voir, by varying the discharge pipe to give equal discharges at such varying maximum heads, or positions. Other types, of course, may be treated likewise, but under similar conditions of adjustment, etc., the form in question will always give approximately twice the discharge of any other type of cylindrical valve of same diameter.

Referring to the drawings, Fig. 1 shows a balanced valve for high or low heads, giving maximum discharge with minimum material and with least movement possible in proportion to discharge. The moving part is a section of a right cylinder, open at both ends, and actuated positively by hand or otherwise. When valve is lifted through a distance equal to or greater than the radius of the interior of the cylinder (if submerged) the liquid in which it is immersed may discharge: 1. Through



Fig. 5.

the unobstructed interior of the cylinder. 2. Through the orifice at its base, giving thus a discharge equal to that obtained through two cylindrical valves of same size of orifice.

If r be radius of interior of valve and of valve seat and R be radius of discharge pipe, then $2\pi r^2 = \pi R^2$ or $R = r\sqrt{2} = 1.414 r$.

For instance, if the moving clinder be 5 feet in diameter, the discharge pipe must be at least 7.07 feet in diameter.

The drawing shows essential parts only, but is readily understood. The valve may be made of many forms and of various materials. Inasmuch as the pressures in the valve produce stresses of tension only, the barrel or cylinder may be of ordinary thickness of boiler plate, with flanges if necessary for valve seats. If its weight be counterpoised the valve may be very easily moved by any positive acting force.

To increase efficiency of valve and prevent possible violent shocks under high heads suitable deflecting valves may be constructed in valve casings.

Fig. 2 shows a design for a hoodless cylinder valve discharging through one end and under the other end of an open cylinder, which constitutes the movable part of the valve.

Fig. 3 illustrates a balanced valve of the same type as that shown in Fig. 1, only showing the application of the valve to a setting in concrete.

Fig. 4 is similar to Fig. 2, except that it also shows the valve in a concrete setting. Fig. 5 shows another application of the hoodless cylinder valve, this time to a setting on a pipe below.

All these valves are proposals of Gen. Marshall for the Reclamation Service. In connection with their presentation, he submits the following cautionary notes respecting large valves :--

(1) Care must be taken that the valve is balanced in direction of its axis, to insure ease in operation.

(2) Valve seats may better be separately constructed rings, carefully machined to fit, and attached to valve castings. They may be of other material than the exit conduits.

(3) The guides, side bars, etc., should accurately fit and be sufficient in number and strength to prevent balloting or vibration of the cylinder when wholly or partly raised.

(4) The bails for manœuvring the valve and as guides to tail or lifting rod should not obstruct the approach of the liquid to the cylinder, which obstruction may increase the force required to manœuvre the valve.

The surfaces of approach and exit to and from (5)the valve may be such as to facilitate and increase the discharge, but such refinements should not be practised where the gain will not justify the cost.

ACCIDENTS IN MINES IN QUEBEC.

During the year 1913, there were 8,611 persons employed in the mines, quarries, clay-pits and concentrating mills of the Province of Quebec. This number is not the actual number, which was somewhat higher, but it is a reduction to a basis of 300 days work per man per year, from the actual number of days work performed, which totalled 2,583,673. The total sum paid in wages during the year amounted to \$5,401,702, or an average of \$626 per person per year. may perhaps appear low, but it must be considered that all the mines and quarries are situated in the settled parts of the province, where unskilled labor commands a much lower rate than in the average northern mining camp, and also that a certain proportion of the employed are signal-boys in the asbestos open pits, girls in the mica trimming shops, and in the asbestos sorting sheds.

Throughout the year, sixteen deaths occurred through accidents in mines, quarries, clay pits, in the province. Taking the basis of 8,611 persons employed, this gives a general proportion of 1.86 per 1,000 men employed. In the mines proper, asbestos, copper, graphite, mica, etc., the proportion was much higher; of 3,444 men, 11 were killed, or a pro-portion of 3.19 per 1,000 men employed. In the quarries proper, clay pits. brick-yards. etc., there were 5,167 persons employed, 5 of whom were killed, or a proportion of 0.97 per 1,000 employed.

BUFFALO RAILWAY TERMINALS.

Railway terminal work in Buffalo, N.Y., calling for an expenditure of \$15,000,000 to \$17,000,000, will be placed under construction in the next year or two. Plans for a new station and other improvements for the Lehigh Valley, to cost about \$5,000,000, have been approved by the Buffalo Terminal Commission. The Lehigh facilities will be shared by the Grand Trunk, Erie, Nickel Plate and Wabash. The New York Central lines are developing a scheme for a new terminal, which according to present plans will cost close to on the \$10,000,000. In addition work is now progressing new Lackawanna station which will cost about \$2,500,000.

On July 11, the Port Dover Brick and Fire Works were destroyed by fire, entailing a loss of \$20,000. It is proposed to rebuild the plant next year.