by H. C. Meloy, chairman. This was an interesting report and covers various improvements relating to apparatus used by the railways which have been brought out since October, 1910. These are described under the following classifications: Axle lighting equipment; storage batteries; lamps, shades and fixtures; fans; motors and generators; controlling devices; wires and wiring devices; transformers and rectifiers, and instruments. The report includes special articles which have been prepared by the different electric manufacturing and supply companies relating to their recent improvements. One of the most interesting is that on the use of forced ventilation on car motors which has been tried on a large scale on the Pennsylvania's Long Island Railroad cars. The used of forced ventilation enables the motors to be operated at a much higher continuous rate than would be possible without it.

At the afternoon session on Wednesday there was presented a report of the committee on shop practice, by C. J. Causland, chairman, and we publish in this issue a liberal abstract of the report. The session on Wednesday concluded with a paper on insulation, by K. R. Sternberg.

The further programme of the convention includes the report of the committee on specifications, a paper on The Light for Safety, by F. R. Fortune, and reports of the committees on train lighting practice and on illumination. The programme for the last day includes routine business and election of officers, closing with a paper on Industrial Trucks, by T. V. Buckwalter. A further report of the convention will be published in a later issue.

Among the exhibits were the following:

Adams-Bagnall Company, Cleveland, Ohio.—A-Bolite flaming arc lamps, train ventilating fans. train ventilating fans.

Adams & Westlake Company, Chicago.—Train lighting fixtures.

American Pulley Company, Philadelphia, Pa.—Pulleys and bushings.

Benjamin Electric Manufacturing Company, Chicago.—Arc lights and train lights.

lights.

Central Electric Company, Chicago.—Okonite Wire and products, D. & W. material, Invincible renovator, Diehl car fans, Columbia train lamps.

Consolidated Railway Electric Light & Equipment Company, New York.—Generating sets, circuit breakers and train lighting system.

Crouse-Hinds Company, Chicago.—Full line of condulets and panel boards.

Cutler Electric & Manufacturing Company, Philadelphia, Pa.—I. T. E. circuit breakers, 4-panel board, remote control.

Edison Storage Battery Company, Orange.—Edison storage batteries for train lighting.

Electric Storage Battery Company, Philadelphia, Pa.—Storage batteries for train lighting.

General Electric Company, Schenectady, N. Y.—Generating sets, dynamos, train lighting turbine parts, circuit breakers, fans and mercury are rectifiers.

rectifiers.

Gould Storage Battery Company, Depew, N. Y.—Generating sets, Gould storage batteries, switchboard and control.

Holophane Company, Newark, Ohio.—Full line of reflectors.

Jefferson Glass Company, Follansbee, W. Va.—Lighting glassware.

Kerite Insulated Wire & Cable Company, New York.—Full line of Kerite wire and cable. J. Lang Electric Company, Chicago.-Panel boards and Lang induction

National Electric Lamp Company, Inc., Cleveland, Ohio.—Headlight lamps and train lighting lamps.

New York Leather Belting Company, New York.—Leather belting.

New York Leather being Company, Niegara Falls, N. Y.—Train lighting, storage batteries and signal storage batteries.

Nungesser Carbon & Battery Company, Cleveland, Ohio.—Carbon specialties and full line of dry batteries.

Oneida Steel Pulley Company, Oneida, N. Y.—Pulleys and shafting.

Pass & Seymour Company, Inc., Chicago.—Special porcelain sockets and full line of sockets.

run inne or sockets.

Pyle-National Electric Headlight Company, Chicago.—Pyle-National headlight and complete plant.

Safety Car Heating & Lighting Company, New York.—Generating sets, gas sets and train lighting fixtures.

sets and train lighting nxtures.

Sangamo Electric Company, Springfield, Ill.—Switchboard, watt-hour meters and meters of various kinds.

United States Light & Heating Company, New York.—National storage battery for car lighting, axle generators, regulating panels, lamp regulators and assortment of spare parts.

Western Electric Company, Chicago.—Interphones and train lighting lamps.

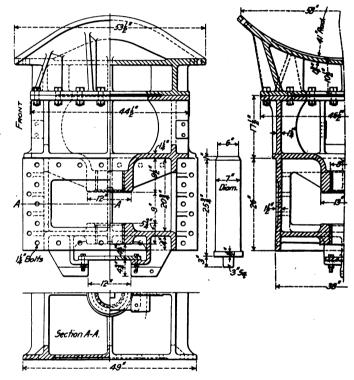
Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa.—Lights and lighting specialties.

Willard Storage Battery Company, Cleveland, Ohio.—Storage batteries for train lighting.

The government of Peru has entered into a contract with the Arthur Koppel Company, Berlin, to build the first section of the Paita-Maranon Railway. The approximate cost of this work is estimated to be \$5,000,000, to be met by the issue of 6 per cent. government bonds.

## MALLET LOCOMOTIVES FOR THE SOUTHERN PACIFIC.

The Southern Pacific Company recently received twelve Mallet locomotives from the Baldwin Locomotive Works, Philadelphia, Pa., which will be used in passenger service on the Sacramento division of the Central Pacific. Eastbound there is a continuous ascending grade from Sacramento, Cal., to Summit, a distance of 105 miles. The total rise is 7,000 ft., and the maximum grade is 116 ft. per mile for about 40 miles. Since 1907 the passenger service on this division has been handled by ten-wheel locomotives built to the Associated Lines standards. They weigh 203,000 lbs., and have 160,000 lbs. on the driving wheels. The tractive effort is 34,700 lbs., and two engines are required to handle a 500-ton train on the 116-ft. grade. Each of the new Mallet locomotives will replace two of the tenwheel engines and under ordinary conditions, the double heading of passenger trains will be avoided. The general design of the new locomotives follow that of the Mallet freight locomotives with 2-8-8-2 wheel arrangement, which were described in the Railway Age Gazette, April 30, 1909, page 933, and have



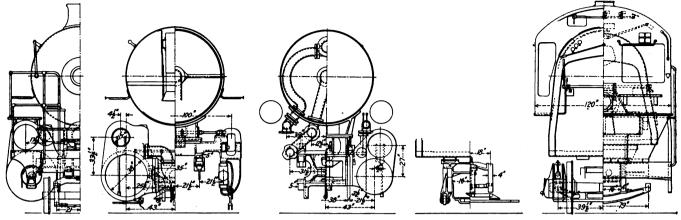
Cast Steel Saddle for Mallet Locomotive.

been in successful use on this division since 1909. A number of modifications have been introduced, however, and these include some features which are new to the practice of the builders.

The boilers of the new Mallet engines are of the separable type, with the dome placed a short distance ahead of the firebox. An internal dry pipe conveys the steam from the dome to the This chamber contains intermediate combustion chamber. right and left hand steam pipes of the ordinary construction, which communicate with short horizontal pipes leading to the high pressure steam chests. The high pressure exhaust is conveyed to the smoke-box through a horizontal pipe located in a large flue which traverses the feedwater heater, and is carried to the flexible receiver pipe. The injector piping is arranged so that the feedwater enters the heater on the bottom center line and leaves it on the top center, thus causing the water to circulate through the entire heater. The hot water enters the boiler proper on both sides, at a distance of 35 in. from the front tube sheet. Check valves are placed at both the heater and the boiler inlets.

The steam distribution to all cylinders is controlled by inside admission piston valves, which are of the built-up type 15 in. in diameter. The valves are operated by the Walschaert valve gear, and are set with a lead of 5/16 in. The exhaust and bronze gibs, and these bear on the tops of the guides only.

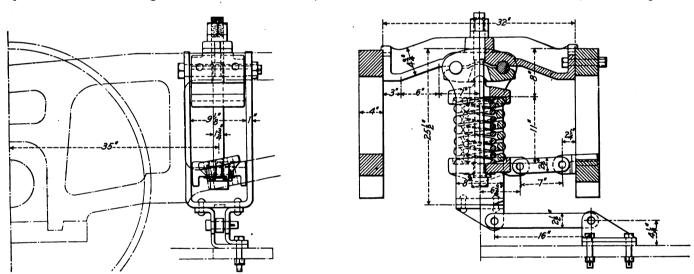
The high pressure cylinders are secured to the saddle by a slab frame 26 in. deep and 2½ in. wide, which is interposed between them. This slab is spliced to the main frame by 21



Sections of Mailet Locomotive.

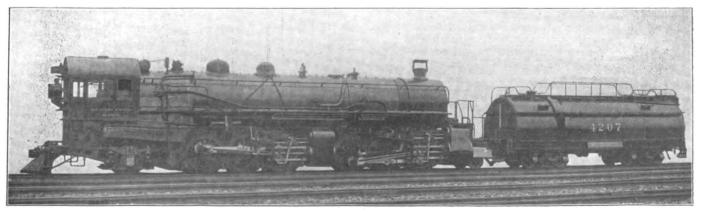
clearance of the high pressure valves is ½ in., and of the low pressure ¾ in. No by-pass valves are used, but a large relief valve is tapped into the steam pipe leading to each cylinder. Special attention has been given to the steam distribution, and

bolts 1½ in. in diameter, and by two vertical keys, driven in a parallel key-way, with their tapered faces in contact. The same plan is used for keying the frames to the cylinders and saddle. The saddle itself is of cast steel, and is composed of



Centering Device for Trailing Truck.

to providing ample sectional areas in the steam and exhaust piping. The low pressure pistons have extension rods which are supported on crossheads at their outer ends, the guides for these crossheads being carried by the cylinder heads and the cast steel bumper beam. The crossheads have cast steel bodies two sections. The lower section extends the full depth of the slab frames, and supports the hinge pin, which is 7 in. in diameter. With this arrangement the separate crosstie heretofore used to support the lower end of the hinge pin is combined with the saddle casting and the cylinders, frames and saddle are



Mallet Passenger Locomotive with Cab at Leading End; Southern Pacific.

bolted and keyed together to form a strong and rigid structure. The low pressure cylinders are bolted directly to a steel box-casting which is secured to the frames.

These engines are designed to run firebox end first to give the enginemen an unobstructed view of the track. The truck under the firebox therefore becomes the leading truck. It is of the Hodges type, and has spring links jointed so as to allow a fore-and-aft motion, as well as a lateral motion. A new design of centering device is applied to this truck. It consists of a double coil centering spring that is held in a vertical position between two cast steel washers, and is guided by a vertical thrust bar. This thrust bar is placed on the center line of the locomotive and is suspended from a crosstie. The upper spring washer bears on the crosstie, through two 2-in. pins and a bearing plate. On these pins is suspended a U-shaped strap, which is wide enough to embrace the spring washers. A link connects the lower end of the strap with a lug which is bolted to the truck frame. When the frame is displaced from its middle position, the strap is pulled to one side, and one of the upper pins is drawn down, thus pushing on the bearing plate and throwing the spring into compression. The bottom spring washer is held in place by a link which is pinned to the engine frame.

These locomotives are equipped for burning oil, and the tenders are coupled at the smoke-box end. The two tanks are semi-cylindrical in shape, and are placed end to end. The tender frame is composed of 12-in. channels weighing 40 lbs. per foot, and braced transversely. The end bumpers are of cast steel. The tender trucks and the trailing truck, are equipped with Standard forged and rolled steel wheels. A table of the important dimensions and ratios follows:

General Data

_ General Data.
Type2-6-6-2
ServicePassenger
FuelÖil
Tractive effort 66,800 lbs.
Weight in working order384,800 lbs.
Weight in working order
Weight of engine and tender in working order568,000 lbs.
Wheel base, driving
Wheel base, rigid11 ft.
Wheel base, driving       32 ft.         Wheel base, rigid       11 ft.         Wheel base, total       51 ft. 4 in.
Wheel base, engine and tender
, ,
Ratios.
Total weight ÷ tractive effort 5.76
Weight on drivers + tractive effort 4.80
Weight on drivers ÷ tractive effort
Total heating surface $\rightarrow$ grate area
Firebox heating surface ÷ total heating surface, per cent. 3.3 Weight on drivers ÷ total heating surface
Weight on drivers + total heating surface 45.
Total weight - total heating surface
Volume of equivalent simple cylinders, cu. ft 22.5
Volume of equivalent simple cylinders, cu. ft
Grate area ÷ vol. cylinders
•
Cylinders.
Kind
Diameter
Stroke
KindBal. piston
KindBai. piston
Diameter
Lead, forward gear5/16 in.
Wheels.
Deining diameter over tire 61 in
Driving thickness of tire
Driving journals main diam 11 in x 12 in.
Driving, thickness of tire
France truck diameter 301/4 in.
Engine truck journals 6 in v 10 in
Trailing truck diameter 45 in
Trailing truck, diameter
StyleStraight
Working pressure
Outside diameter of first ring82 in.
Outside diameter of first ring
Outside diameter of first ring
Outside diameter of first ring       82 in.         Firebox, width and length       84 in. x 120 in.         Firebox plates, thickness       ½ in.         Firebox water space       5 in.
Outside diameter of first ring. 82 in. Firebox, width and length 84 in, x 120 in. Firebox plates, thickness 5 in. Firebox water space 5 in. Tubes, number and diameter 495—2 in.
Outside diameter of first ring
Outside diameter of first ring 82 in. Firebox, width and length 84 in. x 120 in. Firebox plates, thickness 46 in. x 120 in. Firebox water space 55 in. Tubes, number and diameter 56 in. Tubes, number and diameter 67 in. Tubes, number and diameter 68 in. Tubes, length 69 in. Tubes, length 60 in. Tubes, l
Outside diameter of first ring 82 in. Firebox, width and length 84 in. x 120 in. Firebox plates, thickness 46 in. x 120 in. Firebox water space 55 in. Tubes, number and diameter 56 in. Tubes, number and diameter 67 in. Tubes, number and diameter 68 in. Tubes, length 69 in. Tubes, length 60 in. Tubes, l
Outside diameter of first ring         82 in.           Firebox, width and length         84 in. x 120 in.           Firebox water space         ½ in.           Firebox water space         5 in.           Tubes, number and diameter         495—2 in.           Tubes, number and diameter (feed-water heater)         424—2¼ in.           Tubes, length         20 ft. 6 in.           Tubes, length (feed-water heater)         6 ft. 3 in.           Heating surface, tubes         5.292 sq. ft.           Heating surface, firebox         235 sq. ft.           Heating surface, feed-water tubes         1.590 sq. ft.           Heating surface, total         7,117 sq. ft.           Grate area         70 sq. ft.
Outside diameter of first ring         82 in.           Firebox, width and length         84 in. x 120 in.           Firebox water space         ½ in.           Firebox water space         5 in.           Tubes, number and diameter         495—2 in.           Tubes, number and diameter (feed-water heater)         424—2¼ in.           Tubes, length         20 ft. 6 in.           Tubes, length (feed-water heater)         6 ft. 3 in.           Heating surface, tubes         5.292 sq. ft.           Heating surface, firebox         235 sq. ft.           Heating surface, feed-water tubes         1.590 sq. ft.           Heating surface, total         7,117 sq. ft.           Grate area         70 sq. ft.
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Outside diameter of first ring         82 in.           Firebox, width and length         84 in. x 120 in.           Firebox plates, thickness         ½ in.           Firebox water space         5 in.           Tubes, number and diameter         495—2 in.           Tubes, number and diameter (feed-water heater)         .424—2½ in.           Tubes, length         .20 ft. 6 in.           Fubes, length (feed-water heater)         .6 ft. 3 in.           Heating surface, tubes         .5292 sq. ft.           Heating surface, frebox         .235 sq. ft.           Heating surface, feed-water tubes         1.590 sq. ft.           Heating surface, total         7,117 sq. ft.           Grate area         70 sq. ft.           Wheels, diameter         33 in.           Loverals         6 in. x 11 in.
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