

cies of public service. Although the subject as it relates both to common carriers and public utilities has been one widely discussed and litigated for more than a third of a century, wide differences of opinion still prevail regarding many of the problems it presents.

These differences have not yet been set to rest either by commissions or by the courts. In the valuation of railroads we encounter all these complicated issues. It was not to be expected that in the most extensive valuation yet undertaken, and involving properties of great aggregate value, there would fail to develop the most searching public and legal inquiry into the administration and correctness of interpretation of a complicated act that is not entirely free from the ambiguities on which such claims have been based.

No General Rate Investigation

In our last report we referred to the general 10 per cent reduction in freight rates and charges which became effective July 1, 1922, as a result of our decision in *Reduced Rates, 1922, 676*. The effect during the calendar year 1923 of the rate reductions then made will be to lessen the total freight transportation charges paid by the shipping public by more than \$500,000,000.

In our report in *Reduced Rates, 1922*, we referred to stabilization of rates as one of the important needs of commerce. With this in mind and having in mind also the desirability of giving the basis of rates established in July, 1922, a fair trial, and of avoiding the dislocation of business and commercial conditions often incident to investigations involving the possibility of important general changes in the rate level or in the relationship of rates, we have not made any further general investigation of rates during the past year. No general reductions over the country as a whole or throughout any of the major rate groups defined by us have been made by the carriers.

But Many Rate Revisions

But the year has continued to be one of transition and readjustment of rates, largely by reductions. As indicated by specific figures in the chapters covering the work of the several sections of the bureau, the number of freight rate changes made in 1923 has been even greater than the number made in 1922, which was, up to that time, the greatest in the history of American railroads.

As in the preceding year, numerous rate controversies have been settled by negotiation with carriers and shippers without litigation. Where, upon protests of shippers, tariffs providing for changes in rates have been suspended by us, considerable success has attended our efforts to have the shippers and carriers adjust their differences, and in an increasing number of situations of this kind the protested schedules have been withdrawn by the carriers or have been permitted to become effective with such modifications as were agreed upon by shippers and carriers, thus avoiding the necessity of formal proceedings.

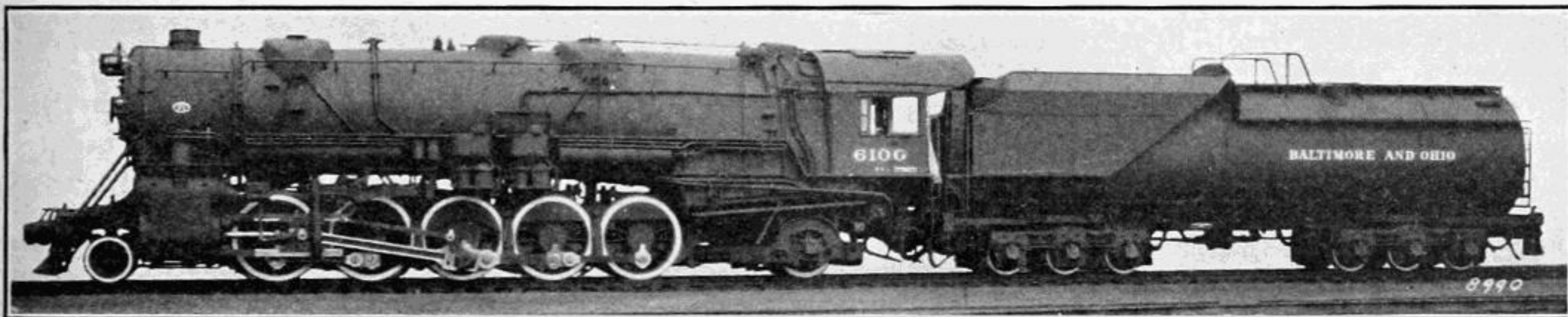
Commends Regional Advisory Boards

A new development now well under way is the organization by the Car Service Division of regional advisory boards, with various committees, for the purpose, among others, of anticipating car requirements and overcoming car-service and operating difficulties which can be worked out locally. Each board covers a convenient district and includes in its organization representatives of agriculture and important lines of industry. The committees of these boards report to the board as a whole, and the carriers co-operate with the boards. Both carriers and shippers are thus in position to understand more clearly each other's problems, and through this meeting on common ground can harmonize their differences. As a result better transportation service seems assured.

Heavy 2-10-2 Type Locomotives for the Baltimore and Ohio Railroad

The Baltimore and Ohio is now receiving from The Baldwin Locomotive Works, a consignment of 50 locomotives of the 2-10-2 type, which are notable chiefly because of their great size and hauling capacity. In these respects

as Class S. They had 30 x 32-inch cylinders and driving wheels 58-inches in diameter, and with a steam pressure of 200 pounds developed the high tractive force of 84,400 pounds. They have been used in both road and pushing



Heavy 2-10-2 Type Locomotive of the Baltimore and Ohio Railroad, Built by Baldwin Locomotive Works

they represent practically the maximum yet attained in a non-articulated locomotive, designed to operate on tracks and bridges of the heaviest description. The tenders are, in their way, quite as remarkable as the locomotives.

The last locomotives of the 2-10-2 type to be placed in service on the Baltimore and Ohio were built by The Baldwin Locomotive Works in 1914, and were designated

service, and have proved especially satisfactory in the latter class of work; the majority now being employed on the Connellsville Division as helpers on the Sand Patch grade (1.98 per cent).

Except on the mountain divisions, where Mallet locomotives are employed, the standard heavy road engine of the Baltimore and Ohio is a Mikado type with 26 x 32-inch cylinders and 64-inch wheels. The new 2-10-2 type

locomotives, designated as Class S-1, are designed to combine the hauling capacity of Class S with the higher speed capacity of the Mikado type; and with this end in view they also have driving-wheels 64 inches in diameter. These are probably the largest wheels ever used on a ten-coupled locomotive, and they fit the new design not only for heavy grade service, but also for work on divisions having moderate grades, where it is desired to haul an increased tonnage as compared with the Mikado type locomotives, while maintaining practically the same speed.

The Class S-1 locomotives are designed to traverse curves of 16 degrees, and have a maximum height of 15 ft. 5 $\frac{3}{8}$ in., a maximum width of 10 ft. 11 in., and an overall length, engine and tender, of 100 ft. 8 $\frac{1}{4}$ in. The tires on the front and rear pairs of driving wheels are set 53 inches between their inside faces, and those on the second and fourth pairs 53 $\frac{1}{4}$ inches; while the middle (main) wheels have plain tires.

The boiler has a straight top, with a slope on the bottom of the barrel at the rear end, to give ample water space under the combustion chamber. The grate area is the same as that of the Class S locomotives, and the grate castings interchange in the two designs. The firebox has a combustion chamber 39 inches long, and contains a brick-arch supported on five water-tubes. A duplex stoker is installed.

The cylinder diameter is nominally 30 inches, but the cylinders are bored, when new, to a diameter of 29 $\frac{3}{4}$ inches; while the machinery is of sufficient strength for full steam pressure with the cylinders rebored to a diameter of 30 $\frac{1}{2}$ inches. The cylinders and steam chests are fitted with gun-iron bushings, and this material is also used for the valve packing rings, and the piston bull-rings and packing rings. The piston heads are of rolled steel, and the piston rods are of carbon vanadium steel. This latter material is also used for the main and side rods. The main rods have the Markel type of back end. The crank pins are of open hearth steel, the main pins being hollow-bored. Baker valve motion is used, and the gears are controlled by a screw reverse, similar to that applied to the last Pacific and Mikado type locomotives built for this road.

The frames are 6 inches wide, and are spaced 41 inches between centers transversely. An exceptionally strong double front rail construction similar to that used on the latest B. & O. Mikados, is applied to these locomotives. The frame rails are bolted to a strongly ribbed front deck casting, which is in turn bolted to the cylinder castings, forming a most substantial construction. The cast-steel cross-ties interchange, as far as possible, with those used in the Mikado type. The rear frame is of the Commonwealth cradle pattern and the rear truck is of the Delta type, so designed that the locomotives can subsequently be equipped with boosters should this appear desirable.

The tender is carried on two six-wheeled trucks of the Commonwealth type. The wheels are of forged steel and the journals measure 6 x 11 inches. The frame is a one-piece Commonwealth steel casting and the tank has a diameter of 9 ft. 6 in. and a length of 40 ft. 5 in. The tank capacity is 15,800 gallons, and the fuel space, which has a width of 10 ft. 6 in., carries 23 tons of coal. These are the largest tenders thus far completed by the builders, and their use will undoubtedly result in more economical operation, by making possible longer runs without stopping for supplies. In this way, not only is time saved, but the possibility of damage to couplers and draft gear is materially reduced.

Further particulars of these interesting locomotives are given in the table of dimensions:

2-10-2 TYPE LOCOMOTIVE, BALTIMORE & OHIO R. R.,	
CLASS S-1	
Gauge	4 ft. 8 $\frac{1}{2}$ in.
Cylinders	30 in. by 32 in.
Valves—Piston	14 in. diam.
Tractive force	84,260 lbs.
Service	Heavy freight
Boiler	
Type	Straight top
Diameter	90 in.
Working pressure	220 lb.
Fuel	Soft coal
Firebox	
Material	Steel
Staying	Radial
Length	132 $\frac{1}{8}$ in.
Width	96 in.
Depth, front	91 $\frac{3}{4}$ in.
Depth, back	77 $\frac{7}{8}$ in.
Tubes	
Diameter	5 $\frac{1}{2}$ in. 2 $\frac{1}{4}$ in.
Number	53 232
Length	23 ft. 0 in. 23 ft. 0 in.
Heating Surface	
Firebox	262 sq. ft.
Combustion chamber	85 sq. ft.
Tubes	4881 sq. ft.
Firebrick tubes	42 sq. ft.
Total	5270 sq. ft.
Superheater	1512 sq. ft.
Grate area	88 sq. ft.
Driving Wheels	
Diameter, outside	64 in.
Diameter, center	56 in.
Journals, main	13 $\frac{1}{2}$ in. by 15 in.
Journals, others	11 in. by 13 in.
Engine Truck Wheels	
Diameter, front	33 in.
Journals	6 in. by 10 in.
Diameter, back	46 in.
Journals	9 in. by 14 in.
Wheel Base	
Driving	22 ft. 4 in.
Rigid	22 ft. 4 in.
Total engine	42 ft. 11 in.
Total engine and tender	89 ft. 10 $\frac{7}{8}$ in.
Weight (working order)	
On driving wheels	347,230 lb.
On truck, front	31,570 lb.
On truck, back	57,710 lb.
Total engine	436,510 lb.
Total engine and tender	730,000 lb.
Tender	
Wheels, number	12
Wheels, diameter	33 in.
Journals	6 by 11 in.
Tank capacity	15,800 U. S. gal.
Fuel capacity	23 tons
Equipped with superheater, stoker, and air brake on all driving and tender wheels, with two 8 $\frac{1}{4}$ -in. cross-compound pumps.	