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THE problem of cooling houses in summer is one that has been often discussed without leading, unless in a few isolated cases, to any practical results; the means that have been usually proposed—ice or compressed air—being too expensive and too difficult of application to commend themselves to common use. The idea of relying upon the earth as a great receiver of uniform temperature does not seem to have been much considered. In a late number of the *Medical Record*, however, is an article describing a contrivance invented by Mr. J. Wilkinson, of Baltimore, which puts the uniformity of the earth's temperature to a very practical use. Mr. Wilkinson's invention is said to be patented, but is new to us, and will probably be so to many at least of our readers. The room to which he has practically applied it is used as a dairy, in which a nearly uniform temperature is very desirable. A site was taken on a declivity, apparently. The floor of the room was sunk six or seven feet below the surface, and a six-inch air pipe a hundred feet long was carried underground to near the bottom of it, with a pitch of about seven feet in its length, opening to the air at the upper end. A similar pipe of like pitch was carried down from the bottom of the room and opened to the air at a point in the ground at a lower level. There was then a continuous conduit of two hundred feet long and fourteen feet fall, passing under ground from a higher to a lower level and expanding in the middle into a chamber. By keeping the pipe for the most part some five feet below the surface it was surrounded by earth whose temperature in summer and winter did not vary much from fifty degrees. In warm weather the cold air in the pipe poured out at the lower end, and the outer air entering at the upper end was cooled in its turn and followed down, producing a cool draught through the room. In cold weather the air in the pipe was warmer than the air outside, and an upward draught was produced, escaping above and warming the air of the room. By this contrivance, it is said, a uniform temperature of about sixty degrees was maintained in the dairy the year round.

THIS very simple and ingenious contrivance suggests a variety of applications, although it is hardly suited to universal use, for it is not everybody who has room to lay down a hundred feet of underground pipe on each side of his house. Its most natural use, perhaps, is as a refrigerator for those who are willing to pay for having their houses or rooms artificially cooled in warm weather. It would seem more sure of practical success in this office than in the converse process of warming a house in the winter, for it is only necessary in hot weather to lower the temperature of the air a few degrees, twenty at most, to reach a point of comfort; whereas in winter it is often necessary to raise the temperature seventy degrees before we can be comfortable, and the last twenty degrees at least would have to be supplied by artificial heat. To maintain this temperature in an ordinary house during zero weather requires a very large supply of air, because of leakage and radiation, and this would call for an amount of warming surface in the form of pipes, which would be impracticable on the score of economy, especially since they could only serve as an adjunct to the necessary heating apparatus.

tus. This difficulty would not occur in applying Mr. Wilkinson's method to cooling houses in warm weather, and the invention would seem to commend itself to those who are in a position to use it. There might also be a field for its use in cooling the wards of hospitals, in which patients suffer greatly during hot weather. The automatic working of the invention, as described above, of course depends on having the two extremities of the air conduit open out of doors at different levels, and there would be danger, we should think, that an ill-timed wind would now and then reverse the current, though these objections might be overcome by the use of a fan wherever there was motive power at hand. It is somewhat surprising that the invention has not been proposed as a means of cooling the fever of debate in Congress and other public assemblies in summer, or of relieving the heat of theatres and other places of assembly, although here, too, the difficulty of modifying the temperature of a sufficient quantity of air comes in as one which it would be costly to overcome, and impracticable under ordinary conditions of space. On the whole, the invention, ingenious as it is, seems at first view to be of rather limited application. But it is a singularly interesting and suggestive one, and it sets forth with emphasis the incongruity of living on an earth which five feet beneath its surface and for thousands of miles below is of unchanging temperature, while in the little superficial film of air a few feet deep which we occupy we suffer from and struggle against every extreme of heat and cold.

THE Committee of the Brooklyn Board of Supervisors appointed to investigate the charges against the architect and contractors of the new jail has submitted its report. As to the first charge, that the granite, which a resolution of the Supervisors ordered to be cut in King's County, is cut partly in Maine, the Committee says that the charge is admitted by the contractors, but that it is averred that employment was given to every King's County man who asked for it, and that to have literally fulfilled the stipulation was to have delayed the completion of the wing beyond the time agreed upon. To the charge that iron sills were substituted for granite by the architect at the instance and for the profit of the contractors, it is answered that there is no evidence that it was done at the instance of the contractors, but that it was declared by the architect to be on the recommendation of the Yale Lock Company, which furnishes the locks for the prison, and that the testimony of experts indicates that the contractors saved no money by the change. The third charge was that granite had been substituted for the Greenwich gneiss required in the ashlar, and that it was of less dimensions than required by the specifications, the stones being thin, and the binders not running through the wall as was specified. To this it is said that the change of stone was allowed under the terms of the specification, that it was no disadvantage to the work, and that the masonry, if not up to the letter of the specification, is admitted by experts to be of excellent quality, and perhaps better than if the specifications were literally carried out. The report, which was laid over to the next meeting, is substantially a repetition of the testimony that was brought out during the investigation, and to which we have already alluded. Whatever may be the rights of the quarrels and complaints that infest this building, we have here, as in Chicago, an illustration of an amusing compensation for some of the evils of the public contract system, which has grown up in the vigorous unofficial supervision of disappointed bidders and workmen.

THE battle over the route of the Inter-Oceanic Canal is still fought, on this side the Atlantic at least, but we are glad to see that in the latest discussions less is said than before about the Monroe doctrine, and more about the practical convenience of the different routes. The American members of the Canal Congress protest that the decision of the congress was purely a matter of wire-pulling and personal influence brought to bear for the sake of franchises that had been obtained in advance from the governments through whose territories it was proposed to carry the canal. In his recent report to the Geological Society, of which he is president, Admiral Ammen complains that personal interests in concessions for the construction of a canal are unfavorable to a fair comparison of projects, and says: "That such personal interests did exist was quite apparent from

first to last, and the concession was frequently discussed, or allowed to be, especially in the committees." He thinks that the ablest engineers in the Congress generally preferred the Nicaragua route to the Panama. He proposes therefore that the United States Government should treat the question of location as still an open one, and should call a second assembly of engineers, inviting all the governments which were represented at the Paris Congress to send their engineers to take part in the discussion anew, "with the view of removing it from all extraneous influences of concessions or other objections than the consideration of a ship canal across the continent capable of fulfilling the demands of the world's commerce under the most economical conditions."

IN the mean time it is a little difficult to see how the balance of probabilities turns. M. de Lesseps, who has shown his prudent desire to consult American susceptibility by his proposition to make General Grant honorary president of his company, is said to be making progress in France toward his subscription of one hundred and sixty millions of dollars, which is the most practical move yet undertaken. On the other hand, Mr. Menocal, in a report which accompanies Admiral Ammen's, argues that the Panama route is likely to be given up for lack of support. A French writer in the *Economiste*, M. Beaulieu, warns his countrymen that after all the Nicaraguan route may have advantages which would lead to building a second canal there, and so rob the Panama scheme of the American trade to which it would look for its chief profits. This last admission, that the canal must rely mainly on American custom, is more to the purpose, it strikes us, than the Monroe doctrine, in showing that it is important to give special weight, not to the fancies and prejudices of Americans, but to their practical convenience and results. The Nicaragua canal, besides being easier to construct, would save to American vessels going to California some seven or eight hundred miles in the sea voyage over that by Panama; but this difference would be more than offset by the extra three days which would be required by the length and the number of locks of the canal, to say nothing of the laboriousness and cost of the transit as compared with a short one at the sea level. The real question seems to be of the difficulty and cost of constructing and maintaining the Isthmus Canal. Here we are a little surprised to be told that the ablest engineers supported this Nicaragua route. Sir John Hawkshaw is a very able engineer, we believe, and his objection that the floods of the rainy season would be likely to interfere with the navigation of the canal told against the Panama project; but the final majority in its favor was for some reason or other overwhelming. The question of cost is, after all, a question for those who will build the canal, while its convenience when it is done will be the determining consideration with those who are to use it. We are inclined to think that if any company succeeds in constructing a direct and clear waterway between the two seas, it need not fear the rivalry of any more obstructed route, however less expensive the other may be. But it is quite possible that the best route has not yet been found. As for the proposed second congress, its deliberations would no doubt be of value, but it might be expected to be pretty exclusively American; for an invitation to foreign governments to partake in it, on the ground that in the previous one they had, through favor for personal interests, committed themselves to a wrong decision, would probably not be welcomed.

FRENCH capitalists appear to hold their money ready for investment in improvements on this side of the Atlantic, for a Franco-American company is ready, it is said, to build a ship canal across Florida whenever it can get satisfactory concessions from the State Legislature. An act of incorporation passed by the legislature last winter did not satisfy the projectors, who wished exemption from taxation for a certain number of years; and while the amendment of it was pending, the legislature, which meets biennially, adjourned till 1881. An effort was then made to have an extra session called, but that is made useless by the discovery that the State Constitution forbids such an exemption as is desired, and so the whole scheme hangs fire. The line of the proposed canal is from Jacksonville, up the St. John's River a short distance, and thence across to the Suwannee River, which it follows to its mouth. The project of a ship canal through Florida is one in behalf of which Congress has been often beset, it being expected that the Government would do the work. Two years ago, in answer to a resolution of inquiry passed by the

United States Senate, General Gilmore submitted a report suggesting the line for a canal, and the last Congress made an appropriation in the River and Harbor bill of \$7,500 for the expense of an examination of the peninsula in the interest of the project. The line prescribed by the Senate was farther north than that proposed by the Franco-American company, being "from the mouth of the St. Mary's River, between the States of Georgia and Florida, through Okefenokee Swamp to some suitable point on the Gulf of Mexico." The work of the examination under the appropriation is not yet finished, but a report is expected at the beginning of the next session.

A NUMBER of business men in Boston, members of firms and corporations engaged in various technical industries, have incorporated themselves under the name of the New England Manufacturers' and Mechanics' Institute for the purpose of providing in that city the means and especially the building for a permanent exhibition of industrial art. The Mechanics' Fairs which are held in Boston every three years have been full and interesting; but they have always been rather awkwardly conditioned in respect of exhibition room. It has usually been necessary to combine as well as might be Faneuil Hall with the great hall over the Quincy Market; and this combination of up-stairs rooms which were not specially adapted for such uses has not been satisfactory for either arrangement or access. Being both in public buildings, moreover, they were available only for occasional and temporary exhibitions. The building put up for the exhibition of last fall was a great improvement in point of accommodation, but was never intended, we believe, to be permanent, and indeed the site which it occupied demands for its permanent use a building of a different kind. There is, therefore, still need of a really suitable exhibition building, and if the new association succeeds in providing one it will do good service. It appeals to the whole of New England for support of the fairs which it proposes to hold annually for the sake of encouraging arts and manufactures in that part of the country. We are glad to see that in the circular which we have received the business side of the undertaking is put forward simply, uncomplicated by projects for universal education and the instruction of the public. The charter of the Institute specifies among its objects: "to create and regulate methods of industrial education and to improve the technical knowledge of the members of the society by libraries, technical lectures, and discussions;" and there is mention in the circular of a mechanical museum, intended, as we understand it, to exhibit systematically the elements of machinery; but nothing is said as yet of permanent exhibitions in which the products of manufacturers are at once to provide a systematic course of instruction for the community, and be sold to whoever will buy them. We have an abiding faith in the usefulness of fairs as fairs, but we distrust the prevalent hankering after the Kensingtonian idea which tries to amalgamate education and commerce by turning every bazaar into a museum.

DRY-ROT IN ENCLOSED TIMBER.

A COMMUNICATION from E. A., in another column, continues the discussion of slow-burning construction, turning this time upon the question of dry-rot in timber which is cut off from the air, in respect to which he claims to differ absolutely with us. We are not sure that the difference on this point is so absolute as E. A. declares, although it may be so. We have never argued, for instance, against the expediency of protecting wood with iron lath; on the contrary, we believe in it, — as far as it goes. We have simply offered a caution against surrounding wood with mortar in actual contact with it, as when E. A. proposes to leave "no open space or air behind the plaster," or as in General Meigs's suggestion, constructively excellent, for a lattice partition in which the wooden strips are entirely imbedded in a mass of mortar, a kind of treatment which, however suitable for constructions that are not expected to last long, seems to us to bring considerable risk on those that are meant to be permanent. On the other hand we have understood E. A. to refuse to believe that to absolutely enclose timber in plaster increased the danger of dry-rot.

In answering E. A.'s rejoinder let us then recall our main position, to which he took exception, that whatever encloses timber in such a way as to entirely cut off contact with air exposes it to this danger of dry-rot (so called), and that therefore to embed timber in mortar is a thing which is not safe to recom-

mend. The theory which we quoted in illustration, that a close covering of masonry is more dangerous than one of iron, and one of mortar still more dangerous, is not one of which we should take the responsibility, and requires for proof or disproof a careful series of observations, which are not at our hand, perhaps have never been made. Assuming the books to be right, the explanation which we offered seems to us reasonable, — that a close envelope which may communicate dampness to the wood is more mischievous than one that keeps it wet. We should not venture to argue, as some writers have done, that to enclose timber in iron is an actual preservative; should go no farther than to say that when wood is placed where it is liable to absorb moisture, an iron shoe, as we said in a paragraph to which E. A. takes exception, "may even protect the end of a timber, once securely dried," and it is commonly conceded, we believe, that the cast-iron plates on which it is customary to bed heavy timbers set in brick walls are serviceable in this way as well as in distributing their weight. This obviously requires the condition which we thus took pains to specify, that the timber should be dry and seasoned before it was enclosed. If it were damp or green when it was put in, as most timber used in building is nowadays, or if the enclosed part could absorb moisture from a more exposed part, the impervious envelope would doubtless be more dangerous than the pervious one, and *a fortiori* more dangerous than none at all. The cases cited by E. A. of dry-rot in wood encased in iron shoes and sheet-iron should be borne in mind, but they are isolated, and to know what they teach we should know the circumstances of material, condition, exposure to temperature and moisture. The only safe ground for comparative conclusions would be either in experience wide enough to eliminate accidental differences, or in experiments carefully tried with the same material, in the same condition, and with the same exposure, except so far as concerns the envelope. If any one would test the influence of the enveloping substance by itself, he might take a dozen blocks of like grain from the same stick, well seasoned and kiln-dried. Then let him case half of them in tin, sealed hermetically, — *can* them, in fact, as preserved meats are canned, — and bed the others completely in mortar under ordinary conditions of exposure, examining them all at intervals of years. Most persons would agree, we fancy, as to what results might be expected; how far the conditions of actual practice would give parallel results is to be determined by experience.

The chief practical point is, however, that since wood cannot be actually desiccated and canned for service it is considered best not to enclose it tightly in anything; and admitting that, encased in iron or embedded in masonry, it is liable to decay, it may be expected to suffer in the same way when embedded in mortar, unless there is in the mortar casing some specially protecting influence. We know no facts to show that there is such an influence, and those which E. A. cites do not meet the case. The timbers referred to in the Mason & Hamlin factory are not embedded in mortar, it appears; but are furred before lathing, so that the mortar is not in contact with the wood, except in some spots, which are discolored by it. The casing of furred beams in lath and plaster is not regarded as dangerous, but is done every day, the space behind the mortar commonly proving to give security enough. As for the floors laid in mortar, the case we cited before is an example where contact with the mortar apparently proved injurious, probably by conducting moisture. Like results follow when joists are bedded in the concrete of a cellar floor. To fill in with mortar round the end of a joist built into a wall which may convey moisture from the ground or from the weather is to invite the same danger; to interpose an impervious iron plate is believed to be, in some degree, a protection. The floors cited by E. A. show only, on the other hand, that to lay plaster on one side of a board does not necessarily do harm; nothing more. They do not indicate the behavior of the same boards when surrounded by mortar, still less that it would be safe to embed beams, which are not usually made, like floor boards, of selected stock carefully dried, and which, being much thicker, are much more liable to decay.

There is one fact that might be thought to bear on this question which we have passed over in our former discussion, — the fact that under some circumstances lime has a preservative action on wood. We mentioned in an early number of our paper the process invented by a Frenchman for preserving wood by impregnating it with lime, suggested by noticing that the boards which enclosed old mortar beds seldom decayed.

An illustration which has come under our notice since this dis-

cussion was begun is curious enough to be worth mentioning. On some old houses in Long Island whose walls have been shingled for a great many years, thin horizontal lines may be seen running across all the shingles of every course just above the butts. These lines are in relief, — are slight ridges in fact, — having for some reason suffered less than the rest of the wood from the weather, which has worn away the surrounding surface, leaving them slightly raised. Along each line is a row of nails, the shingles being very large and having a lap of nearly a foot, so that it was necessary to nail them near the butts to prevent their curling. The scientific explanation that has been given is this: The ridges mark the chalk lines along which the nails were driven; the lime of the chalk has coagulated the albumen, which is the unstable constituent of the wood, so as to make it insoluble, and therefore weather-proof, and not liable to decomposition. The same explanation applies to the French process just mentioned. Whitewashing, likewise, in which the lime is very much diluted with water, and the undissolved excess soon becomes carbonated, is held to be a preservative. On the other hand the freshly slacked lime of mortar has what appears to be a damaging action on certain kinds of wood at least, — a caustic action like that of the caustic alkalis, — especially on hard woods, as for instance butternut and chestnut, which are blackened by it and, we suspect, injured in texture, as all carpenters know who have had occasion to plaster against one of these woods. It is indeed laid down with authority by some writers that lime mortar causes decay in wood, and should therefore be kept from contact with it. These different facts and statements suggest discrepancies which it is not altogether easy to reconcile. The chief difference that is to be noticed is between covering or saturating the wood by a solution of lime and encasing it in a mortar. To discuss this point in full, however, would carry us too far. We mention it rather as a matter of related interest than as one which is important to our issue, for even if we should deny the theory that mortar injures wood by contact, there is no reason to believe that in any case the preservative influence of a mere coating of lime could extend below the surface of the wood.

We see no reason then to reject the received teaching of experience theory that to embed timber in mortar, or to shut it up tightly in anything else, under ordinary conditions, is — not to cause dry-rot — but to run a risk of it great enough to make the action imprudent.¹ Every received doctrine, however, is subject to revision under new light, and if E. A. or any one else can show good cause for rejecting what is accepted as the teaching of experience in this matter, he may fairly be accounted a benefactor by architects and constructors.

AMERICAN DRAMATIC THEATRES. III.

As the plan of entrances depends in a great measure on that of the hall, it is perhaps best to consider the latter first; and here, disregarding the many absurd attempts at change merely for the sake of novelty, there seem to be two general forms, with their combinations, within the limits of which all the best examples may be classed. Of these the first and most interesting is that of the ancient Greek theatre.

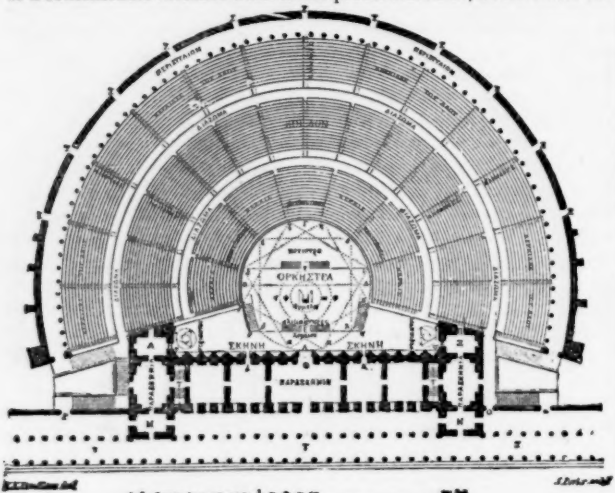
Although in its original completeness not suited to the requirements under consideration, it is worthy of the most careful study. First, because like all structures originating with that remarkable people, it is a perfect solution of the problem involved; and next, because some of its features are, in a modified form, well fitted for modern use.

In the study of the Greek plan one must keep in mind the leading conditions of the relation of their kind of entertainment to their audiences. The term "theatre" is derived from the Greek word signifying "to see." Undoubtedly with them hearing was important, but seeing was essential. On these points Fergusson writes: "The dramas of the Greeks and Romans, or at least those which were represented in their great theatres, were of the simplest possible kind. The action took place on a pulpitum or raised platform in front of a fixed architectural screen. The dialogue was simple, rhythmical, and probably intoned, and the chorus sufficiently numerous to make their united voices heard everywhere. . . . The wonderful instinct of the Greeks, which enabled them always to do the very best thing possible in all that concerns art, caused them to hit on the very best form in plan for the transmission of the greatest quantity of sound, with the greatest clearness, to the greatest possible number." It should be borne in mind that the regular actors were generally but three in number, occupying probably fixed positions at the centre

¹ The fact that a few years ago several trusses of the dome of St. Paul's Cathedral were enclosed in "stone felt" (a species of cement applied in a liquid state) shows that responsible and instructed persons are not unwilling to incur this risk; but in most places, though not in all, an air-space was left between the cement and the timber. The result of this experiment should be watched with interest, for although the conditions are most favorable, the timbers being completely seasoned, the end is not yet.

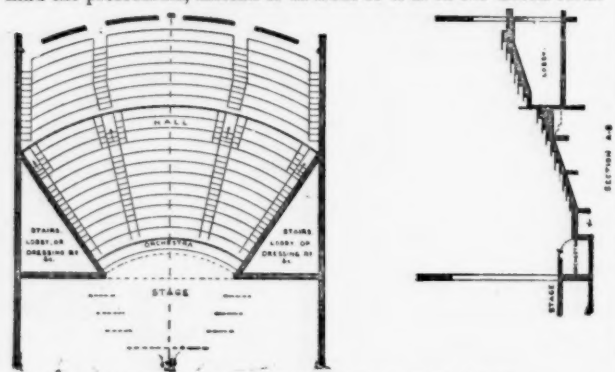
and sides in front of the scene, with the musicians and chorus in front and below them in the orchestra.

In the modern theatre the necessity for seeing into the set-scene to a considerable distance back of the proscenium line, necessitates the



Plan of Greek Theatre, from Stuart & Revett.

abandonment of the end seats of the semicircular plan and an arrangement more in the fan-shape; or more accurately, a portion of the sector of a circle, the centre for the radius of which shall be behind the proscenium, instead of in front of it as in the Greek form.



Modern Adaptation of the Greek Form — Plan and Section.

The old orchestra, in later days the pit, and at present the orchestra stalls or parquet, has become the best part of the audience-room; and the real orchestra is reduced either to a narrow space in front of the footlights or put out of sight altogether. The addition of a single shallow gallery in the rear would somewhat increase the seating room, and many other minor changes might be made to suit the ever varying conditions. The form of the ceiling in halls of the size under consideration is not of great importance. It should not be flat and unbroken in surface, of course; and few, it is hoped, would be foolish enough to use the open-timbered roof or any combination of Gothic vaulting where good acoustic qualities were essential. Avoiding these absurd extremes, there remains ample chance for good combinations of usefulness and beauty. The most common shape of theatre ceiling is that of a shallow dome, with small lantern, eye, or ventilator, in the centre. This is very suitable. The very best would be a shell form, with its longitudinal and vertical section lines somewhat similar to the sectional lines of the seating inverted.

One excellent result of the Greek disposition of seats, each rising from eight to eighteen inches above the one in front, is not only the free view of the stage, but the opportunity it gives for every one in the hall to see almost everybody else, — the social effect, it may be termed. There is no more valuable adjunct to noble architecture than this sea of interested and sympathetic faces, supplemented by the bloom of color in varied costumes. Any one who has seen the tier on tier of bright and happy children, on the stage of the Boston Music Hall, at a school festival, can readily appreciate the charm of this disposition. To the actor on the stage the effect is most inspiring, when in answer to his "touch of nature," he can see the flush of noble emotion or the laughter of keen enjoyment sweep over the faces of his auditors as the summer wind ripples over and stirs a bed of flowers. It is a great mistake ever to sacrifice this magnificent element of effect in a theatre.

In this form of hall, with modern construction of floors in place of the solid rock or masonry of the ancient type, the points of egress are multiplied and the audience may be so divided that the very feeling of human sympathy, most delightful during the entertainment and most hazardous in time of panic, may be checked and controlled by separating the crowd into smaller bodies until beyond the reach of apprehended danger. The steep rise of the seats will furnish

ample lobby room, easily accessible, and with the barrier of the floor between it and the stage, from which quarter the danger is expected. Fire and smoke naturally ascend. The safe way of retreat then would be in the contrary direction. With a proper disposition of exits, an audience could flow in or out of this form of theatre with an ease and celerity that would appear, as compared to the present system of long narrow aisles, almost magical.

There is one limitation of the Greek or amphitheatrical form that has, more than any other, interfered with its general adoption for theatres, and this may be called the money limitation. The rise of the seats is so great that, if galleries of any considerable depth are added at the back, the hall becomes too high for its other dimensions; the difficulty of egress from the galleries is increased, and the cost of building greatly enhanced. The carrying up of the galleries to such height makes proper sight lines to the stage impracticable; and places a large number of the spectators too high for a proper view of the scene, — that is, too far above the horizon line of the scenic perspective. This building up, instead of occupying more ground room, also necessitates additional space for the required long flights of stairs, and greatly increases the hazard to the audience. The constant stimulant to the fashion of large galleries, with lower floor of slight pitch, is in the demand for more seats, at limited expense, and on a given area of land, — a demand which is the continual bugbear of the theatre architect. To satisfy this demand requires a series of most unsatisfactory compromises, generally made at the expense of the comfort, enjoyment, and safety of the public, and equally at the expense of the designer's reputation.

For music halls the Greek form satisfies all needs, and must in the future meet with great favor. It is readily adapted for grand concerts, especially such as include a powerful chorus and orchestra. The oratorio probably somewhat approaches the character of the Greek play, needing but the addition of the dresses and certain formal scenery and very limited action.

A very admirable design for this type of hall is shown on the following page by M. H. Mayeux. This is introduced especially to show the flexibility of the style, and the ease with which it can be adapted to various modern uses and varying forms of ornamentation.

J. A. F.

RECENT MODIFICATIONS IN SANITARY DRAINAGE.¹ II.

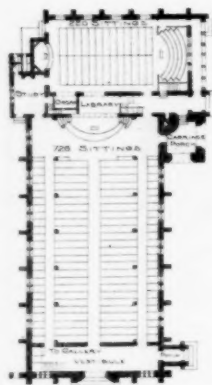
IN no department of sanitary work has the progress been more marked than in the improvement foreshadowed in my former paper on House Drainage concerning the disposal of the liquid wastes of country houses by the process of sub-surface irrigation. Like all radical improvements, it has had its share of prejudice to overcome, and it by no means found the professional public ready to accept it as the demonstrated success which English experience had shown it to be. It is now quite safe to say that, among all engineers and architects who have given attention to the matter, it is acknowledged to afford the best solution yet attained of this most difficult problem. I know very many cases of its adoption, often without professional guidance and carried out in a rule-of-thumb sort of way, and I have heard of none that is not satisfactory. It does away with that king of nuisances, the cesspool, and disposes of all manner of liquid waste insensibly, completely, and safely. The credit for this improvement is due primarily to the Rev. Henry Moule, the inventor of the earth-closet, and hardly less to Mr. Rogers Field, C. E., who relieved it of its chief embarrassment by adapting to it his automatic flush-tank. This system has recently received the unqualified indorsement of that highest American sanitary authority, the Massachusetts State Board of Health, which in a circular issued in April, 1879, says, "Chamber slops, and slop water generally, should never be thrown on the ground near houses. They may be . . . used by distribution under the surface of the soil in the manner described on page 334 of the Seventh Annual Report of the State Board of Health, and now introduced in the town of Lenox, Massachusetts. . . . If water-closets are used, and there are no sewers, the best disposal of the sewage is by the flush-tank and irrigation under the surface of the soil, as described on page 135 of the Eighth Annual Report of the State Board of Health."

This system has been in full operation for the entire sewage of the village of Lenox, where it has proved itself an absolute and unquestionable success. The question which seems to arise in every Northern mind when this method is suggested relates to the possible effect of severe frosts. It seems now to be clearly demonstrated that this consideration may be left entirely out of the account, no instance having been cited of the least obstruction from this source. This point will be more fully treated further.

The progress made in the matter of town drainage has not been less than that in the twin department of house drainage; but the advance has been thus far — at least so far as this country is concerned — more a matter of theory than of practical application, and it relates more to villages and to what may be called village-cities than to larger places, like New York, Boston, and Philadelphia.

Sewerage was long confined to large towns, and it reached its development under the direction of engineers trained to foresee all possible contingencies, and to pitch their work on a scale adequate to cope with them. With usually ample means at their command, and with the inclination to work after great models, their works have

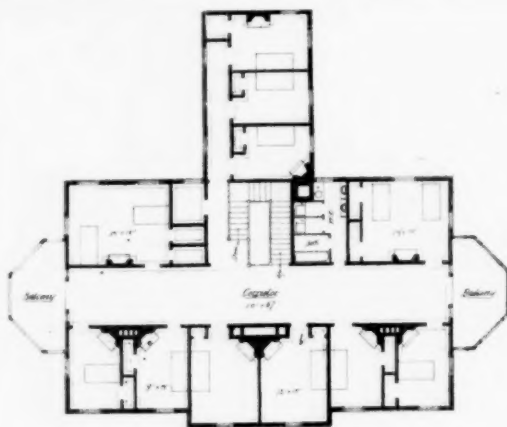
¹ A paper by Col. George E. Waring, Jr., published in the *Atlantic* for July.



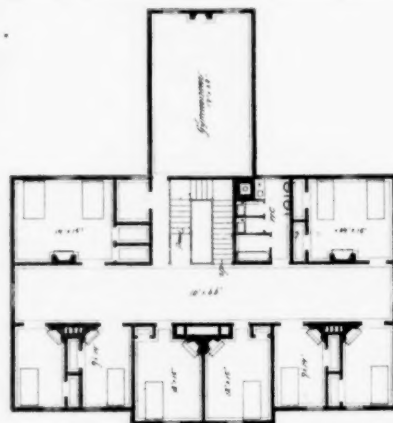
PRESBYTERIAN CHURCH. COR. OF BOUNDARY AVE. AND ST. PAUL ST. BALTIMORE, MD.
 J. A. AND W. T. WILSON ARCHTS. 52 LEXINGTON ST.



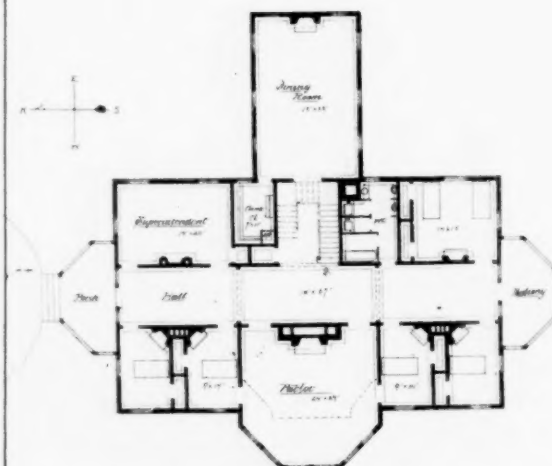
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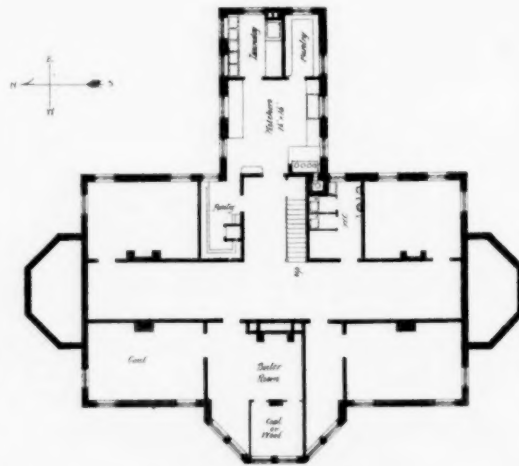
Second Floor Plan



Attic Plan



First Floor Plan

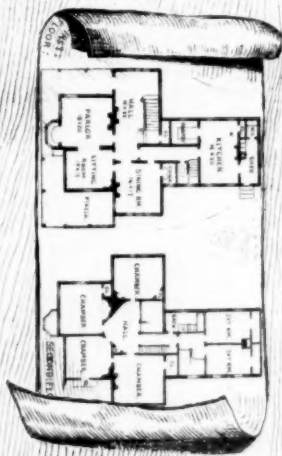


Basement Plan

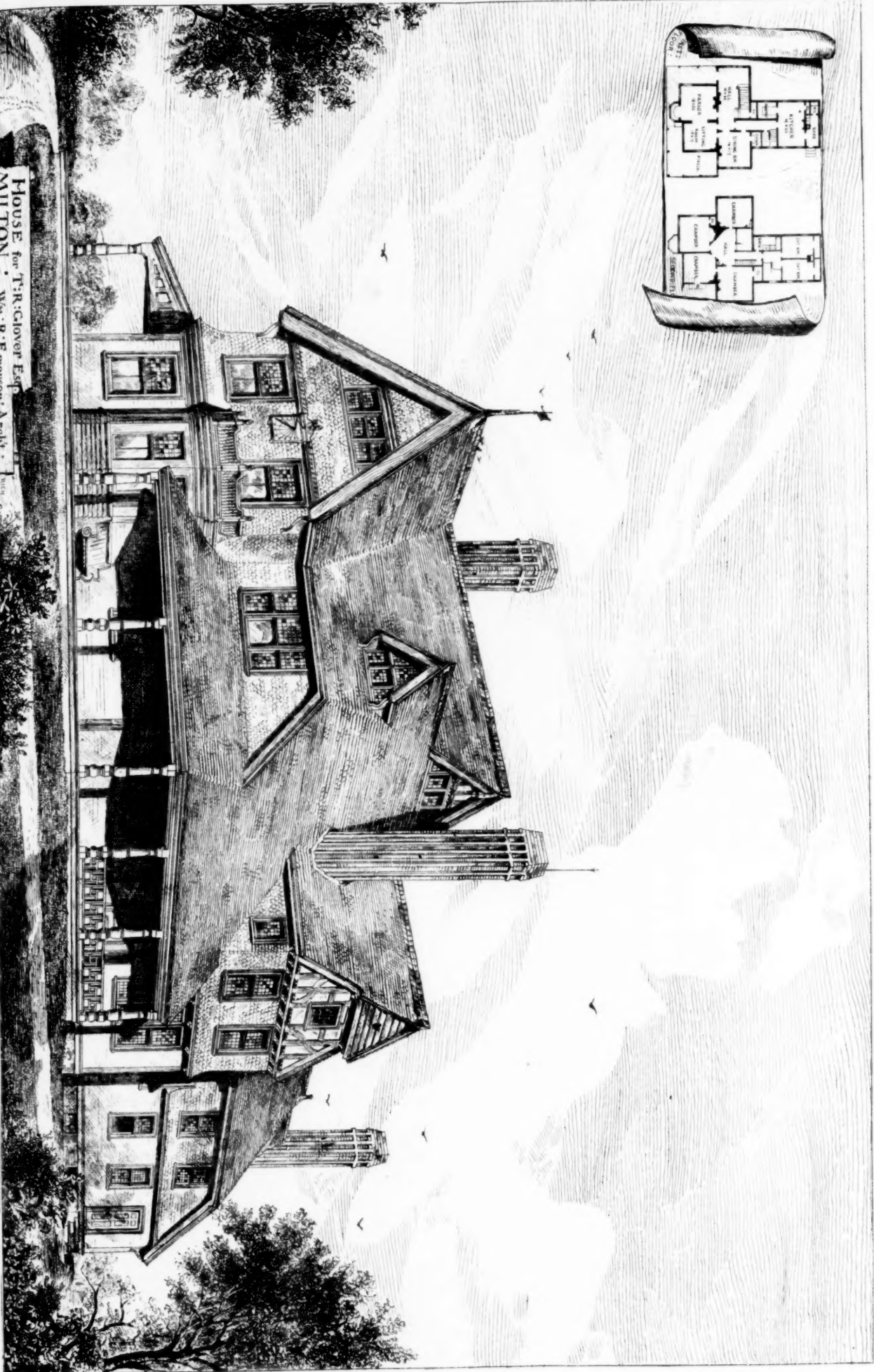
Sketch for Adams Nervine Asylum

Cabot & Chandler Architects Boston

THE HELIOTYPE PRINTING CO. 220 DEVONSHIRE ST. BOSTON

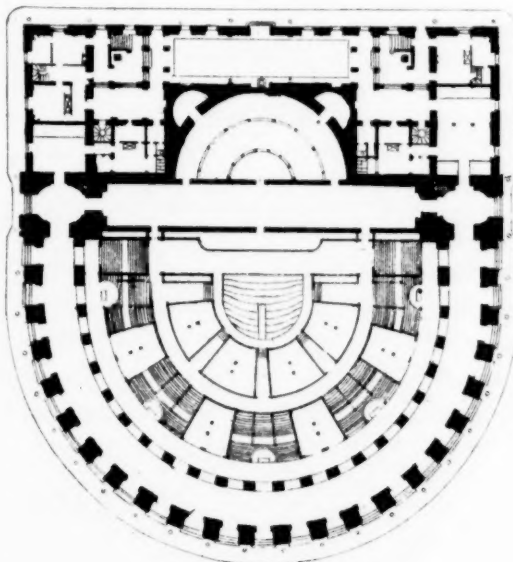
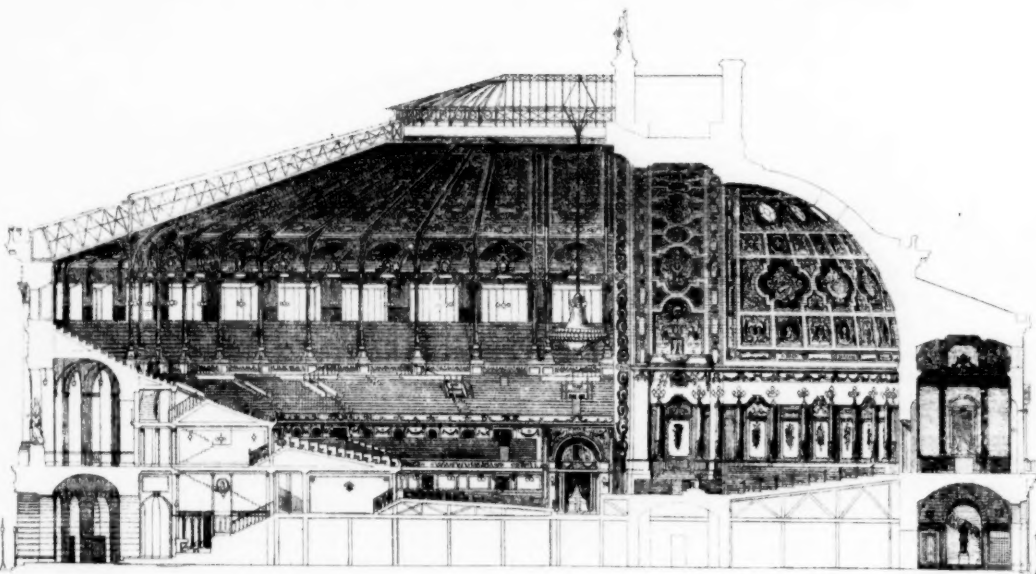


House for T.R. Clover Esq.
MILTON. Wm. R. F. Emerson, Archt.

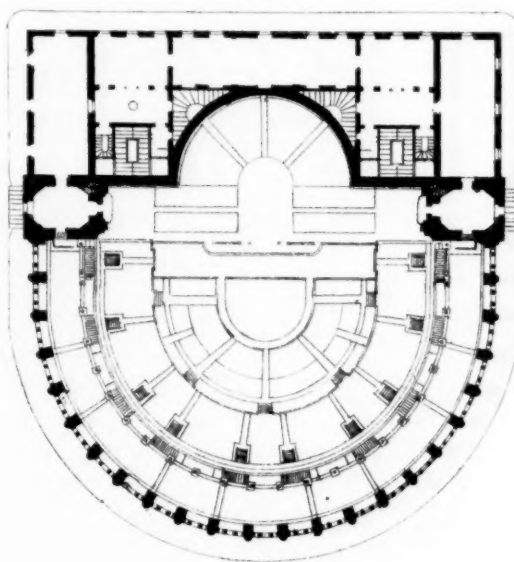


PRIX STENTOR.

M^r H. MAYEUX.



REZ-DE-CHAUSSEE



DEUXIEME ETAGE.

— DESIGN FOR AN ORPHEON —

THE HALLOTYPE PRINTING CO. 220 DUNSTON ST. BOSTON.

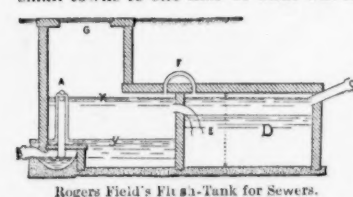
generally been costly and vastly comprehensive. So far as the drainage of great cities is concerned, there is much to be said in favor of their practice. There is much to be said, too, on the other side, and it has been ably said. My present purpose relates chiefly to the sewerage of villages and country towns having a considerable proportion of uncovered and unpaved area. There are hundreds of towns in this country which cannot afford the gigantic and costly work of introducing such a system of sewers as it is usual to find in a great city. Quite generally, when the question of their drainage arises, a city sewerage engineer is consulted, and a plan is prepared which remains unexecuted because of its excessive cost. By far the larger part of this cost is due to the fact that the proposed system contemplates the drainage of such sub-cellars as are rarely found in country towns, involving a depth that would probably never be needed, and the removal of the storm-water, which, after the area shall have become covered and paved, might flow off by the public sewers. It would be better, in the case of all rural towns, to disregard the question of storm-water entirely. This may be more safely and much more cheaply removed over the surface. The only reason for admitting it to the sewers would be to prevent injury to property, and, under the circumstances we are considering, the danger of this is not sufficient to justify the expense, nor is it sufficient, were there no question of expense, to justify the sanitary and economical disadvantages of providing for it by a system of large sewers. It is better to keep above ground, and to discharge by the natural means of outflow, all water which may be so disposed of without offense or danger to health, — that is, all or nearly all rain-fall. The extent to which the first flow over a paved road-way may properly be admitted to the sewers is a question to be decided according to the circumstances of each case. It is generally wiser to keep such road-ways clean by sweeping than to use the rain-fall as a scavenger.

What towns of the class under consideration need — and they need it very imperatively — is a perfect means for the removal of the foul wastes of households, factories, etc., and the draining of the sub-soil, if this is springy or wet. They should only be called upon to spend the money necessary to secure these ends; and if they can learn to limit their demands to this absolute requirement, their sanitary improvement need no longer be the bugbear that it now is.

The advantages of small-pipe sewers have been sufficiently stated, except, perhaps, with reference to the single matter of ventilation. It is much easier and more simple to secure the needed change of the atmosphere of a small chamber than of a large one, and the usual means, which are but partially effective in the case of a large brick sewer, are ample for the complete ventilation of a small pipe. Hitherto the objection has held, in the case of pipe sewers of less than ten inches in diameter, that when they become obstructed it is a difficult and costly matter to clear them. But for this objection, there was no reason why six-inch sewers might not be used for all villages or parts of towns having a population of not more than one thousand; for a six-inch pipe laid even with a very slight inclination has ample capacity for the discharge of all the household waste of such a population.

We have now reached the point where there is no reason whatever to apprehend the obstruction of such a sewer by anything that can get into it through proper and properly arranged branch drains. Rogers Field's flush-tank, as arranged for the periodic flushing of such sewers, may be confidently relied on to keep them swept clean of everything that may enter them. The accompanying diagram shows the construction of the annular siphon which is the essential feature of this tank. A siphon of this form, four inches in diameter, comes into action with certainty under a stream of one tenth of a gallon per minute; so that a tank having a capacity of one hundred and fifty gallons, placed at the head of each branch sewer and fed by a stream which will fill it once in twenty-four hours, will give it a thorough and daily flushing, and keep it clear of all obstructions. No matter how limited the public water-supply may be, this small amount can always be spared for the work. Where there is no public supply and no available extrinsic source of flushing water, the sewage itself from a few of the upper houses along each lateral sewer may be collected in the tank and used for the flush.

This simple device has proved itself, both here and in England, to be entirely reliable and effective. It may safely be assumed that it has secured a reduction of the cost of the drainage of small towns to one half of what was formerly necessary.



Rogers Field's Flush-Tank for Sewers.

the drain will admit drain water to the soil, robbing the sewers of the vehicle needed for the transportation of their more solid contents,

and causing a dangerous pollution of the ground, of cellars, and of drinking-water wells. The foul-water sewers should be as absolutely tight as the best material and the best workmanship can make them, and the drainage of the ground should be effected by the use of agricultural drain tiles, constituting an entirely separate system, which, while they may for economy's sake generally occupy the same trenches with the sewers, should be carefully arranged to prevent sewage matters from entering them.

The question of sewage disposal is the great unanswered question of the day. We are familiar with the objections to the methods usual here. European countries, which have been forced by the density of their population to give especial attention to this subject, have as yet hardly got beyond the point of proving that there is no royal road to success, and that whatever theory may say on the subject, sewage not only has no value to the community producing it, but it cannot be got rid of except at considerable cost.

The only method thus far developed which is entitled to consideration here, aside from discharge into the sea or into a running stream, is purification by application to the soil, with or without the agricultural consideration. Whether by surface irrigation, by the use of sub-surface absorption-drains, or by intermittent downward filtration, this method of its disposal, properly applied, is absolutely complete and satisfactory. The opinion has quite naturally prevailed that the severity of our winter climate debarred us from availing ourselves of it. The experience of the past severe winter has fully justified the opinion of those who have maintained that this objection is not a real one. In England the sewage-irrigation farms have taken charge of the effluent without interruption throughout a season of almost unexampled severity. At Berlin a like immunity has continued throughout the winter; and even at Dantzic, near the mouth of the Vistula, in a climate nearly as severe as that of St. Petersburg, and where provision was made for a direct discharge into the river during the winter season, the disposal by irrigation is said, to the surprise of all, to continue uninterrupted in the coldest weather.

At the Nursery and Child's Hospital on Staten Island, winter overtook us before our absorption-drains could be laid. The flush-tank which holds one day's sewage, was made to discharge over a low spot near the absorption-ground. Even in the coldest weather the entire outflow settled away into the earth before the next flood was delivered. Evidently the warmth of the sewage is in all cases sufficient for it to thaw its way into the ground. This is, without doubt, the explanation of the continued working of the shallow drains under my own lawn during nine consecutive winters, although at least once the ground was frozen to a depth of two and a half feet below them.

THE ILLUSTRATIONS.

DESIGN FOR AN ORPHEON. — M. H. MAYEUX, ARCHITECT.

This illustration, which is reproduced from the *Croquis d'Architecture*, published by the Intime Club, is referred to in the article, *American Dramatic Theatres, III.*, in this issue.

HOUSE FOR T. R. GLOVER, ESQ., MILTON, MASS. MR. W. R. EMERSON, ARCHITECT, BOSTON.

COMPETITIVE DESIGN FOR THE ADAMS NERVINE ASYLUM, DORCHESTER, MASS. MESSRS. CABOT & CHANDLER, ARCHITECTS, BOSTON.

DESIGN FOR THE BOUNDARY AVENUE PRESBYTERIAN CHURCH, BALTIMORE, MD. MESSRS. J. A. & W. T. WILSON, ARCHITECTS.

It was proposed to build the chapel during the coming spring. The materials were to be Amherst or Berea sandstone, rock-faced window finish, etc., tooled. Capitals, and other carved work, Indiana limestone. Jamb-shafts and cloister-porch columns of polished granite. Height of ridge of roof from ground, 66 feet. Tower, 180 feet. Extreme dimensions of church and chapel, 60 by 150 feet.

CORRESPONDENCE.

THE ENVOIS DE ROME.

PARIS, July 7, 1879.

THE annual exposition at the École des Beaux-Arts of the work of the students in the French Academy at Rome has just closed. The work is very excellent this year, rather better it seems than usual, and especially has this been remarked in the architectural studies. One of the daily papers asserts that the *envois* of this year are better than any that have been sent back from Rome since the time when Charles Garnier was a *pensionnaire* of the government. Surely they show a wonderful amount of careful, conscientious study, and excellent, spirited drawing. M. Loviot, in his fourth year as *grand prix* student of architecture, sends some very interesting studies for a restoration of the Parthenon at Athens. Unfortunately he must have been *en charrette*, as they say in the studios, for neither the section nor the plate of details is washed, each being simply drawn in ink with the shadows outlined in pencil. However, this gives one an opportunity to observe what care the best of the French architects take in making their drawings, and though their strongest point lies perhaps in the use of the brush, still, as in this case, they put a great deal of spirit into a simple outlined drawing.

The polychromy of M. Loviot's restoration is quite notable. The shafts of the columns are of a plain terra-cotta color, but the capitals and the entire entablature are covered with brilliant colors, forming a very striking contrast to the simplicity of the architecture and yet not in discord with it, serving rather to unite the grave spirit of the Doric to the animation and vigorous life of the figures in the pediments and metopes. The triglyphs and the tympanum of the pediment are colored a deep transparent blue, represented by a strong wash of the pigment Prussian blue. All the rest of the entablature is of a bright crimson, nearly a carmine, relieved on the principal mouldings by ornaments in strong blues and yellows. The entire length of the architrave is hung with golden shields placed in the axes of the metopes. Between these are Greek inscriptions, while a graceful running ornament in blue and yellow still further subdues the strong red ground. One striking feature is the introduction of mural paintings, covering both the exterior and the interior walls of the cella, and adding not a little to the finished look of the whole restoration. On either side of the entrance is a fierce battle scene, occupying the entire height of the wall. Inside is represented a naval attack, — perhaps the siege of Troy. The paintings are in full color, but very subdued and quiet in tone, notwithstanding the fierce action depicted.

M. Loviot disposes of the question of the lighting of the interior by leaving the centre entirely open, the roof running straight up to the line of the inner two-storied colonnade, so that the colossal statue of Minerva has nothing above her but the open air and the blue sky.

Accompanying these drawings is a very pleasing water-color sketch of the Parthenon as it now exists, a good example of a sketch which, while thoroughly architectural, still takes account of the play of light and shade and beauties of color which make up what a painter styles a work of art.

Hardly less interesting, though not showing the same amount of original talent, is the work of M. Paulin, in his third year. This gentleman is evidently a hard worker, for he has not confined himself to one building nor to one locality. He sends a carefully colored drawing of an elaborate altar-piece in rich mosaic-work from the Church of Or San Michele, at Florence. Also an elevation of the Hospital at Pistola, a very plain building, except for a high frieze band above the loggia arches representing apparently scenes from the history of the hospital. M. Paulin's best studies, however, are of the Temple of Theseus, at Athens. He shows India-ink drawings of its present condition, with carefully detailed studies of the construction, and a very brilliantly colored restoration of the whole temple. The general color of the stone is a strong terra-cotta; the walls of the cella are of a bright, vivid carmine. He seems to have used the pigment pure, and as thick as it would work with the brush. This is not relieved at all, except by a narrow edging at the corners and a low dado, both of a dark green tone. The shafts, capitals, and architrave are entirely bare. The metopes and tympanum of the pediment are of the same vivid carmine, while the triglyphs are represented of an intense blue, obtained by using pure Prussian blue. The corona and a few of the smaller mouldings only are ornamented with these same colors, blue and red. The dragons at the corners of the pediments are a dark brown, with blue wings and red crest. The general effect of this coloring is very striking, and is anything but the "snowy, glistening Pentelic marble, set off against the blue sky of sunny Athens," the ideal of the early restorers of the Greek temples. M. Paulin shows a great deal of skill in handling such vivid colors without making the result either harsh or glaring.

M. Blondel, in his second year, has some mural paintings and some studies from the Soldiers' Camp at Pompeii; also, studies of the entablature of the Temple of Vespasian, at Rome, shaded in India-ink to the last degree of perfection. His studies of the tomb of Cardinal Sforza, in the Church of Santa Maria del Popolo at Rome, are better, and as drawings are very satisfactory. They are colored in a monotint of a light greenish hue, the shades of the statues being put in with pencil, and the effect of the whole monument is indicated so naturally and easily that it commends itself to one's attention much more than many of the elaborate, overworked drawings sent back by so many of the students during their first two years at Rome. Of this last sort is the work of M. Nénot, in his first year. — some studies at Pompeii and of the Temple of Vesta at Tivoli. The drawings are made with the greatest care, and are almost photographic in their exact observance of light and shade, but they all have the same fault. They are overworked, and they make the execution of the drawing of more importance than what is drawn, which is evidently not the true aim for an architectural drawing.

One of the sculptures has attracted a great deal of attention. It is the work of M. Lanson, in his second year, a group representing the story of Judith and Holofernes, nobly conceived and worked out with wonderful correctness and fidelity to nature, while at the same time it is full of freedom and original thought. Indeed a daily paper seems to think that it has given the group the highest possible praise when it styles it as having altogether escaped the enthralling effects of the teaching at the Beaux-Arts. Holofernes, a powerful, muscular man, is stretched out in a deep slumber on a couch; before him is Judith, sword in hand, but her face turned from the sleeper, and bearing a questioning, hesitating look, as though she doubted whether the deed should be accomplished. The right hand of Holofernes, stretched out from the couch, is a perfect *chef-d'œuvre*, marvellous in its anatomical details. No less skillful is the arrangement of the

drapery hanging in loose, simple folds from the left shoulder and waist of Judith.

Beside this piece is the work of M. Cordonnier, in his first year, — Salome bearing the head of John the Baptist: a very excellent study of the nude, a very graceful, pleasing figure, but in sentiment rather a study than an independent work of art, and lacking the appreciation of art feeling which is so manifest in M. Lanson's work. The rest of the sculpture seems inferior in quality, perhaps because under the shadow of Judith, but more probably from lack of real independent talent, and from a too close adherence to academic canons. One little bit, however, by M. Roty, is a real gem. It is a study for a medallion, representing art applied to industry. One face represents Minerva and Vulcan bending over a piece of armor, Vulcan leaning on his sledge-hammer, while the goddess traces a design on the steel. The other face represents a single figure seated on an anvil and drawing upon a shield in her hand. It is but an *ébauche*, but the figures are very clear and sharp cut, almost Greek in spirit, and showing a very fine taste.

The exhibition of painting is rather a disappointment. The fourth year student, M. Besnard, from whom most would be expected, sends an immense canvas, over which he evidently tried to spread himself, and he did it. "After an Invasion," it is called: a throng of fugitives pouring out from the smoking city, followed by the ruthless conquerors in full armor; on the right a dead hero being borne away on a rich bier, followed by mourning companions in arms; in the centre a group formed around a tree, to which is suspended another dead leader; for background a weird, sulphurous effect of sunset; and a black, smoky sky over all. The picture is not lacking in dramatic effect, and has many good points, but it is hardly what might be expected from a fourth year *grand prix*.

More attractive is the work of M. Chartrau, in his first year, consisting of an excellent study of the nude, a "*Jeunesse de Mondore*," — an Oriental maiden playing on a sort of guitar; and a strong, vigorous study from the antique, in charcoal, — the Borghese Faun, — a masterly drawing, freely, easily indicated, nothing like the painfully stippled work one so often meets with. He also contributes a very neat, spirited pencil-drawing of Del Sarto's Madonna of the Sack at Florence. C. H. B.

BUILDERS' PRICE-BOOKS.¹

ARCHITECTS who read the English professional journals with any attention, are generally struck by the important part played in building operations on the other side of the water by price-books and schedules of quantities. For even the smallest piece of construction it seems to be thought necessary to employ a surveyor to take out the quantities, and judging from the large sale of price-books, the English mechanics seem unwilling to trust their own memory as to the cost of the several items.

With all these precautions, one would imagine that bidding would be a mere form. Where a quantity surveyor, paid half as much as the architect himself, supplies to each competitor a schedule of work and materials, detailed to the minutest particular, and the books give him the cost to a fraction of a penny of matching a board, or dovetailing a baluster, it would seem that the process of estimating reduced itself to a mere matter of multiplication and addition, and one would expect the proposals to vary by a few shillings at most, so that it is rather startling to find the bids for ordinary structures, as reported in the current news, often varying by fifty per cent or more, the difference being, we should judge, quite as great as that generally found between the estimates of intelligent builders in this country, made from the drawings alone, without any assistance from quantity surveyors or books of prices.

Some attempts have been made to introduce the practice of supplying quantities on this side of the water, but it is very doubtful whether architects derive any benefit from the custom. To persuade a client to spend as much on surveyors' fees as he does for the contract drawings and specifications is a difficult task, and yet contractors who have once had quantities supplied sometimes continue to demand them as a right, to the great annoyance of the architect, whose duty and interest both forbid his incurring such responsibilities to the contractor, and of the owner, who supposed that the architect took care of everything except paying the bills. Nor does it seem that builders themselves need encourage the practice, if, as it seems, many of the best English contractors find it better to do their own measuring from the plans, without regard to the lithographed quantities furnished by the surveyor.

For price-books more may be said, but the system of discounts is so complex that they can be nothing more than a guide to the probable cost of new or unusual modes of work. We fancy that separate books for each individual builder, varying by a large percentage according to his standing on the Commercial Agency register, would more accurately represent the true mode of estimating; and the common habit here among contractors of keeping an account with every building, to show its actual cost, is far more useful in practice. However, both architects and builders will often find them serviceable for the information they give about approximate cost, and the incidental hints which many of them contain as to the proper execution of various kinds of work.

¹ *Bevis's Builders' Price-Book*, for Architects, Engineers, Surveyors, Builders and Contractors, and Guide for Estimators. London. 1879.

The book before us is far inferior in these respects to the well-known Laxton's Price Book. Although much smaller, a considerable portion is devoted to thinly disguised advertisements of patented articles, and some of the information scattered through the text, such as the observations that "the cost of wrought-iron is greater than that of cast," or "the best materials in painters' work are cheapest in the end," might be very much condensed without loss. However, it is often of advantage to be able to refer to a book of the kind, and in default of any American work more modern than the antiquated little book of Clough, which dates back to 1850 or thereabouts, the English publications might well meet with a considerable sale on this side. It is worth noting that the average English prices approach so closely to ours that an experienced builder estimates that almost any structure could be contracted for here for the sum found by multiplying the quantities by the prices given in Laxton.

AMES'S ALPHABETS.¹

THERE is, just at present, a promising field for a good book of examples of lettering for various uses, — one which shall represent in an available form the practice of the best modern draughtsmen, who have in this, as in other branches of art, made rapid advances within the last few years. If such a book could be easily procured, we should soon see the mass of sign-painters and letterers following in the path already entered upon by some of the more artistic and enterprising, who, however, are obliged in many cases to have their work designed for them by architectural draughtsmen, these being more familiar with the sources of good design, or to invent them themselves, with greater or less success, for want of a sufficient variety of good and appropriate designs.

The book before us, far from showing an advance in the right direction, is inferior to many already in existence. The styles of lettering given are not only antiquated and commonplace, but poorly drawn for the most part, although some pages of monograms, and rich though awkward initial letters, show that it is not skill which is wanting on the part of the author, so much as knowledge, and the taste which comes of the attentive study of good examples. As it is, however, the marble worker who would like to improve his style of cutting inscriptions, the sign-painter who is desirous of imitating some of the beautiful work already to be seen in the streets of our large cities, or the architect who is ambitious to give his plans the air of those made by the best French and English draughtsmen, will look for assistance to this book in vain. Perhaps the author may some time be disposed to try again. If so, we can encourage him to hope that by careful and discriminating study he may be able to produce something far better, and, we hope, much more popular than this work is ever likely to be. Let him procure some large photographs of the arches of Titus and Constantine at Rome, with one of the tomb of Scipio, and such other classic inscriptions as may be easily obtained, with a few numbers of the *Croquis d'Architecture*, and such covers of modern French and German novels as he can pick up. These will give him some idea of style in plain lettering, and any type-founder's specimen book, particularly that of Bruce & Son, of New York, will supply him with varieties for any emergency. Then, if he will make careful copies of mediæval initial letters as reproduced in the works of Delamotte and others, referring to "Modern Painters" for explanations of the moral significance of the various flourishes, he will begin to comprehend how much he has yet to learn.

Let him, in addition, study the lettering of Moyr Smith and Maurice B. Adams in the *Building News*, and make himself master of the system of round hand introduced by Messrs. Keuffel & Esser, of New York, and he will then be qualified to be of some use to the average draughtsman. If he is still ambitious to instruct in topographical drawing or heraldry, he will have much to learn on those subjects also. In the page of the present work which is devoted to such matters, we find, among representations of "heaths," "rice plantations," "fresh water marshes," etc., of which we speak with modesty, never having heard of or seen such things before, some indications of orchards and pine woods which are, though perhaps not without precedent, different from those usually accepted, and in the meagre array of representations of heraldic tinctures, the gold (not "yellow") is represented precisely like the black, only somewhat lighter, both being shown with white vertical and horizontal lines on a black ground; a very poor substitute for the crossing black lines and the dotted white ground which stand for *sable* and *or* all the world over.

SLOW-BURNING CONSTRUCTION.

Boston, July 24, 1879.

TO THE EDITOR OF THE AMERICAN ARCHITECT:

Sir, — In reply to your remarks of July 12th on the inexpediency of protecting wood with wire lath and plaster, I must beg to differ absolutely.

Of course I am well aware of the danger of imbedding the ends of timbers closely in brick and mortar walls. In the most thorough mill construction the timbers rest on an iron plate, having an iron rib projecting from its upper side, fitting into a groove on the under side of the beam, thus tying the walls together. An air-space of about

half an inch is left around the beam for ventilation, and the upper corner of the timber is rounded so that if it is burned or broken it will roll out without pulling down the wall. This is a common but not a universal practice. I lately inspected a railroad station in this vicinity, of considerable architectural pretension, in which timbers 12 inches by 12 were being laid solid and square, in brick walls banked up with earth on the outside. I had a friendly conference with the master mechanic of the corporation, who could find no objection to this method, and politely intimated that I was a theorist whose ideas were of little value to practical men. I replied that the only method of instruction for theorists was in studying the work of good practical mechanics, and that I should have another interview with him when he came to put in new timbers in place of rotten ones in about three years' time.

In respect to the question of covering timbers with metal, or with wire lath and plaster, to protect them from fire, and for other purposes, I will cite some examples: —

The ends of the open timber trusses of Dr. Bellows's church in New York were, as I am informed, protected by "iron shoes closely fitted," the effect of which was to cause dry-rot to begin at the ends, and to extend seven feet into the unprotected part of the timber.

The timbers of a mill roof which the owner covered with sheet-iron in 1872, plastering upon the under side of the roof boards between the timbers, are now completely rotten, and are being removed at heavy expense.

I append a letter from the Superintendent of the Mason & Hamlin Organ Company to prove the good condition of timbers protected in 1874 with wire lath and plaster. This gentleman has kindly examined his building to see if there was any ground for your excepting. You and your friends are cordially invited to examine the two wings of the building of the company, constructed in 1874 in accordance with the plans of this insurance company. The only change we should now make would be to advise the use of automatic sprinklers in place of perforated pipes.

We can find many older examples of beams thus protected and in sound condition, if this example is not sufficient.

I would also call your attention to the removal of wooden posts in many of the buildings constructed after the fire in Chicago, in which the compression of the "close-fitting" metal caps and steps had caused dry-rot to occur. Also to the very common practice of laying mill floors in mortar, which has prevailed more especially in Rhode Island for about forty years, and is still continued by some builders. In other mills tarred paper is used, as the mortar is apt to cause dust to sift through cracks to the injury of the machinery. These floors are not in very dry condition, as they are often scrubbed, and the atmosphere of a mill is purposely kept moist. I can direct you to very many sound floors thus laid more than twenty years old.

Our experience, therefore, leads us to the conviction that a coat of good lime mortar, even on three sides of a heavy beam that is covered on the top by a water-tight, double floor, will not cause dry-rot, provided the ends of such timbers are *not* enclosed in a "close-fitting metal shoe," and not imbedded in a mortar wall without an air-space at each end.

In respect to open-timber construction I merely mean to say that the mill constructor adapted a very ancient method to modern use long before the architect had seen reason to do so.

E. A.

MANUFACTORY OF THE MASON & HAMLIN ORGAN CO.,
102 BROADWAY, CAMBRIDGEPORT, July 23, 1879.

E. A., PRESIDENT:

Dear Sir, — Your communication of the 17th inst. was duly received and acknowledged, but we have deferred answering upon the subject matter of the letter until we could make a careful examination of portions of our timbers in person. The original building erected by us at this place was built in 1870, and the additions to this one on each side were built in 1874. It is to these latter portions we refer in this report, as the timbers here are covered with the wire lath on three sides and plastered, the lath held off about three eighths of an inch by strips of wood nailed to the timbers. These timbers are laid into the side walls at their ends and secured by a flat iron dog to hold them to the wall.

At your request we have uncovered portions of these timbers, pulling off the plastering and wire lath in about a dozen places in different parts of the buildings, and we find the timbers where we have examined in a good state of preservation. The wood is discolored where the mortar or plastering has touched it, and is toughened by the contact; but one corner of one of the timbers which was sappy and most likely to decay was as sound as any part.

We examined the ends of the timbers in the walls, and found these also in a sound and live condition. We also found that there was in most cases a crack about the ends of these timbers, allowing the air to circulate about them.

The places that are uncovered we will leave as they are for a short time, that you may have them examined by any parties, and we shall be pleased to have you refer to or examine our buildings at any time.

Respectfully yours,
(Signed.) MASON & HAMLIN ORGAN CO.,
by W. O. TROWBRIDGE.

STEAM OR HOT-WATER HEATING.

NORFOLK, VA., July 19, 1879.

TO THE EDITOR OF THE AMERICAN ARCHITECT:

Sir, — Will you, or some of your readers competent in such matters answer for me a few questions in the house-warming department, and greatly oblige.

As a mode of house-warming (dwellings), in general terms, which

¹ Ames's Alphabets for Architects, Engineers, Engravers, Artists, Sign Painters, and Others. New York: Bicknell & Comstock. 1879.

is preferable,—all other things being equal,—steam or hot-water? Which the more expensive—as to first outlay, through time, and amount of fuel consumed?

What are the advantages of either over the other? What the disadvantages and objections to either over other?

Please answer in one of your early issues and oblige,

Yours truly, etc., AN AMATEUR SUBSCRIBER.

NOTES OF EXPERIENCE AND INEXPERIENCE.

AUTOGENIC SOLDERING.—Autogenic soldering consists in applying the edges of the two pieces of metal to be joined together, and melting the seam by the flame of the oxyhydrogen blowpipe. REVIEWER.

31. SEWAGE IN THE IRRIGATION SYSTEM.—What becomes of the sewage of houses, in the "irrigation system" proposed by Mr. Waring, during the winter and early spring? This question was asked by ZERO two or three years ago, and the answer was that the system had "worked successfully for several years." But can any one give particulars? M. P.

NOTES AND CLIPPINGS.

MECHANIC'S LIEN.—Judge Gresham, of the United States District Court of Indiana, has just decided that where a contractor furnishes material for the building of a number of houses of the same character, the same material being used in each house, the contractor may take a lien on each house separately for the material furnished, although the material may have been furnished in bulk and in gross for them all, and does not have to prove the identical material in each house, and specifically prove each and every article furnished to each house separately.

THE DECORATION OF ST. PAUL'S.—The *Academy* states that Mr. Heath Wilson and Mr. Pallan have forwarded to London from Florence their design for the decoration of the cupola of St. Paul's. The design is a voluntary contribution toward the solution of the problem of the interior decoration of the cathedral.

WIDENING OF LONDON BRIDGE.—In the recent speech made by the Lord Chancellor, in the House of Lords, in favor of the proposals for widening London Bridge, one of the arguments made use of was that the same thing had been done successfully in Florence. There is, however, no parallel between these two cases, as a correspondent in Florence points out in a forcible manner. "In the first place," he writes, "any comparison between the magnificent edifice, London Bridge, and the paltry Ponte alle Grazie at Florence, is utterly absurd. The first is one of the finest bridges in the world, thrown over a deep and wide river, is a triumph of engineering skill, and is built of costly materials; the second, a commonplace, shabby structure, crosses a torrent—the Arno—which for most part of the year is not a yard deep below its arches, which were therefore easily built, and it is of ordinary hammer-dressed rubble. Before it was widened it was one of the most inconvenient and dangerous bridges for passengers existing in any great city, and it was a matter of absolute necessity to remedy these defects. The Ponte alle Grazie has been widened by cast-iron archways, the abutments of which are the triangular spurs on each side of the piers of the old bridge; the stone arches are semi-circular, the iron ones are elliptical, and the combination of the two is about as ugly in point of design as may be conceived. But the old bridge has no architectural beauty whatever, and its additional disfigurement is little cared for in presence of the fact that it has been made a safe and commodious bridge. If, to widen that most beautiful bridge in Italy, the Ponte alla Trinità, by Ammanati, the Municipality of Florence had suggested a plan resembling that adopted in the case of their plain old bridge of the Grazie, they would have been denounced as vandals all over Europe, and such a proposal would have constituted a case really resembling the proposed widening of London Bridge, so far as the question of taste is concerned. To impair the beauty of any great work of art is a national disgrace and a public calamity. I do not sufficiently remember the bridges on the Rhone or at Paris, also quoted by the Lord Chancellor, but if these instances in any way resemble that selected from Florence, they must tell equally against his argument. He must adduce cases in which the commodious widening of bridges has been attained without injury to the original design, the design being at the same time as beautiful as that of London Bridge. To quote the successful and ugly widening of a plain, old bridge in support of that of one of the noblest bridges in the world, by means calculated to impair its beauty, is objectionable, for there is no end to the mischief which might be done were such a statement allowed to have any weight."—*The Academy*.

WELDING CAST-IRON.—The Chinese process of welding cracked iron wares by cementing them with molten iron is thus described: In the case, for example, of a cast-iron pan requiring such treatment, the operator commences by breaking the edges of the fracture slightly with a hammer, so as to enlarge the fissures, after which the fractured parts are placed and held in their natural positions by means of wooden braces; the pan being ready, crucibles made of clay are laid in charcoal and ignited in a small portable sheet-iron furnace, with bellows working horizontally. As soon as the pieces of cast-iron with which the crucibles were charged are fused, it is poured on a layer of partly charred husk of rough rice, previously spread on a thickly doubled cloth, the object of this being to prevent the sudden cooling and hardening of the liquid metal. While in the liquid state, it is quickly conveyed to the fractured part under the vessel and forced with a jerk into the enlarged fissures, while a paper rubber is passed over the obtruding liquid inside of the vessel, making a neat, strong, substantial, and in every respect thorough operation.

THE HOTEL DE VILLE.—The Hôtel de Ville in Paris, the old seat of the Municipal Government, which was destroyed in 1871, is far advanced in rebuilding, and will be completed in 1881, at a total cost of about \$4,400,000.

THE CHERONEAN LION.—A paragraph in the newspapers states that the Hellenic Archaeological Society have resolved to restore the colossal lion erected by the Thebans on the field of Chæroneia over the Sacred Band and others of their countrymen who fell fighting against Philip, in B. C. 338, and which it is related bore no inscription "because the gods had willed that their fortune should not be equal to their prowess." Through some unknown cause the lion became embedded within a tumulus, remaining there until 1818, and consequently no mention of it is to be found in the descriptions of travellers who visited Chæroneia in the early part of the century. When the people discovered it they imagined that treasures were concealed inside it, and it was consequently broken into pieces by a chief. But for the sake of the credit of the Greeks it should be mentioned that according to another account the statue was originally made up of several pieces of marble, which separated owing to the weight of the earth in the tumulus. The body is hollow, and it was supposed that the lion formed part of a fountain; but such a use must have been impossible, as the head of the lion is solid. Herr Hettner, in describing the statue, says: "How moving the speech of this dumb monument, of this form so powerful, haughty, and noble! We see that the lion, if he cannot conquer, is heroic even in his fall. He has lain down faint to death with the conflict, the tail drawn close to his body; but still he gathers once more his sinking forces and raises himself, with fierce defiance, on his fore-paws. In vain! His eye droops in death. The corners of his mouth open for a loud cry of pain, but he resists with a firm compression of his lips; there shall be heard from him no complaining sound." Nearly forty years since Colonel Mure said the condition of the monument was a proof of how little the regeneration of Greece has done for that of her monuments, and it does not speak much for the patriotism of the descendants of the Hellenes to find such a memorial lying in a ditch in fragments. Even now it is not certain that the restoration will ever be carried out. The world by this time knows the difference between Grecian "resolutions" and Grecian actions.—*The Architect*.

THE TORLONIA MUSEUM.—In this Lungara Torlonia Museum is a great treasure of erudition as well as art, which has been collected with tranquil silence, critical care, and patient study during the course of at least thirty years. Year after year the prince has summoned about him remarkable men, among whom Baron Visconti, nephew of the great Ennio Quirino Visconti, whose memory is closely associated with the fine sculpture-galleries of Rome and Paris, has been the most intimate confidante of his projects, acquisitions, and decisions. Each new statue, bust, or bas-relief has been examined with the most scrupulous and critical eyes; also compared with ancient medals and coins, and passages from ancient and modern writers. Of these important meetings careful journals of proceedings have been constantly made. Thus a valuable æsthetic and artistic unpublished literature has collected about those Lungara Halls. When a statue was found in fragments, it was carefully put together. An accomplished sculptor, an expert in his art, Professor Guaccarini, has devoted his entire professional life to the work of the museum, aided by the councils of the prince and his learned assistants. One of the most remarkable groups of the collection—Hercules and Telephus—when found at Porto was in almost unrecognizable little fragments. Baron Visconti, who was present at the excavation, and who knew the history of that suburb of Ostia, recognized the bits as belonging to a valuable work of art. Others thought not; but the workmen were obliged by an imperious command of the baron to gather the small pieces carefully together and put them in a large basket which the persistent archaeologist took away with him in his own carriage. Two weeks after, these fragments were sufficiently united to prove the truth of Visconti's assertion, his well-practised artistic eyes were not likely to be at fault. Through Baron Visconti's patience and Guaccarini's skill the group was afterwards restored to its present complete state, and offers to us a specimen of antique art most curious in form and development, and which in justice ought to be known to the future visitors to the museum as the *Ecole Visconti*.—*Blackwood*.

A USURER'S TRICK.—A rather sad story is now engaging the attention of the Scottish law courts. A M. Le Conte, who has been engaged by the Association for Promoting the fine Arts in Edinburgh as an engraver, accumulated during the last forty years a vast number of rare and valuable prints. The collection, it appears, was sought after by a money-lender, who once upon a time was also an engraver. Le Conte unluckily was indebted to him for about 12*l.*, and by means of a decree the whole of the engravings and the furniture were seized. It was alleged in court that "instead of making a proper inventory and valuation, the sheriff officer wilfully put a false and absurdly low value upon said valuable property; and, in order to disguise and conceal the false and fictitious nature of the valuation, he illegally and wrongfully slumped a vast number of articles into a very few lots, with the result of bringing out a total valuation of 12*l.* 4*s.* 1*d.* On May 23 a pretended sale of said articles in slump to the defender, at the sum of 12*l.* 4*s.* 1*d.*, was made; or at all events, the sheriff officer, who had two assistants in the sale, declared said articles to belong to the defender, as at that value, in payment and satisfaction of his alleged debt of 12*l.* of principal, with 4*s.* 1*d.* of expenses." Le Conte seeks the restoration of all the articles taken from him, or payment for them and 300*l.* by way of damages. The case seems more like romance than reality. In old days we believe sheriffs' officers were accustomed to make short work of appraisals, but it is different now. The judgment of the court has not been given, and when it is it may be against the unhappy engraver. But however we may look at the affair, it is pitiable to find an artist losing all his treasures, and, as he declares, left destitute of a home because he could not pay 12*l.* 4*s.* 1*d.* It is also rather novel to find an instance of a money-lender with æsthetic proclivities who is eager to secure engravings for his own enjoyment.—*The Architect*.

COMPARATIVE STRENGTH OF WOOD AND IRON.—Heim finds that, in most cases, a uniform strength of structure can be more economically secured by the use of wood than by the use of iron. The strength of wood is proportioned to its density, and can be increased by its immersion for two or three days, or until complete saturation, in linseed oil, kept at a temperature of from 150° to 212° F.—*Fortschr. der Zeit*.