their government may decide, but the total economic cost of transportation, all of which the public must pay in one form or another, depends upon the manner in which the railways are managed, and not upon the question of ownership.

Now that it has come to be generally recognized that there is a very distinct and intimate relationship between the total economic cost of transportation and the rates which must be paid, the public should be furnished all of the information that is necessary to enable it to judge whether the railroads are being prudently and wisely managed. Full publicity concerning all matters of policy and management, including the raising and expenditure of new capital, will go far to insure honesty and to prevent discrimination, and no stronger motive for efficiency can be found than the natural desire for larger profits which, of course, will obtain, and properly so, with private ownership, but will be entirely lacking under government ownership.

Those who manage the railroads should realize, as I believe they do, that they occupy a dual position—that of semi-public officer and also that of trustee for the owners of the property of which they are in charge, and that in the end they will best fulfill the function of trustee by giving adequate and satisfactory service to the public.

There is no reason why we should be ashamed of our railroads as a whole. Professor Ripley says, in his recent book on Railroads: "Never in our history, and probably nowhere else in the world, has the standard of probity, the quickened sense of responsibility, both public and private among American railroad men, been more pronounced than it is at the present time." He also says: "American railways are avowedly among the best in the world."

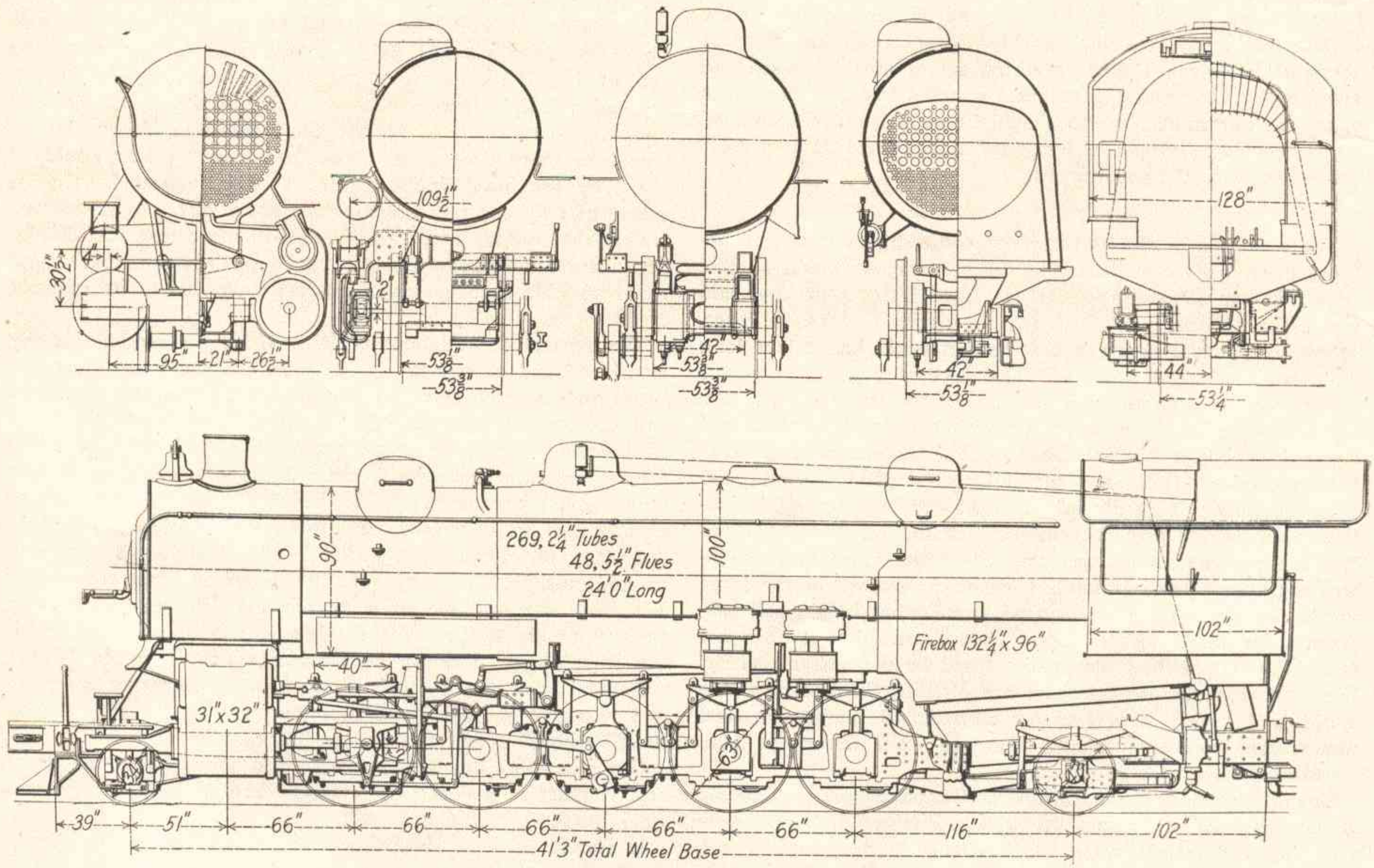
To my mind if there is any one thing distinctively American of which we should all be justly proud, it is our railway system, because, notwithstanding all that may be said against it, the fact remains that it has paid the highest wages, and sold its output—that is, transportation—at the lowest price, and at the same time has furnished more transportation per dollar invested in facilities than any other country in the world; a record, I repeat, of which we should all be justly proud.

ERIE 2-10-2 TYPE LOCOMOTIVE

The Erie Railroad has recently received from the Baldwin Locomotive Works a large locomotive of the 2-10-2 type, which is slightly heavier than the engines of this type built last year for the Baltimore & Ohio, and described on page 242 of the August 7 issue of the *Railway Age Gazette*. The new locomotive has 63-in. drivers, the largest yet to be placed on an engine of the 2-10-2 type, and by using 31-in. cylinders the tractive effort has been maintained very nearly to that of the Baltimore & Ohio locomotives. In the following table is a comparison of the leading dimensions of these locomotives:

Road	B. & O.	Erie
Tractive effort	84,500 lb.	83,000 lb.
Weight on drivers	336,800 lb.	327,250 lb.
Weight, total engine	406,000 lb.	407,700 lb.
Drivers, diameter	58 in.	63 in.
Cylinders, diam. and stroke	30 in. by 32 in.	31 in. by 32 in.
Steam pressure	200 lb.	200 lb.
Evaporating heating surface	5,573 sq. ft.	5,801 sq. ft.
Superheater heating surface	1,329 sq. ft.	1,377 sq. ft.
Grate area	88 sq. ft.	88.1 sq. ft.

The boiler of the Erie locomotive is similar in construction to that of the Baltimore & Ohio locomotive illustrated in the de-



Longitudinal and Sectional Elevations, Erie 2-10-2 Type Locomotive

scription above referred to. The difference in the heating surface is due almost entirely to an increase in the length of tubes, which are 24 ft. long as compared with a length of 23 ft. in the boilers of the Baltimore & Ohio locomotives. The tubes are welded into the back tube sheet. The new boiler has a conical ring in the middle of the barrel which increases the shell diameter from 90 in. to 100 in. The main dome is of pressed steel in one piece and is mounted on the connection ring, while the auxiliary dome is forward of the firebox on the

third ring and is placed over a 16-in. opening in the shell. The boiler contains a combustion chamber 28 in. long. The equipment includes a Schmidt superheater, Security brick arch, Street stoker, Talmage ash-pan and blowoff system, Franklin grate shaker and firedoor and Chambers throttle valve.

The cylinder castings are simple and massive in design, and are secured to the frames by 12 horizontal 1½-in. bolts each. Both the cylinders and steam chests are fitted with bushings of Hunt-Spiller gun iron and the same material is used for piston and valve packing rings. In designing the cylinders special attention has been given to the exhaust passages which are unusually direct and of liberal section area. Steam distribution is controlled by a 16-in. piston valve driven by the Baker gear and set with a lead of 3/16 in. The locomotive is equipped with the Ragonnet power reverse gear.

The reciprocating parts are comparatively light for an engine of this size. Forged and rolled steel pistons of Z-section are used. The guides are of the alligator type with a vertical distance of 20 in. between the bars. The crossheads have steel bodies with bronze gibs 32 in. in length and weigh 785 lb. apiece; this weight, although large in itself, may be considered low for the size required. The front and back main rod stubs are of the Markel type with removable brasses, the cast steel filling blocks in the main stub being cored out to remove as much weight as possible. Owing to the comparatively large diameter of the wheels and the relatively light reciprocating weights it has been possible to balance the locomotive satisfactorily without resorting to the use of auxiliary counterweights on the main axle, and lead has been used in the counter weights of the main wheels only.

The frames are Vanadium steel castings with rear sections of forged iron. The main frames are 6 in. in width and are spaced 42 in. between centers. The single front rails are cast integral with the main sections and in front of the cylinders they are bolted to a combined deck plate and bumper casting furnished by the Commonwealth Steel Company, in which is housed the Miner draft gear. Wherever possible this casting has been cored out to remove superfluous weight.

The driving wheels have a total lateral play in the boxes of ¼ in., and the first and fifth pairs have ¼ in. more play between the flanges and rails than the second and fourth pairs. The main wheels have plain tires, and in spite of the long rigid wheelbase the locomotive will traverse 16-deg. curves. The engine has the Woodard leading truck and the Cole trailing truck and the running gear details include Cole long main driving boxes.

Wherever practicable, details have been made interchangeable with corresponding parts of the Erie's latest Mikado type locomotives. Such parts include the tender trucks complete, the pilot, frame-crossties, brake shoes and heads, and the following parts except for the main wheels: driving boxes, axles, tires and shoes and wedges. Flange oilers are applied to the leading wheels and a speed recorder is operated from the rear truck.

The tender is of the Vanderbilt type, having a water capacity of 10,000 gal., and a coal capacity of 16 tons. The trucks have cast steel side frames and solid rolled steel wheels manufactured by the Standard Steel Works Company.

The 2-10-2 type, although not yet generally in use has met with marked success in heavy freight service and the large boiler capacity, together with the comparatively large driving wheel diameter of the Erie locomotive indicates the possibility of further development in this type toward sustained capacity at higher speeds.

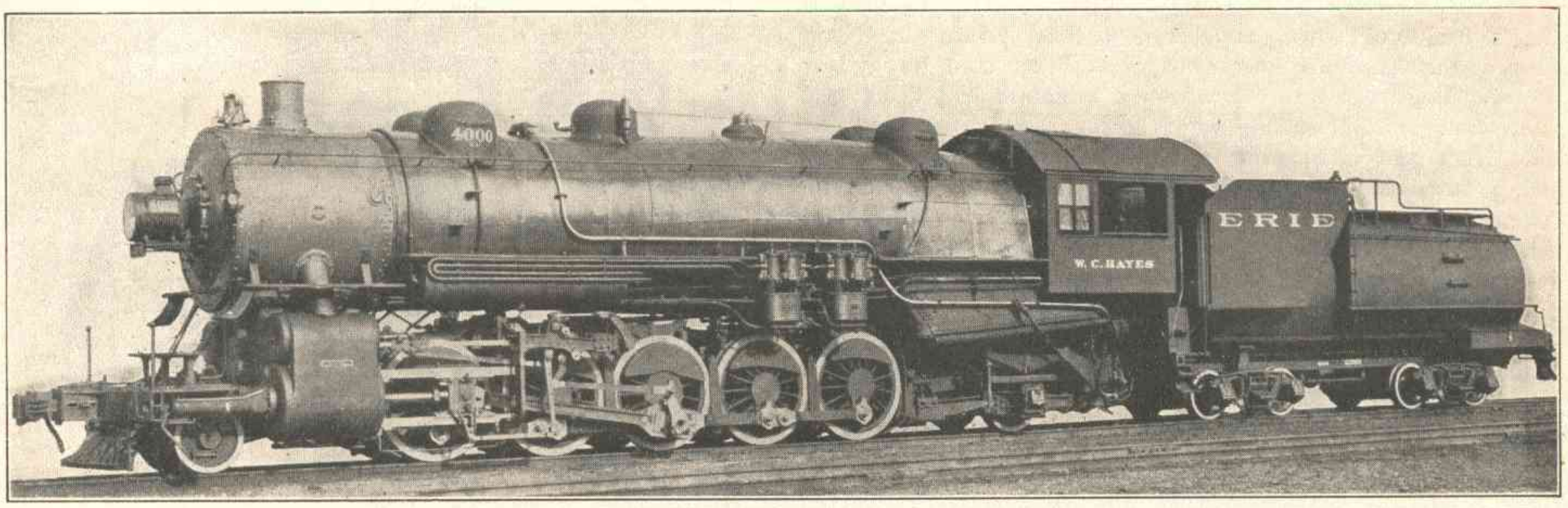
The following are the principal dimensions and data:

General Data

Gage	4 ft. 8½ in.
Service	Freight
Fuel	Soft coal
Tractive effort	83,000 lb.
Weight in working order	407,700 lb.
Weight on drivers	327,250 lb.
Weight on leading truck	24,450 lb.
Weight on trailing truck	56,000 lb.
Weight of engine and tender in working order	586,300 lb.
Wheel base, driving	22 ft.
Wheel base, total	41 ft. 3 in.
Wheel base, engine and tender	77 ft. 4½ in.

Ratios

Weight on drivers ÷ tractive effort	3.94
Total weight ÷ tractive effort	6.18
Tractive effort × diam. drivers ÷ equivalent heating surface*	664.72
Equivalent heating surface* ÷ grate area	89.29



Erie 2-10-2 Type Locomotive for Heavy Freight Service

Firebox heating surface ÷ equivalent heating surface,* per cent	3.28
Weight on drivers ÷ equivalent heating surface*	41.60
Total weight ÷ equivalent heating surface*	51.83
Volume both cylinders	27.95 cu. ft.
Equivalent heating surface* ÷ vol. cylinders	281.45
Grate area ÷ vol. cylinders	3.15

Cylinders

Kind	Simple
Diameter and stroke	31 in. by 32 in.

Valves

Kind	Piston
Diameter	16 in.

Wheels

Driving, diameter over tires	63 in.
Driving, thickness of tires	3½ in.
Driving journals, main, diameter and length	13 in. by 22 in.
Driving journals, others, diameter and length	11 in. by 13 in.
Engine truck wheels, diameter	34 in.
Engine truck, journals	6 in. by 12 in.
Trailing truck wheels, diameter	42 in.
Trailing truck, journals	9 in. by 14 in.

Boiler

Style	Conical
Working pressure	200 lb. per sq. in.
Outside diameter of first ring	90 in.
Firebox, length and width	132¼ x 96 in.
Firebox plates, thickness, sides, back and crown ⅜ in., tube ⅝ in.	
Firebox, water space	6 in.
Tubes, number and outside diameter	269—2½ in.
Flues, number and outside diameter	48—5½ in.
Tubes and flues, length	24 ft.
Heating surface, tubes	5,443 sq. ft.
Heating surface, arch tubes	37 sq. ft.
Heating surface, firebox	258 sq. ft.
Heating surface, total	5,801 sq. ft.
Superheater heating surface	1,377 sq. ft.

Equivalent heating surface*	7,866.5 sq. ft.
Grate area	88.1 sq. ft.

Tender

Weight	178,600 lb.
Wheels, diameter	33 in.
Journals, diameter and length	6 in. by 11 in.
Water capacity	10,000 gal.
Coal capacity	16 tons

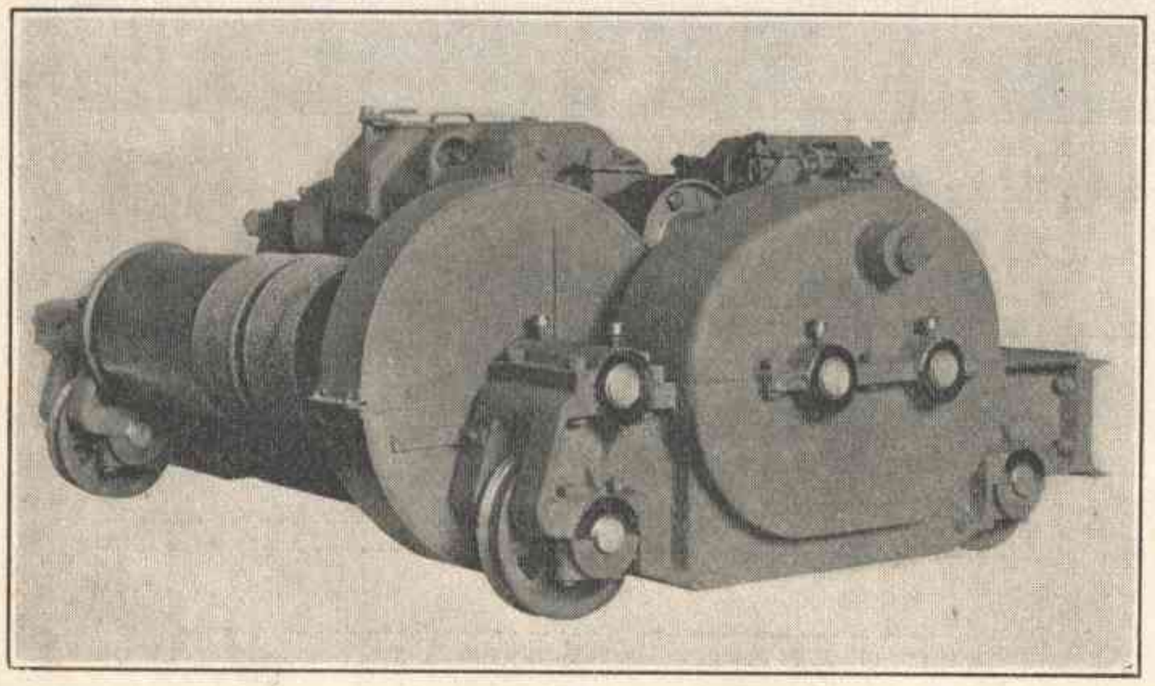
*Equivalent heating surface = total evaporative heating surface + 1.5 times the superheating surface.

ELECTRIC CRANE TROLLEY

The trolley shown in the photograph embodies a number of recently made improvements but is of the same general form as one which has been on the market for some time. It is built by the Northern Engineering Works, Detroit, Mich., and in the present form embodies the most recent crane engineering practice.

A primary consideration in the altered design has been safety, both in the way of strength and in the perfection of working parts. Durability of gears and other moving parts has been secured by enclosing and running them in an oil bath, thus protecting them from dust and grit. The construction is such that the covers of the gear cases must be in place before the gearing can be run, thus preventing carelessness in operating the trolley with gear covers removed.

Each train of back gears is rigidly mounted in a single frame, the bearings of which are bored in line, bronze lined and capped, through bolts instead of studs being used throughout. The hoisting gear train between the armature and drum gear is in a single rigid casting which insures permanent alinement. The drum gear is enclosed in a case of the same general type that is used for the hoisting gearing. All gears bear in the frame and are capped on top, no overhung bearings being used. All gear covers are castings and the joints are planed so that they are perfectly tight, thus preventing the leakage and dripping of oil from the trolley to the floor of the plant. The covers may be easily lifted, but for inspection and lubrication large manholes are provided in each cover. It has been found in



Electric Crane Trolley with Enclosed Gear Cases

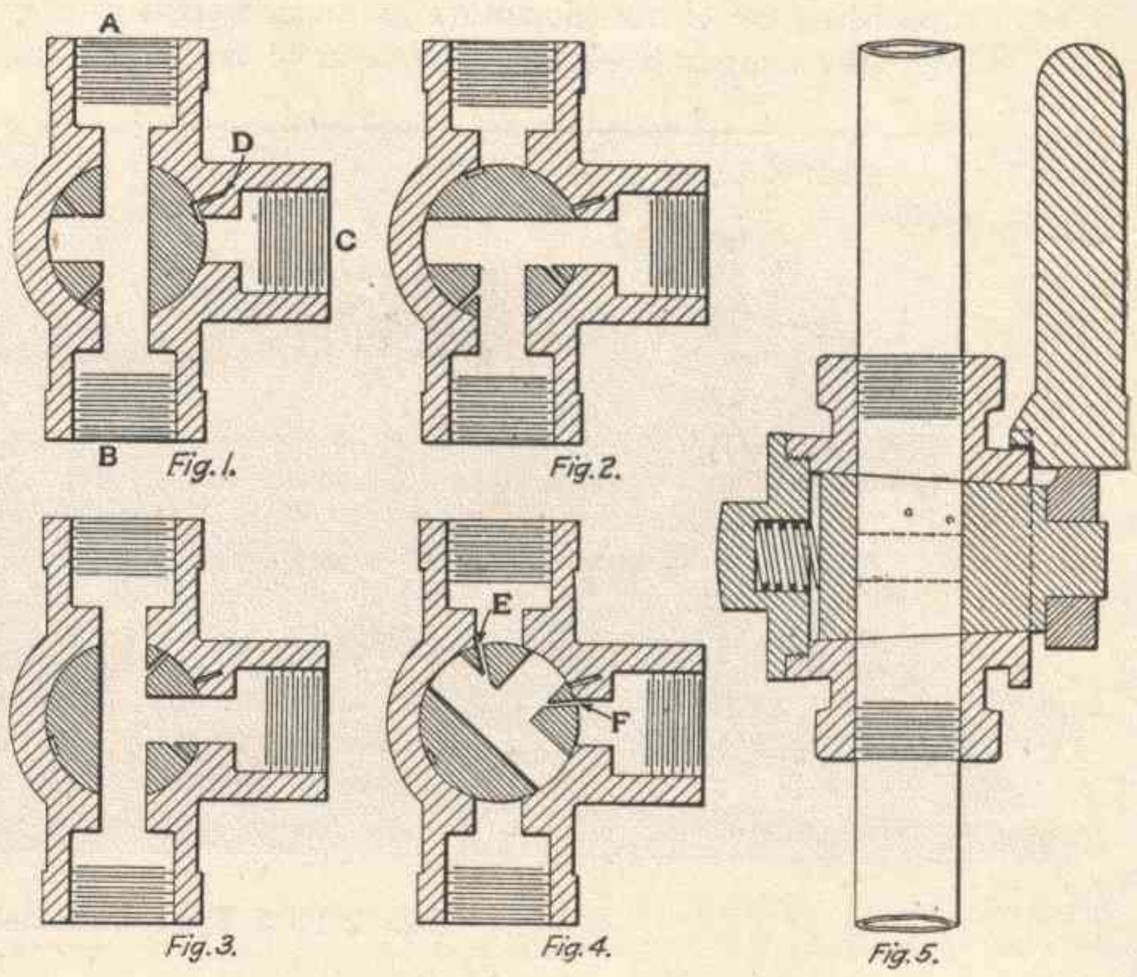
practice that a set of gears in a trolley of the enclosed type running alongside a crane having a trolley with exposed or partially protected gears lasts more than three times as long as the gears in the old type of trolley and the operation is almost noiseless. The hoisting gear box is made an integral part of the main trolley frame, thus securing permanency of alinement of all gears and their shafts.

A double system of electrical and mechanical brakes is used and the trolley is also equipped with an effective limit stop. Interchangeability has been insured by the use of standard gages and templates. The trolley is wired throughout in steel conduits. For mill service it has axle bearings either of the vertical or horizontal cast M. C. B. type. It is made in capacities from two tons to 125 tons.

SAFETY CUT-OUT VALVE

G. H. Wilson, a locomotive engineer on the Atchison, Topeka & Santa Fe, has invented a cut-out valve to replace the ordinary cut-out valve now used in the train line directly under the engineer's valve for the purpose of cutting out this valve when two or more engines are coupled to one train. The special features of the new valve are that it can be used in emergency if there is an accident to the engineer's valve; it is provided with a warning port which gives assurance that there is no train line stoppage between the rear engine and the leading engine as soon as the leading engine is cut in; it permits the rear engineman to instantly assume full control of the brakes in double-heading service, provided he finds it necessary to do so, and lastly, it is so designed that it will not be possible for the helper engine to cut off from the train until the second engineman takes control of the brakes, without the brakes being set throughout the entire train. Its use will eliminate the necessity of having a cut-out cock on the train line leading to the front end of the locomotive.

This valve is a three-way cock with the openings *A* leading to the engineer's valve, *B* to the main train line and *C* to the



Safety Cut-Out Valve for Locomotives

locomotive train line leading to the front end. Warning port *D* leads to the atmosphere, and when double-heading informs the engineman on the second engine that the engineman of the leading engine is ready to assume control of the brakes. Fig. 1 shows the valve in position for operating the train under ordinary conditions. In Fig. 2 the valve is shown in the position used on the second engine when double-heading. Fig. 3 shows the position used by the second engineman when he desires to assume control of the brakes while double-heading. In picking up cars on the head-end of the engine, the train line of these cars is chargd without disturbing the pressure of the main train line, by placing the valve in the position shown in Fig. 4. When a pusher engine is used on the rear of the train, the cut-out valve is operated in the same manner as on the second engine when double-heading. Further information regarding this valve may be obtained from Thomas Ogden, Box 252, Rawlins, Wyo.

Coal in Austria.—The congestion from lack of rolling stock in the Ostrau-Karwin district of Austria, is reported to have been somewhat alleviated, and the mines have been better able to satisfy their customers. The construction of the second line on the Kaschan-Oderberg Railway makes considerable progress in spite of the war, and the last portion of the Orlan-Oderberg section is expected to be ready in the spring.