The Portage, Westbourne and North Western Railway has also quite recently changed hands and is now controlled by a syndicate at the head of which was the late Sir Hugh Allan, among other members being Andrew Allan, Robert G. Allan, of Liverpool, B. H. Buxton, of London, Eng., Lord George Campbell, W. L. Boyle, A. T. Drummond, Lieut-Governor Dewdney, H. N. Ruttan and Duncan MacArthur. Fifteen miles of this road were graded late in the fall and when tracklaying is completed on this section, there will be a total of fifty miles of finished road. Trains are now regularly running to Gladstone, and it is intended to reach Minnedosa by July and to cross the River Assiniboine by October next. Up to this point, the railway passes through a country already well settled; beyond it, its course lies as near as possible directly to Prince Albert on the North Saskatchewan,

The outlook in the North-West, notwithstanding the unhealthy real estate speculations is on the whole very favourable. Immense tracts of country are being opened to settlement through the construction of the railways, and even distant points on the North Saskatchewan are now readily reached during the summer months through the greatly improved class of steamers which ply on Lake Winnipeg and that river. A greater area, also, of desirable land has been found than was supposed to exist. It now only requires an effective immigration system to attract the surplus population of other parts of the world. The class of settlers who have taken up land during the past has been on the whole very superior and it is extremely desirable that more of their class should be found making their home in the Great North-West.

MONSTER STEAM WHISTLES.—People who in this country, complain of the noise made by railway whistles and factory "hooters" may congratulate themselves that they have not to listen to the enormous whistles now manufactured in the United States. A firm in Bridgeport, Connecticut, has recently completed one for a Canadian saw mill, the bell of which is 20 in. in diameter, a quarter of an inch thick and 27 in. long, and is placed five inches from the cup which delivers the steam. The valve is of the ordinary spring pattern, and is 4in. in diameter. The weight of whistle and valve is 406 lb., and the cost of the monster is 500 dollars. The mill, for the protection of which it has been made, has been several times burnt down, and the object, therefore, of the whistle is to arouse the surrounding country in case of a reoccurence of the catastrophe, and also to carry signals to the wood-choppers in the neighbouring forests. There is another big whistle at New Brunswick, in New Jersey State, with a deep bass hum which serves as the clock regulator for farmers and others within a radius of 30 miles of the town. There is also a whistle at Sandy Hook, 15 in. in diameter, while many of the ocean and Sound steamer have whistles from 8 in, to 10 in., which can be heard from 10 to 20 miles.

ON HYDRAULIC LIFTS FOR PASSENGERS AND GOODS.

BY EDWARD BAYZAND ELLINGTON.

(*Continued from Page* 11.)

DIRECT-ACTING LIFTS.

This safer construction is to be found in the case of those lifts which are not hoisted up from above, but pushed up from below, in such a manner that there is always a supporting column underneath the cage. Lifts have been constructed on this principle and worked by ordinary mechanical means, the supporting column being a rack, gearing into a pinion at the ground level; or, in another arrangement, the supporting column has a screw thread on its periphery, and is drawn up or down by means of a nut at the ground level. Looking to safety alone, it would not be possible to find fault with this latter arrangement; but the practicable speed of working must be extremely slow, and the power absorbed in friction very great. An hydraulic ram is clearly the right thing to use for the supporting column of the lift; and by adopting the direct-acting hydraulic ram, as shown on Page 36, it would appear as if the question of absolute safety in lifts were solved. But it is soon found that there is something still required.

An hydraulic lift, with a vertical direct-acting ram, presents some rather curious problems in construction, which increase in difficulty as the height of lift is increased, and the working pressure reduced. A low-pressure lift of this type has to be made subject to the following conditions:—

(*a*) A well or bore hole has to be sunk to a depth somewhat greater than the height of the lift, in which well is inserted the lift cylinder;

(*b*) The ram has to be of an area sufficient, when acted upon by the pressure of water at command, to overcome friction, and to raise both the load and the surplus weight required for lowering the cage when empty;

(*c*) The weight, and also the displacement, of the ram increases with its height and diameter;

(*d*) The bottom of the well being usually far below the drainage level, the water used in working has to be forced up to the drain by the descending ram;

(*e*) The pressure upon the ram at any time during its motion will vary proportionally to the difference between the head of water and the height of lift at that time.

Under these conditions it will be seen that, with a simple ram, equilibrium cannot be maintained. With a given pressure and load to be lifted, there is a limit to the height of lift; the pressure on the area of the ram diminishing as the ram ascends. In ascending with a given pressure of water, the ram would run out a certain distance, and then stop; and in descending with a given weight it would descend a certain distance, and then stop.

It is therefore necessary to balance the varying displacement, in all high lifts working with low pressures of water. It is also necessary, in order to avoid great waste of power, to balance the weight of the ram.

The usual practice has been to introduce counterweights, and chains travelling over head sheaves, as shown in Fig. 11, Page 14. The chains are of sufficient weight to balance the displacement of the ram. When the cage is at the bottom, the ram and cage are balanced by the weight of the counterweight *minus* the weight of the chain; and when the cage is at the top, the ram and cage are balanced by the weight of the counterweight *plus* the weight of the chain. The use of counterweights and chains unfortunately destroys the simplicity and absolute safety of the apparatus; for, though the risks attending the use of ordinary chain lifts are eliminated, and the chances of breakage are remote, there is still a reasonable possibility of accident.

In direct-acting hydraulic lifts the balance chain and weights entirely alter the character of the strains on the ram. For a considerable portion of its length from the top, the ram, instead of supporting the cage as a column, is thus really hanging from it: part of the ram is always in tension, and another part is always in compression, while the neutral plane varies in position according to the pressure on the ram. Should the ram break above the neutral plane, or the attachment between the ram and cage give way, the cage would be violently dragged by the counterweight to the top, the fall being as it were upwards instead of downwards.* A lift so constructed does not therefore fulfil the conditions of safety required in a first-class passenger lift; and means must be found for doing away with the chains and counterweights, leaving nothing but the hydraulic cylinder, the ram, and the cage.

This condition can be obtained by increasing the working pressure, and by reducing the area, and therefore the displacement, of the ram; leaving only sufficient section to prevent its bending under the load, as shown in Fig. 9, Page 36. The

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* This happened at the Grand Hotel in Paris, when several passengers were killed.