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CONTENTS.

THE result of the official investigation into the sanitary condition of the hotel at Seabright, N. J., whose proprietor had to be paid five thousand dollars to prevent him from turning two typhoid-fever patients summarily into the street, is given in the *Sanitary Engineer*. It seems that the hotel is situated on a ridge between the ocean and a salt-water creek, into which the overflow from two cesspools, which receive all the house-wastes, is allowed to run. One of the overflow pipes had been broken by ice, and the discharge escaped into the ground around the cesspool, which was very offensive. The other opened under a wharf, near one end of the hotel, depositing a slimy mud which at low tide gave out a sickening stench. At high tide the end of this pipe was covered, and the air from the cesspool returned into the building by way of the soil-pipe, which was not trapped. It was also found that a part of the waste from the kitchen sink, as well as from the barber's basins, emptied directly into the cellar. In view of these facts, the Board of Health notified the proprietor of the hotel that its condition was dangerously unsanitary, and if he escapes the troubles which his indignant guests have prepared for him, he will probably have to make some radical change, or else go without boarders next summer. Although so much has been said about this particular case, we do not imagine that, aside from the extortion practised upon the friends of the two fever patients, the circumstances were any worse than those which prevail about most summer resorts. Our own experience certainly is that a country hotel or boarding-house which is not, after the middle of the season, pervaded by the acrid flavor of decomposing filth, so familiar to those accustomed to sanitary investigation, is exceptional. The worst are generally those which pretend to a certain fashion, and profess to be supplied with "modern conveniences," but many of a more primitive style are nearly or quite as bad.

THE Water Commissioners of Newark and Jersey City have been examining the tributaries of the Passaic River, from which the two towns obtain their supply of water, to see whether their condition is such as to indicate the probability of contamination of the stream. An analysis of water from two of these feeders, the Springdale Lake and the Second River, has been made, with rather discouraging results. The liquid from the former source was found to be "milky;" the "taste unpleasant;" and it was filled with a greenish-white vegetable growth. The Second River water was "bluish," the "taste bad," "smell bad." Both the samples contained ammonia, nitrates, and chlorine in a proportion many times greater than that which is usually regarded as permissible. Whether the quality of the water was restored farther down the river by the flow of carbolic acid from the paper-mill waste, which the proprietor of the mill supposed to be so salubrious in its effect, we do not know, but the investigation seems to show that the purification of the Passaic will not be an easy matter.

MR. KEELY, the proprietor of the mysterious motor which bears his name, has given unmistakable proof of an ingenuity, not to say an astuteness, in his dealings with the stockholders of his company, which quite prepares us for further revelations of his inventive genius. Our readers will remember that in response to the application of the stockholders Mr. William Boekel was appointed by the Court of Common Pleas as an expert, to learn from Mr. Keely the secret of the construction and operation of the motor, and report to the stockholders according to his discretion. The report has now been made, and it seems that Mr. Keely, by "elaborate written communications," "diagrams," and so on, has imparted to Mr. Boekel various facts which convince him "that a new force or motive power has been discovered." This motive power, which is called "etheric force," "vaporic force," and other appropriate names, "possesses properties wholly phenomenal in character," and "involves the study of vibratory forces," so that the expert, although he is "of opinion that Mr. Keely has so far perfected his invention as to be entitled to letters patent," does not "possess that intimate degree of knowledge of the entire subject," which would enable him to put together the motor and reproduce Mr. Keely's results. In fact it turns out that Mr. Boekel has not seen the motor in operation at all, but seems to have taken the inventor's word for everything. Even his amiable mind appears, however, to have comprehended the unsatisfactory character of such a report, and he appends to it a copy of a letter written by him to Mr. Keely, requesting that the motor, which is now "partially dismantled," should be put in order and operated for his instruction. To this the great inventor replies, saying that the motor is not only dismantled but "oxidized," and that "as soon as the Company shall have furnished him with the means to prosecute his work" he will have it cleaned and put together, and will then further aid the expert in his investigations "to the utmost of his ability."

A REMARKABLE example of the way in which the infection of typhoid fever may be communicated is to be found in a report made to an English official board by one of its local inspectors. In a certain town, situated in a district naturally healthy, a severe outbreak of fever attracted the notice of the inspector, and an investigation of the circumstances was made. It appeared that a patient suffering with the disease had been brought to one of the houses in the village, which was furnished with the ordinary sink and pump, placed directly over the well. The sink was probably leaky, like hundreds of other sinks, and water from the washing of linen used by the patient being either thrown or allowed to fall into the sink, made its way through the seams back into the well, carrying with it the potent poison of the fever, which quickly spread through the household. In other cases the contagion seemed to have come from the public water-supply, and examination showed that the water-closets in many houses were flushed by a valve directly from the mains, without the intervention of a cistern, so that by some interruption of the flow foul matter had probably been sucked back into the service-pipes, to circulate through the whole water-system. So many outbreaks of fever have been traced to infection disseminated in this latter way that there is something wonderful in the assurance with which persons who ought to know better maintain that the old-fashioned valve closets are practically unobjectionable. It is true that the system of constant water-supply universal with us diminishes the danger of the entrance of foreign substances into the service-pipes, but it does not wholly remove it. In few of our large cities is the pressure of the water sufficient to carry it at all times above the highest story of every house, and thousands of fixtures are in daily use which are liable to have their supply fail altogether on certain days and hours, or to have it withdrawn temporarily by the opening of a faucet below. All such fixtures are exposed to the worst consequences of intermittent supply. If any person having access to fixtures so placed will try the experiment of opening a faucet at the time of low water, the rush of the air sucked back into the pipe will be plainly heard; or by placing the finger over the mouth of the faucet the inward pressure can be felt. Even where the head is considerable, an artificial lowering may be, and often is, caused by the opening of faucets in the lower stories, which will leave a vacuum in the pipes supplying the upper fixtures; and in such cases substances near the mouth of the upper faucets are liable to be sucked through them into the supply-pipes. We have known the opening of a pantry-cock in a lower story to siphon out in this way and discharge into the pantry sink the entire contents of a bath in a room above, much to the amazement of its occupant. The bath happened to be fitted with a bottom

supply, or air instead of water would have been drawn into the pipes, but with water-closets the supply is always dangerously near the contaminating matter in case of back flow.

Captain Cowdon's modest scheme for digging a ditch from the Mississippi below New Orleans to Lake Borgne, at a cost of about a hundred thousand dollars, has grown in his estimation to an enterprise which, among other things, will "continue to enrich the East, and will stretch the sinews of commerce across the continent from north to south, laying the foundation for a Government based on good will that will be more lasting than one of bayonets and bonds of triple steel." It is not very evident how the substitution of a twenty-eight-foot ditch at the mouth of the Mississippi for one of twenty-four feet is to accomplish such desirable results; but Captain Cowdon explains further that by this means vessels of from five to seven thousand tons capacity will be able to reach New Orleans, in place of those of twenty-five hundred tons, which is now the limit; and as cotton is now carried from New York to Liverpool in ships of the larger size for eighty-five cents per bale, while the charge from New Orleans to Liverpool in the smaller ones is three dollars per bale, he infers that when his canal is made, and the seven-thousand-ton steamers come to the wharves of New Orleans, the cost of transporting cotton from that port will be reduced to the same, or nearly the same amount as from New York. In consequence of this improvement "a direct trade with South and Central America" is to be "opened up;" seventy millions of acres of land in the Mississippi valley are to be reclaimed, which "will make their annual agricultural production fully one thousand million dollars more than at present;" and Chicago, by deepening the Illinois and Michigan Canal and the Illinois River, is to "become, as it were, a city of the seaboard as well as the leading manufacturing mart of the West," while in general an "empire is to be developed of fertility, wealth, power, and splendor such as will have no parallel in history." It seems a pity to insinuate a doubt concerning such a dazzling prospect, but Captain Cowdon's logic is rather more nimble than that to which we are accustomed, and some of the steps in his reasoning are difficult to follow. The assumption, for instance, that as soon as ships of twenty-eight feet draught can come up to New Orleans the price of cotton freights to Liverpool will be reduced to a third of the former rates, is quite gratuitous. The cost of freights across the Atlantic depends quite as much on the facilities for disposing of one cargo as for securing another in return, and cotton will probably always be carried at low rates from New York, and at high rates from New Orleans, for the reason that taking the outward with the homeward voyage this is the most profitable arrangement; and the empire of unparalleled wealth, power and splendor which is to depend upon the reduction of cotton freights between New Orleans and Liverpool to eighty-five cents per bale will be long in coming.

Le Génie Civil mentions the fact that several manufactories of cement tiles have been recently established in France, and that their product is coming into extensive use. Such cement tiles have long been made in Holland, and furnish a pavement of agreeable texture and appearance at a very low price. The tiles are made in a great variety of forms, and of several colors. For black the material is mixed with powdered pyrolusite, or black oxide of manganese; blue is made by admixture of French ultramarine, and yellow by means of ochre, while green is given by combining the last two. Brown is also obtained with ochre. Some of the tiles have patterns stamped on them, and filled in with a different color, and the range of tints might be greatly extended without difficulty. For hastening the hardening of the tiles, which are composed of Portland cement and sand, a stream of carbonic-acid gas is allowed to play upon them. A much better method, we should think, would be to dip them after setting in a solution of silicate of soda. There are many uses to which such tiles could be put in this country, and we should be glad to see their manufacture attempted here.

A very destructive explosion of gas took place in Paris last month, causing the death of ten persons and wounding many more. It is supposed that a water-main first gave way underground, washing out the earth about it so as to take away the support of a neighboring gas-main, which settled, opening the joints and allowing the gas to escape. The street being paved with asphalt over a bed of concrete, was impervious to the gas, so that no odor was perceived near the break, and the concrete was thick enough to form a strong arch, over which all the traffic of the thoroughfare passed while the subsoil beneath was disappearing under the action of the water. The first place where the escape of gas was noticed was in the cellar of a house near by, and the officials of the gas-company were immediately informed. This was at twenty minutes before eight in the morning. At eight o'clock workmen came to repair the leak, but just before their arrival the gas had found an issue into another cellar, where it caught fire from a candle. At twenty-five minutes past eight an explosion took place in the basement of a barber's shop on another street, and ten minutes afterward came a second, and far more violent one, on the opposite corner of the same street, which completely destroyed two buildings, killing and wounding many of their occupants, as well as some of the people who had gathered at the scene of the explosion on the opposite side. At half-past twelve a third explosion took place, but without doing much damage. The successive detonations in so many places are explained by the supposition that fissures in the ground were made by the settlement due to undermining by the water, which were filled by the escaping gas, to which fire was led from the original explosion.

A Philadelphia gentleman has recently had a sad experience with his telephone. According to the Boston *Journal*, in using the instrument he stood with his face quite close to "the hooks which hold the transmitter," and perhaps unconsciously touched them. "Suddenly he seemed to see a bright blue and white fire shoot out of the very body of the instrument, and at the same moment he experienced a sensation like having a claw seize and drag up the skin of his forehead, and holding him by it shake him to and fro with great violence." He was partially stunned, and on recovering himself, after the lapse of half an hour, found his watch hopelessly disordered. There was no storm at the time, or the transmission of lightning over the wire would seem to be the most probable explanation of the phenomenon, but in default of that, the crossing of the line with an electric-light wire might easily account for it. However that may be, it seems quite time that lightning-arresters should be applied to all telephones. As usually introduced in the country, with several subscribers on each circuit, the crackling of the instrument during a thunder-shower, unless the wire is disconnected, is quite sufficient to alarm a nervous person, and the possibility of an unexpected shock at any time certainly does little to encourage the spread of the system.

The final competition for the Prize of Rome in the architectural section of the Ecole des Beaux-Arts resulted in the choice of M. Esquié, pupil of M. Daumet, the two Second Grand Prizes having been awarded to M. Tournaire, pupil of M. André, and M. Courtois-Suffit, pupil of MM. Suffit and Pascal. Next year is to be held in Paris a grand triennial exhibition of fine art, including works of painting, sculpture, and architecture, and open to foreign as well as native artists. The number of works to be exhibited is restricted to one thousand in painting and monochrome, three hundred in sculpture, fifty in architecture, and one hundred and fifty in engraving, and entrance for examination by the jury must be made within the month of January, 1883.

The city of Boston is rapidly becoming enriched with works of art worthy of the name. Already a portrait bas-relief of Colonel Robert G. Shaw, one of the heroes of the war, is in process of execution by the skilful hands of Mr. St. Gaudens, and a statue of Theodore Parker is to be immediately commenced, while a third, and still more important memorial is in contemplation, in the shape of an equestrian statue of Paul Revere, the patriotic silversmith who gave the alarm through the neighboring country on the night before the battle of Lexington. We hope that the sculptor for this statue will be chosen with care. While nothing could be more characteristic and interesting than a first-rate figure of the young artisan on horseback, oblivious of costume, equilibrium, or anything else but the quickest method of arousing the sleepy villagers, an equestrian statue of the conventional sort, clothed in a toga and stretching out its beneficent hand over the world in general, would be worse than ridiculous. Few people would understand the difference more quickly than the inhabitants of Boston, and the committee which undertakes to make selection of the artist will probably feel sooner or later the difference between popular appreciation and its opposite.

BUILDING SUPERINTENDENCE. — XXI.

PLUMBER.

[*If this is made a separate contract, as it usually should be, the full title and the General Conditions must precede the Specification.*]

Fixtures. There will be

In Basement: Set of four white earthenware Wash-Trays.
Cold Supply to Wash-Boiler.
One [*Hellyer's short Artisan Hopper*], with seat attachment and preliminary flush.
Sill-Cock.
Furnace Supply.

In First Story: One Soapstone Kitchen Sink with draining shelves and wall-plates.
One 50-gallon Bath-Boiler.
One Pantry Sink.

In Second Story: One Bath.
Three Wash-Basins.
One [*H. C. Meyer & Co.'s*] Brighton Water-Closet.

In Third Story: Tank.

Iron Pipes. All iron pipes, including both waste and air pipes, to be of the best quality, [*Mott's*] or [*Brady's*] make, with all proper fittings; the horizontal portion of the main soil-pipe in basement to be double-thick; all other iron pipes to be single-thick; and all to be thoroughly coated inside and outside in the best manner with asphaltum before putting up, and the outside to have a second coat afterwards: all to be put up in the best and strongest manner with iron hooks and stays, and the joints caulked with oakum and melted lead.

Lead Pipes. All cold-water supply, air, and waste pipes under 2 inches are to be best drawn lead, and to weigh as follows: —

Rising Main: $\frac{3}{4}$ inch to weigh 4 lbs. per foot.

Other Supply-Pipes:

1-inch to weigh 5 lbs per foot.
$\frac{3}{4}$ " " " 4 " " "
$\frac{5}{8}$ " " " 3 " " "
$\frac{1}{2}$ " " " 2 " " "

Waste, Air and Overflow Pipes:

2-inch to weigh 5 lbs per foot.
$1\frac{1}{2}$ " " " 3 " " "

Brass Pipes. Hot-water pipes throughout to be of National Tube Works' best seamless drawn plumbers' brass tubing, with brass fittings, all put together with red lead in the best manner and made perfectly tight.

All lead and brass pipes are to be put up in the best manner on boards set in place by the carpenter. The lead pipes are to be secured with hard metal tacks or brass bands and screws, and brass pipes with brass bands. No hooks are to be used. The hot and cold water pipes are to be kept at least $\frac{1}{4}$" apart everywhere. All joints in lead pipes throughout are to be wiped joints, no cup-joints to be permitted anywhere; and all brass pipes are to be put up with right-angled turns so arranged as to allow free expansion and contraction. All connections between lead and iron pipes and traps are to be made with cast-brass ferrules, of the same size as the lead pipes, soldered to the lead pipes with wiped joints, and caulked with oakum and melted lead into the iron pipes.

Waste-Pipes. The waste-pipes are to run as follows: —
The main 4-inch soil-pipe is to be extended through the north side of cellar-wall, and jointed air-tight with clear Portland cement into the drain-pipe outside. From this point it is to run with uniform pitch along the cellar-wall, and under floor of basement water-closet, to a point in Laundry under second-story water-closet, with 4-inch Y-branch to receive trap of basement water-closet, and 3-inch Y-branch for waste-pipe from Laundry wash-trays, then turning up on Laundry wall with 4-inch Y branch and 4-inch brass trap-screw caulked in at the turn for cleaning out the pipe, and running straight up on Laundry wall through the Kitchen floor and Bath-room with 2-inch Y-branch below Kitchen floor for waste-pipe from Kitchen sink, 4-inch Y-branch below Bath-room floor for pipe from trap of water-closet, and 2-inch T-branch above all other connections for air-pipe from traps; and thence straight up through and two feet above the roof; the top to be protected with brass wire netting, and a flange of 16-oz. copper, 18" square, to be soldered on to protect roof, shingled in and warranted tight.

Three-Inch Waste. Carry a 3-inch iron pipe from the connection provided for it in Laundry with uniform pitch on north wall of Laundry to the corner, there turning, with Y-branch and 3-inch brass trap-screw for cleaning out, accessible from the vegetable-cellar, and continuing with the same pitch on east wall of Laundry behind wash-trays, with Y-branch for pipe from trap of wash-trays, to a point nearly under pantry sink in first story, and there turning, with Y-branch and 3-inch brass trap-screw at the turn for cleaning out, and continuing up on Laundry wall to China-closet, with $1\frac{1}{2}$-inch Y-branch under floor for waste from pantry sink, and up through China-closet and closets over it, with double $1\frac{1}{2}$-inch Y-branch under second-story floor for wastes from wash basins, and 2-inch T-branch for air-pipe from trap above all other connections and thence straight up through the roof and 2 feet above, with brass wire netting on top, and 18" x 18" flange of 16-oz. copper soldered on and all warranted tight.

Iron Air-Pipes. Carry a 2-inch iron air-pipe, all caulked air-tight in the same way as other iron pipes, from trap of basement water-closet beside the main soil-pipe to the connection with soil-pipe provided for it in Bath-room, with 2-inch T-branch above Bath-room floor for connection with lead air-pipe from traps of sink in kitchen, and wash-basin, bath and water-closet in Bath-room. Carry a separate 2-inch iron air-pipe from trap of Laundry wash-trays beside the 3-inch waste-pipe to the connection provided for it in second story, with $1\frac{1}{2}$-inch T-branches to receive air-pipes from trap of pantry sink and second-story wash-basins.

Supply-Pipes. The plumber is to apply for $\frac{3}{4}$-inch service-pipe from street main to house, and pay all charges, if any, for it, and is, when called upon, to furnish and fit up temporary cock in cellar to supply water for building. As soon as the house is plastered he is to complete the permanent supply-pipes as follows:

Rising-Main. Carry $\frac{3}{4}$-inch four-pound rising-main up on cellar-wall and walls of Laundry, Kitchen and Bath-room, to tank in attic, with stop-and-waste cock at cellar-wall, and branches as follows:

In Basement:—$\frac{3}{4}$-inch branch to Sill-cock.
$\frac{1}{2}$-inch branch to Furnace Supply.
$\frac{1}{2}$- " " " Water-closet cistern.
$\frac{3}{8}$- " " " Laundry wash-trays.

In Kitchen:—$\frac{3}{8}$-inch branch to Kitchen sink.
$\frac{3}{8}$-inch branch to China-closet, running on Kitchen ceiling, and dividing in China-closet into three $\frac{1}{2}$-inch branches, one of which is to supply the pantry sink, and the other two the wash-basins in second-story chambers.

In Bath-room:—$\frac{3}{8}$-inch branch to bath; the same to supply wash-bowl by a $\frac{1}{2}$-inch branch.
$\frac{1}{2}$-inch branch to Water-closet cistern.

Stop-and-Waste Cocks. Every branch from the rising-main is to have separate stop-and-waste cock in a convenient place, and so arranged that the pipe can be completely drained of water; and each of the three branches in China-closet is also to have separate stop-and-waste cock, to shut off the pantry sinks or either basin and empty the pipes at pleasure. All stop-and-waste cocks to be finished brass ground cocks of the best quality.

Pipe Lining. Line under and behind all pipes and traps above the first floor with eleven-ounce zinc, the horizontal joints to be well soldered, and the upright joints to be lapped. This lining is to enclose completely all pipes, to protect ceilings and walls from any defect or leak, present or future. The lining to be graded to certain points, and to be connected with $\frac{3}{4}$-inch drip pipes to run to basement, and empty over cistern of basement water-closet; the end of the pipe to dip below the water-line of cistern.

Tank. Line with 16-oz. tinned copper in the best manner the tank in attic, 4' x 2' x 4', to be furnished ready for lining by the carpenter. Supply from the rising-main, with $\frac{3}{4}$-inch finished brass compression ball-cock and 6-inch copper float, and put in $1\frac{1}{4}$-inch boiler valve, with $\frac{3}{4}$-inch pipe to boiler, and $1\frac{1}{2}$-inch lead overflow pipe, to be carried down beside rising-main and to empty over kitchen sink, with the end over the sink turned up to form a trap.

Hot Water. Hot water will be supplied to Laundry wash-trays, Kitchen sink, pantry sink, bath, and three wash-basins.

Boiler. Furnish and fit up in Kitchen, beside range, a 50-gallon [*S. D. Hicks & Son*] first-quality, warranted copper bath-boiler, on Lockwood pattern cast-iron stand, to be connected to water-back of range with 1" brass pipe and ground-plug sediment-cock union coupling, and to have waste-pipe carried to the waste-pipe from kitchen sink. The boiler is to have three brass pipe-couplings on top, one for the supply from tank, and the others for two separate $\frac{3}{4}$-inch hot-water supplies. One of these is to be carried on Kitchen ceiling, with $\frac{3}{8}$-inch branch to Kitchen sink, thence to Bath-room, with $\frac{3}{8}$-inch branch to bath and $\frac{1}{2}$-inch branch to wash-basin, and to continue on Bath-room wall and ceiling to connect with the supply-pipe from tank to boiler for circulation, and a $\frac{1}{2}$-inch expansion pipe to be carried from the highest point of the circulation pipe two feet above the tank, and turned down over the mouth of the overflow pipe. The other $\frac{3}{4}$-inch hot-water supply-pipe is to be carried on Kitchen ceiling to China-closet, with $\frac{3}{8}$-inch branch down on Kitchen wall to Laundry wash-trays, and $\frac{1}{2}$-inch branch to pantry sink. Beyond the China-closet it is to divide into two $\frac{1}{2}$-inch branches, extending to wash-basins in second-story chambers, without any circulation or expansion pipe.

Hot-Water Stop-and-Waste Cocks.

Put three finished brass stop-and-waste cocks on hot-water supply-pipes in China-closet, to shut off pantry sink and wash-basins in second-story chambers separately, at pleasure, and drain the pipes. Put two cocks of the same kind over Kitchen sink, to shut off the sink or the Bath-room fixtures.

Wash-Basins.

Furnish and fit up in Bath-room and two chambers in second story, where shown or directed, three best 16-inch white earthenware overflow ground wash-basins. Each to be supplied with hot and cold water through ½-inch pipe, and No. 4 extra silver-plated cast-tube compression basin-cocks; and to waste through plated socket and strainer, with plated plug and chain-stay, bolted to the marble, and plated safety-chain No. 1, 1¼-inch lead pipe to main wastes with 2-inch lead S-trap close to the outlet, and brass trap-screw, and 1½-inch vent-pipe to main air-pipe. Connect the overflow with the traps by 1½-inch lead pipe, entering below the water-line, to prevent circulation of air.

Cover each basin with 1½-inch, best quality, blue-veined Italian marble slab, dished, with all free edges ogee moulded, and with ⅞-inch wall-plates of the same marble, 15″ high, with ogee-moulded edges. Basins to be secured to marble with three brass basin clamps and bolts to each, and the joint to be made tight with plaster-of-Paris.

Bath.

Furnish and fit up in Bath-room, where shown or directed, one 6-foot 20-oz. [*Steeger's*] tinned and planished copper overflow bath, to be supplied with hot and cold water through ⅝-inch pipe and ⅝-inch extra silver-plated compression bath bibb-cocks; and to waste through plated socket and strainer, with plated plug and chain-stay, and plated safety-chain No. 2, with 2-inch lead pipe to main waste, and 2-inch lead S-trap, with brass trap-screw and 1½-inch lead vent-pipe to main air-pipe. Connect the overflow to the trap by 2-inch lead pipe, entering below the water-line.

Pantry Sink.

Furnish and fit up in China-closet, where shown or directed, one [*Steeger's*] 24-oz. tinned and planished copper 14″ x 20″ flat-bottomed overflow pantry sink; to be supplied with hot and cold water through tall, extra silver-plated upright core compression pantry-cocks, with screw nozzle for cold water; and to waste through plated socket and strainer, and 2-inch brass Boston waste-cock, with silver-plated plate and lever, and 1½-inch lead pipe to main waste, with 4-inch round trap and 4-inch brass trap-screw, and 1½-inch lead vent-pipe to main air-pipe. Connect the overflow to the trap by 1½-inch lead pipe, entering below the water-line.

Cover with 1½-inch best quality, blue-veined Italian marble slab, dished, with all free edges ogee-moulded, and with ⅞-inch wall-plates of the same marble, 15″ high, with ogee-moulded edges.

Water-Closet, Second Story.

Furnish and fit up in second-story Bath-room, where shown, one [*H. C. Meyer & Co.'s*] white earthenware Brighton water-closet, and wooden cistern, lined with 16-oz. tinned copper, 16″x 16″x 24″, inside measurement, with [*Meyer's*] 4-inch brass cistern-valve, brass compression or Fuller ball-cock and 4-inch tinned copper float, cranks, lever, and plated safety-chain No. 2, polished black handle complete, and 1¼-inch 2½-lb. lead pipe to basin, and 1¼-inch overflow carried into basin supply. To be connected to branch of soil-pipe by 4-inch lead pipe and brass ferrules, and a 2-inch lead vent-pipe to be carried from this pipe to main air-pipe. Connect the ventilation-pipe from back of closet by 1¼-inch pipe to range flue in chimney, making all tight.

Water-Closet, Basement.

Furnish and fit up in Basement, where shown, one [*Hellyer's*] white earthenware short Artisan Hopper water-closet, with flexible metallic connection, and wooden cistern lined with 16-oz. tinned copper, 16″ x 16″ x 24″, inside measurement, with 24-oz. two-gallon service-box, brass compression ball-cock and 4-inch tinned copper float, and [*Meyer's*] 4-inch brass cistern valve, cranks and all attachments complete for automatic seat-supply with preliminary and after flush, and 1¼-inch 2½ lb. lead pipe to basin with 1¼-inch overflow connected to basin supply. To waste through 4-inch lead pipe to branch of soil-pipe, and a 2-inch lead vent-pipe to be carried from trap to main air-pipe.

Slop-Sates.

Put Mott's enamelled iron slop-safe, of suitable shape, over bowl of each water-closet.

Kitchen Sink.

Furnish and fit up in Kitchen, where shown or directed, one best-quality soapstone kitchen sink, 24″ x 48″ x 8″, with grooved soapstone draining shelf and soap-dish, and soapstone back 16″ high; to be supplied with hot and cold water through ½-inch pipe and ⅝-inch finished brass compression-cocks, the cold water cock to have screw nozzle; and to waste through 6-inch brass cess-pool and strainer, and 2-inch lead pipe to main waste, with 6-inch round lead trap and 4-inch brass trap-screw, and 2-inch lead vent-pipe to main air-pipe. Sinks to stand on wooden frame furnished by the carpenter.

Wash-Trays.

Furnish and put up in Laundry, where shown or directed, a set of four white earthenware wash-trays, of the Morahan Ceramic Co., one to have rubbing board formed in the porcelain. All to be set complete by the plumber, and each to be supplied with hot and cold water through ⅝-inch pipe and ⅝-inch finished brass compression wash-tray cocks. To waste through best 1½-inch silver-plated wash-tray strainers and couplings, with plated plugs, chain-stays, and plated safety chain No. 2, and to have one 6-inch round lead trap for the set of four trays, with 4-inch brass trap-screw, and separate 1½-inch lead waste-pipe from each tray, all entered into the trap below the water-line, with 2-inch lead outlet pipe from trap to main waste, and 2-inch lead vent-pipe from trap to main air-pipe.

Wash-Boiler Supply.

Supply the wash-boiler, to be furnished and set by the mason, with cold water only, through ⅝-inch lead pipe, carried through top of boiler and neatly finished, with ⅝-inch finished brass ground stop-cock on the pipe, in a convenient position over the boiler. There will be no waste to this boiler.

Sill-Cock.

Bore through the sill of house under middle of front bay, or elsewhere where directed, and put on outside a ¾-inch plated compression sill-cock, with screw for hose.

Furnace Supply.

Furnish and fit up on pier next to furnace a ½-inch finished brass compression bibb-cock for drawing water.

Safes.

Line under all fixtures of every kind about the basement with 4-lb sheet lead turned up 2 inches all around, and to have convex brass strainer and 1-inch drip-pipes carried to basement and emptying over cistern of basement water-closet; the end of pipe to dip below water-line of cistern.

All the work is to be done in the very best, neatest and most thorough manner, tested by turning the water onto each part. All defects made good at the completion of the building and all left perfect and warranted for two years.

Peppermint Test.

As soon as the pipes and traps are ready the traps are to be filled with water, and the whole system tested by closing all air-pipes and other outlets, and pouring 5 ounces of oil of peppermint into the top of the main soil-pipe, followed by two or three gallons of hot water, and immediately closing the top of the soil-pipe. This is to be done in the presence of the architect or of some person appointed by him, and if any odor of the peppermint is detected in any part of the house the plumber is at his own expense to search for and find the defect or defects which may have allowed the vapor of peppermint to escape, and make them all good. After repairing the defects so discovered, the test is to be repeated in the same way, and any further defects so detected are also to be made good at the plumber's expense, until the whole is satisfactorily proved to be tight and perfect, and all work is then to be restored and replaced in good order; the whole cost of making such repairs, and of removing and replacing other work disturbed to obtain access to the pipes, with all expense of making good any damage so occasioned, and indemnity for delays to other contractors, to be paid by the plumber.

MILL-BUILDING.[1]

THE establishment in New England of "textile factories" of any considerable size or importance is within the recollection of many of our older neighbors. To-day the manufacturing towns rival in number and importance the commercial ones, and mill-building thrives while ship-building declines.

To those not technically familiar with the subject it may seem strange that so much of the building of prosperous and enterprising manufacturing communities should be independent of the work of the architect. Up to the present time, however, with rare exceptions, the names "mill" and "factory village" have been synonymous with all that was hard, barren and aggressively ugly. No doubt in due time the improvement already begun in the dwellings and public buildings of mill towns will extend to the blocks of corporation tenements; but very radical changes must occur in the views of stock-holders and their servants before questions of taste will find a place with questions of utility and profit; and for many years there will still remain the immense piles of brick known as the "mills," the central interest of whole communities, representing millions of capital, and yet possessing but one solitary element of architectural effect, — the grandeur of vast extent and bulk.

Good architecture demands a liberality in the use of materials beyond the strict requirements of a short-lived stability: to be dignified it must be permanent. Decorated construction while honest and frugal must not be mean. The strict requirements of the civil and mechanical engineer will not suffice for the architect.

In the planning and construction of textile factories the conditions adverse to art have long had full sway. Not only are such buildings often meagre in construction, running as near the verge of disaster as bold and reckless speculation will warrant; but their whole arrangement, location and disposition of parts is controlled by machine

[1] *The Fire Protection of Mills and Construction of Mill Floors, containing Tests of Full-size Wood Mill Columns* By C. J. H. Woodbury, Member N. E. Cotton M'f'g. Association, Amer. Soc. of Mechanical Engineers, Inspector Factory Mutual Insurance Companies. New York: John Wiley & Son.

rules that cramp and hamper the exercise of good taste and fill the mind of the prudent constructor with apprehension. Even the limited effects that might be obtained by the skilful grouping of masses are lost because this very arrangement must be governed solely by questions of convenience and safety from fire.

In addition to the demands of capitalist and machinist controlling this class of building, which are more or less familiar to every one, there is another important consideration, not perhaps so fully understood outside of manufacturing communities, and that is the extreme risks of fire incurred in this branch of manufactures. Among such risks may be noted the necessity for immense lofts without fire-resisting divisions, and with floors upheld by a forest of slender pillars of iron or wood; the distribution of materials of the lightest and most inflammable character; the use, in close proximity to these materials, of large numbers of gas or electric lights; the employment throughout of light machinery driven by power and liable at any moment to set fire to the material in process of manufacture; the free use of oil and the storage of materials extremely liable to spontaneous combustion; the great number of employees, the slightest carelessness of one of whom may result in a disastrous conflagration; the close grouping of many large structures around one source of power; the demand for strictest economy and a close balancing of risks against outlay; the temptation under many conditions to incendiarism. These and other reasons combine to create a very hazardous class of fire-risks, and to promote a kind of building which is strictly a mechanical construction.

It is the proper ambition of the good architect to build for all time. Anything which will enhance the lasting quality of his work must meet with his hearty approval. Even in the secondary consideration of his compensation his interest lies in the same direction. But the demands of a new and progressive civilization on the members of a profession not yet firmly established and thoroughly understood; the desire of clients for ornate and *bizarre* architectural effects, as means of profitable investment or material for the gratification of personal vanity and love of vulgar display, tend to promote a class of work that the conscientious architect must often condemn; but his duty ends with the plain statement of his disapproval to the parties by whom he is employed; or in extreme cases with his withdrawal from the work, at a personal and uncompensated sacrifice. He is not the guardian of the public safety but a paid servant of an individual or corporation. With those who disregard his serious counsel rests the responsibility of such disregard. The professional work in promoting permanent and fire-resisting building would, however, be comparatively easy, were it not for the steady influence of the insurance interest in the opposite direction. In the absence of any proper discrimination in favor of good work the owner finds it cheaper to insure largely than to build well. If building estimates seem high it is the provisions against fire that are sacrificed, on the too often well grounded supposition that insurance rates will not be materially increased. Extra hazardous risks combined with clever appliances for the extinguishment of fires are the temporary necessities of a low order of building. Good architecture, for its proper development, requires peace and security. The present interest of the underwriter is to foster a state of alarm and apprehension. When good building becomes the rule fire insurance and fire-engine companies will have become reminiscences of an imperfect civilization.

In the present condition of textile factories the underwriter finds congenial surroundings; but the risks are so great at the best that the cost of stock insurance has led to the establishment of mutual companies with stringent regulations and steady and continued efforts to lessen the unusual risks encountered by the erection of an exceptional class of buildings, and the introduction of automatic and other appliances for fire extinguishment. The exigencies of the case have given the planning and construction of these mills into the hands of a class of specialists, variously known as "mill architects," "engineers" and "mill builders," who aim to supply the demand as it exists, and who often display great skill in doing so.

Although the architect may find little or no regular employment in connection with mill-building, he can but take a lively interest in it as an important class of construction, and find many valuable suggestions in any careful record of the results of the experiments and experience of the specialists who have such work in charge.

The volume under consideration is naturally divided into two sections, each occupying about half of the book; the former devoted to the "fire-protection of mills," and the latter to "mill construction." The whole forms a clear and concise statement of the experience of a practical man, and cannot fail to be of use to all practical men; but perhaps its greatest usefulness will be in the new mill districts of the West and South, where it will carry the result of many years of expensive experiment of the older manufacturing districts of New England. The relation of the treatise to underwriting is stated to be "an indirect one, being addressed to the manager and builder." In the simple principles laid down for the prevention and control of fires the author takes similar views to the best authorities on such matters. Starting with the assertion that "a fire-proof mill is a commercial impossibility," great weight is given to the element of human agency in causing and preventing fires, and the pail is ranked first as a fire-engine. This importance given to simple implements in ready hands is fortified by the oft-repeated and oft-forgotten truism that "it is an exceptional fire that could not have been extinguished in its earlier stages." Following in the same vein he states that "the greatest losses are due to the failure of apparatus at the critical moment," and dwells upon the vital importance of giving regular "instruction in the use of apparatus by actual trial and work." This principle may well be extended to other fields of usefulness besides mills. Numerous water supplies and independent appliances are also noted as elements of safety.

On the subject of pumps, hydrants, valves, and hose much information of value to an architect is given; and here a preference is again shown for long tried and simple machinery over many later and more complicated devices.

The usefulness of the "factory sprinkler," so called, has been so much discussed of late that it is more or less familiar to all experts in building. The old arrangement of a net-work of perforated pipes, on to which the water was turned by a hand valve, was open to several serious objections, which have been mostly overcome by the introduction of automatic sprinklers which, by the action of heat on fusible plugs or connections, turn on the water in the form of spray at points where the fire is in progress and nowhere else. This device economizes the water, and is independent of human control. The net-work of pipes and distributing heads are liable in course of time to be clogged by rust or impurities in the water; but trouble from such causes can doubtless be avoided by frequent inspection. Of course the automatic pattern would be worse than useless where liable to the action of frost; as for instance, over the stage of a theatre, a use for which it has been suggested. For such a locality the original arrangement of Mr. James B. Francis, of Lowell, is the best, the water being turned on to the pipes from below when required. It is a satisfaction to be confirmed by so good an authority in the preference that many architects have shown for fire-shutters of wood covered with sheet-metal, over any kind of all metal shutters. Careful directions for their construction are given which will be found useful in specifications. It is also well to be assured of the fact that steam-heating pipes will set fire to wood in contact, a matter that has been the subject of much controversy.

The pages devoted to electric-lighting are clear and comprehensive, and in the one estimate of relative cost of lighting by the old and new methods the results are very unfavorable to gas, and this without counting the superiority of the electric-light for all work in which the arrangement of colors bears a part.

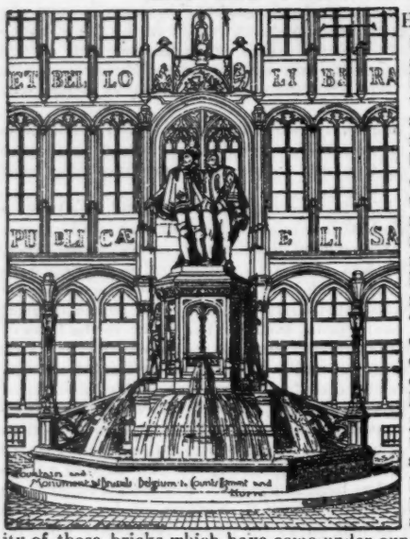
Valuable formulas for use can only be deduced from extended experiment, and here the very peculiarity of the mills, the acres of roofs and floors, the forests of columns, the rattle and jar of hundreds of engines and thousands of looms, give opportunity for a thoroughness of investigation and classification of results of the greatest value and interest in other building. The late experience in covering flat roofs with canvas, or cotton duck, painted or tarred after laying is novel and suggestive. The suggestions for arrangement of pillar connections through floors and girder-bearings in walls are good, but the experiments in the strength of wooden pillars are too limited to be of any great value. It is a reproach to the mill interest that this *practical* question is not made the subject of a series of exhaustive experiments that will give reliable data. A larger part of the mills now standing, and some that have fallen, depended on nothing much more reliable than the rule of thumb for the strength of their principal supports.

The student will find in this little volume many matters for which he may have searched ordinary text-books in vain: the causes and results of oscillation and vibration; the weight of certain machinery; the weight per cubic foot of many kinds of fabrics and materials in bale or package; the stiffness and strength of plank and girder floors, and many kindred matters are set forth in a clear and concise manner.

Although it may not be the lot of all architects "to know many things and know them all well," and although talents like those of Wren and Viollet-Le-Duc may fall to the lot of few, it is well for all to consider the words of this practical writer that "utility is the fundamental element in design, the fitness of means to ends being paramount to other considerations." The true architect must be a builder: without a thorough knowledge of sound construction his ever so clever pencil is that of the draughtsman only.

MEASUREMENTS OF THE GREAT LAKES.—The following measurements of the great lakes have been taken by Government surveyors: The greatest length of Lake Superior is 335 miles; its greatest breadth is 160 miles; mean depth, 688 feet; elevation, 827 feet; area, 82,000 square miles. [The combined area of the six New England States is only 65,038 square miles.] The greatest length of Lake Michigan is 300 miles; its greatest breadth, 108; mean depth, 690 feet; elevation, 506 feet; area, 23,000 square miles. [Denmark, which has somewhat the same configuration, in reverse, contains exactly the same number of square miles.] The greatest length of Lake Huron is 300 miles; its greatest breadth is 60 miles; mean depth, 600 feet; elevation, 274 feet; area, 20,000 square miles. The greatest length of Lake Erie is 250 miles; its greatest breadth is 80 miles; its mean depth is 84 feet; elevation, 261 feet; area, 6,000 square miles. [Connecticut and Rhode Island together contain 5,980 square miles.] The greatest length of Lake Ontario is 180 miles; its greatest breadth is 65 miles; its mean depth is 500 feet; elevation, 261 feet; area, 6,000 square miles. The total of all five is 1,265 miles, covering an area of upward of 135,000 square miles. [Great Britain and Ireland contain only about 120,872 square miles.]

IRON AND OTHER SLAGS.[1]



THE numerous attempts to utilize this abundant waste have been attended with varying success, and although some satisfactory results have been reached through direct treatment of the incandescent mass as it leaves the furnace, no very marked progress has been made in what may be called the "concrete proper" direction. At Middlesborough-on-Tees extensive operations have been for some years carried on in the manufacture of slag-bricks, but owing probably to the imperfect cementing agent used, the quality of those bricks which have come under our observation has not been good in character.

In Germany the manufacture of bricks from slag has been going on for upwards of twelve [now fifteen] years, and at Osnabrück more particularly the industry has been of a progressive character. In 1866 about half a million of bricks were made, and in 1875 upwards of six millions and a half.

The cost of producing these bricks was 16*s* per 1,000, the lime mixed with the granulated slag costing 3*s*. 4*d*. of that amount. In the early experiments the machinery for compressing the bricks was found to suffer much damage from the hard and gritty nature of the slag: this difficulty has been completely overcome by the machines invented by Mr. Lurman.

Many structures have been built in Germany of these slag-bricks, and the testimonials received from architects and others interested testify as to the advantages derived from their use.

In two sets of experiments made to test the compressive strength of slag-bricks, made in two different districts, the following results were obtained: —

OSNABRUCK BRICKS.

Average of ten bricks, 1871 make, were crushed with a pressure of 1487.72 lbs. per square inch.

Average of ten bricks, 1873 make, five months old, were crushed with a pressure of 1571.63 lbs. per square inch.

SIEGEN BRICKS.

Bricks made from granulated slag mixed with naturally disintegrated dust broke under a pressure of 2648.30 lbs. per square inch.

Bricks of granulated slag only were crushed with a pressure of 2109.26 lbs. per square inch.

These experiments were made for the purpose of comparing their strength with local red and pale, hard and soft burnt clay bricks, and in every case slag-bricks exceeded them in compressive value.

Experiments were made in 1874 to test the capacity of these slag-bricks to resist the action of heat, and it was found that they remained perfect when red-hot, thus proving their suitability for chimneys and furnace work.

In the investigations connected with this industry a series of experiments were made under the direction of Professor Pettenkofer, of Munich, and the results are so generally interesting that we quote them below.

The primary object of the experiments was to test the permeability of the slag-bricks to air and water. The pressure of air applied was 0.0108 kilo. per square centimetre, and it was found that through every square metre of the following materials the quantity of air in litres passed through per minute was: —

	Dry.	*Soaked.*
Concrete	15.5	.0
Green sandstone (Upper Bavaria)	7.8	1.4
" " Switzerland	7.1	2.1
Tufaceous limestone	478.8	233.2
Hair-mortar	54.4	3.9
Portland cement	8.2	.0
Slag-brick (Osnabrück, 1871)	93.0	53.8
" "	105.0	15.4
" " 1873	110.4	10.2
" (Haardt, 1873)	455.8	41.0
" (English, 1876)	158.0	1.1
Clay-bricks, (pale) Osnabrück	23.3	5.1
" (slightly burnt, hand-made Münich)	9.6	1.5
" (machine-made Münich	7.9	1.7

By the same experiments it was found that clay-bricks were completely soaked with water in from 9 to 12 hours, whereas it took from 55 to 190 hours to saturate a slag-brick.

A hospital at Georg-Marien-Hütte was built during 1870–1871, of these slag-bricks. It was opened in 1872, and in June, 1876, the medical superintendent testified to its salubrity. There is accommodation within its walls for thirty-two patients, twenty-eight being comfortably placed in four spacious wards, and four in separate small rooms. The walls are hollow, having an air-space of 2½", and so successful is the result that no smell of hospital-air is observable even in the rooms where offensive suppurating wounds are treated. All these advantages are derived from "the extremely advantageous porosity of the slag-bricks."

This new and valuable feature of porosity is entitled to some attention in this country [England] as we usually disregard the advantages to be obtained in this direction, and too frequently aim at an air-tight house.

We need not further refer to the various less important aggregates, except to caution intending concrete-makers against using broken bricks, old plaster, and any rubbish which some writers on concrete recommend for house-building purposes. There is just as much care required in the selection and treatment of the aggregate as the matrix, and unless this is carefully borne in mind, there is not any chance of much success in the concrete mixture.

[1] From Henry Reid's Treatise on Concrete, p. 121.

THE ILLUSTRATIONS.

LINCOLN PARK REFECTORY, CHICAGO. MR. W. L. B. JENNEY, ARCHITECT, CHICAGO, ILL.

THE new refectory, just completed, is situated on the shore of the lake, with office for renting boats on platform over the water. The exterior is painted in rich colors, the body olive-green trimmed with terra-cotta red, with mouldings of cherry; the under side of roof projections sky-blue, the rafters in russet-brown, and the upper panels in neutral orange. The lower story is a lunch-room, with kitchen, storerooms, cool-rooms, etc. The upper story is for a restaurant, and is finished in open-timber work, painted in steel, red, brown and orange, — the orange being the prevailing tint, giving a rich warm glow to the whole room.

DESIGN FOR A DINING-ROOM INTERIOR. MR. E. G. W. DIETRICH, ARCHITECT, BROOKLYN, N. Y.

"REDSTONE," SHORT HILLS, N. J. MESSRS. LAMB & RICH, ARCHITECTS, NEW YORK, N. Y.

ON THE PROTECTION OF BUILDINGS FROM LIGHTNING. — I.[2]

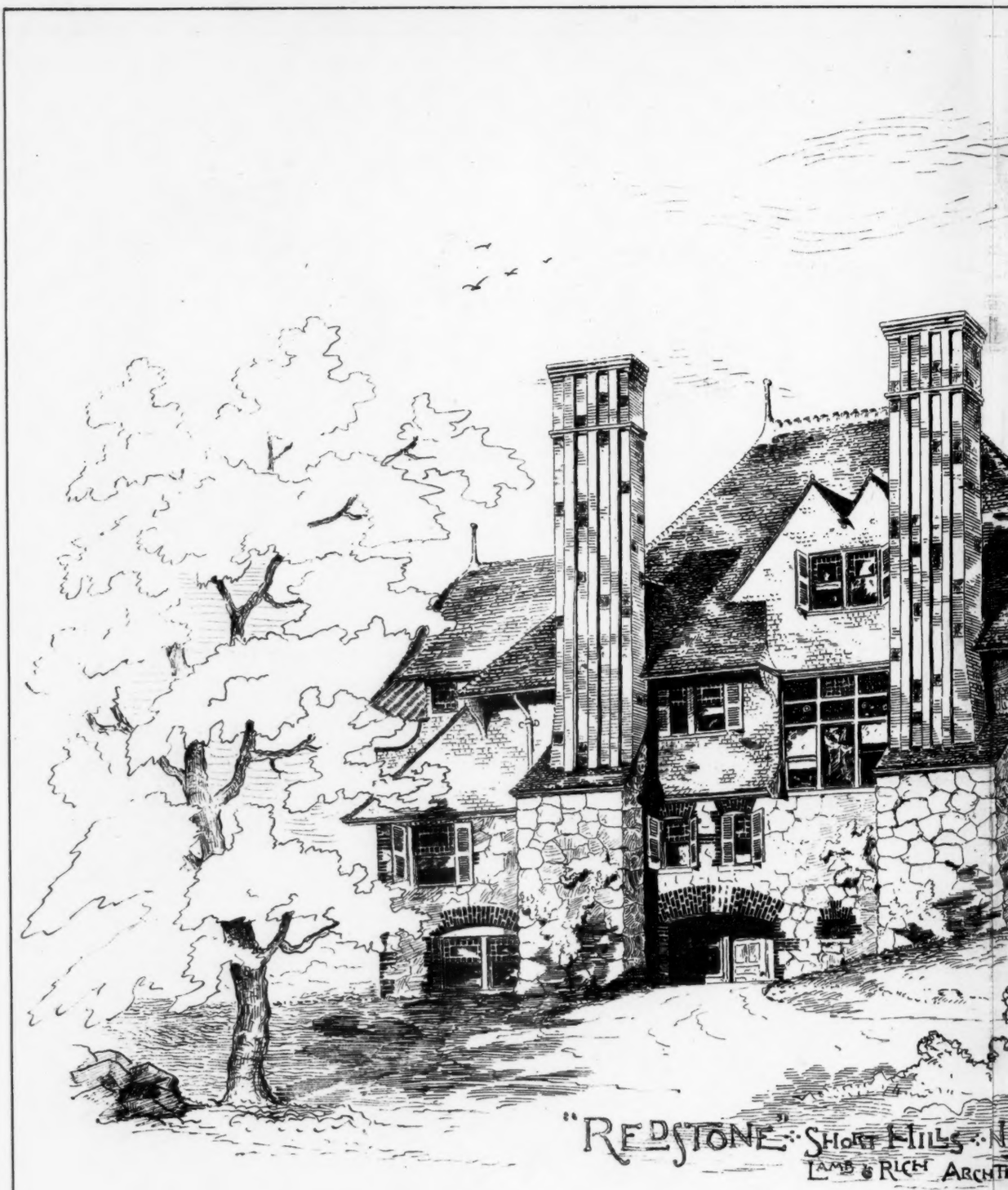
A FEW weeks ago, when I accepted the invitation of the Council of this Institution to read a paper on the application of lightning conductors to buildings and magazines, it never occurred to me how difficult would be the task to deliver an *interesting* paper on so special a subject, or a paper that would be of value to a purely naval and military institution. It is, however, only too true that lightning strikes soldiers, sailors, and civilian alike, and that the laws which should govern the application of conductors are the same whether it be a palace or a jail, a chimney, a cathedral, or a man-of-war that has to be protected. Moreover, the immense interests jeopardized by any faulty arrangements, which might occasion the explosion of magazines, makes the subject of special importance to naval and military men. Imagine the loss to the war strength of the empire which would be entailed by the accidental explosion of one of the large magazines at Tipner or at Priddy's Hard, with its charge of, say, 750 tons of gunpowder, or over 750 millions of foot tons of energy developed in less than one second of time, and this within a short distance of the greatest naval arsenal in the world and a town with 120,000 inhabitants. Every building-shed would be levelled to the ground and the town would be visited as was Chios the other day. The proper application of lightning-conductors to large magazines and to men-of-war is evidently, therefore, a matter of importance to us all.

Electricity exists in two distinct forms, the static and dynamic, but the word static thus applied is somewhat misleading, because electricity (like heat) is now recognized to be a form of matter in motion, whether in the state of potentiality, as in a thunder-cloud, or in the state of activity (the work-producing state), as in lightning.

[2] By Capt. J. T. Bucknill, R. E., from the "*Journal of the Royal United Service Institution.*"

NEW REFECTORY AT LINCOLN PARK CHICAGO ILL.
W. L. B. JENNEY, ARCHITECT.

Photolithographic Printing Co. 81 Tremont St. Boston



"REDSTONE" SHORT HILLS N
LAMB & RICH ARCHT

INTERIORS "REDSTONE"

SHORT HILLS N.

Residence of
W.m Russell Esq

LAMB & RICH. ARCH.TS
346 348 B'WAY N.Y.

"REDSTONE" SHORT HILLS
LAMB & RICH ARC

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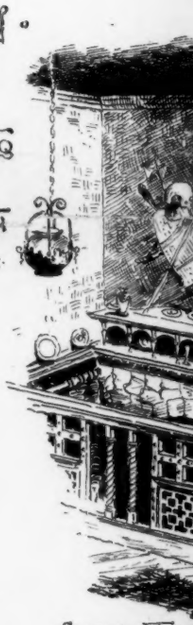
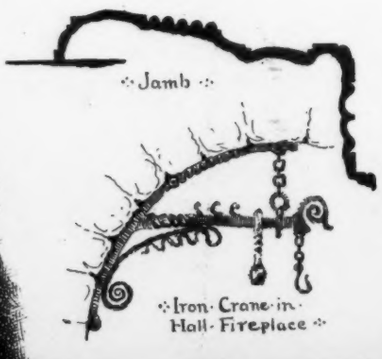
LAMB & RICH ARCHTS
346-348 B'WAY N.Y.

RICH. Del.

Front Porch

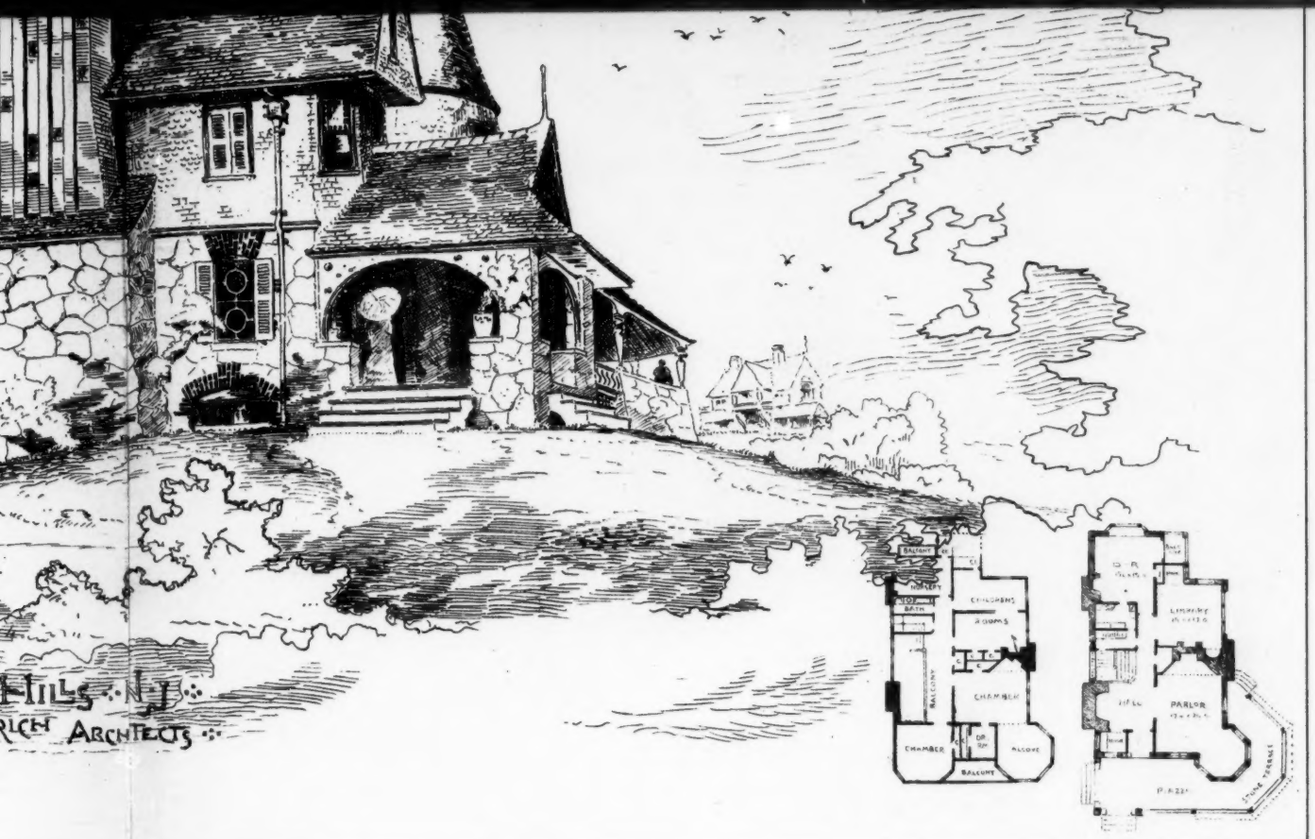


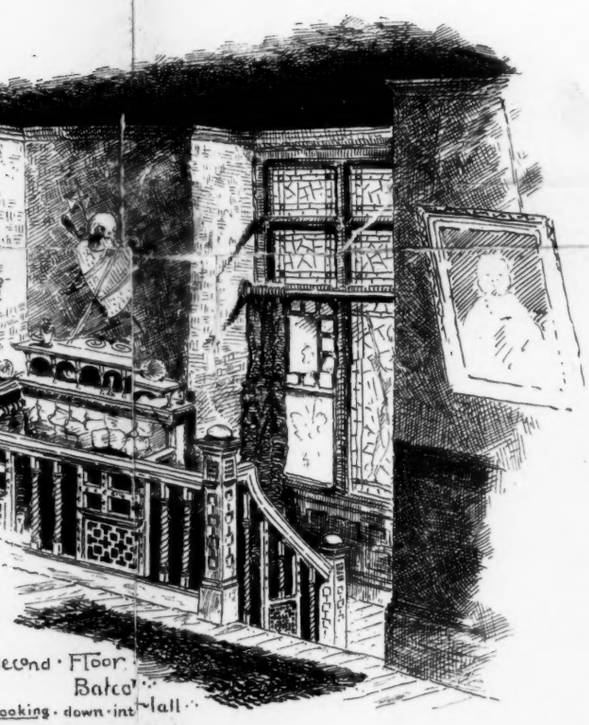
Second Floor
Bath
Looking down in



Jamb

Iron Crane in
Hall Fireplace





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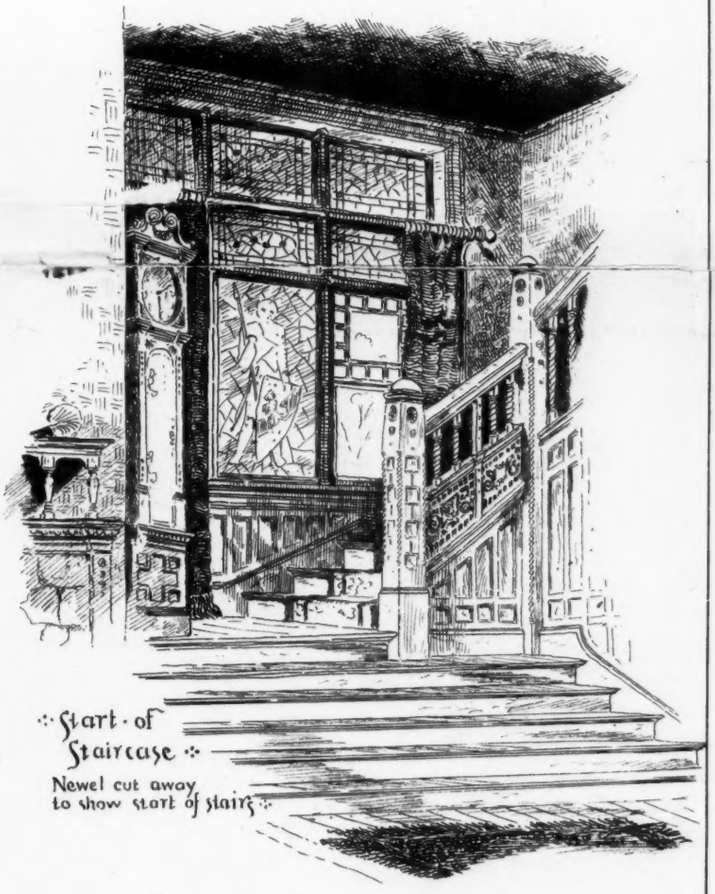
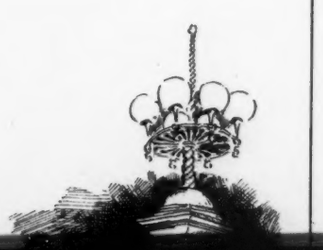
Balco
ooking · down · int · Hall



Start · of
Staircase
Newel cut away
to show start of stairs

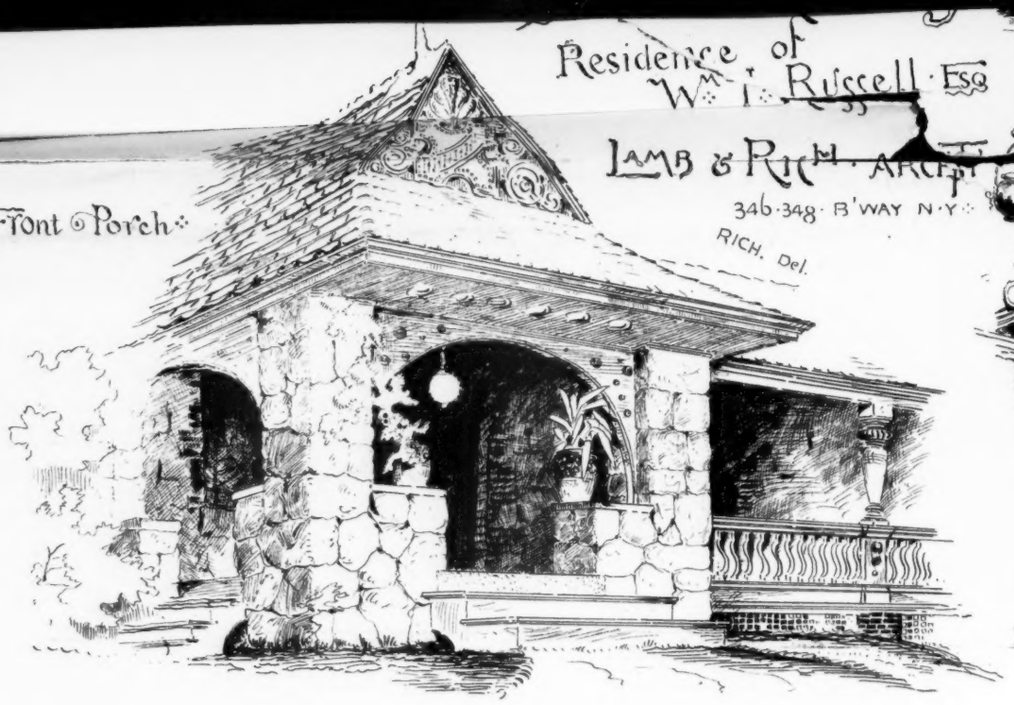


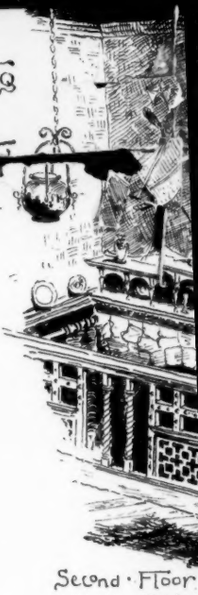
Residence of
Wm. I. Russell Esq

LAMB & RICH. ARCHTS
346-348 B'WAY N.Y.

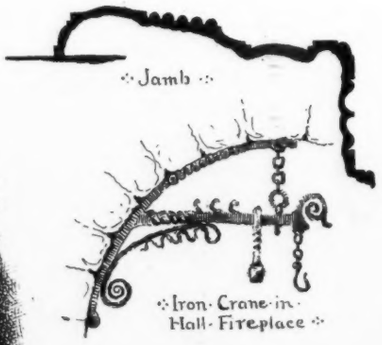
RICH. Del.

Front Porch





Second Floor
Balco
Looking down in



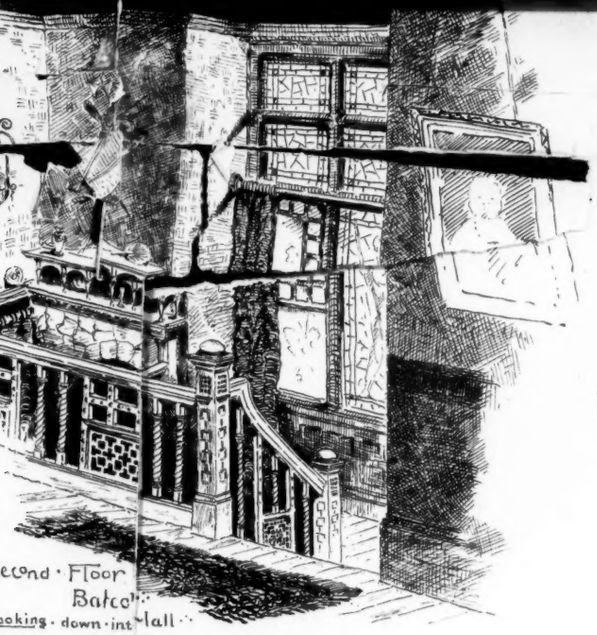
Jamb

Iron Crane in
Hall Fireplace

Out side Door Panel Glass
Background robin egg blue
R in rough hewn crystals
Border ruby and old gold tints

Cut Brass Registers (ALL DIFFERENT)

TERRACE VIEW
SEE EAST VIEW



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Balco
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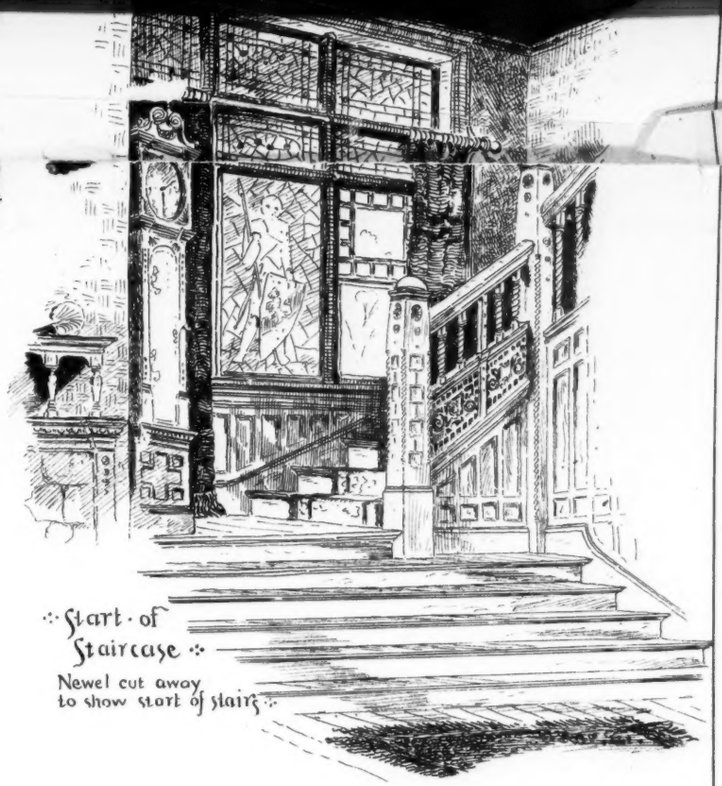
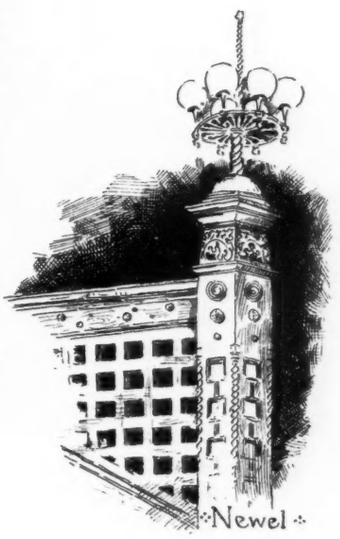


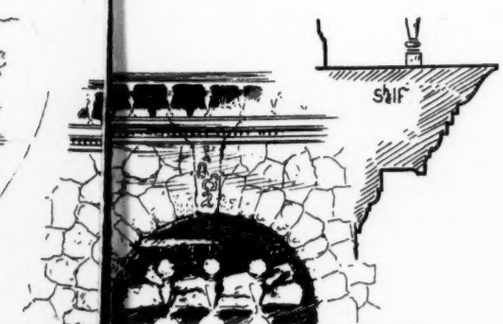
Start · of
Staircase
Newel cut away
to show start of stairs

Library

Outside · Door



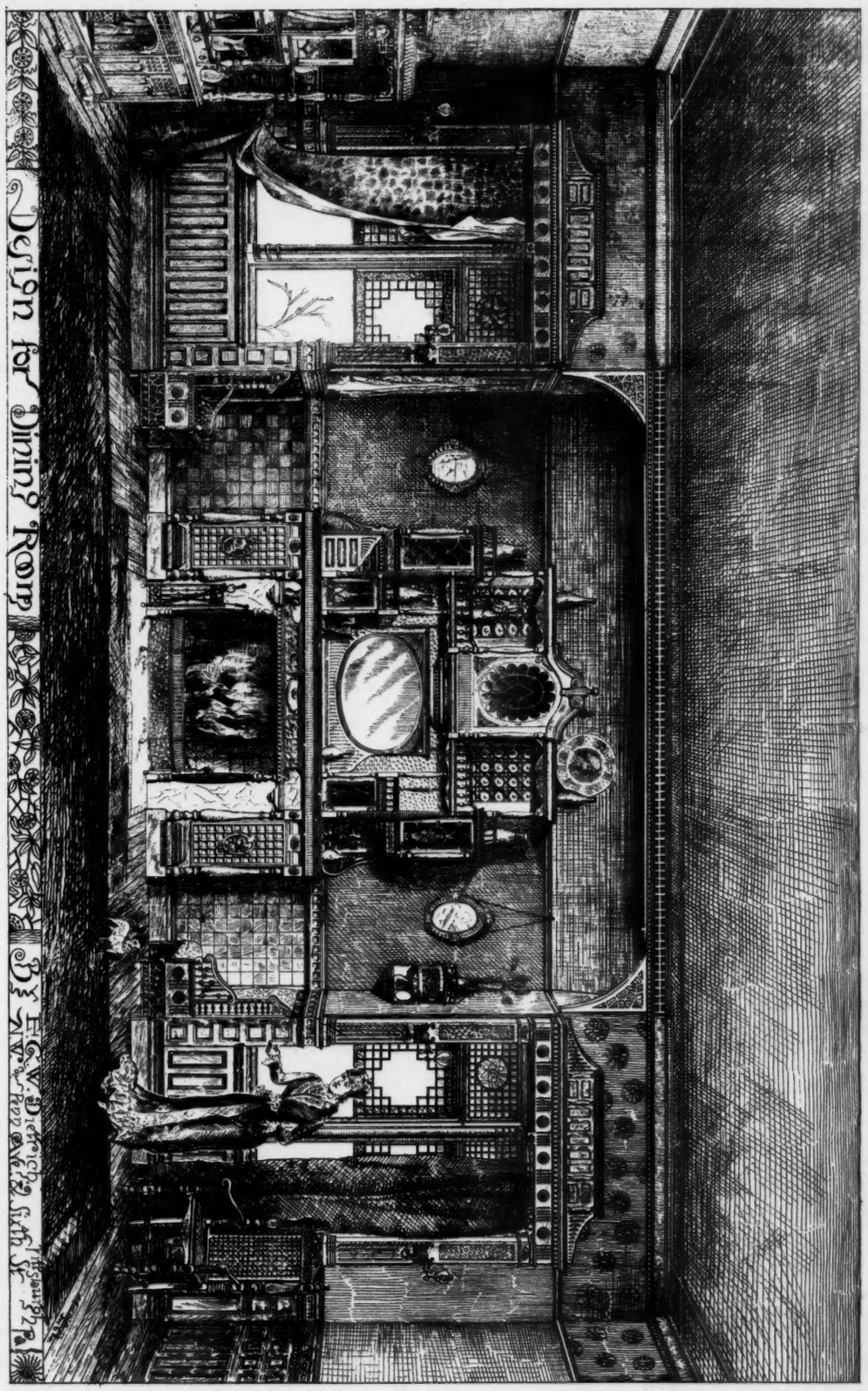
Newel



Hall · Fire · Place
Rough · red · stone ·
5' 0" opening ·

Dining · Room

The Heliotype Printing Co. 211 Tremont St., Boston.



Design for Dining Room

By E. G. W. Dietrich, Providence, R. I.

The Heliotype Printing Co., 211 Devonshire St., Boston.

How the former is produced is still conjectural, although a multitude of theories have been propounded.

In whatever manner the electricity is produced the thunder-clouds act as collectors, and more than this, when the surface of the earth beneath them is not far distant and is composed of fairly good conducting media, the earth, the clouds, and the intervening air form huge condensers: the electrified clouds acting by induction upon the earth, and the latter reacting upon the cloud.

Now the amount of electricity of given potential which a cloud is capable of receiving depends first upon its size, the amount varying directly as the linear dimensions of the cloud; and, secondly, upon the intensity of inductive action of the earth's surface, the cloud's power of receiving electricity being greatly increased thereby.

For example, a cloud of given dimensions at an altitude of 300′ could be charged by eighty times the electricity that could charge it were its altitude increased to four sea miles. For a similar reason a cloud over a conducting area could be charged much more highly than the same cloud at the same height over a non-conducting area.

One of the most remarkable of the phenomena connected with electricity is the mutual attraction of bodies charged with electricity of opposite sign, and the mutual repulsion of bodies charged with electricity of like sign. Now the charges on inducing and induced surfaces are always of opposite sign. The bodies possessing these surfaces consequently attract each other. If, therefore, thunder-clouds be driven by the wind or otherwise over portions of the earth's surface which vary considerably in their conducting power, they will be attracted to those regions which from their conductivity present the greatest facilities for inductive action; and this, in spite of the mutual repulsion of the clouds, just as the numerous admirers of a beautiful woman, although hating each other are attached to her.

Now it generally happens that the thunder-clouds in a storm are sufficiently numerous to cover both favorable and unfavorable areas of the earth's surface, and, as little or no inductive action occurs over the latter, but very considerable action over the former, the electrostatic capacities of the clouds become greatly altered and lightning plays from cloud to cloud, until those which are situated over the earth's conducting surfaces become so highly charged that the electricities are able to overcome the resistance of the intervening air and to unite across it by what is termed the disruptive discharge: this is lightning.

I have been thus particular in describing the action produced by the earth's surface upon thunder-clouds because the somewhat important conclusion must be arrived at that lightning is most to be feared by those who live on well-conducting areas, even of low elevation, and that lightning is least to be feared by those who live on non-conducting areas. This is shown on plate, Figure 9, where the

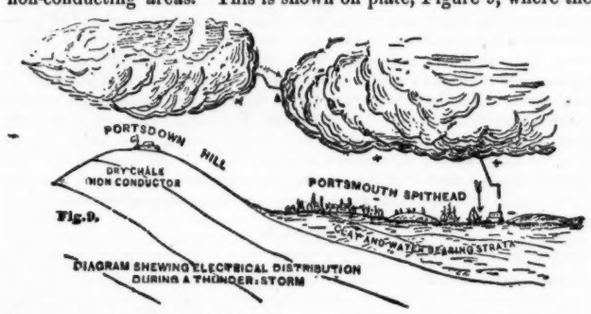


Fig.9.
DIAGRAM SHEWING ELECTRICAL DISTRIBUTION DURING A THUNDER-STORM

distribution of the electrical charge is shaded in. The cloud over the Portsdown Hill, although nearer to the ground is much less highly charged than the cloud over Portsmouth and Spithead, because the former presents a non-conducting area. This electrical distribution is of considerable importance, and it shows that it is much more necessary to provide lightning-conductors for buildings situated upon a damp clay or boggy bottom than for those on a chalk down. This is very convenient, for it is almost impossible to make an efficient earth connection in the latter situation.

As before stated, disruptive discharge constitutes a lightning flash. Immediately before the stroke the particles of air are subjected to a high strain by static induction, producing a polar tension which is proportional to the square of the potential. Faraday's experiments proved this, as well as the fact that the stroke tends to traverse the air in the direction of such polarity. The tendency of lightning is therefore to strike in a direction normal to the earth's surface.

But there is another mode by which thunder-clouds are discharged, viz.: by the brush discharge. Electricity of high potential leaks, as it were, from conductors which are provided with projections in the nature of points, where the distribution of electrical density is greatest, a stream of electrified air being thrown from each point, and the charged conductor robbed by continuous streams of its electricity in this manner.

Although the brush discharge is frequently so intense as to be luminous to a height of 6″ or 8″, it is not attended with any appreciable heat. Its action should therefore be fostered, as it often wards off a dangerous stroke of lightning by neutralizing the opposing electricities in a harmless manner.

It has been observed so late ago as 1758, by a Mr. Wilcke, that a thunder-cloud, in sweeping at low elevation over a forest, not unfrequently appears to lose charge without the occurrence of lightning. The under surfaces of such clouds at first present a serrated or tooth-like appearance, which gradually disappears, the teeth retreating into the cloud, and finally the cloud itself rising away from the forest. In such cases the numerous points on the branches of the trees present facilities for the brush discharge on an extended scale.

To illustrate this action, an experiment was made by Franklin, as follows: a very fine lock of cotton was suspended from the conductor of an electric machine by a thread, and other locks were hung below it; on turning the machine the locks of cotton spread forth their fine filaments like the lower surface of the before-mentioned thunder-cloud; on presenting a point which was connected to earth below them, they shrank back upon each other and finally upon the conductor.

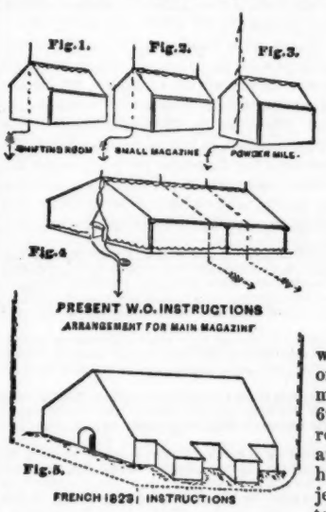
But to return to the lightning. Just as a certain amount of water falling through a difference of level produces a definite amount of energy, so a certain amount of electricity falling through a difference of electrical potential produces a definite amount of energy. It is known that if p be the potential and q the quantity of electricity in a flash, the work done during the stroke is $\frac{1}{2}\ qp$. Now the duration of the illumination of a stroke is rather less than the ten-thousandth part of a second, and although q is small (Faraday said not more than would decompose a single drop of water) p is so enormous that the flash is often capable of decomposing a million drops of water in series. The potential can be calculated approximately because it is known that ten thousand volts will spark across a little more than half an inch at ordinary atmospheric pressure; and, as the sparking distance varies as the square of the potential, a flash of lightning 1,000′ long must be impelled by an electrical potential of one and a half millions of volts or thereabouts. This is only approximately accurate, because the mean atmospheric pressure would be less than that at the earth's surface, and therefore a correction should be made, as the pressure of the atmosphere decreases very rapidly with altitude, and the sparking distance increases very rapidly with decrease of atmospheric pressure. The work $\frac{1}{2}q$ done by a flash of lightning is used in the disruption of the air, in the destruction of non-conducting solids that obstruct its path, in heat, in light, and in chemical decomposition. Ozone is always produced during thunder-storms.

All that can be done to protect buildings from its destructive action is (first) to attract the lightning to another spot if possible, and (second) to arrange that even if the building be struck the work shall be given out at other portions of the path of the stroke. To do this it is necessary to provide a sufficient conducting channel or channels to convey the electricity past the buildings from the air to the ground.

Firstly, let us examine the methods which have been pursued for attracting lightning away from the building which it may be desired to protect. The French Académie des Sciences has issued information concerning lightning-conductors on different occasions, the several instructions having been the results of the labors of various commissions of celebrated physicists.

In the first instruction, 1823, with Gay-Lussac as reporter, the rule is laid down that *a conductor will effectually protect a circular space whose radius is twice the height of the rod*, and it is stated to be in accordance with calculations made by M. Charles.

Accordingly we afterwards find in the same instructions that magazines should be protected in the manner shown on Figure 5, the



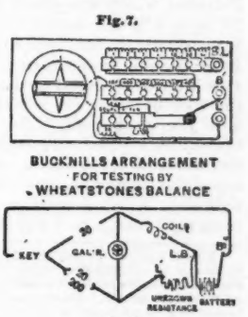


Fig.8.

wording being: "The conductors should not be placed on the magazines, but on poles at from 6′ to 8′ distance. The terminal rods should be about 7′ long, and the poles be of such a height that the rod may project from 15′ to 20′ above the top of the building. It is also advisable to have several conductors round each magazine."

In 1854, however, the next Commission, with M. Pouillet as reporter, no longer supported this rule. The report says: —

"At the end of the last century it was a generally accepted opinion that the circle protected by a conductor possessed a radius equal to twice the

height of the point. The Instruction of 1829 (Gay-Lussac, *rapporteur*), having found that practice established, adopted it with certain reservations. . . . These rules . . . rest on much that is arbitrary" . . . "and they cannot be laid down with any pretense to accuracy, since the extent of the area of protection in each case is dependent on a multitude of circumstances."

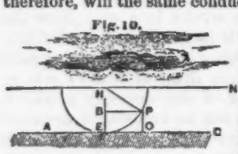
It is the more necessary to make this quotation, because an attempt has recently been made by Mr. Preece to revive the theory in a modified form. In a paper which he read before the British Association last year he attempted to prove that: —

A lightning-rod protects a conic space whose height is the length of the rod, whose base is a circle having its radius equal to the height of the rod, and whose side is the quadrant of a circle whose radius is equal to the height of the rod.

His argument was similar to, but not of such general application as that used by M. Lacoine in a somewhat remarkable paper read 20th June, 1879, before the French Société de Physique, from which the following is extracted: —

"Experience shows that a thunder-bolt has a tendency to fall on the metallic portions of a building. If, then, by the assistance of a lightning-conductor we are enabled to protect a certain metallic surface, much more, therefore, will the same conductor protect the same surface if non-metallic.

Fig. 10.



"Let N, Figure 10, represent a thunder-cloud situated over the surface AC to be protected. Assume that the cloud is at such a distance from the point P of the lightning-conductor PO, that the circle described from N as centre with NP as radius will be tangential to the surface AC. Then the cloud will be equally attracted by the points P and E,* because these points are at the same potential, this rule having always been admitted in all the instructions of the Académie Française. Consequently every point on the surface AC within the circle with radius OE will be protected, but every point outside E towards A would be unprotected.

"Hence the radius of protection $r = \sqrt{NE^2 - NB^2}$, NE being the height of cloud above the ground, NB being the height of cloud above the conductor.

"It is enough, then, to know the height of the thunder-cloud, to know the radius of action of a certain conductor.

"By several years' observation, and by direct measurement, the average height of thunder-clouds could be obtained, and the mean value of r for any given conductor deduced therefrom."†

Mr. Preece does not work out any such formula, but bases his rule on an assumption that a thunder-cloud would never be nearer to the earth than the height of the lightning-rod. This is open to question, as very low-lying thunder-clouds may be driven by the wind into the neighborhood of lofty conductors that command the clouds, and this is corroborated by a case recorded in Mr. Anderson's excellent book on lightning-conductors, page 67, where the belfry of an edifice, 115′ high, "remained standing out clear above the electric cloud" whence issued lightning that killed two priests near the altar of the church. As a single application Mr. Preece's rule comes at once from M. Lacoine's formula.

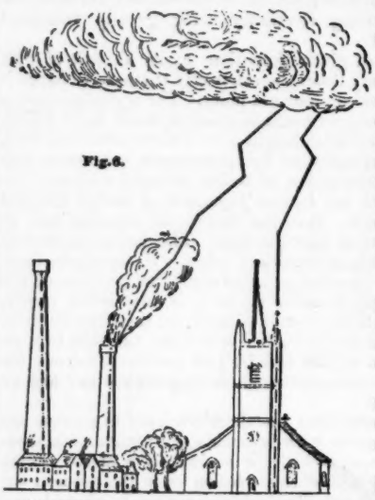
It is perhaps important to bear in mind these theories concerning the area of protection given by conductors, when it is necessary to fix a few conductors on buildings of considerable extent, such as barracks, hospitals, etc.; but sufficient reliance cannot be placed upon the rule to enable us to consider the protection to magazines as shown on Figure 1, and already alluded to, as efficient.

The area of protection afforded by a conductor depends much more upon the efficiency of the earth connections than upon the height of the terminal point, and in proof thereof many instances might be cited. For example, in the case of Shelton Church, in the Potteries, which was struck on the 10th June, 1880, the tower, about 16′ square, is surrounded by four pinnacles 16′ above the roof, which is nearly flat and covered with slates, with lead guttering and ridges. From the centre of the roof springs a large flag-staff, about 40′ high (see Fig. 6), secured to the tower in the upper chamber, 20′ below the roof by large cross-beams unconnected, except by stone-work, with the clock-work, bells, and gas-pipes in the chambers of the tower. A copper wire rope $\frac{3}{8}$″ diameter, is fitted to one pinnacle and taken direct to earth. Although the flagstaff projects some 20′ above the conductor, and is distant only 10′, a very heavy stroke of lightning, which caused much alarm, and which was seen to fall upon the tower, struck the conductor, knocked the point slightly out of the perpendicular, and passed off by it innocuously. In this case a good conductor, well connected to earth, protected something higher than itself, but not well connected to earth.

Again. Sir William Snow Harris mentions a chimney at Devonport which, although provided with a conductor, was struck on the other side, and shattered down to the level of a metal roof below. Here the conductor must have been badly connected to earth, and was useless.

Moreover, the safe area rule may be upset in practice by all sorts of accidental circumstances. Thus, a house within the theoretical circle of protection given by a church-spire close at hand might be struck if the line of least resistance from cloud to earth were afforded by a column of rising smoke from the kitchen fire, and the shorter of the two chimneys in Figure 6 would most assuredly be struck, for a similar reason, although it is within the theoretical cone of safety of the taller chimney as fixed by Mr. Preece.

Fig. 6.



In short, if thorough protection be desired for any building, it is necessary to put a conductor or conductors upon it.‡

Let us now examine the manner in which conductors should be applied.

Churches and dwelling-houses of ordinary dimensions, factory chimneys, monumental columns, etc., need but one conductor led from the most lofty point to the ground, to which a thoroughly efficient earth connection (to be described presently) must be given. As a rule it is the best plan to fix the conductor externally, in which case it should be connected to all *external* metal surfaces, but *not* to any masses of metal wholly within the building. It should be fixed to the exterior by strong clamps of iron or other metal, and provision should be made for its expansion and contraction due to differences in temperature. It should be continuous from top to toe. It should possess a proper amount of conducting power per unit of length.

As regards the last-mentioned and most important matter of conductivity, the last French instructions, dated 14th February, 1867, state that there is no case on record where lightning has fused a square bar of iron having a square of 0.6″, or a section of 0.36□″ and square iron conductors of 0.8″ side are recommended, which gives a section of 0.64 □″. Also Sir William Thomson considers that a round iron bar 1″ diameter would form a very safe protection for magazines; this would be about 0.77 □″ sectional area. It would appear that continuous iron conductors weighing 6 lbs. per yard would be quite safe, as shown in the following table: —

Table A.

	Iron Conductors.		
	Side.	□″	lbs. per yd.
Limits of safety — French instruction	□ 0.6″	0.36	3 6
Conductors recommended by ditto — from	□ 0.75″	0.56	5.6
to	□ 0.8″	0.64	6.4
Sir William Thomson recommended	O 1.0″	0.77	7.7
New W. O. instructions	..	0.8	8 0
Now proposed for general purposes	..	0.6	6.0

Now iron has about one-seventh, and good commercial copper about four-fifths of the conductivity of *pure* copper. Hence iron has about one-sixth conductivity of good commercial copper. A safe conductor in good copper must therefore weigh 1 lb. per yard.

It is, however, inconvenient to specify for a conductor either by sectional area or by weight per yard, because different samples of metal, and especially of copper, vary considerably in their conducting power. See table.

* This is open to doubt; the electrical charge on the cloud is attracted by the induction of an opposing *surface*, the total attraction being proportional to the sum of the tubes of force existing between the two opposing surfaces, charged by inductive action. To assume that the charge on a thunder-cloud is concentrated at a single point is not in accordance with the circumstances of the case in nature.

Faraday's experiments have conclusively proved that static induction polarizes the particles or molecules of the interposing di-electric, and that dynamic currents tend to traverse the same by disruptive discharge in the direction of the said polarity.

Assuming therefore that a lightning flash from the charged surface NN′ occurs at N, it will have a tendency to follow the direction NE rather than the alternative route NP, because polarity exists between NE to a greater extent than between NP.

This consideration will cause the theoretical circle of protection advocated by M. Lacoine to be considerably diminished when the charged cloud lies low, but when the cloud is at a considerable altitude NP becomes more nearly normal to the surface AC, and more nearly parallel to the direction of polarity of the atmospheric particles.

† As the height of thunder-clouds varies enormously, the values for r would range between proportionately wide limits, and the *mean* value of r obtained by M. Lacoine would seem to possess no definite or practical utility. If, however, the observations were directed to observing the minimum altitudes of thunder-clouds in each locality (the altitudes will be found to vary with the locality) the smallest areas of protection given to conductors there situated could be approximately established.

‡ A lamentable result of the practice of placing lightning-conductors distant from a building occurred at Compton Lodge, in Jamaica, the residence of J. Senior, Esq. A lightning-rod, of small dimensions, of iron, had been set up within ten feet of the southeast angle of the building, as used to be the practice with gunpowder magazines, on the assumption that the rod would attract the lightning and secure the building. So far from this, the building itself was struck in a heavy thunder-storm, 28th July, 1857. The southeast angle was shattered in pieces; the escape of the family appears to have been miraculous, whilst the lightning-rod, ten feet distant, remained untouched. If this building had been a deposit of gunpowder it would certainly have blown up.

Sir Wm. Snow Harris said: "To detach or insulate the conductors is to run away from our one principle, which is, that the conductor is the channel of communication with the ground, in which the electrical discharge will move in *preference to any other course*. To detach or insulate the conductor is to provide for a contingency at once subversive of our principle. Is it possible to conceive that an agency which can rend rocks and trees, break down perhaps a mile of dense air, and lay the mast of a ship weighing eighteen tons in ruins, is to be arrested in its course by a ring of glass or pitch, an inch thick or less, supposing its course were from any cause determined in that direction?"

Table of conducting power of different descriptions of copper: —

TABLE B.

Pure copper	100
Lake Superior	98.8
Commercial	92.6
Burra Burra	88.7
Best selected	81.3
Bright wire	72.2
Tough	71.0
Demidoff	59.3
Rio Tinto	14.2

Temp. about 15° C. or 60° F.

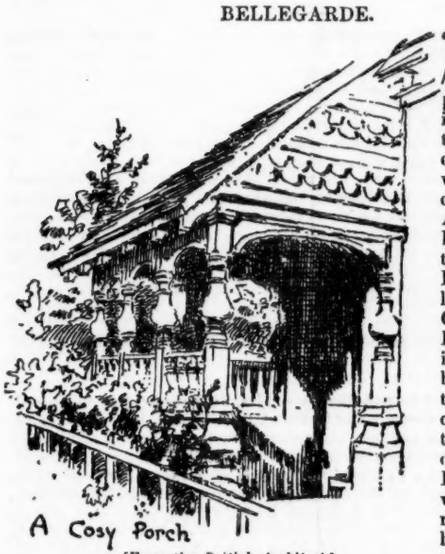
Imagine a conductor made of Rio Tinto copper! No doubt many exist.

A limit of electrical resistance per unit of length should therefore figure in any contract for a lightning conductor, and for the conductors already recommended this limit would be 0.3 ohm per 1,000 yards, or 0.03 ohm per 100 yards at 60° Fahrenheit or 15° C.

This would be obtained from iron wire rigging ropes weighing 6 lbs. per yard, or from copper (equal to 80 per cent pure in conductivity) ropes weighing 1 lb. per yard.

When two "earths" are used, and the conductor is carried up one side and along the ridge and down the other side of the building to be protected, it is evident that the conductor may be reduced in power by one-half, but no further reduction can be made when a still greater number of "earths" are used, because the lightning may strike the system of conductors at any point. A 3-pound iron (or a half-pound copper) rope is therefore the smallest that should ever be used in any situation.

BELLEGARDE.



[From the *British Architect*.]

AS an illustration of American enterprise and energy in Europe we call the attention of our readers to what has been accomplished by an American at Bellegarde and the Perte du Rhone. About an hour by rail from Geneva the Rhone, after having mingled its blue waters with the gray waters of the Avre, enters a narrow deep gorge. From the railway, which follows the river, you can hear the waters groan and roar in the bed they have made for themselves. Suddenly the stream disappears to reappear some hundreds of yards further on—hence the name, Perte du Rhone (Loss of the Rhone). The village where the return occurs is called Bellegarde, a place of indifferent aspect, but promising to become an industrial centre, and probably a large city. Strangely enough, the transformation will be as much the outgrowth of American ingenuity as the result of that freakish turn of the river Rhone. An American tourist visited the Perte du Rhone. He, perhaps, Yankee-like, shrugged his shoulders at first, as he thought of and compared the scene before him with his own glorious Niagara, but when his quick wit ripened into practical ideas, he began to solve a mighty problem. Thoughtfully he walked back to Bellegarde, and, going straight to the notary, said to him:

"Sir, your locality pleases me. Is any of the land for sale? I am possessed with the idea of building a sort of laundry establishment on these beautiful shores. Find me one or more choice spots, and I will purchase. Do you understand?"

"Perfectly," replied the notary.

And the American departed, promising to return in a week's time.

Sure enough, a week later the Yankee entered the notary's office again, and asked whether his application had brought favorable replies.

"Yes," said the notary, smilingly, and laying his hand on a large pile of letters, "you have only to make your selection of sites, for here is all the land of the vicinity placed at your disposal, almost at your own price, for the people about here are only too glad to sell, and, as you see, have eagerly grasped this, the first and only opportunity they have had to do so. I tell you frankly these facts, that you may feel tempted to make a larger purchase than I imagined you thought of doing when you first spoke of the matter to me." The American listened quietly, looked over the papers, learned the various prices, and ended by contracting to buy *all* the land offered for sale. The notary, as well as the inhabitants, was almost stupefied with astonishment. Some went so far as to say the stranger was mad, but when they found that his word and his bond were equally good, they were too glad of the results to question the motive. Thus an American became the proprietor of almost the whole plain of Bellegarde. Soon he began to show these unenlightened people why he had appeared "so mad" to them. He demonstrated that between that point where the Rhone disappears and where it returns again there is a considerable difference of level, and that just there was an enormous loss of water-power—a power which it was possible to gather up and utilize, and, in order to accomplish this, he proposed to open a new channel for the Rhone, and conduct it to the place where he wished to transform its fall into motive power. The idea was practicable, and was put into execution without much delay. A company has been formed, a subterranean channel of more than 500 yards in length has been dug, and a part of those waters which had been engulfed without profit to anybody, now follow peacefully their new road, to pour themselves into enormous turbines, and communicate to them a power valued at that of 10,000 horse-power. Ten thousand horses, however, at the bottom of a hole would, even with all their strength, be useless power without the ingenuity of man. And the question now was, how to transport said power to the summit of the steep banks of the Rhone, and distribute it over all the extent of the plain of Bellegarde. This was accomplished by means of iron wire cables, which transmitted movement and force to great pulleys, around which they were rolled. Power can thus be sent several miles as easily as water or gas is sent through a pipe or conduit, and the "Yankee from America" carried out his plans through this means. Now the lands are to be resold, the 10,000 horse-power will be rented, the American will realize a fortune, and Bellegarde will become the asylum of exiled workmen of Alsace, and the place where they will invest their little capital. So much for one American abroad! — *Galignani's Messenger.*

A BUILDER'S RIGHT TO THE CUSTODY OF PLANS.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Sirs, — Allow me to ask your opinion in the following case:

Architect invites a party of builders to figure on certain building. Estimate is given and accepted, and contract is signed. After this the owner takes the possession of plans and specifications, saying it was the contract with the architect for him to hold the same. Architect remains, though, to superintend the building.

The builders are *not provided* with copies of either plans or specifications, and if they want information about anything they are to go to the owner and beg him to let them see this or that. They do it for a while, but finally get tired of such an unusual way of doing business, and seeing that some meddling had been done with the plans without their knowledge they informed the architect and the owner that they must be supplied with copy of plans and specifications, otherwise they will pay no attention to them. Their wish is not complied with: the owner still possesses the specifications and plans, and if he goes off he carries them with him.

Could the builders in this case be liable or responsible for any mistakes or omissions that might have been made through improper orders or information to their men? Supposing the owner or architect should call their attention to it after everything is done, are the builders to take it down and do it over again?

For an early answer begs your constant reader, BUILDER.

[This seems to us quite an unprecedented case. Why an owner should refuse to allow his contractor to have a copy of the contract drawings and specifications we cannot imagine, but we are clearly of opinion that unless the contract expressly provides otherwise, the builder is by universal custom entitled to the use of a full set of such copies. Whether, if he is deprived of them, he can be compelled to take down and rebuild any work which may not have been done in accordance with the drawings which were inaccessible to him, is a question so doubtful that we should advise him not to run the risk of raising it. If his contract is to build a certain structure in accordance with certain drawings and specifications, and he is ready and willing to perform his contract, but is prevented from doing so by being denied the usual and necessary copies of the drawings, his position is plain, and he can, we think, whether he completes the work or not, collect the whole contract price for what he would have done if he had not been prevented by the other party. If he undertakes to build from recollection he is likely to put himself in the wrong since the owner, although he is bound to allow the builder to carry out his contract, or if he prevents him, to pay him just as if he had completed it, is under no obligation to pay for anything which is not in the contract, or which he did not order, no matter how good the intentions of the builder may have been in doing it. — EDS. AMERICAN ARCHITECT.]

STRAW LUMBER.

FORT WORTH, TEXAS, August 14, 1882.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Please let me know where I could get information and what kind of machinery there is necessary for manufacturing straw lumber. Is there a patent? and how to obtain State rights.

A. MONCHEIN, Architect.

[We have never been able to learn the exact address of the parties engaged in the manufacture of straw lumber in this country, but we have seen it stated that one factory was in a Texas town. The most definite information we have ever come across is that contained in the English legation report published in our issue for August 5, and we have seen more frequent mention of this curious industry in English journals than in our own. — EDS. AMERICAN ARCHITECT.]

TO EBONIZE SOFT WOODS.

Kansas City.

To the Editors of the American Architect: —

Will you be good enough to request, in the next number of your valuable paper, the contribution of recipes "with instruction" for ebonizing pine (soft).

My husband is a subscriber, and we appreciate your paper very highly.

Very respectfully,

Mrs. J. H.

[A simple way of ebonizing soft wood is to rub in very finely pulverized charcoal with oil. To get an even tone by this means requires a practised hand. The common ebony stain is produced by applying to the wood a warm strong decoction of logwood, to every quart of which one drachm of alum has been added. After the wood has thoroughly dried brush it over with a solution of iron-filings in vinegar as often as required, letting the wood dry after each application. — Eds. American Architect.]

BRICK *vs.* IRON PRISON CELLS.

St. Paul, Minn., August 25, 1882.

To the Editors of the American Architect: —

Dear Sirs, — What is the difference between iron and brick used as cells, both properly ventilated and set in the centre of a building, and neither touching outside walls. Is there any difference as regards health? If so is it in favor of iron or brick?

If you will answer these questions in your journal you will much oblige

A Subscriber.

[Iron cells need thorough ventilation to prevent condensation and make up for the loss of the transpiration of air which takes place very freely through brickwork. With this precaution there would probably be no material difference in healthfulness between the two kinds of cells. Of course the wrought-iron ones, if their expense can be afforded, are far more secure than those of brickwork, which is easily destroyed. — Eds. American Architect.]

NOTES AND CLIPPINGS.

The Saratoga Monument. — The monument is now forty-five feet high and much carved work is ready to be put in place.

A Monument to Rinehart, the Sculptor. — A monument over the grave of Rinehart, the sculptor, at Greenmount Cemetery, Baltimore, was unveiled July 17, in the presence of a number of the relatives and friends of the sculptor. The monument is a granite block surmounted by a bronze statue of "Endymion," one of the best works of Rinehart, and has been erected by Mr. William T. Walters, Esq., of Baltimore.

A Novel and Valuable Clock. — Within a short time the American Watch Company of Waltham, Mass., has completed and forwarded to the headquarters of the United States Signal Service Bureau at Washington a large, novel and very finely-constructed clock for the use of the service. The case is made of brass, of sufficient height to allow the swing of a pendulum one metre in length. The case is made perfectly air-tight and has been constructed in such a manner that the air can be exhausted and the movement run in a vacuum, thus avoiding the variations incident to atmospheric changes. A very ingenious electrical attachment has been affixed to the movement whereby the clock is wound as it runs, thus overcoming the variations usual when the main-spring is fully wound or partly spent. The manner in which this is accomplished is by alternately breaking and closing an electric circuit and using the motion thus obtained and the power of the electrical current in re-winding the spring by means of a worm and other mechanism, which is so graduated as to motion that the winding keeps exact pace with the running. The slightest variation from this is shown on a delicate indicator. The train is jeweled, and will consequently be but very little affected by the friction incident to such a complicated piece of machinery. Another of these clocks is in process of construction, and is intended for use at Wesleyan University, Middletown, Ct.

An Ingenious Storage Battery. — In December, 1881, Henry Sutton announced to the Royal Society of England that he had devised a storage battery, which consisted of a long strip of lead and another similar strip of sheet-copper, separated by a layer of sheet-rubber, and wound together into a roll. This roll was placed in a glass jar four inches deep and four inches in diameter, and filled with a solution of sulphate of copper — common blue vitriol. The sheets of lead, copper and rubber were perforated to allow the free circulation of the liquid, and all crystals of the blue vitriol excluded from the solution. The copper being made the positive electrode, the solution, which is highly blue, loses its color. When the cell is fully charged the solution is colorless. During the discharge of the storage battery the solution assumes its original azure hue. This change of color forms a beautiful means of telling when the cell is discharged it is a veritable charging gauge. The power of the battery is very great and very constant. It can be made to last for hours, time being dependent upon the quantity of sulphate of copper decomposed. This form of battery was in turn improved upon by Charles E. Buell of this city, who employed common lead shot, coated with mercury, and placed in a porous cup. He put this cup in a glass cell and surrounded it with a coil of copper wire cloth which served as the positive electrode. The employment of shot and wire cloth furnished the greatest surface in a given weight and constitutes a form most easily made. Mr. Buell verifies the published statement of Mr. Sutton that a cell four inches high and four inches in diameter will keep a No. 28 iron wire at red heat for two hours; that it is more constant, and does not polarize during discharge, as does the Faure battery. It weighs very much less, occupies less space and costs less than the Faure battery of like force, and is untrammelled by patent rights. — *New Haven Register.*

Hart's Statue of Henry Clay. — Hart's statue of Henry Clay, one of the pieces of statuary of which Richmond is most proud, has lately been treated to a thorough scouring and restoration. New hands have replaced the broken ones, and, instead of standing in the little pagoda on the green, the statue now occupies one of the niches in the quadrangular hall of the Capitol. The famous statue of Washington by Houdon occupies the centre of the circle, and another niche contains the bust of Lafayette.

The Excavations at Hissarlik. — The excavations undertaken by Dr. Schliemann at Hissarlik having come to a close, Hamdi Bey, Director of the Imperial Museum at Constantinople, has gone to the Dardanelles with several other antiquarians, for the purpose of receiving the share of the discovered treasures which, by the terms of the firman, belongs to the Imperial Government.

Sanitary Appliances in Paris. — As now provided for, Paris claims to have the benefit of the best devised system of sanitary appliances to be found in any city in Europe. The scavenging plant, under this new arrangement, is kept in a central depot, where materials of every description are stored and classified, for ordinary and extraordinary service. Among these sanitary supplies are chloride of lime, sulphate of zinc, sulphate of iron and carbolic acid as disinfectants, and hydrochloric acid and nitro-benzole as cleansing agents. Chloride of lime is used of a strength of one hundred to one hundred and five degrees; sulphate of zinc at a strength of one-eighth; and carbolic acid is used at a strength of one to forty, and down to one per cent, or even less. For watering streets and gutters it is used as weak as one of acid to one thousand of water. Hydrochloric acid is applied to urinals and slaughter-houses at a strength of one-sixth to one-tenth. Nitro-benzole is also employed of the same strength.

The Earth's Heat. — Scientific men in Japan are now discussing the possibility of utilizing the internal heat of the earth. At a recent meeting of the Seismological Society, John Milne read a paper, in which he said that the fact that there was an unlimited supply of energy in the interior of the earth had been generally overlooked, although portions of it crop out in countries like Japan, Iceland, and New Zealand, in the form of hot springs, solfataras, volcanoes, etc. He stated that there is an unlimited supply of water in hot springs within a radius of one hundred miles around Tokio, and that the heat of these springs could be converted into an electric current, and transmitted to the town. Mr. Milne was on the Comstock about a week ago, on his way home to England on leave of absence. He was much interested in the heat of the lower levels, which he went there to study. He is also a good deal interested in earthquakes, and in Japan has been conducting a series of experiments upon the vibrations of the earth at the time of earthquake shocks, and also the vibrations of artificial shocks produced by the explosion of heavy charges of dynamite. The delicate instruments used gave the same results in both cases. — *Boston Herald.*

Late Discoveries in the Troad. — Mrs. Schliemann has addressed to an Athens newspaper a letter in Greek, in which she says that close to the spot which she and her husband believe to be the site of ancient Troy have been found the remains of two buildings that are believed to represent temples. Their appearance is so strange, however, that they cannot be said to resemble any of the well-known ancient temples, with the exception of that of Hera at Olympia, which, according to Pausanias, was erected probably about 1100 B. C. The first of them is 30 metres in length and 13 in width, while the walls are 1 4 metres in thickness. The other is 20 metres long and 7 metres broad, the walls being 1.2 metres thick. Owing to the great size of the first temple, Mrs. Schliemann thinks it scarcely credible that the roof could be solid and without supports; of the latter, at any rate, there is nothing now to be found. Throughout the entire "Illiad" of Homer, she says, there is no mention of such supports, while in the "Odyssey," where they are spoken of, they are described as of wood. Assuming that there had been wooden supports in the first temple, they could not, she argues, have stood on a floor of clay, and there must therefore have been a stone foundation beneath them, yet nothing of the kind is now to be discovered on the spot. — *Chicago Tribune.*

Experiments on Radiant Heat. — Professor S. P. Langley, of the Alleghany Observatory, finds as one of the results of the Mount Whitney experiments that the true solar constant or amount of heat sent to the earth, is one-half greater than that determined by Pouillet and by Herschel near the sea-level, and even greater than the recent values assigned by M. Violle. On the other hand, the temperature of space, so-called, is lower than that assigned by Pouillet. If the atmosphere of the earth were withdrawn the temperature of the latter would greatly fall, even though the sun's radiant heat were materially greater than it is. Mr. Langley believes that this temperature under such circumstances would be 50 degrees F.: that is, that mercury would remain a solid under the vertical rays of a tropical sun if radiation into space were wholly unchecked, or even if the atmosphere existing, it let radiations of all wave-lengths pass out as easily as they come in. It is not merely by the absorption of the air, but by the selective quality of this absorption, that the actual surface temperature of the earth is maintained. Without this comparatively little-known function, it appears doubtful whether, even though the air supported respiration and combustion as now, life could be maintained upon this planet. Accepting these results as true, the temperature of a planet may, and not improbably does, depend far less upon its neighborhood to, or remoteness from, the sun, than upon the constitution of its gaseous envelope, and indeed it is hardly too much to say that we might approximately indicate already the constitution of an atmosphere which could make Mercury a colder planet than the Earth, or Neptune as warm and habitable a one. — *New York Tribune.*

BUILDING INTELLIGENCE.

(Reported for The American Architect and Building News.)

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

BUILDING PATENTS.

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

262,929. WINDOW-BLIND. — Jas. B. Childs, Rock Falls, Ill.

262,934. APPARATUS FOR PREVENTING THE ESCAPE OF SEWER-GAS INTO HOUSES. — Mathew F. Degan, Chicago, Ill.

262,937. FASTENER FOR MEETING-RAILS OF SASHES. — Gilbert J. Dickson, Albany, N. Y.

262,965. VAULT-LIGHT. — Jacob Mark, New York, N. Y.

262,967. MACHINE FOR DRESSING STONE. — Alexander McDonald, Cambridge, Mass.

262,972. COMBINED FIRE-EXTINGUISHER AND FIRE-ESCAPE. — Albert L. Murphy, Philadelphia, Pa.

262,978. DOOR-CHECK. — William F. Osborn, Burlington, Kan.

263,002. PIPE-SUPPORT FOR FLUES, CHIMNEYS, ETC. — Nathan U. Walker, Walker's, O.

263,043. FIRE-EXTINGUISHER. — Charles T. Holloway, Baltimore, Md.

263,046. EAVES-TROUGH. — George Huth, Delta, O.

263,070. SASH-FASTENER. — William E. Sparks, New Britain, Conn.

263,080. FIRE-EXTINGUISHING DEVICE. — Miciah Walker, Port Huron, Mich.

263,082. FASTENER FOR THE MEETING-RAILS OF SASHES. — C. Wolcott, Hartford, Conn.

263,091. COCK OR VALVE. — David R. Ashton, Clapton, County of Middlesex, and Jas. N. Sperryn, Brixton Hill, County of Surrey, England.

263,100. FIRE-ESCAPE. — Winfield S. Beebe, Middletown, Conn.

263,127. AUTOMATIC HEAT-REGULATOR AND ALARM. — John M. Dolen, Wiconisco, Pa.

263,156. BRICK-PRESS. — Edward Fales, Keokuk, Iowa.

263,180. COMBINED TRAP AND OVERFLOW. — Edwin A. Jackson, New York, N. Y.

263,181. FIRE-ESCAPE. — David Jenkins, Pittsburg, Pa.

263,235. CHIMNEY-TOP. — Porter B. Speer, Muscatine, Iowa.

263,244. PLATE-KEY FOR LOCKS. — Warren H. Taylor, Stamford, Conn.

263,251. WATER-CLOSET VALVE. — Henry A. Tobey, Dayton, O.

SUMMARY OF THE WEEK.

Baltimore.

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

Grillett & Mann, four-st'y brick warehouse, Philpot St., w of Thames St.

John Weigman, two-st'y brick building, in rear of Pratt St., bet. Broadway and Register Sts.

Fred. Niemeyer, three-st'y brick building, King St., bet. Fremont and Pine Sts.

H. Seim & Co., two-st'y brick building, n w cor. Ostend and Leadenhall Sts.

F. H. Smith, two-st'y brick building, Monument St., bet. Sterling and Aisquith Sts.

Estate of Jno. Connolly, three-st'y brick building, n e cor. Patapsco and Boston Sts.

Michael J. Faust, two-st'y brick stable, in rear of Somerset St., bet. Biddle and Chase Sts.

Mrs. M. J. Seltzer, three-st'y brick building, Chester St., bet. Fayette St. and Fairmount Ave.

Henry Pierson, three-st'y brick building, Sharp St., bet. Cross and Hamburg Sts.

Boston.

BUILDING PERMITS. — *Brick. — Emerald St., No.* 59, Ward 16, for C. W. Tuxbury, Trustee for Ralph Huntington heirs, family hotel, 45′ x 52′ 4″, four-st'y; Stephen Moxon, builder.

Emerald St., No. 60, Ward 16, for C. W. Tuxbury, Trustee for Ralph Huntington heirs, family hotel 45′ x 52′ 4″, four-st'y; Stephen Moxon, builder.

Emerald St., No. 61, Ward 16, for C. W. Tuxbury, Trustee for Ralph Huntington heirs, family hotel, 45′ x 52′ 4″, four-st'y; Stephen Moxon, builder.

Emerald St., No. 62, Ward 16, for C. W. Tuxbury, Trustee for Ralph Huntington heirs, family hotel, 45′ x 52′ 4″, four-st'y; Stephen Moxon, builder.

Hanover St., Nos. 174-176, Ward 6, for James Blackie, dwell. and store, 19′ 4″ x 58′ 6″, four-st'y; Richardson & Young, builders.

Wood.—y St., cor. Eighth St., Ward 14, for William Gardner, dwell. and store, 22′ x 40′ and 46′ 10″, two-st'y; L. D. Robinson, builder.

Clarence St., near Dudley St., Ward 20, for Harrison B. Tebbets, dwell., 21′ and 26′ x 42″, three-st'y; John O. Keefe, builder.

Brooklyn.

BUILDING PERMITS. — *Harrison Ave.*, e s, 20′ s Lynch St., 3 three-st'y frame tenements; cost, each, $4,500; owner, J. Bossert, 18 Johnson Ave.; architect, J. Platte; builders, J. Auer and L. Bossert.

Pulaski St., No. 112, s s, three-st'y brownstone dwell.; cost, $7,000; owner, N. Poulson, 108 Pulaski St.; architect, F. A. Winslow; builder, J. H. Smith.

Lincoln Pl., s s, 149′ e Seventh Ave., 3 four-st'y brownstone dwells.; cost, each, $12,000; owner, architect and builder, Wm. Flanagan, 46 Berkeley Pl.

St. John's Pl., s s, 277 e Seventh Ave., 5 four-st'y brownstone dwells.; cost, each, $12,000; owner, architect and builder, Wm. Flanagan, 46 Berkeley Pl.

Oakland St., e s, about 204′ n Van Cott Ave., three-st'y frame tenement; cost, $4,500; owner, J. H. W. Viemeister, 442 Manhattan Ave.; architect and carpenter, A. Lange; mason, M. Vogel.

Oakland St., s e cor. Freeman St., three-st'y frame tenement; cost, $3,000; owner, John Dugdale, Darien, Conn.; architect and carpenter, J. J. Randall; masons, McHugh Bros.

Clifton Pl., n s, 116′ 8″ e Nostrand Ave., 2 two-st'y front, three-st'y rear, brownstone dwells.; cost, each, $4,000; owner, Abel Miller, 373 Decatur St.; architect, S. T. Miller; builder, T. Miller.

Clinton Ave., w s, 142′ 6″ s Greene Ave., three-st'y brick and terra-cotta dwell.; cost, $25,000; owner, C. N. Hoagland, on premises; architects, Parfitt Bros.; builders, T. B. Rutan and Morris & Selover.

Penn St., s s, about 100′ e Lee Ave., three-st'y brick dwell., cost, $10,000; owner, Henry Rankin, Bedford Ave.; architect, E. F. Gaylor; builder, C. L. Johnson.

Prospect St., n s, 50′ w Evergreen Ave., one-st'y brick boiler-house and chimney; cost, $3,500; owner, S. Liebmann's Sons, Forrest St., cor. Bremen; architect, Th. Engelhardt; builder, H. W. Adams.

Eckford St., Nos. 162 *and* 164, e s, 225′ n Nassau Ave., 2 three-st'y frame tenements; cost, each, $4,400; owner, Otto J. Steffelin; architect, Fred Webber; builders, I. & J. Van Riper and S. M. Randall.

Adams St., No. 99, n s, 33′ 10″ w Evergreen Ave., three-st'y frame tenement; cost, $5,000; owner, Geo. Reinhardt, 97 Adams St.; architect, Th. Engelhardt; builder, M. Metzen.

ALTERATIONS. — *Myrtle Ave., No.* 531, raised 7′ and frame st'y beneath; also three-st'y frame extensions; owner and architect, Ann Flood, on premises; builders, C. Collins and J. Flood.

Franklin Ave., s e cor. Atlantic Ave., one-st'y addition; total cost, $5,200; owner, John J. Drake; builder, P. Sullivan.

Chicago.

TOWN.—Designs are being prepared for shops and a town, comprising 1,000 houses, churches, schools, library, theatre, etc., on a similar plan to Pullman City, for the United States Rolling Stock Co., near Chicago; Messrs. Wilson Bros. & Co., of N. Y., are the architects.

CHURCHES.—Work has been resumed on the nave of Ascension Church, on La Salle Ave. The sum of $10,000 will be expended this season.

The Western Ave. Congregational Chapel Society is building, at the cor. of Polk St. and Western Ave., a brick church, 40′ x 90′, and a chapel, 30′ x 40′; cost, $10,000.

Jas. R. Willett has completed arrangements for the erection of the St. Malachi Church, on the cor. of Western Ave. and Walnut Sts.; cost, $20,000.

The corner-stone of St. Thomas's Episcopal church, on Dearborn St., near Thirtieth St., was laid August 19.

The architect of the new church to be built on Milliard Ave. is C. P Randall; cost, $5,000.

HOSPITAL. — The plans for the new Cook County hospital-building are advancing slowly in Mr. J. C. Cochran's office.

HOUSES. — Theo. Karls has let contracts for a house for C. Kaler, on West Madison St., with stores underneath; cost, $10,000; also a store and dwell. on South Park Ave., for W. L. Sullivan, to cost $9,000.

SEMINARY. — W. L. B. Jenny is making plans for additions and alterations to the Theological Seminary of the North-west (Presbyterian), cor. of Halsted St. and Belden Ave. Among other things is a new residence for the professors, which will in itself cost $50,000.

OFFICE-BUILDING. — F. L. Charnley has let the contracts for the Averell Building, which is to be built on the cor. of Jackson St. and Wabash Ave. It is to be six-st'y, with a basement; cost, in the neighborhood of $60,000. The foundations are being laid.

ELEVATORS. — J. A. McLennan, architect, is to build elevators at Toledo, Cincinnati and Detroit.

STORES. — The Watson Building, cor. of La Salle, Kinzie and North River Sts., E. L. Bauman, architect, will cost about $80,000.

W. Strippleman has let the contracts for the Slaughter-building on Wabash Ave., near Congress St.; it is to be six-st'y; cost, $60,000.

Mr. Strippleman is also building a store and flats, cor. of Wentworth Ave. and Twenty-sixth St., for J. Oppenheimer; cost, $17,000. Also a store and flats for C. L. Kramer, cor. Madison St. and Campbell Ave.; cost, $14,000. Also, 6 dwells., on Campbell Ave., for Eich Bros.; cost, $21,000.

DEPOT. — The Illinois Central Railroad will at once begin the erection of a depot where the ruins of the former depot, burned in the great fire of October 9, 1871, still stand. It will cost over $500,000, and will be completed in 1883. It will be jointly occupied by the Illinois Central, the Michigan Central, the Baltimore & Ohio, and the New York, Chicago and St. Louis Railroads.

BUILDING PERMITS. — Charles Hagenon, two-st'y and basement brick dwell., 44′ x 58′, 44 and 46 Fowler St.; cost, $6,000.

A. L. Amberg, two-st'y brick dwell., 22′ x 56′, McAllester St., near Sibley St.; cost, $4,000.

Martha Mathews, two-st'y brick dwell., 21′ x 32′, 194 Ashley St.; cost, $2,500.

Agricultural Insurance Co., two-st'y brick addition, 25′ x 55′, 638 West Madison St.; cost, $6,000.

Henry Kreite, two-st'y brick dwell., 21′ x 46′, 548 North Market St.; cost, $3,000.

G. W. Henry, two-st'y and basement brick dwell., 25′ x 65′, 2805 Prairie Ave.; cost, $20,000.

Barbara Titus, 5 two-st'y brick dwells., 19′ x 28′ each, Van Buren St., near Loomis St.; cost, $5,000.

S. Burdo, three-st'y and basement brick dwell. and store, 21′ x 53′, 229 Larrabee St.; cost, $6,000.

Mrs. A. Jertram, one and three st'y brick store and dwell., 24′ x 60′, No. 590 Ashland Ave.; cost, $5,600.

J. R. Jones, one-st'y and mansard brick barn, 23′ 6″ x 56′, 2704 Michigan Ave.; cost, $3,000.

Cincinnati.

BUILDING RECORD. — The assessors of Hamilton County report the following number and cost of new houses erected for the year ending April 12, 1882: —

808 dwells.; cost, $1,446,020.
48 factories; cost, $284,540.
3 hotels; cost, $88,500.
Machine-shop; cost, $6,660.
Flouring-mill; cost, $1,000.
2 saw-mills; cost, $2,500.
5 railroad depots; cost, $27,850.
74 stables and barns; cost, $27,300.
42 stores and warehouses; cost, $156,280.
20 miscellaneous; cost, $41,910.
Total, 1,004; cost, $2,082,560.

The above may be taken correct as to numbers, but about one-half as to cost.

FIRE RECORD.—The records of the Fire Department show that the following buildings were destroyed by fire or otherwise during the year ending June 30, 1882:—

100 buildings destroyed by fire; cost, $771,780.
57 buildings destroyed by other causes; cost, $58,580; other property destroyed by fire or flood; cost, $230,000.
Total, 157; cost, $1,060,360.

This shows that the amount destroyed was fully one-half the cost of all the new buildings erected during the same period.

BUILDING PERMITS. — Brooks, Waterfield & Co., six-st'y brick tobacco warehouse, Front St., bet. Vine and Race Sts.; Charles Crapsey, architect; cost, $50,000.

J. Lippert, four-st'y brick dwell., cor. of Thirteenth and Jackson Sts.; cost, $6,000.

Wm. Bicksmeyer, two-st'y brick dwell., Wade St., near Demman Ave.; cost, $2,500.

N. Wolff, store on Pearl St., bet. Pike and Lawrence Sts.; cost, $10,000.

9 permits for repairs; cost, $3,000.

New York.

BUILDING PERMITS. — *Fifty-fourth St.*, n s, 135′ w Sixth Ave., four-st'y brick and stone dwell.; cost, $11,000; owners, Wm. H. L. Lee, et al, 20 Nassau St.; architect, A. Crooks; builders, Lizzt & Lennon and James Thompson.

Fifty-sixth St., s s, 125′ w Ninth Ave., five-st'y brownstone tenements; cost, about $16,000; owner, Abraham Benson, 30 North Moore St.; architects, Blau & Quaife.

West Forty-sixth St., No. 517, five-st'y brick tenement; cost, $14,000; owner, John Totten, 517 West Forty-sixth St.; architect, C. F. Ridder, Jr.

Seventh Ave., n w cor. Fifty-fourth St., five-st'y brick tenement; cost, $30,000; owner, Thomas N. Lawrence, Coleman House; architect, Jas. Stroud; builders, Wm. Pettit and J. Washburn.

West Fifty-eighth St., No. 225, between Seventh Ave. and Broadway, four-st'y brick stable, brownstone trimmings; cost, about $15,000; owner, T. H. McGrau, Poughkeepsie; architect, L. H. Broome.

Second Ave., e s, 70′ s Seventy-second St., five-st'y brick tenement; cost, $28,000; owner, N. A. McBride, 436 West Fifty-eighth St.; architect, P. C. Cowen; builder, R. Shaw.

Second Ave., Nos. 787, 789 *and* 791, 3 five-st'y brick tenements; cost, each, $12,000; owner, Edward Mulvaney, 170 East Seventieth St.; architect, Jno. Sexton; builder, C. Callahan.

One Hundred and Twenty-sixth St., n s, 425′ e Eighth Ave., 3 four-st'y brownstone tenements; cost, each, $17,000; owner, Franklin A. Thurston, 62 East One Hundred and Thirty-third St.; architect, G. Robinson, Jr.

Baxter St., s w cor. Walker St., 2 three-st'y brick stores and dwells.; cost, each, $4,000; owner, Jacob Cohen, on premises; architect, J. Brandt.

West Thirty-sixth St., No. 446, s s, 200′ e Tenth Ave., five-st'y brick and stone tenement; cost, $12,000; owner, Henrietta Holzderber, 313 West Twenty-eighth St.; architect, Wm. Kusche.

One Hundred and Twenty-seventh St., 250′ e Seventh Ave., four-st'y basement brick flat; cost, $40,000; owner and builder, John B. Davis, 236 East One Hundred and Twenty-sixth St.; architect, Wm. H. Hume.

Jay St., No. 14, eight-st'y brick warehouse; cost, $37,000; owners, D. Buchner & Co., 173 Duane St.; architects, Berger & Baylies; builders, John P. Schweikert and John Downey.

Chatham St., No. 159, rear; three-st'y brick stable and workrooms; cost, $3,500; owner, B. M. Cowperthwait, 157 Chatham St.; architect, H. B. Thompson; builders, Jno. Thatcher and G. B. Colyer.

Avenue A, s e cor. Fifty-seventh St., four-st'y brick and brown stone flats; cost, $20,000; owner, Thos. Fitzgerald, Fifty-sixth St. and Avenue A; architect, W. R. Smith.

Alexander Ave., w s, One Hundred and Thirty-sixth St. to One Hundred and Thirty-seventh St., 12 three-st'y brick dwells.; cost, each, $7,500; owner, Mary Dugan, 144 Alexander Ave.; architect, John Rogers; builder, Jas. O'Kane.

Park Ave., e s, Sixty-ninth and Seventieth Sts., 12 three-st'y and attic brick (brownstone front) dwells.; cost, total, $300,000; owner and builder, Wm. H. Browning, 441 East Seventy-seventh St.; architect, Bassett Jones.

Fifty-fifth St., n s, 100′ w Sixth Ave., 6 four-st'y and basement brick and stone dwells.; cost, total, $90,000; owner, A. H. Barney, 82 Broadway; architect, James B. Lord; builders, L. N. Crow and Hamilton & Henry.

One Hundred and Forty-fifth St., s s, 125′ e Brook Ave., three-st'y frame dwell.; cost, $3,300; owner, P. Stapleton, 417 West Fifty-sixth St.; architect, James T. McKinstry; builder, Ed. McKinstry.

ALTERATIONS.—*West Thirty-first St., No.* 147, two-st'y brick extension; cost, $3,000; owner, John Wagner, on premises; architect, J. Kastner.

Cherry St., No. 376, n e cor. Gouverneur St., raised one and one-half stories, also, two-st'y brick extension, interior remodelled and walls altered for store and tenement; cost, $9,500; owner, P. A. Fogarty, 352 West Fourteenth St.; architect, J. B. Franklin.

Cherry St., No. 196, cor. Manhattan Lane, rebuild part destroyed by fire; cost, $3,600; owner, Robert

Spier, exr., 162 Montague St., Brooklyn; architect and carpenter, J. Rea; mason, A. S. Knowlton.

Division St., No. 260, take off peak and replace by flat roof, area walls, etc.; cost, $3,000; owner, Daniel Murphy, on premises; builder, Thos. Green.

West Twenty-fourth St., No. 152, two-st'y brick extension; cost, $5,000; owner, Chas. Delmonico, Fifth Ave. and Twenty-sixth St.; architects and builders, Jas. B. Smith & Prodgers.

The "Alcazar," cor. of Forty-first St. and Broadway, is to be altered, and among the improvements will be the introduction of proscenium boxes; Mr. G. E. Harding, architect.

The Bijou Theatre is also to be improved; from designs of Mr. Horace Townsend.

Philadelphia.

Building Permits.—*Front St. and Lehigh Ave.*, n w cor., three-st'y factory, 40′ x 107′; A. B. Rorke, contractor.

Mercy St., s s, w of Fifth St., 9 two-st'y dwells., 14′ x 28′; Clayton Allen, owner.

Susquehanna Ave. and Delhi St., 6 two-st'y and three-st'y dwells., 14′ x 28′ and 13′ x 26′; Campbell & Atkinson, owners.

Sixty-four-and-one-half St., e s, s of Hamilton St., 2 two-st'y dwells., 16′ x 44′; Harry Pettit, contractor.

Chestnut St., No. 1029, two-st'y store, 24′ x 60′; Henry Phillipi, contractor.

Gordon St., s s, e of Sepviva St., three-st'y dwell., 15′ x 18′; Alex. Mellor, contractor.

Arch St., No. 927, three-st'y addition to store, 24′ x 36′; H. W. Vankirk, contractor.

Wyoming St., e s, s of Clearfield St., 4 two-st'y dwells., 15′ x 42′; W. H. Reeves, owner.

Swayne St., No. 1609, three-st'y dwell., 18′ x 44′; J. F. Winner, owner.

Shackamaxon St., n s, w of Girard Ave., three-st'y dwell., 19′ x 28′; J. M. Buchanan, contractor.

Howard St., e s, s of Lehigh Ave., two-st'y factory, 42′ x 110′; Thos. Taylor.

Washington Lane and Sprague St., s e cor., three-st'y dwell., 40′ x 50′; A. F. Cope, owner.

K St., w s, w of Kensington Ave., 2 two-st'y dwells., 14′ x 40′; Jno. Eheim, owner.

Broad and Cumberland Sts., 2 three-st'y dwells., 18′ x 53′; Thomas McCrackin, owner.

Hope St., e s, bet. Somerset and Cambria Sts., 4 two-st'y dwells., 17′ x 30′; W. A. M. Fuller, owner.

Hope St., w s, n of Columbia Ave., two-st'y dwell. and one-st'y stable, 15′ x 36′ and 15′ x 51′; Jas. Hood, contractor.

Pratt St., n s, w of James St., 4 two-st'y dwells., 14′ x 44′; Jno. Brown, owner.

Ash St., w s, n of Thompson St., 2 two-st'y dwells., 16′ x 28′; George F. Little, contractor.

St. Louis.

Building Permits.—Fifty-three permits have been issued since our last report, twenty-one of which are for unimportant frame houses. Of the rest those worth $2,500 and over are as follows:

Chris. Hesemann, dwell.; cost $3,000; R. Bisser, contractor.

J. Larrimore, two-st'y dwell.; cost, $14,000; J. Mahon, contractor.

Mrs. Virginia I. Paul, two-st'y dwell.; cost, $5,000; J. A. Conlon, contractor.

M. Loewenstein, 2 three-st'y dwells.; cost, $12,000; A. Beinke, architect; Charles Wehking, contractor.

Erwin Spraul, two-st'y dwell.; cost, $7,000; E. Jungenfeld, architect; Charles Wehking, contractor.

H. Geiseking, two-st'y dwell.; cost, $3,200; Charles Wehking, contractor.

H. Stabenow, two-st'y dwell.; cost, $4,400; C. May, architect; Casper Bleikamp, contractor.

D. D. Feisher, two-st'y dwell.; cost, $5,500; J. Stewart, architect; E. F. Hoffmann, contractor.

J. Fimmermann, two-st'y dwell.; cost, $4,900; Klute & Hillebrand, contractors.

E. Mueller, two-st'y dwell.; cost, $3,000; W. C. Popp, contractor.

Philip Rothschild, two-st'y dwell.; cost, $2,800; A. M. McAllister, contractor.

Mrs. Helena Roeba, two-st'y dwell.; cost, $2,850; F. Mueller, contractor.

Thomas Gallagher, 2 two-st'y dwells.; cost, $9,000 each; T. Brady, architect.

R. H. Newburry & J. F. Whitney, two-st'y dwell.; cost, $3,000; R. H. Newburry, contractor.

George H. Tower, one-st'y factory; cost, $2,500; A. Cameron, architect.

General Notes.

Columbia, S. C.—Mr. J. G. Cutler, architect, of Rochester, is to build a house for Mrs. E. L. Morris; cost, $5,000.

Fond du Lac, Wis.—Work on the court-house has been stopped for a while, on account of the supply of bricks giving out.

Lancaster, Pa.—It has been decided to at once rebuild the main building of the insane asylum lately burned.

Peoria, Ill.—The excavation for the new mammoth elevator in the lower part of the town, has been completed.

Stony Island, Ill.—New car shops are to be built for the New York, Chicago & St. Louis Railroad.

Takis, Mo.—A two-st'y brick court-house for Atchison County is to be built, at a cost of $90,000.

Ulysses, Neb.—Residence for Arthur Hale, 32′ x 36′ 6″; Hazlehurst & Huckel, architects, Philadelphia, Pa.

Wayne Junction, Pa.—Messrs. McCallum, Crease & Sloan are about to erect the following manufacturing buildings: a three-st'y main building, 42′ 2″ x 112′ 2″; weaving-shed, 83′ x 218′ 10″; dye-house, 42′ x 131′; boiler and engine-house. 52′ x 92′.

PROPOSALS.

STONE. [Near Louisa, Ky.]

U. S. Engineer Office, 82 West Third St., Cincinnati, O., August 9, 1882.

Sealed proposals, in duplicate, will be received at this office **until noon on the 25th day of September, 1882,** for furnishing stone for the construction of a lock in the Big Sandy River, near Louisa, Ky.

Approximate quantity of stone required 11,200 cubic yards. All stone to be delivered by September 1, 1883. Specifications and printed forms for proposals and hektograph copies of general plan will be furnished on application to the undersigned. Applications for blanks should be indorsed on the envelope "Official Business."

350 JAS. W. CUYLER, Maj. of Eng'rs, U. S. A.

HEATING AND VENTILATING APPARATUS. [At Cleveland, O.]

Office of Supervising Architect, Treasury Department, Washington, D. C., August 19, 1882.

Sealed proposals will be received at this office **until 12 M., on the 11th day of September, 1882,** for furnishing, delivering, and putting in place complete a low temperature, hot-water, heating and ventilating apparatus in the Post-office, etc., building at Cleveland, O. The apparatus to be constructed in accordance with drawings and specification. Copy of specification and any additional information may be had on application at this office or the office of the Superintendent, where the drawings may be seen.

JAMES G. HILL,
350 Supervising Architect.

TILE FLOORS AND MARBLE WORK. [At Des Moines, Ia.]

Office of the Board of Capitol Commissioners, Des Moines, Ia., August 24, 1882.

Sealed proposals will be received at this office **until 4 o'clock, P. M., of the 28th day of September, 1882,** for the encaustic and geometrical tile floors on the second and third stories, and the main corridor of the first story of the new Capitol at Des Moines, Iowa. Also for the marble work in the library, corridors in rear of and rooms connected with the House and Senate chambers, and for the marble stairway in the east wing, and the wainscoting in the offices on the first story in the west wing.

Specifications can be obtained by application to the Secretary, and plans can be examined at the office of the Commissioner.

By order of the Board of Commissioners.

351 ED. WRIGHT, Secretary.

SEWER. [At Columbus, O.]

Sealed proposals will be received at the Office of the City Clerk, in Columbus, O., **until Saturday, September 16, 1882, at 12 o'clock, noon,** for furnishing materials and doing the following work, to wit:—

For constructing a main trunk brick sewer, four feet inside diameter, in Fulton St., from the terminus of the main trunk sewer in said Fulton St., near Sixth St., to Parsons Avenue.

Plans, profiles, and specifications for said work can be seen at the office of the City Civil Engineer, after the first of September.

Each bid must contain the full names of all the parties interested in the same, and must be accompanied with good and sufficient security that, if the bid shall be accepted the contract will be entered into, and the work faithfully performed.

The City Council reserves the right to reject any or all bids at discretion. JOHN GRAHAM,
350 City Engineer.

SEWER. [At Columbus, O.]

Sealed proposals will be received at the Office of the City Clerk, in Columbus, O., **until Saturday, September 16, 1882, at 12 o'clock, noon,** for furnishing materials and doing the following work, to wit:—

For constructing a main trunk brick sewer, four feet inside diameter, in Mound St., from the terminus of the Mound St. main trunk sewer, at or near Washington Ave., to Luckhaup's Lane.

Plans, profiles and specifications for said work can be seen at the office of the City Civil Engineer, after the first of September.

Each bid must contain the full names of all the parties interested in the same, and must be accompanied with good and sufficient security that if the bid shall be accepted, the contract will be entered into, and the work faithfully performed.

The Council reserves the right to reject any or all bids at discretion. JOHN GRAHAM,
350 City Engineer.

LIFE-SAVING STATIONS. [North Carolina Coast.]

Office of General Superintendent, Treasury Department, U. S. Life-Saving Service, Washington, D.C., August 24, 1882.

Sealed proposals will be received at this office **until 12 o'clock, noon, of Thursday, the 14th day of September, 1882,** for the construction of three life-saving stations on the coast of North Carolina, one to be located near the south side of New Inlet, Dare County; one at Cape Hatteras, Dare County, and one on the west side of Hatteras Inlet, about three miles south of the Inlet, in Hyde County.

Bidders will state in their proposals the time within which they will agree to have the buildings completed ready for occupancy.

Each bid must be accompanied by a bond in the sum of five hundred dollars, with two good and sufficient sureties, conditioned that the bidder shall enter into contract without delay, and give such bonds as security for the faithful performance thereof as may be required if his bid be accepted; or by a deposit of five hundred dollars United States currency or bonds to be returned to the unsuccessful bidder after the award of the contract, and to the successful bidder after his contract and bond for the faithful performance of the terms thereof shall be approved by the Secretary of the Treasury.

Specifications and plans, forms of proposals, contract, and bond can be obtained at the offices of the Collectors of Customs at Wilmington, N. C.; New Berne, N. C.; Norfolk, Va.; of J. W. Etheridge, Superintendent Sixth Life-Saving District, Manteo, N. C.; of Captains John McGowan and J. H. Merryman, U. S. R. M.; Superintendents of Constructions of Life-Saving Stations, No. 3 Bowling Green, New York City, and also upon application to this office.

All proposals (which may be submitted for one or all of the stations) must be indorsed "Proposals for the construction of Life-Saving Stations on the coast of North Carolina," and addressed to the General Superintendent of the Life-Saving Service, Washington, D. C.

The right to reject any or all bids, or to waive defects, if deemed for the interest of the Government is reserved. S. I. KIMBALL,
350 General Superintendent.

LIMESTONE. [At Cincinnati, O.]

The Cincinnati Gas-Light and Coke Company will receive tenders **up to noon, Saturday, September 16, 1882,** for

Eight thousand perches of Blue Hill limestone, to be delivered at "East End Garden," First Ward, running from Front St. to Ohio River, between Main and Spencer Sts.

Five hundred perches of paving-stone, to be delivered between first of October and first of November.

Two thousand five hundred perches of building stone, to be delivered between first of November, 1882, and first of January, 1883.

Two thousand perches of building-stone, to be delivered between first of January and first of March, 1883.

Three thousand perches of building-stone, to be delivered between first of March and first of May, 1883.

Plans and specifications on file at the Gas Office. Company reserves privilege of rejecting any or all bids. 350

CUT GRANITE AND FLAGGING. [At Washington, D. C.]

Office of Building for State, War and Navy Departments, Washington, D. C., August 19, 1882.

Sealed proposals, for furnishing and delivering the cut granite required for the approaches of the north wing of the building for State, War and Navy Departments, in this city, will be received at this office, **until 12 M., on September 19th, 1882,** and opened immediately thereafter, in presence of bidders.

Sealed proposals will also be received separately for furnishing and delivering the blue and red flagging for the same approaches, to be opened at the same time and place.

Specifications, general instructions to bidders, and blank forms of proposals for either of the above materials will be furnished to established dealers, on application to this office.

THOS. LINCOLN CASEY,
350 Lt.-Col. Corps of Engineers.

SCHOOL-HOUSE. [At Dunkirk, O.]

Sealed proposals will be received at the office of the Board of Education **up to 12 M., August 31, 1882,** for furnishing materials and performing work in the erection of and completing a union school-building according to plans and specifications to be on file at said office on and after August 23, 1882.

Each proposal for the several parts of the work to be made separate, as follows:—

Excavation.
Brick, rubble and cut-stone work.
Carpenter and joiner work and iron-work.
Galvanized iron, slate and tin work.
Painting and glazing.
Plastering.

The contract to be let separate or under one contract, the Board reserving the right, also, to reject any or all bids.

The names of the sureties to accompany each bid, that a contract may be entered into in case said contract is let. For further information address JOSEPH H. SWORLIM, Clerk; or J. C. HOLLAND, Architect, Ada, Ohio. 349

SANATORIUM. [At Dansville, N. Y.]

Sealed proposals will be received by the undersigned **until Tuesday, the 5th of September, at noon,** for the erection and completion of a five-st'y fire-proof brick building, 272′ in length and about 50′ in width, for a sanatorium, on the site of the one recently destroyed by fire in Dansville, N. Y. Drawings and specifications can be seen and information had on application to the architects, Warner & Brockett, 62 Powers Block, Rochester, N. Y.

The right to reject any and all bids is reserved.

Acceptable bonds for the faithful performance of the contract will be required.

PROPRIETORS DANSVILLE SANATORIUM.

SCHOOL FURNITURE. [At Cincinnati, O.

Sealed proposals will be received by the Xenia City Board of Education **until September 12, 1882, at 1 o'clock,** P. M., for furnishing furniture for the new school-house, as follows:—

Primary grade, 100 single desks.
Third and fourth year grade, 90 single desks.
Fifth year grade, 90 single desks.
Sixth year grade, 90 single desks.
Seventh and eighth year grades, 90 single desks.
High school, 100 single desks.
Recitation chairs, 90.
Teachers' desks, 12.
Principal's desk, 1.
Furniture for Superintendent's office.

The right to reject any or all bids is reserved.

A. M. STARK, President.
B. Schlesinger, Clerk. 349