than at the termination of government control, not only is the public paying less for its railroad transportation than at any time since the Transportation Act was passed, but it is also paying less for it than it was before the railways were returned to private operation.

"While the last advance in rates—which was rendered necessary mainly by the increase in operating expenses under government control—was made under the Transportation Act, these large reductions of operating expenses and of freight rates also have been made under the Transportation Act. How, in the face of such facts, can it be asserted, as it is in the proposed joint resolution, that 'by said act the costs of transportation have been excessively increased, with no corresponding benefits in economies of operation'?

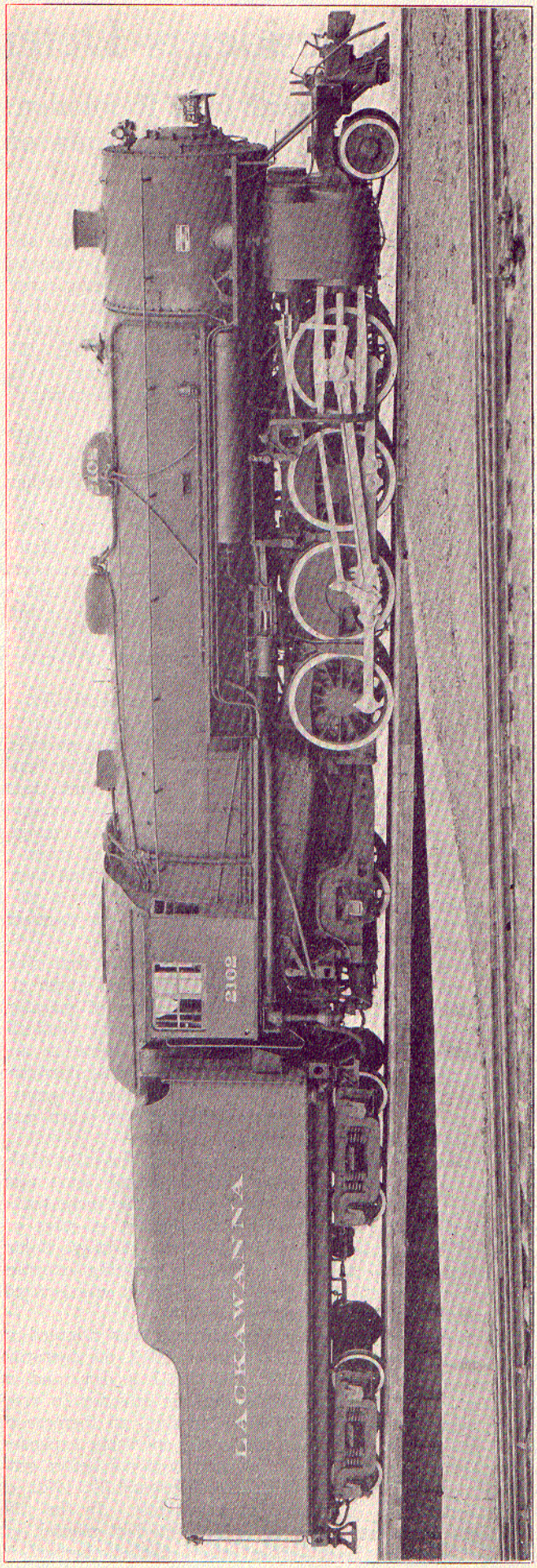
"It is true that for some time after the rates were advanced and the great decline of prices occurred in 1920 the farmers and stock raisers of the country suffered heavy losses. But these were not mainly due, as is charged, to freight rates. They were due to the fact that the prices of everything the farmers and stock raisers produced had declined much more than the prices they had to pay for all the things that they had to buy. In the year 1922, while the average railway freight rate was being reduced 13 per cent, the average price of farm products increased 20 per cent. In consequence, according to a recent report of the Department of Agriculture, the farm value of all farm products in 1922 was $14,310,000,000, or almost two billion dollars more than in 1921. While railway rates were reduced during the last year, the prices of almost all commodities increased, and if today the farmer is in difficulties his troubles are due far less to freight rates than to other causes."

In conclusion, the statement said:

"The Transportation Act, if it is not repealed, will continue to confer benefits upon the public. If its provisions are carried out in the spirit in which it was enacted and the railways are allowed to earn the fair return for which it provides, it will result in further reductions of rates when additional economies in operation can be effected, and cause a renewal of the expansion of the railroads which in time will remedy the acute shortage of transportation from which the country recently has been suffering severely. On the other hand, legislation repealing its constructive provisions unquestionably would interfere with the further economies in operation that are necessary to make possible further reductions of rates, and prevent the expansion of railway facilities which is essential to remedying the present shortage of transportation."

The statement is signed by W. H. Finley, president of the Chicago & North Western and the Chicago, St. Paul, Minneapolis & Omaha; H. E. Byram, president of the Chicago, Milwaukee & St. Paul; Hale Holden, president of the Chicago, Burlington & Quincy; Ralph Budd, president of the Great Northern, and C. H. Markham, president of the Illinois Central.

THE PERE MARQUETTE has announced a budget for 1923 of $10,862,000, the second largest in the history of the company. The largest item is the purchase of 1,500 steel automobile cars, which will cost $3,180,000, 500 steel hopper cars and 26 switch engines have also been purchased. The new engine terminal to be constructed at Detroit will cost $1,200,000 and will include a brick roundhouse, water facilities, coach yard, turntable, etc. An expenditure of $1,500,000 will be made for shop improvements at the Wyoming, Mich., and Grand Rapids yards. Second track work between Detroit and Plymouth, Mich., will involve a further expenditure of $500,000, and a total of $1,700,000 will be spent in reballasting and laying of new rails. The budget also includes the construction of two new stations, three ice houses and 12 water tanks and extension to passing and side tracks to cost $350,000. The Flint Belt line, which was started about two years ago, will also be completed at a cost of $200,000.



The Delaware, Lackawanna & Western Mikado Type Locomotives are the Most Powerful Ever Built

Heavy Mikado Type Locomotives for D. L. & W.

Purchases 40 of the Most Powerful Mikados Ever Built and Postpones Contemplated Electrification

ABOUT 40 PER CENT of the traffic of the Delaware, Lackawanna & Western consists of anthracite coal mined in the vicinity of Scranton. Normally about 900 to 1,000 cars of coal are handled per day, part of this going west in the direction of Buffalo and more than half east to New York. Scranton and the coal mines are located in a valley, and, while there are heavy grades—about 1½ per cent—in both directions, that toward the east over the Pocono mountains is considerably longer than the westbound grade. From Scranton east to Nay Aug, about 6 miles, the grade is 77 ft. to the mile and from Nay Aug to Gouldsboro, about 14 miles, the grade is 51 ft. to the mile. These grades out of Scranton present the most difficult operating situation on the line between New York and Buffalo.

An analysis of the operating and traffic conditions on the Lackawanna with information as to grades, road layout, track situation and motive power, in which the operating conditions at Scranton were described, was given in two articles which appeared in the *Railway Age,* November 26 and December 3, 1921.

In order to equalize the operating capacity of the road plans were drawn for the electrification of some 40 miles of gradients near Scranton, the intention being to furnish electric locomotive helper and pusher service, to the summits for east and west bound traffic. The first set of bids were rejected in the summer of 1921, and later new bids were called for. As the cost of this project was in excess of $5,000,000 it was finally decided to postpone electrification for the time being and to purchase 40 powerful Mikado type locomotives at a very much smaller investment, these locomotives to be used for helper and pusher service as well as for regular road duty.

Coal trains are made up and taken through solid from Scranton to the west or to the seaboard, the necessary additional helper and pusher service being given out of Scranton. The new Mikado locomotives with the helper service mentioned are now hauling trains of 2,900 tons through from Scranton to Secaucus yards, near Hoboken.

With these powerful locomotives a larger tender is used, the capacity having been increased from 10,000 gal. of water and 12 tons of coal to 12,000 gal. of water and 14 tons of coal. This increased capacity enables the locomotives under ordinary conditions to take a train to the summit east of Scranton without taking water and to run 130 miles from Scranton to Secaucus yard without taking coal.

The 40 new locomotives are noticeably heavier than those already in service and in terms of tractive force are the most powerful Mikado locomotives ever constructed. They were designed by the American Locomotive Company to meet the special traffic conditions on the D. L. & W. and were built at the Schenectady works. They bear the road numbers of 2101 to 2140, inclusive. Their weight in working order is 356,500 lb. and their normal rated tractive force is 67,700 lb. Being equipped with boosters, having a rated tractive force of 11,500 lb., the total available tractive force for starting or heavy pulls is 79,200 lb., or 17 per cent over that of the locomotive cylinders alone. The locomotive cylinders are 28 in. by 32 in. and the driving wheels are 63 in. in diameter.

The D. L. & W. has been a user of heavy Mikado locomotives in the past, having purchased 74 locomotives of the 1200 class which are essentially alike. The last order from this design was for ten locomotives placed in 1920. These also were built by the American Locomotive Company. A comparison of the dimensions, weights and proportion of the two designs will be found in the data table opposite the next page.

It will be noticed from this table that the new Mikado locomotives have 10,600 lb. greater tractive force than those previously used, an increase of 18½ per cent for the main cylinders, and an increase of 22,100 lb., or 38½ per cent, if the booster is included. The increase in tractive force of the main cylinders was obtained by changing the piston travel from 30 in. to 32 in. and raising the steam pressure from 180 lb. to 200 lb. The weight of the locomotive in working order was raised from 328,000 lb. to 356,500 lb., an increase of 8.7 per cent, and the weight on the drivers from 256,000 lb. to 271,500 lb., an increase of slightly over six per cent. An axle load of 68,000 lb. would of course not have been permissible except for the favorable track and bridge conditions prevailing on the Lackawanna. The fact that an increase of 38½ per cent in total available tractive force was obtained by an increase of only 8.7 per cent in the total weight of the locomotive is an excellent example of what can be done by good designing combined with the introduction of the booster.

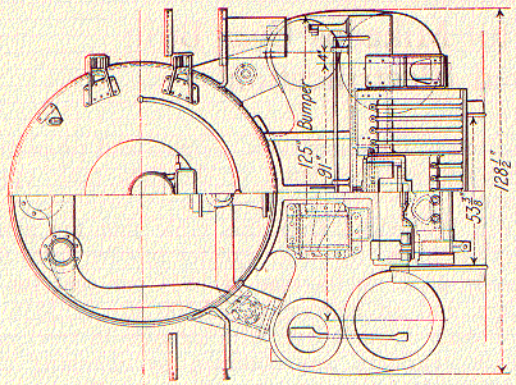
The diameter of the boiler was increased from 84¼ in. to 90 5/16 in., inside the first ring, while the length of the firebox was increased 12⅛ in. without change in width, the grate area thereby being increased from 63.2 sq. ft. to 70.4 sq. ft. The length over the tube sheets of 18 ft. was retained but the number of 2 in. tubes was decreased from 303 to 300 and the number of 5-3.8 in. flues increased from 43 to 50. The total evaporative heating surface was increased 3.9 per cent while the superheating surface was increased 16.75 per cent. In the new locomotives the superheating surface is 25.2 per cent of the evaporative heating surface, a liberal allowance. Superheated steam is used not only for the main cylinders but also for the booster, the connection for the latter being made from the outside steam pipes. A combination exhaust stand is used for the locomotive and the booster cylinders.

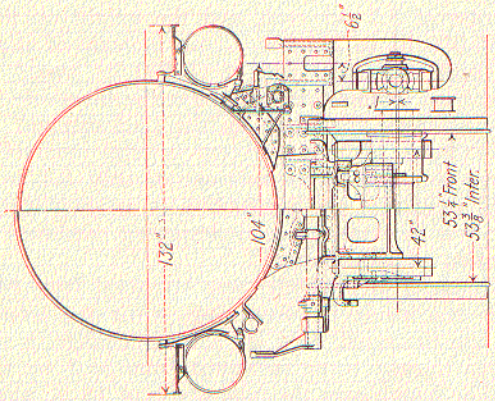
A comparison between the calculated cylinder horsepower and the calculated boiler horsepower shows they are practically the same and would indicate that these locomotives could be relied upon to be excellent steamers. The estimated coal rate when working at full capacity is 130 lb. per square foot of grate per hour. Stokers are provided, those for the new engines being furnished by The Elvin Mechanical Stoker Company.

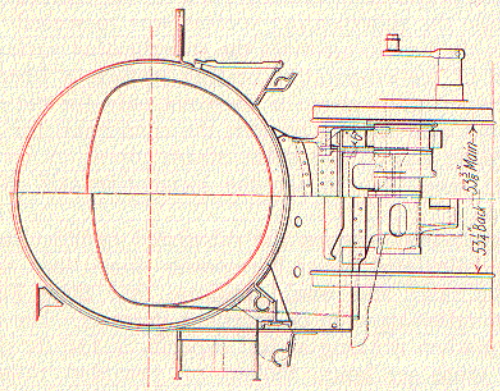
The driving wheels of both the old and the new designs are 63 in. in diameter. The main driving journals of the new locomotives are 12 in. by 20 in., the front journals 10½ in. by 18 in., and the others 10½ in. by 16 in. By using lateral motion driving boxes for the forward drivers the rigid wheelbase is reduced to 11 ft. 4 in. The front trucks are of the Woodward type and the trailing trucks of the Delta type. Baker valve gear with 14 in. piston valves are used on both designs. Chrome-Vanadium steel was used for the main and side rods in order to keep their weight as low as possible and thus minimize the dynamic augment.

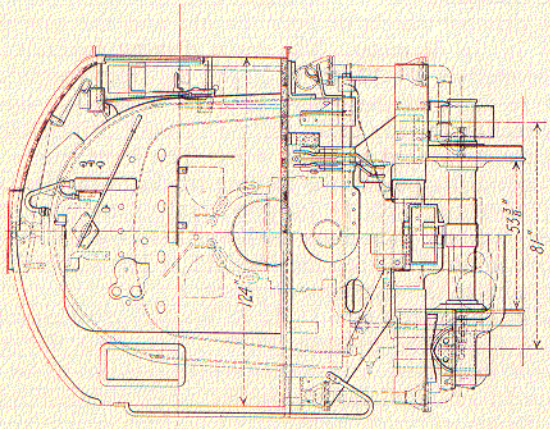
The height of the new D. L. & W. Mikado locomotive is 15 ft. 4⅛ in., the extreme width 11 ft., and the coupled length of locomotive and tender 84 ft. 5½ in. The smoke stack is 18 in. in diameter and the single exhaust nozzle 7 in. in diameter.

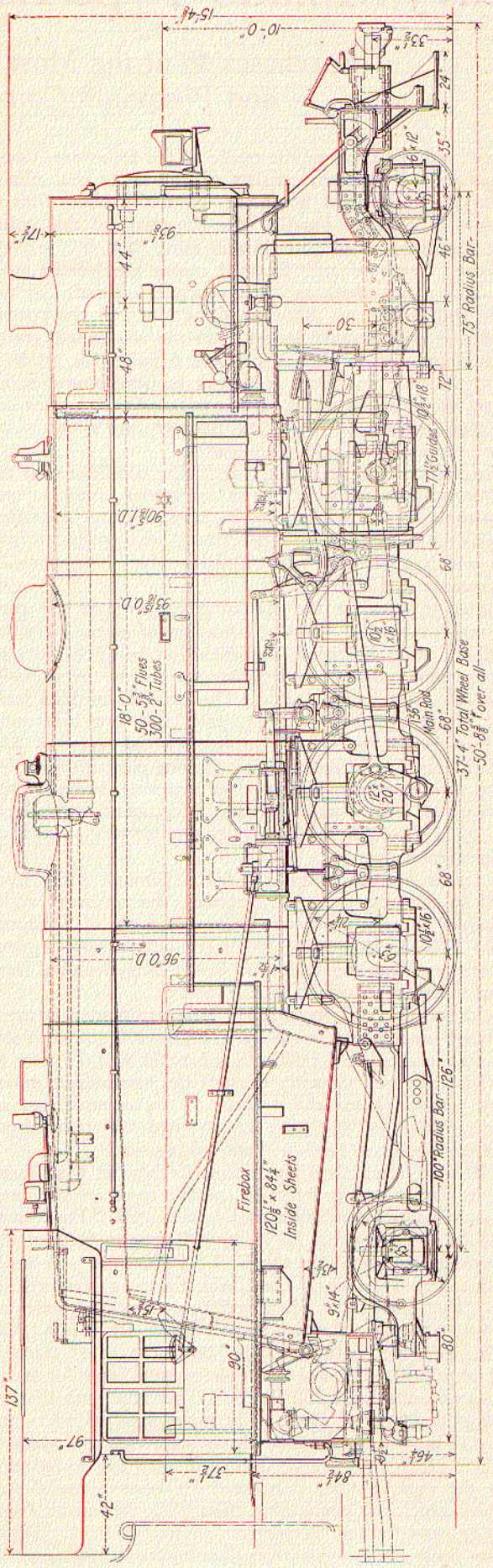
In addition to the booster, Elvin mechanical stoker and











Cross-Sections and Elevation of the Delaware, Lackawanna & Western Mikado Type Locomotive

Baker valve gear other special equipment on these locomotives are the Alco power reverse gear, power grate shaker, automatic fire door of the Butterfly type, Pyle electric headlight and Cleveland low-water alarm.

While the curvature on the main line of the Lackawanna is moderate and while lateral motion driving boxes and a short rigid wheelbase have reduced hub wear and flange wear to a relatively small amount, Chicago hydrostatic flange lubricators are installed to still further reduce the flange wear and decrease the friction on curves.

Conditions on the Lackawanna call for considerable drifting of locomotives. For this reason Talmage drifting valves have been applied to the new Mikados so that it is not necessary to run with a cracked throttle.

To avoid breakage and damage of the pilot drawgear when locomotives are used in pusher and helper service Miner friction draft gear is employed on the head end of these locomotives.

These D. L. & W. Mikado locomotives will naturally be compared with those for the New York Central Lines, one of the most striking designs brought out in 1922; orders were placed for 191 for the various roads comprising that system. The New York Central locomotives weigh 334,000 lb. in working order, have 28 in. by 30 in. cylinders, and 63 in. driving wheels. They also are equipped with boosters and have a total rated tractive force of 74,500 lb. or 63,500 lb. without the booster. They were fully described in the *Railway Age*, September 2, 1922. Other heavy Mikado type locomotives recently ordered are those for the Central of New Jersey weighing 342,500 lb., having 27 in. by 32 in. cylinders and a rated tractive force of 59,000 lb. and those for the Northern Pacific weighing 337,000 lb., having 28 in. by 30 in. cylinders, and a rated tractive force of 57,000 lb. But few Mikado locomotives having a tractive force of over 60,000 lb. have been built.

DIMENSIONS, WEIGHTS AND PROPORTIONS

D. L. & W. Mikado Locomotives

	2,100 Class	1,200 Class
Type of locomotive	2-8-2	2-8-2
Cylinders, diameter and stroke	28 in. by 32 in.	28 in. by 30 in.
Valve gear, type	Baker	Baker
Valves, piston type, size	14 in.	14 in.
Weights in working order:		
On drivers	271,500 lb.	256,000 lb.
On front truck	25,500 lb.	23,500 lb.
On trailing truck	59,500 lb.	48,500 lb.
Total engine	356,500 lb.	328,000 lb.
Tender	217,600 lb.	178,000 lb.
Wheel bases:		
Driving	17 ft. 0 in.	17 ft. 0 in.
Rigid	11 ft. 4 in.	11 ft. 4 in.
Total engine	37 ft. 4 in.	35 ft. 2 in.
Total engine and tender	73 ft. 2½ in.	70 ft. 9½ in.
Driving wheels:		
Diameter outside tires	63 in.	63 in.
Boiler:		
Type	Straight top	Conical Con.
Steam pressure	200 lb.	180 lb.
Fuel	Bituminous Coal	Bituminous Coal
Diameter, first ring, inside	90⅝ in.	84¼ in.
Firebox, length and width	120⅞ in. by 84¼ in.	108 in. by 84¼ in.
Tubes, number and diameter	300-2 in.	303-2 in.
Flues, number and diameter	50-5⅜ in.	43-5⅜ in.
Length over tube sheets	18 ft. 0 in.	18 ft. 0 in.
Grate area	70.4 sq. ft.	63.2 sq. ft.
Heating surfaces:		
Firebox, comb. chamber and arch tubes	345 sq. ft.	328 sq. ft.
Tubes and flues	4,073 sq. ft.	3,923 sq. ft.
Total evaporative	4,418 sq. ft.	4,251 sq. ft.
Superheating	1,112 sq. ft.	953 sq. ft.
Comb. evaporative and superheating	5,530 sq. ft.	5,204 sq. ft.
Special equipment:		
Brick arch	Yes	Yes
Superheater	Yes	Yes
Feedwater heater	No	No
Stoker	Elvin	Duplex
Booster	Yes	No
Tender:		
Water capacity	12,000 gal.	10,000 gal.
Fuel capacity	14 tons	12 tons
General data, estimated:		
Rated tractive force, 85 %	67,700 lb.	57,100 lb.
Rated tractive force with booster	79,200 lb.	.....
Cylinder horsepower (Cole)	2,824	2,542
Boiler horsepower (Cole) (est.)	2,805	2,645
Weight proportions:		
Weight on drivers ÷ total weight engine, per cent	76.1	78.0
Weight on drivers ÷ tractive force	4.01	4.48
Total weight engine ÷ cylinder hp.	126 lb.	129 lb.
Boiler proportions:		
Boiler hp. ÷ cylinder hp., per cent	99.3	104
Comb. heat. surface ÷ cylinder hp.	1.96	2.05
Tractive force ÷ comb. heat. surface	12.23	10.97
Tractive force × diameter drivers ÷ comb. heat. surface	771	691
Cylinder hp. ÷ grate area	40.1	40.2

Consolidation No Panacea for Railroad Ills

The plans of railroad consolidation that have been proposed to carry out the consolidation provisions of the Transportation Act of 1920 may benefit the country's transportation system in many ways, but of themselves cannot be expected to remove the difficulties that face the railroads, according to a report just issued by the National Industrial Conference Board, 10 East 39th Street, New York City. Other changes in government policy toward the railroads, such as a better co-ordination of rate and wage regulation, would have to be made, the Board says, before the railroads would be in a position to keep pace with the rapid growth of the commerce and industry of the country.

According to the board's report, the movement for railroad consolidation, which is recognized in the Transportation Act, is an outgrowth of the economic situation of the railroads following their return to private management after the war, and has persisted and increased with the development of the combination tendency in American industry generally. This movement had been seriously checked by government regulation under the anti-trust laws in the period from 1903 to 1914.

After the World War, however, Congress found it necessary to provide means for the railroads to earn a fair return upon their value. In each of the three rate-making districts of the country, under any uniform scale of rates sufficient to provide a fair return upon the aggregate value of all the roads, the strong lines would earn a high return upon their value, while the weaker roads would be unable to earn a return sufficient to attract the new capital necessary for expansion. To overcome this difficulty Congress decided to permit the railroads to consolidate, with the intention of having the weak roads combine with the strong roads in order to equalize earning power and at the same time maintain competition in service.

An analysis of the financial features of the consolidated systems proposed by the Interstate Commerce Commission, and by J. E. Oldham, made in the board's report, shows that if the railroads were consolidated into a limited number of systems, they would have to be approximately equal in size and strength to be successful. Not only would the small roads have to be joined with those with strong financial structure, but large roads in a weak position would have to be consolidated and their financial structure revised in order to make them equal in strength to their competitors.

A test of the earning power of the Interstate Commerce Commission's 19 proposed consolidated systems shows that, in a normal period, most of the systems would be able to approximate the fair return upon their value which is permitted them by the terms of the law. Three of the proposed systems, and particularly the two in the Southwestern-Gulf region, would be unable to earn more than a fraction of the fair return if consolidated in the manner proposed.

An analysis of the expenditures of four of the most suc-