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CONTENTS.

THE Park Commissioners of Boston have, no doubt very judiciously, made suggestions which if carried out will ultimately make that city one of the most favored in the world in regard to public pleasure-grounds. Even now, beginning within five hundred feet of the Post-Office one might, if the police did not interfere, walk over a succession of beautiful grass-plots and flower-beds, interrupted only by one building and the street-crossings, to the extremity of Commonwealth Avenue, nearly two miles away, where the city gardens give place to the fields and hedges of the country; and this chain of fresh and verdant breathing-places is now in process of extension by means of the new Back Bay Park some two miles farther to the Brookline hills. Besides all these, it has just been decided to provide, for those fastidious persons who prefer sea air to the fragrance of flowers, a broad marine promenade, extending some two miles and a half along the Charles River, and touching at one point the main park system; while another elevated tract in South Boston, commanding a view of the harbor, is to be secured for the inhabitants of that quarter. With all these, added to the broad streets and handsome squares which have been recently cut through the closely-built portions of the town, at enormous expense, it would seem that the present generation of Bostonians might be satisfied, but a strong movement has been organized to engage the city to take a large tract in West Roxbury, lying within the urban territory, but at present very nearly in a state of primeval nature, as a park for the use of future generations. The cost of the land will be about six hundred thousand dollars, so that it may be worth while to go through a calculation to see whether the necessity for reserving this breathing-place for posterity is so imminent as to justify so great an outlay. We will assume that the dwellers among the lawns and groves of Roxbury, or the farms of Winthrop, have no need of parks to supply them with fresh air, and that the tax-payers of the city should not be compelled to contribute money for such purposes until the population becomes about as dense as it now is in the area which was included under the name of Boston in 1865; covering something over three thousand acres, and inhabited by about two hundred thousand people. The present territory of Boston, of which West Roxbury is the most remote portion, comprises, if our impression is correct, about thirty thousand acres, which would if populated throughout as densely as the present average of East Boston and the "city proper" accommodate two millions of inhabitants. It is now occupied by four hundred thousand, in round numbers, so that the city has still ample room for sixteen hundred thousand more people before they will become so crowded that those in the West Roxbury quarter will require any breathing spaces besides those which nature will afford. The average annual increase is now not very far from ten thousand; so that at this rate it would be a hundred and sixty years before the proposed park would be of any great use; but if some unexpected good fortune should arrive, the number might possibly be filled within a single century, and the cost of the improvement, supposing it to be undertaken now, would be represented, as a minimum, by the amount of a principal of six hundred thousand dollars, with cost of maintenance and compound interest for a hundred years. We leave our readers to make this computation for themselves.

GOVERNOR CORNELL of New York has incurred the displeasure of a portion of the public by vetoing the act recently passed by the Legislature to authorize the construction of a new aqueduct for conveying the water of the Croton to New York City. Understanding the disfavor with which his action would be received, he has taken pains to explain the reasons for it in his message with a clearness and care which certainly do him great credit. The principal argument against the bill is in his opinion the unrestricted power which it gives to the Commissioner of Public Works to make expenditures for which the credit of the city must be pledged. The estimate of cost, some fifteen millions of dollars, can be only approximate, and the Governor thinks that even if the new aqueduct is necessary, the tax-payers have a right to be assured that their money is not spent without ample guaranties of economy and responsibility; and of its necessity he is by no means convinced. According to the Controller's report, nearly one hundred million gallons of water per day are brought through the present conduit, or about ninety gallons for each inhabitant, and Mr. Cornell thinks that if the waste, which in New York reaches vast proportions, could be stopped, this would be ample for many years to come. Some of the newspapers — we hope not with the Commissioner's authority — make the assertion that this "restricted supply" is insufficient for the wants of manufacturers, and that to the same cause is due the difficulty which is found in the lower part of the city in getting water above the second story of the houses. The latter trouble is much more likely to be due to waste and leakage in the upper portion of the town than to insufficient supply through the aqueduct, while the manufacturers who complain that they do not have enough city water for their purposes might be reminded that in Manchester, the great manufacturing centre of England, the average daily supply of water is but twenty-one and one-fourth gallons per head, less than a quarter of that which New York now enjoys.

THE competition for the Soldiers' and Sailors' Monument at Buffalo has come to a rather singular conclusion; or rather, it has entered upon a new stage. Our readers will remember the terms of the competition, which, though ostensibly offering what would be a liberal premium for the sketches usually submitted in such contests, really required in return for the highest prize an amount of work for which the sum named would be a very inadequate remuneration. Naturally enough, the opportunity to do a great deal of work, and take a great deal of pains, for the chance of securing a commission at less than half price did not prove very tempting to the better class of architects, and out of twenty-six designs received, none appeared quite satisfactory to the committee. After some discussion, and several ballots, which showed an amusing uncertainty of opinion on the part of the judges, a motion was offered "That the committee decline for the present to select a design from among those offered, and will take steps by personal application to one or more eminent sculptors and architects of the country to ascertain whether a more acceptable design can be procured." This resolution, which is only equalled in *naïveté* by that of last spring which established the second competition "in order that Buffalo architects might have another chance to see what they could do in comparison with the more experienced monument-builders of the East," prevailed, and a sub-committee has set out for New York to carry it into effect. We hope our younger readers will observe and remember what an advantageous position the "eminent sculptors and architects" who did *not* take part in the competition occupy in the whole transaction as compared with those who did. It is inevitable that inexperienced committees should set a low value upon designs which were cheaply obtained, and the very willingness of many ambitious young men to lavish thought and labor on work for which they have little prospect of being paid is often, as here, the worst obstacle in the way of their success.

COLUMBIA COLLEGE, already distinguished as well for the excellence of its professional schools as for its intelligent comprehension of the demands which advancing civilization must continually make upon the institutions devoted to the higher

education, has added to its present departments a School of Architecture, which is to be placed in charge of Professor William R. Ware, for so many years the distinguished head of the Architectural Department of the Massachusetts Institute of Technology. Of Professor Ware's capacity as an instructor, the remarkable success of his Massachusetts school is sufficient evidence, and it is gratifying to know that the great resources and reputation of Columbia College will be at his service in extending still more his opportunities for usefulness. The new department is to be made for the present a branch of the School of Mines, which has come to be, as President Barnard says in his annual report, more properly a School of Applied Science, embracing as it does courses in Metallurgy, Civil Engineering, Analytic Chemistry, Geology and Palæontology, and comprehending in its list of matriculates more than two hundred students; and the technical apparatus and resources which have done their part in bringing it to its present high reputation will be invaluable in imparting to the architects of the future that knowledge of physical forces and materials which they will find more and more indispensable. That a course of instruction so organized has a great and useful work before it is certain, and the best wishes, as well as the more active interest of the profession will constantly follow its development.

The New England Manufacturers' and Mechanics' Institute, which is now erecting a large exhibition building in Boston, near that of the Massachusetts Charitable Mechanic Association, and proposes to hold an exhibition this year at the same time, and of much the same character, as the fair of the latter Association, has, like the latter, taken the opportunity to arrange a portion of its exhibit in the form of a special collection of building materials and appliances, where that large portion of the public which is interested in construction, furnishing and decoration may find the objects suited to its tastes arranged in convenient and effective form. As in the case of the Charitable Mechanic Association, the Boston Society of Architects interested itself in promoting the success of this part of the exhibition, and in response to the invitation of the managers, appointed Mr. W. Whitney Lewis, one of the best-known among the younger members of the Society, to carry out its good wishes by assuming such supervision and direction of the architectural exhibit as might be entrusted to him. The scheme proposed for it, while very different from that to be carried out in connection with the other fair, is an excellent one, and those who may visit Boston during September and October will find open to them two of the most interesting collections ever gathered together in this country.

The dead-lock in the iron trade at Cincinnati is likely to be broken within a very short time, and in a rather unexpected way. The Cincinnati Rolling Mill Company began work at its puddling furnaces on Monday, with a force of some sixty men, not one of whom belongs to the Union of Amalgamated Iron-Workers, and several other mills have secured non-Union men and will start again in a few days. The Cincinnati *Commercial* predicts that within three weeks all the mills in the city will be at work, paying the Pittsburgh prices, and employing only men who are willing to accept them, without inquiring into their connection with trade associations. Forty days have elapsed since the beginning of the strike, and the workmen in six mills have lost in that time one hundred and twelve thousand dollars in wages, part of which has been made up to them by the contributions of the trade in other cities. The manufacturers have lost much more, but will turn part of their loss into ultimate gain by their prudent conduct in repairing and improving their buildings and machinery during the period of inactivity. The theory that the strike was devised and carried out in the interest of the Pittsburgh iron trade continues to find favor in Cincinnati, and in support of it the assertion is made that after a similar strike had been ordered in St. Louis, one of the large wire manufacturing firms there secured non-Union men enough to continue business, when Mr. Jarrett, the President of the Amalgamated Association, made his appearance on the scene, and offered to make a special exception in favor of that particular house, allowing them to take back their old employees, members of the Association, at the reduced prices. The explanation of this singular offer, which, by the way, was declined, is said to be that there are no wire manufacturers in Pittsburgh, and nothing was to be feared from St. Louis competition in that branch of business.

A trial took place recently in Rome which should be followed by many similar ones in other countries. A contractor, Cordone, was engaged in building a house in the Via Volturno, and had engaged two professional scaffold-builders, Cardinali and Diamanti, to construct the staging. While the work was going on, six workmen had occasion to carry a large stone, slung from a pole, along the scaffold, when one of them allowed the pole to slip from his shoulder, letting the stone fall upon the planks, which gave way and brought the whole structure down, killing several men. All the parties were arrested and brought before the court. Cordone testified in his own behalf that he had been in business forty-seven years, and had during that time built more than sixty large houses, without ever before having had to lament the least accident; and many witnesses confirmed his assertions. The foreman of the masons said that the scaffold was solid and strong, and the scaffold-builders themselves acknowledged that Cordone furnished them with all the timber they required. It appeared, however, that they had knowingly allowed some decayed pieces to enter into the construction, and they were therefore both condemned to six months' imprisonment and a fine, while Cordone and the mason were exonerated. Although examples of builders being held to answer in damages for injuries to their workmen through insufficient safeguards are not rare here, it must be acknowledged that rickety stagings, ill-secured ladders and unguarded hatchways are too much matters of course among us, and contractors who can boast of having built sixty large structures of masonry without an accident are rare indeed.

The Atlantic and Gulf Coast Canal and Okechobee Land Company of Florida has opened its stock books for subscriptions, and has issued a prospectus, which gives a much brighter aspect to the scheme than the vague newspaper reports previously published. Instead of draining the Lake, it is proposed only to provide means for preventing the overflow of its banks which now, as the Lake has no outlet, takes place after a heavy rainfall, submerging at times an area estimated at eight million acres. This will be accomplished by the canal, which will at the same time furnish means of transportation for the settlers upon the reclaimed lands, as well as the general public. The Company is to receive one-half of the territory reclaimed, and an additional grant of six square miles of land for each mile of canal constructed and made ready for service, amounting to some four million acres more. Work has actually begun upon the canals, which can be excavated in the sandy soil of Florida by steam dredges with great rapidity and at a small expense. Those familiar with Southern methods of cultivation know the advantage which plantations situated upon a navigable river have over those inland, and it is in every way probable, if malaria does not make its appearance, that the lands bordering on the canal will be as much in demand for cultivation as those on the banks of the St. John.

Captain Eads, having returned from Mexico with notes and data of the surveys made by his engineers on the route of his proposed ship-railway, has been busy with the other promoters of the scheme in New York in studying the profiles of the country and arranging preliminaries for beginning actual operations at the close of the rainy season in the autumn. An *Evening Post* reporter is informed that the first step will be the construction of an auxiliary railway, at the standard gauge, from a point on the Coatzacoalcos River, thirty-five miles from its mouth, to the Upper Lagoon on the Pacific side of the Isthmus. Another railway is already building across the Isthmus on the other side of the same river, under the Mexican concession to Edward Learned, and ten miles of this are already finished, so that there seems to be a prospect of a race between the two for such advantage as priority of completion may give. The Eads line is about forty miles shorter than the other, but the lagoon at which it terminates on the Pacific side will require dredging to make it of practical use as a harbor for large vessels, and the thirty-five miles of river navigation at the Atlantic end will place it at a further disadvantage as compared with its rival, which begins at the mouth of the Coatzacoalcos. Captain Eads, however, expects that the special traffic over his auxiliary road during the construction of the main ship-railway will be profitable, independent of general business. Whether the greater enterprise will be immediately carried out or not depends upon the action of the next United States Congress, which is still to be allowed an opportunity for securing the principal benefit of it on advantageous terms, before it is offered to foreign powers.

ON THE MAINTENANCE OF PURE AIR IN DWELLINGS.[1]

THE question of how best to maintain pure air in a house has an important influence in domestic economy, because the health and the vigor of the inmates depend upon their living in a pure atmosphere.

The inhabitants of close rooms, persons who breathe air which has already been breathed, are subject to diseases which may cause death, amongst which may be mentioned pulmonary consumption and certain classes of fevers. But whilst some persons may be killed outright by breathing air which has been polluted by the breath of other persons, the majority are subject to a low condition of health. The reason of this is partly because the oxygen of the air is necessary for keeping in activity the chemical processes which are bound up with life, and that in the act of breathing, that is, in taking air into the lungs, the oxygen in the air is taken up by the lungs and the expelled air is thus deprived of its oxygen; and partly because an individual in expelling the air from his lungs in the act of breathing expels with the air carbonic acid gas, which in large quantities is fatal to life, as well as a large quantity of organic matter, *i. e.*, a portion of his body, which latter has a tendency to putrefy rapidly in stagnant air, and which may thus become a dangerous poison.

Those who live in a close atmosphere have their vital energy impaired; they are less able to perform work. They more nearly approach to the condition of animals in a state of hibernation; they are less able to enjoy life. There is a case mentioned of a dressmaker who employed a large number of women in a very close room at a low rate of wages. Upon a remonstrance being made as to the condition of the atmosphere, ventilation and fresh air were supplied to the room. The women then complained that their wages were insufficient, because in consequence of the fresh air they were so much more hungry and required more to eat. That is to say, their vital energy was increased; and no doubt their capacity for work was much increased also. The same thing occurred when ventilation was introduced into soldiers' barrack-rooms, through the efforts of Lord Herbert of Lea. The soldiers complained of the insufficiency of their rations, which had to be supplemented.

Mr. Leeds, a ventilating engineer of New York, mentions an experiment which he made with some flies illustrative of this. He confined a certain number of flies in a bottle full of breathed air and tightly sealed up. He also confined a certain number of flies in a bottle through which he allowed fresh air to circulate. The flies in the bottle filled with pure air were very lively, but they all died in twenty-four hours, as they had no food. The flies in the impure air became at once very stupid and could not fly about, but they lived ten times as long as those in the pure air. And thus we find that many poor people living in unventilated houses exist sometimes to quite an advanced age, but they are often sick and feeble. Therefore, when a person finds he cannot earn his living, or if he does earn it he is sure he cannot get sufficient food to eat, he had better imitate the hibernating animals as nearly as possible, and get into some close, unventilated place, and lie down in perfect quiet and repose, and not fret at all, and he will then be able to get along on very little food. But, if full employment is to be made of their faculties, persons must live in pure air.

Stagnant air can never be pure air. There are being given off perpetually into the atmosphere a number of deleterious substances, — the emanations from the breath and other exhalations of every living creature, — the emanations arising from the putrefaction of dead creatures or of decaying vegetable substances, the miasma from marshes, etc. These various poisonous emanations are being constantly changed into non-poisonous forms, or burnt up, as it were, by contact with the oxygen of the atmosphere, which is itself being continually renewed from other sources. The movement of the atmosphere facilitates this burning up of the poisonous emanations.

The atmosphere is always in movement. The Registrar-General gives the average movement of air as measured by an anemometer at Greenwich to be about 17 feet in a second, or 12 miles an hour. It is rarely less than 6 feet a second, or 6 miles an hour. Thus, if a single individual be assumed to occupy a space of 6 feet high by 1 foot 6 inches wide, situated in the open air, there would pass through this small space in an hour nearly 200,000 cubic feet of air, even when the movement of outer air is as low as four miles an hour.

In order to maintain purity of air in a house, it is necessary to keep up a continual movement of the air, supplemented by a continual change in the air. This movement and change of air must be maintained without causing a sensation of draught. The science by which this is effected is termed ventilation. It is a science of much simplicity in climates or in weather when the windows and doors can be kept perpetually open; but in this climate, especially in winter, the necessary condition of the avoidance of draughts makes it a very complicated matter, and renders it necessary in providing for a change of air to provide also for warming the inflowing air. The great differences of temperature which occur in this country, moreover, produce numerous other complications.

In considering the question of ventilation, the first question which arises is as to the quantity of fresh air which is required for change of air. If it were desired to supply in a room a volume of fresh air comparable with that supplied out of doors, it would be necessary to change the air of the room from three to six times in every minute; but this would be a practical impossibility. And even if it were possible, it would entail conditions very disagreeable to the occupants, who would have to live in a gale of wind. It is thus evident that in considering the condition of air indoors, we have to seek a standard of admissible impurity in the air, rather than a standard of purity of air comparable with what we have out of doors.

In judging of the amount of impurity which may be allowed in an inhabited air-space, the sense of smell, when carefully educated, affords the best indicator of the relative purity and impurity of different kinds of air.

The volume of air which is required to maintain the air of a room at a uniform standard varies with the character of emanations given out by the occupants of the room. For instance, the emanations given out by sick persons, and especially those from bad surgical cases, require for their dilution a greater volume of air than is requisite in the case of healthy persons.

Calculations have been made which show that, theoretically, about 3,000 cubic feet of fresh air per hour per individual should be afforded to preserve the air in a confined space at the required degree of freshness; but, in our climate, a careful practical examination of the condition of rooms in barracks and hospitals, judged of by the test of smell, shows that arrangements which appear to provide for a much less amount than that obtained by theoretical calculation will keep the air of rooms occupied by healthy persons in a fair condition. These results have pointed to about 1,200 cubic feet of air per hour per individual.

This variation from theory seems to be partly due to the fact that there is always a change of air to a certain extent going on in a room. The walls and ceilings themselves allow of a considerable passage of air through them, which is proportioned to the difference between the temperature outside and inside a house, and varies with the materials of which it is constructed. Thus, ordinary bricks are nearly twice as pervious to air as sandstone, and plaster is much more pervious than brick.

If you look at the ceiling, you will see that an old ceiling is blackened where the plaster has nothing over it to check the passage of air, and that where the joists come, and the air has not passed so freely, it is less black. If you break the plaster, you will find that its blackness has arisen from its having acted like a filter, and retained the floating particles of dirt while the air passed through. Ill-fitting doors and windows allow of the passage of a considerable quantity of air.

A sleeping-room is very warm at bed-time; a rapid fall of temperature outside occurs, and at once a considerable movement of air takes place. The majority of occupiers of sleeping-rooms in England close their windows at night; they often block up the chimney by a register or otherwise to prevent the blacks falling. They have no special inlet or outlet for changing the air. In the morning the room would, no doubt, be very close: but if it were not for the continual insensible change arising from the air passing through the walls, doors, and window-chinks, etc., the occupants would be asphyxiated. A well-built house, unprovided with special means for the inflow of fresh and outflow of vitiated air, is a real source of danger. For these reasons the form, position, and surroundings of a building are important, because the air thus insensibly coming in, as well as all other air admitted, should be taken from pure sources.

Rooms with a large amount of outside wall-space have a better chance of obtaining fresh air than rooms whose walls separate them from other occupied rooms; because the air, filtering in from an occupied room, would necessarily contain more impurities than fresh outside air. The inflow of air to a room takes place not only from all sides, but also from below. The air does not cease where the ground begins, but air permeates the ground, and occupies every space not filled by solid matter or by water. Thus, if you build on a dry, gravelly soil, where the interstices between the stones are naturally somewhat large, you practically build over a large stratum of air. This air moves in and out of the soil in proportion to barometric pressure, and with reference to the wind.

The fact of this continual free passage of air in and out of the ground makes it important that the ground we live on should be free from impurities. We might just as well (indeed, probably far better) live over a pig-sty than over a site in which refuse has been buried, or in which sewer-water has penetrated, or over a soil filled with decaying organic matter; because in cold or damp weather, when the air in the dwelling is warmer than the air outside, the upward movement of this warmer air will draw in air to supply its place from the ground on which the dwelling stands. This movement would be prevented if the whole surface under the dwelling were covered with an impervious material.

It has been the custom of many London builders to lease a site, to remove the valuable gravel and sand, and in order to fill up the hole thus caused, to invite people to deposit rubbish, often including foul garbage, on the site; and when the whole is thus filled up, to build a house over it. People are then astonished at fevers and sickness prevailing in new houses.

The size of a room does not permanently affect the purity of air in the room; that is to say, that the number of occupants in a large room being the same as the number in a small room, the same amount of air admitted and removed will eventually keep the two rooms in the same condition of impurity.

The degree of impurity in the air of an occupied room ultimately depends solely on these two things: —

[1] Paper by Captain Douglas Galton, C. B., F. R. S., read at the Domestic Economy Congress, Royal Albert Hall, June 23.

1. The rate at which emanations from the occupants are produced.
2. The rate at which the air of the room is being replaced by fresh air.

The advantage of large space is that the large room is longer in reaching the state of normal impurity than the small room. For instance, the following table shows the time required to bring air to a definite uniform standard of admissible impurity (viz., 0.2 per 1,000 of $C O_2$), in different sized rooms: —

	H.	M.	S.
One man in 10,000 cubic feet	3	20	0
" " 5,000 "	1	40	0
" " 1,000 "	0	20	0
" " 600 "	0	12	0
" " 200 "	0	4	0
" " 50 "	0	1	0
" " 30 "	0	0	36

But besides this, the inflow and outflow of air necessary to maintain the standard of impurity is less perceptible in a large than in a small room; for the chief difficulty of keeping ventilation in action arises from the draughts it causes. Every one objects to a current of air which affects him, and desires that if a window is to be opened it shall be situated behind some one else. There is, moreover, in practice, this advantage in the larger rooms, viz., that the larger wall-surface and the more numerous windows will allow of a larger insensible ventilation, and thus large rooms will have an apparently less degree of impurity than small rooms. Although the uniform diffusion of carbonic acid is very rapid in the air of a room, the organic emanations given out do not in practice diffuse themselves either rapidly or uniformly. They hang about in corners where there are obstructions to the flow of air, or near the ceiling. On this account, some space between the occupants of a room is desirable. In sleeping-rooms and in hospital wards, and, in fact, in all rooms where the height is above 10 feet or 12 feet, the floor-space becomes of more importance than cubic space. For adults in sleeping-rooms it is undesirable to have a floor-space for each of less than 50 superficial feet. And the floor-space in dormitories in schools should certainly not be less for each boy or girl than a space of 50 superficial feet, or say 10 feet by 5 feet or 6 feet 3 inches by 8 feet. In hospitals, from 90 to 120 superficial feet of floor-space is generally afforded; and in fever hospitals, and in surgical wards, much more floor-space is frequently desirable.

As before mentioned, the ventilation of a room means the removal of a portion of the air in the room, and the supply of a similar quantity of fresh air to take the place of the vitiated air thus removed.

This change of air may be effected in two ways, — 1, by forcing fresh air into the room and allowing this fresh air to displace the air already in the room; or, 2, by drawing the air out of a room and allowing the fresh air to flow in to fill its place. In some cases a combination of both methods is adopted.

The extraction of the air is that which is simplest and most generally adopted. The extraction may be effected by fans or pumping machinery, but the usual system is to depend upon differences of temperature for determining the movement of air. The molecules of air are but feebly attracted to each other, and increases of temperature or diminutions of pressure separate the particles from one another. Similarly, decreases of temperature bring the particles nearer together, and thus one cubic foot of warm expanded air weighs less than a cubic foot of cold air.

It follows that as warmed air expands it ascends, and as cooled air contracts it falls. It also follows that as the warmed air ascends the air around rushes in to fill its place. Everywhere this heating and cooling of the air is going on; the sun's rays, the proximity of a warm body, the vicinity of a cool shaded surface, — all cause movements in the currents of air.

In a room, as air is warmed by the bodies of the occupants, it ascends; it comes against the glass of the windows, cools, and falls down. Draughts felt near the windows are not necessarily air coming in from the window, it may simply be the cooled air falling. It is on this law of the dilatation of air that all the movement of air depends, from the winds and hurricanes, to the ventilation of our houses, except where we propel air by fans or other mechanical appliances.

The law which regulates this movement of the air in a confined space or a room, when the temperature is higher than that of the outside air, depends upon the following considerations: —

1. Upon the difference of temperature of the air inside the confined space, as compared with that outside.
2. Upon the area of the aperture through which the air passes.
3. Upon the height of the column of ascending air.

Thus velocity of air in a chimney or flue depends on the height of the flue and temperature of the air as it ascends. Therefore, a fire lighted at the bottom of a flue produces a current upwards in the flue. The extraction of air by flues is the plan usually adopted.

The extraction of air by a properly constructed fan, worked by a steam-engine, would be more economical than the flue extraction, especially when the warming of the air which takes the place of that removed is taken into account; but the strong recommendation of the chimney is its simplicity and its permanence. It requires comparatively little repair, and no skilled labor to look after it. The convenience of this system causes it to be almost universally adopted. The open fireplace is one example of it; the sun-burner is another example; but the system is also applied in every room in which there is an opening at the upper part, out of which the warm air can pass, and an opening below, through which fresh air can flow in. Thus, an ordinary sash-window is an example. If the top sash is lowered and the bottom sash raised, the warmed air passes out of the room at the top, and the cooler outer air flows in below.

In the open country air is always in movement. In a town the buildings tend to prevent the rapid circulation of air; and, therefore, the smoke from the houses and the impure emanations from stables, from unclean street surfaces, and from ash-pits, hang about and render the air impure.

In a house the space is so sub-divided that air is necessarily stagnant unless special arrangements are made to provide circulation. Of course, in the summer and in warm weather, it is comparatively easy to obtain circulation of air throughout a house, and to fill the house with pure air by opening windows and doors. But in winter and in cold weather or wet weather, when doors and windows are closed, it is necessary to provide special means for creating a circulation of air.

A change of air in a room means that the air in the room which is deteriorated by the breath of the occupants shall be replaced by fresh air. In cold weather it is necessary to provide in some manner for warming this fresh air, or else the temperature of the room would be so lowered as to be injurious.

In most London houses the ventilation of the room in winter, and the warming of the air, depend on the open fireplace; and there is no better engine for the ventilation of a room. The way in which an ordinary open fireplace acts to create circulation of air in a room with closed doors and windows is as follows: The air is drawn along the floor towards the grate; it is then warmed by the heat which pervades all objects near the fire, and part is carried up the chimney with the smoke, whilst the remainder, partly in consequence of the warmth it has acquired from the fire, and partly owing to the impetus created in its movement towards the fire, flows upwards towards the ceiling near the chimney-breast. It passes along the ceiling, and, as it cools in its progress towards the opposite wall, descends to the floor, to be again drawn towards the fireplace. A fireplace is thus powerful enough to draw into the room all the air it wants, and for this purpose will use indiscriminately all other openings, whether inlets or outlets, if necessary.

The rays from the fire pass through the air of the room without warming it; but they warm the surfaces of the walls and furniture on which they impinge, and thus communicate the heat to the air. Thus, in a room with an open fireplace, every object in the room contributes its heating surface to warm the air, which is drawn in cold from the outside by the fire.

But the cold air is liable to produce draughts. The only way to prevent draughts is to adopt means for providing fresh warmed air to supply the place of that removed. This may be effected in various ways. The fresh air may be brought to the back of the fireplace and there warmed by some of the spare heat which otherwise would pass up the chimney. By this means each room would be self-contained, so far as its heating and ventilation are concerned. Or, if preferred, a stove may be placed in the basement of a house, and fresh air brought to this stove to be warmed, and then conveyed by flues in the walls to the several rooms, and then admitted in convenient positions; or else the stove may be placed in the staircase or hall of a house, and fresh air be brought to it to be warmed, so that the staircase or hall shall form a reservoir of fresh air, from which the open fires in the several rooms draw supplies of air through the doors or through special openings.

Any of these arrangements will prevent draughts being felt in the rooms. Wherever an open fireplace is used, there should be some arrangement for the supply of fresh warmed air in winter to replace the air carried up the chimney; but as the fire itself warms the walls, and all the articles in the room, by its radiant heat, it is not desirable that this fresh air should be warmed to any great extent. Probably a temperature of 54° to 56° would be ample, as it would soon acquire in each room the supplemental heat which the occupants would desire. The lower the temperature of the fresh air, the larger would be the quantity of oxygen contained in a given bulk of air. Thus, a person breathes on an average when tranquil 16½ cubic feet of air per hour. A cubic foot of dry air at 32° contains 130.375 grains of oxygen, and with the air at 32° he would receive 2,164 grains of oxygen into his system. At 80° temperature, the air contains only 118.7 grains in a cubic foot, and in breathing 16½ cubic feet of air at 80° he would receive into his lungs only 1,971 grains of oxygen, or only about 90 per cent of the oxygen which he would inhale at the temperature of 32°. Therefore, the lower the temperature at which air can be supplied for breathing, consistent with comfort, and the avoidance of draught, the better.

There is so great an advantage in the open fireplace as an engine of ventilation for rooms, that although many other and more economical means of heating our rooms have been suggested, it is questionable whether, on the ground of health, it would be wise to give it up.

One great evil from which we suffer in London is the smoke in the atmosphere, and this is aggravated by our open fireplaces, but not necessarily. The smoke is not only an evil in itself, but it aggravates the effect of the fogs which prevail, especially in this country. It seems that the tarry matter given out by the combustion of coal coats over the watery particles which float in the air in time of fog, and thus retards the evaporation, and causes the fogs in towns to be more continuous than they would otherwise be. The fog and smoke are a serious inconvenience to ventilation in London, because ventilation means the supply of pure air. The outside air in London is impure, and the only way to obtain comparatively pure air in the house is to pass the fresh air drawn in through cotton-wool filters. This entails

a considerable amount of trouble, as the cotton-wool filter will, in foggy weather, have to be renewed every three or four days. But even on the finest days in London, when the air is what is called clear, it will be found that the atmosphere is loaded with impurities. There is some smoke, much dust, of which the chief part arises from the enormous amount of horse-manure spread over the streets, and many other impurities incidental to a thickly-peopled area. These impurities, and even the fog and smoke over a town such as London, do not rise to any very great height. The tops of the church-towers, and of the loftiest houses, have been sometimes observed to be in a clear atmosphere on days when the streets are wrapped in fog. At the level of the tops of such lofty structures a much purer air may always be found than prevails near the street level, and this purer air could be brought down for the supply of houses. In all public buildings in London, especially in the Houses of Parliament, the supply of fresh air should invariably be from this purer source.

But this question should be looked at from a wider standpoint. The population of London, at the beginning of the century, did not exceed 960,000. It is now nearly 4,000,000. Thus a population not much smaller than that of Portugal, which is spread over 34,500 square miles, is concentrated in London onto 118 square miles. The houses spring up on the outside of London on every piece of spare land. Each house contributes to the smoke of London, and this smoke-contributing area, and the inhabited area which contributes impurities to the atmosphere, grow more rapidly than the arrangements made for removing the impurities, or for diminishing smoke.

We have had much legislation upon the subject of improving the purity of our rivers and water-supply, but pure air is as important to us as pure water, and this question has been practically left untouched. There are acts of Parliament prohibiting smoke, but, unfortunately, these have been left to be a dead letter, because of the private interests which they assail.

Those who live in the country find the pure air come to them on all sides, because of the constant movement which goes on in the atmosphere. Those who live in London must turn their attention to some method of diminishing the impurities with which London air is charged, or of putting in movement the atmosphere so charged with pollution. The first and most obvious step is to relieve the air from the enormous amount of smoke which is now daily thrown into it, and the next is to remove all refuse from the streets and houses as rapidly as possible. As a contribution towards the well-being of the country, each householder should be bound to adopt some method of preventing smoke in his household.

The question of the avoidance of smoke is essentially one which comes under the cognizance of a Domestic Economy Congress, because smoke means waste; the consumption or prevention of smoke is the utilization of waste, because when smoke proceeds from a fire it shows that a large part of the fuel is going away into the atmosphere unconsumed. There have been many suggestions made to prevent smoke,—the form of the fireplace, the use of anthracite coal, the use of gas instead of coal, or the use of gas in combination with coal.

One of the first persons who turned his attention to the prevention of smoke was Dr. Arnott. He proposed a fireplace which practically produced no smoke; but it had this inconvenience, that it gave a very dull fire. This inconvenience might, however, be easily remedied by a not very great alteration in the arrangements for admitting air to the top of the fuel.

It would be beyond the limits of this paper to enter upon the very large question of the various forms of grates, or of the other means for preventing smoke, and such a discussion would now be premature, as a committee has been formed for the purpose of testing, in the course of the coming autumn, various new forms of fireplaces devised to prevent smoke.

There is scarcely any question at the present day more important to the inhabitants of London than that of devising means to purify the atmosphere. Parliament can make general laws prohibiting smoke, but the enforcement of the laws must rest with the local authorities. In London, unfortunately, the authorities whose duty it is to enforce the existing law have been very supine in the matter; and London suffers far more than ought to be permitted from the smoke of factories and large chimneys. As regards the chimneys in private houses, although each gives out only a small quantity of smoke, the aggregate of smoke contributed by them is as serious an element in the pollution of London air as that from the factories. The source of pollution is beyond the reach of present legislation. It is a matter dependent upon the action of each individual householder. The most serious cause of air pollution in each house may be said to be the kitchen chimney, or the chimney of the hot-water apparatus. These must be in operation winter and summer. There are, however, numerous arrangements for cooking, and for supplying hot water, which do not give out smoke, and which are far more economical of fuel than the ordinary kitchen grate. The use of these would not affect the comfort or the ventilation of the living-rooms. The use of one or another of these arrangements would entirely abolish smoke from kitchen chimneys, and if kitchen chimneys and fuel used for cooking ceased to give out smoke, the atmosphere of London would be sensibly purer than it now is.

The other cause of impurity in London air — viz., that arising from dust — is more a matter for the local authorities than for the individual householder. The streets should be washed every morning, and swept more than once a day; the dust-carts should be covered; dust from dust-holes should not be brought up in open baskets, and emptied, as it now is, into the open carts, so as to scatter the largest possible amount into the atmosphere, and in the face of the persons passing by; but dust should be daily collected from every house, and received in closed receptacles, to prevent any of it being spread in the atmosphere.

If the local authorities would set themselves seriously to work to prevent the pollution of London air in this direction, and if every individual householder would take the trouble to adopt some method of diminishing the smoke from his own house, a sensible effect would soon be produced on the cleanliness of London and on the purity of its atmosphere.

THE TERRACED CITIES OF NEW MEXICO.[1]

THE Archæological Institute of America has recently published, as the first volume of its American series of papers, some interesting accounts of Mr. A. F. Bandelier's labors among the pueblos of New Mexico. Mr. Bandelier introduces his subject by a historical study of the region in which these singular remains are situated, comparing the accounts of the journeys of Cabeza de Vaca and Father Marcos de Nizza, and the military expeditions of Coronado and Juan de Oñate, with the present topography of the country.

By careful reasoning he succeeds in identifying most of the towns described by the Spanish writers of three hundred years ago with existing ruins, and, with this aid, in making it evident that several modern tribes of Indians are directly descended from those with whom Coronado fought, and that, as he says, they still occupy, if not the identical houses, at least the same tribal grounds. The importance of this fact can hardly be over-estimated; nowhere else can the habits and history of the most enlightened tribes of aboriginal America be studied on the spot where they flourished, in the very midst of their descendants, who have never ceased to occupy the very villages which their forefathers founded; and still preserve, though in a modified form, many of their ancient traditions and customs; and archæologists will hardly find a field whose investigation promises more interesting or more certain results.

Mr. Bandelier's first explorations were made among the fragments of the deserted pueblo known as Old Pecos, not far from Santa Fé, on the main line of the Atchison, Topeka & Santa Fé Railroad. The tribe from which the pueblo, known to Coronado as a large and flourishing village, derives its name, is now extinct, but by singular good fortune, Mr. Bandelier found still living near the spot Señor Mariano Ruiz, who was in boyhood assistant to the sacristan of the native church, and in that capacity was adopted as a "son of the tribe." He was even designated for one year as the custodian of the sacred fire, but declined the honor; however, his former intimate association with the Indians enabled him to furnish information of inestimable value in interpreting the vestiges of their ancient prosperity.

In Señor Ruiz's time but eighteen adults were left of the once powerful tribe, living huddled together in one corner of the same vast communal building which, with its four terraced stories, containing five hundred and eighty-five rooms, had excited the wonder of Coronado's soldiers three hundred years before; but this poor remnant still kept up many of their antique customs until, in 1840, reduced by an outbreak of fever to five starving souls, the three great chiefs of Jemez, a pueblo which, though eighty miles away, and separated during many centuries by intervening settlements of hostile tribes, retains to this day a language identical with that of Pecos, made their appearance in solemn embassy before the ruined city, and led away their kinsmen to an asylum with themselves. To Jemez Mr. Bandelier proposed to follow them, to trace, if possible, the earlier history of the race whose two branches, though completely isolated from each other long before the time of Columbus, maintained so faithfully the tradition of their common blood. Dull, ignorant and undistinguished as these poor Indians have always been, their history has a singular, though modest charm, and if the later investigations fulfil the promise of the earlier ones, we shall have to thank the Archæological Institute and its zealous and faithful explorer for two of the most interesting volumes of the year.

PALLISER'S USEFUL DETAILS.[2]

ONE of the most useful of every-day books we ever came across is Laxton's Building Examples, of which a few volumes only were published, and these, we suppose, are now out of print. In these large folios were to be found details of a large number of buildings drawn to large scale — inch, half full-size, and full-size — which had about them an air of practicality that is unusual in books of a similar character. A great merit of the work lay in the clearness and simplicity with which the drawings were rendered. The great drawback to their usefulness was the fact that they were English, and the methods of construction shown, the materials and the scantling of the

[1] *Papers of the Archæological Institute of America, American Series.* I.— 1. Historical Introduction to Studies among the Sedentary Indians of New Mexico. 2. Report on the Ruins of the Pueblo of Pecos. By A. F. Bandelier. Boston: A. Williams & Co.; London: N. Trübner & Co.

[2] *Palliser's Useful Details:* a new and practical work on every description of modern architectural detail. Forty plates, — size of each, 20 × 26 inches. In flexible cover, price $3.00, post-paid. Each plate is a facsimile of the original drawing without reduction. They embrace a variety of constructional working-drawings for all classes of work — exterior and interior — pertaining to the erection of buildings of every description, and are given on a very large scale, none being smaller than three-fourths inch to a foot, and many larger and up to half full size. Palliser, Palliser & Co., Bridgeport, Conn.

timbers used were such as are not familiar to our workmen, unless they have been brought up in the old country.

We have often wondered that some American publishers did not undertake to produce some similar books, for it was evident that a large sale could be found for a work showing American constructive details of as good a character as those in the English work, but so far as we know, all that have been undertaken have aimed at too great elaborateness of workmanship, and this has been expended on examples which unfortunately did not deserve to have so much time and labor devoted to their explanation.

But at length has appeared from that centre of Yankee notions, Connecticut, a publication which in intention approaches Laxton's work, and though as a publication it is a slovenly piece of work, it has about it the indications of a useful and successful undertaking, — useful to those who subscribe for it, and successful as a business venture for the author-publishers. Grouped upon single folio sheets of thin, cheap manilla paper are, in the first volume that has been published, a multitude of details, well arranged and properly co-ordinated, of such constructive features as must be wrought into the small houses, stables, shops, etc., in whose construction nine-tenths of the mechanics and a large proportion of the architects of the country find their occupation. "Useful" details they are properly called, both as examples and as warnings, because there is much shown in these sheets that is good and worthy of imitation, while there is more that, judged as design, is commonplace, and not a little that is vulgar and reprehensible; so that the untrained mechanic is likely to find himself at fault when he turns to this work for an idea as to how he shall finish a gable, or what style of dormer he shall place on his building, and his employer will be lucky if he does not find his house alive with the eccentricities that the jig-saw and turning-lathe are capable of producing, while he sees that the satisfying simplicity of straightforward work has fallen to the share of that employer whose workmen have not come across this publication. Like all aids of this sort the workman needs a certain amount of intelligence in order not to get more harm than good from it, though to say the truth he must be extremely wrong-headed to do so.

When one sees the prodigality with which the authors have made public their ideas, one can but smile afresh at the remark of an English architect on examining our own monthly detail-sheet: "D'ye know I wouldn't be doing that, ye know. When I got an idea I wouldn't be giving it to the other fellows, I'd be keeping it for my own work, ye know."

LETTER FROM KING'S LYNN, ENGLAND.

King's Lynn, Eng., June 7.

Starting from London some two weeks since, armed and equipped with knickerbockers, tourist bag and all, complete, I began a jaunt through some of the eastern counties that has ended, for the present, by landing me in this somewhat interesting but dead

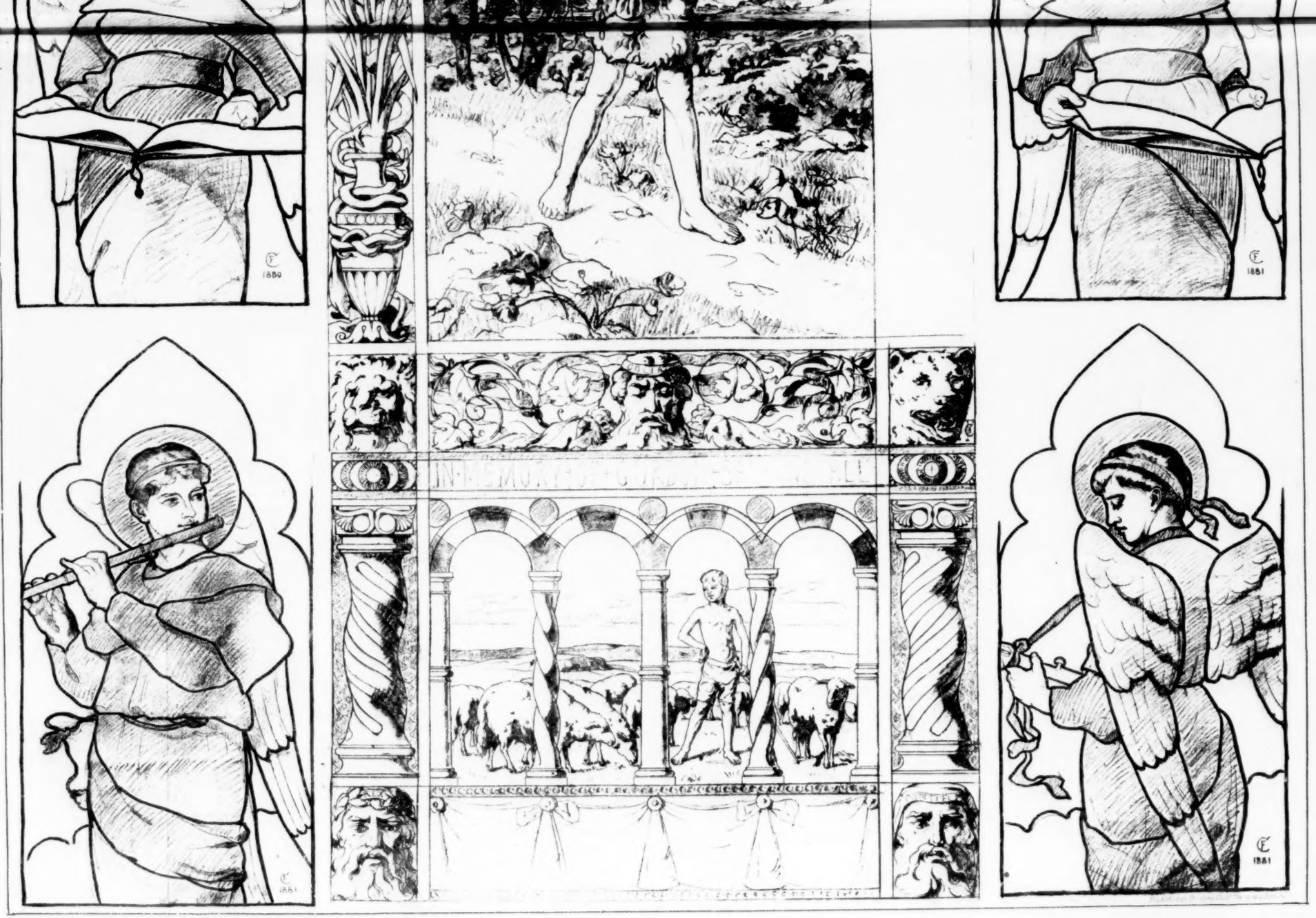
Fig. 1.

borough. Leaving London one not very pleasant Thursday afternoon, I journeyed to Waltham — pronounced Walt'm; here, a short distance from the station, is still standing in very good condition one of the beautiful Eleanor crosses, of which there were formerly so many; there are only three now remaining, I believe. Waltham Cross is jacked up against the corner of an old house, one side of it being thereby almost totally destroyed. Some three miles from here to the eastward is Waltham Abbey, particularly interesting at the present time from its being associated with the name of the late W. Burges, the restorations being conducted under his direction. The entire east end is new, and although the greater part of the church is Norman, the new portion, with perhaps the exception of having round arches, shows not the slightest inclination to Norman, but is rather of the style made so familiar to us by Mr. Burges in his work at St. Fin-barre's Cathedral, Cork. From the Abbey a walk of three or four miles through a corner of Epping Forest brought me to Broxbourne, a famous fishing-place, with a very pretty church. From here I took train for Audley End, found there is no hotel, and, it being nearly two o'clock, had to take a train on a branch line and go to Saffron Walden, where I laid siege to the "Rose and Crown" Inn. As I entered by the back door, the night was passed in total oblivion of the wonders of architectural beauty with which I was surrounded, and not until I went into the coffee-room in the morning and saw there a last year's copy of the *Building News* was I made aware of it. The inn, in the drawing, formed the centre of a view of the market-place of Saffron Walden; on one side was a bank by Godwin, and on the other, a fine half-timbered Town-Hall by E. Burgess. The inn was an old one restored by Nesfield. In the centre of the market-place was an excellent modern fountain. The landlord proved a jolly old fellow and took me into the Town-Hall, which, although plain and inexpensive, is quite effective. The hand-rail of the principal staircase is of brass, with a small balustrade of brass about three inches high supporting it. From the market-place to the church is but a step. Benisons upon the worthy rector or vicar, whichever he may be, for the doors of the church are all wide open, and no hunting up a superannuated old clerk to obtain the keys. The church is a very fine Perpendicular one; the guide-book says "one of the finest in the country." Just east of the church are the remains of an old castle, the only one near here. All that now stands is the keep, in which excavations are making for underground passages: none found as yet.

The landlord kindly directs me to the entrance of Audley End Park, but a few hundred yards from the inn, and I sling my bag and start, walking through the park to Audley End House, that famous old structure with which we are all so familiar. The present building is but a remnant of the once grand residence of which it is said that those living in one part knew nothing of what was going on in another part. The house formerly consisted of two quadrangles, the present building being but the portion that separated the quadrangles. Going up to the entrance, I am informed that visitors are not allowed on Fridays, and after looking in at the windows, start to walk to the station, being half-way to the gates when a servant comes running after me and says that the housekeeper has kindly consented to allow me to look over the house, as I had come from a distance. Inside there is much to repay one for a visit. The great hall is ninety feet long, panelled in oak, with a beautiful carved oak screen at one end. The walls are hung with fine paintings and armor, while the library consists of nearly ten thousand volumes and occupies three rooms. As it is the season of spring cleaning the house is somewhat disorderly in appearance, but the fine fireplaces, ceilings and panellings cannot be removed, so I enjoy myself as well as if the house were in perfect order. From the house the walk to the station is quite pleasant; arriving there and finding that no train goes for more than an hour, I start across the fields to a little church that I see near by and make a sketch. From Audley End the train takes me to Bury St. Edmunds, said to have the finest air in England. It surely has some fine buildings, and most conveniently placed by the far-seeing builders for the convenience of tourists, for they are all in a row, on one street, — the Abbey gates and gardens, the beautiful Norman tower, and the two fine Perpendicular churches of St. Mary and St. James, the latter restored by Sir Gilbert Scott. The former has the finest roof in the country: it is a most exquisite roof, beautifully carved; the ends of the hammer-beams are carved with figures representing the *Te Deum*. From Bury, after making a *détour* to Ipswich and Harwich, and walking sixteen miles across country, I go on to Great Yarmouth, putting up at the "Star" Inn, not because it is the best in town, — which it isn't, — but for the reason that it has some fine old wood-work. The coffee-room here is a magnificent apartment panelled from floor to ceiling in oak, elaborately carved. The fireplace is of a light stone, like Caen stone, while the ceiling is of plaster, beautifully decorated. St. Nicholas Church at the north end of the market-place is the largest parish church in England, and a very beautiful one. The work of restoration is in full swing. The seating capacity of the church is thirty-five hundred, while the standing room is given as ten thousand, on a notice put up at the door. Close to the church is "An Hospital for Decayed Fishermen" (Fig. 2) built in 1702; it is in the form of a quadrangle and quite a curious old building. A peculiarity of Yarmouth is its rows, — not like the rows of Chester, but a series of straight narrow passages, from four to six feet wide, running parallel to each other and connecting the principal streets, which run north and south and parallel to the sea: there are one hundred and forty-five of these rows. Norwich, with its Norman cathedral and castle and its many fine churches, is but a short ride from Yarmouth. St. Peter Mancroft Church, one of the

BLOCK OF HOUSES ON HIGH ST. NEWARK N.J. FOR A.L. DENNIS ESQ. VAN CAMPEN TAYLOR ARCHT. NEWARK


BLOCK OF HOUSES ON HIGH ST



STAINED GLASS WINDOWS DESIGNED BY FREDERIC CROWNINSHIELD.

An Old Dungeon, Provins, France.

Vierzy, Near Soissons, France.

finest in Norwich, is undergoing a thorough restoration, the windows are all out and the interior is filled with staging. From Norwich the train takes me to Wymondham, — pronounced Windham, — where I put up for the night. In front of the inn is the Market-Cross, now turned into a reading-room. The only other object of interest here is the church, a fine building with two towers, one at each end. The one at the east end is very beautiful, Early English date, and formed the central tower of the once large priory church; it is now partially in ruins. From here I walk on to Dereham, thence to Wendling, a distance of sixteen miles, passing Kimberly Park and

Fig. 2.

Church, Garvestone, Whyndburgh and Yaxham, each with its church. At Yaxham Church, as I arrived, they were about to ring the peal in honor of the Queen's birthday. The church was quite small, with a round tower, on top of which a flag was flying. The peal consisted of five bells, but as only four of the men had arrived, I was invited to climb up the little narrow winding turret-staircase and see the bells. The arrises of the treads were so worn that it was more like climbing a steep inclined plane; on arriving at the top, one of the bells was rung from below in my honor, — I would rather not be honored in that way again. Dereham Church, although of good size, is principally interesting from containing the tomb of the poet Cowper. At Wendling, where I took the train, is a pretty little Perpendicular church: in fact nearly everything is Perpendicular in Norfolk. At Swaffham is a fine church, and here I again had the pleasure of hearing a peal rung. The scene, with the eight men in the western tower, as I stood in the nave, and the strong evening light came through the large west window, throwing the bell-ringers into silhouette, taken with the narrow width and great height of the arch in which the ringing gallery is placed, was weird in the extreme. This church has a very good hammer-beam roof. Lynn is reached about half-past nine and the Duke's Head Inn is put in requisition. We drive into a large covered court, opening directly out of which is the principal staircase of the house, — a large, grand, black concern, that makes one feel drunk to go up it, it is so uneven.

WARRINGTON.

THE ILLUSTRATIONS.

DESIGNS FOR STAINED-GLASS WINDOWS, BY MR. FREDERIC CROWNINSHIELD, ARTIST, BOSTON, MASS.

THE central design was executed for the First Church, at Boston, last year, and the others are now making for Grace Church, at New Bedford, Mass. In both cases the work was done by Donald McDonald, of Boston.

BLOCK OF HOUSES ON HIGH STREET, NEWARK, N. J. MR. VAN CAMPEN TAYLOR, ARCHITECT, NEWARK, N. J.

DUNGEON AT PROVINS, FRANCE, AND GATEWAY AT VIERZY, FRANCE. SKETCHED BY MR. THOMAS HASTINGS.

LEGAL NOTES AND CASES.

Grant of Right to convey Water in Pipes. — Diverting Water-Course.

A DEED contained the following clause: "In consideration, etc., the party of the first part does hereby grant to the party of the second part and its assigns forever the right to convey water in iron pipes over and across the lands of the party of the first part," and under this grant the grantee undertook to divert the water-course itself. The court decided that there was no direct grant of any water or of the right to divert it. Before it can be claimed that there is a right to divert a water-course to the use of the grantee, under a clause of a deed permitting the use of the water, the words of the clause must show such a meaning in a sense so broad and certain that they admit of no other construction. Courts cannot indulge in suppositions, or draw inferences from the language used in such cases. 1 Man., 1 Gr., 625. *Simmler vs. San Luis Water Co.*, Supreme Court of California, May 20, 1881. H. E.

Sale. — Implied Warranty of Thing sold.

There is an implied warranty in the sale of an article, as such article, that it is the thing sold, or that it answers substantially to that description or representation. *Gilchrist vs. Hilliard*, Supreme Court of Vermont, May, 1881. H. E.

THE FOUNDING OF "BIG BEN."

THE question whether the bell in the Westminster clock-tower was properly cast was again brought before the Law Courts. On Monday and following days the case of Stainbank *vs.* Beckett was heard at Westminster before Baron Huddleston and a special jury. It is an action of libel brought against Sir Edmund Beckett for statements published by him in the *Times*. The plaintiff carries on the Bell Foundry, Whitechapel, under the firm of "Mears & Stainbank," having succeeded to the business of Messrs. C. & G. Mears, the founders of the bell.

In the *Times* of October 31, 1878, the defendant wrote: —

"Though I do not profess to write about dominants and minor thirds, or to guess how a Belgian bell-founder would probably begin to retune this peal, I have no hesitation in saying that no modern Belgian bells which have come over here and been heard in public are superior or equal to the best English ones, though they are superior to such as used to be made by the English firm which had a practical monopoly of the business until about twenty years ago. There has never been a really good large foreign bell in either of the English exhibitions, and I have not heard of any conspicuously good ones in the foreign exhibitions, which I have not visited myself. The tenor of the peal at Boston Church was recast in Belgium, when a great number of little bells were added for chimes a few years ago, and they are as unsatisfactory as I predicted. That is a good sound bell, but no better than many English ones of the same size, and, in my opinion, not comparable to the eleventh of St. Paul's or several of the Worcester Cathedral bells. I omit the tenor of St. Paul's as yet, because the clapper was not right when I went to hear them rung the first time, a few weeks ago, and I told the founder so. Of course I agree with Mr. Haweis about the present condition of Big Ben of Westminster, which is a disgrace to the nation, as it was to its founders, and as their York bell was still more, and as the clock bells of St. Paul's were to their predecessors, and Tom of Oxford to its maker, which is the worst of all the great ones. These could easily be recast now into good ones, as I have explained in all the later editions of my book on clocks and bells."

Again, in a letter to the *Times* of November 20, 1878, the defendant wrote: —

"Bells without number, which, moreover, were never cast for it with a properly-adapted crown, have been ringing for years and centuries with bolts through their crowns to hold in the clappers when the bells have been turned in the stock, before I introduced the now common practice (except, I believe, at the oldest and worst of the foundries in England) of having the clapper-bolt independent of the bell."

The plaintiff alleges that the publication of these statements has seriously damaged him in his business. In his statement of defence Sir Edmund Beckett admits having published the letters from which the extracts complained of are taken, but denies that they were published of the plaintiff in his trade or business, the plaintiff not having been at the time of the founding of the bell a member of the firm who founded it: viz., Messrs. Charles & George Mears. He further contends that the words complained of, in so far as they referred to the firm of C. & G. Mears, and to the casting of the said bell, were fair comments upon a matter of public interest, and were true in substance and fact.

Mr. Russell, in opening the plaintiff's case, regretted that he had to appear against so distinguished a member of his own profession. The defendant had great attainments in other departments of knowledge than that of law, and among other things in which he had interested himself was the construction of clocks and bells, and principally the clock and bell of Westminster. An action had been brought by the late Mr. Mears against the defendant more than twenty years ago, as the jury would hear, and now, when the person then libelled was dead and gone, the defamatory statements were repeated and reiterated without regard for charity or common generosity. Mr. Stainbank joined the firm of Mears in 1861, in whose name the Whitechapel Foundry had been carried on since 1782; it was, in fact, started in 1570, and was the oldest in the kingdom. A firm of that character had a continued identity. When a peal of bells was ordered they went out with the name of Mears upon them. If at any subsequent time they wanted repairs they were sent to Mears's foundry, which was now the plaintiff's. The defendant was going to say that if any one was libelled it was the plaintiff's deceased partner; but he would ask the jury to find that the plaintiff himself had been libelled and injured in his business by the statements of the defendant. The learned counsel, after relating the history of the first Big Ben, which was made by another firm and condemned, said that a contract was made in December, 1857, with the firm of Mears, for the bell now known as "Big Ben." The defendant designed it, and according to the contract it was to be made to the approval of the defendant and the Rev. W. Taylor. The bell was cast on April 18, 1858. It had an indent in its surface, which, by order of the government officials, was filled up with zinc, and it was covered with a solution of nitric acid. It was carefully examined by the defendant and other government officials, and was approved. Soon after it developed a crack upon the side of the "sound-bow" opposite to that struck by the hammer, at the point where, as witnesses would explain, the two currents of vibration attained their greatest force. The hammer used, with which the firm had nothing to do, was one of seven hundred-weight, and it was the

opinion of some experts that the too great weight of the hammer was the cause of the crack. However, the seven hundred-weight hammer was removed, and one of four hundred-weight substituted, and the latter has been in use for more than twenty years. On the discovery of the crack the defendant was attacked in the newspapers, and defended himself through the same medium. The strictures then passed by the defendant upon the founders of the bell led to the bringing of an action of libel against him by the Messrs. Mears. The defendant justified, but afterwards withdrew his pleas of justification, and the case was withdrawn from the jury upon the terms of the defendant retracting all charges made by him against Mr. Mears and paying all costs incurred. An inquiry was instituted into the state of the bell, reports were made by the Astronomer Royal, Professor Tyndall, Mr. Percy, and others; and, as a result, the hammer was reduced in weight, and the bell was swung round so that the crack should not be opposite the hammer. Years went by, and in 1878 a new controversy arose, in which the Rev. Mr. Haweis took a principal part, and in this controversy the letters of which the plaintiff complained were addressed to the *Times*. In that of November 20, 1878, the "oldest and worst foundry in England" undoubtedly referred to the plaintiff's foundry, as he believed would be admitted by the defendant himself in the witness-box.

Mr. John Mears was the first witness called. He had been manager under his brother, but had not had anything to do with the foundry for many years. He described the casting of Big Ben. The proportions of the metals were according to contract: viz., twenty-two of copper to seven of tin. It was run into ingots and submitted to the defendant. The melting was done in three furnaces by a wood fire, and the molten metal was then run into one reservoir. The metal used had been the best obtainable. From the reservoir it was run into the mould, consisting of a "core" and a "cope." The defendant approved the mould and afterwards the bell, which he minutely inspected and tried with a temporary clapper, and had said that it was a freer-toned bell than the old one.

In cross-examination the witness said that he never heard of any holes being stopped up. If there were any they would have been noticed when the bell was being cleaned up.

Mr. James Howard, M. P., said that he had read all the controversial correspondence. To his mind the statements of Sir E. Beckett referred to the plaintiff's firm.

Mr. Loseby, of Leicester, said he had seen Big Ben before the cracks were discovered, and closely examined it afterwards. He took casts of the holes or cavities upon the surface, which he now produced. In November, 1859, he made a chart of the surface, showing the relative position of the cracks. This also was produced. The cracks were discovered by covering the bell with acid; when the bell was struck, a stream of air-bubbles showed themselves along the line of the cracks. There were three cracks of six inches, seven and a quarter inches, and thirteen inches in length respectively. They would not have been noticed but by wetting the bell. The hammer formerly struck exactly opposite the seven-and-a-quarter-inch crack. Bells are never of a uniform thickness all round; there is a variance of one-twentieth inch at least, and in comparison with that variance these small holes or cavities are of no importance. In his opinion the cracks were caused simply by the weight of the hammer. The bell was now turned round and was struck with a hammer of half the former weight. When a bell is struck by a hammer, the greatest strain is at the opposite point to that struck.

In cross-examination the witness admitted that he had a controversy with the defendant in 1851. The defendant was chairman of the horological jury at the Exhibition of 1851, very much to the regret of the exhibitors in that section. He gave satisfaction to nobody.

The following passage was then read from the report of Dr. Percy upon Big Ben:—

"Several holes about one-eighth inch in diameter, or somewhat more, were discovered in the metal in the course of exploration. The various portions of metal collected were carefully examined; some appeared sound and free from porosity, but most of them were unsound and porous."

The witness said he should not consider one-eighth-inch cavities of any importance. Porosity would consist of a spongy appearance. He did not agree with Dr. Percy as to what constitutes porosity. The original hammer was seven hundred-weight, and had an oblique fall of thirteen inches, equal in power to a vertical fall of about nine inches. A bell of this weight should have a hammer of not more than four hundred-weight. The history of this bell for the last twenty years showed that. He could not say what was the proper proportion; it was easy to tell for a small bell, but difficult for a heavy bell. He would not have used a hammer of more than three hundred and eighty pounds for this bell without previous experiments. The weight must be determined by experience, and there was no experience of such bells in this country before Big Ben was made. Warner's bell (the condemned bell) was sixteen tons, and the hammer thirteen hundred-weight.

Mr. John Imray, consulting engineer and founder, was the first witness called, and was examined as to the composition of the bell-metal, and as to the porosity and want of homogeneity described by Dr. Percy in his report. He said the proportion of twenty-two of copper to seven of tin would make a hard, brittle bell-metal, and in the course of "setting," the tin, being the lighter metal, would be found in greater quantity upon the upper surfaces, especially upon the upper surface of the sound-bow. He examined the bell in 1859, and again in April, 1881. As far as he could see, the cracks were unchanged since 1859. He considered the casting an excellent one. In all large castings, where there is a considerable mass of molten metal, the outer crust sets first; the inner particles in setting afterwards must either crack or draw themselves apart and produce porosity.

Cross-examined: It was physically impossible that the metal in this case should have been otherwise than porous, unless the metal cracked. He saw and examined Warner's bell. Its metal was almost entirely free from cavities.

Mr. Jabez James stated that he was a civil and mechanical engineer, and was the contractor for raising Big Ben to the tower where it is now hung. He saw the bell when it was cast and considered it an excellent casting, considering its size; but at the time he considered the proportions of copper and tin were dangerous, and told the defendant so.

William Wanskitt said that he was a bell-founder at the Whitechapel Foundry — at least he was supposed to be — as lawyers and parsons nowadays thought they knew more about it. He had been at the foundry all his life, and was present at the casting of Big Ben. It was a good casting, but he had observed the cavities in the surface. He did not consider them serious.

In cross-examination the witness stated that the stuffing was put in the holes before the defendant saw it after the casting. Defendant came with Mr. Taylor. He did not tell them that the holes had been filled up. Such holes are always filled up with zinc fillings and resin.

Henry Hart, foreman to Mr. James, considered the casting a good one. He was told to bronze the bell with nitric acid.

Several witnesses were then called, who testified to the excellence of bells cast at their orders at the plaintiff's foundry, among them the Rev. Prebendary Stephenson, Canon Hawkins, and the Rev. Knatchbull-Hugessen.

The further hearing of the case was adjourned. —*The Architect.*

FIRE UNDERWRITERS' RESPONSIBILITY FOR FIRES.

Fire underwriters claim that the frequency with which fires have occurred of late, entailing heavy losses upon the insurance companies, has rendered it impossible for them to realize any profits on the business thus far transacted this year. If the injury inflicted by fire was confined wholly to the insurance companies, the public would trouble itself very little about the matter. The companies assume the risks with their eyes open, do business in a reckless manner, and if, therefore, they deliberately squander their substance by writing insurance at less than cost, the public need not be expected to sympathize with them. But the companies do not sustain all the injury inflicted by fire; every building that is burned jeopards all contiguous to it, and the destruction of one building that is insured may involve the destruction of many others that are not insured. In the case of an accidental fire, the owner of the property is generally a sufferer to some extent; the insurance companies may indemnify him for the actual destruction of his property, but they do not make good the loss occasioned by the interruption to his business caused by the fire, nor do they compensate the thousands of workmen who are thrown out of employment when the means whereby they earn their support are reduced to ashes. Even though the individual owners are paid their actual losses, every community is a sufferer to some extent from every fire that occurs in its midst. It would be well for fire underwriters, from a selfish standpoint, to consider how far they are responsible for the fire-losses of the country, estimated to aggregate nearly $100,000,000 a year.

Intelligent underwriters have publicly stated in insurance conventions that over-insurance is the cause of the greater portion of incendiary fires, and also that the number of such fires is quite one-third of the whole number. According to this estimate, the fire underwriters furnish the motive for the destruction of nearly $30,000,000 of property annually, over-insuring property to such an extent as to tempt the cupidity of the owners beyond their powers of resistance, inducing them to become criminals. But there are sins of omission as well as of commission, and the neglect of underwriters to see that proper building laws are enacted and enforced has been the cause of the destruction of greater values by fire than even the incendiary torch. In New York City alone, the corrupt administration of the Building Department in years past has resulted in the sacrifice of many lives and millions of dollars' worth of property. The laws themselves are not so effective as they should be, or as they could readily have been made had the underwriters shown that interest in the matter that they should do. Property-owners do not care to have the building laws so stringent as to impose additional expense upon them in the erection of buildings, so long as they can insure any sort of a building quite as readily as they can a structure amply provided against fire at great cost. Underwriters make so little discrimination in rates that there is scarcely any inducement for property-owners to erect substantial buildings of slow-burning construction. They put up a building to attract tenants, and such as will secure them good rents. When they have obtained their insurance, they look to the underwriters who have assumed the risk to provide the required fire protection, and this underwriters do not do. Because our building laws have not been enforced in years past, and because they are not sufficiently stringent even if enforced to the letter, our cities and villages are filled with cheap buildings whose very construction fore-

ordains them to destruction whenever a fire gets started in them. This is the principal reason why the fire-losses are increasing year by year, and why they may be expected to increase even more rapidly in the next ten years than they have in the past ten. All our large cities are filled with buildings of cheap and flimsy construction, having elevator-openings and hatchways leading from cellar to garret, which act as flues to spread flames throughout the entire building in an instant of time; hollow iron fronts provide additional flues, while the cheap wood-work with which the buildings are finished furnishes abundant fuel for flames to feed on. Fill such a building with the highly combustible goods generally found in them, and arrangements are made for a conflagration that is sure to come sooner or later. That great conflagrations are not of weekly occurrence is not due to any care taken to *prevent* fires, but to the extraordinary facility developed of late among the firemen, whereby they respond so promptly to every alarm that nearly every fire is strangled in its incipiency. Underwriters have such large interests at stake that it would seem reasonable to expect them to take an active part in securing the passage and enforcement of laws that would compel the erection of a less combustible class of buildings. It is certain that property-owners will not do so while no discrimination is made in rates in favor of the better class of buildings.

A prominent underwriter has said that it was not the business of insurance men to interfere in the construction of buildings, but to "charge for the risk as they find it." No more effective method could be devised for inducing property-owners to erect buildings as nearly fire-proof as possible. Make it to their interest to spend money for fire prevention and they will do it. The same eminent underwriting authority has said that it was to the interest of fire-insurance men to have plenty of small fires, but few large ones; he would have enough not involving serious losses to keep citizens reminded that it is necessary to insure. Probably the gentleman's experience during the past two or three years has convinced him that there may even be a surfeit of small fires, where the losses are not heavy in individual cases, but in the aggregate consume a large amount of money in their adjustment. We do not see any reason to expect a decrease in fire-losses for years to come, owing to the great number of cheap buildings that have been erected, unless the underwriters exercise more discrimination in the matter of rates. If more substantial buildings were erected from this time forward, it will still take many years to burn up the thousands of inflammable ones that have been put up during the past ten years. When underwriters honestly "charge for the risk as they find it," not only will they begin to make their business profitable, but they will offer a premium to property-holders to provide proper means for preventing fires, and to erect buildings which, if not fire-proof, will at least be so constructed as to make them slow-burning.

The firemen of our cities appreciate fully the danger which is threatened by the modern style of tall, highly inflammable buildings, and are straining every nerve to perfect their apparatus and their methods so as to enable them to cope with fires in such structures. But no machinery now possessed by them is equal to fighting a fire in the top of a seven or eight story building, as has been demonstrated on numerous occasions. In such emergencies they devote their energies to protecting adjacent property, and let the fire in the burning building burn till it comes down within reach of their apparatus. The firemen are also bringing into the service appliances for throwing large streams for the purpose of drowning out a fire that threatens adjacent property. When a fire gets started in a building in the middle of a block, the way to save the block is to flood the burning edifice. This accounts largely for the great amount of goods injured by water of which underwriters have complained of late. When a fire looks dangerous, firemen do not stop to consider the interests of underwriters particularly, they work for the interest of the community. Underwriters can, if they choose, compel a revolution in building methods, and when this is secured they may begin to look for profits in their business; but so long as they continue to accept the most hazardous risks at low rates, and insure property above its value, there will be no improvement in building methods and little motive to continue the business of underwriting.—*The Spectator.*

POZZUOLI.

IF the question were asked, "What are the leading characteristics of this little town?" a fair reply would be, "Dirt and dilapidation." Yet the day has been when Pozzuoli was, in its way, the most important city of Italy, being the centre of her commerce with the other cities of the Mediterranean. Pozzuoli is four or five miles distant from Naples, and must be approached by carriage, no railroad having yet made its way to the town, and the only communication being by means of the old road built by the Romans along the coast to Misenum. Every step, however, is full of interest and classic associations, and, once arrived, the traveller finds a delightful hotel, where he is entertained in English fashion, and which, with its solid comfort and air of thrift, affords a most striking contrast to the filth, laziness, and general air of degradation that characterizes everything presided over by the native inhabitants.

Any attempt to get at the early history of Pozzuoli leads us at once into that delightful period that is unencumbered by dates. The Greeks have the credit of laying the foundation-stone. They discovered a cosy little inlet, making part of what subsequently was called the Bay of Naples, and there, at the base of a projecting hill, they built the town of Dicæarchia. It was subdued by the Romans in the Samnite wars; was repeatedly colonized by them, and was called Puteoli. Commerce brought it in contact with Egyptians and Assyrians, who mixed with the Roman population and finally became sufficiently numerous to build temples and introduce Oriental forms of worship. Christianity early gained a foot-hold in Pozzuoli in a little band of believers who received St. Paul and, as told in the Acts of the Apostles, induced him to remain with them seven days. The ruins of the ancient town lie close alongside of the modern one. Beside these not a single trace remains of the wealth and importance which once distinguished it above all the cities of the peninsula.

Like all Roman towns, Pozzuoli was surrounded by an immense wall, traces of which still remain, one gate by which the town is entered preserving its ancient character almost intact. From Pozzuoli came a volcanic earth, called puzzolana, from the name of the city. It is found throughout the district, and from it was made the almost indestructible cement used by the Romans. Through this gate one comes at once upon the main public square of the city. Here, on a Sunday, the day upon which we saw it first, the scene is most grotesque. An Italian crowd, dressed in holiday attire, is nearly always picturesque; but the piazza of Pozzuoli forms a peculiar background for the noisy, gayly attired groups that assemble there on holidays. Every building, monument, and fountain seems to be crumbling with age. Broken, dilapidated, and moss-grown, there is not a statue or a wall that has not stood since mediæval times, and their ancient, solemn grandeur contrasts so absurdly with the grand display of red jackets, yellow ribbons, and all the bravery of attire that the Italian peasant delights in. Two remarkable statues adorn the piazza, that of Q. Flavius Mavortius Lollianus, a Senator of Rome, as we learn from the inscription, and of Bishop Leon y Cardenas, Viceroy of Sicily under Philip III. The first of these statues was unearthed in 1704. The Senator came up without his head, but it was fortunately discovered near by. It appears to have been formed from separate blocks of stone.

The harbor of Pozzuoli is an interesting place to visit, if only to study the manner in which the ancients built their piers. There still remains the tremendous structure, or a very large portion of it, called by Seneca *Pilæ* and by Suetonius *Moles Puteolanæ*. Of 25 buttresses, which supported 24 arches, 16 are left, 3 being under water. They are constructed of brick and of puzzolana earth, and bear an inscription recording that the pier was restored by Antoninus Pius. A common, but very erroneous, impression, owing probably to the fact of the pier being now called Ponte di Caligula, is that it was connected with the pontoon bridge which that emperor threw across the Bay of Baiæ in order that, clad in the armor of Alexander the Great, he might there celebrate his insane triumph over the Parthians.

Pozzuoli contains the remains of two large heathen temples, one dedicated to Serapis and the other to Neptune. The Serapeum is now become a water cure, portions of the ruin being fitted up with modern devices in the way of plumbing, whereby the water from several hot springs is conveyed into marble bath-tubs. Here the nobility and gentry round about repair to get themselves cured of various diseases through the healing effect of these waters. The Serapeum was discovered as early as 1538, but two centuries passed before it was completely excavated. The original structure appears to have consisted of a square court, inclosed by forty-eight massive marble pillars and granite columns, with thirty-two small chambers adjoining. The portico rested on six Corinthian columns, three of which yet remain, bearing a rich frieze. In the centre of the court stood a circular temple surrounded by a peristyle of sixteen Corinthian pillars of African marble. These have been transferred to the theatre of the royal palace of Caserta, the bases alone being left. The interior was approached by four flights of steps and the pavement inclined toward the centre, where the statues of Serapis, now in the museum at Naples, were found. Two inscriptions mention the restoration of the temple by Marcus Aurelius and Septimius Severus

While making our way in among the columns of the Serapeum, we noticed that the lower portions of the central ones seemed to have begun to corrode away. This was explained to us by the fact that for several centuries the lower part of the columns had been under water, during which they were being gradually undermined by a species of shell-fish (*Lithodomus* or *Modiola lithophaga*) still found in this region. Interesting observations have been made here with respect to the changes that have taken place in the level of the sea at different periods. That it had risen considerably, even in ancient times, is proved by the fact that mosaics have been found six feet below the level of the present pavement. After the decline of the old civilization, the sea continued to rise, as is shown by the different water-marks. Subsequently the lower part of the edifice was buried to a depth of thirteen feet, probably by an eruption of the neighboring volcano of Solfatara. It was thus protected against further invasions of the crustacea. It is estimated that at one time the sea-level must have been at least twenty feet higher than it is at present. This great change was caused by the convulsion connected with the upheaval of Monte Nuovo in 1538. This hill, four hundred and fifty-six feet in height, is entirely the result of the action of volcanic forces, and was once a diminutive rival of Vesuvius, on the opposite side of the bay. It is now extinct, however, and its crater has become a deep valley, inclosed by masses of pumice-stone, trachyte and tufa. The salt springs in the ruins of the Serapeum are said to have been called into existence by this eruption. Since the last century the ground has again been gradually sinking.

If the traveller desires to visit the Temple of Neptune he must do it in a boat, for the god of the sea has taken possession of the edifice dedicated to him. Nothing remains of it but a few pillars protruding above the water. In the vicinity, and also under water, is the so-called Temple of the Nymphs, from which a number of fine columns and sculptures have been recovered. A little farther on, again, a few fragments indicate the site of Cicero's Puteolaneum, a villa delightfully situated on the coast, with shady avenues, which the orator, in imitation of Plato, called his academy, and where he composed his "Academica" and "De Fato." The Emperor Hadrian, who died at Baiæ, a few miles from Pozzuoli, was interred within the precincts of Cicero's villa, and Antoninus Pius afterward erected a temple on the spot.

The amphitheatre of Pozzuoli is a finely preserved ruin. It rests on three series of arches which were surrounded by an external court. The two principal entrances were adorned with triple colonnades, and the interior contained four tiers of seats in several compartments connected by flights of steps. The imperial seat was distinguished by Corinthian columns of black marble. The arena was not excavated until 1838, when a number of subterranean passages and receptacles for wild beasts were found, affording a distinct idea of the arrangements and machinery of ancient amphitheatres. By means of a water conduit to the left of the principal entrance, the arena could be laid under water when naval combats were to be represented. The entrance for the gladiators and the air-holes and outlets of the dens of the animals are easily recognized. The celebrated gladiatorial combats under Nero, when he received Tiridates, King of Armenia, as a guest at his court, took place here, and the emperor himself even entered the arena. Under Diocletian, St. Januarius and his companions were thrown to the wild beasts here in vain, as a chapel dedicated to the saint records, before they were put to death at Solfatara. Above the amphitheatre was situated a theatre, the ruins of which have not yet been excavated.

Solfatara, the half-extinct volcano that towers above Pozzuoli, is a most convenient hill to climb, for a fine carriage road has been made leading into the very crater. This is an oblong valley, inclosed by hills of pumice-stone, from fissures in which great clouds of vapor and sulphurous gases ascend. The ground underneath is hollow in every direction, and it only requires a stamp of the foot to bring forth reverberations that echo through the valley. One small cave, whence the vapors issue, may be entered by the traveller if he will consent to crawl in upon his hands and knees, so as to breathe the air at the bottom of the cavern. An attempt to lift the head invites scorching and strangulation from the hot and poisoned gases. At the back of the cave may be seen thousands of tiny bits of stone dancing and jumping in the air as they are thrown up by the forces beneath. The coloring of those volcanic stones is beautiful. Many of them are almost as clear as crystal, some appear like red quartz, and others have the color of sulphur. On the roofs of the caverns there is always a sulphurous deposit, arranged in beautiful natural designs, very much after the manner in which Jack Frost sometimes adorns a window-pane. Solfatara furnishes the material from which the finest stucco is made, and one part of the crater is occupied by an immense factory. Above the volcano and toward the east rise the white hills whose light-colored dust was prized by the ancients for color in groats and other kinds of grain. Several small brooks containing alum have their source here. They fall steaming into a ravine between the Solfatara and the Lago d'Agnana, and are frequently resorted to by sufferers from cutaneous diseases.

Pozzuoli, like all Italian towns, has an assortment of churches containing objects of more or less interest for their pavements, and their altars are usually spoils from some magnificent heathen temple or palace. The only one, however, to which we made a pilgrimage was the cathedral, and that more because it contains the tomb of Giovanni Battista Pergolesi, of Jesi, than for any other reason. Under a simple monument lies the form of the composer of the original "Stabat Mater," who, dying at an age when most men have barely passed their boyhood, left behind him a work rivalling the productions of the ripest musical genius the world has ever known. Pergolesi was only twenty-six years of age when his death took place at Pozzuoli.

Except for its historic associations and the loveliness of its situation, Pozzuoli is not a town that would hold the interest of a visitor long. Of society there is none. Gradually the better classes of its inhabitants have drifted away, and now the population of sixteen thousand souls is chiefly made up of fishermen, petty shopkeepers and lazzaroni of all kinds and descriptions. The people live in the street, cooking and eating in the thoroughfares, and doing their very small amount of washing at the public fountains. Work is a thing they abhor, and they do as little as possible of it. At all hours of the day and night the shores and the public squares will be seen filled with groups of men, women and children, either doing nothing or amusing themselves in various fashions, a free fight involving all ages and sexes being a last resource when all other diversions fail. — *Correspondence of the New York Times.*

A TUNNEL THROUGH MONT BLANC.

The French Government has for some time past been contemplating the construction of a great railway tunnel which should bring Paris and the northern parts of France, and, therefore, Great Britain, into more direct communication with Italy than is afforded by the existing tunnel through Mont Cenis. The projects proposed include a tunnel through Mont Blanc, and another through the Simplon or the Great St. Bernard. The last of the three has found very few friends, but it appears likely that both the former projects will be carried out.

The projected Simplon Tunnel is 18,507 metres in length, while that through Mont Blanc is 13,500 metres. Comparing these with the other Alpine tunnels we find that the Mont Cenis is 12,220 metres, and the St. Gothard 14,920 metres, long. The Simplon would, therefore, be the longest of all; but this is compensated for by the fact that it is at a much lower level than the rest, the entrance at Brieg being only 711 metres, and that at Iselle 687 metres, above the sea-level. The entrances to the Mont Blanc Tunnel, on the other hand, would be 1,050 metres at Montquart, and 1,285 metres at Entrèves, above the level of the sea. The Bardonnêche entrance to the Mont Cenis Tunnel is 1,291 metres, and that at Modane 1,158 metres, above sea-level; while in the case of the St. Gothard Tunnel, the northern entrance at Gœschenen is 1,109 metres, and the southern at Airolo 1,145 metres, above the level of the sea. Thus, the Mont Cenis Tunnel is shorter, but 100 metres higher, than the Mont Blanc, while the Simplon would be almost half as long again, but would be 300 metres lower.

Since the execution of the Mont Cenis Tunnel, the piercing of the Alps or of any other range has become simply a question of time and money. M. Chandon, in his pamphlet, "Le Percement du Mont Blanc," under-estimated the difficulties of the work. But in M. Bérard's *brochure*, "Mont Blanc et le Simplon considérés comme Voies internationales," the estimate of the magnitude and cost of those undertakings was sufficiently correct, and he showed that France could not afford long to do without these means of communication.

Assuming that the work will be done as quickly as St. Gothard Tunnel, the boring will take 4,218 days' work, or, working at both ends, 2,109 days; that is, nearly six years. The entire tunnel might, therefore, be expected to be ready for use in seven years.

With respect to the cost of construction, it is estimated that, calculating on the experience and basis of the St. Gothard Tunnel, the total sum for the execution of the work would be 45¾ million francs. The St. Gothard cost 54 million francs. In the northern line of approach, the cost is calculated for the first two-thirds to be a quarter of a million, the last third, three-eighths of a million, per kilometre. This makes 21 millions. In the southern line of approach the first third would cost half a million; the second, three-eighths of a million; and the third, a quarter of a million, per kilometre, thus making 40 millions. The other necessary outlay in laying down the line, etc., is estimated at 9 to 10 millions, making the grand total from 115¾ millions to 125 millions. Of this sum, it is reckoned that France would grant 50 millions, and Italy 12½ millions, so that from 53 to 64 millions would have to be raised either by the railways which would be directly or most benefited, or by other means. The lines of approach are far more easy than those connected with the St. Gothard, though, of course, less easy than those required for the Simplon Tunnel.

By this line the distance between Paris or London and Brindisi would be shortened by 38½ kilometres; but the greatest benefit France and Italy would reap from it would be the large additional facilities the tunnel would offer for commerce between the teeming populations of those states. — *The Builder.*

SIGHT BELOW THE WATER-LEVEL.

Boston, July 12, 1881.

To the Editors of the American Architect: —

Dear Sirs, — On the twenty-second page of your issue of July 9, under the title "Some Instances of Ingenuity," it seems to me too much credit is given the English engineer. I should be more inclined to blame him for waiting two days on account of the "ripple on the water," when he might have made the exploration in any sea in which a small boat could live alongside by means of a very simple device, viz., nothing more than a tube of wood or metal, say six to ten feet in length, into one end of which fit a glass, made water-tight by cement; submerge the glazed end below the line of disturbance and perfect vision can be had.

Yours very truly, Reader.

BLACK BRICK.

Dover, N. H., July 16, 1881.

To the Editors of the American Architect: —

Dear Sirs, — Will you please give me through your journal what you consider to be the best recipe for coloring common brick black, one that will not be liable to fade? Yours very respectfully,

Phœnix.

["Phœnix" does not say whether he wishes to color the bricks before or after they are baked. By far the best effect in black brick is obtained by using those colored all through their substance, such as are made in Philadelphia, and sold by agents in the large cities. How they are colored, we do not know. The ordinary mode, however, is to heat soft common bricks red-hot and dip them in a pan containing half an inch or so of melted coal-tar. If the bricks are porous, the tar will penetrate the surface, forming a stain which will not fade; but if they are hard, or insufficiently heated, the coating will soon peel off. — Eds. American Architect.]

THE CENSUS COLLECTION OF BUILDING-STONES.

WASHINGTON, July 14, 1881.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Sirs, — As in your very kind editorial concerning our work you call attention to the circumstance that our agents may be communicated with to the advantage of our work, we hereby enclose to you the names and addresses of those who are placed in charge of the gathering of the statistics. Quite a number of sub-agents are working under the direction of these gentlemen, but communications which relate to quarrying or construction in any part of the country will arrive at their correct destination by addressing the parties nearest at hand: —

Prof. N. S. Shaler, Cambridge, Mass.
Prof. C. H. Hitchcock, Hanover, N. H.
Mr. Harrison W. Lindsley, architect, New Haven, Conn.
Mr. Alexis A. Julien, Columbia College, School of Mines, New York City.
Prof. Geo. H. Cook, New Brunswick, N. J.
Mr. Charles Allen, Harrisburg, Pa.
President Edward Orton, Columbus, O.
Prof. J. R. Proctor, Frankfort, Ky.
Prof. Allan D. Conover, engineer, Madison, Wis.
Prof. N. H. Winchell, Minneapolis, Minn.
Prof. G. C. Broadhead, Pleasant Hill, Cass Co., Mo.
Mr. Wm. Foster, Office U. S. Geological Survey, Denver, Col.

Yours truly, GEORGE W. HAWES, Special Agent.

WHAT CONSTITUTES ARCHITECTS' SUPERINTENDENCE?

JULY 15, 1881.

TO THE EDITORS OF THE AMERICAN ARCHITECT: —

Gentlemen, — I write to ask if you can refer me to any recorded law cases published in the *American Architect* in former years, or elsewhere, in which the point described below was involved: I find nothing in the cases referred to in the past two years in the *American Architect.*

In course of a trial before a jury it may be necessary to establish or make clear, when an architect engages to *furnish drawings* for and *superintend* the construction of a building, what is his *duty* as *superintendent;* or to state the matter in another way, the schedule of the A. I. A. is headed, "For full professional services (including superintendence) five per cent on the cost of the work." Query, — In what does the superintendence consist? Individual testimony can be procured. What I wish to be informed is, as to whether any law-suit has taken place within the last five or ten years, to which you can refer me, the facts of which have been published.

I have corresponded with A. J. Bloor, Esq., Secretary A. I. A., and he referred me to you, thinking you might be able to assist me.

An early reply will greatly oblige, Yours very truly,

X. Y.

[THE question of what constitutes the duty of an architect as superintendent is far from being decided, and the practice of architects varies greatly in regard to the amount of personal attention which they give to work under their charge. We think that there has been no adjudicated case establishing any standard, and that unless it could be shown that a building had suffered by neglect of proper supervision, the number of visits which the architect saw fit to make to it would not be inquired into. If, however, the work had so suffered, the architect could be held responsible for the consequences of his neglect, and the courts have been very strict in their notions of architects' duty in this respect. See papers on the Legal Responsibility of Architects, in Nos. 154 and 155 of this journal. — EDS. AMERICAN ARCHITECT.]

NOTES AND CLIPPINGS.

BUILDERS' OBSTRUCTIONS OF SIDEWALKS. — The builders of the new Astor Block in Broadway have done a simple but novel thing, and one which other builders would do well to imitate, and for which the public would be duly grateful. As soon as the foundation of the building was finished, the sidewalk was laid, but a temporary covering was placed over it to protect pedestrians from falling debris. Usually, the construction of a new building blocks the sidewalk and drives thousands of passers-by into the street. Builders in other cities might take a hint from their metropolitan brethren. — *Providence Press.*

FRUGALITY IN THE USE OF WOOD. — An Ottawa, Ontario, paper, in speaking of the lumber interests at that point, says that slabs nowadays at the various saw-mills are almost invariably worked up into fence-pickets and lath, and have become a source of wealth to the mill man, paying about as well as the lumber itself. But still there are the edgings, which are cut into four-foot lengths and sold for firewood, as well as the worst of the blocks produced, the best of the latter being disposed of to match manufacturers. Some in the trade show a wonderful knack of utilizing every iota of material in a log; after the lumber, come pickets and lath from the slabs, matches from the edging blocks, and fire-lighters from the sawdust, a portion of the latter being also used for purposes of fuel in feeding the furnaces supplying the power for the match factory and pail and tub factory. If a slab is thick enough to produce another board, it is sent through the English gate and split, the balance being passed to the lath mill, where as much of it as possible is made into lath and fence-pickets, the edgings being for firewood. Slabs that will not bear re-splitting are thrown into what is called the "hog," a machine that chews them up so effectually that one would scarcely recognize them as having once been a portion of a log. This stuff, with sawdust proper, is largely used in filling up docks and such like. The best of the blocks from deals are sold to match makers, and the rest used for firewood. Match blocks are worth about $5 per cord, and, as the production is about 150 cords for six months, it brings in quite a nice amount in a season — 900 cords at $5 a cord amounting to $4,500. — *Northwestern Lumberman.*

EGYPTIAN PAINTING. — Rawlinson says of Egyptian painting: "First of all the stone, whether it were sandstone or fossiliferous limestone, or even granite, was covered over with a coating of stucco, which was white or whitish, and which prevented the colors from being lost by sinking into the ground. Fresco painting was unknown; the Egyptians allowed the composition whereon they painted to become completely dry before they commenced even to sketch in their figures, much less to paint them. An outline was first drawn with red paint or red chalk, on the prepared surface; when this was satisfactorily executed, the filling in began. The scale of colors known to the artists was not extensive. Besides black and white, and the three primitive colors, red, blue, and yellow, the Egyptians employed only green and brown, together with a light wash of the black, which produced a sort of gray. The black is bone-black, very decided and very durable; the white is a preparation of pure chalk, with a slight trace of iron. The red and the yellow are ochres, the coloring matter being iron, not, however, artificially introduced, but mixed by nature with the earthy substance. The blue color is derived from the oxide of copper; but before becoming a pigment it has been combined with glass, which has then by trituration been reduced into a fine powder. The green is this same preparation combined with a certain amount of yellow ochre. The brown is probably a mixture of the blue-black with the red. A somewhat narrow gamut of color was thus formed. The Egyptian artists appear to have enlarged it by employing several shades of the primitive colors, — three, at least, of blue, one very dark, another of medium hue, and a third very light, resembling our 'sky blue;' two of red, a scarlet and a red-brown, and at least two of yellow, a darker and a lighter. They used also at least two shades of green and several of brown, ranging from a light drab to a hue nearly approaching black. But they were ignorant of lilac, of purple, of orange, of crimson, of olive, and were thus compelled to abstain from all attempts to produce that sort of beauty which is caused by the employment of half-tints and the 'soft and gradual transition of one tint to another' which is to the eye what 'an harmonious concert of music is to the ear' (Reynolds), and which especially characterizes the Italian schools of Bologna and Venice. They had to depend on the broad contrasts of the primitive tints mainly, and were thus thrown upon the style of coloring which produces its effects by striking contrasts. It is quite possible to obtain a good result in this way. Only let care be taken that the colors are strong and forcible, that a balance is maintained, and that the masses are broad and not too much entangled or dispersed, and an effect is produced which is simple and grand, effective and pleasing. The Egyptians, unhappily, broke up their masses of color and intermixed them in such a way that a sense of disquiet is produced; there is a general flutter and disturbance; the eye finds nothing upon which it can dwell long, or repose with a feeling of satisfaction. The painting was executed in a sort of distemper. The colors were mixed with water and with a certain rather moderate amount of gum, which rendered the mixture more tenacious and adhesive. They were applied, as already observed, to a stuccoed surface, which might either be flat and unbroken or already prepared by the chisel with figures in relief or intaglio. These figures by the variations of their surfaces enjoyed the advantage of a slight variety of light and shade, which helped to mark them out, and gave their contour greater definiteness. Some compensation was thus introduced for the absence of painted chiaroscuro; but the compensation was slight, and did not extend to all classes of paintings. Altogether it must be said that, while as artistic productions the Egyptian paintings possess only a low degree of merit, as wall decorations they were undoubtedly effective and striking."

"LAKE MACKENZIE," A FEEDER FOR THE MISSISSIPPI. — The St. Louis *Republican* says: Lake Mackenzie is one of those "possibilities of North America" recently suggested. The lake would result from a proposed closing of the northerly outlet of the valley of Mackenzie River at the line of 68 degrees north, and storing up the water of 1,200,000 square miles. And to this could be added the water of other large areas. It would be a lake of about 2,000 miles in length by about 200 of average width. Its surface would have an altitude of about 650 feet above sea-level. It would cover with one continuous surface the labyrinth of streams and lakes which now occupy the Mackenzie valley. It would be a never-failing feeder for the Mississippi. It would connect with Hudson Bay and with the "Great Lakes," and also with the interior of Alaska by connecting with the Yukon and its affluents. By concurrent results and other "possibilities" it would become during some months of each year, a navigable water, adding not less than 12,000 miles of communication to the Mississippi. It would complete the interior lines of river courses by connecting them. Cutting the "divide" which now exists between the Mississippi and Mackenzie would do this. This work is small when measured by its results, and it becomes easy of accomplishment under the methods proposed. The connection of the upper Mississippi with the proposed Lake Mackenzie could be easily made. The outflow from such a lake, having a length of more than 2,000 miles from south to north, and draining a very wide range of altitudes and latitudes, would be a timely and enduring one. This lake would make possible and easy the straightening of the lower Mississippi. It would also contribute to the proposed ship channel from Cairo, Ill., to the Gulf of St. Lawrence, by the almost straight line which cuts the Wabash Valley, the lakes Erie and Ontario, and the lower St. Lawrence.

PROGRESS OF THE HUDSON RIVER TUNNEL. — The New York *World* says that the work on the Hudson River Tunnel is now progressing favorably under the direction of the new engineer, General William Sooy Smith. The portion of the tunnel already built has been strengthened and it is now extending at the rate of about five feet a day, which gives promise of its completion within three years. The work now extends about three hundred feet under the river from the Jersey shore. A heading from the New York side is now being started. The present arch is thirty feet below the bed of the river, which is formed of a fine silt and is very easily worked under compressed air. A double system of air-locks has been introduced, which will give additional safety and allow more rapid progress of the work.

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.*]

244,025. Hinge. — Benj. S. Atwood, South Abington, Mass.

244,059. Telescopic Ladder. — Ferdinand W. Hotele, Brooklyn, N. Y.

244,063. Wire Lattice. — Bernard Kücken, Stralsund, Prussia, Germany.

244,066. Covering for Steam-Pipes, etc. — Robert H. Martin, Brooklyn, N. Y.

244,070. Truck for Moving Buildings. — John Minahan, Steelton, Pa.

244,092. Hydraulic Elevator. — Eli Thayer, Worcester, Mass.

244,101. Sash-Balance. — Finley F. Westerfield, St. Louis, Mo.

244,123. Sash-Weight. — Patrick H. Griffin, Detroit, Mich.

244,134. Timber-Framing Machine. — Isaac Lepley, Amador City, Cal.

244,136. Skylight. — John M. Lutz, Philadelphia, Pa.

244,162. Door-Check. — Samuel A. Armstrong, Gibson City, Ill.

244,168. Elevator. — Henry Baragwanath, Brooklyn, N. Y.

244,169. Lock-Strike. — John H. Barnes, New Haven, Conn.

244,170. Manufacture of Gas Tubing. — Samuel Barr, Providence, R. I.

244,184. Door-Spring. — Charles B. Clark, Detroit, Mich.

244,185. Spring-Hinge. — Charles B. Clark and Henry C. Hart, Detroit, Mich.

244,206. Sash-Cord Fastener. — Thomas P. Dunne and Paul Rath, New York, N. Y.

244,209. Lathing-Hammer. — Homer G. Elliott, Hicksville, O.

244,211. Fire-Grate. — Adam C. Engert, Three Mills Lane, Bromley-by-Bow, England.

244,219. Water-Closet and Bidet Bowl. — John Flanagan, Newburg, N. Y.

244,224. Roof for Vaults. — Hamline Q. French, New York, N. Y.

244,269. Pipe-Tongs. — Charles H. Lovrien, Erie, Pa.

244,298. Locking-Latch. — Anders Rand, Galveston, Tex.

244,305. Ventilating and Fire-Extinguishing Apparatus. — Christian Raub, St. Louis, Mo.

244,309. Ratchet Screw-Driver. — Leverett E. Rhodes, Hartford, Conn.

244,323. Fire-Escape. — Lorenzo D. B. Shaw, Revere, Mass.

244,327. Composition for Preserving Wood. — Bat Smith, Spanish Camp, Tex.

244,335. Circular Sawing Machine. — Daniel O. Striffer, St. Louis, Mo.

244,348. Artificial Stone. — David G. Weems, Baltimore, Md.

244,358. Jail or Prison. — William H. Brown and Benjamin F. Haugh, Indianapolis, Ind.

SUMMARY OF THE WEEK.

Atlanta, Ga.

Houses. — Messrs. Parkins & Bruce, architects, have in hand houses for the following gentlemen: —

Mr. Burkhardt, cost $6,000; E. F. May, cost $10,000; D. A. Beatie, cost $6,000; Henry Hilyer, cost $7,000; R. S. Jefferies, cost $15,000; A. G. Grier, cost $6,000; three cottages for W. R. Hill, cost $5,000; nine cottages for J. T. Grant, cost $15,000; and J. J. Pilisbury, cost $3,000.

Stores. — Messrs. Parkins & Bruce, architects, are building a store for W. D. Grant, cost $10,000; and one for J. C. Fuller, cost $3,000.

Bank. — Alterations costing $10,000 on the Atlanta National Bank are being carried out by Messrs. Parkins & Bruce.

Baltimore.

Building Permits. — Sixteen building permits have been issued since the last report, the following only being of sufficient importance to be mentioned: —

Strawbridge M. E. Church, stone church and chapel, cor. Wilson St. and Park Ave.

Marine Bank, two-st'y brick building, n w cor. Second and Frederick Sts.

E. W. Gorman, three-st'y brick building, Patterson Park Ave., near Gough St.

F. Siebert, two-st'y brick packing-house, Carolina St., near Alice Anna St.

Henry Taylor, addition and improvements to warehouse on Baltimore St., between Eutaw and Howard Sts.

John Fleckenstine, two-st'y brick building on Dallas St., between Gay and Chew Sts.

Store. — Mr. Charles L. Carson is preparing drawings for an addition to the store of Mr. Joel Gutman, on Eutaw St., near Fayette St., 56′ x 49′, 2 stories high; cost, about $7,000.

Boston.

Building Permits. — During the month of June the following permits were issued: —

Brick, 42; wood, 70; alterations, 204; boilers, engines, etc., 33; heating, etc., 29.

Semi-Annual Report. — The semi-annual report from the office of the Inspector of Buildings shows the following permits granted for the first six months of the year: —

Brick, 147; wood, 337; wood (special), 7; alterations, etc., 1,274; boilers, etc., 206; heating, etc., 121.

The permits for brick buildings show an advance of from 10 to 30%, and for wooden buildings, from 3⅓ to 40% over any year except 1875, while the others are in advance of any year since the formation of the office.

Permits not written up since the first of the month, but will be ready for next issue.

Hotel. — Ex-Alderman Flynn has decided on plans for his new hotel at City Point.

Freight-House. — The N. Y. & N. E. R. R. will build a wooden freight-house, 52′ x 830′, on Pier No. 1, South Boston flats.

Brooklyn.

Building Permits. — *Van Buren St.*, s s, 291′ 9″ w Throop Ave., 2 two-st'y brownstone dwells.; cost, each, $4,000; owner and builder, Chas. Isbill.

Van Buren St., s s, 147′ 9″ w Throop Ave., 3 two-st'y stone dwells.; cost, each, $5,800; owner and builder, Chas. Isbil.

India St., s s, 100′ e Manhattan Ave., three-st'y brick tenement; cost, $5,600; owner, Daniel McCollum, India St.; architect, James Mulhaul; mason, Jas. Rooney.

Elm Pl., w s, 100′ s Fulton St., three-st'y stone theatre; cost, $75,000; owners, B. Lewis, Wm. Barry, and Hugh Fay, 161 Montague St.; architect, A. Jones.

Concord St., s s, 100′ w Bridge St., 2 three-st'y brick dwells.; cost, each $5,500; owner, E. T. Backhouse, Carlton Ave.; builders, E. F. Smith and T. K. Schermerhorn.

Atlantic Dock, s s, 300′ n Clinton Wharf, eight-st'y elevator; cost, $6,000; owner, etc., Atlantic Dock.

Greene Ave., n s, 140′ w Yates Ave., 4 two-st'y brownstone dwells.; owner and builder, John Cregier, 81 Reid Ave.

Yates Ave., n w cor. Lexington Ave., three-st'y brick store and dwell.; cost, $6,200; owner, J. Quinn, 469 Macon St.; architect, J. D. Reynolds.

Cumberland St., w s, 28′ s Fulton St., three-st'y brick stable; cost, $5,200; owner, Joseph Johnson; architect, F. D. Morris; builders, Thos. Donlon and Wright & Brook.

Jefferson St., near Bedford Ave., three-st'y brick public school; cost, $40,000; owner, Board of Education; architect, J. W. Naughton; builders, P. J. Carlin and P. F. O'Brien.

Broadway, No. 371 E. D., four-st'y brick store and tenement; cost, $11,500; owner, William R. Bell, 118 South Fifth St.; architect, C. F. Eisenach; builders, S. J. Burrows and C. L. Johnson.

Wythe Ave., between Hewes and Hooper Sts., 10 three-st'y brick tenements; owners, D. Appleton & Co., Bond St., N. Y.; builder, G. H. Stone.

Lorimer St., w s, 125′ n Calyer St., two-st'y brick dwell.; cost, $5,400; owner, Gertrude Calyer, cor. Calyer and Lorimer Sts.; architect, F. Weber; builders, J. Reed and T. Kepple.

Remsen St., s s, 75′ e Clinton St., four-st'y brick dwell.; cost, $20,000; owner, William Hester, 36 Fulton St.; architect, G. L. Morse; builders, P. J. Carlin and Morris & Selover.

Alterations. — *Washington St., Nos. 196 and 200*, s s, repair damage by fire; cost, $3,091; owner, Brooklyn Institute; builder, E. Smith.

Remsen St., No. 36, raise one-st'y; cost, $3,000; owner, Josiah O. Low, on premises; architects, W. Field & Son; builders, Martin & Lee.

Remsen St., No. 34, improvements same as last; cost, $5,600; owner, E. H. R. Lyman, on premises; architects and builders, same as last.

Sixth St., between North Ninth and North Tenth Sts., add two stories to the one-st'y building, and one st'y to the two-st'y building; cost, $3,500; owners, Wadsworth, Martinez & Co., 207 Pearl St., New York; architect, Joseph Todd; mason, J. Doremas.

Buffalo.

Houses. — Prospect Ave. cor. Porter Ave., brick dwell.; cost, $14,000; owner, Mr. John Smith; architects, Messrs. Porter & Percival.

Franklin St. cor. Allen St., brick dwell.; cost, $18,000; owner and architect, F. W. Caulkins; builders, J. Beier & Son.

Factory. — Ellicott St. cor. North Division St., seven-st'y brick factory; cost, $25,000; owners, Messrs. John C. Jewett & Sons; architect, Geo. J. Metzger; builders, Rumrill & Rupp.

Chicago.

Building Permits. — C. C. Peterson, three-st'y brick store and dwell., 24′ x 70′, 601 West Indiana St.; cost, $6,000.

A. Dixon, two-st'y brick barn, 50′ x 94′, 301 Fifth Ave.; cost, $6,000.

City, two-st'y engine-house, 24′ x 100′, Jane St. and Ashland Ave.; cost, $10,000.

A. Garrity, three-st'y brick dwell., 24′ x 60′, 701 Wells St.; cost, $3,500.

J. A. Saxton, 3 three-st'y brick stores and dwells., 58′ x 41′, Sixteenth St., near Wabash Ave.; cost, $9,000.

F. J. Nellig, three-st'y brick store and dwell., 25′ x 50′, 3 3 Thirty-first St.; cost, $4,500.

Mrs. — Rallan, two-st'y brick dwell., 24′ x 43′, 96 Laflin St.; cost, $3,500.

Mrs. — Hull, two-st'y brick dwell., 22′ x 60′, 93 Laflin St.; cost, $4,500.

J. Smith, 3 three-st'y brick dwells., 50′ x 49′, Clark and Schiller Sts.; cost, $3,200.

S. Smith, 3 three-st'y brick dwells., 70′ x 65′; cost, $12,000.

J. Kincade, 5 one-st'y brick dwells., Indiana and Springfield Aves.; cost, $3,000.

H. Meyer, two-st'y brick dwell., 21′ x 54′, 388 Webster Ave., cost, $4,000.

C. J. Hull, 3 three-st'y brick stores, 24′ x 80′, 105 Blue Island Ave.; cost, $15,000.

J. B. Grommes, two-st'y brick dwell., 28′ x 70′, Dearborn and North Aves.; cost, $20,000.

B. Gale, three-st'y brick dwell., 25′ x 70′, 257 Ashland Ave.; cost, $10,000.

H. J. Dirks, three-st'y brick dwell., 40′ x 65′, 720 Wells St.; cost, $12,000.

J. Wenkler, two-st'y brick dwell., 24′ x 50′, Le Moyne and Leavitt Sts.; cost, $4,200.

J. Sampson, three-st'y brick dwell., 22′ x 59′, Webster Ave. and Hurlbut St.; cost, $6,000.

(*Continued on next page.*)