

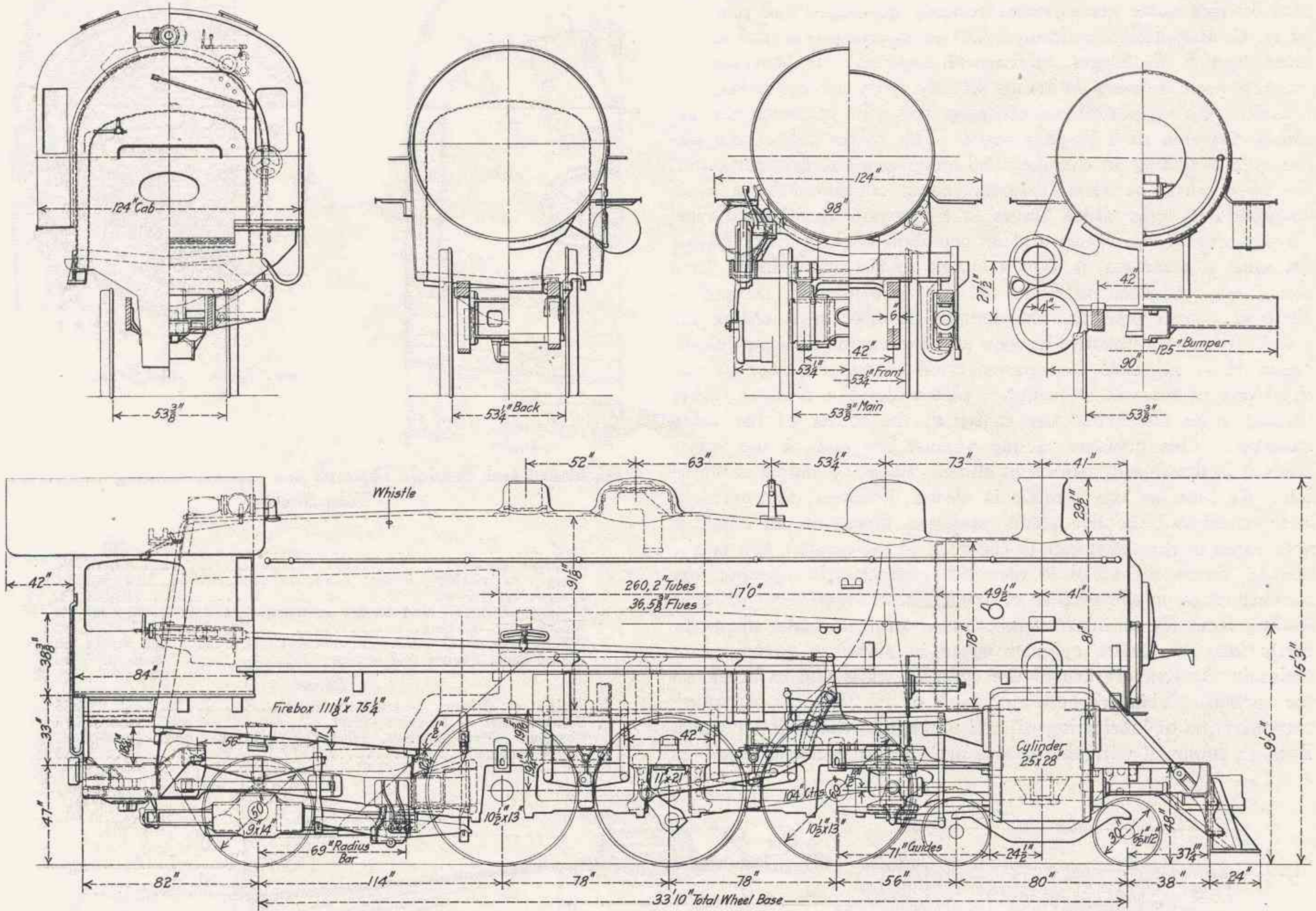
# Lackawanna Pacific Type Freight Locomotive

Second Order of These Engines for Freight Service;  
Cylinders Include New Type of By-pass Drifting Valve

The Delaware, Lackawanna & Western has recently received 14 Pacific type locomotives for fast freight service which were designed under the supervision of H. C. Manchester, superintendent of motive power and equipment, and built by the Lima Locomotive Corporation. This is the second lot of Pacific type

service and the same general design has been followed in the new engines.

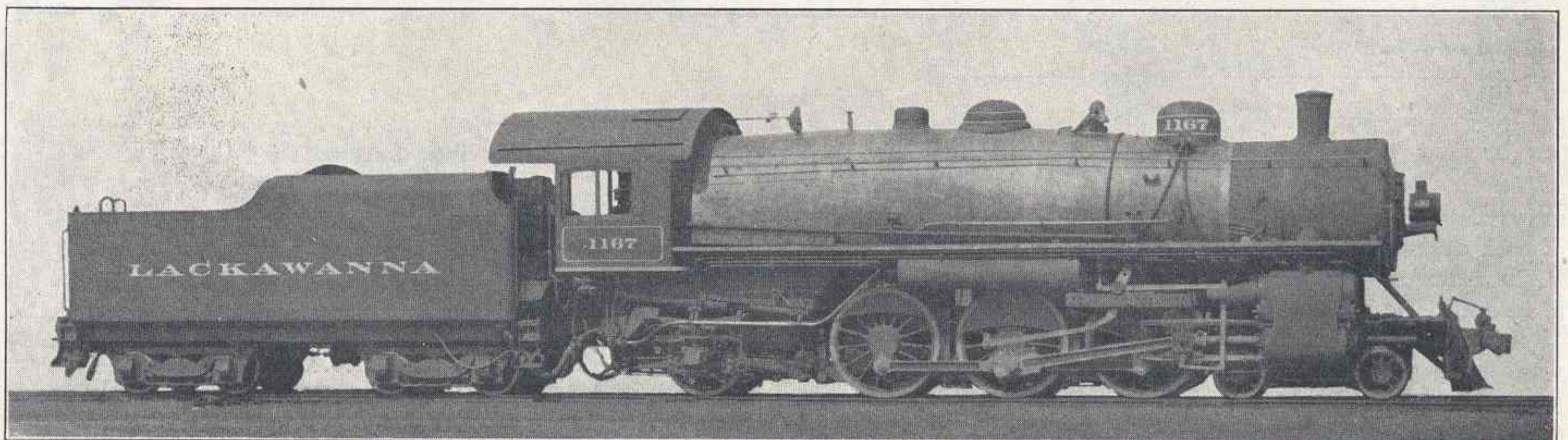
The principal change in the new engines is the introduction of a 36-in. combustion chamber in the boiler with a consequent reduction in the length of tubes from 20 ft. to 17 ft. This



Elevation and Sections of Delaware, Lackawanna & Western Fast Freight Locomotive

locomotives to be placed in freight service by the Lackawanna. The original locomotives which have been in service for about one year, were described in the *Daily Railway Age Gazette*, June 14, 1913. They have proven very satisfactory for this

change has necessitated the enlargement of the boiler at its greatest diameter and has slightly increased the weight with a decrease in total evaporative heating surface of 432 sq. ft. The superheater heating surface has been increased, however, and



Delaware, Lackawanna & Western Pacific Type Locomotive for Fast Freight Service

the total equivalent heating surface is only 234 sq. ft., or a little over 4 per cent less than that of the former engines. The better distribution of the heating surface should benefit the steaming qualities and add slightly to the locomotives' hauling capacity in the service for which they are designed.

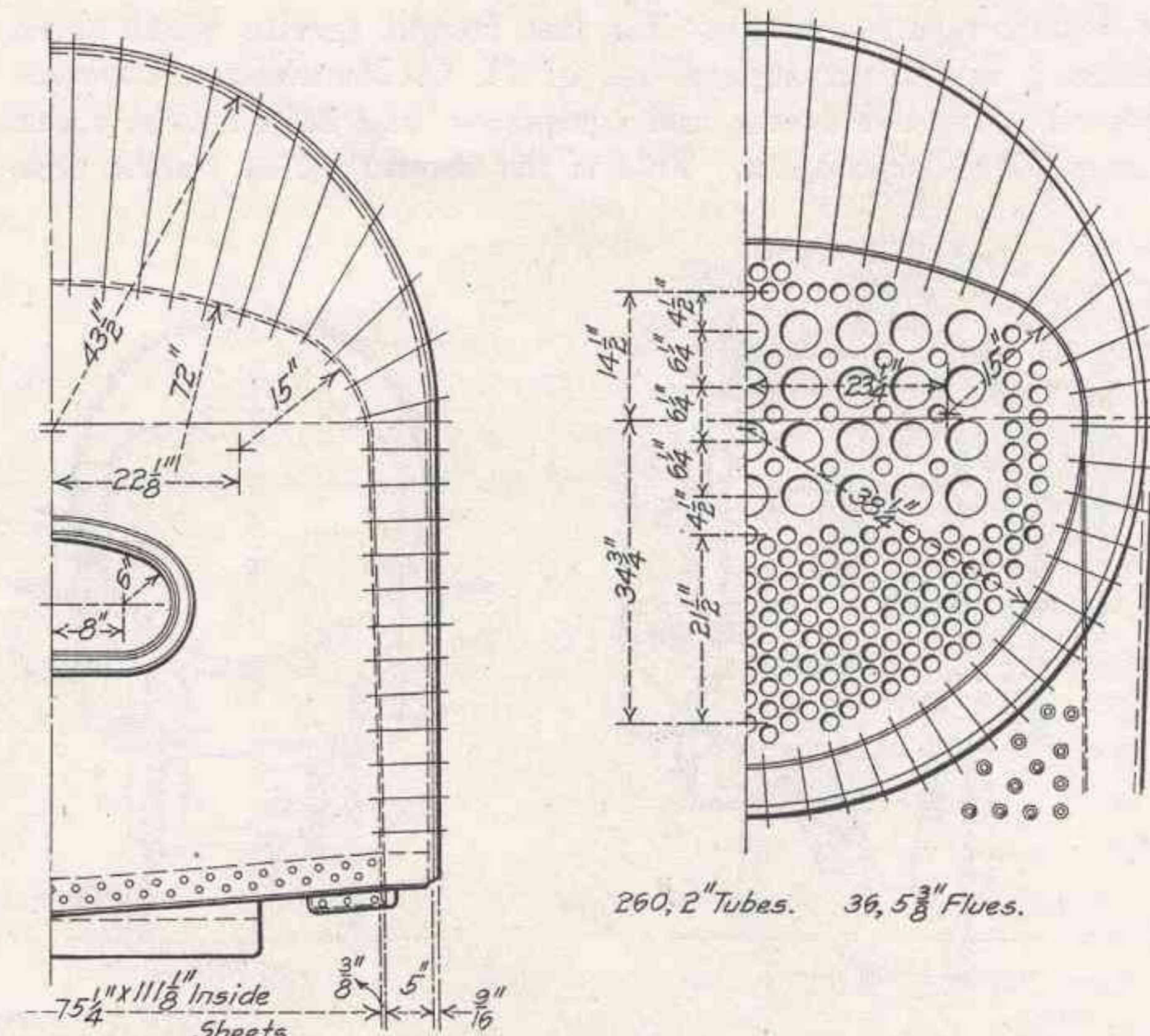
The boilers are provided with auxiliary manhole domes. These offer a clear opening 16 in. in diameter so that the boiler may be entered and inspected without the removal of the throttle valve from the main dome. The cab turret is a special form of the single manifold type, so arranged that it can be removed for repairs with the full steam pressure on the boiler.

The cylinders are provided with the Lackawanna standard by-pass drifting valve arrangement recently developed and patented by H. C. Manchester, superintendent of motive power and equipment, and S. S. Riegel, mechanical engineer. It provides for the automatic delivery of steam directly from the boiler into the cylinders during periods of coasting, and also performs the ordinary function of a by-pass valve. The valves are of the piston type operating in chambers opening from the cylinder ports, the two ports on each cylinder being connected by a 5 in. wrought iron pipe, which serves as a by-pass. A sectional view through one of the valves and its chamber, slightly distorted for the sake of clearness, is shown in one of the engravings. Live steam from a globe valve in the cab is conducted through a 13/16 in. copper pipe into the annular chamber surrounding the valve. When the throttle is open and the engine is using steam, steam chest pressure is communicated to the chamber at the outer end of the valve through a pipe under the cylinder jacket leading from the live steam cavity at the center of the valve chamber. This pressure, acting against the end of the valve, holds it in the closed position as shown while the engine is working. As soon as the throttle is closed, however, the pressure is removed and the live steam pressure, acting on an effective area equal to the difference in the area of the smaller and larger pistons, forces the valve to the open position. In opening, the packing rings on the smaller or inner piston travel over grooves leading from the annular chamber, thus admitting live steam directly into the entire cylinder space in sufficient quantities to maintain the temperature of the cylinder walls and to break up the vacuum. This prevents an inrush of air with the attendant carbonization of lubricating oil and damage to the cylinder walls. Engines equipped with this device are very free coasters and its

when closed permit blowing the water in the hose back into the tank, thus providing against freezing. Vanadium cast steel has been used in the frames. The principal dimensions and weights are given in the following table:

General Data

Gage .....	4 ft. 8 1/2 in.
Service .....	Freight

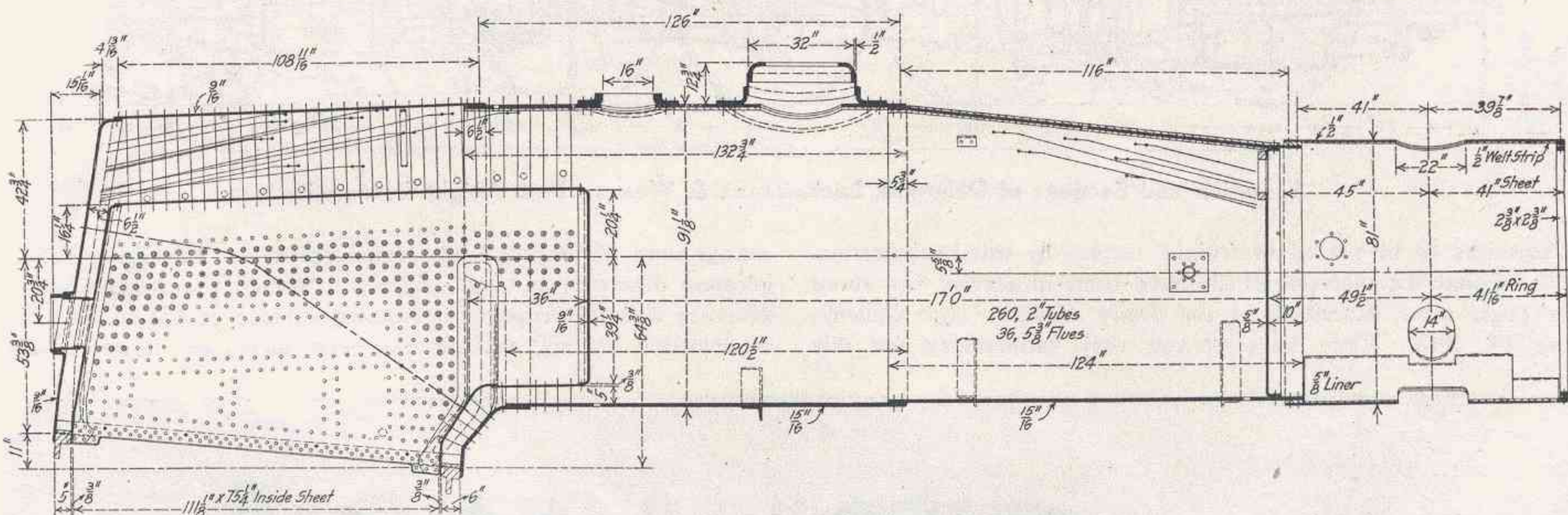


Backhead and Section Through the Boiler, Showing the Rear Tube Sheet

Fuel .....	Bit. coal
Tractive effort .....	43,200 lb.
Weight in working order .....	291,000 lb.
Weight on drivers .....	188,000 lb.
Weight of engine and tender in working order .....	456,500 lb.
Wheel base, driving .....	13 ft. 0 in.
Wheel base, total .....	33 ft. 10 in.
Wheel base, engine and tender .....	66 ft. 4 in.

Ratios

Weight on drivers ÷ tractive effort .....	4.35
Total weight ÷ tractive effort .....	6.74
Tractive effort × diam. drivers ÷ total equivalent heating surface* .....	589.3



Boiler for the Delaware, Lackawanna & Western Fast Freight Pacific Type Locomotive

use is claimed to have effected a considerable increase in the life of both cylinder and piston rod packing.

The main driving boxes used on these locomotives are 21 in. in length. The main pedestals are increased in width by means of steel castings between the frames. The engines are provided with the Woodard self-centering engine truck and the Miner friction draft gear has been included on the front end. Economy type grate shaker brackets, which insure against dropping of fuel through the deck, and low type tank wells are also used. The valves for these wells are operated from the ground and

Total equivalent heating surface* ÷ grate area .....	87.2
Weight on drivers ÷ total equivalent heating surface* .....	37.2
Total weight ÷ total equivalent heating surface* .....	57.5
Volume of both cylinders .....	15.9 cu. ft.
Total equivalent heating surface* ÷ vol. cylinders .....	318.0
Grate area ÷ vol. cylinders .....	3.7

Cylinders

Kind .....	Simple
Diameter and stroke .....	25 in. by 28 in.

Valves

Kind .....	Piston
Greatest travel .....	6 1/2 in.
Outside lap .....	1 1/16 in.

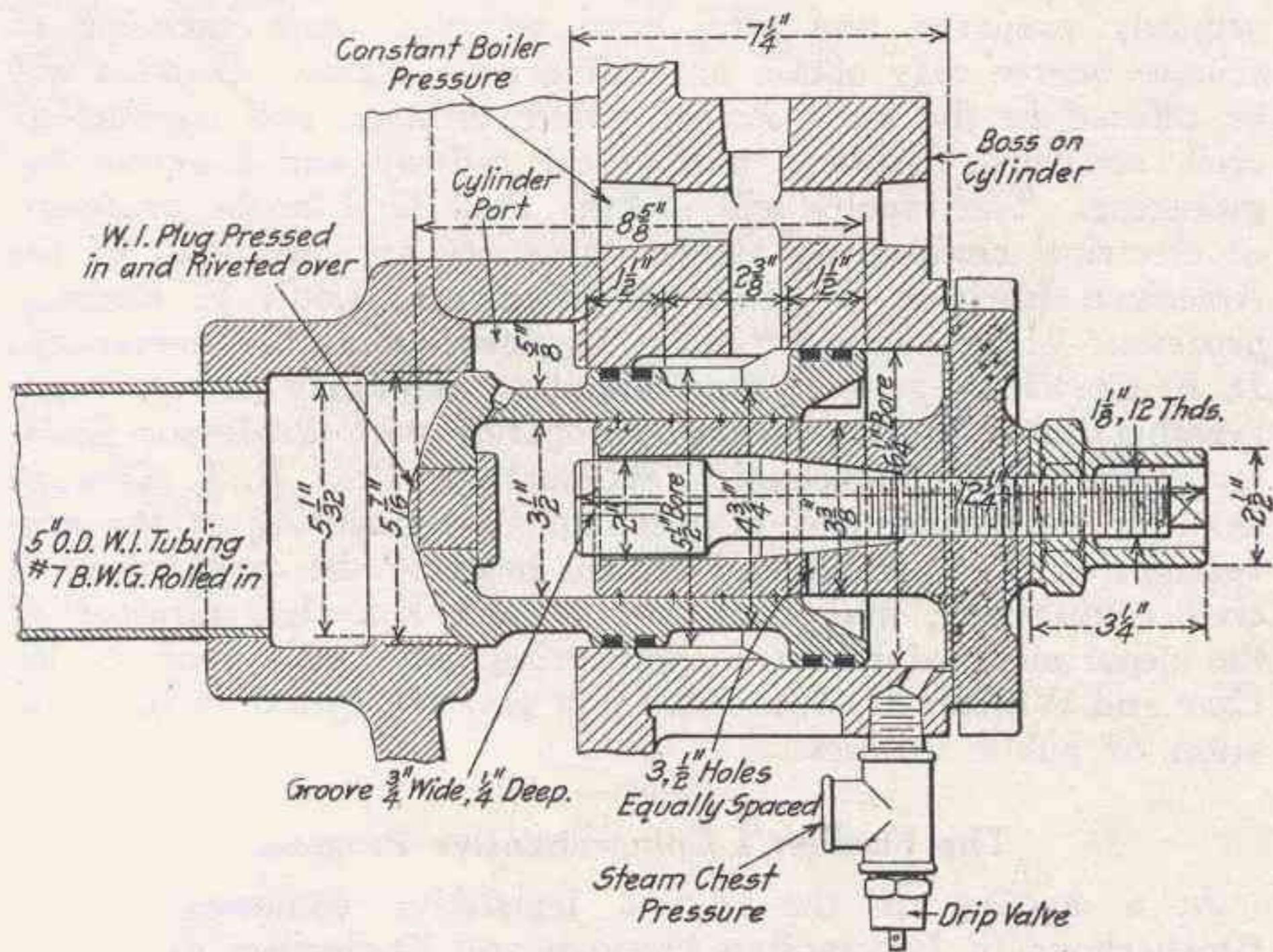
Inside clearance .....	3/16 in.
Lead in full gear.....	3/16 in.

*Wheels*

Driving, diameter over tires.....	69 in.
Driving journals, main, diameter and length...	11 in. by 21 in.
Driving journals, others, diameter and length...	10 1/2 in. by 13 in.
Engine truck wheels, diameter.....	30 in.
Engine truck journals.....	6 1/2 in. by 12 in.
Trailing truck wheels, diameter.....	50 in.
Trailing truck journals.....	9 in. by 14 in.

*Boiler*

Style .....	E. W. T.
Working pressure .....	200 lb.
Outside diameter of first ring.....	78 in.
Firebox, length and width.....	111 3/8 in. by 75 1/4 in.
Tubes, number and outside diameter.....	265—2 in.
Flues, number and outside diameter.....	36—5 3/8 in.
Tubes, length .....	17 ft. 0 in.



Section Through By-Pass Drifting Valve Chamber

Heating surface, tubes and flues.....	3,279 sq. ft.
Heating surface, firebox and combustion chamber..	279 sq. ft.
Heating surface, total.....	3,558 sq. ft.
Superheater heating surface.....	about 1,000 sq. ft.
Total equivalent heating surface*	5,058 sq. ft.
Grate area .....	58 sq. ft.

*Tender*

Tank .....	Water bottom
Weight .....	165,500 lb.
Water capacity .....	9,000 gal.
Coal capacity .....	10 tons

\*Total equivalent heating surface = total evaporating heating surface + 1.5 times the superheater heating surface.

**INCREASE IN MILEAGE BOOK RATES FAVORED**

Although, as mentioned in last week's issue, the secretary of the Illinois Commercial Men's Association has sent out circular letters to 100,000 traveling salesmen, asking them to fill out a blank form of protest to the Interstate Commerce Commission against the increase in rates for mileage books on the eastern railways, it is apparent that there is some division of opinion on this subject among the members of the association. Lorenzo Norvell, manager of Fairbanks, Morse & Co., at St. Louis, Mo., has addressed a letter to R. A. Cavanaugh, secretary and treasurer of the Illinois Commercial Men's Association, in which as a member of the organization he enters an emphatic protest against the attempt to incite the members of the organization to take up this movement. Mr. Norvell concludes his letter by saying that unless he is accorded the same privilege that the secretary has used in sending out his letter, broadcast, by having circular copies of it printed and sent to each member, he will solicit the aid of the press of the country, having reason to believe that it will willingly join in a protest against the movement. He states that he will also send copies of his letter to the managers of many large firms with which he is acquainted, and solicit their assistance, which he feels will be willingly given.

Mr. Norvell says in his letter:

"I deny that there is any disposition on the part of railway officials to antagonize traveling men as a class. I further deny that their attempt to secure increased rates is in any way striking at the bread and butter of traveling salesmen. On the contrary, they are making a last effort to conserve their properties and I share the opinion of a great many business men that the men who are now handling our great railroad properties are to be commended for their magnificent courage against such overwhelming odds and that they should receive the united support of commercial houses and traveling salesmen throughout the country. They are our natural allies, and their mission is just as important as that of the traveling salesmen.

"Our great need today is service. We want trains in plenty to enable traveling men to get over their territory quickly without loss of time. We also want our freight handled promptly and when we get service we should be fair enough to pay for it. You have stated that the railroads have not increased their mileage rates for a period of 30 years, and I submit to you in all fairness that it is time for an increase, as there is no comparison between the service of the present day and 30 years ago. You have stated that there will be no objection to raising passenger rates on single-trip tickets. Why look at the question from your side only? As a matter of fact, I cannot see why traveling salesmen should get a better rate on transportation than individuals, particularly when in nine cases out of ten the firm for whom the man is traveling pays the bill.

"We are now facing a very grave condition—not a theory—and if there ever was a time for the doctrine of 'live and let live,' it is before us now, as the railroads throughout the country are losing money every day they operate, regardless of their utmost efforts to economize in every direction.

"You propose to ask the Interstate Commerce Commission to fix a price on a service without any reference whatever to their gross income and expenses, and yet there isn't a man in our entire organization that would consider it anything but an outrage if the same doctrine were applied to any commercial institution in this country.

"There has been entirely too much agitation against railroads and the cause for this agitation which originated long ago has passed, but the railroads are still reaping the results, and I submit to you that any traveling salesman in this organization knows of many railroad towns where the shop forces and maintenance forces have been cut down to such an extent as to seriously impair the business of the merchants with whom that salesman does business in that town.

"According to your theory, you would cut down their forces and keep the salaries of their employees at a minimum in order to put bread and butter into the mouths of traveling salesmen, and I submit that you would be fooling yourself all the time because the salesman's welfare is indissolubly connected with that of the railroad man.

"You would appeal to the Interstate Commerce Commission for relief in this matter, and yet you have lost sight of the fact that 30 years ago we did not have an Interstate Commerce Commission and that the existence of the Interstate Commerce Commission at this time has made it necessary for the railroads to spend hundreds of thousands of dollars, in fact millions, for the purpose of keeping records in order that the commission may supervise their business methods for the benefit of the people of the United States.

"I also desire to call your attention to the fact that railroad bonds are largely held by our leading insurance companies and a depreciation of their value is a blow at the integrity of the insurance policies held throughout the country.

"It is my understanding that the Illinois Commercial Men's Association was organized for the purpose of conducting a mutual accident insurance business among its members. You should, therefore, be debarred from making any such campaign at the probable expense of leading insurance companies in which nearly all of your members have policies."