Canadian Railway and Marine World

August, 1914.

Rolling Lift Bridge at Fort William for Canadian Pacific Railway.

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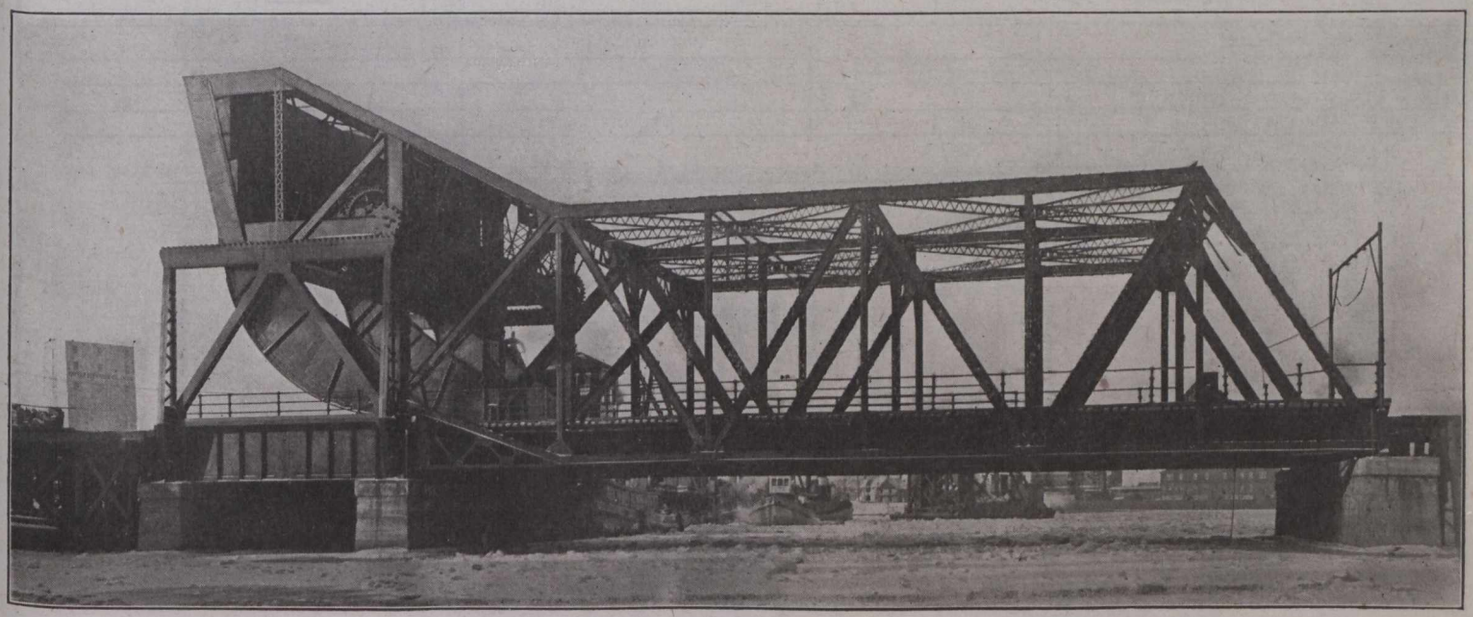
There has recently been completed for the C.P.R. a lift bridge across the McKellar River, at Fort William, Ont., to enable it to reach its new terminal yards on Island No. 1. It is a single leaf, four track, Scherzer rolling lift bridge. The movable span is 120 ft. c. to c. of supports, giving a clear channel of 114 ft., while the track for the segmental girder is 32 ft. long. The total width of the bridge out to out is 61 ft. Two of the tracks are for the C.P.R.; the other two are for electric cars. There are three trusses 31½ ft. c. to c. and 31½ ft. deep. The segmental girders have a radius of 25 ft., and when the bridge is rolling or opening they travel approximately 30 ft.

There are two operating motors, which



Rolling Lift Bridge Across McKellar River, Fort William, Ont.

are not fixed on the stationary part of the bridge, but move with the bridge when it opens. They are connected by gearing to pinions which mesh with racks on the rack girder, which is stationary. When the bridge opens, it merely rolls backward, and in order to ensure this the segmental girders are meshed into the track girders by means of a form of gearing consisting of square projections about 1 in. high on the track girders, with corresponding recesses in the segmental girders. The angle through which the bridge leaf moves between the closed and open position is approximately 74 degrees. No equalizing gear is interposed between the operating pinions and the motors to balance up the stress of each of the pinions, but two couplings have been provided on the main shaft which had to be drilled in the field after all the gears had been adjusted.

There are two operating motors 37 h.p. 680 r.p.m. 550 volt, 60 cycle, fitted with solenoid brakes. As the motors turn through approximately 74 degrees around an axis parallel to the motor shafts, the bearings have been specially designed. For the same reason it was not possible to fit the solenoid brakes in the usual manner on the end shield, but the solenoid brake has been turned through 45 degrees. This arrangement avoids the solenoids being in a horizontal position when the bridge is open. They are provided with release attachment and automatic trip.

For the operating motors two controllers geared together have been used.

The two end locks are motor operated by a 2 h.p. 1,200 r.p.m. 550 volt, 60 cycle motor. It is fitted with solenoid brake and operates the end locks through worm gearing. It only operates in the horizontal position, but as it moves with the bridge, it was necessary to provide it with special bearings. Provision was also made for operating the end locks by hand, by means of a lever in the operator's cabin. When the end locks have been withdrawn, they are held back by means of catches, and remain in that position during the whole time the bridge is raised. Provision is made for the catches to be knocked out by a stop as the bridge again reaches the nearly closed position. The position of the end locks is indicated in the operator's cabin by means of an indicating lamp, operated through a lock signal switch.

The emergency brake is operated by a 3 h.p. 550 volt, 60 cycle motor, which is geared to a crank disc. A pin on this disc is connected to a lever, which releases the brake mechanism. The brake is normally set by a spring. There is a small solenoid brake on the motor, which sets when current is applied, and releases when current is off, thus operating in the reverse manner to the usual solenoid brake. A drum type limit switch mounted on top of the motor and driven by a sprocket chain from the back shaft of the motor is used to make proper connections. The operation is as follows: Assuming the main brake is set, to release the brake the triple pole line switch on the emergency brake circuit is closed. The motor immediately starts and makes a few revolutions, bringing the crank disc pin to the upper position. When it reaches this point, the limit switch opens the motor circuit and at the same time energizes the solenoid, thus setting the brake on the motor. This holds the motor and prevents it from rotating backwards. So long as the solenoid brake is energized, the main brake is kept in release. To set the brake, the triple pole switch is opened. This deenergizes the solenoid and releases the brake on the motor. The force of the spring on the main brake then immediately pulls around the crank disc and resets the brake.

When the bridge is closed and ready for traffic, the arm of the lock signal switch and the arm of the bridge signal switch are in the position marked "Closed," and the contactors in the circuits of the main operating motors and the lock are open. To open the bridge the first step required is to set the railway signals at "Danger." Until this is done, the lock motor contactors remain open and the end lock cannot be withdrawn. Until the end locks are withdrawn, the contactors of the operating motors remain open and these motors cannot therefore be started.

The action of moving the lever to set the railway signals at "Danger" closes the switch in the railway signal cabin. When this switch is closed, the contactor coils of the lock motor are energized and close the contactors. The circuit breaker is then closed, the controller handle of the lock moved around and the lock withdrawn. As the lock bar moves out it operates the lock signal switch, and this in turn changes the signal lights in the railway signal cabin