THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XIV. Copyright, 1883, JAMES R. OSGOOD & Co., Boston, Mass. No. 411.

NOVEMBER 10, 1883.

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

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THE first day of November was signalized in New York as the date of the adoption of a new schedule of rates by the members of the Board of Fire Underwriters, applicable to all buildings within the so-called "dry-goods district." One of the most important of the new rules requires that shutters of iron or other fire-proof material, approved by the Committee on Surveys, shall be placed either inside or outside of all windows except the front windows of the first story. The shutters are in all cases to be set at least four inches from any woodwork, and those on the front of the building are to be arranged to open from the outside. In cases where no suitable shutters are provided for rear or side windows not opening on a street, ten cents will henceforth be added to the premium rate, and buildings situated upon streets forty feet or less in width, without shutters to the front windows, will be subjected to an increase in the premium charge of fifteen cents. Buildings facing upon streets more than forty feet, but not over sixty feet in width, will be charged a rate of ten cents for dispensing with front shutters, and an increase in the width of the street to more than sixty feet will reduce the penalty to five cents. Why the first-story front windows should be excepted from the general requirement of shutters it is not easy to see, but the new rule will undoubtedly have its effect in promoting the security of such structures. It is worth remarking that the New York building law has for many years required that all mercantile structures should be fortified with fire-proof shutters to every window, except, we believe, the first-story front openings; adding, moreover, the command that all shutters should be securely closed at the end of each business day; but the letter of the law has always been waived so far as to allow stores upon streets forty feet or more in width to be built without any shutters to the front windows.

ANOTHER custom, quite common among careful real-estate owners, is sanctioned under the new insurance rules by an addition of ten cents to the premium rates for buildings not constructed in accordance with it. This is the useful practice of carrying up party-walls five feet above the roof, with loop-holes for the use of men engaged on one side in fighting a fire on the other. In the matter of elevators, which, as sources of loss in conflagrations, deserve more serious attention than any other detail of building, the recent schedule prescribes an addition of ten cents to rates for hatchway-openings not provided with trap-doors, and of twenty cents for open elevators. What the distinction may be between a hatchway and an open elevator we will not undertake to say, but we are glad to see that the cost of either is to be increased, through the addition to the insurance rates, sufficiently to make its use unprofitable. Skylight openings, not protected by iron trap-doors or heavy flooring-glass, will involve the same increase in rates as hatchways; and automatic sprinklers are so far recognized as useful in preventing fires that ten cents will be deducted from the standard rates where they are employed. This, which would indicate that the sprinklers diminish the risk of loss by fire only to the extent of about one-tenth, seems to be very far from a fair estimate of their value to the underwriters, but insurance companies find it advantageous to be always a little blind to the merits of safeguards against fire, and we can hardly look for more from them than a reduction of premium barely sufficient to make their introduction profitable. In the case of the New York dry-goods district, moreover, no dependence could be placed upon the Croton pressure for operating the sprinklers in case of need, and the tanks necessary to supply its place might not receive the care that a mill superintendent would give them.

THE appointment of Mr. Mifflin E. Bell of Iowa as Supervising Architect of the Treasury Department, to succeed the retiring incumbent, Mr. James G. Hill, will, we think, give general satisfaction to the profession and the public. Mr. Bell is a comparatively young man, being only thirty-six years of age, but, as principal assistant of the late Mr. Piquenard, he has had an extensive experience of building operations on a large scale, and for some years was in charge of the work upon the Illinois and Iowa State-houses. He has the reputation of great thoroughness in his work, and certainly no quality could better fit him for the great and complex business of the Government office; while, as an architect, he is said to possess both the ambition and the ability necessary for success.

THE *Iron Age* comments upon the fact that notwithstanding the immense increase during the last few years in the volume of building operations in New York, the business of the so-called "architectural iron foundries," which furnish castings for building work, has steadily declined. The cause of the decline is to be found principally, it thinks, in the general distrust of cast-iron as a fire-resisting material, which has led to the adoption of brick for the fronts of a great number of the most costly business structures in the city. The influence of the Department of Buildings has also, whether intentionally or not, tended to discourage construction in iron, as much by its singular interpretation of the law, in subjecting iron fronts to the rules in regard to thickness originally provided for brick or stone walls, as by a certain passive resistance to anything like originality or novelty in such matters. Although there is something to be said in favor of the general substitution of heavy masonry for the metallic framework which was regarded ten years ago as the type of the common mercantile building of the future, it must be acknowledged that the necessity for admitting the largest possible quantity of light into the interior of such buildings does not accord very well with the conditions of stability for masses of brick and mortar, and while some of the newer brick store fronts are models of skilful balancing of weights and resistances, others show violations of structural laws which must inevitably lead to their ruin before many years.

IN spite, however, of their frail piers, and their gigantic arches, held up only by the neighboring buildings, the most open brick fronts are far from presenting the almost unlimited window surface that can be obtained, at the same time with perfect rigidity and stability, by the use of iron. In the later iron buildings, whose architects had the courage to abandon the imitation of stone, and to use their material frankly as a metal of immense strength, the vertical and horizontal members are reduced in appearance almost to mere lines, the necessary substance being obtained by extension in planes perpendicular to the line of the street. The framework so composed, when bolted together at all the angles, is far more secure against the effect of every external force except fire than a light brick front, and if protected in some of the many ways now known to architects, it would surpass the brickwork even in that respect, without losing much, if any, of its own special advantages. It is a little surprising that this combination should not have come more generally into use for such purposes. The practice of fire-proofing interior columns and girders by coverings of terra-cotta, or wire-lath and plaster, has become very common, while exterior work is left bare; and the beautiful terra-cotta colonnade at South Kensington, built twenty years

ago, still remains the principal, if not the only, example of its class. That there will be before long a revival of iron building can hardly be doubted. In the business part of the great commercial cities of the present day light is too precious to be lost for the sake of architectural effect, and if protected iron can be made as secure against fire as brick, a matter about which there is no question among experts, some real-estate owner, who understands the relation between window surface and rental value, will attempt to use it, and if successful will set an example for others to follow. The course which the new development will take must depend very much upon the architects into whose hands the task of making the first essays may fall. If they are well-trained and enterprising the new problem will be full of interest, and its solution fruitful of future progress in art. If they are cold and dull, looking upon novel conditions as irksome, because thought and imagination are needed to deal with them, the step which they are called upon to make in American architecture will be one toward feebleness and failure.

THE last issue of the Report of the Massachusetts Board of Health, Lunacy and Charity for the Department of Health contains a paper on the Sewerage of Nahant, by Mr. Ernest Bowditch, the engineer in charge of the work. Nahant is a small, rocky peninsula, jutting into the sea from the northern part of the harbor of Boston, and is occupied in great part by rich proprietors for summer residence. Two years ago a very severe outbreak of typhoid fever occurred in the town, eighty cases being reported in a total population of fifteen hundred. The seriousness of the epidemic was hardly understood until the season had closed, but as soon as a comparison of the cases had shown the dangerous condition into which the place had fallen, a vigorous movement was made toward its amelioration. The peninsula has, or had at that time, no public water-supply, and no attempt at sewerage. Water for household use was obtained partly from wells, and partly from cisterns, and wastes were disposed of by means of cesspools or vaults. Naturally the first suspicion of infection fell upon the water-supply, and a great number of analyses were made of well and cistern water, which showed that objectionable contamination existed in more than half of them. The time remaining before the opening of the next summer season was too short to admit of securing a public water-supply, which would have to be brought from the mainland, a distance of eight or ten miles, or sought for in the underlying strata of the peninsula by means of artesian wells; but it was possible to remove the sources of contamination which already existed by means of a system of sewers, and the resolution was promptly taken to introduce these at once. Thanks to Mr. Bowditch's energy, the execution of the work corresponded in vigor with the disposition of the town government, and more than five miles of sewers, with man-holes and flush-tanks complete, were constructed in five months, together with nearly all the private drains, cesspools, grease-traps and fresh-air inlets connected with the sewerage system; while in addition to this work, the foul vaults of the poorer dwellings were cleaned out and filled up, and either movable pails, standing on asphalted floors, or tight, shallow vaults of brick and cement, were substituted; and at the same time certain marshy spots, which received foul water from the neighboring houses, were thoroughly drained.

THE good effect of these measures was seen immediately, and although no change had been made in the wells and cisterns, except to clean them out, not a single case of typhoid fever occurred in the town during the season of 1882 which was not proved to have had a foreign origin. It is true that the summer population was less by some three hundred than that of the preceding year, and also that many of the richer inhabitants, warned by their previous experience, used spring water, brought to them from a distance, for drinking and cooking, but even allowing for these circumstances, the complete recovery of the town from a serious epidemic is remarkable. As an incident of the benefit conferred by the sewers, the immediate improvement of the well and cistern water, which, deriving its original contamination from a slowly saturated soil, might be expected to show the effect almost undiminished for years after the sources of contamination had been removed, is interesting. Actual analyses were made in 1882 of water from many of the wells and cisterns which proved to have been most seriously corrupted, the result showing in many instances a striking change. In most tests, the analyst knew nothing of the source from which the samples came, so that the comparison is quite impartial. In one case, the water, taken in November, 1881, from the cistern of a house in which a very severe case of typhoid fever had occurred, was pronounced "highly dangerous." In 1882 another sample was taken from the same cistern, which showed on analysis a large amount of free ammonia, perhaps due, as the chemist thought, to ammoniacal vapors from the chimneys, but less than one-sixth as much albuminoid ammonia as the earlier sample, and less than one-third as much chlorine, and in general about one-fourth as much residue of all descriptions, and was pronounced to be "a satisfactory water," "from a sound and clean cistern." Of the well-waters, one sample, taken in 1881, from a well not more than twenty feet deep, in running gravel, was pronounced "unfit for use." In February, 1882, just at the time of the commencement of the sewerage work, water from the same well was pronounced "very soft and good," and in July of the same year, it was called "still an excellent water."

LA SEMAINE DES CONSTRUCTEURS reports some very encouraging news from the scene of operations on the Panama Canal, where fourteen thousand men are now hard at work excavating on the line of the great trench. The terrors of the climate have been, with the help of the dry and comfortable sectional houses brought from the United States, in great part overcome, and the well-kept gardens which now surround each house have provided the tenants with European vegetables, to their great benefit and satisfaction. A large majority of the laborers now employed are negroes from Jamaica and the Antilles, who are seasoned to a tropical climate, and have little to fear from the fever; and the laziness which was supposed to be habitual to the race has disappeared with surprising rapidity under the stimulus of payment "by the piece," instead of by the day. A certain sum is paid for each carload of material excavated, and the men, who can in this way easily earn five or six francs a day, exert themselves to the utmost to increase the amount of their gains. For such of the work as can be done by mechanical appliances, the French and Belgian excavating machines have, after a fair trial, proved themselves the best, and have therefore replaced the American excavators; but it is gratifying to learn that another Yankee invention, that of the diamond drill, has shown itself far superior to all its foreign rivals, and will be of much service in rock excavation. The most important of the operations in rock on the line of the canal is the vast cutting of the Culebra, three hundred and ninety feet in depth, the material from which is to be utilized in the construction of the dam across the Chagres River, not far away.

THE scheme of the Pittsburgh glass-blowers for establishing a coöperative manufactory of their own excites a good deal of attention, and many comments, favorable and unfavorable, are made upon it by the daily papers. Among the best of these should be mentioned an editorial in the *Iron Age*, which, with its associated periodicals, may generally be relied upon for sensible and sympathizing interest in everything affecting the welfare of working men. Instead of drawing an imaginary picture of future prosperity for the new enterprise, the editor of the *Iron Age* reminds his readers that such ventures are rarely successful, the men who take part in them possessing neither the persistent courage necessary to sustain them through the discouragements inseparable from the commencement of any business, nor the habits of untiring industry, so little encouraged by the present eight or ten hour system, which can alone lay the foundation for future success; and warns the glass-blowers that "those who are not prepared to make greater sacrifices as proprietors than they were ever willing to make as workmen had better not go into the undertaking." It would be impossible to wish better to the glass-workers who are disposed to try their fortune in the new venture than that they should take this excellent advice to heart; and if they will do so they may be assured that whatever the result may be, their experiment will be productive of nothing but good to them. They may not be able to persist until they reach final prosperity, but if they work diligently and courageously as long as their means will permit, they will find that the effort alone, in developing their intelligence, forethought and self-reliance, has perhaps done more for their future, and for that of their families, than could even a more obvious success in their undertaking.

SPANISH ARCHITECTURE.[1] — III.

CORDOVA (*continued*).

CORDOVA was so essentially a city of the Moors, and so superb a city withal in the victorious times of those brilliant warriors, that even to this day the things which are not, at least in some degree, of Moorish origin seem to an enthusiastic visitor to be intrusions. Even the few beautiful examples of architecture in other styles, notwithstanding their richness, have a somewhat discordant effect, like that of a new full-toned string among the quaint twanging wires of an old harpsichord.

The Plateresque style was very often used with such effect as this. It is the last flickering of the Gothic spirit with increasing adulteration and deterioration (from the Gothic stand-point) by the admixture of newly-imported Renaissance features. When it allows sufficient dominance of either of these motives, so as to contain some elements of unity, it is often very interesting, as for instance, in the doorway of S. Jean Cordova Cathedral. Here, although debased and often meaningless, the ornament is still of Gothic derivation, with scarcely a trace of the Italian influence. It may be taken as a specimen of the architecture upon which the new ideas were soon to be engrafted. In examples of a little later date we find the buttresses becoming disguised as pilasters, and little broken pediments supplanting the crocketed gablets until, in the last Plateresque work, the Gothic element is almost eliminated, and the Renaissance asserts itself; and it must be remembered that the latter had already in Italy and elsewhere progressed through stages of development into those of decline, so that it is not here always distinguishable as "early" or "late" by simplicity or complexity. During this Plateresque period much work was done in adding doorways and façades to the ancient buildings, often, as I have remarked, with little regard to unity of effect; and still more inharmonious are those extravagant abortions in stone and plaster which the later Renaissance here, as elsewhere, reared in that age of financial wealth and æsthetic poverty; and some of these are placed (as was the *coro* of the Cathedral) in such contact with older and truer work that it is evident that the builders thought they were beautifying instead of defacing the architecture which had become old-fashioned. Perhaps it is more excusable in the case of patriots regaining their fatherland from the hated conquerors of another race and religion — it is not surprising that the Christian Spaniard thought he did well in raising *rococo* doorways, and screens, and chapels to change the aspect of the Oriental mosques — yet there seems to have been always some misguided notion of improvement in ignorant humanity all the world over in their treatment of architectural inheritances, down to the times when our Philistine forefathers in England whitewashed the cathedrals; a notion that the work they did made its subject better in some way or other than it was before. Fortunate are the people who, in improving their old-fashioned architecture, have not disfigured it. Many have done so without the excuse which the Spaniards had, — that at least they produced something to record their recovery of possession of the soil and its treasures; something to partly change the aspect of works which were a record of their subjection. Most of the architects who designed the Renaissance additions to Moorish buildings in Cordova and other Spanish cities did this truly, for these works, whether compiled of the dead blank masses of masonry, called by Ford "Græco-Roman," or of the wild medleys of the Churrigueresque have a character different enough from the Moorish to have been highly gratifying to their creators.

There is much of this description inside the Cathedral in chapels, and altars, and retables, and screens; and hard by is a bishop's palace of kindred taste; while nearly every church in the city contains little or much of such wretched design executed in tawdry materials,—theatrical structures of boards, and paint and gilding; bad enough on the stage but pitiable in a church. It cannot be denied that the Renaissance in Spain produced a great deal of beautiful work, and when it stands for itself, not applied to older and different structures, one can often sympathize with its exuberance, and pardon some excesses in that respect, but these examples are to be sought in other localities.

Cordova does not possess much of Renaissance styles that is good. After the conquest of the Moors its wealth and influence, which had already waned from their magnificent proportions of the ninth century, declined rapidly, and the city was never in its Spanish history what it had been under the Moors. One can find, here and there, a Spanish-Italian work of good design in the simpler and earlier manner, but only a very few pleasing specimens of the more elaborate styles. Among the former the tower of the church of San Lorenzo is rather curious. The lower part rises square and plain at the northwest angle of the church, and supports a massive belfry of simple arches and pilasters, with two openings on each side. Upon the pier between these openings comes the weight of the arched upper belfry, which is also square, but set diagonally upon the substructure. As I have already noted of the Giralda at Seville, a square belfry, placed parallel upon its basement retains much of the character of composition of the Moorish towers, but it is interesting to notice how completely the expression is changed by turning the crowning feature this one-eighth of a circle. The grouping and proportions might, perhaps, be better than in this example, but the constructive principles are sound, and it is possibly a suggestion for a better effort in the same direction. The position of the bells low down in the tall arches is very pleasing. [*See Illustrations.*]

Another phase of the revolution in Spain's architectural history, consequent upon the overthrow of the Moors, produced much beauty in works of a style called the Mudejar, of which some examples are to be found in Cordova, although finer and more complete specimens may be seen in Seville and Toledo. It is a kind of fusion of the styles of the two races, more or less complete in different places, and varying, too, in the preponderance of influence of one or other of the two. It belongs to that period when the Spanish re-possession of a city was so new that the influence was only partial, and what there was yet worked in Gothic forms (except as they were modified by Moorish ideas) free from the Italian fashion. Sometimes we see works almost purely Moorish, yet evidently built for Christian purposes, and under Spanish direction. In some other buildings whose style is European in conception, and in almost all the detail, parts will be found which have much of the Eastern character, or even which were clearly designed and executed by men of the alien race; and between these two extremes the Mudejar style proper shows in some instances a complete amalgamation of the motives and spirit of the Gothic and Moorish which had preceded it separately, and, although it is perhaps rare that the balance is so even, it does occasionally produce most beautiful and suggestive results. It is not Gothic in one bit and Moorish in another; not a combination of one with the other piecemeal, but it partakes of the nature of both, while it is in itself characteristic and different from either. Some of this work I thought exceedingly good, and it seems to me that there is in it a good suggestion of how modern architects may better profit by the past than by borrowing directly from it. There is a hint that in seeking to improve our work by study of the ancients it is the essence, the spirit, the expression of a good thing noted in the sketch-book that should be valued, rather than the actual forms and dimensions. The ideas and principles are susceptible of very much wider adaptation than the stones which express them, and if designers will work as did the best of the Moresco-Spanish artists, not imitating, but making the things they wanted with the method of beauty discovered in foreign things, they will more rarely encounter the charge of plagiarism which so much modern work meets with and deserves, when the very lines and compositions of some original work are copied into situations for which they are unfit or inharmonious.

The Mudejar style is of much archæological interest too, in that it shows that less of the race hatred existed than one would expect. It is clear that the Moorish population was not ejected completely from the land along with its kings and armies. The conquerors, men of war, employed the subjugated Moorish artisans in the arts of peace when peace was established, and even for some time tolerated their religion and customs; and not a few only, but in some cities nearly all of the industries were in their hands. Populations migrated slowly in those days, and it was a very gradual change that transformed a Moorish city into a Spanish one, in fact as well as name; so gradual that it was never really completed to the extermination of everything Moorish. Not only the architecture, but the language and habits of the people still retain many evidences of these facts, which will last as long as the stock upon which they are engrafted.

I am sorry that I had not time for a longer study of Mudejar work. I saw much that deserved careful description with pencil and pen. One drawing made at Cordova is given with this — of the west window of the church of San Lorenzo. I think the blending is almost as complete in this as in any example. The window has lost none of the fitness or beauty of a Gothic rose window, while it has taken on a great amount of the grace and delicacy of the Moorish traceries and arches. From one origin come the ideas of the radiating columns, the concentric circles, the cusping of small piercings, and the subdivision of the main arch into moulded and recessed rings; from the other the interlacing character of the tracery, the varying forms of the piercings, and the mode of accentuating the design by lines on the face of the stone. Of course, a purist may assert that the Gothic pure and simple is equally beautiful, and the churchman that it would have been better if undefiled by the Moslem art. That may be true in its way, and yet the style be no more beautiful than either of its parents, since it carries the expression which its makers desired, and which was so natural in them, and, moreover, can at least claim not to have actually lost by its departure from precedent either in utility or beauty. It seems to me to be worthy of some appreciation, for

[1] By Robert W. Gibson, Travelling Student of the Royal Academy. Continued from page 196, No. 409.

similar circumstances have at other times and places produced, and are now producing, far inferior results.

TRANSVERSE STRENGTH OF TIMBER.[1]—I.

IF we consider the amount of literature upon the strength and stiffness of timber beams under a transverse load, it might seem almost superfluous to write upon the subject; but while article after article has been written, transforming and retransforming the formulæ into this or that shape, according as one form or another has seemed most convenient to the writer, nevertheless the experiments which have served to determine the constants for use in these formulæ have been derived from tests made on specimens much smaller than those used in practice. We are thus brought face to face with the question whether it is correct to employ these same constants in determining the proper dimensions of full-size beams, such as are used in practice, in which we have knots, crooked grain, cracks, and general lack of homogeneity.

It was with a view to investigate this question, and also with the view of giving the students practice in actual testing, that a testing-machine of fifty thousand pounds' capacity was arranged to test the transverse strength and stiffness of beams twenty-five feet long. This machine is in operation in the laboratory of Applied Mechanics of the Massachusetts Institute of Technology, Boston, and is used for the instruction of the students.

Up to the present time, sixty-five tests have been made on transverse strength and stiffness, and the results have fully justified the experiments, as the breaking strength of full-size beams as found by experiment are very much less than the breaking strengths as calculated by means of the constants in common use. The deflections under given loads have also been found to be somewhat greater than those ordinarily calculated, and considerably greater, if the action of time be taken into account.

COMMON THEORY OF BEAMS.

In giving an account of these results, and deducing from them the consequences that follow, it will be necessary, in order to make the paper intelligible to all, to develop here the principles that underlie the common theory of beams, so far as to enable the reader to deduce the formulæ necessary to use. I will also give the deduction of some of the formulæ.

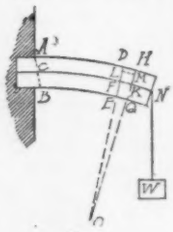


Fig. 1.

The first figure shows a beam fixed at one end and loaded at the other; the second figure, one supported at the ends and loaded at the middle. Let, in each case, the plane of the paper contain any vertical, longitudinal section of the beam. In the first figure it is evident that the upper fibres are lengthened, while the lower ones are compressed; and *vice versa* in the second. In either case there is, somewhere between the two outside fibres, a fibre which is neither elongated nor compressed. Let $C\,N$ represent that fibre in the first figure, and $C\,P$ in the second.

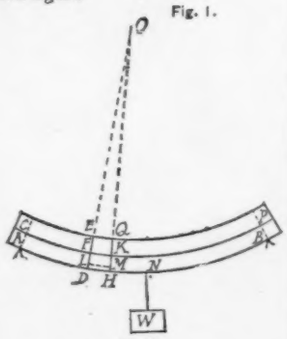


Fig. 2.

This line may be called the neutral line of the longitudinal section, and if a cross-section be made at right angles to this line, then the horizontal line which lies in the plane of the section, and has one point in common with this line is called the *neutral axis* of the cross-section. In the ordinary theory of stresses in beams, a number of assumptions are made, which I will proceed to enumerate:—

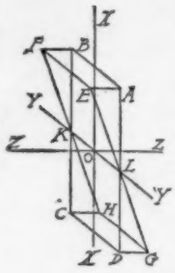
ASSUMPTIONS MADE IN THE COMMON THEORY OF BEAMS.

Assumption No. 1. If, when a beam is not loaded, a plane cross-section be made, this cross-section will still be a plane after the load is put on and the bending takes place. From this assumption we deduce, as a consequence, that if a certain cross-section be assumed, the elongation or compression per unit of length of any fibre, at the point where it cuts this cross-section, is proportional to the distance of the fibre from the neutral axis of the cross-section.

Proof.—Let $E\,D$ and $Q\,H$ be the lines in which these cross-sections cut the plane of the paper, and let O be the point of intersection of the lines $E\,D$ and $Q\,H$. Then let $O\,F = r$, $F\,L = y$, $F\,K = l$, $L\,M = l + a\,l$, where a is the elongation per unit of length of the fibre whose distance from the neutral axis is y, y being a variable; then, because $F\,K$ and $L\,M$ are concentric arcs subtending the same angle at the centre, we shall have the proportion $\frac{OF+FL}{OF} = \frac{LM}{FK}$ or $\frac{r+y}{r} = \frac{l+al}{l}$ or dividing out we have

$1 + \frac{y}{r} = 1 + a$, or $a = \frac{y}{r}$, or $a = (\frac{1}{r})\,y$; but as y varies for different points in any given cross-section, while r remains the same for the same section, it follows that a varies as y, and hence follows the proposition.

Assumption No. 2. This assumption is that commonly known as Hooke's law. It is as follows: The stress is proportional to the strain, *i. e.*, to the elongation or compression per unit of length. As to the evidence in favor of this law, experiment shows that as long as the material is not strained beyond safe limits, this law holds. Hence, if these two assumptions be correct, we shall have:—



At a given cross-section of a loaded beam, the direct stress on any fibre varies directly as the distance of the fibre from the neutral axis. Hence it is a uniformly varying stress, and we may represent it graphically as follows:—

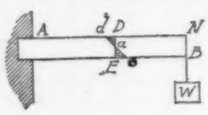
Let $ABCD$ be the cross-section of a beam, and $K\,L$ the neutral axis. Assume this for axis $O\,Y$, and draw the other two axes as in the figure. If now, $E\,A$ be drawn to represent the intensity of the direct normal stress at A, then will the pair of wedges $AEFBKL$ and $DCHGKL$ represent the stress graphically, since it is uniformly varying.

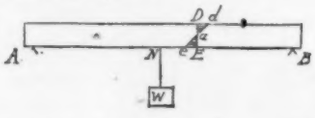
POSITION OF THE NEUTRAL AXIS.

Assumption No. 3. This assumption is that the only resistances opposed to the bending of the beam are the direct tensions and compressions of the fibres.

Making use of these three assumptions, we can show that the neutral axis must pass through the centre of gravity of the cross-section.

To show how this is done, we have the following: Since the curvatures in the preceding figures are exaggerated, in order to render them visible, I have drawn the next two figures:—





If now, we assume a section DE such that $AD = x$ in the first figure, and $NE = x$ in the second figure, and consider the forces that act on that part of the beam which lies to the right of $D\,E$,—*i. e.*, both the external forces and the stresses exerted by the other part of the beam upon this part, we must find them balancing each other. The external forces are, in the second figure:—

1°. The loads acting between B and E, and in this case there are none.

2°. The supporting force at B, and in this case it is equal to $\frac{W}{2}$.

In the first figure they are:—

The loads between D and N, and in this case there is only one; viz., W.

The internal forces are merely the stresses exerted by the other parts of the beam on this part, and they are:—

1°. The resistance to shearing at the section, which is a vertical stress.

2°. The direct tensions and compressions of the fibres, which are horizontal.

Hence, since the forces enumerated must balance each other, and since all are either vertical or horizontal, it follows:—

1°. That the vertical forces must balance each other.

2°. That the horizontal forces must balance each other.

3°. That the tendency of the external forces to cause a rotation of the part of the beam under consideration must be balanced by the tendency of the internal stresses to prevent that rotation.

But the second condition shows us that, inasmuch as the only horizontal forces are the direct tensions and compressions, therefore the total tension must be just equal and opposite to the total compression. Hence, wedge $a\,D\,d$ = wedge $a\,E\,e$. And if these two wedges are to be equal, it can easily be shown by the use of the calculus that the neutral axis $K\,L$ must contain the centre of gravity of the section, whatever be the form of the section; and, if the section be rectangular, it is evident, even without the calculus, that the neutral axis must pass through the centre of the section, for only thus can the wedges be equal.

RÉSUMÉ.

The conclusions arrived at from the foregoing are as follows:—

1°. That at any section of a loaded beam, if a horizontal line be drawn through the centre of gravity of the section, then the fibres lying along this line will be subjected neither to tension nor to com-

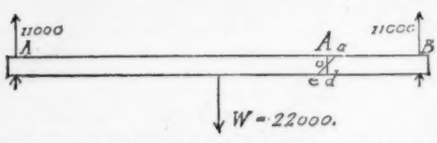
[1] By Gaetano Lanza, Professor of Applied Mechanics, Massachusetts Institute of Technology.

pression; in other words, this line will be the neutral axis of the section.

2°. The fibres on one side of this line will be subjected to tension, those on the other side being subjected to compression; the tension or compression of any one fibre being proportional to its distance from the neutral axis.

These are the fundamental principles of the common theory of the stresses in beams, and I will now proceed to show how to deduce upon this, as a basis, some of the common formulæ for the strength of rectangular beams.

In order to make matters clearer, I will, before deducing formulæ, work out a numerical example. Let us suppose a beam 24 feet long, supported at the ends and loaded at the middle with 22000 lbs. Let the section of the beam be 9 inches wide by 14 inches deep, and let it be required to find the stress at different points. Suppose we set out first to find the stress at the outer fibre, at a point 6 feet from the middle.



Solution. — The total tendency of the external forces to bend the part of the beam to the right of A, about A, is the supporting force multiplied by its leverage, or $11000 \times 6 = 66000$ foot-pounds $= 12\ (66000) = 792000$ inch-pounds, and this is called the bending moment at the section at A; moreover, this tendency must be resisted by the stresses represented by the wedges $A\ a\ o$ — $o\ d\ e$. Now, if we let p represent the intensity of the stress at A, then, since area $o\ A = (9 \times \frac{14}{2}) = 63$ square inches, and since $\frac{p}{2}$ represents the mean stress on this area, and therefore $(63)\ (\frac{p}{2}) = \frac{63p}{2}$ = force represented by wedge $A\ o\ a$. The force represented by the lower wedge is the same. The resultant of each acts at the centre of gravity of its corresponding wedge, a distance of $\frac{2}{3}\ (o\ A)$ from o. This gives two equal and opposite forces, each equal to $(\frac{36p}{2})$ at a distance apart equal to $2\ (\frac{2}{3}\ o\ A) = \frac{4}{3}\ o\ A = \frac{2}{3}\ (14) = \frac{28}{3}$ inches. This gives for the moment of these two forces $(\frac{63p}{2})\ \frac{28}{3} = 294p$.

Since this is the moment that resists the bending moment, we must have: — $294\ p = 792000\ \therefore\ p = \frac{792000}{294} = 2964$ pounds per square inch. If, on the other hand, we require the stress per square inch at the outside fibre at the middle of the beam, we should have for bending moment: —

$11000 \times 12 = 132000$ foot-pounds $= 1584000$ inch-pounds $\therefore\ 294\ p = 1584000\ \therefore\ p = \frac{1584000}{294} = 5388$ pounds per square inch.

If we now substitute letters for the figures in the example, and pass also to the general case, we shall have 1°. If the breadth $= b$ and the depth $= h$, then if we represent the stress at the outside fibre by p, we shall have for the stress represented by the upper wedge $(\frac{p}{2})\ (\frac{bh}{2}) = \frac{pbh}{4}$, and the leverage about o will be $\frac{2}{3}\ (\frac{1}{2}\ h) = \frac{h}{3}\ \therefore$ the leverage of the couple will be $\frac{2h}{3}$. Hence the total moment that resists the bending moment will be $(\frac{pbh}{4})\ (\frac{2h}{3}) = \frac{pbh^2}{6}$.

Now, in all cases of rectangular beams, if M represents the bending moment at any section, or the tendency to turn the part of the beam that lies to one side of the section about a horizontal axis in the section, we must have $M = p\ \frac{bh^2}{6}$ (1).

Hence, if we wish to find the stress at the outer fibre of any section, we must find the bending moment at that section, and then determine the stress at the outer fibre from equation (1).

If, on the other hand, we wish to determine the stress to which the most strained fibre of the beam is subjected, we must first find the greatest bending moment, and then the equation (1) will give us the greatest value of p.

Again, if we wish to find the greatest load that a beam can bear without causing a stress in the outer fibre greater than f, we must determine the greatest bending moment in terms of W, the load, and then put $M = f\ \frac{bh^2}{6}$.

Definition. — The moment of a force about an axis perpendicular to the force is the product of the force by the perpendicular distance between the axis and force.

Definition. — The bending moment at any section of a loaded beam is the total tendency of the external forces to turn that part of the beam that lies to one side of the section about the section; or, in other words, it is the resultant moment of the external forces acting on that part of the beam that lies to one side of the section, these moments being taken about a horizontal axis in the section.

In a beam supported at both ends it is the difference between the moment of either supporting force and the sum of the moments of the loads between the section and that support, all the moments being taken about a horizontal axis in the section.

FORMULÆ FOR BENDING MOMENT.

I will now give a table of bending moments for some of the more common cases of loading of beams. Let, in each case, the length of the beam be l, and the total load W. When the beam is fixed at one end and free at the other, let the origin be taken at the fixed end; when it is supported at both ends, let it be taken directly over one support. Let x be the distance of any section from the origin; then we shall have the following results: —

Description of Beam.	Distribution of Load.		Bending Moment. At distance x from the origin.	Bending Moment. Greatest.
Beam fixed at one end and free at the other.	Single load at free end.		$W\ (l-x)$.	Wl
	Load uniformly distributed.		$\frac{W}{2l}\ (l-x)^2$	$\frac{Wl}{2}$
Beam supported at both ends.	Single load at middle.	Between origin and middle.	$\frac{W}{2}\ x$	$\frac{Wl}{4}$
		Beyond middle.	$\frac{W}{2}\ (l-x)$	
	Load uniformly distributed.		$\frac{W}{2l}\ (lx-x^2)$	$\frac{Wl}{8}$
	Single load at a distance a from origin.	Between origin and load.	$\frac{W\ (l-a)}{l}\ x$	$\frac{Wa}{l}\ (l-a)$
		Beyond load.	$\frac{W\ a}{l}\ (l-x)$	

MODULUS OF RUPTURE.

If a beam be broken, and if, from its breaking load W, the value of f be calculated from equation (1), then is f called the *modulus of rupture* of the material. It would (if all the assumptions made in the common theory of beams, and hence in the deduction of equation (1) held up to breaking) represent the tensile or compressive stress per square inch at the most strained fibres at the time of breaking.

FORMULÆ FOR BREAKING LOAD AND MODULUS OF RUPTURE IN RECTANGULAR BEAMS.

I will next give the formulæ for breaking load in terms of the modulus of rupture, and for modulus of rupture in terms of the breaking load, for some of the most usually occurring cases of rectangular beams.

Let W = Breaking load in pounds.
f = Modulus of rupture in pounds per square inch.
b = Breadth of beam in inches.
h = Depth of beam in inches.
l = Length of beam in inches.

Then we shall have: —

(*A*) *Beam fixed at one end and free at the other.*

1°. Single load at free end, $W = f\ \frac{bh^2}{6l}$; $f = \frac{6Wl}{bh^2}$.

2°. Load uniformly distributed, $W = f\ \frac{bh^2}{3l}$; $f = \frac{3Wl}{bh^2}$.

(*B*) *Beam supported at both ends.*

1°. Single load at the middle, $W = \frac{4}{3}\ f\ \frac{bh^2}{l}$; $f = \frac{3}{2}\ \frac{Wl}{bh^2}$.

2°. Load uniformly distributed, $W = \frac{4}{3}\ f\ \frac{bh^2}{l}$; $f = \frac{3}{4}\ \frac{Wl}{bh^2}$.

3°. Single load at a distance a from the origin, $W = f\ \frac{lbh^2}{6\ a\ (l-a)}$; $f = \frac{6Wa\ (l-a)}{bh^2}$.

When we know the value of the modulus of rupture for any given material, we can compute the breaking load of any rectangular beam of given dimensions, by means of the principles already enunciated, or else by means of the formulæ just developed, if they fall under any of the cases just enumerated.

We have then been told that when the safe load is to be determined by dividing the breaking load by a certain number called the *factor of safety*, that while in iron bridge-work 4 is a suitable factor of safety, that for wood we must use a factor of 6, 8, or 10; indeed, ideas seem rather indefinite as to what this factor should be. The cause of this will, I think, be evident, when we consider that the usual method of proceeding is to determine the modulus of rupture from tests made on very small pieces, and from this modulus to compute the breaking weight of full-size beams.

FORMULÆ FOR THE BREAKING LOAD OF TIMBER BEAMS, THE CONSTANT BEING IN THE FORM USED BY TRAUTWINE AND HATFIELD.

I will give later a comparison of the moduli of rupture as determined from these tests, with those usually given; but will first say that the constant for calculating the breaking strength of rectangular beams is given by different authors in different forms. A form very commonly used is the so-called centre breaking load of a beam one inch square, and one foot long, supported at the ends. This is the constant in the form given by Trautwine, by Hatfield, and by others. To compare it with the modulus of rupture, we only need make $b = h = 1''$, and $l = 12''$ in the formula $W = \frac{4}{3}\ f\ \frac{bh^2}{l}$ and we shall have: $W = \frac{4}{3}\ \frac{f}{6}$, or $W = \frac{f}{18}$.

Hence the value of this constant will be one-eighteenth of the modulus of rupture; if we call its value c, we shall have, $c = \frac{f}{18}$.

Hence calling L the length in feet, the formulæ already given would, if c be used as the constant, become: —

(*A*) *Beam fixed at one end and free at the other.*

1°. Single load at free end, $W = \frac{3cbh^2}{l} = \frac{cbh^2}{4L}$.

2°. Load uniformly distributed, $W = \frac{6cbh^2}{l} = \frac{cbh^2}{2L}$.

(*B*) *Beam supported at both ends.*

1°. Single load at middle, $W = \frac{12cbh^2}{l} = \frac{cbh^2}{L}$.

2°. Load uniformly distributed, $W = \frac{24cbh^2}{l} = \frac{2cbh^2}{L}$.

3°. Single load at a distance a from the origin, $W = \frac{3clbh^2}{6a(l-a)}$.

DEFLECTION OF BEAMS.

While the preceding formulæ refer to the breaking strength of beams, it is better engineering to determine as the safe load of a beam, the load that will not deflect it more than a certain small fraction ($\frac{1}{300}$ or $\frac{1}{400}$) of the span. I shall not enter into the deduction of the deflection formulæ, but will merely write them out, stating first, that these formulæ are based upon the same assumptions as the other formulæ, and the additional assumption that the angle of slope is very small.

Let W = Given load in pounds.
b = Breadth in inches.
h = Depth in inches.
l = Length in inches.
v = Greatest deflection in inches.
E = Modulus of elasticity of the material in pounds per square inch.

(*A*) *Beam fixed at one end and free at the other.*

2°. Load uniformly distributed, $v = \frac{5}{32}\frac{Wl^3}{Ebh^3}$; $E = \frac{5}{32}\frac{Wl^3}{vbh^3}$.

1°. Single load at free end, $v = \frac{4Wl^3}{Ebh^3}$; $E = \frac{4Wl^3}{vbh^3}$.

2°. Load uniformly distributed, $v = \frac{3}{8}\frac{Wl^3}{Ebh^3}$; $E = \frac{3}{8}\frac{Wl^3}{vbh^3}$.

(*B*)

1°. Single load at the middle, $v = \frac{1}{4}\frac{Wl^3}{Ebh^3}$; $E = \frac{1}{4}\frac{Wl^3}{vbh^3}$.

The above formulæ enable us to determine the deflection of a beam under a given load, when the modulus of elasticity of the material is known, or to determine the modulus of elasticity of the material from the observed deflection.

SHEARING FORCE IN BEAMS.

The *shearing force* (technically so called) at any section of a loaded beam is the tendency of the part on one side of the section to slide by the part on the other side. In a beam fixed at one end and free at the other, it is the sum of the loads between the section and the free end. In a beam supported at both ends, it is the difference between either supporting force and the sum of the loads between the section and that support.

LONGITUDINAL SHEARING OF BEAMS.

Besides, and consequent upon this tendency to shear along a vertical plane, there is, in the case of a beam under a transverse load, a tendency to a longitudinal shearing along the horizontal layers, the intensity becoming greatest at the neutral layer. I shall not enter into a discussion of the formulæ for the intensity of this shearing force, but shall merely give the formulæ for its greatest intensity in the case of rectangular beams.

In any rectangular beam, the greatest intensity of the longitudinal shearing force at any section, *i. e.*, its intensity at the neutral axis of the section is, if we let F = shearing force at the section technically so-called, in pounds: —

b = Breadth of beam in inches.
h = Depth of beam in inches.

$$\frac{3}{2}\frac{F}{bh}.$$

In the case of a beam supported at the ends, and loaded at the middle with a single load, we have, for all sections except the middle, $F = \frac{W}{2}$ and hence, if we denote by i the greatest intensity of the longitudinal shearing force at the neutral layer, we shall have $i = \frac{3}{4}\frac{W}{bh}$ (1), and this is the intensity of the shearing force at all points along the neutral layer, except at the middle section, where it is zero.

In the case of a beam supported at the ends, with the load uniformly distributed, the greatest intensity is that at the support, and is also given by equation (1), but decreases gradually to the middle.

Having given this much in the way of theory and formulæ, I will next give a summary of the results of the tests, and then follow with the tables of results of the individual tests.

THE ILLUSTRATIONS.

COMPETITIVE DESIGN FOR A MONUMENT TO THE CONFEDERATE DEAD, NASHVILLE, TENN. MR. HENRY O. AVERY, ARCHITECT, NEW YORK, N. Y.

In the absence of any recognized emblems of an established government, the late Confederacy of Southern States is here simply recalled by an attic of discs (five in front, five in the rear) on which are placed the names of the ten individual States in the order of their oath of allegiance. The State of Tennessee is personated by a bronze emblematic figure, which clasps to its breast a group of swords representing the principal grades of officers of the Southern army. Total height, forty feet; material, light Indiana limestone.

ST. LORENZO, CORDOVA, SPAIN; TOWER AND ROSE WINDOW. DRAWN BY MR. R. W. GIBSON, ARCHITECT, ALBANY, N. Y.

For a description see the article on "Spanish Architecture" elsewhere in this issue.

HOUSES OF D. W. GIBBS, ESQ., AND D. L. STINE, ESQ., TOLEDO, O. MESSRS. D. W. GIBBS & CO, ARCHITECTS, TOLEDO, O.

THE ALBANY CHAMBERS, MONTREAL, CANADA. MR. THOMAS C. SORBY, ARCHITECT, MONTREAL, CANADA.

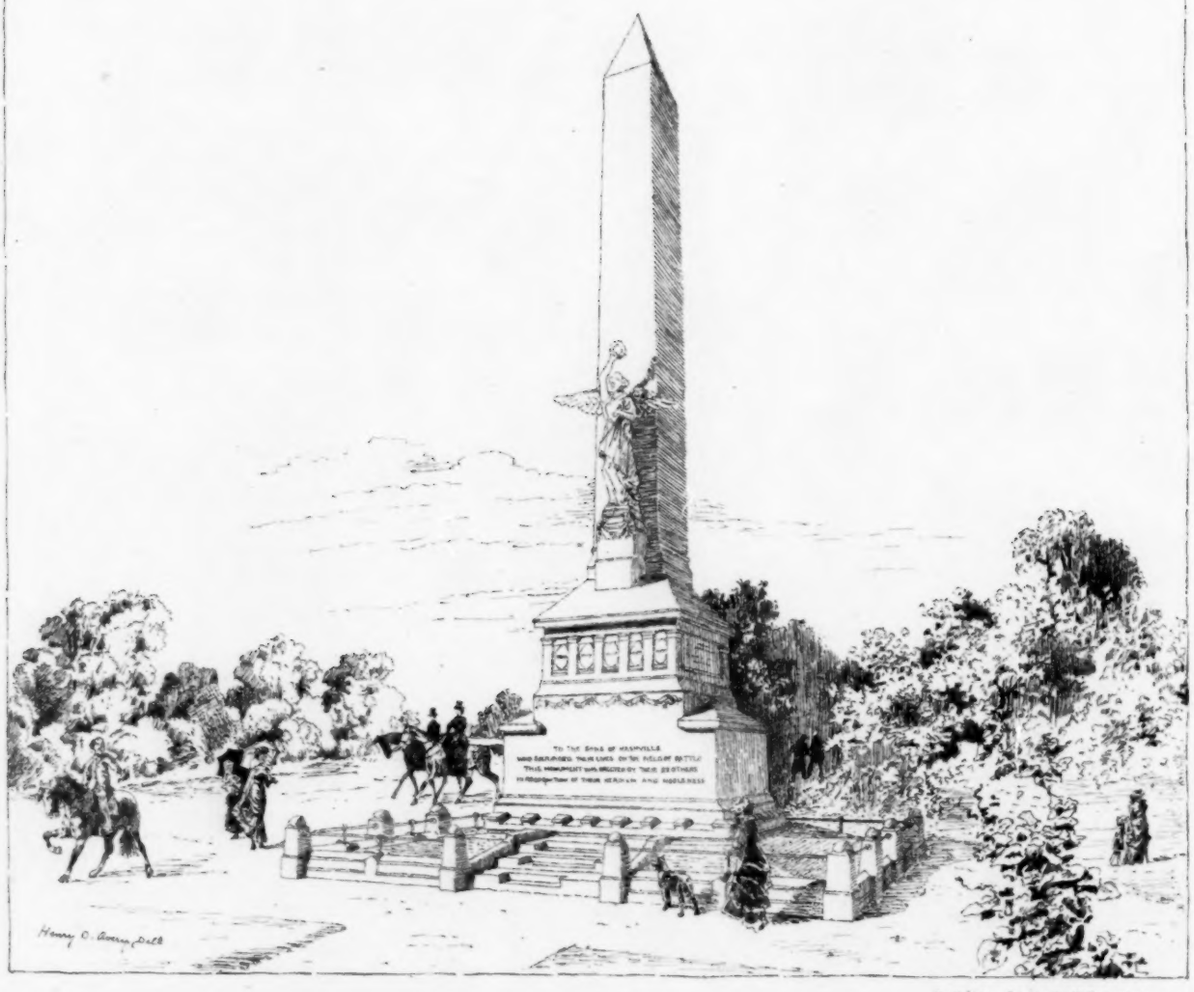
THE GERMAN NATIONAL MONUMENT.

On September 28, the National Monument on the Niederwald, overlooking the Rhine, was unveiled by the Emperor of Germany. The idea of such a monument was, says a correspondent of the *Times*, mooted to Prince Bismarck by Count Eulenburg so early as the day of the signature of the Peace of Frankfort. Warmly approved by the Chancellor, the project soon after passed into the hands of an executive committee, which converted it into a resolution that received support throughout the nation. In the spring of 1872 the artists of all Germany were invited to send in models of a monument that would best express the idea and object of its erection; but though three of the twenty-six competitors were awarded prizes of honor, the jury declined to adopt any of their sketches. A second competition had no better result; but at last, in April, 1874, the jury expressed themselves thoroughly satisfied with the architectural and sculptural plan of Professor Johannes Schilling, of Dresden, who was thereupon authorized by the grand committee, under the presidency of Herr Benningsen, chief of the National Liberals, to proceed with its execution.

The cost of the monument, which is not expected to exceed the estimated sum of 1,100,000 marks, or £55,000, has been covered partly by public subscription, and partly by Parliamentary aid. As much as 240,000 marks had been collected by 1874, but there was a falling off in the contributions in the reactionary era ensuing on the *Gründerzeit*, or time of rash and not over-honest commercial speculation prompted by the receipt of the French milliards; and though by 1878 the above sum had increased to 665,000 marks by the accumulation of interest, the sale of photographs, and the collection lists of schools and veteran societies (*Krieger-Vereine*), the Reichstag in the following year saw itself compelled to vote a subsidy of 400,000 marks in order to insure the completion of the enterprise. In 1876 the necessary ground was purchased; in September of the following year the foundation stone was laid; and now the finished monument stands flashing high and far "on free hill-top by German stream" in all its proud and noble beauty.

The tourist as he passes up or down the river cannot but be struck with the shining monument away up on the Niederwald brow, but it is only when he has toiled up to it that he can take in all its expressive character and truly beautiful proportions. A colossal statue of *Germania*, said to be an idealized copy of the artist's own daughter, clad in a flowing girdle-bound robe, her left hand resting on the hilt of a drawn but laurel-sheathed sword, and her right holding high a laurel-wreathed Imperial crown — that is what surmounts the huge statuary edifice and first fetters the eye. Beneath her mantle, which is richly embossed with historic symbolism, can be seen a coat of chain mail, over that being a steel breast-plate blazoned with the spread eagle, and she is standing before an Imperial or curule throne, or chair. Underneath, on the pedestal is the inscription, "In memory of the unanimous and victorious rising of the German people and of the restoration of the German Empire, 1870–71." On the one side of the pedestal are the names "Weissenburg, Wörth, Spicheren, Courcelles, Mars-la-Tour, Gravelotte, Beaumont, Sedan;" and on the other, "Strassburg, Metz, Le Bourget, Amiens, Orleans, Le Mans, St. Quentin, Paris." A succession of well-laid-out terraces and flights of steps leads up to the foot of the monument, the front basement of which presents two very large and finely-sculptured recumbent figures — the Rhine and the Moselle — the former in the shape of a Father Neptune-looking old man offering a cornucopia to his companion, a lovely nymph with an oar or rudder in her hand. Above that on the first socle is a magnificent relief group representing "Die Wacht am Rhein," flanked at the corners by two outstanding figures, *War* and *Peace*, each about 6 metres high — the former, an allegorical character, partly Mercury, partly mediæval knight, with blastful trump in one hand, and sword in the other; the latter, a mild and modest angel maiden, holding out an olive branch in one hand and the full horn

Competition for Monument to the
Confederate Dead, Nashvillee, Tenn.
Premiated—Design by Henry O. Avery, Archt N.Y.

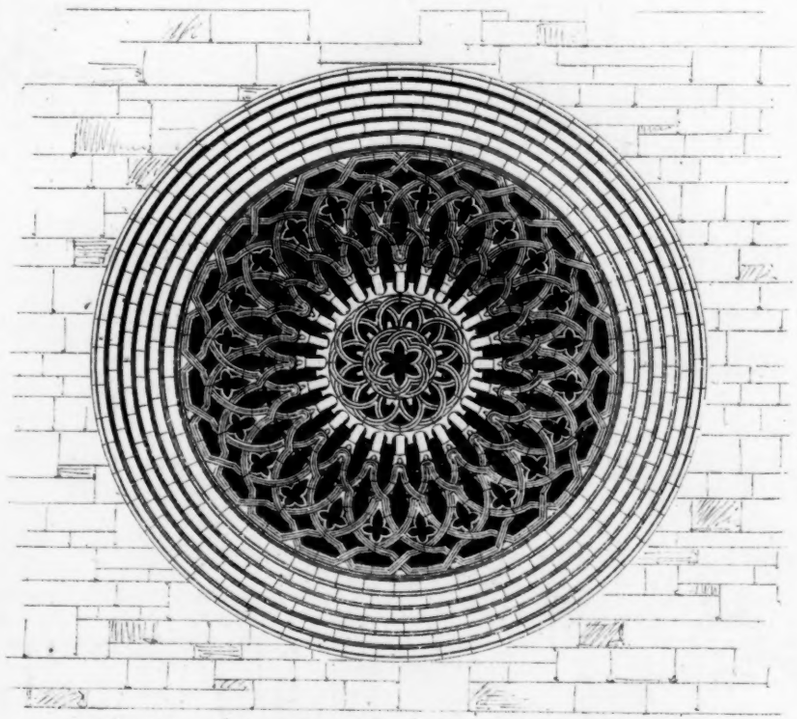


The Heliotype Printing Co. 211 Tremont St. Boston.

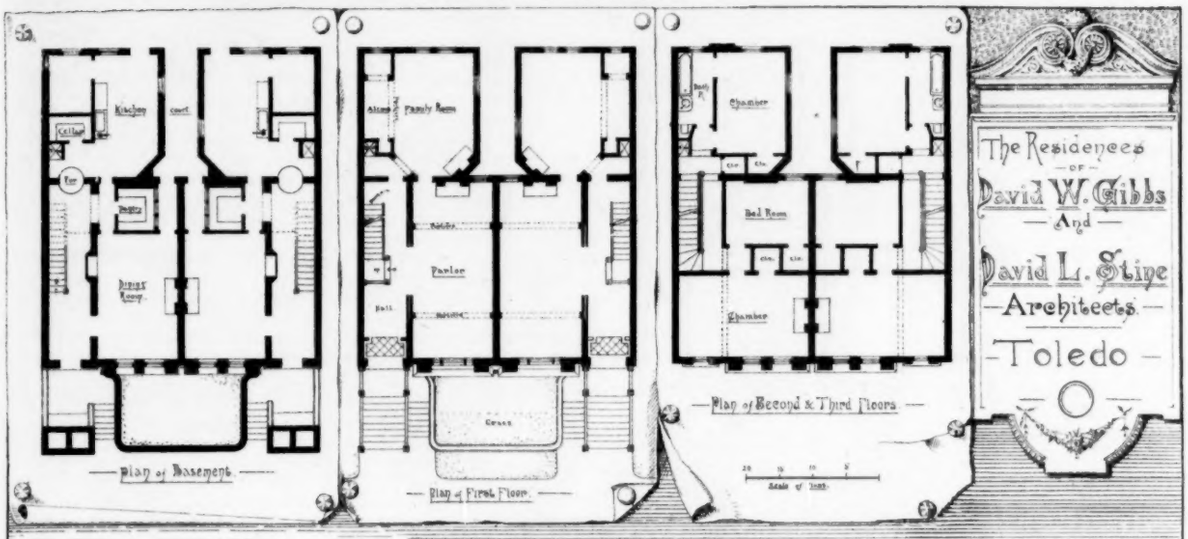
AMERICAN ARCHITECT AND BUILDING NEWS, NOV. 10, 1883. No. 411

Ch: S. Lorenzo · Cordoba : Spain.

Window in W. End.



Robert W. Gibson.
8 April 1880.



of peaceful blessings in the other. Between the two is the front façade, representing the "Watch on the Rhine" — a faithfully and splendidly-executed relief group. In the centre is the Emperor William on horseback against a background of the banners of the chief German cities, flanked on either side by the chief princes and generals, corps and divisional commanders, and statesmen — nearly two hundred in number — who helped by word, or deed, or counsel to found the Empire. The Kings of Saxony and Bavaria, the Crown Prince, Prince Frederick Charles, Bismarck, Moltke, Roon, and all the rest of the kaisers, princes, knights, and paladins are there — true to the life in breathing bronze; a rich storehouse and infallible standard in every respect; an Elgin-marble slab, so to speak, of the German nation. In the corner of the façade relief next the figure of *War* is a group of combatant German soldiers, while on the other side near *Peace*, warriors are shown in their career of victory. Beneath the group are inscribed five verses of the "Wacht am Rhein" — happy and thrice-to-be-envied poet to have his verse thus immortalized in bronze! — with the refrain in larger letters in one line under the whole: —

> Lieb' Vaterland, magst ruhig sein,
> Fest steht und treu die Wacht am Rhein.
> (Dear Fatherland, thou needst not fear,
> Stands firm and true thy Rhine-watch here).

On one side of the socle which bears the above described front façade another magnificent relief group represents the departure of the soldiers for the war, and their affecting leave-taking of parents, wives, and children; while on the other side is a similar portrayal of the return home of the laurel-crowned warriors. Above the Emperor, and in front of a second die, sits perched a huge eagle — nearly 2½ metres high — with outstretched wings and the Imperial shield on breast, while round the socle are hung the arms of all the chief States of Germany, above them being the iron cross, with various sorts of wreaths and garlands; and surmounting all, the colossal far-flashing statue of *Germania* — powerful, victorious, and proud. From the socle to the crown the monument measures about 25 metres. The *Germania* itself has a height of nearly 12 metres, and weighs 700 cwt. Its little finger can be spanned by two adults only; its thumb-nail is 7 centimetres broad and 11 long. A man can creep through the hollow of the wrist, and inside the lower part of the body, ten couples can conveniently dance. The sword is 8 metres long, and weighs from 5 cwt. to 6 cwt. That the monument should have been devised and completed in all its parts within eight years is justly regarded as a brilliant proof of German industry and perseverance. The technical and architectural difficulties to be overcome were immense. For the building of the lower part of the edifice stones of immense weight — some of them all the way from the Leutoburger Wald, weighing 900 kilogrammes — had to be dragged up the Niederwald slope by teams of a dozen and eighteen horses. For the modelling of the various parts of his masterpiece, Professor Schilling, of Dresden, had to erect huge scaffoldings; and when finished they were distributed among various German foundries to be cast. The moulding of the *Germania* fell to the lot of Herr von Miller, of Munich, and when triumphantly turned out, like Schiller's "Bell," the question was how to transport it to its destination — by road or rail? The latter method being eventually chosen, the various portions of the statue were conveyed with laborious precaution as far as Rosengarten, opposite Worms, where legend fables the Nibelungen Hoard to lie embedded in the Rhine's pellucid depths, and there "the epic in bronze and stone" was confided to the river. Ringing cheers and salvos of cannon greeted the huge barge and its precious burden all down the Rhine to Rüdesheim, where it safely arrived, and was gradually hauled and pushed up the Niederwald slope by strenuous and sweating teams of men and horses. But would the scaffolding bear the weight of the colossal metal fragments that had to be hoisted aloft? This was first successfully tested by the swinging up of 11,000 kilogrammes of iron rails, then the main portion of the *Germania*, weighing 8,500 kilogrammes, was carefully elevated; and within a month of their removal from Munich, all the pieces had been triumphantly raised on high and fitted together. Though attended with great difficulty and danger the laborious enterprise was accomplished without any loss of human life, the only serious mishap that marked its progress being the overthrowing of a heavy scaffold crane by a thunderstorm.

Such is a brief sketch of the work, but brief as it is it will speak volumes for the workman who will henceforth take rank with the world's greatest masters of plastic art. Professor Johannes Schilling, of Dresden, the Florence of the North, is a Saxon by birth, and was born in 1828. After studying with Rietschel he made his début as a sculptor in 1851, with a beautiful group — "Amor and Psyche." Working then at Berlin with Drake — the artist of the Victory Column — he produced a pair of relief medallions, "Jupiter" and "Venus," which procured him a travelling scholarship; and the result of the two years' residence in Italy which he was thus enabled to spend were his "Wounded Achilles" and his "Centaur and Venus." Returning to steady industry at Dresden, he turned out in rapid succession a variety of high productions; and on the death of Rietschel undertook the execution of the City of Spiers figure for the Luther Monument at Worms. Tourists will remember with equal admiration his "Four Seasons" on the Brühl Terrace at Dresden, his Schiller statue at Vienna, his Maximilian statue at Trieste, and his War Memorial at Hamburg, not to mention other creations, which have now all been surpassed and crowned by his Niederwald monument — a work which will immortalize its author as it will perpetuate the memory of the events whereof it is the record in eloquent marble and breathing bronze.

The National German Monument has cost £59,600. The principal expenses were as follows: site, £5,650; custodian's house, £990; garden, £1,750; pedestal, £16,750; candelabra and inscriptions, £450; models, £10,500; statue of Germania, £8,787; War and Peace, £3,000; Rhine and Moselle group, £1,750; escutcheons, £544; eagle and wreaths, £1,347; large reliefs, £2,565; small reliefs, £1,065; supervising architect, £1,550; competition, £1,350; and administration, £1,550. — *The Architect.*

WHAT SHOULD THE AMERICAN ARTIST PAINT?

AN article in your issue of October 20, entitled "A French Critic on Current French Art," suggested many thoughts that have long lain dormant, and only needed the justification of such an article to see them in print. What I now write is not written in any controversial spirit; for there are many nuggets of wisdom in M. Bigot's observations, which, by the way, Mrs. Van Rensselaer has deftly rendered in English. I merely use the article for a pretext — a *raison d'être* for discussing a subject of vital importance to the world of art, and, by analogy, to the world of letters. The boundary lines betwixt art and literature have been so definitively drawn by Lessing, in the "Laocoön," that anything any one might write thereon would be purely an act of supererogation. What M. Bigot says is to the point, but for a fuller exposition of the fallacies of literary art, let the reader turn to Lessing's pages.

What should an artist paint? He should paint what he feels when his choice is free, and should feel his subject when it is not free. Better the timely renunciation of an unfelt scheme, than disastrous discomfiture in its execution. To counterfeit the feeling of others will not suffice; Mrs. Van Rensselaer signals this danger to our artists abroad. Rather be a *bona fide* American than a sham Frenchman. Our feeling for subjects indigenous to France is but cultivated, the feeling of a feeling. Let our transatlantic students stock their minds with the experience of the past and the present; let them saturate themselves with the great creations of the great schools, — never neglecting Italy of halcyon days, — and then let them return home to adapt themselves to their native environments — environments far more suitable to their physical, mental and artistic growth than those of foreign climes.

To stake out the confines of pictorial subjects, except perhaps where they trench on literature, is dogmatic, and dogmatism either in art or literature is to be deplored. The creative power should be allowed the widest range. The excesses of a few will be more than counterbalanced by the conservative variety of the many. To say that modern art should confine itself to contemporary life is to shackle it with chains as ponderous as those of the official academy. Many a sweet and poetic imagination would die of inanition. What does inspiration mean? Does a man chase an inspiration? As well chase a shooting-star. The inspiration comes to a man, is breathed into his being, germinates there, and manifests itself objectively through the medium of his controlling hand. Say to that man: "Receive only the impressions of the life about you, only of what you see and hear," would be almost tantamount — almost — to saying: "Shut out every entrancing souvenir of the past, every mystic vision of the future, every dream of the beautiful, the creative, the heroic." Men will eternally feel such subjects; the number and calibre of those who have felt them is significant. Realism or no realism, will the time ever come when life-worn human nature will cease to yearn for the ideally beautiful? Fancy how exquisitely, yet profoundly, a few bars of noble music agitate us; yet nothing is more purely ideal than music. We are as keenly sensitive to the abstractly beautiful to-day as we ever were, though we may be more modest in the expression of our sensibilities. "Contemporary life," by all means, especially for those who feel it; but contemporary life alone means the ostracism of many generous natures, and these not the least intelligent, from the ranks of art. Take care, or those ranks will be metamorphosed into a well-trained legion of hewers-of-

wood. Millet painted the peasant because he felt the peasant, because he *was* a peasant; but isn't it rather mortifying to see a band of intelligent young fellows who do not feel peasants, and are not peasants, painting peasant life? Peasant life is picturesque, of course, and interesting as all human nature is interesting; but picturesqueness is but a small factor in art, and should be reserved for men of commensurate inspiration. I do not for an instant mean to confound the study of life, high and low, as a means — all the celebrities did that — I am referring now to the depicting of picturesque life as an end.

Primarily it is the *style* that is the epoch, not the subject. Certain subjects of course have their cycles of popularity, but the distinguishing characteristic of any particular epoch is the style. The gods of Rome and of the Renaissance claim the same nomenclature, but what else have they in common? They were the mere vehicles of current ideas and current methods. Giotto limned the Madonna, so did Raphael, and the epoch has indelibly limned her signature to either work. Greek following Greek sculptured the same divinity, each perfecting his predecessor's work, till perfection was attained, and scholarly archæology, thanks to the style, has classified them all. Did the Hellene hesitate to draw his inspiration from the chaotic past? True, he pictured contemporary life as well — manly, athletic contemporary life; the two things were not inconsistent. We, by the way, might well imitate them in their choice of contemporary life, pictorially the grandest phase of it, not the meanest; for we, too, have our high-bred athletes. The mighty men treated subjects as hackneyed as any of to-day, probably much more so. Little recked they; *to see them well* was their problem. These stale topics gave them opportunities for artistic expression that no contemporary life could have offered. Who could confound the Antigone of Vittorio Alfieri with the Antigone of Sophocles? Yet we could ill spare either. Is George Eliot's "Romola" less precious or less modern because the scene is laid in the Florence of Savonarola? Could Henry Esmond be spared? What could be more shop-worn than the plots of Shakespeare? Yet who cares? They are but the media of his thoughts. His style rings with the life about him. When the style is shop-worn, too, then all is hopeless.

The Academy fell into disrepute not altogether because the subjects grew stale — this was an effect rather than a cause — but for the reason that the style became hopelessly conventionalized, absolutely foreign to anything like nature; no one dreamed of looking at her through his own eyes. Even the Academy inculcated some sage doctrines, well known to monumental artists, and respected by them, which have been smothered in the general entombment. A picture now on exhibition in this city, by Regnault, "Automedon, the Horse-Tamer," an heroic poem, tingling with inspiration, is really the Academy's offspring. Not that it is cold and bloodless as its children were a half-century ago; we are too intimate with nature, now-a-days, for anything of that sort — the glacial period has long since passed — but the forms of Automedon are eloquent with the happiest maxims of the schools whose tendency abroad has been to encourage epics, which but few individuals have the hardihood to undertake on their own responsibility in this country. The truth is we are not now and here in love with form, a love that generally comes with knowledge, and is far less intuitive than the love of color. At times one almost fears that drawing — not purely imitative drawing, but artistic drawing — will be relegated to the realms of the lost arts. Decoration may yet save us, for monumental work implies purified, dignified and well defined forms. Monumental artists must respect certain traditions, their inspirations of course being drawn from Nature; any attempt to the contrary, when the novelty is worn off, will prove a failure, especially when it is borne in mind that each generation in matters of taste is anything but charitable towards its immediate predecessor.

Traditions menace us but little. We are free, self-reliant, and in constant intercourse with nature. We are in entire sympathy with the revolution organized by Constable, Corot, Rousseau, Courbet, and their successors. But the revolutionists must not overreach themselves; their remedies may prove too drastic. As I have just observed, there is no fear that we shall be too academic; our danger lies in an opposite direction. The picturesque element is now in vogue. Impressionism, to which we owe much, and naturalism, are opening the ranks to all sorts and conditions of men and women, who are not content with the humbler emoluments of art — with the industrial arts for a profession, so much more sympathetic to people of taste than the non-artistic trades; men and women who have neither the ability, perhaps, to think a noble thought, nor the patience to learn to express it. Art-schools tell this story to those who know them well. This is plain talking; but we ought to rid art of all its glamour when we counsel possible aspirants to artistic fame. There is going to be, if there is not already, a disastrous glut in the art-market, and a cruel selection of the fittest.

That picturesqueness is in the ascendancy merely means that it claims for itself a majority of artists; but in art, as in politics, there should always be an opposition, an intelligent minority. This is the day of liberalism. There should be the same catholicity in art as there is in religion. Let us have all things as men feel them. Let us have the epic — if by great good luck we can have it — and the historical; let us also have naturalism and impressionism. Each will work to the advantage of the other, just as water-colors have worked to the advantage of oils, though there was a time when they sought to devour one another. The past has told its story too well, servilely to imitate its style. Though we have lost in many respects, perhaps the most important, we have gained in others. There may be a little less formal art, but there is a great deal more nature. We have gained in quality, in texture, in light. It seems as though the genius of art had said: "Let there be light." Little matters it what we paint — saints, nymphs, peasants, or clerks — provided we inundate them with our modern life and light. In the broadest significance of the word, we are about as religious to-day as we ever were — more religious, perhaps — and it is safe to say that we can paint religious subjects with as much feeling, certainly, as did the pagan painters of the Renaissance. They felt their subjects æsthetically; so can we. We can also feel them religiously, not superstitiously. Mythological subjects are but the vehicles of a phase of artistic feeling difficult to express in other ways. Why eliminate them? Why eliminate any true inspiration? However much any one may yield the preference to contemporary life, let him deem it but a preference, not a formula. The imagination is too subtle, too freakish, ever to be guided within restricted bounds. Such a guidance would be but a repetition of the fatal error of the Academy, and art would become monotonous and tiresome. The distance-levelling inventions of modern times have already tended to induce uniformity. Decentralization has always been more fruitful in good works than centralization. Diversity of subject should be encouraged rather than discouraged, and contemporary life, while influencing all of us at all times, should only be depicted when we are in the mood for it. However, all preaching and writing to the contrary notwithstanding, pretty much every artist will paint what he wants to, which is equivalent to saying that he will paint what he feels.

Frederic Crowninshield.

SANITARY PLUMBING.[1] — VII.

(*e*) "SIPHON"-CLOSET.

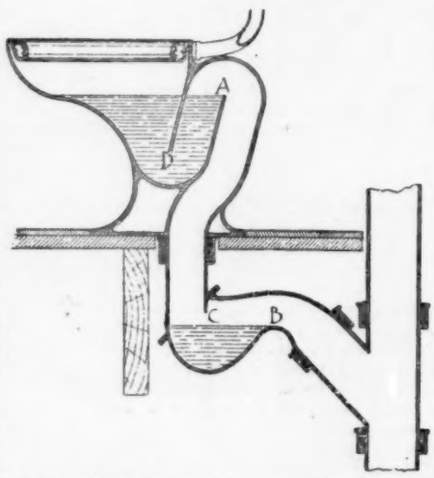


Fig. 16. — "Siphon"-Closet with Water-Chamber below Floor.

Figures 16 and 17 represent a type of closet in which the wastes are discharged by siphonic action. A weir-chamber is used below the trap to assist in charging the siphon.

In Figure 16 the weir-chamber is shown below the floor, and made in a separate piece from the rest of the closet. In Figure 17 the weir-chamber is placed above the floor, and made in a single compact piece with the rest of the closet.

In order to charge the siphon the water is let into the basin through the supply-pipe and the flushing-rim until it overflows the outlet of the trap, and falls into the weir-chamber below. If the quantity is sufficient it closes the inlet of the weir-chamber before it can escape through the outlet. This prevents air from entering the siphon. The air already there is carried out by the current of water, and the siphon is formed. As soon as the water in the bowl descends to the bottom of the dip of the trap air follows it and breaks the siphon; then the contents of the weir-chamber fall below the inlet, and allow the air again to enter the siphon: the bowl is refilled by the after-wash.

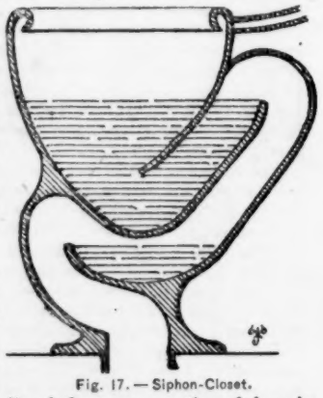


Fig. 17. — Siphon-Closet.

These closets are ingenious, and so far as the writer's experience with them goes, the better forms produce invariably the siphonic action in the manner described; but since the siphon is broken when the water reaches the bottom of the dip of the trap, a portion of the soluble and lighter parts of the waste matters must return to the bowl, and may fail to be removed by the after-wash. Nevertheless, a strong and well-regulated after-flush may remedy this defect, and the improved forms are certainly to be preferred to any closet heretofore described.

[1] Continued from page 200, No. 409.

(*f*) "WASH-OUT" CLOSET.

Wash-out closets are those in which the basin is made to hold a certain quantity of standing water while the trap is placed below its level, usually entirely below the bowl. The outlet from the basin into the trap is above the level of the standing water. Hence, these closets are sometimes called "side-outlet" closets.

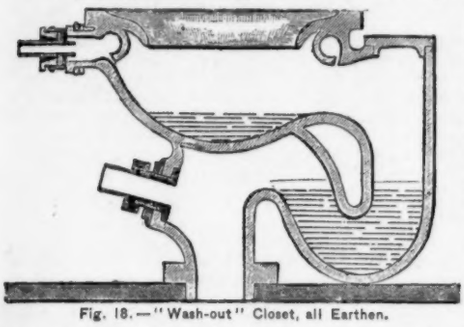


Fig. 18.—"Wash-out" Closet, all Earthen.

In Figure 18 is shown a wash-out closet made of a single piece of earthenware, and having the supply-pipe opposite the outlet into the trap.

In Figure 19 the same kind of closet is shown with an earthenware body and an iron trap, and having the supply-pipe in the rear. These closets have of late become the most popular of the sanitary water-closets. The flushing stream sweeps across the bottom of the bowl with irresistible force, and drives everything before it into the trap. Whether or not the trap itself be emptied depends upon the length of time the flushing is continued after the bowl is cleared. In consideration of their simplicity, and of their uniformity and certainty of action, they are to be placed even higher than the last.

Unfortunately, however, they have several serious defects, of which some might be remedied, while others are inherent in the principles of their construction and operation.

Most important of these is the faulty method by which they are connected with the drain-pipe. In the majority of these closets, as also of all the hopper-closets, except the siphon-closet, Figure 16, (whose connection with the soil-pipe is made on correct scientific principles,)

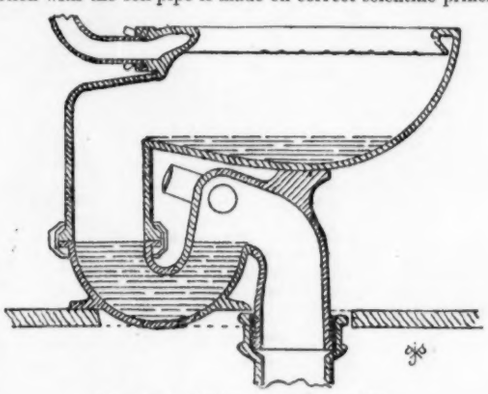


Fig. 19.—"Wash-out" Closet: Iron Trap.

this connection is so made that a shrinkage or settlement of the floors is extremely likely to cause a leak. Most of them depend upon the strength of an earthenware flange to receive the pressure of the screws or bolts by which this joint is tightened up. Such a material is totally unsuitable for such a purpose. An iron flange-joint, such as is used for steam-pipes, is the only one proper for this purpose.

A *second* important defect of this, and all the other hopper-closets thus far mentioned, is the excessive noisiness of their flushing.

A *third* defect lies in the extravagant consumption of water. The power is not scientifically applied to good advantage. Of the water which rushes across the basin only a portion takes effect directly upon the waste matters; the rest spends its force upon the sides and back of the bowl to no advantage, and rebounding amuses itself in twirling the lighter substances about in small eddies for a time before it shoots them into the trap.

In a perfect system of flushing no water should be wasted. Every drop should serve a useful purpose, and devote its entire energy to ejecting the wastes and the wastes only, solid and dissolved, but not the pure water.

A *fourth* defect is in the presence of the extended pipe surface between the basin and the trap, and of its upper corners near the clean-out opening, which partakes of the nature of a receiver. It would be better if this dry pipe or canal were not required. The smaller and more compact the surface of a water-closet is the better. The trap is deep and somewhat inconvenient of access when it is necessary to empty it of its water, as is the case with water-closets of summer residences which are to remain unoccupied during the winter.

A *fifth* defect, not often touched upon by sanitarians, is the length of time required for flushing. The water does not begin to act until quite an appreciable time after the handle has been pulled, whereas its action should be instantaneous, and the flushing be complete even though the handle be immediately released, otherwise, in many cases of careless usage the flushing will be neglected.

A *sixth* defect is in the spattering occasioned by the violence of the water-flow of these closets.

A *seventh* defect is in the position of the trap, being such that the water is partially and in some of them wholly out of sight, so that it is impossible to know the condition of its contents, or even if it retains its water-seal.

An *eighth* defect is in the unfitness of its material.

A *ninth* is in the want of a tight and rigid frame for its protection, connections and support of its seat.

A *tenth* is in the want of any provision to restore its water-seal in case of its loss through evaporation, siphonage or other causes.

An *eleventh* is the want of any provision for conveniently emptying all parts of the closet of water, as is desirable in summer residences in case of disuse during the winter, or at times of severe frost, and leaving the trap secure against the entrance of sewer-gas.

Finally, a *twelfth* is the difficulty and expense of accurately moulding and baking the earthenware, of which hopper-closets have hitherto been made, in pieces large enough to serve the purpose for which they are intended.

These defects are none the less important because custom has rendered many of us oblivious to them. We have, therefore, made an effort to remedy them, with what success will be seen in the next chapter.

BOOKS.

BUFFALO, N. Y., October 29, 1883.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Gentlemen,— Will you kindly state how soon we may expect the publication of the papers on "Building Superintendence," in book form? Very truly, G. F. H. BARTLETT.

[*Building Superintendence* was published last week and can now be obtained of Messrs. James R. Osgood & Company. Price $3.00.—EDS. AMERICAN ARCHITECT.]

NEW YORK, October 27, 1883.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,— Will you please oblige me by letting me know the names of best books on architecture for one to read who has just started to learn the profession? J. B. B.

[FOR the history of architecture read *Fergusson's History of Architecture;* for architecture in all its branches procure *Gwilt's Encyclopædia of Architecture* and *study* it; for American practice read and study *Building Superintendence* by Professor T. M. Clark; for perspective drawing the best and most complete work is Professor Ware's *Modern Perspective.* The last two books are published by James R. Osgood & Co., for $3.00 and $5.00 respectively. The first two can beordered through any importing book-dealer, and cost about $15.00 each, though second-hand sets can often be obtained for less.—EDS. AMERICAN ARCHITECT.]

INDIANAPOLIS, IND., October 30, 1883.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Gentlemen,— I would like to obtain Durand's works; as I already wrote to Ducher, Paris, from whom I received the answer that they could not be had, I would be very glad if you could inform me where they may possibly be had, also Viollet-le-Duc's *Dictionnaire Raisonnée.*

Should there be no chance to get Durand's works would you be so kind as to name me a similar work to *Leçons d'Architecture, Partie graphique des cours d'Architecture?* If so, please state price. My best thanks for all the information you can give me.

Respectfully yours, HENRY GIBEL.

[DURAND'S *Parallèle,* the best known work, is easily obtained. Write to B. T. Batsford, 52, High Holborn, London, W. C. The price will be about 35 shillings, with duty added here. Viollet-le-Duc's *Dictionnaire Raisonnée* can be had at the same place second-hand, for about 10 pounds, bound. New, it costs here $65, unbound. To be had of A. Levy, 4 Bond Street, New York, or through any other foreign bookseller.—EDS. AMERICAN ARCHITECT:]

THE REJECTION OF COMPETITIVE DESIGNS.

BOSTON, MASS., October 29, 1883.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,— As a subscriber to your valuable journal I desire to get your decision on the following. In submitting plans for a public building under a published call (with no reserve or right to reject), building to cost $5,000, have the committee the right to adopt a plan which, knowingly, will cost much in excess of that amount, and reject all others of equal merit; and what redress have the competitors, providing their designs show equal merit, and come within the amount specified? Please answer in your next issue, and oblige,

Yours truly, ARCHITECT.

[EVERYTHING depends upon the terms of the published call, which forms a valid contract with all who accept the invitation. It would, however, under most invitations of the kind, be difficult to show that the committee had not a right to adopt a plan costing indefinitely more than the limit they themselves set, or to give the "job" to a brother Freemason or political friend, and confiscate all the designs of the unsuspecting dupes who were foolish enough to send them in, for their favorite's benefit. When architects realize the fact that their services are worth paying for, and will be paid for if they cannot be had on other terms; and that in order to secure adequate remuneration and honorable treatment from those who desire their help they have only to refuse to give it until they know positively what they have to expect, we shall see the beginning of the end of the sordid frauds upon feeble-minded architects which burlesque the name of competitions.—EDS. AMERICAN ARCHITECT.]

NOTES AND CLIPPINGS.

Electric Railways in Vienna.—The project of a high-level railway for the city of Vienna has failed because the capital could not be raised, and the Austrian Government has now granted Messrs. Siemens and Halske a concession for the preparatory works for a net of electric railway lines, by which communication in the city would be greatly facilitated. The contractors will have three distinct periods wherein to build the railways. The first will comprise the completion of a line from the central town to the Danube Canal and several suburbs through which no tramways go at present. The same firm some time ago opened a small line of electric railway to the Electric Exhibition, which was so great a success as to induce two syndicates of banks—the one represented by the Länderbank, the other by the Vienna Banking Union — to offer to find the necessary capital for the new undertaking, namely, 40,000,000 to 50,000,000 florins.—*St. James's Gazette.*

M. Poelart and the Brussels Palais de Justice.—The fate of M. Poelart, the architect of the new Palais de Justice, at Brussels, remarks the *Pall Mall Gazette*, has been curiously like that of Mr. Street, the archiect of the newt Law Courts in London. In each case the most prominent architect of his generation has died, leaving his crowning work unfinished. Joseph Poelart was the favorite pupil of Visconti, the architect of the Louvre, and he became city architect of Brussels in 1856. It is said that a new Palais de Justice was the dream of his life, and that when the Commission waited on him at last with a request that he would commence the plans of such a building, he simply opened a portfolio and replied, "*Le plan demandé, le voila.*" The fact was that for ten years he had been working in silence on the project, which he felt must come before him sooner or later. The first stone was laid in 1866. In all, Poelart dedicated fifteen years of his life to this work.

The Production of Siena Earths.—Consul Colnaghi, in his report on the mineral products of the province of Siena, says that Siena earths, known also under the names of ochre, bole, umber, etc., are considered by some mineralogists to be ferruginous clays, by others, minerals of iron. They are chiefly found in large quantities in the communes of Castel del Piano and Arcidosso. The yellow earths and bole found on the western slopes of Monte Amiata are true lacustrine deposits found amid the trachytic rocks, of which it is principally composed. They lie under, and are entirely covered by the vegetable soil. Varying in compactness and color, they are termed yellow earths when of a clear ochreous tint, and *terra bolare*, or bole, when of a dark chestnut color. Each deposit consists for the greater part of yellow earth, beneath which bole is found in strata or small veins. The mineral being very friable, its excavation is easy, and is generally conducted in open pits. The different qualities are separated during the process, the bole which has the higher commercial value being the more carefully treated. After the first separation the bole is further classed, into first, second, third, and intermediate qualities — *boletta, fascia, cerchione*, etc. Its most important characteristic is termed, in commercial language, *punto di colore*, or tint. The value of the bole rises as its tint deepens. Thus bole of the third quality is lighter than that of the second, and the second than that of the first. After the third quality comes the *terra quilla*. The yellow earths, after excavation, are exposed to the open air for about a year, by the pit side, without classification. The bole, on the contrary, is placed in well ventilated storehouses to dry for about six months. This diversity of treatment is owing to the fact that exposure to the elements brightens the color of the yellow earths, and raises their value, while it would damage the bole by turning its darker tint first into an orange yellow, and if continued, into an ordinary yellow earth. It also loses in compactness and crumbles up under exposure. In addition to the *punto di colore*, the size of the pieces influences the commercial value of the bole, which increases with their volume. Thus the classification is *Bolo pezzo, Bolo grapolino*, and *Bolo polvere*. The yellow earths are classed as *Giallo in pezzi, Giallo commune*, and *Giallo impalpabile*, the impalpable being worth more than the common yellow. The production of the Siena earths is estimated at about six hundred tons per annum, of which amount about fifty tons are calcined, and the rest sold in their natural condition. The value of the trade is estimated at from £4,000 to £6,000. — *Journal of the Society of Arts.*

The Temples Destroyed in Java.—About the middle of the island, but not given on ordinary maps, there is a group of very remarkable old temples. Their position may be roughly understood by a reference to any map of Java, by drawing a line south of Samarang to the other coast, where a river will be found called the Progo, and on the east of it there is a town which has a variety of spellings, but it may be written Djockjakarta — the Dutch call it "Jockio" — this place is also mentioned as having suffered seriously. About thirty-five miles from Djockjakarta is the great temple of Boro Buddor; also called Boro Bodo, and Boer Buddha. The dome of this monument is stated to have been crushed in by falling rocks. The temple does not stand on the side of a mountain, but on the top of a hill, so this could not have resulted from masses of rock rolling down upon it. The destruction must be ascribed to huge fragments having been thrown into the air and then descending with terrific force. There is a picture of Martin's in which the top of a mountain is rolling over, but extreme as that is, it represents a tame landscape in comparison to the wild Walpurgis which went on in Java. Boro Buddor is by far the largest and greatest monument of the Buddhist religion in the East. The temple of Nakon Wat in Cambodia is the only other that can be put in comparison with it. The base is square, and each side is about four hundred feet long. The upper portion is circular and about one hundred and fifty feet in height; there is one central dome and there are seventy smaller ones. On the terraces round it there are between four and five hundred chapels, each with a statue of Buddha in it, seated in the usual cross-legged position. The sides are covered all round with bas-reliefs on each terrace: one terrace has one hundred and twenty subjects, which embrace the whole history of Buddha. The temple is a solid mass of masonry, and is of the same kind as the Dagobas of Southern India or the Topes of the Northwest. Luckily, the Dutch Government some few years ago had it all carefully measured and drawn, and the whole has been published in a large folio volume. The first notice of this temple was given by Sir Stamford Raffles, who at the time stated that "the interior of Java contains temples that, as works of art, dwarf to nothing all our wonder and admiration at the pyramids of Egypt." Miss North has lately painted pictures of Boro Buddor on the spot. About twenty miles southeast of Boro Buddor is a place called Brambanam. This is the site of the ancient capital of Java, and there are a very large number of temples standing, which have more or less suffered from former earthquakes. One of the celebrated groups at this place is known as the Chandi Siwa, or the "Thousand Temples." This is also said to have suffered. There is a volcano somewhere near to these and to Boro Buddor, called Mt. Merapia, which has probably been the active agent in this case. About two miles and a half from Boro Buddor there is an interesting temple called Mendoet, but it has not the reputation of those already mentioned, and it has not been alluded to as yet in the fragmentary intelligence which has come home. It is only a fertile or rich country that can produce large and elaborate temples. Java possessed the necessary qualifications and her temples have been a wonder to all who have seen them. — *London Daily News.*

Spontaneous Combustion. — Mr. C. T. Holloway, Fire Inspector of Baltimore, recently cited in a paper on spontaneous combustion read before the Convention of Pennsylvania Firemen, the following cases, which, though highly tinctured with romance, yet are said to be literally true, and are new instances of the existence of the much criticised reality of spontaneous combustion: —

"Countess Cornelia Zangari and Bandi, of Cesena, of Italy, who was in the sixty-second year of her age, retired to bed in her usual health. Here she spent about three hours in familiar conversation with her maid and in saying her prayers, and having at last fallen asleep, the door of her chamber was shut. As her maid was not summoned at the usual hour, she went into the bedroom to wake her mistress, but receiving no answer, she opened her window and saw her corpse on the floor in the most dreadful condition. At the distance of four feet from the bed there was a heap of ashes; part of the body was half burnt, the stockings remaining uninjured; most of the body was reduced to ashes. The air in the room was charged with floating soot (animal carbon). The bed was not injured. From an examination of all the circumstances of the case, it has been generally supposed that an internal combustion had taken place; that the lady had risen from her bed to cool herself, and that on the way to open the window the combustion had overpowered her and consumed her body by a process in which no flame was produced which could ignite the furniture or the floor.

"Still more wonderful and awful is the assurance that the wife of Dr. Treilas, physician to the late Archbishop of Toledo, Spain, emitted inflammable perspiration of such a nature that, when the ribbon she wore was taken from her and exposed to the cold air, it instantly took fire and flashed with sparks of fire like a lively 'Roman candle.'

"Professor Hafmeister, in the Berlin Transactions, 1876, records a case of the same nature respecting a peasant, whose linen took fire, whether it was laid up in a box when wet, or hung up in the open air.

"A case of this kind recently occurred at the Abattoir in Jersey City. During the recent spell of hot weather one of the workmen threw off his blue linen blouse, smoking with perspiration. It was hung up in the ice house. In a few minutes it burst forth into a coruscation of sparks and literally consumed itself."

The Emperor of China at Home. — The ruler of the 250,000,000 of which the Chinese nation probably consists is now within five years of his majority, and is an occupant, while yet a minor, of the same apartments in which lived the Emperor who preceded him on the Dragon Throne. The building in which the Emperor resides, says the *North China Herald*, is called Yang Hsin Tien, and is a little to the west of the Ch'ien Ch'ing Mêu in the middle of the palace. At the back of the central gate, on the south side, is the great reception hall. When Ministers of State and others enter for an audience at four, five, or six in the morning, according to custom, they have to go on foot to the centre of the palace over half a mile, if they enter by the east or west gate; and when they get on in years they can appreciate the Emperor's favor, which then by a decree allows them to be borne in a chair instead of walking. The rooms of the Emperor consist of seven compartments. They are provided with the divan or *k'ang*, the peculiar institution of North China. The *k'angs* are covered with red felt of native manufacture, and the floor with European carpets. The cushions all have embroidered on them the dragon and the phœnix. The rooms are in all thirty yards long by from eight to nine yards deep, and are divided into three separate apartments, the throne-room being the middle one. Folding-doors ten feet in height open into each of these apartments to the north and south in the centre of each. The upper part of these doors is in open-work, in which various auspicious characters and flowers are carved. At the back paper is pasted to admit light to the rooms. The front is ornamented with gilding, sculpture, and varnish of various colors. These doors remain open even in winter, because during that season a thick embroidered curtain of damask is hung in the doorway, which by its weight keeps its place close to the door-posts and prevents cold air from entering. In summer this is replaced by a curtain admitting the breeze on account of its being made of very thin strips of bamboo. The silk threads used in sewing the strips of bamboo together are of various colors, and passing through the whole texture of the curtain from the top to the bottom are very agreeable to the eye. These summer and winter curtains are rolled up to give air to the rooms when required. Exit and entrance are effected on each side of these curtains by side doors. Along the whole front of thirty yards there is a covered flight of steps fifteen feet wide. The roof over this rests on two rows of pillars. The pillars shine with fresh vermilion both within the rooms and on the steps outside, and are decorated with sculptured work, partly gilt and partly varnished.

BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

[Although a large portion of the building intelligence is provided by their regular correspondents, the editors greatly desire to receive voluntary information, especially from the smaller and outlying towns.]

BUILDING PATENTS.

[Printed specifications of any patents here mentioned, together with full detail illustrations, may be obtained of the Commissioner of Patents, at Washington, for twenty-five cents.]

287,409. SASH-FASTENER. — Frederick Bell, Anderson, Ind.

287,410. FIRE-ESCAPE. — Charles F. Bierbach, Milwaukee, Wis.

287,413. SEWER-TRAP. — Jacob Bodine, Jersey City, N. J.

287,432. BRICK-KILN. — Frances L. Hall, Oneida, N. Y.

287,434. VENTILATION. — Alfred J. Hendry, Darlot, Ga.

287,467. FIRE-ESCAPE. — Newman J. Powell, Pontiac, Ill.

287,477. VENTILATOR. — Wm. Schmolz, San Francisco, Cal.

287,480. METAL-RULER. — Chas. A. Smith, Providence, R. I.

287,491. FIRE-ESCAPE. — Frank R. Woodward, Hill, N. H.

287,492. FIRE-ESCAPE. — Frank R. Woodward, Hill, N. H.

287,510. PLUMBER'S TRAP. — Fredk. N. Du Bois, New York, N. Y.

287,538. BIT. — Edward Hall, Elkhardt, Ind.

287,540. FIRE-ESCAPE.—Andrew J. Heavner, Pittsfield, Ill.

287,549. SAFETY-ELEVATOR.—John W. King, Lambertville, N. J.

287,552. FIRE-PROOF PARTITION-BLOCK. — Martial Lapersonnerie, New York, N. Y.

287,553. CHIMNEY-CAP. — Francis H. Leonard, Boston, Mass.

287,558. WATER-CLOSET. — Samuel G. McFarland, New York, N. Y.

287,560. FIRE-ESCAPE. — Jos. A. Miller, New York, N. Y.

287,584. PLANE. — Solon R. Rust and Arthur R. Rust, Pine Meadow, Conn.

287,590. HATCHWAY FOR ELEVATORS. — William Stevens, Philadelphia, Pa.

287,598. FIRE-ESCAPE. — William H. Welsh, Erie, Pa.

287,612. PLANE. — Henry B. Beach, Meriden, Conn.

287,632. SHEET-METAL ROOF-VALLEY. — Chas. B. Cooper, Nashville, Tenn.

287,647. LIGHTNING-ARRESTER. — Josiah W. Dyer, Philadelphia, Pa.

287,648. MACHINE FOR SMOOTHING STONES.—John Eger, Chicago, Ill.

287,668. ELEVATOR-LOCK.—George A. Grover, Boston, and Edwin E. Worden, Somerville, Mass.

287,712. BLIND AND SHUTTER. — Harvey L. Page, Washington, D. C.

287,715. DOOR-LATCH. — Edward N. Porter, Burlington, Vt.

287,747. FASTENER FOR MEETING-RAILS OF SASHES. — Edwin R. Wethered, Woolwich, County of Kent, England.

287,757. — THERMOSTATIC FIRE-INDICATOR.— Richard N. Dyer, New York, N. Y.

287,764. FIRE-ESCAPE.—Chas. Ives, Kirkland, N. Y.

287,770. STEAM-RADIATOR.—Silas H. Morrill, Geneva, N. Y.

SUMMARY OF THE WEEK.

Baltimore.

BUILDING PERMITS. — Since our last report twenty permits have been granted, the more important of which are the following: —

M. Dailey, three-st'y brick building, w s St. Paul St., n of Lanvale St.

J. C. Pencil & Bro., two-st'y brick building, w s Sharp St., between Stockholm and Ostend Sts.

Boston Fear, three-st'y brick building, e s Fulton Ave., n of Patterson Ave., and 4 three-st'y brick buildings, w s Fulton Ave., n of Patterson Ave.

P. McGuire, three-st'y brick building, e s Pine St., between Baltimore and Raborg Sts.

Samuel Bealmear, two-st'y brick building, n s New Church St., rear of No. 82, s s Lexington St.

Wm. T. King, 11 three-st'y brick buildings, n s Mulberry St., between Mount St. and Vincent Alley; and 3 three-st'y brick buildings, e s Mount St., between Mulberry and Saratoga Sts.

Jackson Musselman, 3 three-st'y brick buildings, e s Druid Hill Ave., n of Robert St.

Max Plitt, 6 two-st'y brick buildings, w s Division St., s of Robert St.; 6 two-st'y brick buildings, e s Boulder Alley, rear of above; and 3 two-st'y brick buildings in alley in rear.

Boston.

SURGICAL WARD.—A surgical building, 40′ x 80′, is now building for the Massachusetts Homœopathic Hospital. It will be four stories high, of brick and stone. D. Connery for the mason-work, and L. Greely for the carpenter-work are the contractors.

A two-st'y fire-proof boiler-house and laundry, 45′ x 45′, is being built by the same contractors; Messrs. Allen & Kenway, of Boston, are the architects.

BUILDING PERMITS. — *Brick.* — *Washington St.*, rear, nearly opposite Albano St., Ward 23, for Marcus Ammidown, stable, 10′ x 15′, one-st'y pitch; M. Ammidown, builder.

Wood. — *Gerard St.*, near Farnham St., Ward 20, for A. N. Shurtliff, 2 stables, 25′ x 40′, two-st'y flat.

Gerard St., cor. Farnham St., Ward 20, for John W. Chandler, stable, 25′ x 40′, two-st'y flat.

Washington St., cor. Baker Ave., Ward 24, for John Whitten, dwell., 14′ x 14′ and 23′ x 30′, two-st'y pitch; Leander Wilkinson, builder.

Centre St., rear, opposite Bellevue St., Ward 23, for Hannah D. Richards Estate, storage, 12′ x 25′, one-st'y; Geo. A. Spear, builder.

Byron St., between Pope and Saratoga Sts., Ward 1, for Edw. P. Flanagan, dwell., 12′ x 15′ and 20′ x 30′, two-st'y mansard; Edward J. Turner, builder.

Armandine St., rear Washington St., Ward 24, for Esther J. McDowell, dwell., 14′ x 15′ and 22′ x 28′, one-st'y pitch; M. H. Jackson, builder.

Cook St., Nos. 18 *and* 20, Ward 4, for Augustus F. Dickson, 2 dwells., 20′ x 32′, three-st'y flat; Augustus F. Dickson, builder.

Brooklyn.

BUILDING PERMITS. — *Park Pl.*, s s, 210′ e Classon Ave., 6 two-st'y brick dwells., gravel roofs; cost, each, $3,500; owner, Adam Ferris, 498 Macon St.; architect, E. Mason; builders, Ferris & Ramsdall.

Luquer St., No. 155, three-st'y brick tenement, tin roof; cost, $4,000, owner and builder, Thos. Keogh, 149½ Nelson St.

Hancock St., s s, 290′ w Marcy Ave., 3 three-st'y brick dwells., tin roof, iron cornice; cost, each, $9,000; owner, Geo. H. Stone, 301 Jefferson St.; architect, G. A. Schellenger.

Fulton St., n w cor. Verona Pl., three-st'y brownstone front store and tenement, tin roof; cost, $6,000; owner, E. Donnellon, President St., near Henry St.; architect, Robert Dixon; builder, E. L. Donnellon.

Newell St., No. 113, w s, 67′ s Norman Ave., four-st'y frame double tenement, tin roofs; cost, $4,200; owner and builder, L. Antonius, 108 Newel St.; architect, T. Engelhardt; mason, U. Maurer.

Dykeman St., w s, 325′ n Conover St., four-st'y frame double tenement, tin roof; cost, $6,200; owner, D. Ruther, 183 Conover St.; architect, Jno. Smidt.

Conselyea St., No. 82, two-st'y and basement frame dwell.; cost, $3,000; owner, Jacob E. Neilsen, 41 Richardson St.; architect, J. B. Wilson; builders, Jacob Schoch and S. L. Hough.

Seventeenth St., n s, 400′ e Fifth Ave., 4 three-st'y frame tenements, tin roofs; cost, each, $2,500; owner, Ellen F. Hermans, 263 Seventeenth St.; architect, A. B. Bush; carpenter, Geo. Hermans.

Manhattan Ave., No. 525, w s, 50′ n Eagle St., four-st'y frame store and double tenement, felt and gravel roof; cost, $5,300; owner, Mr. May, 83 Oakland Ave.; architect, F. Weber; builders, J. Hafford and Port & Walker.

Hart St., n s, 140′ e Sumner Ave., 6 two-st'y and basement brownstone front dwells., tin roofs; cost, each, $4,500; owner, Thomas J. Moore, 72 Sumner Ave.; architect and builder, John Erickson.

Van Buren St., s s, 250′ e Throop Ave., 13 two-st'y brownstone front dwells.; tin roofs; cost, each, $5,000; owner and builder, Patrick Concannon; architect, I. D. Reynolds.

ALTERATIONS. — *Meserole St.*, s s, 75′ w Leonard St., raised one-st'y, front wall rebuilt; cost, $4,000; owner, Jos. Burger, Meserole St., cor. Leonard St.; architect, Jno. Platte.

Twenty-second St., Nos. 130 *to* 136, cellar excavated and walls built; cost, $4,000; owner, John Schlegel; architect, T. Engelhardt.

Chicago.

APARTMENT-HOUSES. — J. V. Wadskier is architect for an apartment-house, cor. of State and Superior Sts., for C. B. King, of brick, brownstone and terra-cotta; cost, $40,000.

J. V. Wadskier, architect, has completed plans for flats, to be built on North Wells St., between Oak and Wendell Sts., for Z. Stiles Ely, of New York, of pressed brick, limestone and terra-cotta; cost, $30,000.

BUILDING PERMITS. — E. Russell, two-st'y dwell., 796 West Monroe St.; cost, $5,000; builders, Wilkie & Holman.

F. Zapel, three-st'y dwell. 861 Clybourne Ave.; cost, $6,000.

Rev. Herrick Johnson, two-st'y dwell., 1082 North Halsted St.; cost, $10,000; architects, Treat & Foltz; builders, Falkner Bros.

Mrs. Ellen Spry, two-st'y dwell., 481 West Monroe St.; cost, $20,000; architects, J. M. Van Osdel & Co.; builders, Clark Bros.

Z. S. Ely, three-st'y flats, 322 to 326 Wells St.; cost, $30,000; architect, J. V. Wadskier; builder, T. Nicholson.

J. E. Waters, three-st'y flats, 147 and 149 West Congress St.; cost, $15,000; architect, J. I. Flanders; builder, Thos. Nicholson.

F. H. O'Connor, two-st'y dwell., 132 and 134 North Market St.; cost, $4,000; architect, J. Zittel; builder, Neals.

G. A. Johnson, three-st'y dwell., 345 Rush St.; cost, $7,000; architects, Burling & Whitehouse; builders, Fagerlund & Wilson.

J. F. Lawrence, three cottages, Colorado Ave., cor. Albany Ave.; cost, $3,000.

Arthur Dixon, 4 three-st'y stores and dwells., State St., near Thirty-fifth St.; cost, $20,000; architect and builder, Arthur Dixon.

G. Schnee, two-st'y dwell., 99 Jay St.; cost, $3,500.

Ames & Frost, four-st'y factory, 215 to 221 Cherry Ave.; cost, $8,000; architect, L. G. Halberg; builder, Thos. Nicholson.

Henry Wedemeyer, 2 three-st'y dwells., 216 and 218 Ohio St.; cost, $10,000; architect, H. Rehwoldt.

Parkhurst & Wilkinson, one-st'y shed, 152 to 156 Kinzie St.; cost, $6,500; architects, Scott & Gage.

D. D. Fanning, four-st'y flats, 329 East Indiana St., cost, $12,000; architect, G. H. Edbrooke; builders, Rogers & Koch.

J. Roff, two-st'y dwell., 3262 Groveland Park; cost, $4,000.

Mrs. M. Jaurett, two-st'y dwell., 3252 Groveland Park; cost, $4,000.

E. C. Day, two-st'y dwell., 3250 Groveland Park; cost, $4,000.

D. F. Bacon, two-st'y dwell., 3260 Groveland Park; cost, $5,000; architects and builders, Briggs & Warren.

H. F. White, three cottages, 468 to 472 Idaho St.; cost, $3,600.

H. F. White, three cottages, Oakley St., cor. Emerald Ave. and Summer Sts.; cost, $3,600.

Mrs. H. Keeney, two-st'y dwell., 780 Washtenaw Ave.; cost, $3,000; architect and builder, D. P. Keeney.

F. A. Thomas, two-st'y dwell., 20 Walton Place; cost, $6,000.

M. W. Diffley, two-st'y dwell., 42 Bellevue Pl.; cost, $7,000; architect, J. H. Huber; builders, T. Clark & Son.

Cincinnati.

HOUSES. — Mr. Geo. W. Rapp has the following new work on the boards; —

For F. Enneking, brick dwell., on Myrtle Ave., Walnut Hills; cost, $6,500.

For same party, brick dwell.; cost, $6,000.

For F. Thauwald, pressed brick dwell., 41′ x 55′, on Gilbert Ave.; cost, $12,000.

New York.

CLUB-HOUSE. — The New York Athletic Club has appointed Mr. C. W. Clinton architect of its new building.

DWELLINGS. — Five three-st'y frame dwells., 18′ x 30′, are to be built from designs of Mr. H. D. Tiffany, on the e s of Stebbins Ave., between One Hundred and Sixty-fifth St. and Holmes St.

FAMILY HOTEL. — Excavation has commenced on the Central Park Plaza property purchased by Pfyfe & Campbell. It is proposed to erect an apartment-house without kitchens, the food to be supplied from the restaurant, so that it will more appropriately be termed a family hotel. The cost of the buildings may reach as high as $1,500,000; Carl Pfeiffer, architect.

APARTMENT-HOUSES. — For Mr. Jacob L. Maschke, 10 five-st'y brownstone double flats, 25′ x 80′, are to be built on the n s of Seventy-first St., between First and Second Aves., from designs of Mr. Jno. C. Burne; cost, $150,000.

For Mr. Frank Grube, 2 five-st'y brick and brownstone flats, 25′ x 75′, are to be built on the s s of One Hundred and Sixth St., 100′ e of Fourth Ave.; cost, $28,000; Mr. Andrew Spence, architect.

For Mr. James Moore, plans are being drawn by Mr. Jos. M. Dunn for 2 four-st'y tenements, to be built at Nos. 505 and 507 West Twenty-sixth St.

For Mr. W. H. Schneider, a five-st'y tenement, 25′ 6″ x 75′, is to be built at No. 1428 Avenue A, from designs by Mr. Julius Kastner.

For Mrs. Julia Mullaly, a five-st'y flat house, 25′ x 65′, with extension, is to be built from plans of Mr. C. F. Kidder, Jr.

BUILDING PERMITS. — *Fiftieth St.*, s s, 128′ 11″ e Eleventh Ave., three-st'y brick factory, gravel roof; cost, $11,000; owner, Rosalie Steinhardt, 239 West Twenty-fourth St.; architect, Geo. B. Pelham.

One Hundred and Thirty-first St., s s, 225′ e Seventh Ave., one-st'y brick and stone church, slate roof; cost, $6,000; owner, Baptist Church of the Redeemer, Wm. J. Coles, President of Board of Trustees, 20 East One Hundred and Twenty-seventh St.; architect, Wm. J. Merritt; builders, John Cullam and R. A. Hollister.

Forty-seventh St., s s, 150′ w Eighth Ave., 2 five-st'y brownstone front flats, tin roofs; cost, each, $22,000; owner, Fred. Schuck, 516 East Eighty-fifth St.; architect, John Brandt.

Park Ave., w s, 67′ n Ninety-first St., 4 three-st'y brownstone front dwells., tin roofs; cost, each, $10,000; owner, Andrew J. Kerwin, 1 Riverview Terrace; architect, A. B. Ogden.

Madison Ave., n e cor. Seventy-first St., two-st'y brick and stone church, slate and copper roof; cost, $100,000; owner, St. James Church, Cornelius B. Smith, pastor, 48 East Seventy-fifth St.; architect, R. H. Robertson; builders, Norcross Bros.

West Forty-sixth St., No. 515, five-st'y brick tenement, tin roof; cost, $9,000; owner, Mrs. Margaret Costello, 532 West Forty-sixth St.; architect, John M. Foster.

West Forty-Sixth St., No. 534, five-st'y brick tenement, tin roof; cost, $9,000; owner and architect, same as last.

One Hundred and Forty-fourth St., s w cor. Brook Ave., four-st'y brick tenement and store, gravel roof; cost, $10,000; owners, John H. Schilling, One Hundred and Forty-sixth St., cor. Third Ave., and Samuel F. Pease, One Hundred and Forty-third St., near Brook Ave.; architect, John Rogers.

Elizabeth St., Nos. 53 *and* 55, seven-st'y brick warehouse, tin roof; owner, Philip Strobel, 25 East One Hundred and Twenty-seventh St.; architect, Albert Wagner.

West Sixteenth St., Nos. 431 *and* 433, 2 five-st'y brick tenements, tin roofs; cost, each, $15,000; owner, Henry G. Monarque, 2147 Third Ave.

One Hundred and Sixth St., s s, 120′ e Fourth Ave., three-st'y brick and stone coach-house and dwell.; cost, $14,000; owner, Daniel Sheffiin, 2056 Second Ave.

West Forty-ninth St., Nos. 405 *and* 407, 2 five-st'y brick tenements, tin or gravel roofs; cost, each, $9,000; owner, D. W. Slocum, 219 Hooper St., Brooklyn; architect, Robert Mook.

Ninety-first St., n w cor. Park Ave., 5 three-st'y and basement brownstone front dwells., tin roofs; cost, each, $12,000; owner, Andrew J. Kerwin, 1 Riverview Terrace; architect, A. B. Ogden, 409 East Fifty-third St.

Eighty-first St., n s, 97′ 4″ w Park Ave., 2 four-st'y brownstone front dwells., tin roofs; cost, each, $15,000; owner and architect, same as last.

East Forty-fifth St., No. 232, five-st'y brownstone front tenement, tin roof; cost, $17,000; owners, Jas. Kyle & Sons, 137 East Fortieth St.; architect, Jas. Kyle.

Fifty-seventh St., s e cor. Tenth Ave., five-st'y brownstone front flat and store, tin roof; cost, $40,000; owner and builder, Wm. Ranain, 338 West Forty-seventh St.; architects, Thom & Wilson.

Fifty-seventh St., s s, 27′ e Tenth Ave., 2 five-st'y brownstone front flats, tin roofs; cost, each, $32,000; owner, builder and architects, same as last.

Fifty-seventh St., s s, 81′ e Tenth Ave., five-st'y brownstone front flat, tin roof; cost, $20,000; owner, builder and architects, same as last.

Thirty-seventh St., s s, 325′ e Eleventh Ave., five-st'y brick packing-house and refinery, gravel roof; cost, $17,000; owners, Rohe & Brother, 254 and 256 West Thirty-third St.; architects, Thom & Wilson.

ALTERATIONS. — *Madison Ave., No.* 678; cost, $3,000; owner, Mrs. Augustus Brown, on premises; architects, Kimball & Wisedell; builders, Elice & Ketson.

West Twenty-second St., Nos. 508, 510, 512 *and* 514, one-st'y brick extension and internal alteration; cost, $3,150; lessees, Am. Metre Co., Wm. H. Down, Secretary, 512 West Twenty-second St.; architects, D. & J. Jardine.

William St., No. 35, new entrance and internal alterations; cost, $3,000; owner, Bank of the State of New York, on premises; architect, O. V. Hatfield; builders, Robinson & Wallace, and Haight & Hanlon.

Philadelphia.

MARKET-HOUSE AND HALL. — At Third St., cor. Norris St., market-house and hall, of brick, 77′ x 236′, is being built for J. L. Shoemaker, Esq., from plans by Willis G. Hale, architect.

CEMETERY LODGE. — Entrance to the Mechanics' Cemetery, cor. Twenty-second and Diamond Sts., consisting of lodge, gateway, and chapel; lodge, 28′ x 48′; chapel, 20′ x 30′; cost of the entrance, $10,000; from plans by Willis G. Hale, architect.

BUILDING PERMITS. — *Woodland Ave.*, w of Seventy-first St., two-st'y store and dwell., 21′ x 53′; Wm. Clarg, Jr.

Sutherland Ave., No. 800, two-st'y stable, 32′ x 90′; C. D. Rees' Sons & Co.

Eighteenth St., n of Catharine St., one-st'y factory, 40′ x 60′; Rosengarten & Sons, owners.

Lex St., s of Seneca St., two-st'y dwells., 15′ x 30′; W. D. Haines, contractor.

Mulberry St., cor. Branner's Ave., three-st'y store and dwell., 24′ x 24′; Geo. F. Payne & Co., contractors.

Paschall Ave., w of Seventy-first St., 4 two-st'y dwells., 14′ x 42′; Geo. S. Patchell, contractor.

Tacony St, and Trenton R. R., two-st'y addition to storehouse; Elvis S. Lewis, contractor.

Eighth St., cor. Mifflin St., 4 two-st'y dwells., 16′ x 40′; J. Stukey, owner.

Kates St., e of Broad St., two-st'y brewery, 16′ x 45′; Jno. Welde.

Shamokin St., between Twenty-second and Twenty-third St., boiler-house, 28′ x 45′; Jas. H. Howard, contractor.

Cedar St., n of Meadow St., one-st'y factory, 30′ x 60′; E. K. Welch, contractor.

Wyoming Ave., cor. Fisher's Lane, two-st'y back building, 30′ x 32′; E. K. Welch, contractor.

North Nineteenth St., No. 809, three-st'y addition to factory, 40′ x 50′; Catherwood Robinson, owner.

Otsego St., No. 1722, two-st'y dwell., 15′ x 28′; and two-st'y stable, 15′ x 26′; Jackson Hook, contractor.

Walnut Lane, cor. Wayne Ave., two-st'y stable, 35′ x 75′; Townsend Bros., contractors.

Watt St., n of Federal St., two-st'y dwell., 16′ x 40′; Howard May, owner.

Broad St., n of Jefferson St., 2 four-st'y dwells., 20′ x 76′ and 29′ x 96′; H. G. Freeman, owner.

Market St., w of Front St., four-st'y warehouse, 70′ x 125′; A. B. Rocke, contractor.

North Third St., No. 28, three-st'y addition to store, 30′ x 32′; E. Thompson, contractor.

Manayunk Ave., cor. Cedar St., three-st'y dwell., 19′ x 50′; McIlvain & Cunningham.

Sixth St., n of Dauphin St., addition to stable, 20′ x 124′; Jas. Hood, contractor.

Gray's Ave., cor. Seventy-second St., two-st'y dwell., 28′ x 38′; Robert Alexander, owner.

Edward St., w of Hancock St., three-st'y stable, 40′ x 72′; J. B. Doyle, contractor.

Smick St., cor. Jefferson St., three-st'y store and dwell., 20′ x 51′; E. R. Leigh, owner.

Front St., n of Master St., three-st'y dwells., 17′ x 48′; Shegog & Quigley, contractors.

Sixth St., s of Berks St., three-st'y dwell., 18′ x 45′, and two-st'y stable, 28′ x 50′; J. C. Haldeman, contractor.

Shumach St., between Manayunk St. and Ridge Ave., two-st'y dwell., 24′ x 64′, and two-st'y stable, 18′ x 40′; Jas. A. Davis, owner.

Penn St., s of Ashland St., 2 two-st'y dwells., 16′ x 27′; P. O'Keefe, owner.

St. Louis.

BUILDING PERMITS. — Fifty-nine permits have been issued since our last report, eighteen of which are for unimportant frame houses. Of the rest, those worth $2,500 and over are as follows: —

Martin Johanson, two-st'y brick dwell.; cost, $3,000; J. B. Legg, architect; Samuel Lonquist, contractor.

S. Watson, two-st'y brick dwell.; cost, $3,000; J. Stewart & Co., architects; S. Watson, contractor.

Brinkwirth & Nolker Brewing Co., four-st'y brick ice-house; cost, $10,000; E. Jungenfeld, architect; contract sub-let.

A. A. Condon, two-st'y brick dwell.; cost, $4,000; F. Weston, architect; E. T. Hoffman, contractor.

Zelle Bros., two-st'y brick dwell.; cost, $3,400; Beinke, architect; Hy. Wanschaffe, contractor.

Zelle Bros., two-st'y brick dwell.; cost, $3,400; Beinke, architect; Hy. Wanschaffe, contractor.

St. Paul, Minn.

HOUSES. — Dr. Sutherland is building, on North Tenth Ave., a block of four houses; cost, $3,000.

J. A. Tyler is to build a $2,500 house on Western Ave., near Seventh St.

ENGINE-HOUSE. — Work has commenced on the new engine and hose house, cor. of Franklin Ave., between Twenty-first and Twenty-second Sts.

STORES. — Robinson & Bartleson have commenced a frame store on North Washington Ave., above Fourth Ave.; cost, $1,500.

Herman Dean is adding another store to his block on Plymouth Ave., between Fourth and Fifth Sts.

STABLE. — Robert Brandon is erecting a large livery-stable on Plymouth Ave., between Fourth and Fifth Sts.

General Notes.

CUMBERLAND ISLAND, GA. — Ground has been broken for the granite mansion for Mrs. Lucy Carnegie, of Pittsburgh, Pa., on the site of the historic ruins of Dungeness, on Cumberland Island, Ga., the former residence of General Nathaniel Greene, of Revolutionary fame.

KANSAS CITY, MO. — For P. E. Emery, Esq., of Flemington, N. J., three dwells., brick, tile and stone finish, 20′ x 60′; cost, $18,000; plans by Willis G. Hale, architect, Philadelphia, Pa.

NEWPORT, R. I. — It is now understood that the Committee of the City Council on the selection of a site for a new asylum have decided upon recommending the Newton lot, off Broadway.

Mr. G. G. Haven, of New York, is to build a cottage on Bellevue Ave.

Mr. James Wilcox, of Philadelphia, will build a cottage on Conanicut Island; as also Dr. W. V. Keating of the same city.

NEW ORLEANS, LA. — Director General Burke, of the World's Industrial Cotton Centennial Exposition, has invited designs for the main building, to embrace one million square feet of floor space, and cost $250,000. Premiums are offered of $1,000 for the best plan, $500 for the second, and $250 for the third. Plans are receivable to noon, November 25!!

PAWTUCKET, R. I. — Subscriptions are being collected for a new church for the Park Place Society.

SOUTH ORANGE, N. J. — The corner-stone of the Alumni Hall of Seton Hall College was laid October 25. The building will be a Gothic structure, of undressed brownstone, 45′ x 75′, and will consist of two stories. The building, when completed, will cost about $13,000.

Bids and Contracts.

BOSTON, MASS. — The following is a synopsis of the bids for marble wainscoting, etc., for the post-office and sub-treasury: —

C. E. Hall & Co., $5,345.

E. Fritsch, $4,813; K. W., $6,574.40 and $6,268.40.

Davidson & Sons, $5,887.17.

Bowker, Torrey & Co., $10,365.

A. Wentworth Roberts, $2,554, for marble mantels only.

The following is an abstract of the bids for marble and encaustic tiles: —

Thomas Aspinwall, encaustic tiles, $1,281.

American Encaustic Tiling Company, encaustic tiles, $700.

Davidson & Sons, encaustic tiles, $960.75.

C. E. Hall & Co., encaustic tiles, $1,065.

Davidson & Sons, marble tiles, $4,500 and $5,095.24.

C. E. Hall & Co., marble tiles, $6,817, $6,000, and $5,600.

Bowker, Torrey & Co., marble tiles, $6,679.

George & R. L. Barney, marble tiles, $6,200.

CHARLESTOWN, W. VA. — The following is a synopsis of bids for iron fences, gates, etc., for the approaches for the post-office, court-house, etc.: —

Champion Iron Fence Company, $1,049.50 (*accepted*).

Burnet & Co., $1,062.

Henry A. Vanderbeck, $1,100.

Merz Architectural Iron Works, $1,175.

George White & Co., $1,334.

J. P. Walton & Co., $1,373.

Joseph Hall & Co., $1,430.

M. J. O'Brien, $1,841.99.

Charles Ward, $1,250.

CHICAGO, ILL. — The contract for fire-proofing the new Board of Trade Building has been awarded to the Wight Fire-proofing Co., of this city, at $44,000.

PITTSBURGH, PA. — The following is a synopsis of the bids for cut-stone for the superstructure of the court-house and post-office: —

Jacob Veihmeyer, granite, $235,000; lime, $194,000 and $213,000.

Virginia State Granite Co., granite, $217,386.

M. A. M. McGowan, Berea, $90,200.62; lime, $99,-905.75; granite, $214,083.75.

Syenite Granite Company, granite, $249,786.

Gile & McMahone, granite, $192,330.

Sweet & Davis, granite, $223,369.

Davis & Tilson, granite, $207,000.

W. D. Collingwood, Ohio blue, $103,700; buff, $103,-700; Berlin, $109,800.

Bedford Limestone Company, lime, $117,259.85.

Cape Ann Granite Company, granite, $228,851.25.

Bodwell Granite Company, granite, $117,721.

Mount Waldo Granite Company, granite, $239,850.

PROPOSALS.

FOUNTAIN.

[At Jersey City, N. J.]

OFFICE OF CUSTODIAN POST-OFFICE, ETC., JERSEY CITY, N. J., November 5, 1883.

Sealed proposals will be received at this office **until 12 M., on the 19th day of November, 1883,** for furnishing the material and building complete the fountain required in the improvement of the grounds of this building, in accordance with drawing and specification.

Copy of the specification and any additional information may be had on application at this office, where the drawing may be seen. J. G. GOPSILL,

410 Custodian.

STONE AND BRICK WORK.

[At Peoria, Ill.]

OFFICE OF SUPERVISING ARCHITECT, TREASURY DEPARTMENT, WASHINGTON, D. C., November 7, 1883.

Sealed proposals will be received at this office **until 12 M., on the 28th day of November, 1883,** for furnishing the labor and material, stone, bricks, mortar, etc., and building complete, the basement and area walls of post-office, court-house, etc., at Peoria, Ill., in accordance with drawings and specification, copies of which and any additional information may be had on application at this office or the office of the Superintendent. JAS. G. HILL,

412 Supervising Architect.

FURNITURE.

[At Paducah, Ky., Topeka, Kan., Charleston, S. C.]

OFFICE OF THE SECRETARY, TREASURY DEPARTMENT, WASHINGTON, D. C., October 31, 1883.

Sealed proposals will be received at this office **until two o'clock, P. M., of Monday, November 19, 1883,** for manufacturing, delivering and placing in position, in complete working order, certain furniture for the United States court-house and post-office buildings, at Paducah, Ky., and Topeka, Kan., and the United States custom-house building at Charleston, S. C.

Upon application to this office, detailed information will be furnished to furniture manufacturers desiring to submit proposals.

The Department reserves the right to reject any or all bids or parts of any bid, and to waive defects.

412 CHAS. J. FOLGER, Secretary.

GAS-FIXTURES.

[At Charleston, W. Va., and Topeka, Kan.]

OFFICE OF THE SECRETARY, TREASURY DEPARTMENT, WASHINGTON, D. C., November 5, 1883.

Sealed proposals will be received at this office **until 2 o'clock, P. M., of Monday, November 26, 1883,** for manufacturing, delivering, and placing in position in complete working order, certain gas-fixtures for the United States court-house and post-office buildings at Charleston, W. Va., and Topeka, Kan.

Upon application to this office, detailed information will be furnished to all manufacturers desiring to submit proposals.

The Department reserves the right to reject any or all bids or parts of any bid, and to waive defects.

H. Q. FRENCH,

413 Acting Secretary.