The several types of drop manholes are classified as follows: The open drop; the recess drop; the pipe drop; the chamber drop; and the cascade and ramp drop.

The open drop is merely an ordinary manhole sometimes slightly enlarged in diameter, into which the sewer discharges. This type should be used only where small sewers of moderate flow are concerned.

In the recess drop manhole the side of the manhole towards the upper sewer is sloped from the bottom of the manhole to the invert of such sewer, so that at such invert the diameter parallel to the axis of the upper sewer is considerably greater than at the bottom of the manhole or than the upper portion of the manhole above said sewer. In New York the slope of one to four is common. This produces a recess in the manhole below the upper sewer, down which recess the sewage from such sewer glides. The junction between the slope and the bottom of the lower sewer is curved with a radius of 3 to 5 ft. in the case of large sewers, and is lined with paving blocks. Where only pipe sewers enter the manhole at the higher elevations, the recess map be a bay extending a foot or two from one side and with vertical the upper pipe sewer merely extending through the wall of such bay and the sewage therefrom dropping down in such recess to the bottom of the manhole. This construction should be confined to house sewers only.

In the pipe drop, a vitrified pipe is attached to the outside of the manhole wall, entering through the wall at the bottom of the manhole by a bend of approximately 90 degrees. In the case of a combined sewer, this pipe is supposed to carry the dry-weather flow only, and the upper sewer is continued through an opening through the manhole wall, through which opening a considerable part of the storm water is discharged, the opening in the invert of the upper sewer by which it connects with the drop pipe serving as a leaping weir. If the upper sewer carries house sewage only, all of the sewage should drop through the drop pipe, but the line of the main sewer should be continued by an opening through the wall of the manhole to allow inspection and cleaning of the main sewer. "The advantage of this type lies in the dry-weather flow being confined entirely to the drop pipe, thus facilitating inspection of the manhole. The disadvantage is the liability of the bottom bend of the drop pipe becoming frequently obstructed; causing the flow to fall into the manhole proper, and requiring cleaning."

The chamber drop is similar to the pipe drop, except that a separate chamber takes the place of the pipe, ordinarily being constructed by building a curtain wall across the manhole near one side. This chamber is made of such dimensions as to permit the entrance of a man for inspection if occasion requires. This type, like the pipe drop, provides a dry chamber for inspection at all times. It is probably more economical for high drops than the recess type would be, but it is more costly than the pipe drop.

The cascade or ramp drop should not strictly be called a drop manhole, since it takes place over a considerable length of sewer, a manhole ordinarily being provided at about mid-length of the cascade. The cascade consists of a series of steps in the invert of the sewer, which are generally paved with granite or vitrified blocks. The ramp consists of a steep incline in the sewer without the steps. The use of steps was adopted in New York because they render the cleaning and interior examination of the sewer safer for the men and prevent development of such high velocities of sewage flow as would be developed with a ramp construction, thus reducing erosion of the lining of the sewer below the ramp.

WATER-POWERS AND INDUSTRIAL DEVELOPMENT*

By Leo G. Denis

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OUR water-powers and the part they will play in the readjustment of industrial conditions suggest various questions of vital importance to Canada. It would be presumptuous, at this stage, to predict their solution, or even to point to any definite course which should be followed; consequently the writer has confined himself to pointing out some of the principal steps required to secure the maximum of result, and to emphasizing the necessity for immediate action.

We Must Be Less Wasteful

The war has awakened Canadians to a realization of the natural resources of their country. It has thrown us back upon ourselves in a way which perhaps no other one thing could possibly have done. It has shown us we must be less wasteful in the use of our resources and must devote more attention to their more adequate development.

If we are to retain our place industrially, we must learn to do for ourselves what others have been doing for us. The time has surely arrived when we should work out our industrial independence and prepare for the industrial struggle that must follow the war; otherwise, it is more than likely we will lapse into our old helpless dependence and never realize our destiny of becoming a really great industrial nation.

It is impossible to state the definite total water-power potentiality for Canada. There are so many factors, such as allowance and facilities for artificial storage, or the adaptability of industries to seasonal fluctuation in the flow of streams. Various estimates for the Dominion have been made but all are of the nature of glorified guesses. One of the most recent estimates gives 25,000,000 h.p. as the total available water-power in Canada; another places the make-up total, exclusive of the North-west Territories, Yukon and Northern Quebec, at 17,746,000 h.p., not assuming the use of full storage possibilities; while a third estimate gives a total of over 13,000,000 h.p. for the three provinces of Ontario, Quebec and British Columbia alone.

Undeveloped Water-powers

Although the representative total for the whole of Canada is more or less uncertain, fairly definite figures are obtainable for numerous water-powers, which are, as yet, undeveloped, particularly those in the more settled southern portion of the Dominion.

The importance of our water-powers is shown in the rapidly increasing rate at which they are being utilized. As early as 1851, official records show 3,550 grist and sawmills operated by water-power in Upper Canada and Lower Canada alone. It is estimated that, in 1901, water-power utilized in the various industries for the entire Dominion amounted to 350,000 h.p., while, in 1911, a careful survey, made by the Commission of Conservation, revealed a total of 1,016,500 h.p. Estimates for 1915 show some 1,700,000 h.p. in use, and it may be taken for granted that the 2,000,000 horse-power mark has by now been reached.

*From Eighth Annual Report, 1917, Commission of Conservation, Canada.