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SOME time ago, we made some remarks on a communication to the *Engineering Record*, the author of which thought that cement concrete was best made with no more water than that which would adhere to the surface of the broken stones in the aggregate, after washing and draining. We thought that this was far too little water, and said so, giving an account of an actual case in which the amount of water used was accurately measured. Now, the *Engineering Record*, while not defending its correspondent's theories, criticises our opinion in a way which appears to us not quite fair. In the first place, it informs its readers that "the concrete approvingly cited by the *American Architect*" consisted of one part Portland cement, four parts sand, and seven of broken granite of the ordinary size, and says that this "is too poor for any first-class foundation work." Now, as a matter of fact, the concrete cited in our article, and expressly described in two places, was made with six, not seven, parts of broken granite; so that the "poverty" which the *Engineering Record* attributes to it may, we hope, be reduced by a considerable percentage. Farther on, the *Engineering Record* says that "the layers," which our article described as twelve inches thick, reduced to ten inches by the tamping, "are about double the proper thickness for effective ramming, which is always needed for good foundations." We do not dispute the *Engineering Record's* authority in such matters, but here, again, it seems to us that a grain of salt might appropriately season this statement. The concrete in question was put in, as is the case with concrete generally in architects' practice, in broad layers, the trenches varying from ten to fourteen feet in width; and, in this particular instance, the bottom on which it was laid was soft gravel, which had been filled in when the land was reclaimed from the sea, some fifteen years before. Obviously, to tamp a six-inch layer of concrete of this width, on such a bottom, would only result in disturbing, without compacting it; and, even if the first layer were successfully put in, the thin shell, only five inches thick, resting on a soft bottom, would certainly have been broken to pieces by the tamping squad, armed with their thirty-pound rammers, operating on another six-inch layer above it. The breaking of a slab of concrete is about the worst thing that can happen to it; and, while its tensile strength is, undoubtedly, increased by thorough com-

acting, there is a point, in practice, where the extent to which compacting can be carried must be influenced by the danger of breaking what ought to be a continuous mass.

IT is partly for this reason, as we conceive, that it is found advantageous in practice to add water to concrete beyond the theoretical quantity. The *Engineering Record* says, in regard to the twelve gallons of water to each cask of cement which was used in the work to which we referred, that this was "probably twenty to twenty-five per cent more water than is needed for 'setting'"; but the surplus undoubtedly helped to compact the mass, and there is no reason, so far as we know, to believe that it injured the character of the subsequent crystallization. Every one knows the effect of water in compacting sand, or gravel. It is said that if dry sand is subject to a pressure of a ton to the square inch, and is compacted to the utmost density that such pressure can produce, it will still contract if sprinkled with water; and there is certainly reason, from analogy, as well as from the results of practical experience, to believe that a certain surplus of water greatly assists the tamping in compacting a layer of concrete of such thickness as must often be used in building operations. The *Engineering Record*, in speaking of the six-inch layers which it thinks most suitable for tamped concrete, says that "A half-hour's ramming," such as that described in our article, "would seriously injure much otherwise excellent concrete, for initial setting might begin in less time than that after deposition." It is hardly necessary to say that architects are generally quite aware of the difference between quick-setting and slow-setting cement, and would never think of using, in a tamped foundation like that described, anything but the slow-setting cements.

WE ought, perhaps, to apologize to our readers for bringing up this matter, but everything that concerns the proper making and using of concrete is of such vital interest to architects, that we wish simply to use it to invite the participation in the discussion of others, perhaps better qualified than we to impart information of real value.

THE New York *Press* has been alarming its readers with a description, attributed to an "architect," of what would happen if "a rivet" should give way in a high steel-frame building. According to this "architect," "if a rivet gave way at any place in the top story," the building "would then collapse utterly." It is strange at this time to find people who claim to be experts indulging in such talk. Nobody spreads such alarms about bridges; yet a steel-frame building is nothing else than a simple piece of bridgework, erected under favorable conditions for stability, and covered with a protecting casing. That the modern steel-frame structure is all that could be desired no one will pretend; but it is certainly a skilful adaptation, to new purposes, of materials and processes which have been many years in use, and it is ridiculous to speak of it, as it is the fashion to do, as a new creation, about the properties of which no one is in a position to form an opinion.

M. MAUREL, the celebrated baritone of the Opéra, has published in the Paris *Temps* some observations on the artistic capacity of the Americans, as he has been able to judge of it during his professional tour in this country. M. Maurel, who seems to be a man familiar with such matters, says, charitably, that in painting and sculpture the Americans have a great future before them; while in architecture he thinks that they have already arrived at a high state of artistic development. It is true that the twenty-story office-buildings do not please him much, but in the dwelling-houses of America, particularly in the villas in the suburbs of the great cities, he finds an originality, an artistic feeling, and delicacy of taste, which delight him greatly. While American architects, like those of every other country, must avail themselves of what has been done before, he finds that blind copying, such, for instance, as that which dots the country districts of France with "frightful Swiss chalets," is not common here, and that an artistic feeling controls the arrangement even of familiar details. It is a pleasure to think that, with all due allowance

for Mr. Maurel's personal taste, and, perhaps, his desire to be amiable to the Americans, his judgment of American architecture is well founded; and, as an encouragement to the people who produce that architecture, there can be no harm in quoting it.

A GERMAN architect lately got himself into trouble in a peculiar way. He had been commissioned by the Imperial Court to carry out an important building, for the execution of which a contribution of seventy-five thousand dollars or so was asked from the City of Berlin. The authorities of the city, who have all they can do to keep the streets clean, and provide for their paupers, could not feel themselves justified in making such a large donation out of the taxpayers' money; and declined to contribute. For some reason, the architect seems to have felt himself called upon to wreak vengeance on the City Councillors, and, just before the completion of the building, which, as it happens, was a church, erected in memory of the late Emperor, he had an inscription cut upon a bas-relief in a conspicuous place, informing the beholder that the town Councillors of Berlin were "camels," and that they were "too mean" to give any money to the building. Naturally, upon the opening of the church to the public, this inscription attracted great attention. It appeared that the architect had composed the inscription, and had stood by while it was being cut; and the police authorities, as an act of poetic justice, made him stand by a second time while it was being chiselled away. No further discipline appears to have been administered to the culprit; but the *Builder*, which is very properly indignant over this extraordinary abuse of authority, thinks that the Berlin Society of Architects ought to take the matter up.

IN our opinion that great *soi-disant* "journal of civilization," *Harper's Weekly*, has in its issue for last week committed a most uncivilized and unwarranted act in ascribing, by its illustrations, the full authorship of the Congressional Library Building, at Washington, to a young man who was appointed to the position of architectural director only after the building had been under construction three or four years, and the walls had reached the main cornice line. It is a most unfortunate editorial blunder, for the circulation of *Harper's Weekly* is so large that the elaborate illustrations of the building will probably fix permanently in the minds of the public the mistaken belief that Mr. Edward P. Casey is really the sole architect of the building. We believe that the misstatement that does so grave an injustice to Mr. Paul J. Pelz — to say nothing of the credit which is due for initiative work to his former partner, Mr. J. L. Smithmeyer — is due to mere editorial inadvertence, and was not caused by intentionally misleading statements on the part of any one. The text which accompanies the illustrations tells the real facts, though the writer's prejudice and bias in favor of the young men who are now carrying out the work of decorating the building cause him to give too slight credit to the real author of the building. Full credit can be given to General Casey, the executive official, to his son, the present architectural director, and to Mr. Green, the administrative official, for their thorough and excellent work without unfairly withholding from Mr. Pelz the credit that, we believe, unquestionably belongs to him, of having designed in most of its essential particulars the Congressional Library Building as it will stand hereafter.

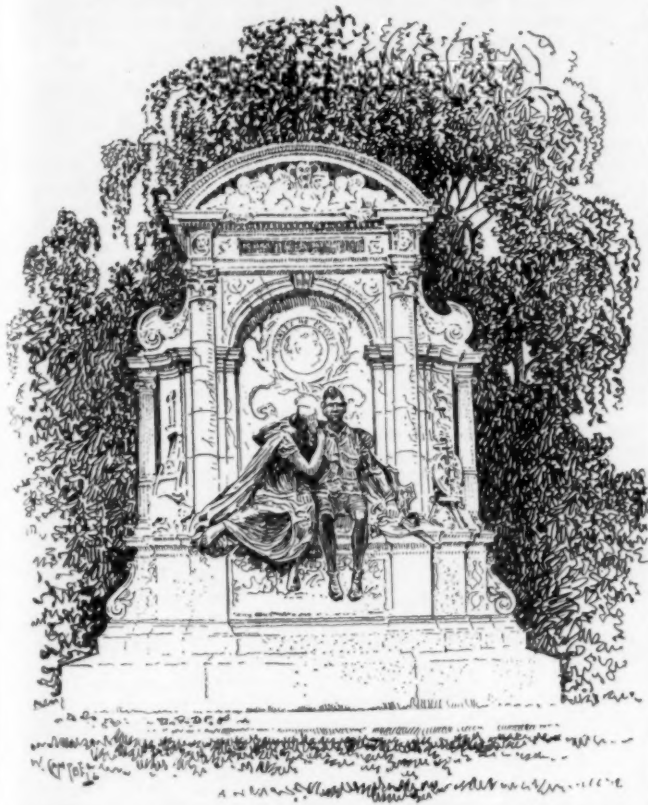
A PROPOSITION is under consideration in Philadelphia for removing all the buildings on Independence Square, except Independence Hall, so as to give the surroundings of the latter nearly the appearance that they had at the time of the Revolution; and steps have actually been taken to that end; but it appears that two other buildings on the Square have great historical interest; one of them having once been occupied by the Supreme Court of the United States, while the other served as the first Capitol of the Republic, Washington and Adams having both been inaugurated there, while Congress held for several years its meetings in the building. It is hardly necessary to say that the Philadelphians, on realizing these circumstances, have changed their minds about remodeling the Square; and, if anything is done, these two buildings, as well as Independence Hall, will be left intact. The remaining houses will, however, probably be removed; and a committee of the city Government is now in consultation with other citizens on the subject.

A SCHEME has been invented by some London malefactors, for the purpose of obtaining possession of other people's property, which is quite likely to be put in practice on this side of the water, so that our readers and their families should be on their guard. Not long ago, the Committee of the Cancer Hospital, at Fulham, decided to introduce incandescent electric lighting into their building, and made a contract for the wiring. The London electrical workmen take a half-holiday Saturday afternoons; and one Saturday, just after the workmen who had begun running the wires had gone for the day, a man appeared, who said that he had appointed to meet the foreman there at that time, and arrange where the switches should be placed. The porter of the hospital took him over the building, waiting for him while he took careful measurements of the rooms, and made marks on the walls, to show, as he said, where the switches were to be. At last he arrived among the nurses' bedrooms, in the upper story, and here, in addition to making measurements, and marking on the walls, he helped himself to three watches, some jewelry, and all the money that he could lay his hands on.

LE *Monde Moderne* gives an interesting account of the Carmelite convent in Paris, which is to be removed, to make way for a large school-building. Probably some students of architecture, at least, have penetrated into the beautiful garden of the convent, which, a few years ago, formed a quiet oasis in the midst of one of the busiest quarters of Paris; and the chapel is noted as the scene of the first Parisian massacres of the Revolution, when the populace, on the second of September, 1792, fell upon the unfortunate occupants of this peaceful abode, chased them, stabbing and beating them, through the garden walks, and finally penned them up in the chapel, where those that remained alive were murdered systematically. Already, owing to the extension of two streets across the site the chapel has disappeared, together with a large part of the garden; and the improvements now in contemplation will be made by the owners of the property, the Institut Catholique, which needs more facilities for its school work. The authorities of the Institut Catholique will preserve the great church of the convent, which is still standing, and some of the details of the buildings with which special associations are connected, but that is all that can be done. *Le Monde Moderne* recalls the circumstances of the massacre in an interesting way. On the 27th of August, the Assembly, in deadly fear of a reaction, issued orders that no vehicles should be allowed to circulate through the streets of Paris, that all persons should remain in their houses, and that every one found in a house not his own should be arrested. The next day, at six o'clock, a systematic visitation of houses commenced. It is hardly necessary to say that such an immense number of persons were arrested, that the prisons could not contain them all, and it was necessary to relieve the latter by transferring some of the prisoners to the convents. In the Carmelite convent were collected about one hundred and eighty people, including the brothers Rochefoucauld, Bishops of Beauvais and Saintes, the Vicar-General of Paris, and many others of the high clergy, only three laymen being included among the captives. On the 30th of August, the Procureur of the Commune visited the convent, and talked very amicably with the prisoners, to whom he spoke of arranging for their temporary exile; but, on the next day, he came back, to give a hint to the inn-keeper who supplied food to the illustrious prisoners to collect his accounts, as, in twenty-four hours, he would have nobody to collect from. The next day, the slaughter commenced, thirty armed men having been, for that purpose, secretly introduced into one of the buildings of the convent. A very few of the prisoners escaped; one was the Abbé Bérardier, who had been Robespierre's teacher at the school of Louis-le-Grand, and by his orders, was locked up in an out-of-the-way room.

IT is with sincere pleasure that we congratulate the editors and proprietors of *La Construction Moderne* upon the completion of the tenth year of publication, and the commencement of a new series. We have so often had occasion to refer with approbation to articles in this excellent journal that we need not repeat our praises, but will only wish to its readers many years' continuance of the brilliant comment on current events, the careful and learned technical articles, and the charming illustrations, which have characterized it from the beginning.

MURAL PAINTING BY THE AID OF SOLUBLE SILICATES AND METALLIC OXIDES, WITH EXAMPLES CHIEFLY FROM ST. MARTIN'S, WONERSH.¹



Monument to Charles de Coster in the Bois de la Cambre, Brussels, Belgium. Charles Samuel, Sculptor, Fr. de Vestel, Architect.

THE use of soluble silicates was certainly known to the metallurgist, George Agricola, in the sixteenth century, and in the seventeenth Glauber,² the chemist, described the method of preparing what he called the "Tincture of Pebles or Flints," and, moreover, actually used soluble silicate as a "vehicle" by staining it ruby with gold. He justly observes, "that many great secrets are hid in the contemptible pebble or sand; which an ignorant and unexpert man (if they were disclosed to him) would hardly believe; for this present world is by the divels craft so far possessed with avarice that they seek for nothing but money, while honest and ingenious sciences are not regarded at all," . . . and, he adds, "if an honest godly chymist by the grace of God in his labours do hit upon the right steps and yet do doubt whether he be in the right way or no, then by reading of good and true philosophers' books he may at last learn out of them the firm and constant truth."

We need hardly say that we took Glauber's advice; the literature of our subject is voluminous, and we consulted all the "good and true philosophers' books" relating to it which we could obtain, but we regret that their conflicting advice sometimes left us in doubt as to whether we were taking the right steps, and we were thrown, in no small measure, upon our own experimental resources. The results are described in this joint paper, but the chemist would for the moment beg leave to say that it is the artist who has done all the work, as the chemist has merely watched the case in the interests of science, and in the hope of being able to promote the advance of decorative art in relation to the Church.

We would add that the late Bishop of the Diocese from time to time expressed the most kindly solicitude in the work at St. Martin's, and his appreciation of the results, and we deplore the fact that Dr. Thorold did not live to see the completion of the decoration of the little building in which he took so much interest.

We have naturally turned to the Society of Arts, which has always shown generous interest in efforts to improve the decoration of our buildings, and we therefore ask its members to give their sympathetic attention to the efforts we have recently made to revive in this country a method of mural painting which has, we think, been unduly neglected.

It is not necessary that we should attempt to give the history of mural painting, our object being to describe the method adopted by one of us in the decoration of a little church in Surrey, and to give our reasons for the hope that the results will prove as enduring as they are effective. It is, however, necessary to indicate briefly the

nature of the more important methods of mural decoration which have from time to time been adopted.

An examination of the walls of old churches in this country shows that colored ornament was widely used in internal decoration. Cases in which true fresco was employed must have been but few, though other methods were frequently adopted. It is recorded,³ for instance, that, in the reign of Henry III, both English and foreign painters decorated the walls of the Royal Palace of Westminster. The foreign artists, Peter of Spain and William of Florence, received sixpence a day for their work, while William the monk, in the adjoining Benedictine Abbey of Westminster, had the higher remuneration of two shillings a day. Their work, however, was probably painted on the walls with colors mixed with oil, oil-varnish being also used. With decorations of this kind we have nothing to do in the present paper. We only offer an incidental reference to the truly-venerable decorative methods of ancient Egypt by which walls were colored by metallic oxides, as leading to the consideration of the methods in which the surface of the wall is imbued with color, which, in fact, becomes a part of the mural surfaces. These methods are as follows:—

1. The method of painting on freshly floated mortar with raw pigments, either mixed with pure water or slaked lime, the ground being both wet and caustic. The painting progresses like the fragmentary fitting of a child's puzzle, the edges left by one day's work being covered by the next. This process is called *Buon' Fresco*.

2. The method known as *Fresco-secco*, in which colors are used on a fresh but dry *intonaco*, or ground, but in *Buon' fresco* and in *Fresco-secco* the vehicle is lime water, and the binding is effected by the formation of carbonate of lime.

3. The method of painting with a medium of which wax forms a considerable part. The wax mixed with color, may either be distributed by means of a heated spatula over the design drawn upon the walls, or a brush dipped in color may be employed. As we shall not have to refer to this wax method again we may add, as showing that the chemistry of the method received some attention, that the artist is directed not to employ an iron spatula, and Van Dyck is said to have used one of horn. The modifications of the wax method are numerous, and some of them involve the use of gums, varnishes and turpentine, the vehicle being solutions of resin, wax and paraffin.

It is unnecessary to say that the President of the Royal Academy advocates the use of a particular modification of the wax method, known as "spirit fresco" and that Sir Frederic Leighton used it with admirable effect in his well-known picture at Lyndhurst⁴ and those in the Gallery of the South Kensington Museum. With regard to this process Sir F. Leighton observed in 1864 that "the only point in which it is inferior to real fresco is in the absence of that pure crystalline quality of light so peculiar to the latter." The South Kensington pictures are, we venture to think, deficient in this luminous quality, and in this respect the new pictures at St. Martin's, Womersley, leave little to be desired. Mr. F. Madox Brown has also used this Gambier Parry "spirit fresco" process in his seven beautiful mural paintings in the Manchester Town-hall, and, as he says, has "had no reason to complain of their behavior." The process, is, however, so far as we know, absolutely unsuitable for external decoration.

The Society of Arts viewed this wax process with favor more than a hundred years ago, as it awarded, in 1786, a gold palette to Miss E. J. Greenland⁵ for her attempts to revive the use of wax in mural decoration, while in 1792 she was thanked⁶ for a further communication "on a method of making a composition for painting in imitation of the ancient Grecian manner."

As regards the methods of *Buon' fresco*, so widely practised in early Italian art, from the year 1390, when Pietro d'Orvieto used it at Pisa, we would only observe that it was hardly ever employed alone, as the works were finished with external touches of unprotected *tempera*, which, of course, rapidly faded under atmospheric influences. We owe to Vasari and to Cennino Cennini (1437) clear statements as to the methods followed by the Byzantine artists, and subsequently by the Italians. Cennini says that their works were always finished in distemper. Angelino used solid distemper of excellent quality, which proved to be very enduring. Ghirlandajo employed distemper widely, Perugino painted in pure fresco, and retouched with distemper. We have dwelt on these facts because the retouching with *tempera*, which is certain to fade, was to some extent rendered necessary by the puzzle-like nature of the work in true fresco, as even the most skilful artist must have left some joins in the frescos which needed covering with color. In the use of the method, the merits of which we are about to urge, no retouching is necessary.

It may be useful if we add that M. Marzocchi di Bellucci has, after laborious investigation, recovered many of the old receipts and prescriptions adopted by the early fresco painters, and has recently received a gold medal for his fresco-work from the *Société d'Encouragement* of Paris.⁷

THE SOLUBLE SILICATE PROCESS.

The history of this process, so far as England is concerned, may be said to have begun with the efforts to revive the use of true

¹ A paper by Mrs. Lea Merritt and Professor Roberts-Austen, C. B., read before the Society of Arts and printed in the *Journal* of the Society.

² The works of John Rudolph Glauber, translated by Christopher Packe, 1689, pp. 45-47.

³ *Vetusta Monumenta*.

⁴ *Journal of the Society of Arts*, Vol. xii, 1854, p. 203.

⁵ *Transactions*, Vol. v., p. 107.

⁶ *Ibid.*, Vol. x., p. 168.

⁷ *Bull. de la Soc. d'Enc.*, Vol. x., 1895, p. 821.

fresco in the decoration of the Houses of Parliament at Westminster! Its use in that building is well described in the Reports and letters written by Daniel Maclise, R. A.,¹ between the years 1859 and 1861, and the *Journal* of this Society shows how anxiously the subject was considered within these walls. We believe, however, that in the interval between the work of Maclise and that done by one of us at St. Martin's, Wonerh—that is, more than thirty years—no decorative work has been executed by the water-glass process in this country, and this fact constitutes the main justification of our paper. The process is referred to at some length in a paper on fresco-painting communicated to the Society in 1864² by Mr. Beavington Atkinson, the chair being taken on that occasion by Lord Elcho (now the Earl of Wemyss) who observed that "while they admitted that *fresco puro* was imperfect in itself, let them not on that account give up mural decoration altogether—till they were assured that no good substitute had been discovered." It was on this memorable evening, the 10th of February, 1864, during the discussion of Mr. Beavington Atkinson's paper, that the merits of the process we have adopted and the difficulties which attended the efforts to work in true fresco at the Palace of Westminster were brought into strong light. Lord Elcho referred to "a most interesting conversation" he had had with Mr. Herbert on this subject, and the following is the graphic record of this conversation as given in the pages of our *Journal*. Mr. Herbert told Lord Elcho that "he had nearly been driven mad by the trouble and annoyance which the old system of fresco had caused him. He added that he never knew how the work would turn out, the colors being put on while the plaster was wet, in which state it remained for about eight hours, and having finished a piece one day, he had to wait till the next to see whether it was correct." The results also differed from day to day. "Thus, with respect to the small fresco of King Lear and Cordelia, Mr. Herbert had cut out the head of Lear six times and that of Cordelia five times, and there was no part of that picture which had not been cut out four times," so that evidently much depended on the plasterer. We would here observe that we are satisfied from our own experience that this must have been the case, and we may add that at St. Martin's we maintained throughout the work the most cordial relations with the artificer whom we entrusted with the manual portion of the work. We should not have considered it necessary to say this, had not the page of the *Journal* of the Society from which we are quoting recorded the "melancholy fact that Mr. Dyce's and Mr. Herbert's plasterers had each died mad—one raving mad and the other melancholy mad," Mr. Herbert attributing this regrettable incident in a great measure "to the constant worry" to which these unfortunate men were subjected in their department of the process.

In view of these statements, it is not remarkable that the soluble silicate, or water-glass process, the rival of true fresco, found strong advocates, for, as Lord Elcho said, "they had high testimonials in its favor, as it appeared to have stood the test of a good many years. The examples, for instance, of this process at Munich had stood while the (true) frescos had failed." Reference will subsequently be made to the present state of the pictures by Maclise at the Palace of Westminster.

After a lapse of twenty years the water-glass process, or stereochromy, was again brought to the notice of this Society on the 15th of February, 1884, when the Rev. J. A. Rivington read a paper on the modification of the process, which bears the name of Herr Adolph Keim.

It is to Mr. Rivington's efforts to introduce the process into this country, and to his personal kindness, that one of us was, in the first instance, indebted for information respecting it, and for our knowledge of its details, which we will now proceed to describe. We should, however, state that although, so far as we can ascertain, no decorative work had been executed in this country for thirty years, that is, until we worked at St. Martin's, nevertheless, many experiments in the process have from time to time been made by Professor Church, F. R. S., the distinguished Professor of Chemistry at the Royal Academy. His first investigations on this subject were made in the years 1853-54, and were noticed by the Rev. John Barlow in a Friday evening discourse at the Royal Institution. Professor Church's latest contributions to stereochromy are embodied in his treatise on "*The Chemistry of Paints and Paintings*,"³ and in a Parliamentary paper to which we shall again refer.

The process of mural painting known as stereochromy was invented about the year 1825 by von Fuchs, and first practised in Germany by a group of artists, of whom Kaulbach is the best known, and in this country by Daniel Maclise, R. A. That the early paintings were less permanent than the inventor hoped they would be, is largely owing to the imperfections in the preparation of the walls and to the too hasty application of the final fixing fluids. These points have been so completely demonstrated that it is safe to conclude that, where the preparation of the wall is thoroughly and conscientiously carried out, pictures can now be painted on the walls of our buildings which will not only resist atmospheric conditions of a trying kind, but may be cleansed by free use of pure water, that is, filtered rain-water or distilled water.

MANIPULATION INVOLVED IN THE PROCESS.

There is nothing about the process which is beyond the skill of any good plasterer, but it is necessary to follow faithfully the directions issued by the Munich manufacturer of Keim's materials.

The method of painting is simple and the artist may pursue it at leisure, and may retouch the work where desirable until the whole effect is satisfactory. The final fixing of the colors also indurates the wall and vitrifies the painting, so as to make it hard and capable of resisting wet and atmospheric conditions which are ruinous to fresco and tempera. The surface is without lustre, it may be either rough or smooth as the artist wishes, and the colors are both clear and bright. A very full palette is available which comprises forty-five pigments chiefly composed of the mineral oxides with which artists are familiar. Vermilion, cadmium, chrome-yellows and madders are not used, but are replaced by red-lead, chrome-red and uranium-yellows. Zinc-white and baryta-white replace white-lead. The important stages of the process are the preparation of the wall and the final fixing of the pictures, which also completes the hardening of the mortar. In preparing a wall for painting, the first care should be to make it absolutely dry. Damp-bricks or over burnt bricks, or decaying wood must be cut out and replaced with sound material. Upon the stone or brick wall the first coating of mortar, commonly called "rough-cast," must be laid.

For this mortar, lime must be selected which has been slaked a very long time, and the purest that can be obtained. It should have lain some years in a pit thoroughly slaked. In the preparation of the mortar and throughout the entire work, only distilled water or filtered rain-water can be used.

The mortar for the rough-cast consists of four parts of washed and dried sand, to which one-eighth part of Keim's rough-cast extract is added, and one part only of lime. The lime must first be well-stirred in twice its bulk of water and passed through a fine sieve; then mixed with the sand. Water may be then added to produce the proper consistency.

The wall is to be carefully dusted and made very wet. When it has sucked in the water, a very thin mortar is "thrown" from the trowel, and before this is quite dried, the mortar is again cast upon it in sufficient bulk to make the surface absolutely even. Great care must be taken that the rough-cast is perfectly even, because if this is not the case, the painting ground subsequently laid upon it cannot be made of equal thickness. This mortar must not be allowed to dry too suddenly, as cracks would be caused. In very dry, hot weather, it should occasionally be sprinkled with water. If cracks appear, they must be carefully filled. The time that this mortar takes to dry varies according to climate or weather. Under the most favorable circumstances, it would require nearly a year. When dry, the painting ground is laid upon it.

The painting ground consists of eight measures of dry-painting ground to one measure of lime. Thin and sift the lime as before, and mix it with the powdered material in distilled water. The rough-cast must be made thoroughly wet with distilled water, and the painting ground is then laid upon it. This should not exceed one-eighth of an inch in thickness. It requires some skill to lay it, as the quantity of lime is so very small. The plasterer must only undertake so much as he can finish rapidly before it sets, for if he rubs it after it is dry, the surface will be rotten. When this layer has dried for several days, a crust of carbonate of lime will be formed upon the surface, and would prevent the water-glass from being absorbed in the body of the mortar. To destroy this calcareous incrustation, an acid is used. The acid supplied by the Munich firm is diluted by three measures of distilled water. We find that the acid supplied to us for use is hydrofluosilicic acid. This is brushed upon the walls twice in succession by a slow, regular movement from a large hog's-hair brush. The wall is then allowed to dry for twenty-four hours. After the acid is dry the wall may be washed twice with distilled water. The hardening fluid as supplied by the Munich manufacturers is then applied, being first diluted with two measures of distilled water. A varnish brush about three inches wide is used for the purpose, and is lightly and evenly drawn over the surface. Drops must not be allowed to run down, and there must be no retouching. The wall is allowed to dry for twenty-four hours, and the application then repeated exactly as before.

In the case of ceilings where it is difficult to lift the liquid with a brush, or on walls where the painting ground has from some cause been of unequal thickness (which makes it difficult for the hardening fluid to penetrate equally and so bind it to the wall), it is best to dilute the hardening fluid with four measures of distilled water and to brush over the surface twice in succession, and after it has dried, to repeat the operation in the same way.

Ceilings may more easily be treated by means of spray, but for the acid solution a glass spraying-can must be used. The appliance supplied for fixing may be used for this purpose, the spray being produced by the aid of ordinary bellows.

The ground thus laid is pure white. When struck or scratched it should ring like stone, if rubbed with the finger no little grains should be detached, and water thrown on it should be quickly and evenly absorbed. If the painting ground satisfies all these tests it is ready for the artist, and may be either immediately painted on or it will remain equally fit to receive color after an interval of years.

Should the presence of any hollow spots in the painting ground be detected by sounding, these must be cut out with a sharp knife down

¹ See the excellent work on mural decoration by Mr. W. Cave-Thomas, London, Windsor and Newton, and also the Twelfth Report of the Commissioners on the Fine Arts.

² *Journal of the Society of Arts*, Vol. xii, 1864, pp. 194 and 225.

³ *Loc. cit.*, p. 202.

⁴ Seeley & Co., 1890, pp. 19, 73 and 244.

to the rough-cast and replaced, every detail of the successive treatment of the original ground being repeated. The cause of such spots in which there is no union between the painting ground and the rough-cast may either be due to insufficient wetting of the rough-cast, to careless work in plastering, or to insufficient treatment with the acid and subsequently with the hardening fluid. The rough-cast had not, in fact, been penetrated by these fluids.

The colors are found to "work" very freely. They are supplied finely ground in distilled water and are mixed on a tin palette (an aluminium one would be much lighter), with little wells arranged to hold the moist color.

The wall must be kept wet, while painting, for which purpose the spraying machine used for fixing is available. The pigments, of course, look darker in the wet state than they look when dry, but as the picture may be easily moistened there is no difficulty in harmonizing various parts, and a knowledge of the depth of color to be expected when the work is dry is soon acquired. The use of thin transparent washes upon the white ground or over other colors adds a great charm to the effect. Body colors may also be used. It is, to a certain extent, possible to wash off unsuccessful portions of the color; but, as in fresco, the best work is that which is carefully traced from finished studies and painted quickly without alteration. Generally speaking, it may be said that the depth of color attainable is about equal to pastel, although there is a clear transparent quality about the work which differs greatly from pastel.

When the whole picture is finished and has been allowed one or two days to dry, the fixing should be done as follows, but if the atmosphere is not exceptionally warm and dry, have the place warmed by fires. The fixing fluid supplied from Munich is diluted for the first and second applications with two measures of distilled water, and for subsequent applications with three measures of water. It is very advantageous to warm it after dilution, by standing it, in covered vessels, in pails of boiling water, as when hot it sets more quickly, but if warmed in other vessels evaporation would cause loss of some of its ingredients.

It is first applied in the form of spray by means of a small appliance specially devised for the purpose, and connected with bellows. Care must be taken to spray the work evenly, and any drops running down should be instantly dried with clean blotting-paper. After drying for twenty-four hours the fixing fluid is applied again, the degree of dilution being the same, but the spraying appliance may be more closely approached to the work, and a more copious douche given without fear of disturbing the colors. After again drying, the fixing solution is again applied as spray, but diluted with three measures of distilled water.

After this the colors will be found to be so far fixed that for further treatment it is best to use a broad paint-brush. For the lighter colors, four applications of the fixing solution will generally be found enough, but some colors, notably the darker tints, may require twice as many. The test of perfect fixing is afforded by rubbing the work with a white cloth, or with white paper. Strong white paper or visiting-cards may be dragged across the color to be tested with as much pressure as the hand can exert. If the card shows the least stain of color, the portion whence it came should be brushed over with the fluid again. No color should receive more solution than it requires, for "over fixing" would produce a gray, shiny spot. This part of the process is tedious, as time must be allowed for the drying between each application of fluid. In Munich it is always done by an experienced workman. It is well, after the first fixing, to dwell more upon the darker colors, going over those parts a second time with the spray while they are still moist, provided that no moisture lies on the surface, and is thoroughly absorbed.

A few weeks after the fixing, it is desirable to wash the pictures with a copious spray of distilled water to cleanse them from a slight efflorescence that may have appeared.

Von Fuchs recommended that the underground should be treated with two applications of water-glass, diluted with twice its bulk of water. Upon this the painting ground is laid one-tenth of an inch in thickness, and is composed of ground marble, or dolomite, with *not too much* lime. The proportion of lime is not fixed, but in Maclise's journal stated to be as one-third. The subsequent treatment of this ground, first with phosphoric acid diluted with six times its bulk of water, in order to convert the crust of carbonate of lime into phosphate of lime, and afterwards two applications, with interval allowed for drying, of fixing water-glass diluted with equal bulk of water. The painting is then executed in water-colors. The fixing is effected by spraying with water-glass diluted with only half its bulk of water, the operation being repeated with intervals for drying until the result is attained.

Reference to the original treatise by von Fuchs shows that the improvements effected by Herr Keim consist, first, in restoring the original scheme of the inventor in the preparation of the wall; second, in fixing the proportion of the lime used in the painting ground at one-eighth instead of one-third of the bulk of powder; third, in directing that the fixing should be done more gradually by more diluted silicate. The fixing fluid, as provided by his manufacturers, is to be diluted with twice its bulk of water, and, after the second application, with three times its bulk, instead of only one-fourth, as prescribed by von Fuchs.

Von Fuchs found that silica combined more readily with two bases than with one, and, consequently, water-glass became insoluble with increased rapidity, when mixed with earths or mineral oxides,

forming double and treble silicates. Water-glass exhibits much greater power of adhering to powdered marble and dolomite than to quartz, although a little lime with quartz improved its cementing powers. With gypsum its effect was not satisfactory.

As has been already stated, one of the authors of this paper was instructed in the details and manipulation of this method by the Rev. J. A. Rivington, who most kindly obtained the necessary materials from Munich, and explained their use. Fortunately, he has now arranged for the supply of the materials in London, and has trained a practical man in the preparation of the wall, and in the operation of fixing. The walls of the little church of St. Martin's, Womersley, which one of us had the pleasure of decorating, were successfully prepared by a skilful local plasterer, employed by its builders, Messrs. Brown Bros., of Bramley, Surrey; there were, however, slight irregularities, which more experience would have rendered it possible to avoid. The process of fixing was, therefore, unduly prolonged. We were anxious to show that, with the exercise of due care, satisfactory results could be obtained by inexperienced plasterers; but the services of a trained workman, who is perfectly competent to fix pictures, can also be secured by the application to the Rev. J. A. Rivington, of Baldon Woodstock.

The cost of the materials, the acid, hardening fluid, and fixing fluid, as sold by the Munich firm, is estimated at about 3s. 4d. per square metre of surface. The cost of colors is about what artists' pigments of the best quality always are in this country.

THE CHEMISTRY OF THE PROCESS.

First, as regards the ground, the simultaneous presence of quartz and marble-dust in this painting ground is found to be useful, and we ascertained that the material we employed gave on analysis the following results:—

Free Silica (quartz sand).....	52.28
Lime.....	26.96
Carbonic Anhydride.....	20.72
	99.96

which corresponds to about equal parts of quartz sand and marble dust. This ground is mixed with eight measures of lime and laid on the wall as has already been indicated. The ground when dry is treated in the manner already described, with a dilute solution of hydrofluosilicic acid. Analysis proved that the undiluted solution contained 2.34 per cent of acid (H_2SiF_6). The object of treatment with this acid is to destroy the superficial layer of carbonate of lime and to form silicofluoride of calcium, which is, however, not insoluble. The use of the solution of hydrofluosilicic acid constitutes, in our opinion, one of the chief improvements of the process, for at the time Maclise worked, dilute phosphoric acid was recommended for the preliminary treatment of the painting ground, the object being to form phosphate of lime. The use of hydrofluosilicic acid gives rise to very complicated reactions, the nature of which we are still investigating. It is probable that some hydrofluosilicic acid may remain on the painting ground until the first treatment with the potassium silicate, and, if this is the case, the effect would be to form fluosilicate of potassium, which is comparatively insoluble and so acts as a cementing agent. It seems clear that gelatinous silica is also precipitated.

Treatment with the solution of soluble silicate then follows, and we find that the undiluted solution contains:—

Silica.....	22.03
Potash (K_2O).....	8.19
Water.....	68.92
	99.14

which corresponds roughly to the formula $K_2O, 4SiO_2$. We should state that these analyses have been made under the direction of one of us, by Mr. William Groves, in the Royal Mint Laboratory.

Painting with the pigments then ensues. It is stated by Prof. Church that the pigments should be treated, as recommended by Kuhlmann, with some of the fixing fluid and then re-ground; and in some cases they require the addition of oxide of zinc, powdered marble, powdered glass, carbonate of baryta, soluble silica, and hydrate of alumina, "in order that their natural inaptitude for equal fixation by the alkaline silicate should be remedied." When the picture is completed, the fixing solution is applied, and we find the application of the fixing solution completes the cementing together of the particles of the ground, and of the various pigments by forming an alkaline carbonate and double silicates. Analysis proved that the undiluted solution we used contained 16.50 per cent of silica.

The main constituents of these silicates must be calcium and potassium, the other bases will of course vary with the pigment employed, and as these are mainly metallic oxides, either natural or artificial, the silicates formed will, therefore, correspond to certain minerals which are met with in nature. It appears from the examination of some sections that the mere cementing action of the silicate of potash is considerable, apart from any important chemical change, and we are satisfied that sufficient attention has hardly been devoted to the fact that the external colored layer which contains the pigment is very thin compared with the rest of the section of the ground, and that it is very difficult to determine by chemical analysis

alone, what changes have really taken place. It is certain that the glazing action which results from the treatment with the soluble silicate is very considerable, and it must be remembered that the color of the pigments are not materially changed by their union with the silica. In many cases we have examined it seems as if the silicates which are formed, whatever their composition may ultimately prove to be, is only colored by the oxides used as pigments, just as the colored bands of agate often owe their tints to the presence of enclosed metallic oxides.

It will be evident, therefore, that the study of the chemical reactions must be supplemented by petrographical examination. Portions of the finished fresco must be treated as if they were natural rocks by cutting them into sections, for submission of micrographic investigation in the usual way. By the kindness of Professor Judd, C. B., Dean of the Royal College of Science, we have had such sections prepared, and one section colored, as seen by reflected light, brilliant yellow and red, will be thrown on the screen.

A careful examination of the section reveals the fact that the pigments are unaltered. The quartz grains are apparently not attacked, but the carbonate of lime has been acted upon, and an isotropic substance, probably silica, has infiltrated into the cracks, the cleavage, and the twinning planes of the marble grains. There are little masses of a substance, probably silica, acting as a cement. The surface from which this section was cut had been prepared about three years, and it will be interesting to see whether in the course of time silicates slowly form. There appears to be some of the marble-dust remaining in it after the hydrofluosilicic has done its work. It will be evident that if failure in stereochromy should occur, the cause of failure can be more surely traced by micrographic examination than by any other known method.

As regards the work at St. Martin's, we would only observe that some of it has now been completed for nearly three years, and that no trace of deterioration is evident. No efflorescent bloom—which is, we think, mainly caused by the use of silicate of soda instead of silicate of potash for the ground, and to the undue use of the fixing solution—has appeared over the surface of the pictures, nor have the colors, so far as we can detect, faded in the least degree. One of the pictures was by accident subjected to a severe test, as a defect in the roof freely admitted rain-water from behind, and one of the heads, a figure-subject, was thoroughly drenched with water, a test it stood perfectly.

THE RESULTS OF THE EARLIER EFFORTS IN STEREOCHROMIC PAINTING.

As has been already stated, the method was employed in the decoration of the Royal Palace of Westminster. In a report dated December, 1859,¹ Daniel Maclise states that he did not consider it necessary to treat the painting ground with the soluble silicate before beginning to paint. He therefore omitted to do so, acting on advice which had been tendered to him by eminent German authorities, but we consider that this omission was most unfortunate. He also seems to doubt whether organic colors, such as lakes and madders, were really unsuitable, and he said that "water-glass does not affect them to any appreciable extent." We have no reason, however, to suppose that he really used organic colors. F. Madox Brown² has recently referred as follows to "the water-glass process in which Daniel Maclise's great paintings have been executed": "I see no precise reason," he adds, "why these noble works should not last and defy climate for many long years yet, though from want of experience he very much endangered their durability through the too lavish application of the medium." We think that as regards the preparation of the ground, he was not lavish enough. The actual state of the pictures in the Palace of Westminster is often cited as telling heavily against the use of the process we are advocating. It is fortunate, therefore, that during the present year an authoritative report on their condition has been made by Prof. Church. This interesting Parliamentary document³ begins with the reassuring statement that "the two water-glass (or stereochrome) pictures in the Royal Gallery are in a generally sound condition"; this is, however, qualified by the observation that they are "obscured by a white efflorescence." Mr. Herbert's "Moses," painted in water-glass, is also "obscured in a few places by a white efflorescence," but flecking the picture with soft linen, followed by treatment with soft bread, "restores the obscured parts to their pristine beauty." With regard to the pictures by Maclise, Prof. Church found that they are covered with a gray film, which, on analysis, proved to contain the sulphates of calcium, potassium and sodium, with traces of ammonia compounds, but it is in the highest degree satisfactory to learn that "the colors underneath the above-named film were firmly attached to the plaster." In the case of the "Nelson," finished in 1865, a "deep-blue pigment and a deep-red pigment were found to be rather loosely attached." We were aware that certain colors required more careful fixing than others, and in the work at St. Martin's special care was devoted to this particular point.

It seems to us that the worst that can be said against the process is that in the smoky atmosphere of a great city, soot and moisture will be deposited on the surface of the pictures, and that this moisture will carry with it "dissolved sulphuric acid from the atmosphere,"

but the pictures will wash, and can readily be washed, though in a country atmosphere they will not probably often need it. It is unnecessary to point out that distilled water must be employed for these ablutions.

Brief reference should be made to the use of this process for external work, and we would add that we have been provided with satisfactory testimony as to its permanence from Professor Lindenschmit and others, who speak from long experience and in no uncertain words. In this country Mr. F. Shields has painted a lunette over the entrance to the chapel in Hyde-park Place, and he will, we trust, state his views as to the use of this process, and the day may not be far distant when we may hope to be reminded by decoration on the exterior of our churches of the little Alpine Chapel which Browning describes as follows:

"It has some pretension, too, this front,
With its bit of fresco half-moon wise
Set over the porch, art's early wont;
'Tis John in the Desert, I surmise,
But has borne the weather's brunt."

As we believe that St. Martin's, Wonerah, is the first church in this country in which this process has been adopted, we may be permitted to briefly indicate the scheme of its decoration. This has already been described by the architect of the church, Mr. C. Harrison Townsend, of 29 Great George St., in a paper submitted to the Institute of British Architects in February, 1894. He says that, "Throughout the whole of the design of my little building I bore in mind the intention of decorating its interior in polychrome. As this feature was to be its main feature, the exterior, for instance, was kept entirely plain and simple; and effect was gained by proportion and color-value of its material, rather than by any elaboration of detail or mouldings. In the interior the problem was to obtain, notwithstanding the unusual lowness of the building, a maximum amount of surface—there not being a flat ceiling—upon which to execute a series of all but life-size subjects. This the semicircular form of ceiling enabled me readily to do, the springing line of which is but seven feet from the floor. About half-way towards the highest point of this barrel-ceiling a moulding runs the length of the church, and while it is proposed that the upper portion shall be enriched in plaster surface ornament and solidly gilded, the surface below this moulding to the springing line is left free for the work of the fresco-painter. Divided, as it is, by the 'bonnet heads' over the windows, it resolves itself into a series of two large spandrel pieces on each side, and of a smaller one against the west and another against the east walls."

There can be no question that the revival of mural painting is a matter of much interest and importance, and we will conclude by a brief reference to authorities on decorative art. We would first appeal to the old painter, Cennino da Colle, who in the beginning of his famous "Treatise on Painting," quaintly traces the history of art by reminding us that "Adam began by digging and Eve by spinning." "Then," he adds, "followed many arts; now the most worthy is science; after which comes the art derived from science, and dependent on the operations of the hand, and this is called painting, for which we must be endowed with imagination and skill to discover things (concealed under the shade of nature) . . . and well does painting deserve to be placed in the next rank to science and to be crowned by poetry." The place of decorative art is, indeed, a very high one, as Mr. G. F. Watts told us when Mr. Rivington's paper on silicate painting was read to this Society in 1884. Mr. Watts wrote as follows: "The highest expression of painting as a decorative effort belongs to designs composed with reference to architectural combinations, and I cannot but feel that when the habit of producing such works falls into absolute disuse, art must take the lower place of being only a luxury." Later still, Mr. William Morris has told us that "the position which we have to face is this; the lack of beauty in modern life (of decoration in the best sense of the word), which in the earlier part of the century was unnoticed, is now recognized by a part of the public as an evil to be remedied if possible . . . but no general sense of beauty is extant which would force us into taking up the dropped links of tradition, producing genuine organic art."

The authors of this paper hope, by the use of a process which can be trusted, to revive the old traditions of mural decoration, and they believe this paper will show that in making the effort the artist and the chemist must work together.

DISCUSSION.

MRS. LEA MERRITT said her part in the paper was limited to the technical details, and she thought Professor Roberts-Austen made one little slip in reading it when he said that after treating the wall with acid it should be washed: as she understood the acid was left on until the second coat of silicate was applied.

PROF. ROBERTS-AUSTEN said that was how the statement in the paper originally stood, but he had been informed that evening by Mr. Rivington that Keim recommended washing, as it tended to drive the silicate farther in.

MR. BATTEN asked if the pigments were mixed with water only, or was anything used to make them adhere.

MR. WALTER REID said he thought it was evident that the pigments were not converted into silicates, but were really enclosed by

¹ Twelfth Report of the Commissioners on the Fine Arts.

² "Arts and Crafts" Essays. Rivington, Percival & Co., 1893, p. 153.

³ Copy of Memoranda by Prof. Church, furnished the First Commissioner of Works, Parliamentary Paper, c. 7, 651. 1895.

⁴ Journal of the Royal Institute of British Architects, Vol. I, 1894, p. 247.

gelatinous silica, for the simple reason that in many cases the silicates were of a different color from the oxides; for instance, red oxide of iron, if converted into silicate, would become a dirty green. The real essence of the matter was the foundation to which the pigments were applied, and the failure of most other kinds of mural painting was due to the imperfect preparation of the wall. The film of color must be so thin that any crack or alteration in the surface would make it flake and peel off. This reminded him of the extreme care used by those artists whose paintings had lasted longer than any others, the Greeks and Romans. The way in which they prepared their walls was described by Vitruvius, as carried out in Pompeii. They took first rough-cast plaster of sand and lime, but the sand was *puzzolano*, which rendered the lime hydraulic, and probably in London one would try to substitute for it ground brick, or pulverized burned clay, as Vitruvius recommended for use in localities where *puzzolano* could not be obtained. This point was important, because the foundation being a silicate, there would be the same expansion and contraction by variations of temperature or moisture as there was in the film upon it; if there were the slightest difference in the coefficient of expansion, the film must go. A second and a third coat, each being thoroughly dried, were added, and then three coats of marble-dust and lime were applied in the same way, so that there were six coats in all. This care, however, was amply repaid. He had himself examined some very beautiful frescos by Kaulbach, in front of the museum in Berlin, and also the efflorescence from the surface, which was mainly carbonate of potash and soda, especially soda. There was a great difference between that and the efflorescence which occurred here, which was chiefly composed of sulphates, arising from the many sulphur acids present in the London atmosphere. An efflorescence of carbonates did not do nearly so much damage as sulphates, and sulphate of soda was specially injurious. In damp weather it sank into the plaster, and in dry weather crystallized out again, so that there was a constant action going on similar to that of the freezing of water, which would disintegrate the best building-stone. He had made many experiments on the presence of such sulphates in limes, and suggested that any lime to be used for such artistic purposes should be burned, not with coal, but with some fuel which did not contain sulphur, such as petroleum or wood. Sulphur would then be eliminated at any rate from the background, and as it might be hoped the surface would be impervious, that would prevent it entering from the front, and there would thus be a good chance of the painting remaining uninjured. He should like to know if any paintings executed in this method had stood the test of exposure for any length of time. The phosphoric acid had been proposed by Kuhlman, of Paris, and from a chemical point-of-view he should think it might have advantages over hydrofluosilicic acid. Phosphate of lime was almost perfectly insoluble, and would protect the other pigments, but fluosilicate of lime was something soluble. Fuchs, in Germany, was the inventor of stereochromy in 1825, and MacIise did not use it in this country until about 1859 or 1860. In conclusion, he might say that he had found slate, which did not exfoliate when ground, a capital foundation for painting on, and if it were employed and the colors fixed with silicates, he believed the work would stand almost anything.

MR. R. HALLWARD said if it were not out of order he should like to say a word in favor of tempera. He had used it a great deal, and though he could not speak from long experience, so far he had found it permanent. But, going beyond his own experience, there were churches in Norfolk and Suffolk decorated in this manner; and he had recently been looking at the roof of Palgrave Church, which was probably of the fifteenth century, and though the work was comparatively simple, not pictorial, he believed it retained all the beauty and color it had originally. He lately came across some words of Ruskin, the purport of which was that, as the result of many exhaustive inquiries, he came to the conclusion that all the finest work on the walls of the churches in Italy during the best period was executed primarily in tempera. He had not studied the Italian work sufficiently himself to give an opinion, and whether Mr. Ruskin had at all confused the original work with retouching afterwards, he could not say, but he did not think he had. If this were so, the enormous advantage of tempera was obvious; it imposed no conditions whatever; the artist could work with the greatest freedom, and express himself with as much facility as in oil-painting. You could absolutely do what you liked with it; it should be as much in the surface of the wall as on it. It was a thin medium when properly used and sank into the walls, and that, he believed, was one reason for its permanence.

MR. H. JACKSON suggested that if this process insured that there should be no change at all in paintings after their execution, it would not permit of that mellowing by the hand of time which was generally considered to add beauty to works of art.

SIR HENRY DOULTON said he was not prepared to say anything about the process itself, but he had seen the examples in Womersley Church, and thought them very beautiful.

MR. WESTON asked the strength of the acid used.

THE REV. J. A. RIVINGTON said he was very glad the point had been insisted on that this process was not fresco. As long as the public or those interested in art were under the delusion that they were trying to revive fresco-painting by this means, nothing would come of it. He was also much obliged to Professor Roberts-Austen for the rock sections he had shown, which had carried the science

of the subject into an entirely new sphere. Since he first brought forward the matter, nearly twelve years ago, he had seen reason to modify a great deal of the chemistry he then put forward, but during this period his faith in the process had increased. He had paid frequent visits to Munich, and had seen great works of art on the exteriors of buildings which had withstood the atmosphere of a large town and of a climate much more severe than that of England. Only recently he saw pictures which he assisted in fixing twelve years ago, which retained their colors perfectly; some blocks of houses, almost giving the impression of entire streets, were painted from top to bottom in this process, and nowhere was there any sign of failure which could be attributed to any defect in the process itself. There had been mishaps now and then, but they had always been traced to neglected work. He regretted that Mr. Shields, who had trodden in Mrs. Lea Merritt's footsteps, and was as enthusiastic as herself, was unable to be present. He had completed two lunettes to go over the doors in Hyde-park Chapel, which would be visible as soon as they were fixed, which he should be doing on the following day. The interior of the chapel was about to be done entirely in this process, so that by next summer there would be an opportunity for every one to see what it was capable of. Water was the only medium employed—it was a pure water-color process; filtered rain-water would do in the country, in London it must be distilled. He pointed out in his former paper that it was Roman and Greek work which Keim had taken for his models, and he had, somewhere, samples of Pompeian frescos showing the coarser ground underneath and the finer on the top, but could not put his hand on them that evening. There were, however, only two grounds; six were not required. Mr. Keim eliminated all soda from his fixing and hardening solutions in order to avoid the evils Mr. Reid had mentioned. There were paintings abroad which had stood for fifteen years exposed to very bad weather; one in particular he had in mind, on the outside of a church, which stood above the other buildings in the town. The winter there was very severe, and after a heavy rain sometimes a sharp frost would come and the whole painting had been at times covered with a thin coating of ice; but when the thaw came, it proved every time that the painting had stood perfectly. As yet there was not the slightest indication of a flaw, either in the painting or the ground underneath it. He had no doubt that ground-slate would form a durable surface, but feared the expense would be prohibitive. Mr. Keim at first used pumice-stone, but gave it up afterwards, and as far as one could judge, quartz sand answered every purpose. There was something else developing now, but he was not yet able to give any details with regard to it. One gentleman remarked that the simpler a process was the better, but although this process sounded complicated, the artist had nothing to do with the complication. Nothing could be more direct or simple than the artist's part of the work. He had simply to mix his paint with water and put it on. All the trouble was for the workman who prepared the surface, and he believed from a workman's point-of-view it was as simple as possible. The trouble and complication was for the chemist who tested it. Whether one could ensure that there should be no change was entirely a chemical question, but though he was not an artist, he devoutly hoped the chemistry of this process would effectually protect it from the mellowing hand of time. If he were painting a picture he should be very sorry to think that any mellowing hand was required to improve his work. This idea reminded him of a time when the object of English art was to produce a so-called "black master," but he hoped that time had gone forever.

PROF. ROBERTS-AUSTEN, in his reply, first drew attention to two palettes on the table, one of which had been exposed for some months to the atmosphere of his laboratory; but he really could not tell, from observation, which it was. He also had specimens of painting on cloth and canvas, lent him by Mr. Rivington, which had been saturated with spirits-of-wine, and then fired to show how durable was the work. A little picture, by Mr. Rivington, showed that he was over-modest in disclaiming the title of an artist. In answer to Mr. Reid, he might say that he had deliberately rejected phosphoric acid, for though phosphate of lime was not insoluble, phosphate of potash was nearly so. With regard to tempera, he should think a careful inspection of the Florentine churches would convince any one that they had suffered very much from time; and probably Mr. Ruskin had retouching in view when he used the words referred to. They all revered Mr. Ruskin, but probably, if any one showed him tempera work in an advanced state of decomposition, he would say that did not affect anything he had said with regard to tempera generally. The strength of the acid was stated in the paper; he believed it was about twenty-four per cent. With regard to the question whether these paintings would undergo change from the atmosphere, he feared that in London there would be some degree of "mellowing," quite apart from any chemical change, which he hoped would not occur, but that frequent ablutions and occasional flicking with a silk handkerchief would really preserve the pictures. The experiment was now being made whether the paintings were really permanent; he could only, as a chemist, express his firm belief that they would be.

THE CHAIRMAN said he hoped one result of this paper would be to bring about greater enthusiasm for mural decoration, which, in his time, had ceased to be in demand at all. The unfortunate failure of fresco-painting gave an excuse to people who had no real interest in art to forswear mural decoration altogether. Artists

must take something on trust, but they now had a chemical assurance, backed by some amount of practical experience, that this work would be permanent. No doubt Ruskin expressed a preference for tempera-painting over fresco, but he associated fresco with the decline of art. Shakespeare said, "Fortune rarely comes with both hands full," and the time when fresco-painting was introduced was just the time when that simplicity of invention which Ruskin so much admired was beginning to disappear. Many of his disparaging references to Michael Angelo had a good deal to provoke them; there was something a little bombastic in his style which was very repugnant to Ruskin, and he failed to appreciate what was really great in his work. But in condemning fresco, he was condemning what was accidental, not what was essential to it. He (the Chairman) remembered one example, the Santa Maria Novella, which was very much affected by the weather; in other cases where the paintings had been better protected they had been preserved very well. It was evident, however, that some more trustworthy process was wanted. No doubt in looking at some old pictures they had a feeling that the "mellowing hand of time" had added beauties to them, as in some instances of the quattro-cento and cinque-cento period in the National Gallery, where the colors had not only been preserved, but something like a process of vitrification had taken place which gave them almost the appearance of precious minerals, but in the majority of cases a very different kind of change had taken place. No one could persuade him that the brown masses of foliage, rich brown as they were, which came close up to the edges of the flesh, illuminated by a strong light in Titian, were brown originally; they were green, and the green had gone. They admired them now, but they would admire them much more could they see them as they were originally. Mr. Ruskin on one occasion referred to this prejudice in favor of the changes in old pictures, and said a picture was never so perfect as at the moment it left the painter's easel. He believed it was the case except where the enamelling process he had spoken of took place. There was a deplorable lack of appreciation of grand art in England. The artist must bow to the caprices of rich people who wanted to decorate their drawing-rooms, where a grand serious picture was felt to be out of place. Such works must be in public buildings and churches, and every excuse for neglecting such opportunities should, if possible, be taken away. For this reason he hailed the present paper, and concluded by proposing a vote of thanks to Professor Roberts-Austen and Mrs. Lea Merritt.

THE ALDRICH PUBLIC BUILDINGS BILL.

A BILL has been introduced by Representative Aldrich, of Illinois, providing for the securing of plans and for the erection of the public buildings of the United States, and it is the intention of Mr. Aldrich, who was formerly Commissioner of Public Works of Chicago, to endeavor to secure the passage of the measure.

The following are the provisions of the bill:

Section 1. That the President, by and with the advice and consent of the Senate, shall appoint a Commission on Public Architecture consisting of three architects of high scientific and artistic attainment and large practical experience, and two officers of the Engineer Corps of the United States Army. If necessary, a separate appointment of any or all of three members of the Commission who are architects may be made for each building under consideration, and members of the Commission for one building may act upon other buildings. That the Commission, under the general direction of the Secretary of the Treasury, shall discharge all the administrative duties relating to the procuring of designs and the appointing of architects for all buildings hereafter erected by the Government of the United States.

Section 2. That the Secretary of the Treasury shall be the President of the Commission *ex-officio*, and the Supervising Architect of the Treasury Department shall be a member of the Commission *ex-officio*. In the absence of the President of the Commission one of the members shall be elected as Chairman by ballot, and he shall preside at the meetings and perform such other duties as the rules of the Commission may prescribe; and the Supervising Architect of the Treasury shall act as Secretary of the Commission.

Section 3. That the Secretary of the Treasury shall convene the Commission whenever in his judgment the exigencies of the service require it.

Section 4. That the Commission shall adopt rules and regulations governing competitions in the procuring of designs and for the government of its meetings and the general performance of its duties. The members of the Commission shall be paid their actual expenses and subsistence and a *per diem* allowance of \$10 while actually engaged in the performance of their official duties, but no *per diem* allowance or salary shall be allowed to any civil or military officer on account of his being employed on the Commission, but his actual travelling expenses and subsistence shall be paid while engaged thereon.

Section 5. That in case the limit of cost provided by law is \$100,000 or over, the Commission shall select by ballot, for each building, five architects to prepare designs in competition; in case the limit of cost is less than \$100,000, the Commission may, in its discretion, select by ballot an architect without competition. No architect shall be eligible for entering as a competitor, or for appointment, who has not had, at least, ten years' experience as an architect-in-chief, and unless he can satisfy the Commission, through work already done by him or otherwise, that he is competent to take charge of the economical construction of the building. The Commission shall cause to be made and issued to competing architects, surveys, schedules of requirements for the building, limitations of cost, and all facts which might control or influence the character of the required design. The Commission shall

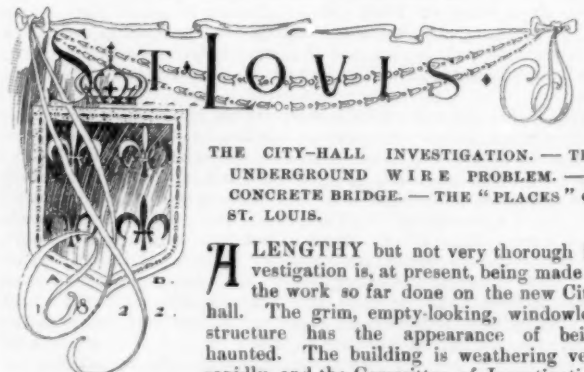
specify the number and character of the drawings required and fix a definite time for their completion. The Secretary of the Treasury, upon the recommendation of the Commission, shall pay to each unsuccessful competitor, to reimburse him for expenses incurred in preparing the competitive drawings, the following amounts: For designs for buildings to cost not more than \$150,000, the sum of \$150, and for each and every \$100,000 of the limit of cost of the building above that amount, the additional sum of \$100; but in no case shall more than \$1,000 be paid to any unsuccessful competitor.

Section 6. That the Commission shall reject and return to the author any drawings which have failed to exactly comply with the requirements and regulations adopted by the Commission for the competition, and no compensation for their preparation shall be paid, and the author thereof shall be debarred from all further participation in the competition. The Commission shall carefully examine the drawings of each competitor in competition, and shall select one design as the design of the proposed building, and shall recommend its author as the architect for that building and return forthwith all other drawings to their authors. The Secretary of the Treasury shall thereupon appoint the architect so recommended, and he shall perform all the customary duties performed by an architect in private practice, namely: The making of all preliminary sketches, the modification of his design to meet possible requirements of the Commission, the preparation of a set of general working-drawings to procure estimates; the preparation of a set of general details on a larger scale, a set of full-size drawings for moulded, carved or ornamental work, and a set of all other original drawings and specifications required by the Commission. He shall supervise the construction of the building, and no payment shall be made to any contractor until the certificate of the architect has been received by the Secretary of the Treasury that the work has been executed in conformity with the contract. He shall file a complete set of the construction-drawings in the Treasury Department, from which all duplicates shall be made, which duplicates shall be paid for out of the appropriation for the building. The architect shall be paid for his services a fee of five per centum upon the total cost of the work and the usual travelling expenses. The expenses of the Commission and the fees of the architect shall be paid by the Secretary of the Treasury out of the appropriation for the building in the erection of which they were incurred.

Section 7. That the Secretary of the Treasury, upon the recommendation of the Commission, shall authorize the architect to employ a competent Clerk-of-the-works, at a salary to be established by the Commission, and he shall be paid for his services out of the appropriation for the building.

Section 8. That the Supervising Architect of the Treasury Department, under the direction of the Secretary of the Treasury, shall be the representative of the Government in all matters connected with the erection and completion of public buildings and the payment therefor. He shall receive proposals for the work, and, with the approval of the architect of the building, he shall award the contracts therefor. He shall perform all other duties that now pertain to his office, except such duties as are vested by this act in the architect of the building.

Section 9. That all acts and parts of acts inconsistent with this act are hereby repealed.



THE CITY-HALL INVESTIGATION. — THE UNDERGROUND WIRE PROBLEM. — A CONCRETE BRIDGE. — THE "PLACES" OF ST. LOUIS.

A LENGTHY but not very thorough investigation is, at present, being made of the work so far done on the new City-hall. The grim, empty-looking, windowless structure has the appearance of being haunted. The building is weathering very rapidly, and the Committee of Investigation, such as it is, is uncompromisingly slow in its work, such as that is. Mayor Walbridge called Mr. McMath, the President of the Board of Public Improvements, into consultation recently and asked him what all the delay meant. Mr. McMath's answer has not been made public, but after a similar consultation with Mr. Marshall, the City Counsellor, the latter requested the Committee to go into executive session. Mr. Marshall then addressed the Committee to the effect that the investigation as it was being conducted must be stopped, and that the Committee must either bring its work to a close or pursue a different course of investigation in the future. He pointed out to them that their labor to unearth anything new had been futile, and that to continue their open sessions with insinuating questions as to the honesty of reputable men, who must stand innocent in the eyes of the community as well as in the eyes of the law, was wrong and should not be countenanced. He, therefore, suggested to the Committee that their future investigation be conducted outside of the committee-room, the Committee dividing itself into sub-committees with an assignment to each to pursue a certain line of investigation, and that when these lines are exhausted the Committee should quietly get together, compare notes and block out other work until they have either completed their investigations or discovered matter requiring the evidence of witnesses in open session. Mr. Marshall's advice has been followed out, but such a short

time ago that we are unable to say with what success. It can be put on record though, that the Committee, or sub-committees have taken decisive action. A note has been sent to the Board of Public Improvements stating that it is the sense of the Committee that a more rigid inspection of the work at the new City-hall is absolutely necessary; that the manner in which some of the contracts are being carried out is not satisfactory; and that the Board should at once proceed to adopt remedial measures, instead of waiting until the work is completed.

A number of witnesses were examined by the former Committee. One of them stated that on personal inspection he discovered that eight of the steel columns in the building were full of blow-holes, and that there might be others for all he knew. The workmen have recently been covering up the greater part of the steel-skeleton work with fireproofing, and in consequence, work has been stopped until the investigators look after this part of the make-up of the structure and find out the defects. That this work should even have been allowed to commence without any faults or defects whatever being made known, is, of course, gross mismanagement. The idea at first was to use terra-cotta instead of stone trimmings, on account of its matching so well with the brick and being cheaper, but, fortunately, it was agreed that it was too undignified, and a buff limestone was finally decided upon. It is complained that the price paid for the latter, \$152,000, was too high, one witness saying that he was sure that it could have been bought for \$30,000 less. This is amply made up for though, in the Missouri red-granite contract, which was awarded to Schneider & Co. They lost \$60,000 on what we consider the best work yet furnished. The granite supplied by them is of a fine red quality, but in our opinion it is not only entirely too dignified for the other materials in the building, but too heavy for the style of architecture adopted—French Renaissance.

Another difficulty has arisen, namely, a conflict of authority. This matter was brought to the attention of the Investigating Committee recently by one of its members. He stated that he had gone through the building and had talked with the architect, Mr. Mann. The latter complained to him that the orders he gave were ignored, and that the inspectors appointed by the Superintendent of the Board of Public Improvements, Mr. McMath, were the only people whose orders were obeyed. The member asked Mr. McMath to explain the position Mr. Mann was supposed to occupy. He said that he was informed by Mr. Marshall, City Counsellor, that as President of the Board of Public Improvements his authority was above that of Mr. Mann, and if the latter had any orders to give they should be given through his [Mr. McMath's] clerk. This unprecedented state of affairs is certainly appalling and must be decidedly humiliating to Mr. Mann. The idea that the President of a Board of Public Improvements, elected simply for political reasons and not because of any qualification for the position, should dictate to the architect of a building, is an astounding piece of downright insolence. As one of the members of the Committee asserted, there is hardly any use of employing an architect at an expense of 5 per cent of the cost of the structure. Mr. McMath obtains this authority, according to City Counsellor Marshall, from the city charter, which stipulates that all power and authority in a case like the present one is vested in the President of the Board of Public Improvements. In the face of this, the ordinance providing for the erection of the City-hall states that the architect is to be supervisor of the building. This is another example of careless and shiftless legislation, doing things by halves. Under the circumstances, Mr. McMath could give way gracefully to Mr. Mann, but there is an undercurrent of some kind which has been hampering the architect ever since the present administration got into power. During this time the entire new City-hall affair has been a grand fizzle. The project was conceived wrongly and has been gone about wrongly. The method employed in such cases in our larger cities should have been adopted, and the money to pay for the structure should have been obtained through special tax or bonds, and not by reducing appropriations for other and pressing needs. The law limiting the bonded indebtedness should be repealed, the limit having already been reached. The folly of this law is apparent on its face, as the city certainly must grow and improve.

This same inaction is displayed in the underground-wire problem. The city government has had this question under consideration for the last three years, but so far as putting wires underground is concerned has accomplished nothing. The principal point to be decided just now is how to deal with all the wire-using companies collectively. The City desires to control the conduits and to compel all wires to go into one or more conduits as necessity demands. The companies have fought against municipal management, desiring to have each a conduit to itself and to control the same. Of course, such a proposition will not be entertained. There are at least eight wire-using companies, and the idea of having eight conduits on thoroughfares like Washington Avenue, Olive Street, or Broadway, is simply preposterous, for these streets already contain one wire conduit, numerous gas, water and other pipes, sewers, cable-conduits, etc. The question to be decided upon, and it is the chief one, is whether the companies shall own the one large conduit in which their wires are to be placed subject to the City's supervision, or whether the City shall both own and supervise it. In the former case it is intended that the City shall ultimately own the conduit.

As to the method to be pursued in going about the work of compelling the companies to comply with the terms of the ordinance in case

they are unwilling to do so, the Boston plan is thought to be the most effective. The latter consists in doing the work by districts, one at a time. The area to be covered by the conduits is bounded on the north by Cass Avenue, on the south by Chouteau Avenue, on the east by the Mississippi River, and on the west by Grand Avenue, a district comprising about eight square miles.

Nothing is said about the disposal of the street railway feed-wires which are strung on the poles supporting the trolley-wires in the above-named district. The feed-wires strung on pole lines coming directly from the power-houses are of course included in the conduit system. The only method of doing away with the former is to place them in conduits under the streets on which the railway tracks exist and run a short conduit for each feeder from the main conduit to the point where it feeds the trolley-wire. This is done with great success in Boston, Brooklyn and Philadelphia, the other great trolley-line centres, and we hope that this method of disposal of the great feeder-cable will be adopted in connection with the underground system.

A concrete bridge was recently completed at the suburban town of Belleville, Ill., across Richland Creek. It was built by A. Geisel & Co., of St. Louis, for \$10,500, on a contract made with the Town Council of Belleville on July 16, 1895, providing for the completion of the bridge in three months. The structure is built entirely of concrete, and the roadway is paved with vitrified brick. Its dimensions are: span, 40 feet; height, 22 feet; roadway, 52 feet in breadth. It was guaranteed to withstand a pressure of 5,000 pounds to the square foot, any portion of the structure selected by the Town Council to be tested. On November 11 last, the test was made, the bridge found to be up to contract, and finally opened for traffic. It is a very neat structure, the concrete being so shaped on the surface as to resemble stone blocks. The railing on each side of the surface of the structure is of ornamental iron, and divided into four parts by concrete pedestals, also shaped to resemble stone.

The Mississippi River Committee of the St. Louis Merchants' Exchange met recently and listened to a very interesting exposition of the workings of portable jetties for deepening the Mississippi River channel, by Capt. Thomas W. Shields, of Cairo, Ill. Captain Shields exhibited a model of the jetty or caisson, and showed its use. The caisson itself is 300 feet long, 25 feet wide and 10 feet deep. It is made of steel, hollow, and wedge-shaped at both ends. The idea is to sink a caisson on each side of a bar formed in the river, thus forcing the current over the bar and washing away the sediment. The wedge ends of the jetties are intended to direct the water over the bar, and to relieve the water when leaving the jetties at the farther ends. The famous jetties at the mouth of the Mississippi River, erected by Capt. James B. Eads, are a good example of what is desired, but on a large scale.

One of the most distinctive features of the residence portion of St. Louis is the "places." They have become so numerous of late that we fear, on account of their exclusiveness, the "No Thoroughfare" signs prevailing quite generally, they will some day prove barriers to direct communication between important streets. In some cases the main avenue divides a block into halves. The residences face the same, and, in consequence, their barns face the city streets. In other cases the avenue is merely a continuation of a street, but so improved with handsome gateways and paved in a superior manner that it is readily to be distinguished from the latter. In the latter plan the barns face the alleys, as they should. The "No Thoroughfare" sign is legally put only where the main avenue runs through the middle of a block, or when it is laid out before the location of the city streets has been determined upon. It is not permitted when the streets have been platted. The "No Thoroughfare" regulation is not meant to be universal, however, but is aimed at all heavy wagon traffic. In fact, we think the signs entirely useless, because the gateways and improved appearance are sufficient indications of the privacy of the "places." This view of the matter is borne out by the fact that Fullerton Place with no sign is just as private as Vandeventer Place with the signs very much *en evidence*, and in both cases we noted that heavy travel seeks the surrounding streets. Then, further, Fullerton Place is the extension of a street, while Vandeventer Place is not.

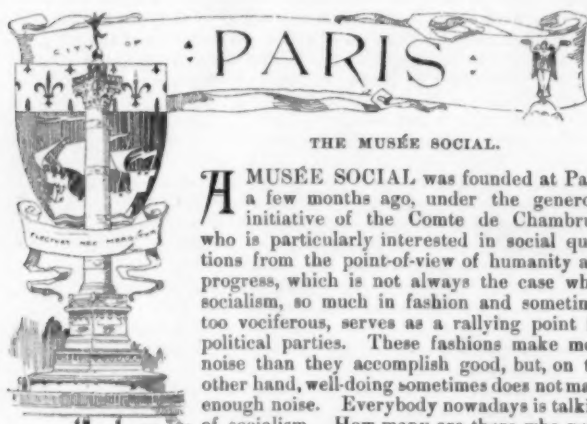
The majority of St. Louis's handsome residences are located in the "places," Vandeventer Place, Westmoreland Place and Portland Place containing the finest group of residences, perhaps, in the United States. There are more costly residences in New York, but nowhere are there so many well-grouped beautiful houses as in the above "Places." However, none of these possess the remarkable feature of Fullerton Place, the almost entire employment of the Colonial style of architecture, and the fact that all the houses were built by the same architect, Albert Swasey. The efforts of this gentleman have not been wasted in the case of Fullerton Place upon cheap, ephemeral, Colonial structures, so numerous in the suburbs of others of our large cities, but he has erected handsome residences in permanent and lasting materials.

In the building of these "places" there is generally a law prohibiting the erection of a house costing less than a certain amount, and we think there is such a condition attached to Fullerton Place, though we are not certain on this point. However this may be, there is not a house in it which could have cost less than \$30,000, which means a great deal in St. Louis, where building-materials are remarkably cheap.

We cannot speak with great favor of Mr. Swasey's treatment of

the Colonial style in some particular points, though generally speaking, he has been quite successful. There is a certain lack of that simplicity which we consider one of the most charming attributes of the Colonial style. There is often an overabundance of ornamentation, in fact, in some particular cases the style is overdone. Though this is of minor consideration, the materials are often too rich in themselves, and are better suited to the French and Italian Renaissance styles than the severely Classical and consequently plain Colonial. We noticed in one house the use of Italian marble pillars with Corinthian capitals supporting a shell-shaped arch, the whole forming the entrance. The rest of the structure is Colonial.

A mistake, too, has been made, we think, in the use of colors and materials not at all suited to the decidedly smoky and foggy atmosphere of St. Louis. This is well demonstrated in the first two houses built in Fullerton Place. They are in light brick with white or cream-colored woodwork, and are very shabby looking already, notwithstanding the fact that they were erected only three or four years ago. Messrs. Eames & Young have acted very wisely in this respect in the house they are building for Governor Francis. In this case a very dark, almost black, brick is used, and it contrasts beautifully with the pure white wood-work. The wood-work can be repainted, but the bricks cannot be touched. In the case of the Fullerton Place houses, if the wood-work were touched up, the light bricks would look not only inherently shabby, but more shabby by contrast. And we condemn the use of light brick not only in Fullerton Place, but any place else in or near St. Louis for the above-mentioned reasons.



THE MUSÉE SOCIAL.
A MUSÉE SOCIAL was founded at Paris a few months ago, under the generous initiative of the Comte de Chambrun, who is particularly interested in social questions from the point-of-view of humanity and progress, which is not always the case when socialism, so much in fashion and sometimes too vociferous, serves as a rallying point for political parties. These fashions make more noise than they accomplish good, but, on the other hand, well-doing sometimes does not make enough noise. Everybody nowadays is talking of socialism. How many are there who practice it?

How many even in Paris, with the exception of the closet philosophers, know of the creation and existence of the social museum of which I speak above? And yet a foundation of this kind ought to be announced and cried from the house-top, in the quarters of the rich and in the faubourgs—in the faubourgs especially, whence always comes the noise of which I spoke just now, but where many efforts are unknown, many results unsuspected.

In a communication made at Lyons, in August, 1894, to the Eighth Congress of the Sociétés Coopératives de Consommation, M. Cheysson, vice-president of the Société du Musée Social, declared the aim which the Comte de Chambrun proposed to himself in founding this social museum, and assuring to it ample means of existence. First, What is a social museum? M. Cheysson said that, "Like the other sciences of mutuality, coopération and prevoyance, social science, in a word, cannot do without an organization, which at once secures its popularization, its progress, and amongst other things chairs and laboratories." Chairs of social economy already exist. There is one at the Conservatoire des Arts et Métiers, one at the Faculté des Lettres de Paris, and a third at the École des Sciences Politiques. In addition to these official chairs, courses and conferences were organized some time ago by the Société d'Economie Sociale, but up to the present time there was no laboratory—that is to say no museum or permanent exhibit of social economy. Although a place was reserved at the Exhibition of 1867 for the study of questions which might ameliorate the physical and moral condition of the public, it was particularly in 1889 that these matters were accorded the importance which they deserved, which, I would even say, they demanded as their proper right. To interest visitors who rebelled at examining dockets, pamphlets, statistics and administrative documents, they put under their eyes drawings, graphic tables and models in relief, and the crowd then dared to penetrate into this pavilion, which after all was not so very repulsive of aspect. Workmen let themselves be seduced by these works, which proved to them better than words that people were taking interest in them. The result was morally instructive; and all the following exhibitions since that time have reserved an important space for social economy, and M. Picard, organizer of the Exhibition of 1900, has added to social economy, hygiene and public assistance—an important group in a general classification. But after the exhibition, what is going to become of these documents, whose gathering has been so useful, so precious? It was this that aroused the idea of a permanent museum of social economy—an idea which the Government took

into consideration. The exhibitors in 1889 generously abandoned in favor of this foundation the documents they had exhibited, and after many difficulties and delays, an act was passed for the creation of a social museum at the Conservatoire des Arts et Métiers. This museum has existed for about a year, and contains a certain part of the documents exhibited at Chicago and at Lyons, but it is quite small, very technical and its most important portion is consecrated to measures preventive of accidents due to machinery. This museum is rather a complement to the course in social economy which is carried on at the Conservatoire des Arts et Métiers.

Somewhat different is the social museum founded by M. le Comte de Chambrun, recognized as of utility on August 31, 1894, and inaugurated March 25, 1895, at 5 Rue Las Cases, in a *hôtel* especially arranged through the care of the founder. The twenty articles of the statutes clearly describe the aim of the Musée Social; and I cannot do better than quote some of them:

Article I. La Société du Musée Social has for its end the placing gratuitously at the disposal of the public, together with information and advice, the documents, models, plans, laws and so forth, of social institution and organizations, which have for object and result the amelioration of the material and moral situation of the laboring classes. It excludes all political and religious discussions.

Article II. The principal means of action which the Society proposes to employ are:

1. A permanent exhibition of social economy.
2. A library and work-room, free to all.
3. The communication, to those who are interested, of all the information which can be demanded by them on the subject of social labor.
4. Technical consultations, whether on the planning of works about to be created, or upon the condition of existing works and the modifications which the situation admits of.
5. The organization of conferences, lecture-courses and oral demonstrations, having for their aim to comment on the documents exhibited and to popularize the institutions of social economy.
6. The sending of commissions of study and investigation to different parts of France and foreign countries.
7. The issue of publications serving to make known the works of the societies and the documents collected by them.
8. The awarding of prizes and medals to the most remarkable works, and an organization of competitions upon special subjects.

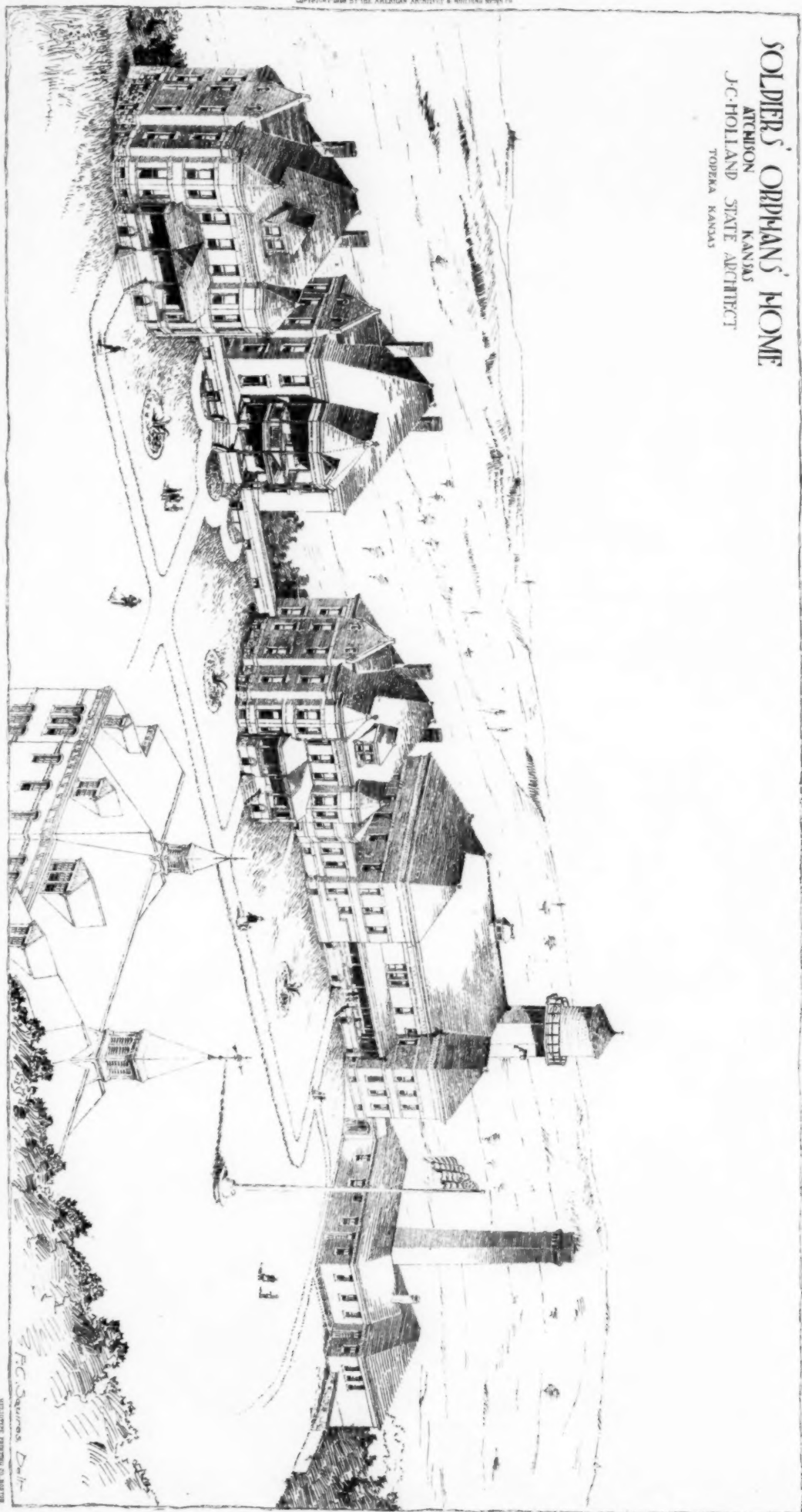
As we see, this social museum, whose future is absolutely assured by a capital of 200,000 francs, increased by a building site given by the Comte de Chambrun, and representing a value of a million and a half francs, will make easy for all the practical study of social questions, and will bring into full light the applied solutions and whatever experiments are made.

The documents of the museum are classed in the following manner: 1st, social statistics and general documents; 2d, the government of the family; 3d, the government of property; 4th, the government of labor; 5th, the normal period of life for workmen [labor, savings and credit, habitation, food, clothing, etc.; recreation, clubs, etc.]; 6th, the critical periods of a laborer's life [loss of work, sickness, accident, old age, invalidism, premature death, and so on]. We see that the programme which the museum lays down for itself embraces all branches of social economy, and, according to the expression of M. Cheysson, is truly a "laboratory" for the study of this science.

Two important questions are the subject of two primary competitions, open to everybody, to Frenchman and foreigner alike. The first concerns "participation in benefits," for which the competitors will have to study the present conditions, their origin, antecedents and history, and also their after-development and future. To the study of the basic principles of the contract of participation in benefits can be joined the study of the means by which this mode of remuneration may be propagated throughout the world of labor. The second question offered for competition relates to workmen's associations, information concerning which, their results and the services they render, the competitors will have to seek. These two competitions, of which the importance can easily be judged, since they address themselves to the whole world, will give an opportunity for the offering of a prize of 25,000 francs each, and will close, the first on the 31st day of December, 1896, and the second on the 31st day of December, 1897. The duration of these competitions and the great value of the prizes show sufficiently that the Musée Social expects on the part of the competitors serious and useful study.

During the eight months since the Musée Social has been opened, many serious-minded men have come thither, but the working element still ignore it too much. It is a movement which will take place progressively, and which can only be encouraged by the societies of public utility, cooperative societies and workmen's associations. In any case, the existence of the museum is known to them, and all cooperators should be interested in it to the highest degree. Now, at the present moment, there are in France about 1,200 cooperative societies, and workmen's associations number about 120. The total amount of their annual operations can be set at twenty million francs. The foundation of this Musée Social can only accelerate the march of the cooperative movement, and in a very general way that of progress. It may be a centre for studies and instruction for everything which is connected with social questions, and as these questions interest the whole world, it cannot be useless to make it known in America, the country of liberty and progress.

SOLDIER'S ORPHAN'S HOME
ATMORION KANSAS
J.C. HOLLAND STATE ARCHITECT
TOPEKA KANSAS



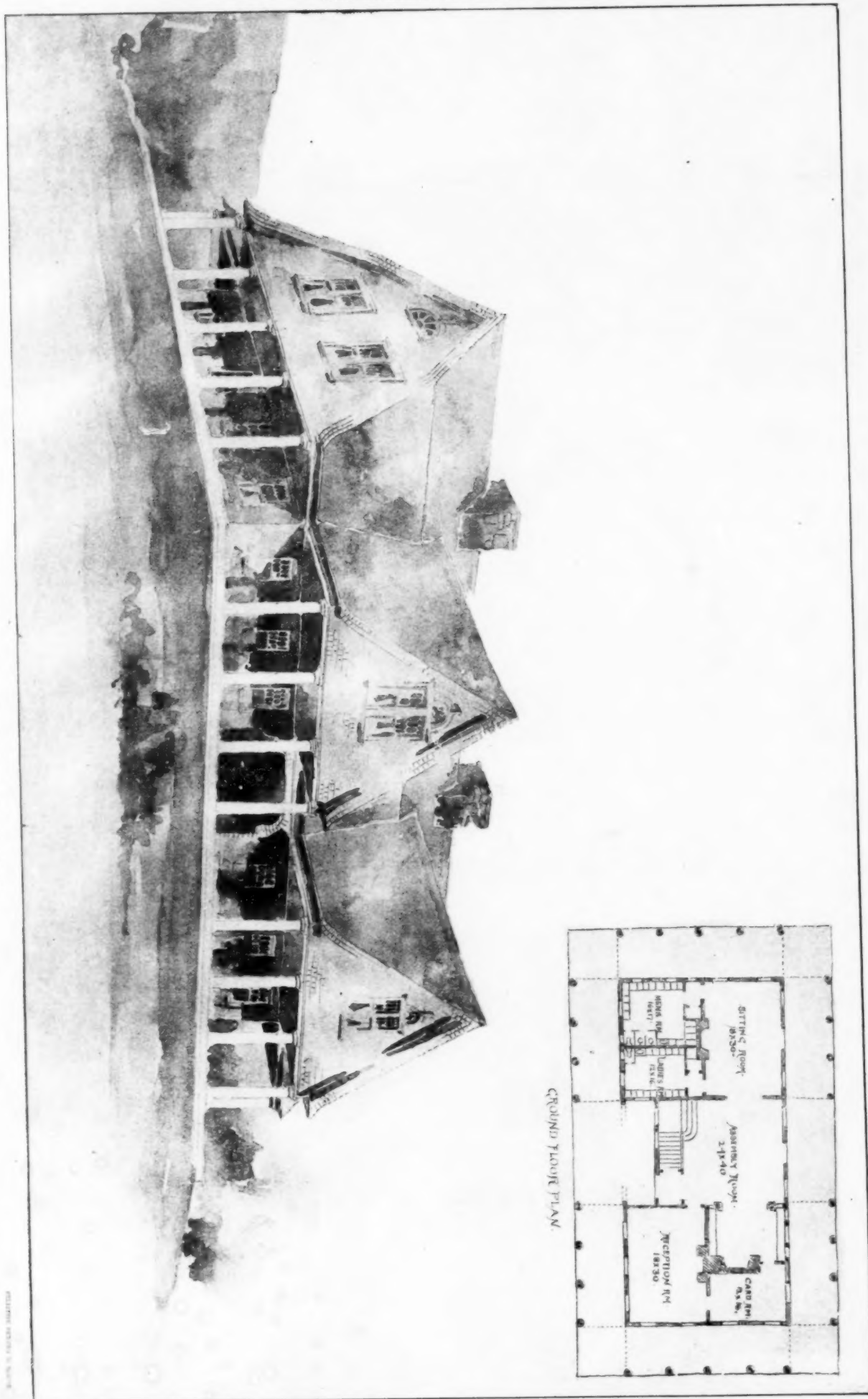
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GATEWAY TO UNIVERSITY, HUY, BELGIUM.

SKETCHED BY W. W. BOSWORTH.

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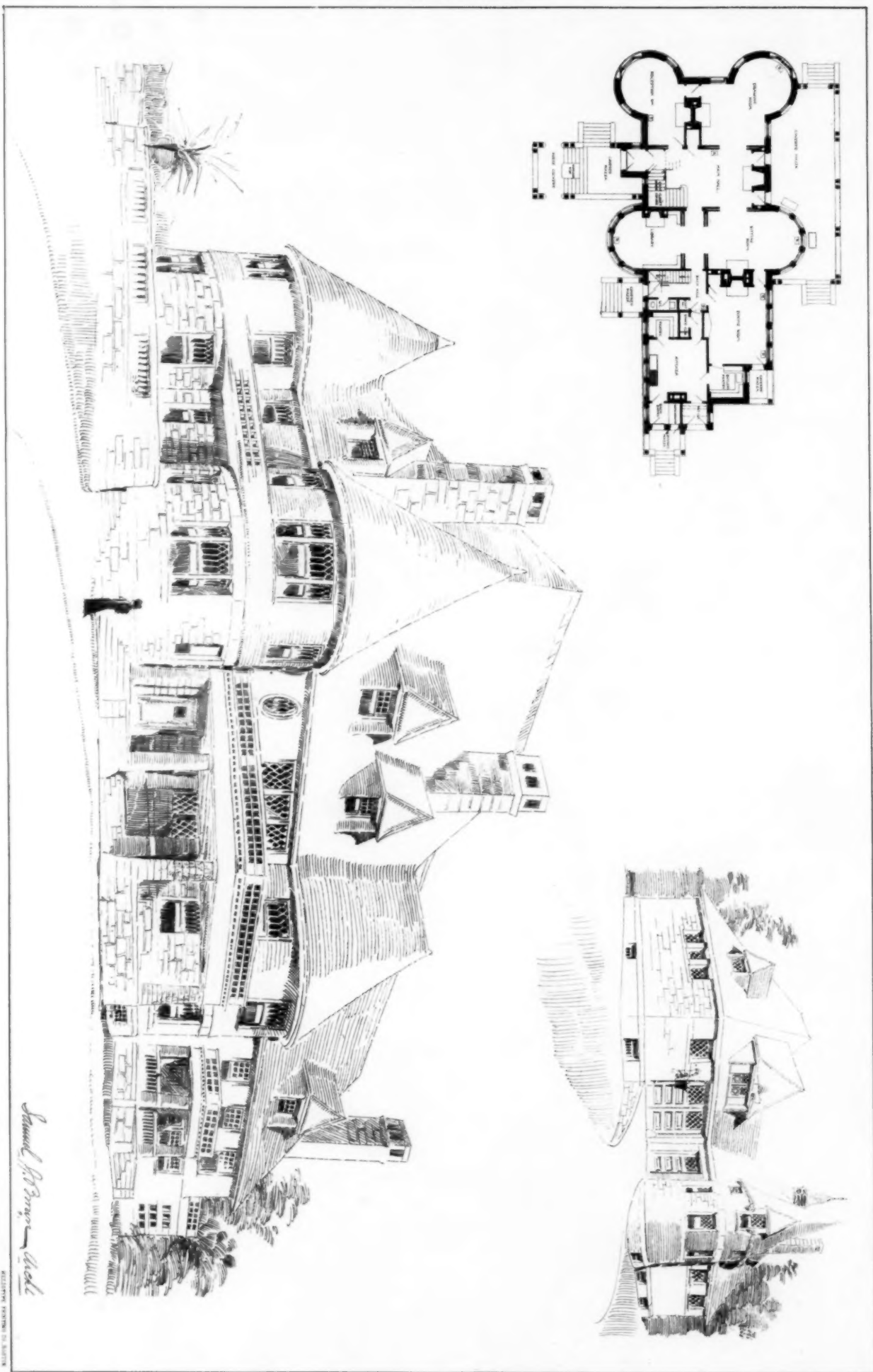


GOLF AND COUNTRY CLUB, RIDGEFIELD, CONN.
WILLIAM A. BATES, Architect.

INTERIOR IN THE APARTMENT OF BELA KRISTINKOVICH, ARCHITECT, BUDA-PESTH, HUNGARY.

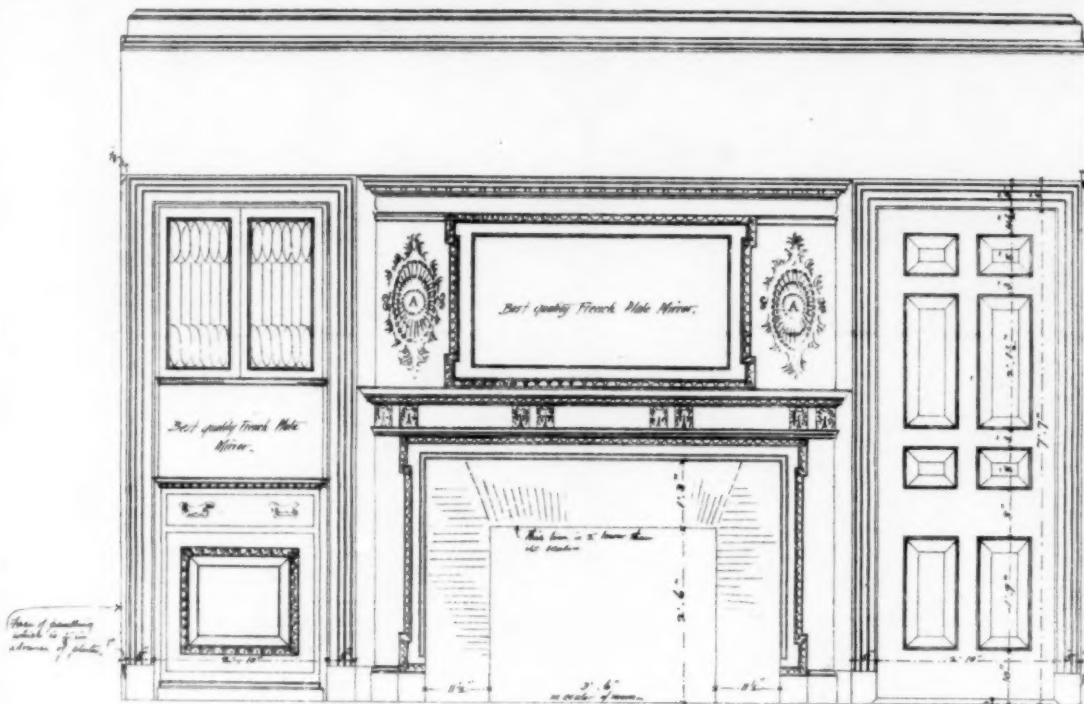


INTERIOR IN THE APARTMENT OF BELA KRISZINKOVICH, ARCHITECT, BUDA-PESTH, HUNGARY.



HOUSE AND STABLE OF A. N. BELDING, ESQ., ROCKVILLE, CONN.
S. J. BROWN, Architect.

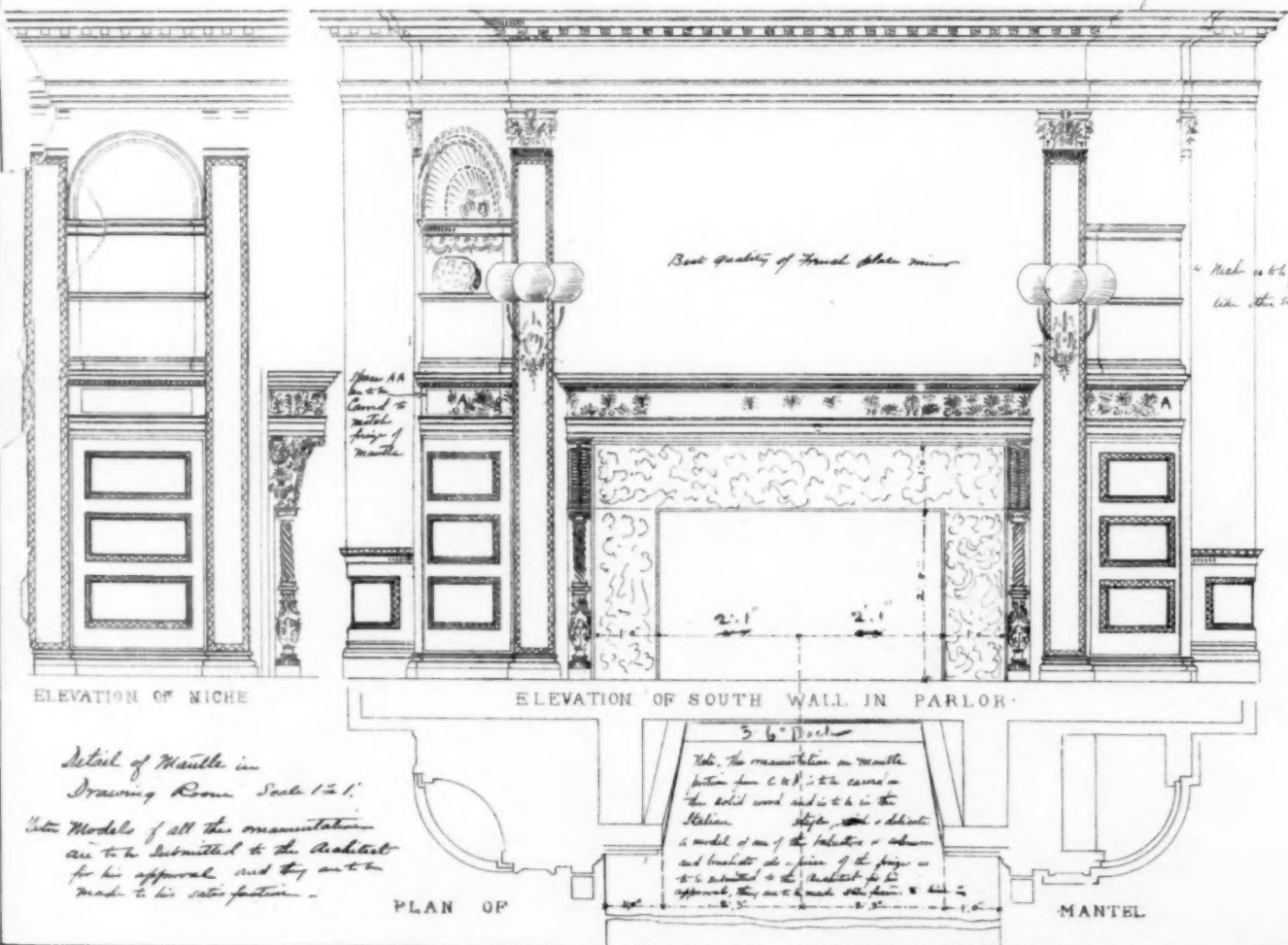
S. J. Brown, Archt.



• SOUTH WALL OF DINING ROOM •
 Note: Measurements for this work must be obtained at the building after the finished line plan is built. A. N. Belding, Esq., Architect.
 Location of gas - Lenses brass given on appropriate.

Note: All the top moulding in dining room is to be the top & leaf moulding, not the top and leaf.

Brackets on the cornice to be the same distance apart as on other portions.



ELEVATION OF NICHE

ELEVATION OF SOUTH WALL IN PARLOR

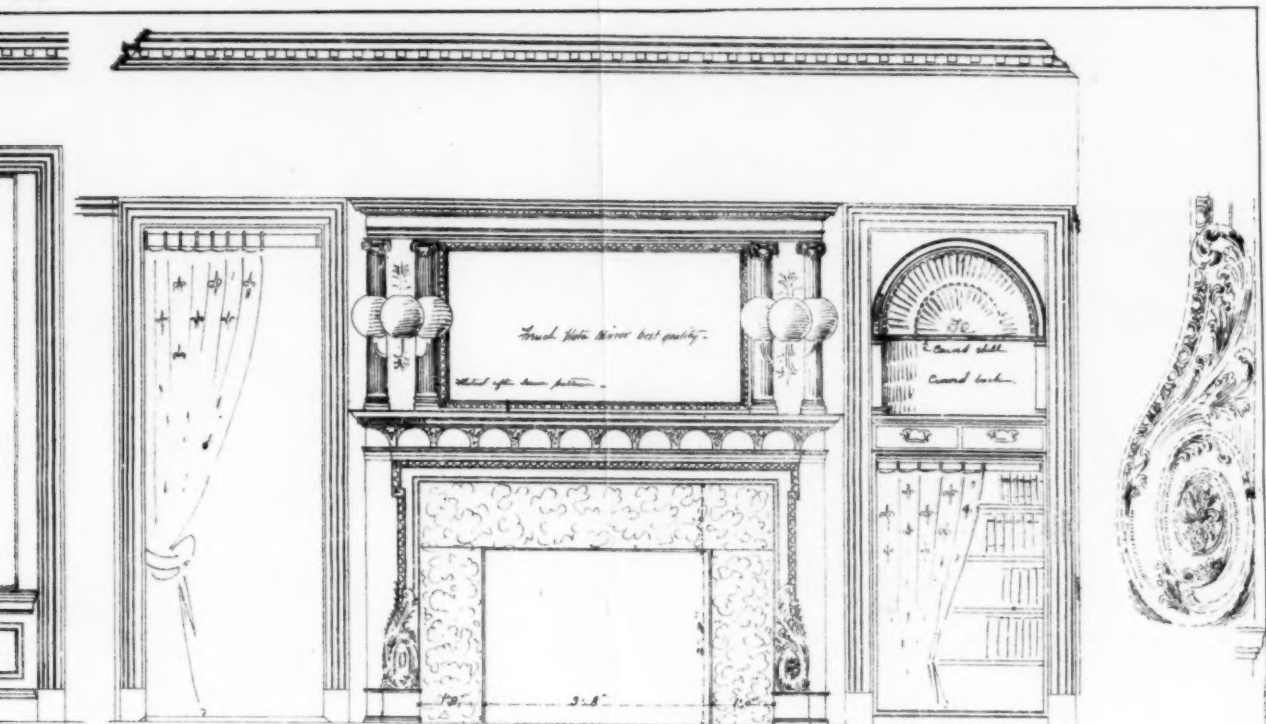
PLAN OF

MANTEL

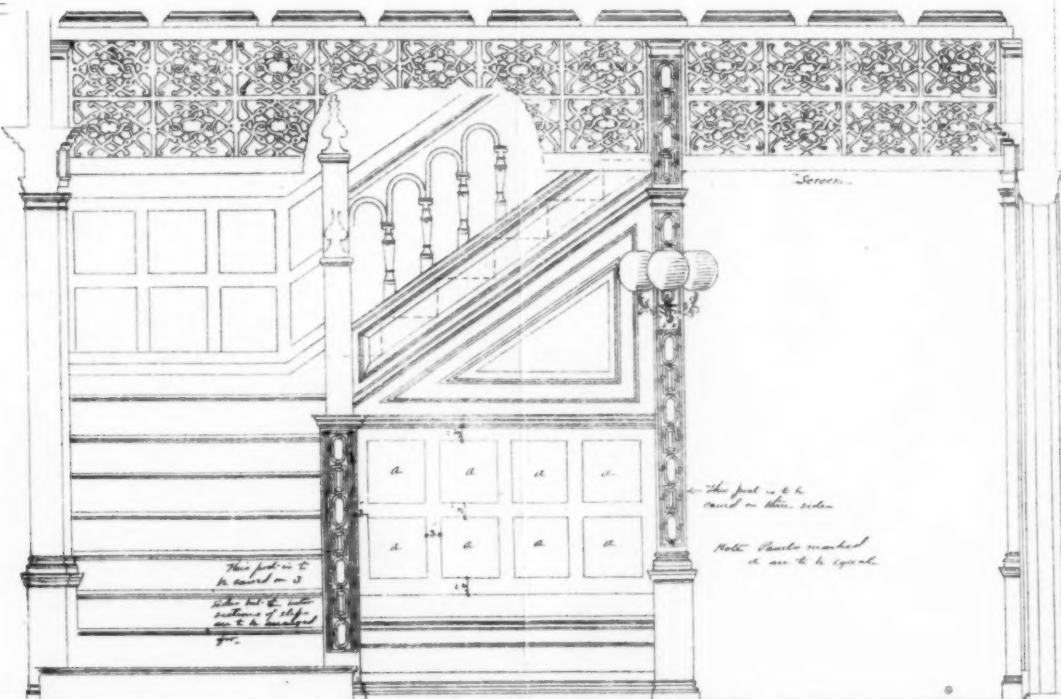
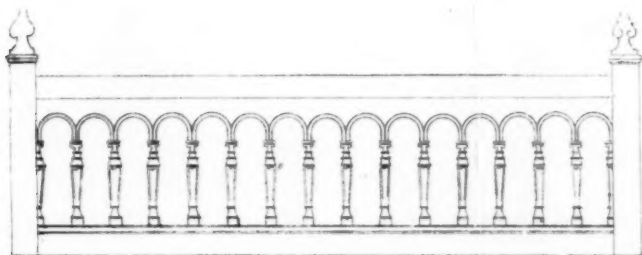
Detail of Mantel in Drawing Room Scale 1/2" = 1'

Notes: Models of all the ornamentation are to be submitted to the Architect for his approval and they are to be made to his satisfaction.

Note: The ornamentation on mantle is to be carved in the solid wood and is to be in the Italian style, and a delicate model of one of the balustrades is shown and brackets are a piece of the finger as it is submitted to the Architect for his approval, they are to be made after him & not in the style of the model.



• NORTH WALL OF SITTING ROOM •



ELEVATION OF EAST WALL OF MAIN HALL.

Samuel J. Brown Architect
25 Congress Street
Boston Mass

HELIOTYPE PRINTING CO. BOSTON

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T-SQUARE CLUB, PHILADELPHIA.

ON December 18 the third regular meeting of the season was held. The Secretary announced that notice had been received from the Secretary of the St. Louis Architectural Club, stating that the T-Square Club had won the Inter-Club Medal offered by them for the best six First-mention drawings submitted by a representative architectural club. The announcement was received with great satisfaction, and it was resolved to communicate with the St. Louis Club, thanking them for their courtesy and assuring them of our desire to reciprocate by any interchange of civilities, professional or social, that might arise in the future as a result of a much-to-be-desired intimacy.

The T-Square Club was represented by drawings submitted by A. C. Munoz, Wm. Chas. Hays, C. O. Provost and Albert Kelsey.

Under the head of new business, Mr. Palmeter was asked to take the chair. Mr. Kelsey then brought up the subject of the recent Art Museum competition, and deplored the undignified way in which the result had been received by certain competitors—not members of the Club. He proposed that, in view of the discourteous newspaper agitation which had arisen, as a result of the protests of these competitors, that the T-Square Club pass a Resolution endorsing the experts' decision—remarking that the thirteen T-Square Club competitors had shown no bad feeling in the matter.

After much discussion it was moved that such a resolution be prepared by the Executive Committee, and be mailed to the Park Commission. The resolution was carried.

The resolution was prepared as follows:

PHILADELPHIA, PA., December 21, 1895.

TO THE COMMISSIONERS OF FAIRMOUNT PARK, PHILADELPHIA, PA.:—

Gentlemen, The appended resolution was adopted at a meeting of the T-Square Club, held December 18, 1895:

Whereas, Certain Philadelphia architects, competitors in the recent competition for the Art Museum to be built in Fairmount Park, and several daily newspapers having severely criticised the Report of the Board of Experts and having thereby cast unwarranted reflections upon the integrity of its members, therefore, be it

Resolved, That the T-Square Club, in the interests of good architecture, is of the opinion that the decision of the Board of Experts should be upheld without question.

Signed: ALBERT KELSEY, President,
WALTER COPE,
EDGAR V. SEELER,
LOUIS C. HICKMAN,
WILLIAM L. PRICE,
DAVID K. BOYD, Treasurer,
ADIN B. LACEY, Secretary.
Executive Committee.

The evening's competition was the designing of an "Alteration and Addition to a City House." Although a very practical subject, it was well contested. Horace Burrell won First Mention; Chester Kirk, Second; Adin B. Lacey, Third.

Messrs. Bissell and Valentine also had creditable designs.

Mr. William L. Price lectured to the Club on December 4th on "Domestic Architecture." It was the occasion of quite a debate.

ADIN B. LACEY, Secretary.

SOCIETY OF BEAUX-ARTS ARCHITECTS.

THE following resolution was adopted at the annual meeting of the Society of Beaux-Arts Architects, held in New York City, on November 25, 1895:

The members of the Society of Beaux-Arts Architects, sympathizing in a common loss, express their sorrow at the death of Richard Morris Hunt.

For many years the most eminent of American architects, he was a constant example of artistic conscientiousness and enthusiasm, and of a generous and high-minded conduct in all his relations, that endeared him to all who knew him.

We can add nothing to what others have said as to his great gifts. Those are indeed fortunate, whose works, like his, are their best monument. But as members of the last society to which he gave the aid of his name and his counsel, we feel that to us his death was a peculiarly personal loss. Bound together, as we were, by a common affection for our Alma Mater, the School of Fine Arts, he was to us not alone the honored master, but the elder comrade and friend.

His life was rounded and complete. His character and his example are his priceless legacy to his family and to the profession he loved. His memory will be our greatest consolation for his loss.

THE "GOOSE AND GRIDIRON," LONDON.—The Goose and Gridiron, said to be the oldest tavern in the City of London, has been pulled down. The tavern was situated in a narrow alley almost in front of the steps of St. Paul's Cathedral, and was in a fairly sound state of preservation. It is recorded that Sir Christopher Wren, the famous architect, stayed at the tavern while St. Paul's was being erected.—*N. Y. Evening Post.*

THE HEINE MEMORIAL FOUNTAIN.

THE annexed cut will serve to indicate the character of the fountain which the German Societies of New York recently desired to have that city accept and erect on some conspicuous site.



Fountain in Honor of the Poet Heinrich Heine offered to the City of New York after its Rejection by the City of Dusseldorf. Ernst Herter, Sculptor.



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

THE MUSEUM OF FINE-ARTS, ST. LOUIS, MO. MESSRS. PEABODY & STEARNS, ARCHITECTS, BOSTON, MASS.

[Gelatin Print issued with the International and Imperial Editions only.]

SOLDIERS' ORPHANS' HOME, ATCHISON, KAS. MR. J. C. HOLLAND, STATE ARCHITECT, TOPEKA, KAS.

GATEWAY TO THE UNIVERSITY, HUY, BELGIUM. SKETCHED BY MR. W. W. BOSWORTH, ARCHITECT, NEW YORK, N. Y.

GOLF AND COUNTRY CLUB-HOUSE, RIDGEFIELD, CONN. MR. W. A. BATES, ARCHITECT, NEW YORK, N. Y.

INTERIOR IN THE APARTMENT OF BELA KRISZTINKOVICH, ARCHITECT, BUDA-PESTH, HUNGARY.

THE following note will add interest to the illustration:—

BUDA-PESTH, September 24, 1895.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—As a punctual subscriber of the *American Architect*, I come most respectfully to you with a request to put a part of the arrangement of my lodging, which is acknowledged to be very tastefully arranged, in your journal.

Of this part of my lodging I take the liberty to give the following description:

In my travelling abroad as well as in America I collected the models of the most celebrated sculptures and monuments in faithful and artistic execution. And I also succeeded with great trouble and expense in gathering a matchless collection of miniature sculptures in its line; in which gallery there are represented all the artistic works of the antique Grecian and Roman sculptors, and of the present time the artistical works of the modern artists—nearly all the sculptures and reliefs of Thorwaldsen.

They are not arranged as a museum, but only serve (as the drawing itself shows) to ornament my lodging in every imaginable order, and on different pieces of furniture.

For this purpose the sofa with ornament and stands were directly made after my own design and project, on which stands a part of antique and modern statues are to be seen.

Before this sofa, on a little table there is my favorite reading, the last number of the *American Architect* with a bound annual set.

On the sofa there is thrown a genuine Persian carpet. The whole arrangement as a private interior is respectable and instructive for architects.

Hoping you will publish this in your journal, I am, dear sir,

Yours truly, BELA KRISZTINKOVICH, Architect.

HOUSE AND STABLE OF A. N. BELDING, ESQ., ROCKVILLE, CONN. MR. S. J. BROWN, ARCHITECT, BOSTON, MASS.

MANTELS IN THE SAME HOUSE.

[Additional Illustrations in the International Edition.]

ENTRANCE TO THE NEWBERRY LIBRARY, CHICAGO, ILL. MR. HENRY IVES COBB, ARCHITECT, CHICAGO, ILL.

[Gelatine Print.]

DETAIL OF WESTERN PORTAL OF CHARTRES CATHEDRAL.

[Copper-plate Etching.]

INTERIOR OF BOLTON BANK, BOLTON, ENG. THE LATE MR. G. WOODHOUSE AND MESSRS. BRADSHAW & GASS, ARCHITECTS.

STAIRCASE: WHITEHALL COURT, VICTORIA EMBANKMENT, LONDON, ENG. MESSRS. ARCHER & GREEN, ARCHITECTS.

[The following named illustrations may be found by reference to our advertising pages.]

HOUSE ON CHAUSSEE D'ANVERS, MONT ST. AMAND-LEZ-GAND, BELGIUM. M. MODESTE DE NOYLETTE, ARCHITECT.

DETAILS OF TWO OLD DOORWAYS, BOSTON, MASS. MEASURED AND DRAWN BY EUGENE L. CURRIER.

DETAILS OF COLONIAL STAIRCASES.

CITY HOUSES: THE SKIPPER'S HOUSE, GHENT; THE WEAVER'S HOUSE, GHENT; HOUSE ON AVENUE WAGRAM, PARIS.



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.

CHICAGO, ILL.—Paintings by Robert W. Vonnoh, also Tapestries lent by Charles M. Ffolke: at the Art Institute, until January 15.

MINNEAPOLIS, MINN.—Exhibition of Posters: at the Studio Club, 719 Hennepin Ave., January 6 to 15.

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.

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.



STEALING GILDED RAILINGS IN PARIS. — Numerous Parisian monuments are surrounded by rails of wrought-iron, and these, as a rule, are gilded over. The quantity of the precious metal utilized is so infinitely small that one can hardly imagine that it would be worth anybody's while to take the trouble to smash and carry away these rails, and yet for several weeks past they have systematically disappeared. Last night the police surprised a gang of robbers at work on the fence of the Jardin du Luxembourg, but so clumsily did the officers go to work that all the criminals escaped with one exception, and he vigorously protests that he knows nothing of the gang and was only a passer-by. — *Galignani Messenger*.

WOOD-PRESERVING IN SWITZERLAND. — A simple, effective and cheap way of preserving wood from decay is practised in Switzerland in the preparation of posts for the telegraph service. A square tank, having a capacity of some two hundred gallons, is supported at a height of twenty feet or twenty-five feet above the ground by means of a light skeleton tower built of wood. A pipe drops from the bottom of the tank to within thirty inches of the ground, where it is connected with a cluster of flexible branches, each ending with a cap having an orifice in the centre. Each cap is clamped on to the larger end of a pole in such a manner that no liquid can escape from the pipe except by passing into the wood. The poles are arranged parallel with one another, sloping downwards, and troughs run under both ends to catch drippings. When all is ready, a solution of sulphate of copper, which has been prepared in the tank, is allowed to descend the pipe. The pressure produced by the fall is sufficient to drive the solution, gradually of course, right through the poles from end to end. When the operation is ended, and the posts dried, the whole of the fibre of the wood remains permeated with the preserving chemical. — *London Work*.

A MERITED REBUKE TO AMERICANISM. — "For colossal gall and impudence, Mrs. Elizabeth Garrison, of Chicago, takes the bun. She asked Sir Mackenzie Bowell yesterday to grant permission for the erection at Quebec of a monument to Colonel Montgomery, who fell on December 31, 1775, when leading a party of Yankee troops in an attempt to capture the ancient capital of Canada. The First Minister received his visitor courteously, but is said not to have held out any hope that the request would be granted. He promised to lay it before his colleagues. Canadians, in his judgment, would regard it as a most extraordinary thing if the Government approved of the erection of a monument in this country to the memory of a man who had invaded Canada and sought to subdue it. Did the lady suppose for a moment that permission would be given to Canadians to erect a monument to Brock in Detroit, to commemorate his capture of that city in 1812? Mrs. Garrison evaded this question, but ventured to remark that a monument to Montgomery in Quebec would be an indication of close union between Anglo-Saxon people. She reminded the Premier that the precedent existed in case of a monument in Quebec to Montcalm. It is a good many years since the Premier went to school, but his knowledge of history was equally as good as the Chicago lady's. He reminded Mrs. Garrison that the monument at Quebec was a joint one to Wolfe and Montcalm, typical of union between the two nationalities, English and French. He was glad to inform Mrs. Garrison that this union still existed, and was strengthening every year, and that English-speaking and French-speaking Canadians were living on friendly terms with each other as British subjects. Montcalm and Montgomery could not be mentioned in the same breath, one being engaged in defending his country, the other being a foreign invader. Mrs. Garrison was evidently depressed at her want of success, and will, doubtless, return to Chicago and write columns of spreadeagleism and condemnation of the pigheadedness of the Canadian Premier." — *Ottawa Dispatch to the Halifax Herald*.

ABSURDITIES IN STAGE-SETTINGS. — Prof. Herkimer, R. A., recently delivered an address at the Institute of British Architects on "Scenic Art." Criticising the modern theatre, he said some new form of auditorium, with an entirely different arrangement of the seats, was badly needed, and this, he thought, could be done without too much space being taken up. The aim should be to provide seats from which the full work of both actor and scenic artist could be seen by the spectators. Some people thought scenic art was antagonistic to the drama, but he held a different opinion. The real secret of that art lay in illusion. The make-up of the background should be as carefully attended to as was the make-up of the actor; yet the audience, which howled down the slightest inconsistencies in the actor's portrait, took no notice of the inconsistencies in the scene. At present it was thought proper to have pieces of sky hanging in strips, like clothes on a line, and to have pieces of the firmament coming together at an angle in the corner of the stage. [Laughter.] It was strange that tradition stuck to the stage more than to any other form of art. Still, he would not destroy tradition in that direction. The present system for footlights was bad in every way, and very inartistic. There was a strange commotion when candles had to give way to lamps, for the actors, who were not always such swells as they were to-day, regarded the stumps of the candles as their perquisites. The proscenium in all theatres was much too high, and, for many scenes, far too wide. He proposed a contracting proscenium, which would adapt itself to the particular scene which was being portrayed. He claimed for scenic art a position not inferior to any form of pictorial art, and in this connection condemned the inconsistency of flashing a "moonbeam" upon an actor at all points of the stage. He had known a case in which two actors of equal prominence were on the stage at the same time, and each had a "moonbeam." — *London Standard*.

HOW THE FOUNDER OF THE VENDOME COLUMN WAS RUINED. — During the present century one of the most enormous monuments which have been attempted in bronze is the celebrated Vendôme Column. The French Government entered into a contract with an ironfounder who had never been engaged with either the modelling or casting of bronze; the Government engaged to supply him with the cannon which had been taken from the Russians and Austrians during the campaign of 1805 in quantity sufficient to found the monument. Knowing nothing of the phenomena which the fusion of bronze offers, he discovered when he had completed two-thirds of the column that he had used up all his metal. Enough bronze had been served out to him to complete the monument, and he was responsible for the full amount. Ruin stared him in the face. In order to get out of his difficulty he melted up his scoræ and mixed the metal with some cheap refuse which he bought, and so managed to finish the founding. These castings were discovered to be full of flaws, and the work was stopped, to the utter destruction of the founder. The moulding of the different parts of the bas-relief was so ill-executed that the chisellers employed to repair the defects removed no less than seventy tons of bronze, which became their perquisite in addition to £12,000 paid for their labor. — *Illustrated Carpenter and Builder*.

A RECORD YEAR FOR PIG-IRON. — The production of pig-iron in 1895 has verified the predictions made early in the year that if the rate of output at the time was maintained for the year the record of tonnage would be exceeded. The total output, according to official figures compiled by the *American Manufacturer*, shows a production of 9,387,639 tons, exceeding 1890, the largest previous year, which had a tonnage of 9,202,703 tons. In 1892 the output was 9,157,000 tons. The tonnage of 1894 is exceeded by 730,251 tons. Unless Great Britain shall exceed any year's production the tonnage of the United States will far outstrip the British. Great Britain's heaviest year was 1892, when 8,589,680 tons was turned out, and in 1894 her production was only 7,364,745 tons. The enormous increase in pig-iron production of 1885, when the total tonnage was 4,044,525 tons, is less than half that of 1895. — *N. Y. Times*.

THE AMERICAN ARCHITECT AND BUILDING NEWS

ADVERTISERS' TRADE SUPPLEMENT.

No. 163.

SATURDAY, JANUARY 4, 1896.

VOLUME LI.
No. 1045.

MERTZ TURNED MOULDING.

"MERTZ Turned Moulding" is to the architect and builder as "Santa Claus" is to the child, made familiar not by its false representations or bulky "Ads," but by its own characteristics of uniformity and smoothness of finish. It well serves as an example of the progress of the age we are now living in.

Only six years ago from thirty to thirty-five feet was the limit of a day's output of this moulding by one man and had then to be turned by hand on a lathe. Our perfected "Automatic Machines" are now turning out four thousand feet per day each. This removes the barrier of cost and permits its use in the humble cottage as well as the Newport mansion.

Prompt delivery is as potent a factor in this age of hurry and bustle as either price or quality. We have no misgivings when claiming our superiority in all, as our plant is evidence of itself, being capable of turning out one million feet a month.

The continual growth of our export trade is also evidence of its worth. Our agents, Henry Hughes & Co., 12 & 14 Paradise Street, Liverpool, England, have always a large stock of our mouldings on hand and are in position to supply the trade in their locality.

For convenience and promptness, buyers in or near the following cities can facilitate the delivery of moulding by ordering from our agents who carry a large stock. Smith & Young, San Francisco and Los Angeles, Cal., Morse & Co., Bangor, Me., J. W. Bailey & Sons' Co., Boston, Mass., Edward Hall & Son, Philadelphia, Pa., and Ludwig Carved Moulding Co., New York City.

Our illustrated catalogue with prices and discounts will be cheerfully furnished upon application to

GEO. MERTZ'S SONS,
PORT CHESTER, NEW YORK, U. S. A.

ROOFING TIN.

THE attention of our readers is called to the advertisement of Messrs. N. & G. Taylor Co., Manufacturers of Tin-plate, Philadelphia, in our last issue, particularly those who are interested in wanting a "good tin roof." They advertise the Taylor "Old Style" extra heavily coated, as being the only Roofing Tin made exactly the same as in 1830. Our readers probably are not aware of the fact, but Roofing Tin, or what is known as "Terne" plates, was originally made in Philadelphia in 1830, and then handled by Messrs. N. & G. Taylor Co. The original way of making Terne, or Roofing Plates, was by dipping

sheets of bright tin in open pots of metal, it being strictly a hand-dipped or double-coated process. This is the same method as is employed in the manufacture of the Taylor "Old Style" brand at Messrs. N. & G. Taylor & Co.'s works in Philadelphia. This house recently sent out an invitation to the trade, entitled "Open Doors" — "There are no secrets in making the best goods."

The Taylor "Old Style" brand has now attained a world-wide reputation. It is handled by all the leading jobbers throughout the United States and covers more prominent buildings than any other brand of Roofing Tin sold. It is also endorsed by the United States Government and the list of buildings as shown on the circular issued by Messrs. N. & G. Taylor Co., is certainly a very flattering record.

As above stated, this reliable brand of Tin has undoubtedly secured its great popularity through its wear or durability. This is secured by the simplicity of its manufacture — no rolls or machinery are used to squeeze off the coating, nor Acid Flux used. These methods are adopted by modern manufacturers to cheapen the cost, whereas in the manufacture of the Taylor "Old Style" brand, each sheet is dipped by hand in open pots of metal with different degrees of temperature, each sheet thus containing every ounce of metal that it is possible to secure. It is made by what is known as the Palm-Oil process throughout, no Acid Flux being used, the manufacturers claiming that the use of acid is disastrous to the life of Roofing Tin, and many architects now throughout the country are incorporating in their specification in addition to the name of the brand of Tin specified, that no Acid-Flux plates will be accepted. To those wanting a first-class brand of Tin, we advise the use of the Taylor "Old Style" brand, each sheet stamped with the brand and thickness, as in the use of this brand of Tin you will virtually secure one that will outlast the life of the building itself.

N. & G. TAYLOR CO.,
PHILADELPHIA, PA.

AUTOMATIC WATER-HEATER.

THE Tobey Automatic Water-heater is the only water-heating apparatus on the market that regulates and controls the temperature of the water delivered from it, positively, and that can be used in connection with high-pressure or exhaust steam, or both together.

It costs no more than a tank and coil heater having the same capacity.

The Heater can be readily set to deliver

water at any desired temperature, and will maintain the same without a variation of more than ten degrees, as this is sufficient to completely open or close the valve controlling the steam supply. The regulating device is controlled by a fixed principle — that of the expansion and contraction of metal — and therefore is permanent, cannot vary, and does not get out of order.

It possesses the maximum degree of economy in the use of steam, for the water is never heated beyond the desired temperature, and when the draught is lessened or discontinued the supply of steam is proportionately reduced or is shut off altogether.

The Heater can be used in connection with live steam at any pressure, or exhaust steam, or both together if necessary, for by using our double valve the exhaust is utilized until it fails to maintain the temperature at which the Heater is set to deliver the water, when the high-pressure valve is opened and enough live steam admitted to the heating surfaces to make up the deficiency. Where any considerable quantity of water is used it will pay for itself in one year by its economy in the use of steam.

The Heater is no experiment, for nearly two hundred of the largest size have been in constant use for upwards of eight years.

It is adapted for use wherever a supply of warm or hot water, of a uniform temperature, is desirable, especially in hotels, office-buildings, public institutions, bath houses, etc.

If you are interested, we will be pleased to correspond with you and send descriptive catalogue.

THE TOBEY WATER-HEATER AND MFG. CO.,
TOLEDO, O.

TECHNICAL FACTS RELATING TO CHAIN BLOCKS.

THE two most important elements in a hoisting machine are the *velocity ratio* and the *mechanical efficiency*. The "velocity ratio," or leverage, is the number of feet of rope or chain which the operator must overhaul with his hands to lift the load one foot. With a low velocity ratio, the operator can lift only a small load, but can lift it quickly; with a high velocity ratio, he can raise a large load, but only slowly. The choice between these conflicting conditions is a matter requiring great experience and good judgment, and depending also upon the purposes for which the machine is intended. As a rule, the blocks which are lowest in efficiency have the highest velocity ratio, the purpose of their makers being thus to conceal their inefficiency by making them to appear to work easily.

The "mechanical efficiency" of a hoist is a term which indicates the percentage of the applied power which is utilized in lifting the load, the difference between the power applied and the power utilized being the amount of power consumed or wasted in overcoming the friction of the machine. Common hoists rarely have an efficiency of more than fifty per cent, which means that of each 100 foot-pounds of energy applied by the operator, one-half is utilized in lifting the load and the other half is wasted in overcoming friction. In most chain blocks the efficiency is necessarily less because of the unavoidable friction of the chain, and still more because of the "self-sustaining" feature which such blocks usually possess. The best chain blocks heretofore obtainable have had an efficiency of less than 33 per cent, and some of less than 20 per cent. Believing that the heavy loss of power which this implies could be obviated, we began, some years ago, a series of experiments with spur-gear blocks, which resulted finally in the invention of the Triplex Block, whereby we have obtained an actual efficiency of almost 80 per cent.

More recently we have, in like manner, developed an improved Worm-gear, or Screw Block, having an efficiency of about 40 per cent, which is at least 25 per cent better than any Screw Block previously made. Our original

Weston Differential Block has an efficiency of 31 per cent, which, with one exception, is higher than that of any other chain block, except our Duplex and Triplex Blocks.

ABSTRACT OF REPORT OF TESTS MADE TO DETERMINE THE EFFICIENCY OF CHAIN BLOCKS.

In order to obtain an impartial test of the comparative efficiency of the various chain blocks in use, Prof. R. H. Thurston was requested to procure in the open market, and test for efficiency, a one-ton block of each of the following makes: Yale-Weston Differential, Harrington, Box, Teal, Olsen, Wharten and Batt, as well as the new Yale-Weston Triplex Block.

The results of these tests are fully given in the complete report of Professor Thurston, copies of which will be furnished upon application. The following abstract will serve to indicate the general results.

In describing the various blocks tested, Professor Thurston explains that all of them, except the Triplex Block, depend for their self-sustaining feature upon the use of some gearing or purchase having a very low mechanical efficiency, so that the friction of the working parts, which is a positive resistance to motion, in hoisting, as well as in lowering, serves to prevent the running down of the load. Proceeding, he says:

"The new Yale-Weston Triplex Block, on the contrary, has a very simple and compact triple train of spur gearing and thus develops a remarkably high efficiency as compared with any of the other types of chain block. Its efficiency is so high, indeed, that it becomes impossible to rely upon the friction of the apparatus to sustain the load. For the latter function a separate and simple friction device is introduced. This independent sustaining mechanism automatically holds the load suspended, and yet enables it to be lowered at will with the exertion of a very slight effort and at a high velocity, but without acceleration or danger."

The results of the tests are then given in tabulated form, the Yale-Weston Blocks being given by name and the other blocks by number only, as it was not the intention of the report to make any criticism upon the actual performance of the other blocks, but only to show the very low efficiency which all of them unavoidably possess. The Yale-Weston Dif-

The purpose of a common rope tackle block is to obtain leverage or "power," whereby the operator, with a given pull (by passing many feet of rope or chain through his hands), may lift a heavier load a shorter distance. Chain blocks have a higher "power," and also the valuable quality of holding the load automatically suspended at all times, so that it cannot run down, even if the operator lets go; whereas the common tackle block will run down, and allow the load to drop, unless the operator maintains a constant pull on the rope at all times.

Each of the three types of chain blocks greatly multiplies the power of the operator, but with varying leverage, or "velocity ratio," and the load is always self-sustained, except that the Duplex Block can, if desired, be converted from "Safety" to "Despatch" lowering.

The Differential Block obtains its power through a differential sheave, and is the simplest and cheapest chain block in the world. It may be used under the worst conditions of dirt and exposure, and will always operate.

The Duplex Block obtains its power through a worm wheel and screw, and its action is very smooth and easy. It requires good lubrication, but, as its mechanism is enclosed in an oil-tight box, it may be used under any ordinary conditions. It is especially adapted to foundry use.

The Triplex Block obtains its

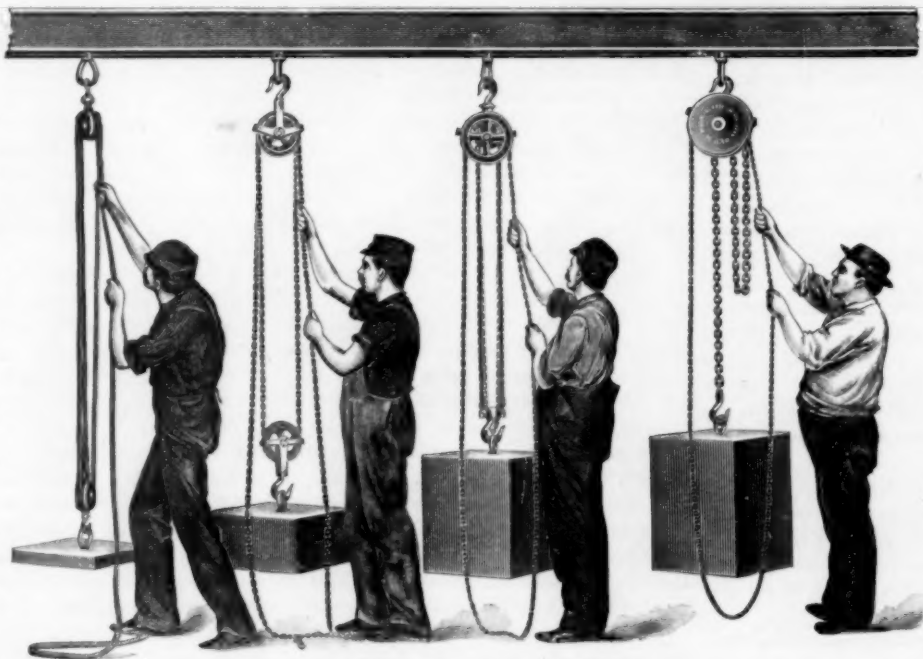


Illustration of Relative Efficiency of Blocks.

FOUR PART ROPE TACKLE BLOCK.

Load not self-sustained. One man can lift 200 lbs. about 15 feet per minute.

YALE-WESTON DIFFERENTIAL BLOCK.

Load always self-sustained. One man can lift 800 lbs. nearly 4 feet per minute.

YALE DUPLEX CONVERTIBLE SCREW BLOCK.

Load always self-sustained. One man can lift 1,700 lbs. about 1½ feet per minute.

YALE-WESTON TRIPLEX SPUR-GEAR BLOCK.

Load always self-sustained. One man can lift 2,000 lbs. about 3 feet per minute.

NOTE.—Pull on hand-chain in each case 82 lbs., or about the efficiency of one able man. The sizes of weights indicate the proportionate load in each case. Each Chain Block automatically sustains its load; the operator only supplying power to hoist or lower. This means perfect safety. The Rope Block runs down unless the operator sustains the load with one hand while shifting other hand for fresh hoist. This means constant danger.

ferential Block shows as high an efficiency as the best of its competitors, while the Triplex Block far outstrips them all in efficiency, both of hoisting and of lowering.

In his table, Prof. Thurston says: "The foregoing figures indicate fairly the relative efficiencies of the several blocks, and show that the new Yale-Weston Triplex Spur-Gear Block excels all its predecessors to a remarkable extent. The secret of its excellence lies in the fact that while in other blocks a wasteful friction is chiefly relied upon to prevent the load once raised from running down, the Triplex Block is designed with a view of reducing the lost work of friction, both in hoisting and in lowering, to a minimum, and to obtaining the highest mechanical efficiency; a new and independent device being introduced to control the action of lowering, this device causing no friction in hoisting, and being perfectly reliable and effective for its intended purpose during the act of lowering."

"A glance at the figures show that the Triplex Block returns 79½ per cent of the work of the operator, while the best of its competitors cannot do better than 32 per cent."

RELATIVE EFFICIENCIES OF CHAIN BLOCKS.

The annexed cut shows actual facts relating to the relative powers and speeds of the several kinds of blocks; i. e., the power applied, the load and the distance.

power through a train of spur gearing, and hence has a higher mechanical efficiency than any other similar device ever invented. A man can do more work with it than with any other block, and do it more easily. Where the use is frequent and the conditions reasonable, this is the best, and ultimately the most economical, of all portable hoists.

YALE & TOWNE MFG. CO.
STAMFORD, CONN.

THE SLATE TRADE.

THE value and importance of the slate industry to the people of the Lehigh Valley will cause an account of its condition and future prospects to be read with interest at this time.

Slatington being one of the principal slate-mining regions of the United States, a representative of the *Morning Call* visited that lively borough yesterday and interviewed Mr. James L. Foote, manager of the Slatington-Bangor Slate Syndicate.

"What is the condition of the slate trade?" Mr. Foote was asked.

"Quiet and hopeful. With the advent of winter, slate business shows a falling off as it

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For economy of operation they are unparalleled by the elevators of any other make or motive power.

In ease and certainty of control, and smoothness of operation, they are superior even to the best hydraulic elevators heretofore made.

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always does, while at many of the quarries the stocks of roofing-slate are larger than usual, but little complaint is heard for the reason that the manufacturers believe that business will open up good in the spring with better prices. Generally the conditions of the slate business are sound and we have sanguine hopes that January will see the beginning of what promises to be an era of great prosperity in the slate trade."

"Has the slate business for the year 1895 been satisfactory and how does it compare with previous years?"

"So far as the Slatington region is concerned, the shipments of roofing-slate for this year are the largest ever known and will aggregate more than 150,000 squares or 3,500 car-loads. Over 1,000,000 square feet of slate blackboards in about 27,000 crates and 35,000 cases of school slates have been shipped, making the total value of the slate product from the Slatington region the greatest in its history. With all this unprecedented activity, it cannot be said that the roofing-slate business has been satisfactory. The main trouble has been low prices and lack of profits in transactions. This has been brought about by competition engendered during the era of depression while business was less. Instead of doing that little at proper prices, the greedy sought to arrogate to themselves more than their share by cutting prices. Such competition, of course, was met and in some instances exceeded. As a consequence, prices were shattered and profits destroyed. Customers at any time could not tell but they might have bought at lower rates and thus much distrust and dissatisfaction were produced all around. Business could not live long in this way, and with the dawn of legitimate demand calling

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on supply it is imperative now to increase the scale of prices. Herein is the main trouble, for prices once lowered are very difficult of being raised. Nevertheless, it will cure itself, for no business can long be continued at a loss. It only goes to show that competition should never involve simply the destruction of values but should rather be confined to excellence and improvement in product, accompanied by normal prices. Thus things are mending, and prospects in the roofing-slate business are becoming brighter and clearer.

"The blackboard trade has been good throughout the season, but does not exceed that of former years. Better prices have prevailed and this branch of the slate industry has been generally prosperous and satisfactory.

"The school-slate business has been brisk and the margin of profit greater to the producer and manufacturer than for many years."

"Do you look for a betterment in the slate business in 1896?"

"Yes. There is ground for the belief that trade in all branches will improve, and in none more than the slate industry. Already large quantities of roofing-slate have been exported to Great Britain, and our manufacturers have recently received orders amounting to 5,000 squares for export during the winter months, with prospects of orders for several thousand squares more. This will materially help the home market and create more demand and higher prices by next spring. The indications are that most of our quarries will work all winter. Preparations for building all over the country are greater than ever before, besides the activity now existing in the iron market, where large contracts have been placed for the future, tend to convince every thinking business man that prosperity and

confidence will prevail next year." — *Morning Call, Allentown, Pa.*

N. & G. TAYLOR Co., tin plate manufacturers, Philadelphia, are out in a very neat blotter illustrating the brands of Bright Tinplates which they make. They state that all of their plates are made of the finest materials, and in a most thorough manner, and they also call particular attention to the quality of rib tin used, "being of exceptional fineness and purity."

Their "brilliant" brand, extra fine quality, is the heaviest coated bright tin that can be made, and holds the same high position that their celebrated "Taylor Old Style" brand does in the list of brands of roofing tin. Buyers of Bright Tinplates should correspond with Messrs. N. & G. Taylor Co.

COMMON-SENSE FIREPROOF CONSTRUCTION.

WHEN a chimney-stack is built a lining is provided for the portion exposed to great heat. This lining is detached from the walls of the stack because it has been found by experience that the lining must be free to expand and contract and be taken out for repair without disturbing the stack proper.

When buildings are designed to resist fire, the same common-sense precautions must be taken.

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The following test, made in actual work, by Col. D. C. HOUSTON, Corps of Engineers, U. S. A., at the sea wall around Governor's Island, New York Harbor, has never been equalled by any other cement. It is as follows: Tensile strength per square inch, one day, 384 pounds; seven days, 600 pounds; thirty days, 818 pounds.

For Sidewalks it gives the best color, and the most enduring wearing surface. Most of the prominent Railroad Bridges and the large Office Buildings of the country stand upon a foundation of concrete made of ALSEN'S CEMENT

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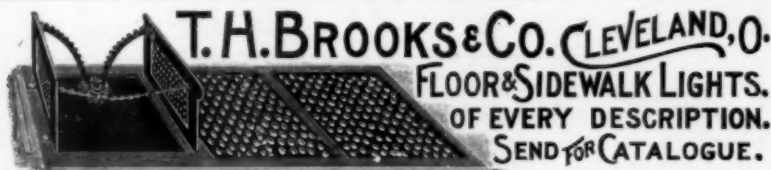
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ESTIMATES.

THE Contractors Estimating Co. is organized for the purpose of furnishing guaranteed estimates with sketches for the use of contractors, architects, engineers, committees, etc., as well as approximate estimates and figures for those contemplating building.

The estimates are furnished much less than cost, as this company can use many of them for other parties. The charges for estimates with sketches are less than one-tenth of one per cent on investments of \$100,000. The limit of error is generally two and one-half per cent, or according to the completeness of the plans estimated upon. Any mistake beyond that is made good to the successful bidder.

The Company also act as experts in cases of litigation, figuring quantities, and giving estimates in court; also furnish separate estimates on any or all parts of contract when desired.

The field which this Company have entered is one of special interest to contractors and builders. Each alike are able to test the cor-

rectness of their own work, while many contractors who pass contracts from lack of time to estimate will be able to obtain at once safe and reliable figures on which to base their action. Offices have been opened at 23 Park Row, N. Y., 12 Pearl Street, Boston, Mass., 33 Lyman St., Springfield, Mass., where they will be glad to see interested parties.

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NOTES.

THE Andrews Manufacturing Company, of New York City, which manufactures high-class bank furniture and fittings, has been associated in the public mind with the Chicago house of A. H. Andrews & Co., although it is a distinct corporation, and not financially connected with the Chicago firm for over seven years. The Andrews Manufacturing Company, therefore, has not failed nor made an assignment. The Company is still the Eastern representatives of the product of the Andrews Chicago factories, not on the basis of commissions or consignments, but by actual and exclusive purchase of merchandise for the Eastern States, New York, Pennsylvania, New Jersey and Southern Atlantic Border States, there being a mutual understanding between the two houses as to division of territory. The Andrews Manufacturing Company has very large facilities in its own factory at Buffalo; seven capacious floors, 52,500 square feet, equipped with the most modern machinery and the most expert mechanics in its line of work. The Company makes the same grade of work in the Buffalo

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factory that is made in the Chicago factory. The Company invites investigation of its methods, and will be pleased to submit designs, plans and estimates for bank and office furniture. All grades of good work at lowest prices. The troubles that have fallen on the Chicago house are to be regretted. It seems likely that they are only of a temporary nature, and that A. H. Andrews & Co. will soon be in the field again and in better shape than ever before, the judgment of the Globe National Bank having been already satisfied and the assets more than double the liabilities.

THE Flexible Door & Shutter Co., of Worcester, Mass., have lately completed a pair of Flexible Partitions in oak, for the lecture-room of the New York University Building, to fill an opening 50' wide by 11' 6" high, the largest pair of doors ever made, it claims. They, together, weigh about 2,600 pounds, yet a man can operate them easily. Some idea of their size may be gained when it is suggested that if spread out flat on the ways, the doors will be of ample area for four sets to dance upon.

THE Follansbee Bros. Co., Pittsburgh, Pa., successors to the old established firm of J. B. Scott & Co., have purchased additional ground adjoining the Allegheny Tinning House, and will enlarge their plant. They have already ordered new machinery for this purpose. With this increased capacity, they will be able to fill all orders promptly and keep pace with their increasing business.

OUR readers will regret to learn that Mr. John Williams, so well known as a worker of ornamental ironwork, was recently the victim of a cable-car accident which caused the loss of one of his hands.