

Three-Cylinder Mountain Type Freight Locomotive Built by the American Locomotive Company for the Delaware, Lackawanna & Western

# Lackawanna Buys Twenty-Five Three-Cylinder Locomotives

*Now being used in freight service over the heavy grades between Scranton and Hoboken*

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EARLY in April of last year, the management of the D. L. & W. placed an order for 25 three-cylinder Mountain type locomotives with the American Locomotive Company. These locomotives were recently delivered and have been placed in slow freight service. They were purchased primarily to operate over the heavy grades between Scranton, Pa., and Hoboken, N. J., where the ruling grade, eastbound from Scranton to Nay Aug, Pa., a distance of 5.4 miles, is 1.67 per cent, and from Nay Aug to Lehigh, Pa., a distance of 13.05 miles, is 1.21 per cent. Trains are assisted on these grades by two-cylinder Mikado type locomotives. There is, however, another grade of .55 per cent between Slateford, Pa., and Port Morris, N. J., a distance of 28 miles, where the new Mountain type locomotives handle their tonnage unassisted in eastbound movement.

These locomotives develop a tractive force of 77,600 lb. An additional tractive force of 11,200 lb. is provided by a booster, making a total of 88,800 lb. starting tractive force. They have 63-in. diameter drivers. The inside cylinders have a diameter of 25 in. and a stroke of 28 in. and the two outside cylinders have a diameter of 25 in. and a stroke of 32 in. The boiler operates at a pressure of 200 lb.

The new three-cylinder locomotives are a development from two other classes; namely, the Mikado locomotives, referred to in a preceding paragraph as being used in pusher service between Scranton and Lehigh, and five three-cylinder Mountain type locomotives, which were placed in fast passenger service early in 1925. A description of the Mikado type locomotives was published in the March 3, 1923, issue of the *Railway Age*, page 511, and a brief description of the three-cylinder Mountain type passenger locomotives, including data pertaining to the kind of service in which they were placed at that time, was published in the May 16, 1925, issue of the *Railway Age*, page 1201.

A comparison of these three classes of locomotives

is given in one of the tables. From this table it will be observed that the new three-cylinder Mountain type freight locomotives have a tractive force for the main engine of 77,600 lb. as compared to a tractive force of 67,700 lb. for the Mikados. They are equipped with 50 per cent cut-off boosters which have a tractive force of 11,200 lb., as compared to a full cut-off booster with a tractive force of 11,500 lb. for the Mikados. The diameter of the driving wheels of both types of locomotives is identical.

The three-cylinder freight locomotives, however, develop an increased tractive force with a total weight on the drivers of 274,000 lb., operating with a factor of adhesion of 3.54, as compared with a weight on the drivers of 276,500 lb. and a factor of adhesion of 4.08 for the Mikados. Naturally the new locomotives are easier on the track, because the lower factor of adhesion permits more effective use of the weight and they do not slip their driving wheels as readily as the Mikados. This shows that the three-cylinder feature is a distinct advantage in tractive force and in the ease with which, it is observed, such locomotives handle additional tonnage.

The boosters operating on the 50 per cent cut-off principle of steam distribution are economical in use of steam and the locomotive can be operated with the booster engaged for relatively long periods of time without reduction of steam pressure. The booster has been kept in operation in tests from Scranton to Gouldsboro, Pa., a distance of approximately 21 miles, and the steam pressure was maintained without difficulty in handling full tonnage trains.

The cylinder load is divided between two main axles. The middle cylinder is connected by a middle main rod to a crank axle on the second pair of drivers in the usual manner. The outside cylinders are connected to the third pair of drivers. In this way the power is divided between two separate axles and less load is carried by the rails than would be the case were all the



cylinder effort handled by a single main axle; this is also an improvement.

Ten of these locomotives are equipped with Nicholson thermic syphons, two syphons per firebox. Eleven locomotives are equipped with Standard type "B" mechanical stokers, the remaining 14 have Duplex type D-1 mechanical stokers. All 25 locomotives are equipped with Security brick arches set tight against the throat sheet, and each is equipped with the Cleveland low-water alarm, the Ashcroft DA locomotive cut-off control gage, which registers the steam chest pressure and back pressures, B-S drifting valves, Chambers front end throttle valve for superheated steam, the Nathan water column and gage cocks, Type A superheater with the loose

COMPARISON OF THE PRINCIPAL DIMENSIONS OF THE MIKADO AND THE THREE-CYLINDER MOUNTAIN TYPE LOCOMOTIVES

Service	Mikado	Three-Cylin-	Three-Cylin-
	Type	der 4-8-2, 1925	der 4-8-2, 1926
	Freight	Passenger	Freight
Cylinders, diameter and stroke:			
Inside	28 in. by 32 in.	25 in. by 28 in.	25 in. by 28 in.
Outside	28 in. by 32 in.	25 in. by 28 in.	25 in. by 32 in.
Weights in working order:			
On drivers	276,500 lb.	256,000 lb.	274,000 lb.
On front truck	25,500 lb.	66,500 lb.	59,500 lb.
On trailer truck	60,500 lb.	59,500 lb.	60,500 lb.
Total engine	362,500 lb.	382,000 lb.	394,000 lb.
Diameter driving wheels	63 in.	73 in.	63 in.
Boiler pressure	200 lb.	200 lb.	200 lb.
Tractive force	67,700 lb.	61,100 lb.	77,600 lb.
Tractive force of booster	11,500 lb.		11,200 lb.
Tractive force, engine and booster	79,200 lb.		88,800 lb.
Factor of adhesion	4.08	4.2	3.54

finger header, the Superior type E soot blower, Alco power reverse gear, Baker heavy type valve gear, automatic adjustable driving box wedges, the pneumatic firedoor, radial buffer and unit drawbar between the engine and tender, the latest design of narrow type Franklin grease screens and cellars, and the Everlasting Company's blowoff cock and tank valve.

The locomotives are also equipped with engine trucks of the Commonwealth constant resistance rocker type, Delta trailer trucks, Commonwealth cast steel tender frames and rear main cradle frames and Davis tender inside brake beams with Creco four-point supports.

The locomotives are capable of handling 7,000 tons assisted over the heavy grades from Scranton to Lehigh by the Mikado type and unassisted from Lehigh to Hoboken. They have broken in in a most satisfactory manner and bid fair to continue a very satisfactory performance.

DIMENSIONS, WEIGHTS AND PROPORTIONS OF THE D. L. & W. THREE-CYLINDER FREIGHT LOCOMOTIVE No. 2203

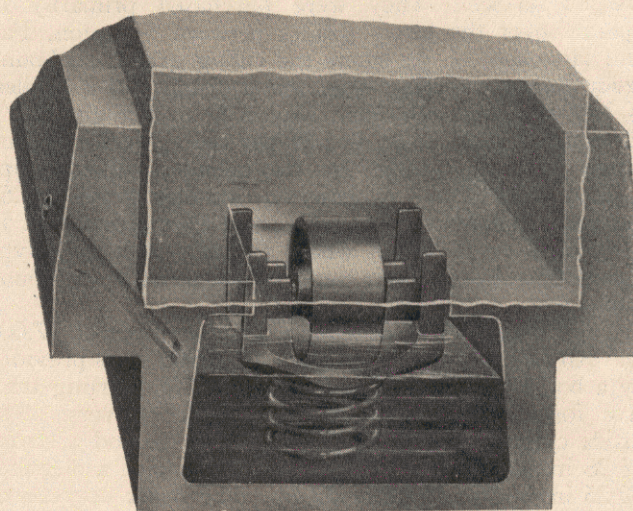
Railroad	D. L. & W.
Builder	American Locomotive Co.
Service	Slow freight
Cylinders, diameter and stroke:	
Inside	25 in. by 28 in.
Outside	25 in. by 32 in.
Valve gear, type	Baker
Valves, piston type, size	12 in.
Maximum travel	7 1/4 in.
Outside lap	1 1/4 in.
Exhaust clearance	3/8 in.
Lead in full gear	1/8 in.
Weights in working order:	
On drivers	274,000 lb.
On front truck	59,500 lb.
On trailing truck	60,500 lb.
Total engine	394,000 lb.
Total engine and tender	609,000 lb.
Wheel bases:	
Driving	17 ft. 6 in.
Total engine	39 ft. 11 in.
Total engine and tender	75 ft. 9 1/2 in.
Wheels, diameter outside tires:	
Driving	63 in.
Front truck	33 in.
Trailing truck	43 in.
Journals, diameter and length:	
Driving	11 1/2 in. by 14 in.
Front truck	7 in. by 14 in.
Trailing truck	9 in. by 14 in.
Boiler:	
Type	Conical

Steam pressure	200 lb.
Fuel, kind	Bituminous
Diameter, first ring inside	90 1/8 in.
Firebox, length and width	120 1/2 in. by 96 in.
Combustion chamber, length	43 in.
Flues, number and diameter	50, 5 3/8 in.
Tubes, number and diameter	285, 2 in.
Length over tube sheets	21 ft.
Grate area	73.2 sq. ft.
Heating surfaces:	
Firebox and combustion chamber	316 sq. ft.
Arch tubes	24 sq. ft.
Tubes and flues	4,590 sq. ft.
Syphons	80 sq. ft.
Total evaporative	5,010 sq. ft.
Superheating	1,292 sq. ft.
Comb. evaporative and superheating	6,302 sq. ft.
Tender:	
Water capacity	12,000 gal.
Fuel capacity	14 ton
General data, estimated:	
Rated tractive force	77,600 lb.
Rated tractive force, with booster	88,800 lb.
Weight proportion:	
Weight on drivers ÷ total weight engine, per cent	69.5
Weight on drivers ÷ tractive force	3.54
Total weight engine ÷ comb. heat. surface	62.4
Boiler proportions:	
Tractive force ÷ comb. heat. surface	12.3
Tractive force × diam. drivers ÷ comb. heat. surface	774
Firebox heat. surface ÷ grate area	4.32
Firebox heat. surface, per cent of evap. heat. surface	6.3

## Bronze Self-Oiling Type Gib

A BRONZE self-oiling type of crosshead gib has recently been placed on the market by the More-Jones Brass & Metal Company, St. Louis, Mo. The gib is made interchangeable for the top and bottom guide, the top guide being lubricated by means of a roller in a frame and spring, in the oil chamber, by which means the oil is deposited on the guide face by the movement of the gib.

For the lower guide, the chamber is filled with a pack-



A Bronze Gib with Oil Pocket and Roller Distributer

ing or other absorbent material with a screen placed in the opening, in contact with the face of the guide. The sliding action of the screen on the guide, and the wiping action, by capillary attraction, feeds the lubricant to the guide surface and by this means both the top and lower guides are automatically lubricated, according to the service or operation of the locomotive.

The bronze gib weighs approximately half as much as the iron gib of the same type. Therefore, the initial cost is little, if any more than the iron gib and when the bronze gib is worn out, the salvage value will offset to a great extent the original cost.