THE NEW POST OFFICE, MONTREAL.

This extensive building is being erected by the Dominion Government on the site of the old Banque du Peuple, St. James Street, corner of St. François Xavier Street, and adjoining the Montreal Bank. The foundation was, it will be remembered, laid by the Hon. the Minister of Public Works. The structure is to have 120 feet frontage on St. James Street, and 92 feet frontage on St. François Xavier Street, the whole being built of Montreal grey stone, the internal faces having an air space and brick lining for protection against dampness.

The façade on St. James Street will have an imposing appearance, the ground floor story being in the Doric style, and the second and third stories having full carved Corinthian columns, pilasters and window dressings of a rich design. On St. James Street front there will be an arcade or portico for summer and winter entrance, with the latest improvements for the convenience of the public, with letter and paper slides inside and out of the building. The façade on St. François Xavier Street will be in keeping with St. James Street front, this façade having Corinthian pilasters, and being finished in every other respect similar to the main front. The other fronts will be of a plainer character. The top cornice for the two principal fronts is of a rich finish, with ornamental fascia with pateræ, dental blocks and carved modillions with panelled and moulded top finish to the roof. The roof as well as the towers will be in the French style, with crescent work for top finish; the centre or main tower terminating above the Mansard roof with a cornice and cresting work, will have a clock shewing three faces. This clock will have scroll and ornamental finish. The angle pedestals above the cornice including returns, as also chimney stacks, will be highly moulded and finished with top finials. The main lucarnes or dormer windows including the circular roof-lights, &c., will be of a neat style, giving an imposing appearance. The interior will be finished in keeping with the general design, and will have the latest and most approved arrangements for the public, and the Post-Office officials and employees. There will be strong fire-proof safes for all documents, letters, papers, &c., and hydrants and hose will also be provided in the building. The basement story will be occupied by the newspapers and mail-bags department, also keepers' apartments, coal cellars, furnaces, &c., &c. The ground or principal floor, will be occupied by the Post Office department, including Post Masters' offices, Assistant Post Master, &c., &c. The second story will be occupied by Post Office Inspector, and others, leaving a third story to be laid out hereafter as occasion may require. The contractors are Messrs. Allord & Dufort, and the architect is H. M. Perrault, Esq., of this city.

THE MEASUREMENT OF FLOWING WATER.

There is probably no point which has occasioned more dispute and litigation than the conflicting rights of persons entitled to take water power, in certain proportions, from a common source, where the demand exceeds the supply. The experiments, conducted by mathematicians and philosophers, have been, many of them, conducted on a small scale, and the results are not regarded as entirely conclusive, as the causes of contraction and other phenomena in a vein of water an inch in diameter would hardly bear the same proportion to the waters of a river discharged through a sluice. As a consequence, persons having charge of large works have endeavoured to form rules based on their own experience. English engineers, on their own account, have made many experiments to determine the difference between the theoretic discharge (computed by the laws of gravitation) and the actual discharge, as modified by friction, lateral retardation, reaction of adjacent fluid, and other causes of diminished velocity and volume, and consequently of quantity. The French Government also, some twenty-five years ago, appointed a commission to determine the question, and elaborate experiments on a very extensive scale were made by competent engineers, and the results of these experiments have brought the question within narrow limits.

In the "Philosophical Transactions" of the Royal Society of London, we have the following conclusions, which have been deduced from the experiments just referred to: 1. That the quantities discharged in equal times, are as the areas' orifices. 2. That the quantities discharged in equal times under different heights, are to each other nearly in the compound ratio of the areas of the apertures and of the square roots of the heights. The heights are measured from the centres of the apertures. The mean result, also, of several experiments, all the openings being formed in brass plates 1 20 of an inch thick, showing that, for round, triangular, and rectangular holes, the average of the numbers showing the proportion, between the theoretic discharge of the water calculated as a falling body, and the actual discharge as measured, was 6 1, and for the rectangular holes it was 6. It has also been found that the effect of gravity may be represented by 64 feet 4 inches, or 64 3—that is, the height in feet through which the body falls, being multiplied by 64 3, will give the square of its velocity in feet per second. For the actual discharge per second in cubic feet, multiply the product of the altitude or head of water in feet, the area of the orifice in square feet, and the time in seconds, by 64 3, then extract the square root, and multiply by 6. It is found also, that with small orifices the effect of a high head is to contract the vein and to diminish the discharge, so that the nearer the orifice can be brought to the surface, and yet the water be kept running with a full stream and without causing any eddy or depression of the surface, the greater will be the discharge. But with larger apertures, as, for instance, one with 3½ feet in length by 1⅝ feet in width, or 5⅝ square feet of area, the discharge increases with the increase of head.

As to the discharge of water from open notches in dams it is found to be equal to ⅔ of the discharge from an orifice of the same size with a full stream under the same head. The proportion between the theoretic and the actual discharge from the open notches varies with the depths, the factors used being less with the greater depths. An English handbook of tables gives 214 cubic feet per minute as the quantity which would run over every foot in width of a regular notch 1 foot in depth from the water's surface. The amount discharged depends very much on the form of the notch or aperture. A plain rectangular notch, cut with square edges in a three inch plank, will discharge very much less than one which has its inner edges bevelled or rounded off in the parabolic form of the contracted stream or vein of water. If the aperture be small, the difference may amount to a fourth of the whole quantity. Care should also be taken to form the wing-walls to sluices with curved or trumpet-shaped approaches, conformed to the natural contraction which may be produced by the overflow or sluice way.

To obtain the quantity which passes through a parallel channel in a given time, the sectional areas should be multiplied by the mean velocity, the latter element being obtained by adding the velocity of the water at the surface and that at the bottom of the current and dividing the sum by two. As it may not be convenient, in every case, to ascertain the velocity at the bottom, the mean velocity may be determined, with accuracy sufficient for practical purposes, by ascertaining the surface velocity in inches per second in the middle of the stream, and the mean velocity will be equal to this velocity less the square root of this velocity *minus* five. If, for example, the surface velocity in the stream is equal to 36 inches per second, the mean velocity will be found by subtracting 5 from 36, leaving 31, then extracting the square root of 31, which is 5 5, and subtracting this last figure from 36, giving 30 5 inches per second for the mean velocity. Multiplying this number by 60 and dividing by 12, or, which is the same thing, multiplying it by 5, will give the velocity in feet per minute. In the case just supposed the velocity per minute will be 152 5 feet. If, then, the water course be 4 feet wide and 2 feet deep, the amount of water discharged per minute would be 152 5 x 8 or 1,220 cubic feet.

When the overfall is a thin plate, it will discharge a greater proportionate quantity when the stream is only one inch deep than with greater depths. When the overfall is of two inch plank, the flow of water is more retarded, a greater head is requisite, and the maximum discharge is given by a head of seven inches. When the length of the overflow plank is ten feet, the coefficient is greater with a depth of five inches, and when wing boards are added, causing the stream to converge toward the overfall at an angle of 64°, the coefficient is