

OUR ILLUSTRATIONS.

THE NEW YORK LIFE INSURANCE COMPANY'S
NEW BUILDING.

THE handsome new building about to be erected on the corner of St. James Street and Place d'Armes, Montreal, for the head office of the N. Y. Life Insurance Co., forms one of our principal illustrations this month.

The building will have a basement, sub-basement and eight storeys. The two fronts will be of Scotch Galloway Bridge sandstone, and all the piers in basement and basement front are to be of Thousand Island red granite. All the brick and stone work will be set in cement. The inside finish of wood work is to be of polished cherry, and the floors will be laid with Georgia pine, and polished.

The building will be perfectly fire-proof, the stair-case to be of iron, with marble steps, and all corridors to be laid in tile. Size of building, 71 x 112 feet; architects, Messrs. Babbs, Cook & Willard, of New York; contractors, Simpson & Peel, of Montreal; and the following sub-contractors: Mason work, Peter Lyall; brick work, T. W. Peel; iron work, E. Chanteloup; plastering and fire-proofing, J. McLean; painting and glazing, W. P. Scott.

DESIGN FOR COTTAGE COSTING \$3,000.

We give in this number, in geometrical elevation, interesting views and plans of new designs for cottages.

The cottages are built of timber, framed and sheathed with 1-inch boards, and weather boarded over a lining of heavy weather-proof paper. The roofs are covered with I. X. charcoal tin, with standing seams.

Modern improvements, understood to be a bath-room, and kitchen with the usual fittings for hot and cold water supply, wash bowls, water-closet, tubs and boilers, with tank and cistern supply, are among the conveniences secured to these elegant cottages, at a moderate cost.

The wood work is chiefly pine, stained and varnished to preserve the effect of the natural grain. The foundations are stone and brick, the cellars cemented, brick cisterns, and soil drains.

The cost of the two cottages, built together, is estimated at about \$5,800. To erect a single house would cost probably \$3,000.

MEDICAL COUNCIL BUILDING.

The new Medical Council building which forms one of the leading illustrations in this number is situated on the corner of Bay and Richmond streets in this city, and is being erected for the Medical Council of Ontario from plans and under the supervision of Mr. E. J. Lennox, architect, Toronto. It is five stories in height, and has a frontage on Bay street of 88 feet by a depth on Richmond street of 95 feet. First two stories are built in heavy Credit Valley coursing stone. Top three stories are built of Carlton face brick, Credit Valley stone dressing, and relieved with ornamental cut brick and cut stone panels executed in Scotch sand stone. The roof is covered with terra cotta tiles. The entire structure is very substantially built. The interior is partially finished in hardwood. The building has all the latest improvements—first-class elevators, large hall and stairways, thoroughly ventilated and heated by direct low-pressure steam. The cost of the structure will be about \$75,000.

RECESS AND FIRE PLACE FOR HALLWAY.

By Geo. G. Booth.

VENEERS.

SOME of the finest veneers are still made, by preference, with the saw, notwithstanding the results obtained by knife machines. Woods like ebony and lignum-vitæ cannot be cut with a knife, while finely-figured and consequently close-grained mahogany is also difficult to cut by other means than the saw, the latter having to be, necessarily, very thin, and so finely adjusted that hardly the slightest variation shall be possible in the thickness of the veneers turned out. While a nicely arranged circular saw will turn out boards varying the twentieth part of an inch, which would be imperceptible, such a lack of uniformity in thin sheets would prove a damaging imperfection. The amount of steaming required by various woods to be made into veneers, differs considerably. Thus it is stated, an ordinary wood like black walnut, which has an open grain, will steam sufficiently in six hours, while the close-grained South American woods require 36 hours. Mahogany, tulip and rosewood, being hard to cut, require more and careful steaming and a knife in the best condition.

The capitol building at Albany, N. Y., which is but two-thirds finished, and upon which \$19,000,000 has been expended, is said to be in danger of tumbling down owing to the strain from unequal support.



CIVIC ENGINEERING.

THIS is a wide field of increasing importance embracing hydraulic, mechanical, electrical, gas, railway and road engineering, that is water supply and sewerage, electric lighting and the electric railway, the elevated and the cable railway and pavements, any one of which is the subject for a separate and extended essay. I can, therefore, only refer to a few questions in connection with each.

Water supply and drainage or sewerage, on account of their influence on the health, protection and comfort of the citizens, are first in importance. Every epidemic is immediately ascribed to the water supply or the sewers, although typhoid and diphtheria are often more prevalent in country districts, where no fault can be found with the water or the drainage. It is an annual plague in the Rocky Mountains as well as in the Panama or Roman marshes. This outcry has given rise to a new name in our profession, the Sanitary Engineer. The jurisdiction of the City Engineer does not extend into the houses. With the best arrangements, eternal vigilance is the price of exemption, and as we cannot tell how everything is working if not always in sight, and when soaked up by ice and snow, I believe the only safety is in providing for the worst. Wherever this gas can get in, make a way for it to go out—ventilate the exposed rooms as well as the sewers.

Undoubtedly there is much room for improvement in the drainage of our towns—both as to streets and houses—but the best systems for both assure us no guarantee against the ravages of an epidemic. The health commissioners have ascribed the recent epidemic at Ottawa, to the water, not because they discovered anything wrong in it—but because they could find no other solution of the question. We cannot even suggest a remedy until we know the cause. Experts are not agreed upon that—the drainage, the water supply, the heat, the drought, and deficient supply of electricity in the atmosphere, have, one or more, in turn been held responsible. As all, with the same exposure, are not victims, the individual constitution must be an element in the question. If the existing cause can be located upon the term firms, engineers may be able to deal with it—but if it is in the air we must remember that it can get there from the four quarters of the compass as well as from under our feet, from above as well as from below, and this will go on in spite of all our efforts until the last vital is poured out into the air.

Periodical outcries against the water are accompanied by demands for filtration at the works. Filtration has two sides, you "live" all the impurities in a limited space, and compel all the water to run the gauntlet through them. Frequent cleansing of the filter beds would be necessary, and how is this to be accomplished with the thermometer 20° below zero? We cannot cover acres and heat the enclosure to handle ten millions of gallons daily. Of this ten millions, two per cent, or less may be used for drinking and culinary purposes. Filtration, therefore, like ventilation should be done in the houses by those who demand it, and they must see that, by daily cleansing, they get the water in as good condition as it comes to them.

The Insurance Companies are reminding us that fire protection should be a leading consideration in every system of water supply. In gravitation supplies like Quebec with sufficient elevation, and in pumping supplies where water power is used, as in Ottawa, this result is obtained without additional cost. But where steam power is required, as in Toronto, the best fire protection—that from direct pressure from hydrants—is secured only by increased consumption of coal. The people there complain of their coal bill, but if it were less their insurance bill would be greater. They compare their consumption of coal with cities which do not lift the water half the height to which it is lifted in Toronto.

Our principal cities, Halifax, St. John, Quebec, Montreal, Ottawa, Toronto, Hamilton and London, have very efficient systems of water-supply, in respect to quality and pressure. As compared with the older systems in New York, Philadelphia and Boston, our pressure is greater and our use of steamers for fire is less. We pay more for pumping and less for fire insurance. With the exception of Winnipeg, Vancouver and Belleville, all our cities own their water-works. Quebec, Halifax, St. John, St. Catharines, Victoria and Vancouver have gravitation supplies. Montreal and London have water power supplemented by steam, with distributing reservoirs. Ottawa has water power exclusively; continuous pumping without stand pipe or reservoir since 1874, and without any failure in the supply. Both pumping power and mains are duplicated, because, with a single pump and main, in the absence of a reservoir, a break down of either suspends the delivery instantly, and in toto.

Brandon, Guelph and Stratford pump by steam, Peterborough, Port Hope and Lindsay by water power; the two latter for fire purposes only. Brampton has a gravitation supply. In Stratford and Port Hope the water power is used at nights for the electric light. This is also done in Victoria, where, with a gravitation system, the high levels are supplied during the day by steam from the electric light boilers. This economical arrangement is only applicable, for constant supply, where there is a reservoir and sufficient pumping capacity to keep it filled by working only during daylight.

Vancouver's gravitation supply is only commenced. The water is brought from a mountain canon—nearly ten miles distant—through steel pipes 22 and 16 in. diameter, and carried across a series of the sea in 60 feet water by a cast iron flexible jointed pipe. The fountain head is 160 feet above tide, the highest parts of the city being about 30 feet lower than the source of the supply.

There are a number of other Canadian towns and villages which

*Extract from annual address of President Thos. C. Keeler, C.M.E., before the Canadian Society of Civil Engineers, Montreal, Jan. 7th, 1888.

have water works. I trust we will receive a full account of them, as well as of those mentioned, through local members of this Society.

An economical and ingenious method of supplying a limited number of houses above the distributing reservoir head, has been in successful operation in Burlington, Vermont, for the last six years. An hydraulic motor is inserted in the pumping main near the reservoir, the water surface of which is 80 feet above Lake Champlain, the source of supply. Two ten-inch rising mains connect the pumps and reservoir passing through the city. The distributing pipes are fed from these mains, receiving from pumps, when in motion, and from reservoir when pumps are standing, the pressure on the motor being greater on the pump side when the latter is working, and upon the reservoir side at other times. When the reservoir is full the head is between 12 and 13 feet, and the pressure a little over 5 lbs. This motor raises the water 50 feet and delivers it through a mile of pipe into a tank having an overflow pipe into the main, so that no water is wasted. The speed of the pump worked by this motor varies from 5 or 6 strokes per minute in the night, to 25 strokes per minute in the day time. The cost of this application was under \$3,000.

Mild steel is competing successfully with cast iron for mains, rivetted for the larger sizes and lap welded for 24 inch and under. The strength and security is greater, and the cost on the whole less, because of the lighter weights, longer pipes, fewer joints, and lesser cost of transportation. Cast iron, however, maintains its supremacy for all purposes of distribution on account of the facility and economy with which connections can be made with it. Its greater durability on account of its greater thickness also checks the extension of the use of steel.

I can only direct attention to the great works going on for the further supply of New York, Liverpool, Kansas City, San Francisco, etc., and to the rapid extension of water supply to the smaller towns and villages on this continent. This last is the result of the organization of large water companies, having like the electric fire service a stipulated annuity from the corporation.

This secures the whole or the greater part of the interest on the outlay and the companies trust to other consumers to make up any deficiency. Many towns prefer to pay an annual subsidy to undertaking the works, in some cases because they are unwilling to entrust their representatives with their construction. Belleville has agreed to pay an American company 3 1/2 per cent, on an estimated cost of \$200,000, for the construction of water works.

I am not aware of the formation of any company in Canada for this purpose. If our unsupplied towns have not wisdom enough to construct and own the works which should pay them as well as it pays a company, capitalists and engineers may do a good thing for themselves and the country by showing them how it can and ought to be done.

SEWERAGE.

The foremost question in connection with sewerage is whether the combined or separate system should be adopted for new towns or for new extensions in older ones having the combined system. For house drainage, sewers require a deeper excavation than is necessary to get rid of surface water, and are therefore very costly when large enough for both purposes. The combined system is necessarily weaker in form and therefore more exposed to damage from excessive rain fall. Much depends upon climate and surface inclination of the streets, as well as the relation between the street grades and basement openings in the buildings. Before towns are sewerer all the water is carried off upon the surface, but with level streets and particularly in Northern towns when the snow is melting fast, there is a necessity for rapidly relieving the streets by underground drainage, in order to prevent flooding of basements. In the sewers of the combined system, the gas is diluted by contact with a larger body of air and water, and these sewers are flushed by the rain fall, but at irregular intervals which are too long in the dry season of summer and the cold one of winter. In the separate system, the pipe sewers are flushed automatically, and at frequent intervals at all seasons; but for this purpose water must be provided although comparatively little is required.

The separate system being much cheaper than the combined will doubtless be adopted where the question of cost is decisive, and surface water can be disposed of as before.

Our new city of Vancouver has adopted the separate system for which all the conditions are favorable, a mild climate, excessive rain fall for six months, and good grades for rapid removal of surface rain fall.

The needs of this city were so urgent that they could not wait for metal roadways, or for sewer pipes from Glasgow by the long voyage around Cape Horn. They therefore have covered their roadways with plank, and made their sewer pipes of the same material, with rubber joints, for which when necessary earthenware pipes will be substituted, all man holes, etc., being moonoliths in Portland cement.

The proper disposal of sewage, is the great question in other countries, especially where the discharge causes river pollution or endangers the source of the water supply. Chicago is extending her tunnels four miles into the lake, instead of the two miles which were considered sufficient to escape the pollution of the lake shore, by her "dredge machine" the Chicago River.

Toronto is agitated over intercepting sewers, pumping, and sewage farming. The utilization of sewage to diminish the cost of its diversion from the natural outlets is limited by local conditions. Clarification and irrigation both involve pumping, and the latter is only practicable where large areas of low, level and cheap land are to be obtained.

No system can surpass the discharge into large flowing rivers, or large bodies of water, and where these are the sources of the water supply, the best and cheapest course is to remove the intake of the latter to a safe distance.

The removal from the streets of garbage and rubbish, which may be washed into sewers, and the cremation of all combustible trash, is attracting deserved attention in towns where this new departure is needed. This cremation is as old as Jerusalem, where the fires in the Valley of Hinnom were never quenched.

PAYMENTS.

The gradual approach to the old Roman method of roadway is