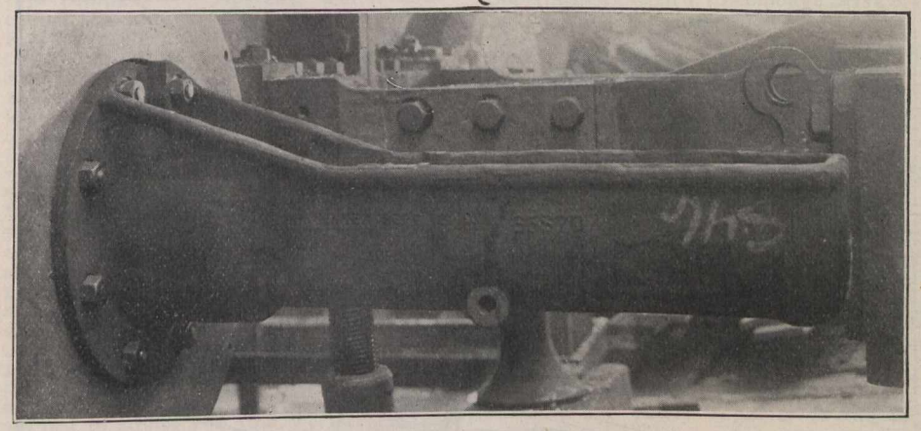
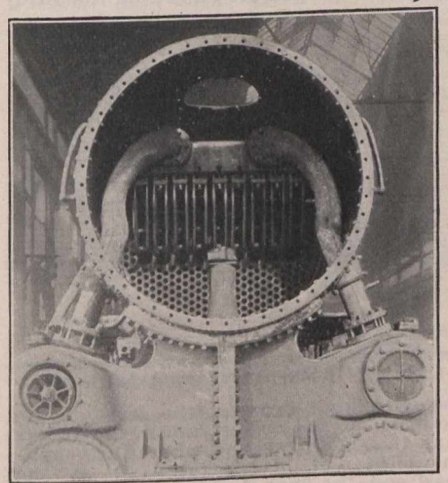
time its axis exactly coincides with the longitudinal axis of the cylinder. It also provides ample wearing surface to insure long service without requiring adjustments. The general construction of this device is shown in one of the accompanying illustrations. The guide is so constructed that it is bored out and faced off at one setting on the machine. Its circular face registers with a corresponding face on the front cylinder head and the surface of the guide is struck from the centre of the cylinder. The shoe fitted to the extension of the piston rod has a radial bearing on the guide. Consequently, any refinement in adjustment between the piston rod shoe and the main cross



C.N.R. Locomotive. Piston Crosshead Guide.

head is unnecessary because, while the latter works in a flat guide, the former will swing around on the centre of the cylinder so that it will always take a fair bearing without cramping. The guide casing is open at the top, with a corresponding opening in the flange; so that the guide can be easily removed, if the engine is on the forward centre, without taking down the pilot and bumper. It is provided with a dust tight top and cover and with oil stops; so that the shoe always runs in oil. Experience with this device, covering nearly two years on a large railway in the northwest of the



C.N.R. Locomotive. Arrangement of Outside Steam Pipes.

United States, indicates that the wear on the shoe and guides in two or three years will not exceed 1-16 in. This obviates the necessity of relining between general shoppings. In view of the general use of extended piston rods on superheater locomotives, this device represents an important improvement in locomotive construction.

In the boiler construction, the principal features of interest are the superheater and the brick arch. The superheater is the Locomotive Superheater Co.'s type A. design. This arrangement employs a top-header and superheater pipes of the double loop construction. It is arranged to give a high degree of superheat and provides a superheating surface of 279.6 sq. ft. Because of the use of superheated steam, a low boiler pressure of 170 lbs. is employed. The boiler, however, is designed to stand a pressure of 200 lbs. The brick arch is supported on studs.

Following are the principal dimensions of the locomotives:—

Fuel	Soft coal
Weight on drivers in running order	112,500 lbs.
Weight on truck in running order	41,500 lbs.
Weight, total of engine in running order	154,000 lbs.
Weight of tender in running order	123,400 lbs.
Wheel base, driving	13 ft. 6 ins.
Wheel base, total engine	23 ft. 10 ins.
Wheel base, total engine and tender	52 ft. 8 ins.
Tractive power, maximum	243,000 lbs.
Adhesion (factor of)	4.63
Cylinders, diameter and stroke	20 in. by 24 in.
Valves, type of gear	Walschaert
Valves, diameter	12 in.
Greatest travel	5½ in.
Lead in full gear	3-16 in. lead constant
Driving wheels, diameter outside tire	57 in.
Driving journals, diar. and length.	8½ in. by 10 in.
Main crank pin journals, diar. length,	6 in. by 6 ins.
Side rod crank pin journals, diar and length	6¾ in. by 5 in.
F. H. B. journals	4½ in. by 3⅝ in.
Engine truck, type	4 wheel with swing bolster
Engine truck journals, diar. and length	5½ by 10 ins.
Engine truck wheels, diar.	30 ins.
Boiler, style	Extended wagon top, radial stay
Boiler, outside diar. front end	58¼ in.
Boiler, outside diar. largest course	65 in.
Boiler, height over crown, front	21½ in.
Working pressure	170 lbs.
Firebox, length	102⅛ in.
Firebox, width	41¼ in.
Firebox depth	Front, 71½ in. back 58½ in.
Firebox, depth (top of grate to cen. lowest tube)	28-15-16 in.
Tubes, material	Kewa seamless steel
Tubes, thickness	no. 11 B.W.G.
Tubes, number of	133
Tubes, diameter	2 in.
Tubes, length	13 ft. 2¼ in.
Flues, material	Kewa seamless steel
Flues, number of	18
Flues, diameter of	5⅜ in.
Flues, spacing of	6¼ in. and 6⅝ in.
Heating surface, tubes,	1,241 sq. ft.
Heating surface, firebox	141 sq. ft.
Heating surface, total	1382 sq. ft.
Superheating surface (on basis of inside diar of superheater pipes)	279.6 sq. ft.
Grate area	29.2 sq. ft.
Exhaust pipes	Ry. Co.'s standard with single nozzle
Exhaust nozzle	4¾ in.; 5 in. and 5¼ in.
Smoke stack, diameter inside	16 in.
Tender wheels, number of	8
Tender wheels, diameter	33 in.
Tender journals, diar. and length	5½ in. by 10 in.
Tender wheel base	17 ft. 10 in.
Tender frame	13 in. cen. and 10 in. outside channels
Tender trucks, type	Ry. Co.'s 4-wheel pedestal type
Tank, kind	water bottom
Tank capacity	5,000 imp. gals.
Tank, coal capacity	10 tons

G. G. Hare, Assistant Engineer, Dominion Atlantic Ry., Kentville, N.S., writes:—"I enclose renewal order for my subscription to Canadian and Marine World. Please forward me the July and August numbers, which I have not received, owing to my removal here from Kingston, Ont., so that my file of your valuable publication may be complete."

Removing and Repacing a Wrecked Timber Truss Span on the C.N.R.

The clearing of a wrecked timber truss span and erection of a temporary structure, restoring traffic, was accomplished in three days on the Canadian Northern Ry. at Saskatoon, Sask., where a derailed car demolished the north shore span of the bridge over the South Saskatchewan River. This bridge consists of six 150 ft. through Howe truss spans of timber on concrete piers, the rail elevation being about 45 ft. above the surface of the water. The bridge was of Pacific Coast fir in first class condition. It was built about six years ago.

As one of the southbound through passenger trains, carrying several sleeping cars on its rear end, was pulling through the south end of the yard at the approach to the bridge on March 4, the rear truck of the last sleeper left the rails at a switch about 500 ft. north of the bridge. The truck slewed and led off on the switch to the west or right hand side until the wheels that should have been on the left hand rail were over a foot outside the right hand rail and beyond the guard timber. There was a 30 ft. approach trestle, but the wheels were hanging over the ends of the ties when this was reached, so the guard rails could have no effect. The sleeper was dragged in this position on to the bridge, sideswiping the truss and breaking or knocking out the posts and diagonals. This span collapsed completely, falling with the last car to the river bed below, which was almost dry and frozen to the bottom. The damage to the bridge did not extend beyond the first pier and the car preceding the one which wrecked the truss remained on the structure, having its rear badly damaged, however. Fifteen passengers were in the rear sleeper, and 12 were injured, but none fatally. A fire started in the wreckage, but was quickly put out by the city forces.

The werckage of the truss and the car was cleared away with the aid of a Lidgerwood ballast unloader, which dragged it sideways off the bridge site. A track which runs west along the river bank at right angles to the bridge was utilized for this purpose, the Lidgerwood car being set at the point marked A on the photograph of the reconstruction.

The cable was then run down to the wreckage, dragging the tangled mass of rods and timber and the wrecked sleeper out of the way.

Reconstruction was started by first erecting a temporary trestle over which traffic could be opened. Bents were framed on the ice and raised by a wrecking crane working outward from the shore end, blocking being put under the bents. On account of the end of the second sleeper overhanging the adjacent span, it was necessary to build entirely from the shore, so that the crane could be used to lift the overhanging car. The last two bents next to the pier were framed at the side of the bridge, then lifted clear and swung into place. When all but one panel of the trestle was decked, the crane lifted the end of the hanging car and pushed it forward on the undamaged part of the bridge.

With traffic thus restored, work was continued on the erection of the permanent Howe truss span, utilizing the trestle for falsework. Additional posts were placed vertically on the end of each sill to carry the weight of the new span.

The nature of this accident was such that it was believed to be unpreventable by the guard rails, and it is also believed that a steel structure would have suffered similarly.

The clearing of wreckage and re-erection of the span was done under the direction of J. A. Crawford, Bridge and Building Master, C.N.R. at Saskatoon.