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DECORATION

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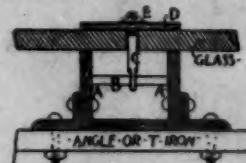


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THE AMERICAN ARCHITECT AND BUILDING NEWS.

VOL. XLVII.

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MARCH 23, 1895.



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ACCORDING to the New York papers, there is a prospect of a great revival in building in the metropolis this season. Applications have been filed for a large number of office and business buildings, of the most substantial and expensive kind, on and near Broadway, below Fourteenth Street, and in the upper part of the city there will be much new work. The estimated value of the buildings for which plans have been filed, since January 1, is nearly eighteen million dollars, while the value for the corresponding period last year was less than seven millions. Moreover, investors of moderate means are said to be turning their attention to the purchase and improvement of small lots of real estate, and an excellent demand for such property is reported.

THE promise of the New York Assistant District Attorney, that he would have the coroner's jury in the case of the fall of the Orchard Street tenement-houses composed partly of architects, appears to have been kept, Mr. Ernest Flagg being the foreman of the jury, while Mr. E. K. Rossiter was another member. Several other architects and builders testified before the jury, the evidence all going to show, not only that the materials and workmanship of the buildings were bad, but that the plans were defective, and notwithstanding their defects, had been approved by the Department of Buildings, while no adequate attention had been paid by the inspectors to the work as it went on. As the jury found, the arrangement of the plans was such as to bring a load of ninety tons to the square foot on certain brick piers in the cellar, in direct contravention of the law, which limits the allowable load on brickwork to eight tons per square foot. This defect in the plans, as the jury thought, ought to have been noticed and pointed out by the examiners of plans for the Department of Buildings; and, in failing to do this, the jury found the two examiners to have been guilty of "gross carelessness in the discharge of their duties." The inspector for the district in which the buildings were situated was also found to have been guilty of "criminal negligence of the worst kind," inasmuch as he not only failed to notice either the bad workmanship or the open violation of the law, but made a false report of the condition of the buildings. The contractors and owner were also found "criminally guilty," in having violated the law in instances "so numerous and flagrant that they could only have been carried out by collusion with the Inspector of the district," and in having knowingly, and to save expense, used bad materials, and allowed bad workmanship. In conclusion, the

jury remarked that, in their opinion, "the most efficient check which could be placed upon practices of the kind which have led to this disaster would be the licensing of all architects, who should be required to undergo a thorough examination as to their qualifications to practise an art upon which the lives of so many people depend." Unsparing as the jury showed itself toward the parties whom it found negligent, it exonerated, in its verdict, Mr. Brady, the head of the Building Department, who, as it said, "seems to be a man of ability and integrity," but it found that he was "seriously hampered by the character and incompetency of many of the men employed in the Department."

THE old scheme, of having officers of the United States Army superintend the construction of public buildings, has been revived, according to the Washington papers; and the usual frightful examples of the slowness of progress on such buildings, under the ordinary methods, are brought up to show how much more quickly they would be finished if the military arm took hold of them. To complete the alluring picture, we are told that the Congressional Library, which is nearing completion, under military direction, and has certainly been rapidly built, is "a gem of art," as if all we had to do, to scatter gems of art speedily around the country, was to transfer the Supervising Architect's office to the Army Headquarters. It is hardly necessary to say that this agitation is decidedly pernicious. That the Congressional Library is a fine building, well and quickly built, we acknowledge with pleasure, but, notwithstanding the remarkable and exceptional qualifications of General Casey and Colonel Green for architectural undertakings, it is quite capable of improvement as a work of art, and the rapidity with which it has been carried out is due as much to the energy with which the officers cut off Congressional interference, and demanded appropriations, as to any hidden capacity of the military mind for making bricks and stones jump into their places without assistance; while the Pension Building, the other great example of military architecture, though quickly built, for the same reasons, is about as far from being a "gem of art" as any structure within our knowledge. The fact is that the people who can build most rapidly, skilfully and beautifully are the people who have devoted their lives to learning how to do so, namely, the architects; and the sooner the public stops dodging around them, and trying to utilize politicians and generals and carpenters and what not, in place of them, the better off it will be.

ARCHITECTS often get themselves into trouble over public work, by forgetting that buildings erected by the public are carried out in pursuance of some special statute or ordinance, and paid for by some special appropriation; and that, if they find some modifications in the plans, or some extra expenditure, to be desirable, another special statute or ordinance must be proposed and passed, and another appropriation ordered, before the change can legally and safely be made. It is, therefore, useful to read occasionally examples of the strictness with which legality, or, as we call it, red-tape, is observed in public building-matters by the officials who have them in charge. In a recent debate in the French Chamber of Deputies, some curious instances were referred to. At the porcelain-factory at Sèvres, which is public property, the interior of the building is under the care of the Department of Fine Arts, while the exterior is in charge of the Department of Civil Buildings. The consequence is that, whenever the windows need washing, the two departments have to be notified. It is hardly necessary to say that such departments never take any notice of each other's existence, still less coöperate with others; and the inside of the windows is washed by one set of people, and the outside by another, the two operations never taking place at the same time, so that the windows are never clean on both sides. In the same way, the statues in the Paris parks belong to the Department of Fine Arts, and the pedestals to that of Civil Buildings. Some four years ago, the nose of a statue in the court-yard of the School of Fine Arts, probably loosened by frost, fell off. The Director wrote to his official superiors, requesting that it might be replaced. Then arose a question, whose business it was to put back the nose, and notes were exchanged among the different

Departments, without result. The matter was not allowed to drop, but no way could, apparently, be found to bring it within the scope of any one's authority, until this year, when an appropriation was made for restoring and repairing the façade of the School, including the nose of the broken statue in the courtyard.

THE practice favored by our English brethren, of blowing themselves up in cold weather with their hot-water apparatus, appears to be more popular than ever this year. According to *Engineering*, "every newspaper we take up contains its tale of houses wrecked and women killed." On the seventh day of February, there were four explosions, by which one person was killed, and five injured; the next day there were nine explosions, and seven or eight more people injured; on the ninth, four more boilers blew up, on the tenth two, and on the eleventh four more. During February, six people were killed, and thirty-four injured, by these explosions, while last year nineteen people were killed, and fifty-four injured, in the same manner. In nearly all cases, the explosions were caused by the freezing of the water in the circulation-pipes, which, sealing up the outlet for the escape of steam, allowed the pressure in the boiler, or, as we should call it, the water-front of the range, to increase beyond its power to resist. Considering that our climate is far colder than that of England, and that our houses are much more generally furnished with hot-water supply, it is rather surprising that the explosion of a water-front, which is almost unknown with us, should be so common there, and the reason is undoubtedly to be found in the fact that piping is laid out there with what seems to us incredible carelessness, while the treatment accorded to the apparatus in cold weather is not much better. It is hardly necessary to say that almost the first care of an architect here is to arrange his plumbing compactly, in the middle of the house, or over the kitchen, so that the circulation of the hot water will be as direct as possible; and not only every architect, but every householder, knows that hot-water pipes are more likely to freeze than those carrying cold water, and takes special care of them. Our plumbers claim that if a pail of boiling water, and one of cold water, are set out of doors together on a cold day, the boiling water will freeze first; and, however this may be, it is always the hot-water pipes which, in our houses, are boxed-in, or covered with felt, if they have been so planned as to be exposed to the cold. Moreover, with us, the open hot-water tank in the attic, forming the reserve from which the house supplies are drawn, which is still used in England, has long been obsolete, and the direct circulation from the water-front is simply to and from the closed copper or galvanized "boiler," which stands close to the range. It is true that, if the pipes which lead from this boiler to supply the house fixtures were allowed to freeze, it would be possible to accumulate steam-pressure enough to cause an accident; but the boiler contains forty or fifty gallons of water, and, even if the range fire is allowed to go out, a slow circulation, sufficient to prevent freezing, will continue for many hours between the water-front and the boiler, and, if these connections are open, when a fresh fire is built in the range, the first effect is to heat the water in the boiler, no pressure of steam being produced, even though all the other pipes in the house may be frozen, until all this water has been raised to the boiling-point, which takes, usually, several hours. During this period, the lead pipes, which are good conductors, are transferring heat in all directions over the house, so that, while it is not unusual to have a hot-water supply or circulation pipe "caught" by frost, it is almost always free before any steam pressure need be feared. Moreover, our water-fronts are almost always of cast-iron, and an explosion, if it should take place, would not usually be very serious. *Engineering* advocates, with reason, the application of safety-valves to domestic boilers; but a safety valve on a water-front is unheard-of in this country, where more careful arrangement seems to give all the security required.

AS we see by the newspapers, a bill resembling in all respects the New York dressed stone law, including the paving-stone feature, which is so clearly expressed that no legal opinion will be required to determine whether it is covered, has been introduced in the Massachusetts Legislature, and at the committee hearing, was warmly supported by the officers of the Granite-Cutters' Union, and, apparently, opposed by no one. It will be remembered that the Tobin law is said to have

rown five thousand pavers out of work, for the benefit of one

hundred and fifty granite-cutters; and we advise the people in Massachusetts whom the passage of such a bill would deprive of their living to bestir themselves in the matter.

MR. STANFORD WHITE'S beautiful Washington Arch, in New York, is nearly completed, with the exception of two groups of statuary, for which a place only is provided, and is to be handed over to the City on the thirteenth of April next, with appropriate ceremonies. The National Guard of the citizens will probably parade on the occasion, and President Cleveland, who is a member of the committee in charge of the erection of the arch, has been invited to be present. The day chosen is the one hundred and sixth anniversary of the inauguration in New York of George Washington as the first President of the United States and is therefore a highly appropriate one.

ACCORDING to the *Schweizerische Bauzeitung*, work is to be commenced this summer on the great bridge over the Bosphorus, which has been talked of for many years. The Bosphorus, at the point where the bridge will cross it, is about half a mile wide, and it is intended to build eight piers, so that the spans will not be of extraordinary width, but the clear height of the middle span above the water is intended to be about two hundred and fifty feet. Of course, no draw will be needed under these circumstances. The bridge will be of the girder and cantilever type. The bottom of the channel offers a good foundation for the piers, so that no special engineering difficulties are feared. The cost is estimated at sixty million francs, and will be borne by a French syndicate, which has already carried out docks and other improvements in and around Constantinople. What the political aspects of the undertaking may be, or what the Powers may say to it, remains to be seen; but the Turkish authorities are said to have already approved the scheme. So far as tourists are concerned, the opening of direct railway communication between Europe and the little-known interior of Asia Minor will be an important matter. On many accounts, Asia Minor is a region of extreme interest to the traveller. It was, according to the legends, the original home of the Ionian portion of the Greek race, and was, in ancient times, in constant communication with Greece, as well as with Persia and the East. Moreover, although traversed, not only by the great trading caravans which exchanged goods between Asia and Europe, but by the armies of Cyrus, of Xerxes and Darius, Xenophon, Alexander, Pompey and Belisarius, Osman and Tamerlane, the inhabitants are said to retain in tolerable purity the blood of the antique population. Unfortunately their Turkish conquerors have inspired them with fanatical Mohammedanism, while they keep up their ancient reputation for brigandage; so that few countries are so dangerous for a European to explore. With the establishment of direct railway communication, it is reasonable to expect that travel will increase, and will be made safer, and the beautiful scenery and salubrious climate of the country, to say nothing of its archaeological interest, will then certainly attract many visitors.

THE sentimental people who are pleased with the story of Sir Walter Raleigh's laying down his new embroidered cloak in a mud-puddle, for Queen Elizabeth to step on, may be interested to hear that the estate on which this incident took place is for sale. The manor-house is known as Forty Hall, probably from the fact that the estate once belonged to the Fortie family. It fell afterwards into the hands of Sir Nicholas Raynton, who, in 1629, built the present house, from designs by Inigo Jones. In 1700, the house, which had passed by inheritance from the Rayntons to the Wolstenholmes, was altered and modernized. Two generations later, the sole heiress of the Rayntons and Wolstenholmes married a Breton, whose son divided and sold the estate, and it has since passed through several hands. At the time of the Raleigh story, Queen Elizabeth was visiting at the neighboring manor of Elsyng Hall. In contrast with the vicissitudes which this property has undergone, it appears that an estate in Gloucestershire is also for sale, which has remained in the same family, in unbroken succession, for more than seven hundred years. This would make the original possessor a contemporary of Richard Cœur de Lion, at least. How a family must feel in giving up such property, we, in this country, can hardly imagine, but one can hardly conceive of anything but harsh necessity which could lead to such a step.

ELECTRICAL SCIENCE FOR ARCHITECTS.¹—IX. THE NATIONAL CODE OF RULES FOR ELECTRIC WIRING.—II.

6. LIGHTNING-ARRESTERS :—

a. Must be attached to each side of every overhead circuit connected with the station.

b. Must be mounted on non-combustible bases in plain sight on the switch-board, or in an equally accessible place, away from combustible material.

c. Must be connected with at least two "earths" by separate wires, not smaller than No. 6 B. & S., which must not be connected to any pipe within the building, and must be run as nearly as possible in a straight line from the arresters to the earth connection.

d. Must be so constructed as not to maintain an arc after the discharge has passed.

A "lightning-arrester" would perhaps more properly be called a lightning diverter, since it does not arrest the lightning, but diverts it from the wiring by offering a comparatively easy path to the earth. If there were not this easy path, the lightning would pierce the insulation in some other place, because of the great force urging a discharge. The lightning-arrester is made so that the connection with the earth is immediately broken as soon as the lightning or "static discharge" has passed, for otherwise there would be an opportunity for the leakage of the dynamo current.

Figure 18 shows the principle of a lightning-arrester. At A is a very short air-space that is an effectual insulator so far as the normal electrical pressure on the line is concerned. When a lightning charge accumulates on the line there is a very strong tendency for it to break through the insulation to the earth, and the short air-space is easily sparked across. The air is heated somewhat by the discharge, and the normal electrical pressure on the line will then be sufficient to maintain a constant leakage to the earth, if there be not some arrangement that breaks the connection. This connection can be broken in several ways. Often the arrester is made so that after a discharge the air-space is increased until the electrical pressure can no longer force a current through it, and sometimes a strong magnet is directed across the space; it being a curious fact that a magnet will repel an arc and thus "blow it out."

"Each side" of the circuit means each wire of the circuit; the one going out and the one coming in.

An "earth" is a connection with the earth; or, the special arrangements such as buried metal, pipes, etc., that insure the electrical connection. A good earth is made by imbedding a copper or iron plate about two feet square in broken coke and burying the whole in moist earth, all connections being soldered.

The wire gauge of Brown & Sharp is the one by which copper wire is usually measured in this country, and it is commonly called the "B. & S. gauge."

The electric "arc" has been mentioned before in these papers. It is familiar in the arc-lamp. A current of electricity in being forced through an air-space, meets a high resistance and the energy required to force the current through this resistance is transformed into intense light and heat. The heated air and volatilized substances make of the space a conductor to some extent, but one with a comparatively high resistance.

Lightning-discharge currents do not act the same as the currents from dynamos. They do not always take the path that would be taken by a dynamo current, but frequently jump across spaces of air rather than go around corners and bends in conductors. It is consequently important that the path from the lightning-arrester to the earth be straight, so that the lightning discharge will not cause damage on its way to the earth. Although arresters are made to automatically break the connection with the earth as soon as the discharge current has passed, a heavy discharge may prove too much for the arrester, and the arc be long continued. For this reason, everything about the arrester should be non-combustible. Since parts of the arrester have good connection with the earth, special care must be taken to prevent leakage, and consequently the base on which the parts are mounted should be of a material that will not absorb moisture.

The two earths are required to make sure, good and sufficient connection with the earth. It is bad practice to connect to pipes in a building, because there is no certainty that the discharge current will go to the earth without damage in some unlooked-for place.

7. TESTING :—

a. All series and alternating circuits must be tested every two hours while in operation, to discover any leakage to earth, abnormal in view of the potential and method of operation.

b. All multiple-arc low-potential systems (300 volts or less) must be provided with an indicating or detecting device, readily attachable, to afford easy means of testing where the station operates continuously.

c. Data obtained from all tests must be preserved for examination by insurance inspectors.

These rules on testing to be applied at such places as may be designated by the association having jurisdiction.

A "series circuit" is one in which everything in the circuit,—dynamo, wire, lamps, etc., come one after the other, "in series"; the same current going through each. (Fig. 19.)

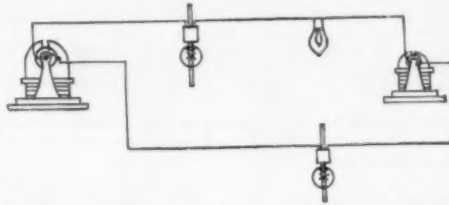


Fig. 19. Series Circuit, showing same current passing through lamps and motor.

The electrical-pressure necessary to force the current through such a circuit is usually high, because each device requires a certain pressure and the total pressure on the circuit

must be the sum of the pressures required by the different devices. The high pressure, of course, makes leaks more probable and more disastrous. (See *American Architect*, No. 971.)

In "alternating circuits" the current alternates in direction. Such a circuit has peculiar properties that make it possible, where branches are taken off, to change the pressure with transformers to anything desired. With alternating circuits the pressure between the wires that leave the station is high, and this system is consequently classed with series systems and it is required that it conform to the more stringent rules in regard to testing.

In the "multiple arc," or, more simply, the multiple system, there is a constant pressure between the main wires, and the different devices are connected-in between the wires, each device operating at the full pressure of the system and taking only such current as its resistance allows. (Fig. 20.)

The pressure between the mains of a multiple system is usually below 300 volts and is consequently "low," although there are often

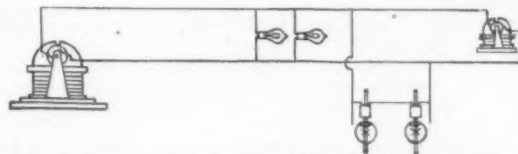


Fig. 20. Multiple Circuit, showing Lamps and Motor working with constant pressure.

multiple circuits on which motors are operated, that have a pressure of 500 volts. (See *American Architect*, No. 971.)

"Detecting" or "Indicating Devices" are arranged to operate by the leakage current. Thus a simple form that will serve as an illustration, is as follows:

Suppose that in Figure 21, A and D are the main wires of a multiple system, and that l and l' are two incandescent lamps connected across between the mains, but "in series." They will not burn brightly, because instead of each lamp getting the full pressure, each gets only one-half. At B suppose there be a connection with the earth. If now there be a ground-connection, say at C, the current that passes through l does not all go through l', but can at least, partly leak through the earth, up to B and thence to D. As a result, less current than before will go through l', and more than before through l. This will, of course, make l brighter and l' less bright. Thus when the left-hand lamp burns brighter, there is a leakage on the right-hand wire, and when the right-hand lamp burns brighter, there is a leakage on the left-hand wire. A lamp may also be put in the wire leading to the ground. This lamp will then light up more or less according to the amount of the leakage.

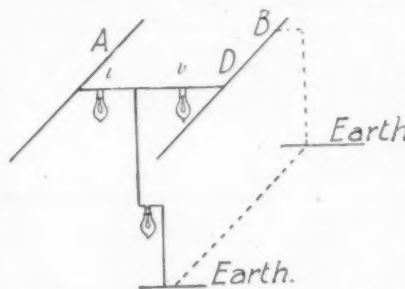


Fig. 21. A Form of Ground detecting device.

8. MOTORS :—

a. Must be wired under the same precautions as with a current of the same volume and potential for lighting. The motor and resistance-box must be protected by a double-pole cut-out and controlled by a double-pole switch, except in cases where one-quarter horse-power or less is used on low-tension circuit, a single-pole switch will be accepted.

b. Must be thoroughly insulated, mounted on filled dry wood, be raised at least eight inches above the surrounding floor, be provided with pans to prevent oil from soaking into the floor, and must be kept clean.

¹ Continued from No. 1001, page 22.

c. Must be covered with a waterproof cover when not in use, and, if deemed necessary by the Inspector, be enclosed in an approved case.

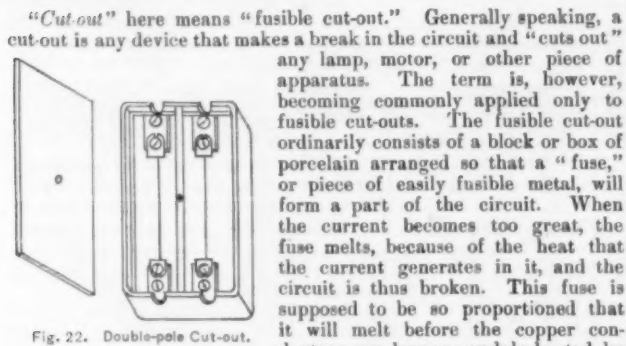
[Section c. From the nature of the question, the decision as to what is an approved case must be left to the Inspector to determine in each instance.]

9. RESISTANCE-BOXES:—

a. Must be equipped with metal or other non-combustible frames.

b. Must be placed on the switch-board, or at a distance of a foot from combustible material, or separated therefrom by a non-inflammable, non-absorptive, insulating material.

[Section a. The word "frame" in this section relates to the entire case and surrounding of the rheostat, and not alone to the upholding supports.]



an excessive current. The fusible cut-out is frequently called a "fuse block."

A "double-pole" device is one that acts in each of the two poles, two wires, or two sides of a circuit. It is required that cut-outs and switches be double-pole so that the cutting-off will be complete and certain.

Suppose that, as in Figure 23, the fuse is single-pole, that is acting on one wire of the circuit only: a heavy current flowing through the circuit will, of course, melt the fuse and the flow be stopped. But suppose the fuse to be just inside the wall of the building and that the wire A outside the wall comes into connection with a metal column or with some other conductor connected with the earth. Suppose further, that there be a connection with the ground on account of poor insulation at the motor, or that the wire comes into contact with a gas-pipe somewhere in B C. [See remarks under Rule 1.] Then the earth will be a by-path or "shunt" around the fuse and will make a closed circuit even though the single-pole switch be open. Thus in this case a large part of the wire will not be protected by the fuse at all. A double-pole cut-out or double-pole switch will, however, cut off all the circuit beyond it.

The "switch" is a device that operates mechanically, and is simply an arrangement by means of which one can pull out of circuit metal that bridges over a gap. An air-space or some other insulation is left, over which the current cannot pass.

When a circuit is broken, there is an arc at the point of separation. If the circuit be broken at only one point, this effect will be greater than if there are several points of separation. With a double-pole switch having two breaks in each pole, there is thus much less arcing upon opening, than if the switch were single-pole with one or two breaks. With a small motor running on a low-potential circuit, the current is small, and the pressure low, so that the arc formed when the circuit is broken is inconsiderable. It is also of little importance here that the switch cuts off completely all

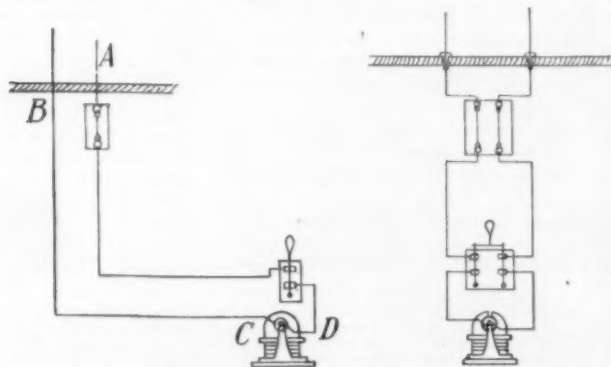


Fig. 23. Showing Single-pole Cut-out and Single-pole Switch.

Fig. 24. Double-pole Cut-out and Double-pole Switch.

the wiring beyond it. For these reasons the rules allow single-pole switches under the conditions mentioned.

The motor must be insulated from the ground for the same reasons that apply to the generator. A motor is, however, used in all sorts

of places and usually has not a special space set apart for it as a generator has, so there is need of greater precaution. Mounting the motor on filled dry wood and raising it eight inches from the surrounding floor keeps it well insulated, away from dirt that might gather on the floor, and less liable to water-damage in case the floor become flooded during a fire. Drip-pans are required, so that all surplus oil may be caught, thus keeping everything about the machine clean and less combustible.

The waterproof cover serves the same purpose as it does in the case of the generator. (Rule 1—d.)

Rule 1—c requires that a generator shall not be placed in a room where there are flyings of combustible material. It is obviously not always practicable to confine motors to rooms altogether free from this sort of thing, and where there is dust or dirt, or flyings of any kind, the motor is enclosed in a case that will isolate it from bad conditions. Usually the best case is a small room or closet built about the motor and lined with sheet metal.

Rules 9—a and 9—b are made for the same reasons that 5—a and 5—b are. In the case of a motor, however, a wooden resistance-box is still more unfit, for it is used only in starting the motor, and resistance is not supposed to be left in circuit, but to be all cut out as the motor reaches full speed. When through carelessness or accident some of the resistance is left in, the coils are very likely to overheat as they are frequently of too small carrying capacity to carry for any length of time the current that would flow through them.

RUSSELL ROBB.

(To be continued.)

BRAMANTE AND ST. PETER'S.

THE little town of Urbino which in the year 1883 celebrated the four hundredth anniversary of the birth of the great painter Raphael Sanzio, has lately celebrated the five hundred and fiftieth anniversary of the birth of the greatest architect of the Italian Renaissance period who, in 1514, died at the age of seventy years. The name of this grand artist is attached to that of the greatest of the Catholic monuments, the incomparable Church of St. Peter, of which he was one of the chief architects. The anniversary was also commemorated by an address at the Technical Institute at Pesaro delivered by Professor Benedetto Passeri, a man learned in the history of art. At the back of the peristyle of the Institute there was unveiled in the presence of the political and administrative dignitaries and of delegates from abroad, a bust of the celebrated architect, upon which was the inscription:

TO DONATO BRAMANTE,
PRINCE OF MODERN ARCHITECTS,
THE TECHNICAL INSTITUTE OF PESARO
PROUD TO BEAR HIS NAME.
MDCCCXCIV.

The occasion was as brilliant as possible, and in all respects worthy of the man it was designed to honor. Bramante was assuredly one of the artists whose works most powerfully contributed to raise the reputation of the century to which he belonged. Chance willed it that he should also be the uncle of Raphael so that the glory of the greatest of Italian painters and that of the grandest architect are involved one in the other and belong to one and the same family.

Bramante belonged to a poor family, but had at an early hour manifested a strong leaning toward drawing, though at first he seemed rather to incline towards painting, and his father who needed to utilize the budding talent put him to study in the studio of a painter of Urbino, Carnevale, under whose direction he executed several works of very secondary worth. He went to Milan, where he studied closely the celebrated Gothic cathedral, of which the imposing style charmed him and caused to spring up in his breast the inclination toward architecture. Shortly afterwards, he arrived at Rome. He still lived by his brush and he is credited with painting over the Porta santa of St. John Lateran, the escutcheon of Pope Alexander VI. But his penchant for architecture had already become firmly rooted and he devoted the greater part of his time to analyzing and measuring all the remains of antiquity remaining in Rome and its environs. Next he spent some time in the south of Italy in studying Greek and Roman remains there. Returning to Rome, he gave open evidence of his intention of devoting himself to architecture, and the first one to encourage him to follow the new career was the Cardinal of Naples, who commissioned him to construct in travertine the cloister of the Convent of Sta. Maria della Pace. Then little by little he was helped by the same patron to secure the construction of several monumental fountains, the Palazzo S. Giorgio, the Church of S. Lorenzo in Damaso and other churches. He prepared the design for the palace of Cardinal Adriano da Corneto, at Borgo Nuovo, and he conceived and carried out the enlargement of the Chapel of Sta. Maria del Popolo. But his reputation reached its apogee in 1503, when he entered the service of Pope Julius II, lately elected, whose first commission was the creation of the Belvedere, which Bramante carried out by using two orders, Doric and Ionic. He also did a great deal of work in re-arranging the interior of the Vatican Palace, especially the great galleries wherein were placed, later, the most valuable specimens of Grecian sculpture.

Bramante was inventive and impetuous; he worked with feverish

and indefatigable ardor and if events had favored him, he would, in a few years, have made the right bank of the Tiber a truly monumental city. Unfortunately, money was sometimes lacking in spite of the munificence of the popes and he was forced to curb the ardor which consumed him.

Amongst his chief works, we must not forget to include the sanctuary of Sta. Maria di Loreto, which was finished later by Sansovino, nor the graceful little house in the Trastevere which belonged to his nephew, Raphael. Yet his chief claim to fame rests on the part he took in the construction of the Basilica of St. Peter, a participation which has given rise to many controversies as to whether the part he played was useful or disadvantageous to the beauty of the edifice. Bramante has been accused of too warmly seconding, through personal interest, the intention of the pope, who wished to tear down the basilica and build a new church. He prepared an infinite number of designs, each more *bizarre* than the last, but which all bore trace of the fertility of the imagination whence they proceeded. The fact is that a good half of the ancient structure was torn down, and that Bramante set about rebuilding with all the impatient zeal which characterized him. At the death of the pope, the building had already risen to the height of the cornice. He was the first to use vaults with wooden projecting caissons, with the stucco ornaments that encase them, which catch the eye. To him, also, was due the invention of the method, subsequently used by Antonio San Gallo, of building the vaults on hanging bridges.

Bramante's design was grandiose indeed and colossal, but in addition to the fact that the money at command was not enough to provide for his vast conception, death overtook him too soon and prevented his carrying to completion his gigantic undertaking. We cannot even form an opinion of the value of his plan, because it was altered by the architects who succeeded him, each of whom, for personal reason, or because they felt the need of flattering the several pontiffs who ascended the throne, one after the other, found it desirable to introduce changes so as finally to totally change its spirit. In the first place, there followed Raphael and Giulio da San Gallo, who, after the death of Julius II, changed the design and even altered parts already newly erected. Then came Balthazar Peruzzi, who would have liked to pull down the entire building and make a fresh start, and then in the last place came Michael Angelo Buonarroti, who knew how to make all details give way before his iron will, and conform themselves to his taste and manner of conceiving and understanding things. But all contemporary writers are agreed that none of these had succeeded in imagining anything as sumptuous and magnificent as that which Bramante had conceived, and that St. Peter's would have been a monument much more worthy of admiration if Bramante's ideas had been respected. Even Vasari dares to express this belief, in spite of his love for and partiality toward Michael Angelo, which so often made him unjust towards others.

He died, as we have said, in 1514, at the age of seventy. He lived ostentatiously, spending with liberal hand the money that he earned. He was very fond of music, and often improvised on the lyre, nor did he scorn to practise the poet's art, and his biographers declare that some of his sonnets were far from bad. He was a typical artist of the Renaissance, well read and well informed and epicurean, like the popes of that marvellous epoch.

This Basilica of St. Peter, of which Bramante was one of the most active architects, is a monument which has passed through the strangest vicissitudes, some of which have modified and transformed its physiognomy. It occupies the site where was in ancient times the Circus of Nero, where all the martyrs were done to death. The remains of these ancient Christians have been placed in a catacomb, of which the entrance is at the foot of Monte Vaticano, and according to a tradition, which is questioned by Protestants, the remains of St. Peter himself were transported thither by St. Marcel. However this may be, about a hundred years after the death of Jesus Christ, the fourth pope after St. Peter, St. Anacletus by name, caused to be erected here a sanctuary. The foundations of the great basilica were laid as follows: About two centuries later, the Emperor Constantine, converted to Catholicism, to show himself worthy of the baptism he had just received, undertook to construct on the ruins of this sanctuary a sumptuous basilica which should be rectangular in form and divided into five naves by four rows of columns, each nave being reached through a separate door in the façade, in this particular greatly resembling the Church of St. Paul extra Muros as we see it to day. After the manner of the time, the structure was preceded by an open square court surrounded with porticos, of which no trace remains.

In 1440, the Basilica of Constantine threatened to fall in ruins and Nicolas V, about the middle of the fifteenth century, conceived the idea of building a new metropolitan church. Nicolas was that pope of enterprise and genius who first practically opened the era of the Renaissance. He loved art for itself, not for the sake of mere show and fashion like some of his predecessors.

The architects of this new structure were Rossellini and Leon Battista Alberti; but it had been raised only a few metres above the ground when Nicolas died and the work was instantly abandoned. Paul V, a man of Venetian birth, undertook a veritable crusade to raise the necessary funds, himself giving five thousand crowns and, on his appeal, the faithful sent contributions to Rome for the purpose of continuing work on a structure which shortly after was to become the most noted in the Christian world. But the merit of having given decisive impulse to this grand undertaking was reserved for

Julius II, a Ligurian by birth, who, by the boldness of his conceptions and the firmness with which he prosecuted them, may be properly held one of those men of true genius of whom humanity can boast. He desired above all things that St. Peter's should be finished during his reign and he gave the preference to the design of Lazzari Bramante, who, by the breadth of his views and the ostentatious character of his project, could not fail to seduce the imagination of such a pope. Julius II urged him to do something which should surpass in size and majesty every fine piece of work that the world contained, and Bramante did not need to be told this twice.

The most characteristic feature in Bramante's design is that the basilica was to have the form of a Greek cross with arms of equal length. He had been much impressed at Florence by Brunelleschi's dome, which is still a masterpiece of elegance and audacity, and he dreamed of repeating it at Rome on a greater scale, to be in keeping with the programme the pope had prepared for him. To this end he had built at the four corners of the transept four enormous piers to serve as supports for the dome. Unfortunately, death surprised him while in the full current of feverish execution and Julius II survived him only one year.

His successor, Leo X, entrusted the work to the young Raphael and Giuliano da San Gallo. Their first care was to consolidate the substructures of the four great piers which did not seem to them to be strong enough to bear the enormous dome which Bramante intended to place on them. It was Raphael who, setting his love for an artistic ideal above the veneration he had for his uncle, changed the general plan of the building, giving it the form of a Latin cross such as it has to-day. Unfortunately, death overtook this incomparable artist, too, in his full bloom, and from 1520 to 1546 the work had to be entrusted to divers architects who, as much through vanity as through ignorance, often made changes in the design of the monument which thus grew without the spirit of natural development and underwent alterations the unfortunate effects of which its general style felt. At length, in 1546, the pontiff Paul III broke through the intrigues which up to that time had kept Michael Angelo at arm's length and placed the work in his hands. He made the design for the dome, but before it could be built he also died. It was not finished until 1573 by Jacopo della Porta who entirely respected Michael Angelo's design. This was not the case, however, with the façade, which according to Michael Angelo's design was not so commonplace as the one we now see, with its enormous columns planted against the wall. He intended to have the columns stand free, forming a portico like that of the Pantheon and those of the great monuments of antiquity, which are not heavy, in spite of their often enormous proportions, simply because light and air have free play over their exterior texture.

During the pontificate of Paul V, Maderno finished this monumental structure by completing the façade upon which, in 1612, the name of the munificent pontiff was engraved in huge letters.

Fontana published a monograph of this building, from which it appears that up to 1694 the total sum expended upon the building had been forty-seven million Roman crowns, which represents in our money the sum of about forty-five million dollars. There must be few buildings in the world that have cost as much, but it is fair to say that St. Peter's by its vast size and the richness of its details accounts for the enormous size of the pecuniary sacrifices that its construction demanded.

The aspect of the building gives no clue to its tremendous size, for every part is so well proportioned, that what elsewhere would seem gigantic, here appears to be merely of normal size. The circular colonnade which surrounds the piazza serves to reduce to reasonable proportions the enormous mass of the basilica framed between the two semicircular colonnades. This is the reason why, when one undertakes to measure any portions of the building, the resulting figures are far greater than was expected. For instance, the façade has a total height of 167 feet¹; the columns engaged in the wall are 8.5 feet in diameter and 91.6 feet high; the cornice is 8.5 feet high, the attic 33 feet, the balustrade 5.8 feet, while the statues on the balustrade measure 17 feet. The cross which crowns the structure is 460 feet above the level of the ground. The length of the building is 613 feet and its breadth at the crossing is 124.7 feet. To get an idea of the immense size of the nave, it is enough to measure the baldachino which encloses the high-altar at the middle of the transept. At first sight it appears to be only of common size, and yet it is really more lofty than the Farnese Palace, the summit rising 91.6 feet above the level of the floor, that is to say 22 feet higher than the pediment of the colonnade of the Louvre at Paris.

The diameter of Michael Angelo's dome is only 3.2 feet less than that of the Pantheon, which measures 141.7 feet. The wall which supports the dome is not less than 25 feet thick and the distance from the floor to the vault of the lantern is 393 feet.

The axis of the building runs almost exactly east and west. The length from the door to the tribune is 597 feet and the width at the high-altar the same. Finally, the total height from the level of the piazza to the top of the cross surmounting the lantern is 452 feet.

Michael Angelo passes for the chief architect of St. Peter's,

¹Our correspondent gives his measures not in *metres* but in *pieds*, which we assume to be the old French *pied* and have so reduced his figures to English measure, though the results so obtained do not agree precisely with any published figures. It is impossible to say which are the really correct ones, as no one has thought to state with explicitness from and to what particular points the measures are taken.

because it was he who had the luck to give the building its definitive character. Maderno injured it by adding a façade which maims the design and conceals from the spectator in front the view of the magnificent dome as Michael Angelo intended it should be seen. San Gallo and Raphael worked up the details and carried out some of the secondary ideas contained in Bramante's plan. Balthasar Peruzzi fortunately could not carry out his own ideas which would have turned the temple into a ridiculous monstrosity. The real architect of this cathedral was Bramante, whose anniversary was celebrated last year, and it is proper to do the justice to his memory that is its due. Even the dome which bears the name of Buonarrotti was conceived by Bramante and the merit is really his. The fame of Michael Angelo is sufficiently great without seeking to make it greater at the expense of others.

H. MEREU.

VENETIAN ART AT THE NEW GALLERY, LONDON.¹—II.

IN a previous paper, we gave a general idea of the contents of this exhibition; reserving to this one a more critical survey of the chief features of it, viz, the pictures. The three hundred pictures include works attributed to all the great lights of the Venetian school, and many of the lesser ones, but we must say at once that, with the exception of the proud possessors, no one for a moment imagines that all are correctly named.

As usual, the battle of the experts chiefly centres around the name of Giorgione. Since it is well known that he painted many more large frescos than small pieces, and that many of these latter have been lost or destroyed by fire and the vicissitudes of time, the number of pictures bearing his name to which the judges have given the "hall mark," has been gradually reduced, and Mr. Berenson—the latest critic, if we mistake not—unhesitatingly affirms that less than a score of his pictures are in existence. It is obvious, therefore, that of the thirteen in the New Gallery, only very few can be genuine. The same may be said of the Bellinis and some other of the earlier painters. The fact is, when an artist became the fashion in Italy or Venice, unscrupulous owners effaced an inferior name, and substituted that of the favorite of the hour.

"Virgin and Child," certainly not a Bellini, lent by Captain Holford, has inscribed on the canvas in large capitals "*Opus Bellini Joannis Veneti non Aliter*," which is quite sufficient to raise a doubt of its authenticity.

English owners in the last century were no better than those abroad and the result of it all is that we have become hypercritical. The faults of the re-namer can, however, be remedied by a little painstaking study, but what can atone for the offences of the restorer? How is it possible for those delicate touches, by which the very soul is put into a face, to survive such treatment as the following, related by a picture-dealer? A family group by Van Eyck, having been injured in some parts by fire, was treated as follows: he first lined it and removed the old varnish; soaked it with poppy oil, then extracted the cement and wax with which the cracks in the color had been filled, replacing them by a preparation of fine white wax. He then painted over the background and some less important parts, restoring the glazings where they had vanished, and completed his work by two coats of the finest copal varnish. Certainly a frightful example of the senseless restoration by which numberless masterpieces are and have been irreparably ruined!

The visitor naturally compares the style of the Florentine and other schools shown last year with those before him; remarking especially how much more intellectuality appears in the faces, notably of the "Madonnas." Instead of the former sanctimonious self-consciousness, we see, in most cases, a healthy good-looking mother—peasant or lady—of everyday life, caressing her child, and holding him up to the admiration of the beholder. This bears out what some writer has said, "that the Venetian School in its purity was highly intellectual; and that we might distinguish the three Italian schools thus: the true Florentine, as *soul*; the Venetian, as *mind*; and the Roman, as developed after Michael Angelo and Raphael, as *body*."

The Vivarini, of the Murano School, are too meagrely represented by two pictures on the same legendary subject—the "Death of the Virgin"; both legend and treatment are Byzantine: there is also a "Virgin and Child," who are standing behind a handsomely carved frame, which is surmounted by a beautiful garland of fruit; while from a window in the background is seen a fine landscape. This device of a landscape, viewed through an open window, is introduced in several pictures.

By Jacopo Bellini there are two pictures, and there are several attributed to his sons, Gentile and Giovanni. Gentile, it was, who, at the desire of the Sultan, Mahommed II, was sent to Constantinople by the Council, to paint his portrait—now in the possession of the Layard family, though not lent to this exhibition. Gentile had been at the court for above a year in high favor, when one day, the Sultan, criticising a painting representing the beheading of John the Baptist, ordered a slave to be decapitated before him to explain his meaning. This alarming incident gave Gentile no rest till he was *en route* for Venice.

Giovanni's well known "Circumcision," from the Orleans collection, lent by Lord Carlisle, is interesting, not so much for the sub-

ject, though a favorite with early painters, as for the wonderful way in which its most harmonious and rich coloring has been preserved—and for the naturalness of manner in the Virgin and her female companion, both of whose dresses and ornaments are perfect. Near this is one of the numerous copies of this picture, but the colors are less vivid. The former is signed "*Joannes Bellinus*," the latter, "*Joanis Bellini P.*"

Though, strictly speaking, Andrea Mantegna was Venetian neither by birth nor style, his marriage to the sister of the Bellinis—a circumstance never forgiven by his first teacher, Squarcione—and his subsequent residence in Padua, have led to his being included among Venetian painters. It is said that he, like Giotto, was in early life a shepherd-lad, but how he came to be a pupil of Squarcione is not known. We wonder how many embryo Giottoes and Mantegnas are lying *perdu*s in our villages, waiting for their talents to be developed in a Technical or Art School!

Mantegna is specially known in England by the nine paintings by him, now in Hampton Court. They are painted in *tempera* or distemper, on twilled linen, which has been stretched on frames and fixed to the walls of the Communication Gallery, a place said to be haunted by the ghost of Queen Katherine Howard. Mantegna was sent for by the Duke of Mantua to paint a frieze for a hall in his newly-built palace of San Sebastiano; the subject was "The Triumph of Julius Caesar," and the frieze remained in its place a hundred and fifty years, and with the rich collections of paintings, was hidden when the town was pillaged in 1629. Afterwards the then Duke, being much impoverished, sold the frieze and several paintings for £20,000, to Charles I of England, who was then forming his splendid collection. After his execution, Parliament disposed of the pictures, but Mantegna's frieze, valued at £1,000, was reserved to the Protector, to whose care we also owe the preservation of Raphael's cartoons. They were afterwards given to Charles II, but it is not known by whom.

Louisa, Lady Ashburton, lends a magnificent "Adoration of the Magi," by Mantegna, which, though it has suffered from age, is a fine example of his later style and technique. The gifts being presented by the three kings are all Venetian; one, held by the African, being a glass vase of exquisite workmanship. His own cape is confined loosely under the chin by sequins attached to a delicate gold chain, while round the neck his muslin shirt is richly embroidered in Venetian fashion. The scene is very homely, bearing in mind that none of these pictures suggest a *locale* other than that of Italy and Venice. Also by him, and a later work, is the fine Greek head of "Judith."

The name of Antonello da Messina is assigned to three pictures: the first in importance being the "Ecce Homo," of which there is a replica with variations in the Academy at Venice. It is a wonderfully-painted head, the eyes being simply perfect, and the whole expression showing intense, though subdued suffering. The model, however, was a man of a low type, consequently the face lacks the dignity and grace that even in extreme sorrow should characterize the person of the Saviour. This picture, on a panel 11" x 8", and in excellent preservation in a glass case, is said to have been picked up at an old stall in Seville many years ago; it was then brought to the fine collection at Richmond, whose owner, Sir F. Cook, has lent it to the New Gallery. Another work, "Head of Hans Memling," is lent by M. Léon Somzée, and is marvellously life-like: the eyes again are charming. There is also a "Judith" by him, a small full-length figure, putting the head of Holofernes into a bag. This picture is said to have passed for a Raphael in Charles I's collection and was exchanged by him with the Earl of Pembroke for one by Parmigiano. It is doubtless known to most of your readers, that during a visit Antonello paid to the Netherlands, he became acquainted with Van Eyck, and learned the secret of mixing colors with oil instead of fixing them with a gum made by infusing young figs. On his way home he imparted the knowledge to some of the Venetian painters.

Of the thirteen pictures reputed to be by Giorgione, what is to be said? Undoubtedly, the best that can be affirmed is that they are Giorgionesque, but "The Shepherd with a Flute," lent by the Queen from Hampton Court, is one that bears all the marks of genuineness. It is in a shabby old frame and needs cleaning, but probably on that account there still remains the subtle glow which is the distinguishing characteristic of this painter, joined to the joyousness that was so marked a feature of the Renaissance.

Of three exceedingly fine portraits by Lorenzo Lotto, the gifted and original contemporary and fellow-countryman of Giorgione, one is lent by the Queen, from Hampton Court; while Captain Holford lends the others. Her Majesty's is the beautiful and well-known one depicting Andrea Odoni, standing surrounded by the various antiques he has collected, a good-looking and easy-going man. He has a ring on one finger quite near the nail, and the same is noticeable in other portraits, besides which the rings are small. Odoni was a rich and enthusiastic admirer of contemporary art in North Italy and the friend of Titian, Aretino and other artists and writers. This picture was for a long time supposed to be by Coreggio, but Dr. Waagen recognized Lotto's style which was verified later by the faint signature "Laurentius Lotto, 1527," being discovered. The other portraits are of ladies and are unnamed. The first is a half-length; nearly full face, she wears a black dress, white sleeves and chemisette, serviceable leather gauntlet gloves and a large black turban with gold medallions. The dress of the other lady is a mixture of black and green, with large short puffed sleeves and an extraordinary

¹ Continued from No. 999, page 74.

turban trimmed with something resembling little curls of white wool. She wears a large jewel suspended by a gold chain from her neck, in her left hand she holds a drawing of "Lucretia,"—which name has been given to this picture—while on a table beneath it is a paper with this inscription, "*Nec Villa Impudica Lucretia Exemplo Vivet.*" All three portraits, but especially those of the ladies, show powerful treatment.

Some thirty pictures bear the name of Titian, and from among those not portraits we select a few for some remarks. In "The Magdalen," from the collections of Christina of Sweden and the Duke of Orleans, we see depicted a very beautiful and refined woman with fair hair, looking up as in prayer; a skull and book stand on a table before her and to one side is a delicate glass vase with cover. "The Daughter of Herodias" looks out of the picture, her deep-set eyes and her beautiful classic features showing a tragic intensity. The charger is on a table from which she turns away, and an attendant stands near her; through an arch is seen a landscape, recalling in its somewhat gloomy mountains the scenery of Titian's early home. This picture is a repetition of the beautiful one in the Doria Palace. "The Triumph of Love" is a characteristic one of the great Venetian's, representing Cupid with bow and arrow standing on a lion's back. The canvas is circular in form and rather dirty. "Lucretia," lent by the Earl of Malmesbury, and which formerly belonged to Charles I, shows a nude full-length figure holding with the left hand a red cloak over her eyes, while she is about to stab herself with a dagger. M. Somzée lends the "Worship of Venus," a replica of a picture in the Royal Gallery, Madrid, but not particularly interesting.

The portraits, however, form the chief attraction in the exhibition, not only as regards the interest attaching to them historically, but also for the grave and senatorial dignity imparted to portraits by all Venetian artists, and notably by Titian. Indeed, after looking at some of these for a short time the visitor feels quite *en rapport* with them, as though face to face with flesh and blood. If it be so now, when the canvasses have been scoured, re-varnished and what not, with what beauty must they have gleamed on the walls when in their pristine splendor! It is said that Titian always painted his pictures for the place they were to fill, and, when possible, finished them on the spot.

Having to contend with old Giovanni Bellini on the one hand, and the fashionable Giorgione on the other, Titian found it somewhat difficult to obtain the height of his ambition—the appointment of Court Painter, then and for above thirty years past held by Bellini in succession to Vivarini, a post by no means a sinecure, since the entire walls and ceilings within the Ducal Palace were in process of being covered by the works of the greatest painters: besides "It is a custom of this city," says Sansovino, "that the Prince when in office should do three things, procure his own likeness, life-size, to be placed in a certain lunette under a window in the Hall of Great Council; obtain a picture of himself kneeling before the Madonna attended by Saints, for the College; and furnish a shield bearing his arms, to be placed on board the Bucentaur."

The salary attached to the post was paid in two ways, probably to prevent the great cost being known to the people of Venice. The painter was granted a broker's patent connected with the Salt Office, producing a hundred ducats yearly, with an annual exemption from taxation equal to twenty more. It was the privilege of the best masters to paint the portrait of the Doge, the remuneration being twenty-five ducats. Titian followed up his numerous petitions by one in which he said he had been invited to the Papal Court, but would prefer devoting his talents to the Republic "if it pleased their sublimity."

The first Doge whose portrait he painted was Antonio Grimani, whose career was so remarkable that a brief sketch may be interesting. Long before his age entitled him to inscribe his name in the "Golden Book" of Venice, he had visited every market in the Mediterranean, amassing so much wealth that he paid twenty-five thousand ducats for a Cardinal's hat for one of his sons; a lucky investment as the sequel shows. Grimani was elected Captain-general of the expedition against the Turks, in 1499, the famous Loredano being next in command. The result was a decided Turkish victory; each of these two Venetians accusing the other of withdrawing his support at a critical moment. When the news came, Grimani was cursed by the infuriated Venetians as the ruin of Christianity; he was brought home in irons and condemned to imprisonment. After some time he escaped to Rome where he lived for some years with his son, the Cardinal, until, being able to reconcile Venice and the Papal See after the League of Cambrai, he was entitled to a pardon. When he returned home, eleven years later, at the age of eighty-seven, he was elected Doge far ahead of all competitors. This Cardinal Grimani was one of the four distinguished persons whose friendship Erasmus enjoyed during his visit to Rome.

To return to the portrait after this digression; the face is a marvel of skill even from Titian. Over the intrenched and shrivelled face of the old Doge he has thrown an indescribable charm, as it were, glorifying without concealing the wrinkles, while in the keen glance and the firmly set mouth there is an air of vigor and subdued triumph. The life-size figure of the Doge is three-quarters length; he stands erect looking out from the canvas, wearing an ermine mantle with gold embroidery up the front and round the neck. The ducal cap—by this time become very rich—is adorned with jewels,

while underneath it is the cotton biretta covering the ears. This biretta was worn, it is said, in order that under no circumstances the dignity of the Doge should suffer by his head being uncovered. This picture was an heirloom in the Grimani Palace till 1873, though sold in 1871 to Count Rosenberg, Netherlands Consul-General; at his death, in 1890, it became the property of his widow, who has lent it to the exhibition—it is now shown for the first time in this country.

Rapidly glancing at the other portraits by Titian we notice one, formerly in the Orleans collection, lent by the Earl Cowper, that of his daughter "Lavinia," the famous and splendid picture representing this beautiful woman holding a bowl of fruit and looking back over her shoulder; all the details are rich. The "Portrait of a Lady," a golden-haired dame in a pink dress holding flowers, comes from Mr. G. F. Watts, R. A. The celebrated "Cornaro Family," owned by the Duke of Northumberland, with the great series of Titian's at Bridgewater House, with many other gems are conspicuously absent; two portraits of members of that family are exhibited. Captain Holford lends his "Caterina Cornaro," niece of Andrea Cornaro, a Venetian noble, who was declared a daughter of St. Mark's, and married in 1472 to the King of Cyprus. At his death, shortly after, she was proclaimed Queen, but by the advice of her brother Giorgio, abdicated in 1489, in favor of the Republic. In this portrait the beautiful Queen is superbly attired, a noticeable feature being the high pointed head-dress of some rich material, with the ends falling over the shoulders; in her hand she holds a marten with a collar on its neck.

"Giorgio Cornaro" is here also, an undoubted Titian, an attractive looking man caressing a falcon, with his dog at his side. We know from his history that the habits and manners of the Venetians of the fifteenth and sixteenth centuries were far from puritanical, but these men and women have at least open countenances, and do not look as if they would have a man stabbed in the dark. "Francis Medella Rovere, Duke of Urbino, with his Son," the picture next on our list, is, however, the exception proving the rule, having a most crafty face, though that of his little boy is very winning. In this large canvas—44" x 78"—the Duke, a noble-looking man, life-size, in white doublet and hose with black surcoat and cap, stands full length, his right arm resting on a helmet placed on a table, beside which are two scrolls inscribed "S. R. E." and "S. V. R. P." The picture is lent by the Duke of Westminster.

There are some specimens of that highly decorative artist, Paris Bordone, a pupil and imitator of Titian's. The most striking subject is that of "Alfonso II D'Este, Duke of Ferrara, and his Mistress," who was Laura dei Dianti, and perhaps at this time his second wife. It depicts the life-size, three-quarter length figure of a fair-haired buxom young woman, wearing a rich dress, very low and exposing the neck, standing by a table, her left hand on the shoulder of the Duke, who leans against her breast and holds her right hand. He is a dark handsome man, but weak and amorous. The picture was brought from Venice by Napoleon I and given by him to his uncle, Cardinal Fesch; it now belongs to the Earl of Malmesbury. A picture called "Gli Innamorati," by Romanino, from the Casa Mori collection is treated somewhat similarly. The Corporation of Glasgow lends a "Madonna and Child with Saints and Donors," but, as a rule, the donors do not appear to such advantage as they do in portraits intended for the walls of their own palaces; they are then more natural and not overawed.

A more important collection of Tintoretto's has seldom, if ever, been seen in England, the finest two examples being "Esther fainting before Ahasuerus," a painting of the first order, lent by the Queen, from Hampton Court—where it is not seen to such advantage as in the New Gallery—and a "Venetian Noble and Family." The former—the original sketch for which is in Madrid—is a large canvas, 81" x 105", and would be improved by careful cleaning. In the fine sweep of this magnificent and animated composition, so characteristic of Tintoretto, there is all the dignity suited to an Oriental court. On the left is the King, behind whom a man in armor is seen anxiously descending the steps of the throne, before which the fainting Esther is being supported by two attendants. Many handsomely dressed women are crowding around, while—a not uncommon object in the Venetian picture—a cat is seen in a boy's arms. The "Venetian Noble and his Family" has an air of grandeur conveyed to it by the almost royal dignity in the pose of the chief figures, and by its size, 73" x 93". The father is dressed in black with an ermine-lined coat, while his son is held by the hand of the mother, who wears a richly-embroidered brown-velvet gown and white ruff, pearl ear-rings and necklace. The boy is in a crimson satin dress with white and gold sleeves; and the lady's train is borne by a page in brown and gold velvet, the whole scheme of color being sumptuous. A curious conceit of the portraiture of the time is the background, where, through an open window, God the Father is seen with outstretched hand blessing the group. The lady in this picture is exceedingly like Jane Dormer, Duchess of Feria, a great friend of Mary I, of England, and the image of the Duchess of Fife. The Earl of Roseberry lends a first-rate portrait of a weather-beaten "Venetian Admiral"—from the Hamilton Palace collection. The portrait of "Andrea Barbadiago," life-size three-quarter length, is grand; on a table near which he stands is a splendid suit of inlaid armor, while through a window is seen the sea and sea-monsters; its size is 46" x 37".

Tintoretto proved himself more than a match for Aretino, who

was without doubt the most malignant man Italy ever produced, and it was truly said of him "that he spake ill of everybody except God," excusing himself for that by saying, "I do not know Him." Meeting Tintoretto one day, he began to praise the "amiable Titian"—a nasty trick of his which had brought him many a blow. Tintoretto, becoming impatient, bethought him of an artifice, viz, to invite Aretino to his studio in order to "take the portrait of so illustrious a man." Aretino did not refuse and having entered the studio arranged his ugly face in accordance with the wishes of the artist who, at this juncture, with great calmness, pointed a long pistol at the face of the sitter. "Don't be so frightened" said he with a burst of laughter, "I am only seized with a fancy to take your measure," and glancing at him from head to foot he continued quietly, "You are twice and a half the length of my pistol," then placed himself in the attitude of sketching him. Aretino, trembling all over, forced his lips into an awkward smile and replied, "You are very clever and will always gain your point." History tells us that henceforth this "Scourge of Princes," as he was called, had no language sweet enough for Tintoretto.

By the middle of the sixteenth century a great change had taken place in the manner of delineating sacred subjects, and although the transition was gradual, it was none the less marked, so that even the most casual observer can easily detect the vast difference between the devotional pictures of Giovanni Bellini, in their fervor and sweetness recalling Fra Angelico, and the gorgeous canvases of Paolo Veronese, all aglow with the mundane splendor of every-day life.

Far and away Veronese's finest picture in this exhibition is "Christ at the House of Levi," a small replica of one in the Academy at Venice. This work was in the Carthusians' Monastery, at Lyons from the sixteenth century till it came into the hands of its present owner, M. Léon Somzée, to whom we are indebted for its appearance here. This unsurpassable picture is in size 60" x 85", and we see depicted a portico with three arcades, beneath which is a long table crowded with guests; under the central arch Christ is seated, and near him are Peter, John and Levi—called later Matthew. The feast is a splendid one, judging from the number of dishes and the retinue of servants coming and going, almost jostling one another on the fine staircase leading to the court-yard beneath. The details are minute, from a servant carrying a glass with wine, sent from table evidently, as he smells it—to the cat running out from under a table to fly at a dog. Over the table is a sort of balcony from which a red baldachino hangs over the chief guest. Apart from the personal interest the picture is very grand architecturally; through these arches we look out upon splendid palaces brilliant in the radiance of the Adriatic light.

Passing on to those bright lights of the Venetian decadence, Canaletto and Guardi, we notice two or three of their charming little works. The former is impressively represented by a "View of a Fair on the Piazza," a line of booths and crowds of visitors making a busy scene, while a fine architectural effect is conveyed by the Campanile and Cathedral of San Marco seen in the distance. "A View of the Grand Canal," looking towards the ducal Palace, is taken from the steps of Santa Maria della Salute, while another "View from the Piazzetta" looks toward that splendid edifice.

The Misses Cohen lend two Guardi's, but they have become blanched through exposure; one is a view of Venice comprising the ducal Palace, the "Tower of St. Mark" and other buildings. The other is "Santa Maria della Salute." Also by Francesco Guardi are two pictures of ceremonials, Pope Pius VI receiving the Doge and Senators of Venice in the great Hall of the Scuola (or guild) of Giovanni and Paolo—showing these dignitaries entering in procession, the sides of the hall being lined with the members of the guild. The other picture is an out-of-door pageant, showing great attention to minute details.

We must leave unnoticed a number of really magnificent paintings. For instance, there is the sketch for Titian's "Last Supper" for Philip II, which being too high for the wall in Madrid where it was to hang, had the top—containing the fine arches—cut off! The sketch, of course, is complete.

A picture called a "Lady Professor at Bologna" excites great comment; said by many to be the work of Fernandino Licinio though not attributed in the catalogue. It is difficult to say whether it is a somewhat manly woman, or a womanish man, since, though the hands holding a skull on the table are delicate, and indeed beautiful, the face and head of hair resemble those of a young man of the time. Be that as it may, it is a splendid painting; the dress is black and there is a white chemisette above it. The dress might be for either sex.

THE ACADEMY OF FRANCE, AT ROME.

THE list of French students of architecture entered at Rome—and M. Chedanne is one of the latest—is a long one, dating as it does from the year 1720. Since then, with the exception of the years of disorder, 1794-5-6 and a few other years, the French Government have sent a student of architecture annually to the Academy of France, at Rome; and, in some years, two such students have been sent. Among them are such names as Dorbay (1739), Clérissieu (1746), David Leroy (1750), De Wailly (1752), Peyre, Jr. (1762), A. L. T. Vaudoyer (1783), Percier (1786), Guenépain (1805), Huoyt (1807), Caristie (1813), Lesueur (1819), Blouet

(1821), Duban (1823), Labrousse (1824), J. L. Duc (1825), L. Vaudoyer (1826), V. Baltard (1833), Lefuel (1839), Ballu (1840), L. J. André (1847), Brune (1863); and a host of other architects, who did well in their time, whom it is impossible to mention here. Again, among the living may be cited the names of Alfred Normand (1846), Charles Garnier (1848), Honoré Daumet (1855), Honorable Corresponding Members of the Royal Institute of British Architects, and many others in practice at the present time.

The establishment of the Academy of France, at Rome, was the work of Louis Quatorze and his great Minister, Colbert. The King commanded that "the sound principles and most correct rules of architecture should be publicly taught two days a week, in order that a nursery, so to speak, of young architects might be formed; and to give them more courage and passion for the art, the King ordered that, from time to time, prizes should be awarded to those who succeeded best, promising that a certain number of the young men so premiated should be sent immediately, at the Royal cost, to Rome, in order that nothing might be wanting on the King's part to complete their education and render them fit to act in the conduct and superintendence of the Royal buildings." This was after Desgodetz had been despatched by Colbert on a mission to Rome to measure the finest of the ancient buildings remaining there—the results of that architect's labors not having been published until 1682. But long before—as early as 1666—Louis Quatorze had sent young painters and sculptors to Rome; and established, at the Palazzo Capranica, an academy in which twelve artists were to be lodged and boarded at the Royal cost, each for a term of five years. Its first Director was the President of the Royal Academy of Painting and Sculpture in Paris; and he, in March, 1666, left for Italy with twelve young Frenchmen for the purpose of pursuing their studies in Rome. This period was also eventful for architecture. The Italian Bernini, who had just completed the colonnade of St. Peter's, and who was in Paris at the invitation of the King, had visibly impressed His Majesty with the magnificence, long fallen into disrepute, of the master-art; and in 1671, by the exertions of Colbert, was founded the Royal Academy of Architecture, which still exists, partly as the section of the École des Beaux-Arts and partly as the third section of the Académie des Beaux-Arts, one of the five academies now composing the Institut de France, which was founded, by a decree of the Republic, on August 22, 1795.

The Palazzo Capranica had long been used for the purposes of the Academy, when it was transferred to the Palazzo Mancini; leaving that palace, in 1803, for the Villa Médicis (as the French term it) where it is still housed.

The course of events which led to the formation of the present École des Beaux-Arts, some particulars of which were furnished about ten years ago to the Editor of the *Journal* by the late Albert Lenoir, formerly Secretary of the École, is instructive as showing how the arts emerged from the flood of destruction which deluged France at the end of the last century and the beginning of this:

The condition of architecture after the Revolution was most unsatisfactory. Of the Royal Academy, suppressed in 1793, no trace was permitted to remain. The systematic study of architecture was discontinued until David Leroy, a *pensionnaire*, in 1751, of the French Academy, at Rome, afterwards celebrated for his researches in Greece, and known to Englishmen from his controversy with Athenian Stuart, collected together a few young men and taught them in private.

About that time, Antoine L. T. Vaudoyer draughted a scheme for a School of Architecture, and in 1800 he joined Leroy. The two, with the assistance of L. P. Baltard and, among others, Fontaine and Percier, promoted emulation by offering prizes for designs and drawings, to be submitted in competition, according to definite instructions issued for the purpose, within the studio, or *atelier*, they conducted. This school, founded and developed by private enterprise, was afterwards removed to the Louvre, and ultimately taken under Government protection at the Collège Mazarin (the present Palais de l'Institut) in which, at that time, the students' competitions for the annual Grand Prix de Rome used to take place.

In such a manner the École des Beaux-Arts, the most justly-famous school of its kind in the world, came into existence. In 1816, it was removed to the Convent des Petits Augustins de la Reine Marguerite, in the street of that name, now called the Rue Bonaparte, where it is still located. At that time, the Convent buildings contained the Musée des Monuments Français, which was a collection of fragments of royal tombs and effigies, and of monuments of distinguished Frenchmen, preserved from iconoclastic fury by the reverential care of the scholar and gentleman. The Museum was abolished in 1816; in its place, the present École des Beaux-Arts was begun. This was affected by the adaptation of parts of the old Convent and the construction of new buildings, first under the charge of Debret, and afterwards of Duban—both members of the Institut. On the 4th of August, 1819, a Royal ordinance determined the rules of the School, and divided the section of architecture into two classes. No change occurred until 1863-64, when the School was reorganized by Napoleon III, and in a manner which has since undergone hardly any alteration in principle.

A young Frenchman, in order to gain admission as an "élève de l'École des Beaux-Arts," has to pass an examination, after which he is received into the second class of the school. He has then to work on the various competitions and other exercises belonging to this grade, and relating to both the science and art of architecture, to ornament and figure drawing, and to the modelling of ornament. These courses of study, moreover, include mathematics, physics, and chemistry generally, descriptive geometry, perspective, stereotomy

and construction. Numerous prizes of every kind are awarded to the *élèves*, both in the first and second classes. It is, however, impossible to devote space to a full description of a French student's career; all that can be done is to describe the final competition in which he may take part:

The competitions for the Grand Prix de Rome take place at the Ecole des Beaux-Arts, and they are open only to candidates of French nationality under thirty years of age, whether students of the school or not. In the case of architecture, as in those of painting and sculpture, the competition is an annual one, adjudicated on by nine architects, who are chosen by ballot from a list presented by the Council of the School. In like manner, nine painters and nine sculptors compose the juries of their respective sections. The conditions of admission to the competition for the Grand Prix in architecture are very simple. In March of every year a preliminary trial takes place. The candidate has to make a sketch (*esquisse*) in twelve hours, and from the authors of these sketches the jury select twenty-five, who have to undergo a second ordeal, which consists of another sketch, to be made in twenty-four hours. From these last, ten candidates are chosen, and they enter their *loges* for seventy-two days. A *loge* is an enclosure within which, as before mentioned, a candidate works all day, beginning at 8 A. M., and during the period of trial he is not permitted to enter the *loges* of the other competitors or introduce anybody into his own. A careful programme of the work he has to do is given to him by the Academy of Fine Arts, and this last year (1883) it was a "Necropolis." Out of the ten competitors, three are selected and premiated. The first obtains a gold medal, which has always been, and, I believe, is still, regarded as the highest prize open to French students, and he leaves early in the following year for the Academy of France, at Rome, where he is lodged and boarded at the cost of the nation.¹ The competitors placed respectively second and third also receive medals, and gain a just distinction thereby; they further are exempted, should they try again for the Grand Prix, from submitting preliminary sketches.

Nor is this the place in which to enter on a description of the diploma in architecture granted, after examination, to students of the Ecole des Beaux-Arts, after they have obtained a certain number of medals, etc., in the various competitions of the school, or in the "Prix de Rome." To continue:

At the Villa Médicis the student has a bedroom and a studio allotted to him: he dines and sups at fixed hours at a common table; he has to conform to the rules of the Academy, and to submit while there to the orders of the Director, who is always a French painter, appointed for five years, one of the conditions of the appointment being that he shall have previously resided in Rome. The original term of a student's sojourn was five years, but in 1864 this was reduced to four years. By a pleasant fiction he is supposed never to re-enter Paris during those years, the real fact being that, so long as a student fulfils his obligations in the matter of drawing, no restraint is put upon his actions. It is a part of his duty, after the second year, to visit the principal cities of Italy, and he may extend his tour to Greece. During the first year of his sojourn he has to make four studies of detail from such of the finest ancient buildings as he may choose in Rome and Central Italy; the second year he must make four studies of detail, from the ancient monuments of Italy, and add some details of Renaissance architecture; the third year he has to draw two sheets of details from ancient monuments of Italy (including Sicily) and Greece; and all the foregoing must be drawn to a scale of one-quarter of an inch to a foot. During this same year the student has also to make a restoration of a part of some ancient monument, the details of which he has hitherto been drawing; and the restoration must show the character of the construction the principal points of which he has to describe in an explanatory *mémoire*. The student has, moreover, to make detail drawings of external and internal ornaments, together with views of buildings and portions of buildings erected during the Middle Ages and the Renaissance. Tracings of these are preserved in the archives of the Academy, but the original drawings remain the property of the student. In the course of the fourth year he makes the geometrical drawings of an ancient building, either of Italy or Greece. These drawings are colored and executed from the building itself, representing it exactly as it appeared at the time. The student has also to make another set of drawings of the same building restored to its pristine condition, or as he supposes it to have originally been, adding an historical notice of it and an account of its construction. He has also to make detail drawings, a quarter full-size, of the most interesting or characteristic portions of the building; and all these drawings become the property of the Government.

The student, on his return from Rome, reports himself to the Academy, in Paris, and his name is then sent to the Government. He is afterwards admitted, as an assistant, to the Conseil Général des Bâtiments Civils, a council established by Colbert for the purpose of advising him upon matters regarding buildings, which met, at the great Minister's time, twice a week — on Tuesday and Friday — and still meets on those days. Admission to that board gives the student of Rome, in due time, a right of presentation to some public building or national monument, in which he becomes the subordinate of some architect of eminence, who has risen to high position after a similar course of training. As an *inspecteur*, the student passes the day upon building works, checking the quantity and character of materials, and the hours of workmen employed. He rises in time to be assistant-architect, then, perhaps, joint-architect, and he may ultimately become the architect-in-chief to the very work upon which he began as an *inspecteur*. To quote further from a small English

treatise on this and like subjects connected with public buildings in France, the student of Rome will be summoned in course of time to take a place of Councillor on one or other of the several boards pertaining to various administrative departments. The Académie des Beaux-Arts will hear of him again; and having at their disposal the record of his earlier career, the Academicians have no need to make a humiliating inquiry of outsiders for possible recruits.

Those who desire to obtain fuller particulars of the Academy of France, at Rome, than can be given in a hasty compilation like this will do well to read the late Victor Baltard's "*Villa Médicis à Rome*" (fo. Paris, 1847). Information on the whole subject will also be found in "*Transactions*," 1883-84, in a paper entitled "A Brief Review of the Education and Position of Architects in France since the year 1671."—*Journal of the R. I. B. A.*

THE ARCHITECT AND THE ENGINEER.²

MR. PRESIDENT AND GENTLEMEN OF THE AMERICAN INSTITUTE OF ARCHITECTS:—

JUST why a committee should select one who had never been known to make a speech, to respond to so important a sentiment as that of "The Architect and the Engineer," will probably never be known; but the subject is so fitting to an occasion of this kind that even a tyro may say an interesting word upon it.

We understand an architect to be one who plans buildings and superintends their erection; while the civil engineer is one who plans and constructs the works pertaining to the internal development of the country. The work of the architect is so broad that it develops some specialists, but the field of engineering is so diversified as to bring forth not only specialists in various branches, but special professions, if they may so be called. Legally, neither the architect nor the engineer is recognized as a professional man, but after ten or twenty years of combined study and practice he is probably as well justified in speaking of his calling as a profession, as is the callow youth who has spent three or four winters in the law school or the medical college. This condition gives rise to a happy freedom, both pleasant and refreshing. If it becomes expedient for a carpenter to sign his name as "architect," or an auctioneer to pose as a civil engineer, either can do so without violating any statute and neither architect nor engineer can do more than to merely smile at the peculiarities which some people manifest. Before the law, then, we stand upon an equality—it always being granted that men of our quality can stand upon nothing whenever occasion demands.

Even here the engineer may be said to have some advantage, because there are so many things that such a variety of people may have done and thereby acquired such various titles. One may have drawn a map with certain marks upon it to indicate a hill, a stream and a road, and become a "topographical engineer," another may set up a pump somewhere and become an "hydraulic engineer," he who has invented a smoke consumer is unquestionably a "mechanical engineer," and the prolific geniuses who have produced car-couplers and travelled upon tie passes, are entitled to rank as "railroad engineers"; others have laid pipe-lines even into the domains of architecture and style themselves "sanitary engineers," but the Lord has been kind to us and raised up in the building trades a sort of counter irritant known as the "sanitary plumber"; then we have a class of successful wire-pullers who are letting their lights shine upon us as "electrical engineers," while another species are endeavoring by a different kind of wire-pulling to pose as "municipal engineers," while so long as there remains "one more river to cross" we shall continue to have with us the "bridge engineer."

Being only a plain civil engineer, I cannot be expected to represent everybody, but I can point with pride to the great achievements of the American civil engineer, in developing lines of transportation, constructing great industrial establishments, opening mines, and providing for the commerce of our country. Wherever we may go with our railroads or highways, we are followed or accompanied by the architect, who builds for the progressive American the massive business block, the tasteful home, the public building, the school-house and the church. The American architect and the American engineer are placing the products of their handiwork all over this fair land. They are proud to be known as its master-builders, and their works shall endure as lasting monuments of their skill and fidelity in the centuries when the present age shall have become ancient history.

In the routine of every-day work, the architect being commissioned to plan and erect a building, sends for the surveyor or civil engineer to define for him the boundaries of the premises to be occupied, give the grades of the adjacent streets, the location of sewers, water-supply, etc. This is properly the work of a city surveyor, or it may be done by a civil engineer having the requisite local knowledge. The surveyor ordinarily styles himself a civil engineer, and when he is without knowledge of the qualities of materials or of engineering construction, or even of mathematical science, as is frequently the case, he becomes a more troublesome maverick, than does the carpenter who poses as an architect, because he pretends to be that which

¹ Irrespective of the Government allowance, certain other sums of money fall to the winner of the Grand Prix in architecture, the proceeds of special legacies left for the purpose at various times by discriminating persons.

² Response by M. D. Burke, President Cincinnati Engineers Club, to the Sentiment, "The Architect and the Engineer," at the dinner given by the Cincinnati Chapter of the American Institute of Architects, on its 25th Anniversary at the University Club, Feb. 14, 1895.

he is not, assumes responsibilities for which he is unqualified and brings odium upon an honorable vocation. Those who employ him suffer for his incompetency, and never become wise enough to know an engineer when they see him.

The diagram having been furnished, the architect and the surveyor or engineer are wont to part company. When it has been made by a surveyor, this is wise. If it had been made by a civil engineer, and the building is to be one of much magnitude, it may be unwise. In viewing anything we see that feature which our study and training brings most prominently to our minds. If it be a landscape, the botanist will see its flora, the farmer its soil, the geologist a valley of erosion, or the age of its rock formation, the architect its buildings, the engineer its topographical features and means of accessibility. If it be a building or the drawing of a structure, the architect will place it in its proper order of architecture, speak of its sky-lines and its symmetry, while the engineer will regard the correctness of its proportions, mainly in the light of its stability. The moments of the engineer are not moments of leisure, his unit strains are not musical, but he has the true scientific method so long as he takes nothing for granted, other than that which observation has shown to be truth, and by mathematical reasoning he can demonstrate that his structure will carry given loads and resist given stresses. No college diploma gives him title, and no statute gives him standing, but by his works ye shall know him.

In the erection of the modern building, his analytical methods, his knowledge of machine tools and their application in shop practice, will give you the proper skeleton, correctly articulated, and you can clothe it with the ruddy flesh of symmetrical beauty, and drape it with the lines of architectural and artistic finish. It is this composite structure, or the picture of it, which the people desire to see. If, you, gentlemen, would put a little more engineering into your architecture, you could frequently add to the stability and endurance of your structures without increasing their cost, and if the engineer would come to you with the bare-bone work of his roof and bridge trusses, you would clothe them with lines of beauty, such that all the world would call you blessed.

There is here a broad field for mutual labor and mutual benefit. To work it profitably, the architect must admit that he is not an engineer, and must not be content with the aid of a mere computer; and the engineer must acknowledge that he is not an architect, and that utility and stability are not the only elements to be regarded in designing his structures. He must not be content with the work of a mere draughtsman, who will endeavor to fasten a few tawdry rosettes, or patches of galvanized iron upon a gaunt framework, and call such things ornament. It is the joint production of the master-builders, which the analytical methods of the engineer has made like the deacon's "one hoss shay," of equal strength in all its parts, and which the artistic taste of the architect has made of symmetrical design, and clothed in lines of beauty, that will meet the demand in the modern building. And this will stand for ages, silently setting forth that, in America, the architect and the engineer in "the age of steel,"

were the peers of all who preceded them in the art of building, and that they were men, who, like true artists, combined utility and beauty of design with strength and endurance.

DATA RELATING TO WATER.

PURE water consists of 2 parts hydrogen and 1 part oxygen. Chemical name, hydrogen oxide; chemical symbol, H₂O. Pure water is a colorless, odorless, tasteless, transparent liquid, and is practically incompressible. Water freezes at 32° Fahr. and boils at 212° Fahr. At its maximum density — 39.1° Fahr. — it is the standard for specific gravities, and 1 cubic centimetre weighs 1 gramme.

1 United States gallon...	231 cubic inches. 0.13369 cubic foot. 8.3311 pounds — distilled water. 8.34 pounds — in ordinary practice.
1 cubic foot.....	62.425 pounds at 39.1° Fahr., maximum density. 62.418 pounds at 32° Fahr., freezing point. 62.355 pounds at 62° Fahr., standard temperature. 59.64 pounds at 212° Fahr., boiling point. 57.5 pounds at ice.
1 cubic foot.....	7.485 United States gallons.
1 pound.....	27.7 cubic inches.
1 cubic inch.....	0.03612 pound.

A column of water 1 inch square and 2.31 feet high weighs 1 pound.

A column of water 1 inch square and 1 foot high weighs 0.433 pound.

A column of water 33.947 feet high equals the pressure of the atmosphere at the sea-level.

One pound per square inch equals a column of water 2.31 feet in height.

0.433 pound per square inch equals a column of water 1 foot in height.

Water is an almost universal solvent; consequently pure water does not occur in nature. Sea water contains nearly every known substance in solution.

The latent heat of water is 79 thermal units. When water freezes, it gives off its latent heat. The latent heat of steam is 536 thermal units. When steam condenses into water, it gives off its latent heat. — *Catalogue of the Holly Manufacturing Company.*

Doubling the diameter of a pipe increases its capacity four times. Friction of liquids in pipes increases as the square of the velocity.

The mean pressure of the atmosphere is usually estimated at 14.7 pounds per square inch, so that with a perfect vacuum it will sustain a column of mercury 29.9 inches, or a column of water 33.9 feet high.

To find the pressure in pounds per square inch of a column of water: Multiply the height of the column in feet by .434. Approximately, we say that every foot elevation is equal to $\frac{1}{2}$ pound pressure per square inch; this allows for ordinary friction.

To find the diameter of a pump cylinder to move a given quantity

BAROMETRIC PRESSURES AT DIFFERENT ALTITUDES. — WITH EQUIVALENT HEAD OF WATER AND THE VERTICAL SUCTION LIFT OF PUMPS.

Altitude.	Barometric Pressure.	Equiv. Head of Water.	Practical Suction Lift of Pumps.	Altitude.
Sea-level.....	14.70 lbs. per sq. in.	33.95 ft.	25 ft.	Sea-level.....
$\frac{1}{4}$ mile (1,320 ft.) above sea-level.	14.02 " " " "	32.38 "	24 "	$\frac{1}{4}$ mile (1,320 ft.) above sea-level.
$\frac{1}{2}$ " (2,640 ft.) " "	13.33 " " " "	30.79 "	23 "	$\frac{1}{2}$ " (2,640 ft.) " "
$\frac{3}{4}$ " (3,960 ft.) " "	12.66 " " " "	29.24 "	21 "	$\frac{3}{4}$ " (3,960 ft.) " "
1 " (5,280 ft.) " "	12.02 " " " "	27.76 "	20 "	1 " (5,280 ft.) " "
$1\frac{1}{4}$ " (6,600 ft.) " "	11.42 " " " "	26.38 "	19 "	$1\frac{1}{4}$ " (6,600 ft.) " "
$1\frac{1}{2}$ " (7,920 ft.) " "	10.88 " " " "	25.13 "	18 "	$1\frac{1}{2}$ " (7,920 ft.) " "
2 " (10,560 ft.) " "	9.88 " " " "	22.82 "	17 "	2 " (10,560 ft.) " "

WEIGHT AND CAPACITY OF DIFFERENT STANDARD GALLONS OF WATER.

	Cubic Inches in a Gallon.	Weight of a Gallon in Pounds.	Gallons in a Cubic Foot.	Weight of a Cubic Foot of Water, English Standard, 62.321 lbs. Avoirdupois.
Imperial or English.	277.274	10.00	6.232102	
United States.....	231.	8.33111	7.480519	

A "miner's inch" of water is approximately equal to a supply of 12 United States gallons per minute.

APPROXIMATE QUANTITIES OF WATER DELIVERED PER HOUR BY SINGLE-ACTING PUMPS.

From 2-inch to 6-inch diameter by 4-inch, 6-inch, 8-inch and 12-inch length of stroke respectively, and worked at 30 strokes per minute.

Diameter Working Barrel or Cylinder, Inches.	2	2 $\frac{1}{2}$	3	3 $\frac{1}{2}$	4	4 $\frac{1}{2}$	5	6	7	8
Gallons delivered by pumps with 4-inch stroke..	70	90	120	160	220	280	360	450	650	885
" " " " " 6 " " "	105	135	180	240	330	420	540	675	975	1,326
" " " " " 8 " " "	140	180	240	320	440	560	720	9,000	1,300	1,770
" " " " " 10 " " "	175	225	300	400	550	700	900	1,125	1,625	2,212
" " " " " 12 " " "	210	270	360	480	660	840	1,080	1,350	1,950	2,652

If pump be worked at 40 strokes per minute, the quantity delivered will be, of course, one-third more than named above; if at 20 strokes only, one-third less water will be delivered, and so on.

Double-barrel pumps, having two cylinders each of above diameters, or double-acting pumps, will deliver twice the quantities named above.

of water per minute (100 feet of piston being the standard speed): Divide the number of gallons by 4, then extract the square root, and the product will be the diameter in inches of the pump cylinder.

To find quantity of water elevated in one minute running at 100 feet of piston speed per minute: Square the diameter of the water-cylinder in inches and multiply by 4. *Example:* Capacity of a 5-inch cylinder is desired. The square of the diameter (5 inches) is 25, which multiplied by 4 gives 100, the number of gallons per minutes (approximately).

To find the capacity of a cylinder in gallons: Multiplying the area in inches by the length of stroke in inches will give the total number of cubic inches; divide this amount by 231 (which is the cubical contents of a United States gallon in inches) and the product is the capacity in gallons.

The capacity per minute will be determined by multiplying this product by number of strokes cylinder is working per minute.

To find the horse-power necessary to elevate water to a given height: Multiply the number of gallons per minute by 8.35 (weight of one gallon), and this result by total number of feet water is raised (that is, from surface of the water to the highest point to which the water is raised), and you have the power in foot-pounds. Divide by 33,000 and you have the horse-power. One horse-power is equal to about five men. To the theoretical power a liberal allowance for friction, etc., always wants to be added. — *Catalogue of the Goulds Manufacturing Company.*



SKETCH-CLUB OF NEW YORK.

THE first of the regular weekly Club Nights which the Club has inaugurated, occurred on Wednesday evening, March 13.

There was an exhibition of sketches by Club members, including some recent composition by Mr. Henry P. Kirby and water-colors by Mr. Hughson Hawley. The Century Company loaned the original drawings for the Napoleon posters, including a caricature by "M. Grassy."

Music was furnished by Club members and their guests, free cigars had been supplied by an enterprising material-man and a steady demand was made upon the House Committee for other refreshments. The occasion was voted a social and artistic success and the popularity of the Club Night in future was felt to be assured.

ALFRED F. EVANS, Recording Secretary.



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

GOTHIC CORRIDOR: UNION PASSENGER STATION, ST. LOUIS, MO.
MR. THEODORE C. LINK, ARCHITECT, ST. LOUIS, MO.

[Gelatine Print issued with International and Imperial Editions only.]

THE UNION PASSENGER STATION, ST. LOUIS, MO. MR. THEODORE C. LINK, ARCHITECT, ST. LOUIS, MO.

A FULL description of this building was published in our issue for October 13, 1894. The total cost of station, train-sheds, etc., has exceeded \$7,000,000.

PLAN AND DETAILS OF THE WAITING-ROOM AND STAIRCASE OF THE SAME.

DESIGN FOR THE STATE NORMAL SCHOOL, JAMAICA, N. Y.
MESSRS. CRAM, WENTWORTH & GOODHUE, ARCHITECTS, BOSTON, MASS.

THE design represented by this plate was not successful in gaining the approbation of the jurors in the competition in which it was submitted.

HOTEL FOR MR. T. C. PATRICK, IRWIN, PA. MESSRS. BARTBERGER & EAST, ARCHITECTS, PITTSBURGH, PA.

[Additional Illustrations in the International Edition.]

EAST APPROACH: UNION PASSENGER STATION, ST. LOUIS, MO.
MR. THEODORE C. LINK, ARCHITECT, ST. LOUIS, MO.
[Gelatine Print.]

PRIVATE DINING-ROOM IN THE SAME.

[Gelatine Print.]

SOUTH END OF MAIN WAITING-ROOM OF THE SAME.

[Gelatine Print.]

NORTH END OF MAIN WAITING-ROOM OF THE SAME.

[Gelatine Print.]



[The editors cannot pay attention to demands of correspondents who forget to give their names and addresses as guaranty of good faith; nor do they hold themselves responsible for opinions expressed by their correspondents.]

THE GRILL-ROOM.

NEW ORLEANS, LA., March 13, 1895.

TO THE EDITORS OF THE AMERICAN ARCHITECT:—

Dear Sirs,—In several, if not most, of the Club plans published, I note the term "grill-room." I would be thankful to you for an explanation of its meaning, as I must confess I do not know it.

Yours, etc.,

F.

[The grill-room is an adjunct of the modern restaurant in this country, adopted from the English inn and London chop-house: it is merely an eating-room, with open fires whereat the cooks broil, or grill, steaks, chops, etc., so that the consumer may not only pick out the particular viand he wishes to eat, but oversee its cooking and have it served without loss of heat. — *EDS. AMERICAN ARCHITECT.*]



BALTIMORE, MD.—The Walters Art Gallery will be open to the public on all Wednesdays in March.

BOSTON, MASS.—*Winter Exhibition, including Pictures loaned by Quincy A. Shaw; Paintings by Puvis de Chavannes; Line Engravings, Mezzotints, and Etchings by Rembrandt: at the Museum of Fine Arts.*

Eighth Annual Exhibition of Boston Society of Water-color Painters: at Williams & Everett's Gallery, 190 Boylston St., March 14 to 28.

Loan Collection of Portraits of Women: at Copley Hall, 194 Clarendon St., March 12 to 30.

Pictures by Edmund H. Garrett: at Shreve, Crump & Low's, Corner of Tremont and West Sts., March 15 to April 6.

Exhibition of Japanese Prints: at the St. Botolph Club, March 18 to 30.

Water-colors of the English Homes of the Pilgrims, by Harold B. Warren, also, Etchings by C. J. Watson and Frank Short: at Walter Kimball & Co.'s, 9 Park St.

Exhibition of the Dutch Water-color Society: at J. Eastman Chase's, 7 Hamilton Place.

Exhibition of Oil-paintings by J. J. Enneking, D. Jerome Elwell, T. M. Wendel, J. H. Hatfield, Joseph De Camp and others: at Wm. Hatch & Co.'s Gallery, 209 Tremont St., March 25 to April 6.

BUFFALO, N. Y.—*Second Annual Architectural Exhibition of Buffalo Chapter, A. I. A. and Exhibition of Buffalo Society of Artists: at the Art Gallery, March 18 to 30.*

CHICAGO, ILL.—*Pictures by George Inness and Claude Monet; also, an Exhibition of Bookbindings: at the Art Institute, February 26 to March 24.*

Seventh Annual Black and White Exhibition of the Chicago Society of Artists: 274 Michigan Ave., opened March 12.

NEW YORK, N. Y.—*Loan Exhibition: at the Metropolitan Museum of Art, New North Wing, opened November 5.*

Paintings by Edouard Manet, also, Works by William A. Coffin: at the Durand-Ruel Galleries, 389 Fifth Ave., March 11 to 30.

Theobald Chartran's Portrait of Madame Calvé as "Carmen": at Knoedler's Gallery, 170 Fifth Ave.

Miniatures by W. J. Baer: at Knoedler's Gallery, March 21 to 30.

Paintings by Leonard Ochtman: at the Avery Galleries, 368 Fifth Ave., March 18 to April 1.

Seventieth Annual Exhibition of the National Academy of Design: opens April 1.

Pictures and Sketches by Anton Mauve: at the Macbeth Gallery, 237 Fifth Ave., March 15 to 30.

Seventeenth Annual Exhibition of the Society of American Artists: at the Fine-Arts Building, 215 West 57th St., March 25 to April 27.

Loan Exhibition of Specimens of Religious Art: at the Tiffany Glass Co., 333 Fourth Ave., March 25 to April 6.

Second Annual Exhibition of Society of Amateur Photographers of New York: at 111 West 38th St., closes March 27.

Engraved Portraits of Women Writers: at the Grolier Club, closes March 23.

PHILADELPHIA, PA.—*Fifth Annual Exhibition of Water-colors and Pastels: at the Art Club, March 18 to April 14.*

Dutch and Flemish Old Masters, Water-colors of Egypt by Wilfrid Ball, Etchings and Mezzotints by Frank Short and Charles J. Watson: at Robert M. Lindsay's Galleries, 1028 Walnut St., until April 15.

PROVIDENCE, R. I.—*Loan Exhibition of Paintings:* at the R. I. School of Design.

Water-colors by S. R. Burleigh: at the Art Club.

ST. LOUIS, MO.—*Works of St. Louis Artists of the last fifty years:* at the Art-Union "Palette," 1820 Chouteau Ave., March 12 to 25.

NOTES AND CLIPPINGS

THE YOUTHFUL PERFORMANCE OF CHRISTOPHER WREN.—Sir Christopher Wren, says an article in *Current Literature* for February, was a prodigy in youth, as in maturity. Oughtred, the first mathematician of his day, declares in the preface to his great book that an "Ingenious boy, Gentleman Commoner at Wadham," had enlarged the sciences of astronomy, gnomonics, statics and mechanics by most brilliant discoveries, "*præclaris inventis*." This was Wren at the age of fifteen; a year before that he had taken out a patent for an instrument to write with two pens at the same time; in the same year he was appointed Demonstrating Assistant on Anatomy at Surgeons' Hall. Wren lived to justify his early promise; but Dugald Stewart tells us of a boy who, as he hoped, "would rival the fame of Sir Isaac Newton." This was the son of Count Pungstall. "I cannot help considering him," wrote the Scotch professor, "as the most extraordinary prodigy of intellectual endowment that has ever fallen under my knowledge." This is a great saying, indeed, from Dugald Stewart, who was not given to enthusiasm nor to careless expression. Unfortunately, we have no detailed information about the youth's acquirements in later years; he died at nineteen, of general decay apparently. But Mr. Lemaistre met him in his travels, and published an account in 1806—the boy being then five years old: "He sits on a carpet, surrounded by his books, and when the gravest and most acute remarks fall from the lips of his little person, a spirit seems to speak rather than a child, and the fine expression which sparkles on his countenance tends to strengthen the idea." Among other tests, Mr. Lemaistre asked him to make a map of the Venetian Empire, which he did with accuracy. Those competent to judge the fact will readily believe that the child of five years who performed it was an animated miracle. The French armies barred nearly every road in Europe to an English traveller at that date. Mr. Lemaistre asked how he could get home without touching Hanoverian, French or Dutch Territory; the child "instantly traced on the globe the single road remaining open." It is well for this gentleman's credit that Dugald Stewart's evidence, long afterwards, makes the story possible.

THE CHIMES OF ST. MICHAEL'S, CHARLESTON, S. C.—The chimes of St. Michael's Church, in Charleston, S. C., have a peculiar history. The bells are nine in number, and of unusual purity and sweetness of tone. They were cast in England when St. Michael's was built, about 130 years ago. When the War of the Revolution came the bells were sent to England for safe-keeping. After the treaty of peace had been consummated, negotiations were opened in London for the return of the bells by the first American Minister to Great Britain. He succeeded, and the bells were sent to Charleston, and upon their arrival were received with triumphant ovations and escorted by a large procession to the church, in the belfry of which they were replaced. During the late civil war the citizens of Charleston were desirous of protecting the bells from danger, and as the steeple of St. Michael's was made the target for the cannon of the besiegers the bells were taken down and sent to Columbia for safe-keeping. When Sherman's army took Columbia the sheds in the yard of the State-house, in which the bells had been placed and which also contained the marble friezes and other sculptures intended for the decoration of the Capitol, were broken in and the sculptures and bells were smashed into fragments, and the sheds were then set on fire. At the conclusion of the war the pieces of the bells were carefully gathered together, boxed and shipped to a commercial house in Liverpool, together with extracts from the records of St. Michael's, showing where the bells were cast and the proportions of the metals forming their component parts. Upon inquiry it was found that there was still in existence in England the firm of bell-founders, unchanged in name, and consisting of the descendants of the proprietors at the time the bells were made. The records of this firm contained descriptions of the bells, and the proportions there given were found to correspond with those furnished from Charleston. The bells were made anew, therefore, of the same metal, and for the fifth time they were carried across the Atlantic and arrived safely at Charleston. Their return was made the occasion of great rejoicing in the city.—*Charleston Newspaper.*

AN "ORIGINAL PORTRAIT" TALE.—I believe it was our pleasant friend, Mr. Dixey, the comedian, who once remarked on the funny things one sees when one hasn't got a gun. About ten years ago, an artist friend of mine, who was grogging and nicotining the small hours away in the office of a paper I then edited, fell into a discussion with me upon the power of memory. As an illustration of the extent to which it could be practically developed, he, with pen and ink, on the paper which bore my office heading, sketched half a dozen admirable portraits of celebrities, merely from his recollection of originals from life which he had seen. Not one was an actual copy. Each was a composite as it might be, but all were striking likenesses. One of them was a head of George Washington in uniform. I left the sketches on my desk when we locked up and went off to eat a daybreak supper of broiled lobster. When I returned to the office, the small boy who set things to rights there, including myself not seldom, and who was a pro-

nounced stamp fiend, autograph fiend and very clever sketcher, asked me if he could borrow these sketches "so's to learn something from 'em, boss." I told him he could have them, and he carried them away. A few weeks later, he asked me if I had any objection to his selling the sketch of Washington. He had been offered \$2 for it by a bookseller with whom the paper did business and to whom he was often sent on errands. I told him to sell it and buy himself some stamps with the proceeds. Last week, a subscriber to this paper wrote to me that he wished my opinion of an original pen-sketch from life of George Washington, made by Peale, which he had purchased for \$40 from the agent of a New York bookseller. He sent me this prize by express, and when I looked at it I almost fell out of my armchair. It was the old mnemonic sketch which I had given to my little office-devil—who is, I am happy to say, quite a big and booming young man now—ten years ago. It had been given a bath of coffee-grounds, and pasted down on a cardboard mount, evidently a cover of an old book. I soaked it off, and on the back was my office imprint and also my name in type. The dealer who had doctored the sketch had not even taken the trouble to scrape them off. I sent the documents in the case back to my subscriber, and am curiously awaiting to ascertain whether he has the moral courage to acknowledge publicly that he has been swindled, and to force the swindler to disgorge.—*The Collector.*

A LEGEND ABOUT DAMASCUS SWORDS.—A manuscript, lately discovered, gives in detail the method employed in making the famous Damascus blades. The manner of tempering is something almost too horrible to relate. "Let the high dignitary furnish an Ethiop of fair frame," the description runs, "and let him be bound down, shoulders upward, upon the block of the god, Bal-hal, his arms fastened underneath with thongs, a strap of goatskin over his back and wound twice around the block, his feet close together, lashed to a dowel of wood, and his head and neck projecting over and beyond the block. Then let the master-workman, having cold-hammered the blade to a smooth and thin edge, thrust it into the fire of cedar-wood coals, in and out, the while reciting the prayer to the god Bal-hal, until the steel be of the color of the red of the rising sun when he comes up over the desert toward the east, and then, with a quick motion, pass the same from the heel thereof to the point six times through the most fleshy portion of the slave's back and thighs, when it shall have become the color of the purple of the king. Then, if with one swing and one stroke of the right arm of the master-workman, it severs the head of the slave from his body, and display not a nick nor crack along the edge, and the blade may be bent round about the body of a man and break not, it shall be accepted as a perfect weapon, sacred to the service of the god Bal-hal, and the owner thereof may thrust it into a scabbard of ass's skin, brazen with brass, and hung to a girdle of camel's wool dyed in the royal purple."—*Illustrated Carpenter and Builder.*

THE GENERAL SCHEME FOR THE EXHIBITION OF 1900 SETTLED.—The commissary-general of the Paris Exhibition of 1900 has just settled the general plan of that great international show in accord with the projects which obtained awards at the recent competition. The principal points of the programme are as follows: The suppression of the Palais de l'Industrie in the Champs Elysées and the creation of a great road connecting the Champs Elysées with the Place des Invalides, with a monumental bridge over the Seine. The Palais de l'Industrie is to be replaced by a new edifice. The principal entrance to the exhibition will be on the Place de la Concorde. All that concerns decorative art and that has a distinctly French character will be grouped along the Cours la Reine and on the Esplanade des Invalides. The Electricity Palace will be close to the principal entrance. The banks of the Seine will be made as decorative as possible. The Champ de Mars, where the Eiffel Tower will be preserved, will be occupied by exhibitions which require great space, such as agricultural machinery. The Machinery Gallery, of the 1889-exhibition, will be allowed to stand. It will be decorated with a huge dome, and will be occupied again by machinery. The fine arts and liberal arts palaces will be suppressed. The Champ de Mars will be levelled, and will rise in an inclined plane from the Seine to the Machinery Gallery. The Colonial exhibition will be at the Trocadéro.—*N. Y. Evening Post.*

DECOMPOSITION OF GLASS BY WATER.—From a long series of experiments of his own on these subjects, and from the work of others, the author draws the following conclusions:

1. The weathering of glass is caused by the decomposing action of the atmospheric moisture. The carbonic anhydride of the air does not act directly on the glass, but only on the alkaline products of the aqueous decomposition.
2. Dry carbonic anhydride is without action on dry glass.
3. There is no proof that water can be retained by glass, except when it enters into chemical combination therewith.
4. The weathering of glass and the decomposition of glass by water are similar processes, and are both preceded by the taking up of water into the glass molecule.
5. The surface changes caused by weathering are comparatively slight with good glass.
6. The action of water on weathered glass is only temporarily more rapid than it is on new glass.
7. Glasses (lime glasses) are more hygroscopic and weather more easily, the more easily they are attacked by water.
8. Even after long action of water, glass is still capable of becoming weathered.—*Illustrated Carpenter and Builder.*

GARIBALDI MONUMENT IN ROME.—The cornerstone of the Garibaldi monument was laid March 18, in the presence of the Ministers, Garibaldi's sons, and the municipal authorities. The monument is intended to commemorate the defence of Rome, in 1849. It will be completed and unveiled with great pomp in September, on the twenty-fifth anniversary of the reunion of Rome with Italy.—*Exchange.*





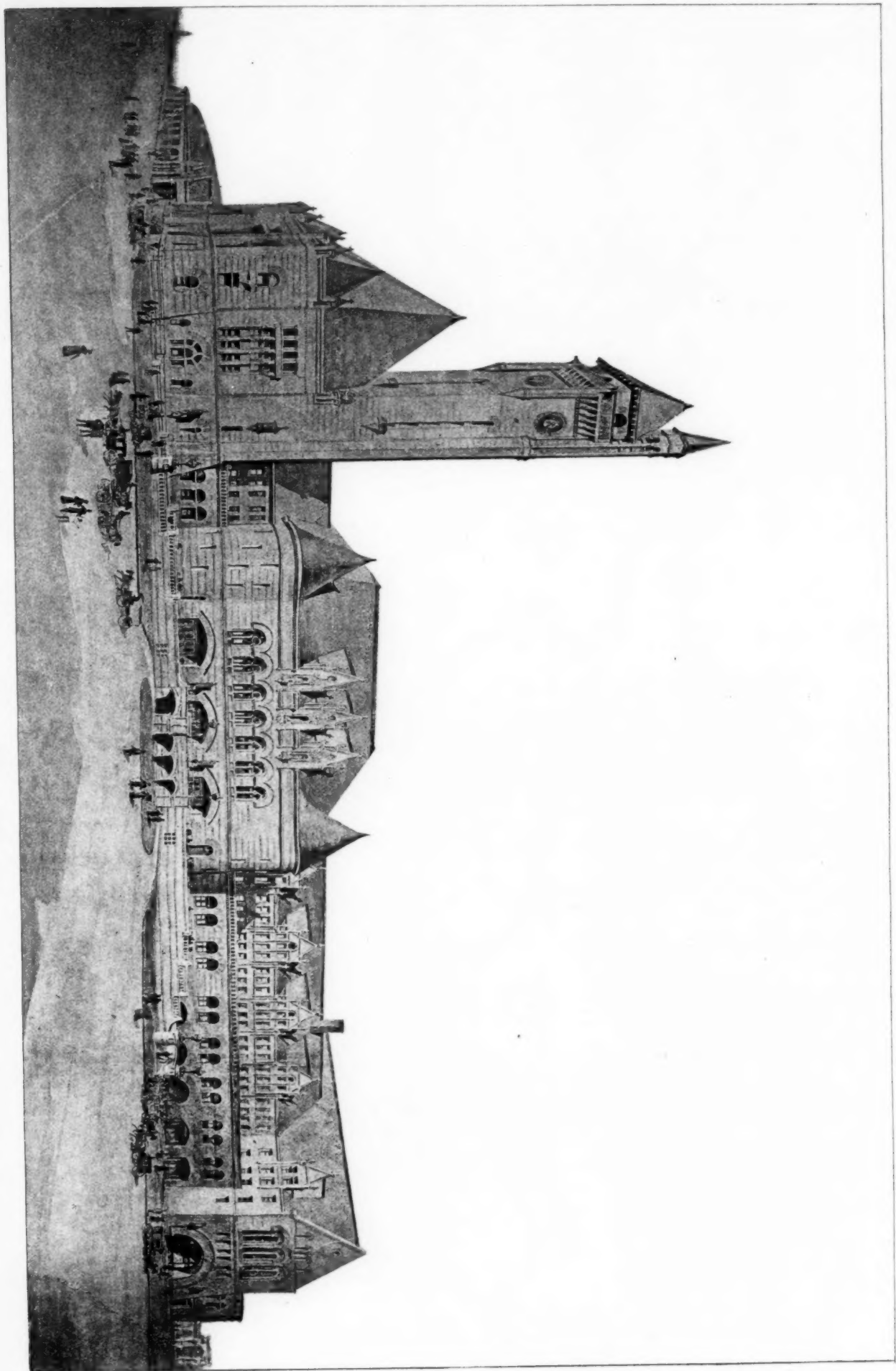
PERSPECTIVE VIEW
STATE NORMAL SCHOOL, JAMAICA
NEW YORK.

Chas. F. Smith & Son, Architects.
52 State Street, Boston, Mass.



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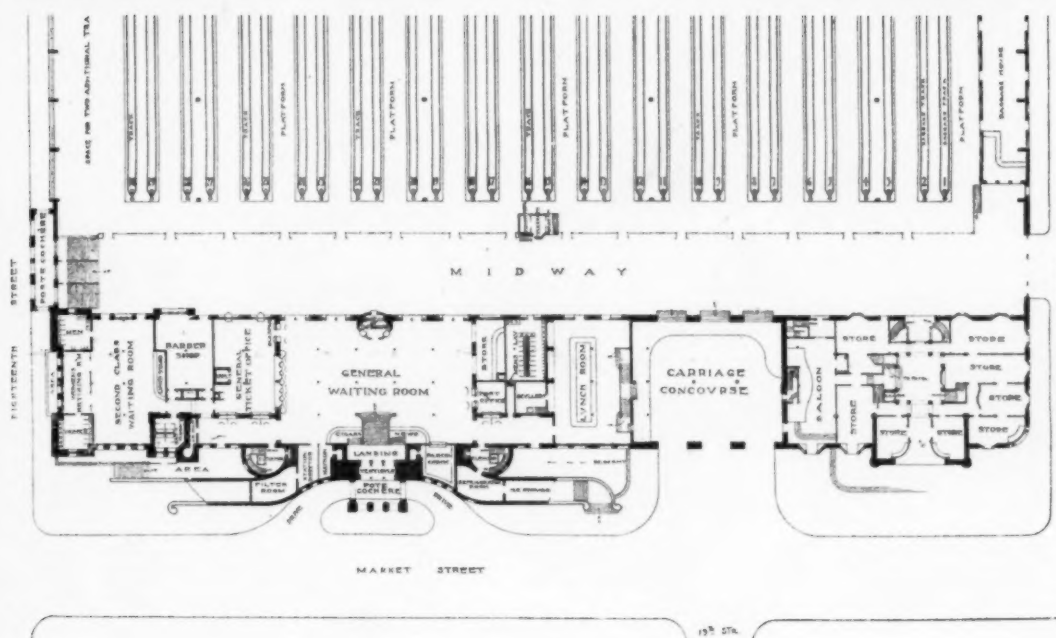
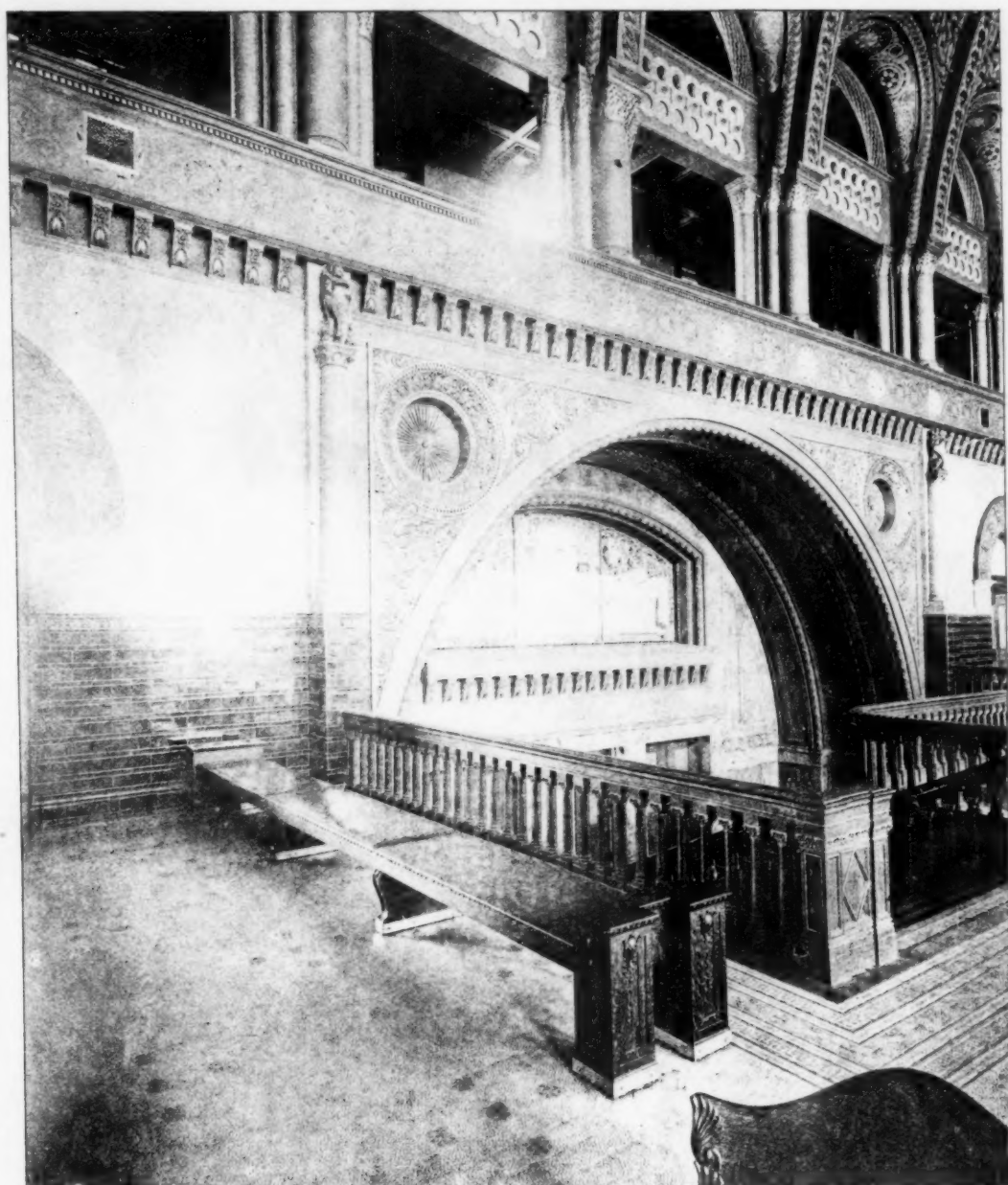
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