposed upon by scapegraces of good family, who would put up at Blenheim for weeks at a time, dining princely, using the horses in the stable, and occupying with valet a good suite of rooms, and all without the master's knowledge. So vast is Blenheim. — *Westminster Gazette.*

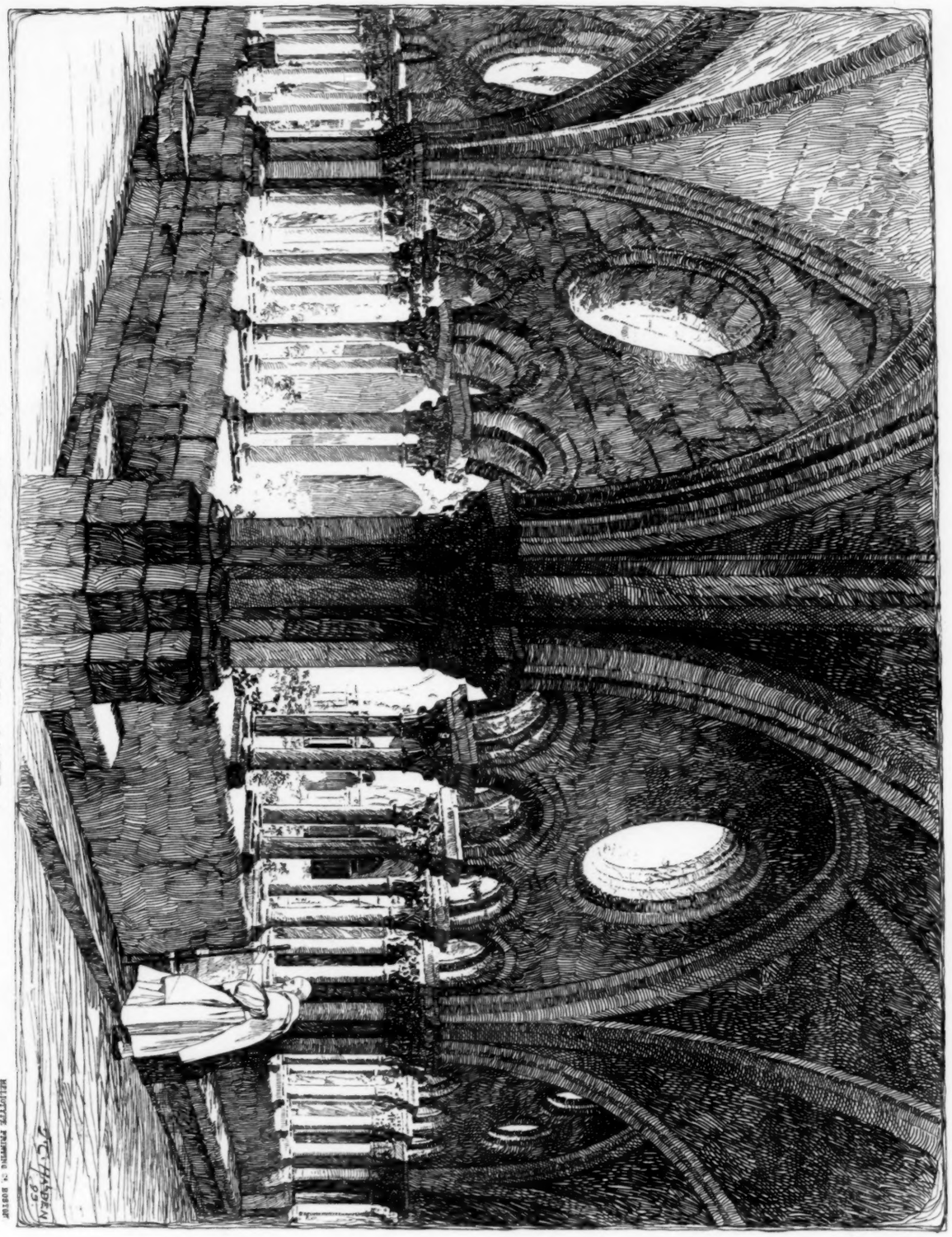
Deflecting a River to the Opposite Watershed. — Another wonderful engineering work has just been completed in India, which practically compels a river which formerly entered the sea on the western side of India to reverse its course, to pierce its way through the lofty central watershed, and flow down to the eastern coast, thus affording irrigation to a vast and arid region in which famines have been common for centuries. This territory extended from the central watershed eastward to the Bay of Bengal. It occurred to an officer of the Madras Engineers, Capt. Caldwell, in 1803, that it might be possible to divert one of the western rivers, near its source in the hills, towards the east. The most important of those western-flowing rivers, the Periyar — literally, "The Big River" — rose not far from a headwater of the Vaigai River, which runs southeastwards into the Bay of Bengal. But while the Periyar deluged the western coaststrip with destructive floods, the Vaigai was almost completely exhausted on its course through the dry regions east of the watershed. Capt. Caldwell's project was again brought forward in 1867 by another officer of the Madras Engineers, Major Ryves, and complete plans for diverting the waters of the Periyar into the Vaigai were drawn up. These included an enormous dam to close the valley of the Periyar, a vast reservoir to hold the waters thus collected, and the driving of a broad tunnel, nearly 7,000 feet long, to convey the overflow through the ridge to the dry channel of the Vaigai River. This huge work has just been finished at a total cost of about $2,500,000. — *N. Y. Evening Post.*

The Shrinkage of Iron. — The action of fluid cast-iron in the mould is somewhat curious. When poured into a mould in a state of fluidity, cast-iron, and especially what is known technically as "very gray," expands at the moment of solidification, thus giving a sharp impression in the mould. The expansion, slight but very noticeable, extends until in the process of cooling the iron attains the stage of red heat. Contraction then takes place with the result that the cooled iron is noticeably smaller than the mould. In making patterns for iron castings, therefore, pattern-makers commonly allow about one-eighth of an inch per foot for shrinkage. The shrinkage in castings, however, is by no means a constant quality, but varies materially with the proportion existent in the pattern and the character of the metal used — as much as one-tenth of an inch per foot being allowed when casting beams and only one-thirty second of an inch with large cylinders. When any metal in a fluid state is poured into a cold mould, solidification commences at the outside. As the cooling is continued, the castings, therefore, would consist of a rigid outside envelope containing a soft interior. If, therefore, the condition of a small piece of such metal in the centre of a square be considered during cooling, it will be seen that the contracting force existing on each side of the square will be the same. A cube or sphere of cast-iron contracts in cooling in a uniform manner throughout its mass. If two squares be placed side by side, forming a rectangle, on each half of the sides, the contracting forces are as before, but on the ends, there being no rigid division between the two squares, both parts exert a unit of contracting force. The result is that the contracting force of the ends is equal to that of the sides, or, on a unit of length the contracting forces are double as great on the ends as on the sides. In casting, therefore, thin strips, the shrinkage of the length is very great, while in the thickness it is scarcely appreciable. A square plate shrinks little in thickness, but equally in width and breadth; a flat disc shrinks little in thickness, but equally in all diameters. A thin ring shrinks more in diameter than a thick one, and so on. When it is known that iron with different shrinkage from that generally employed is to be used in a foundry, the patterns are altered to meet the changed conditions. Silicon, unless in excessive quantities, gives a gray, soft iron which has the minimum shrinkage. In many cases a judicious mixture of iron will give the desired result without extra expense in pattern making. Charcoal iron has usually a higher melting-point than that of less pure iron made with coke. It sets more quickly in the mould and contracts more, so that an extra allowance for shrinkage must be made in all patterns employed. It will be seen from the above that pattern-makers require special technical skill as well as knowledge of the iron to be used in casting for their patterns. There are few employments which require greater specialized knowledge of rather a wide range than that of pattern making. — *Invention.*

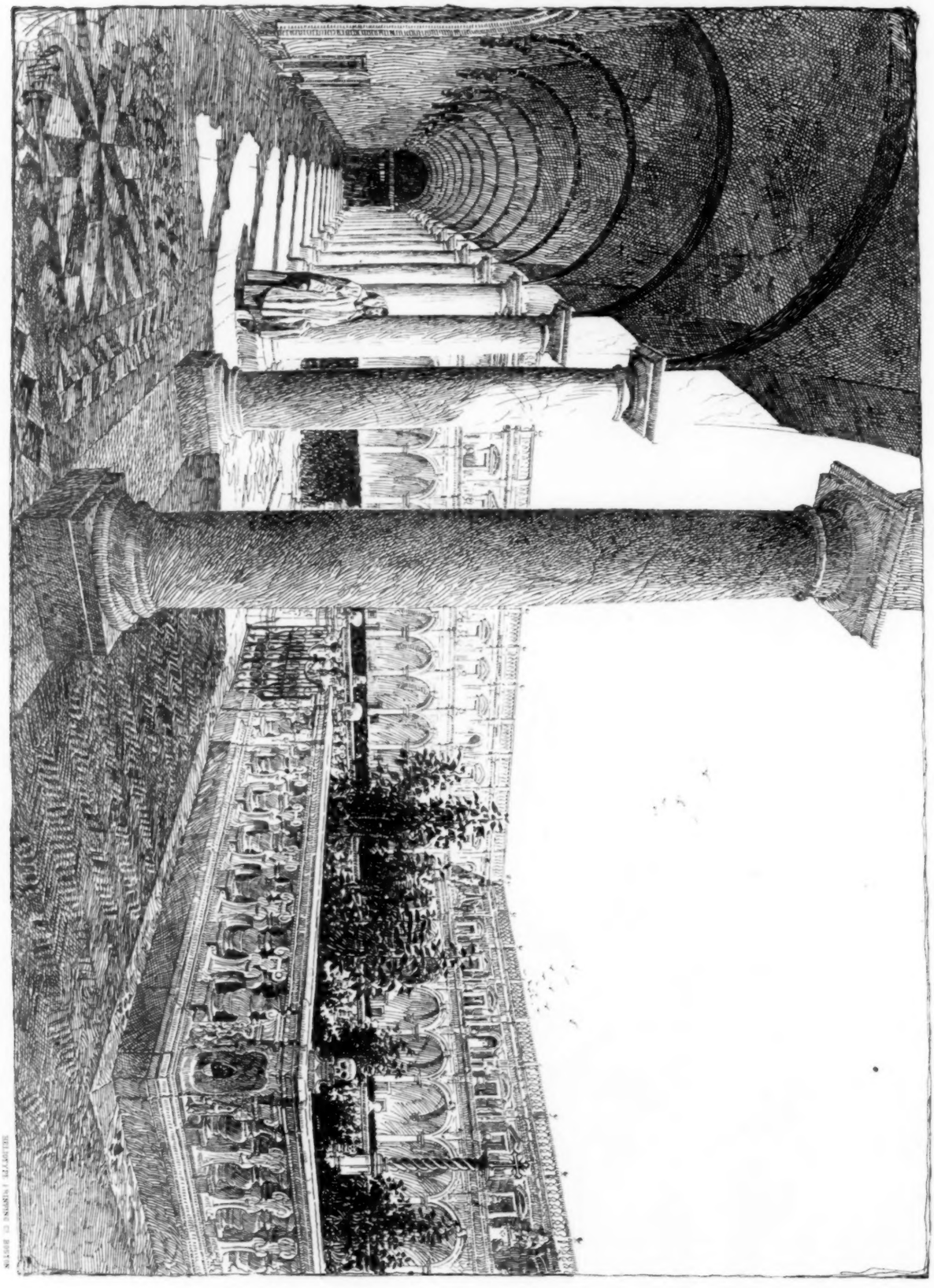
T. J. Parkhill & Co., Printers, Boston, U. S. A.



CLOISTER OF ST. TROPHIME AT ARLES, FRANCE.



OLD ABBEY, FONTFROIDE, AUDE.



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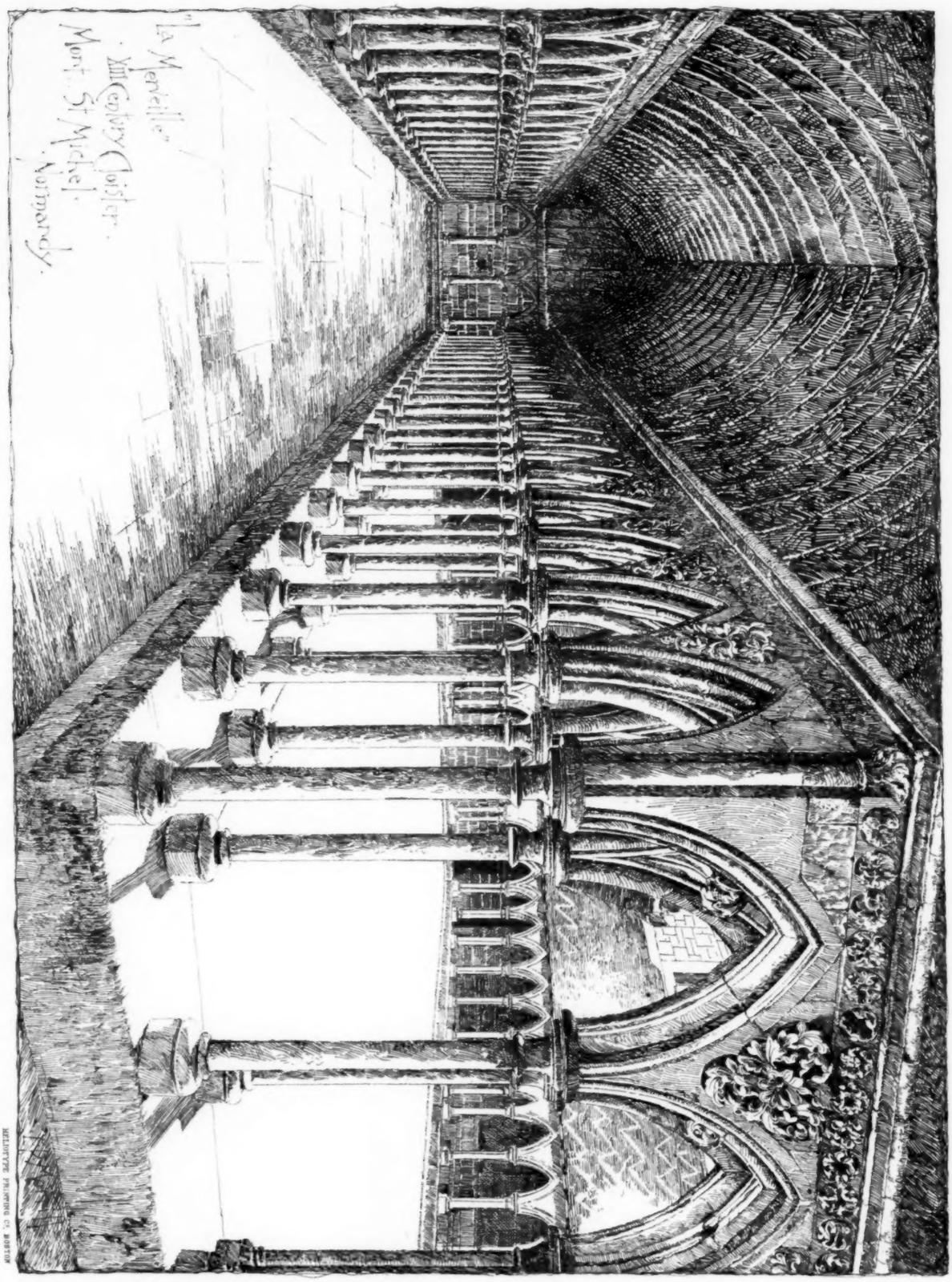
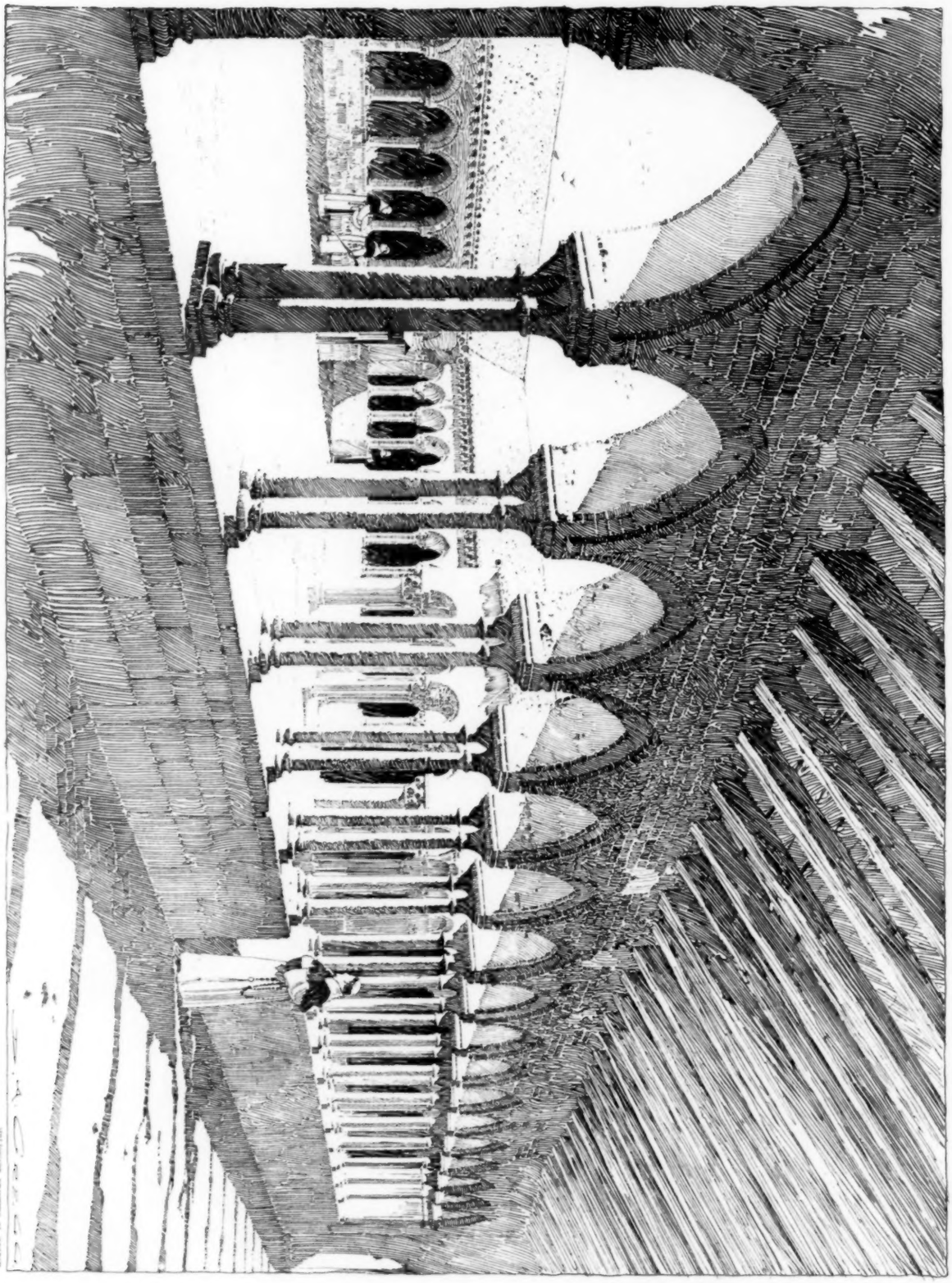
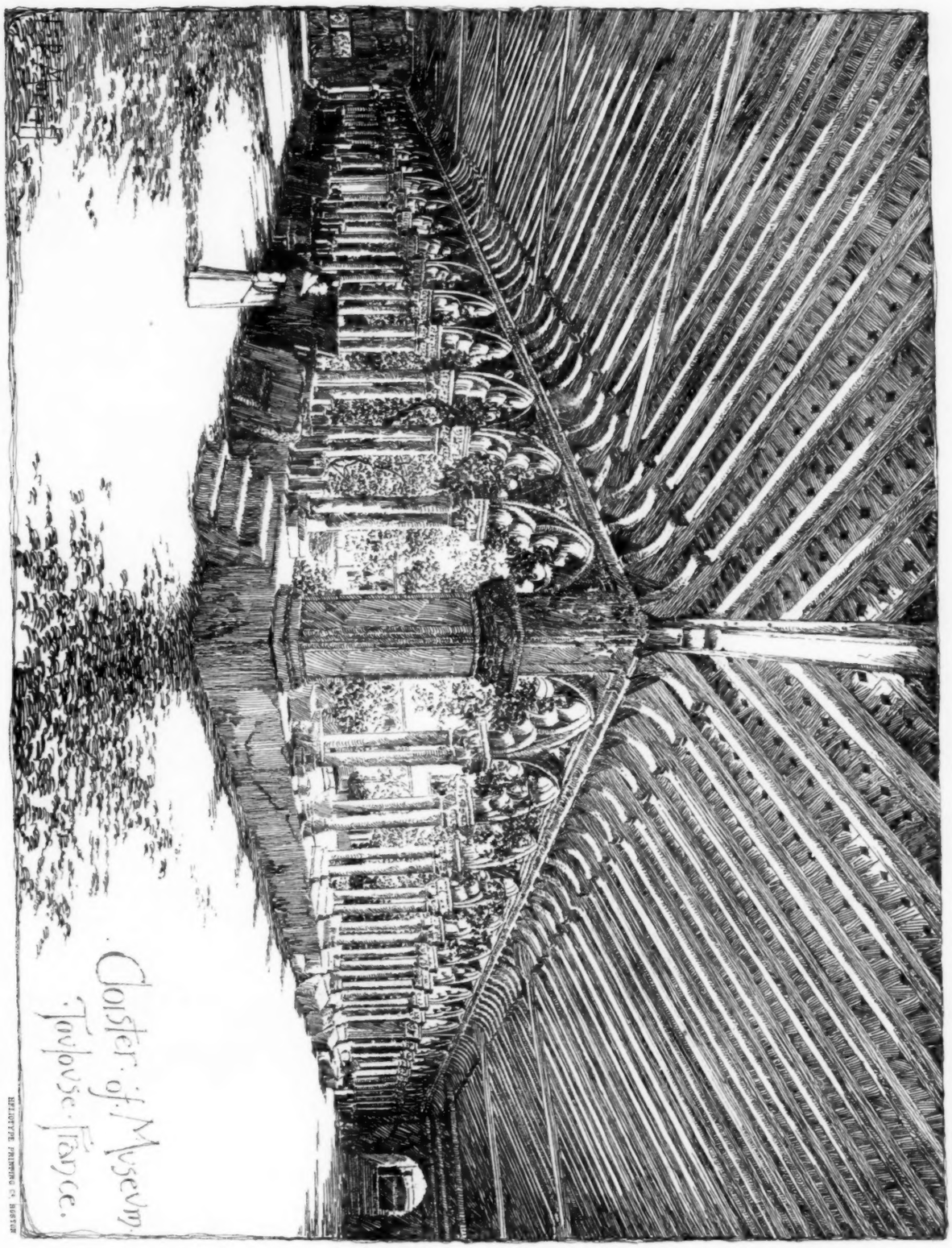




CLOISTER OF S. ZENO MAGGIORE, VERONA.
X-XII CENTURIES.



Cloister of Museum
Toulouse France.

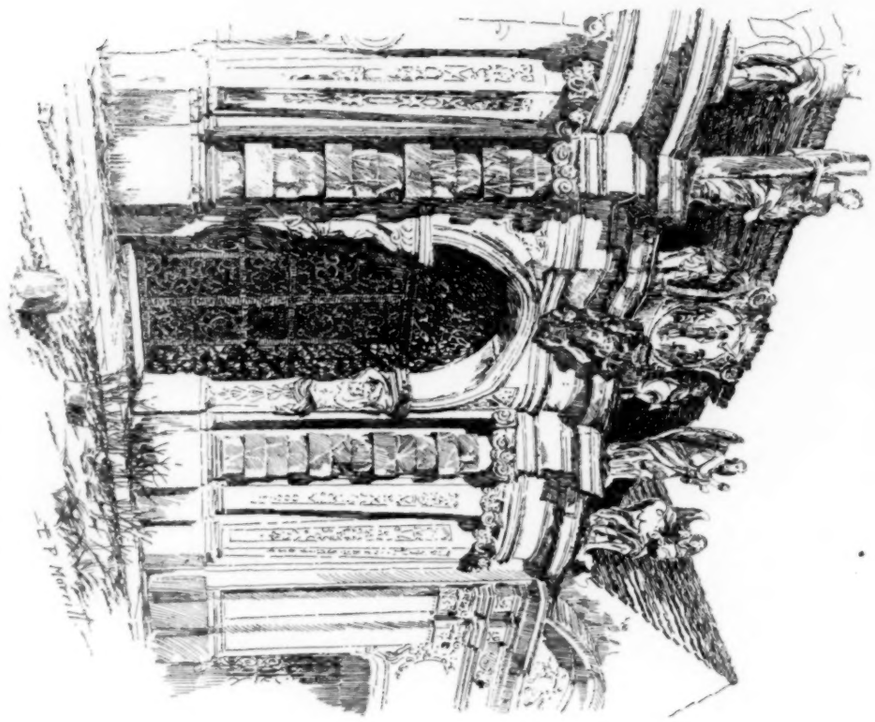


Fig. 1. Tomb of the von Schweinichen Family, Hirschberg, Silesia.

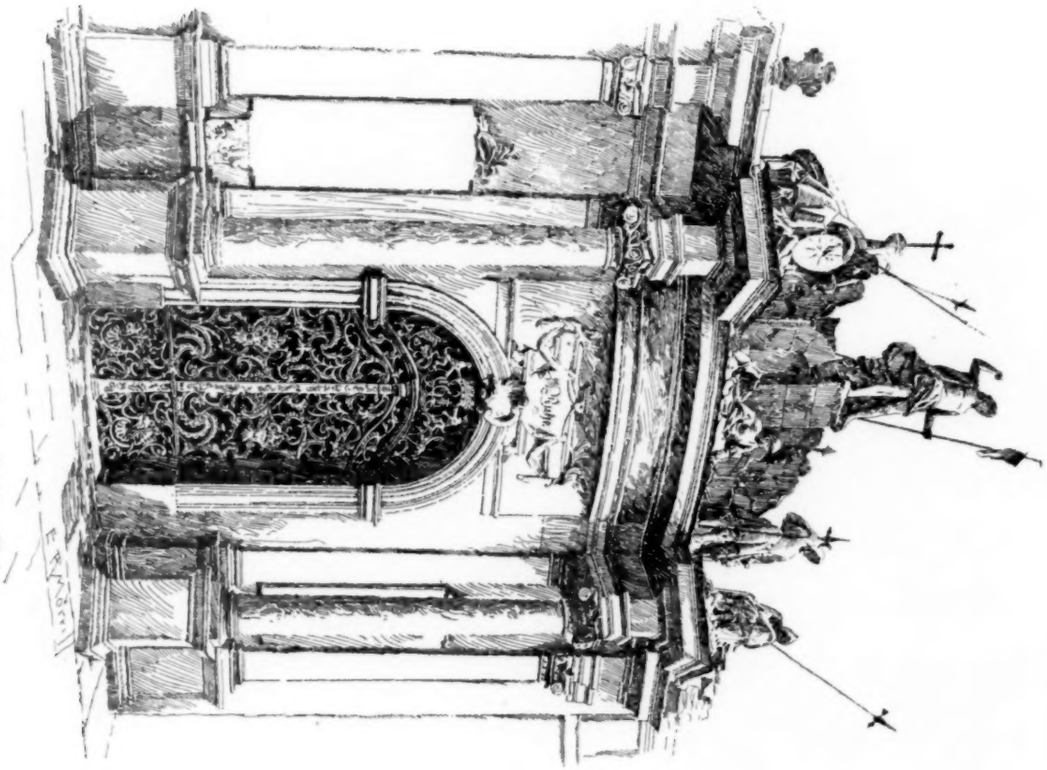


Fig. 2. Tomb of the Merchant Kosche, Hirschberg, Silesia.

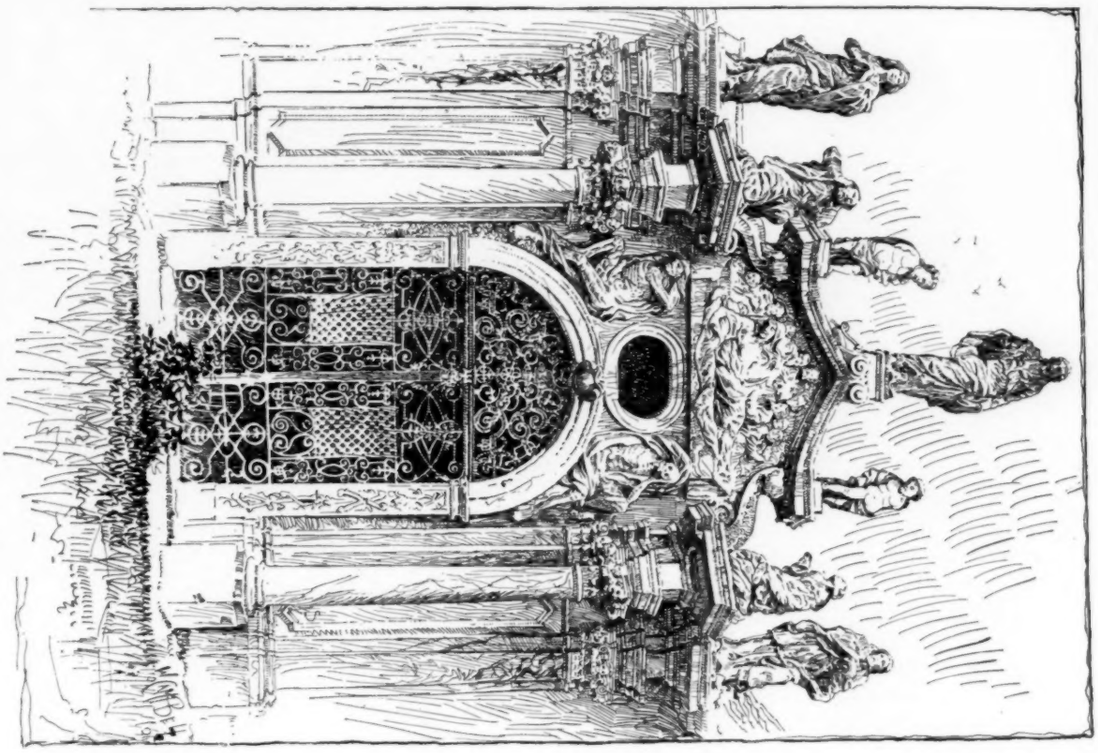


Fig. 3. Tomb of Justice Hess, Hirschberg, Silesia.

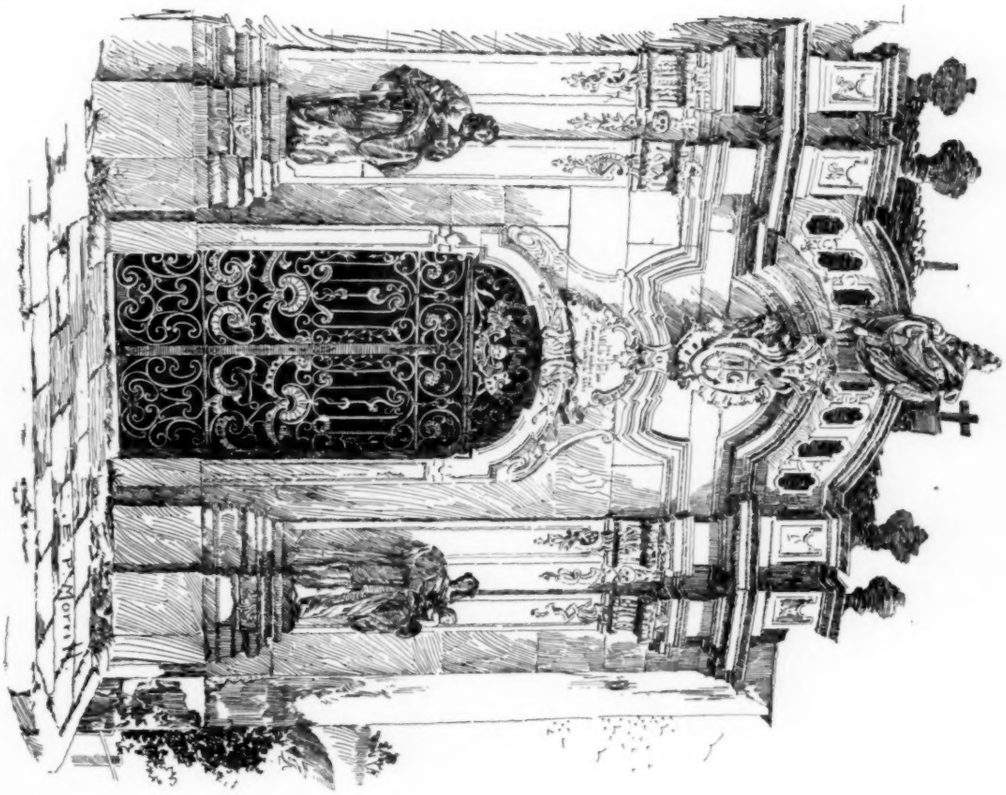


Fig. 4. Tomb of Judge Titze, Hirschberg, Silesia.