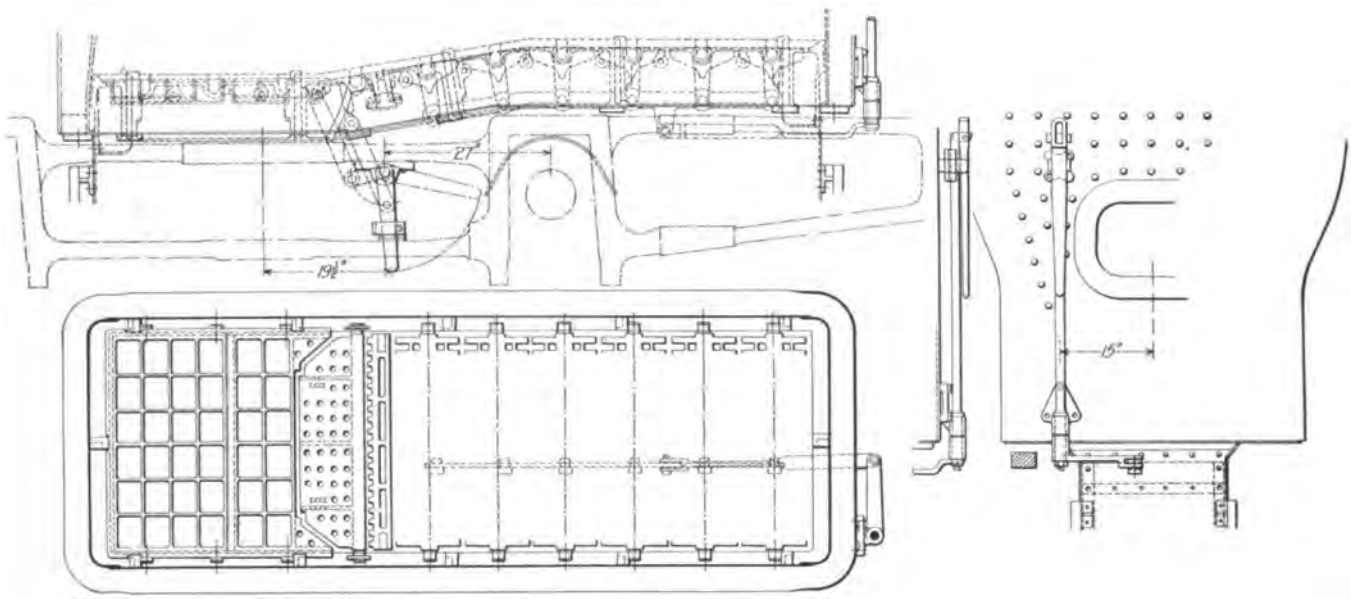
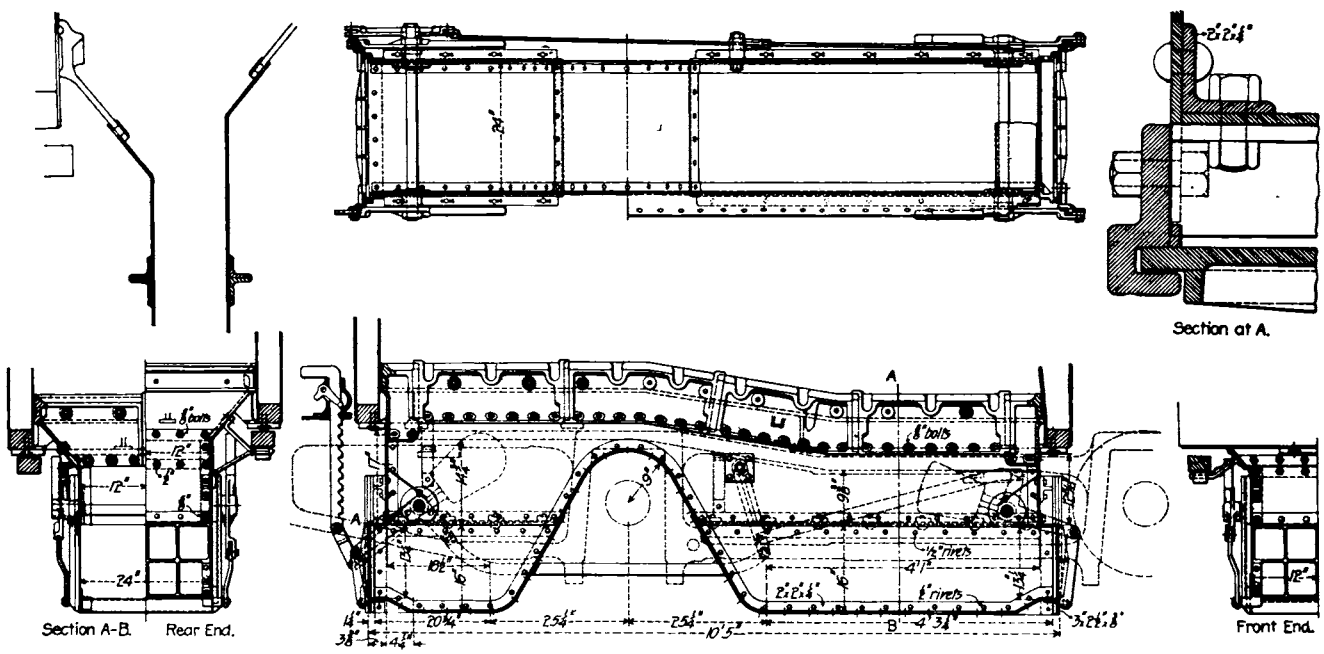


Grates for Bituminous Coal.—Class L Locomotives.

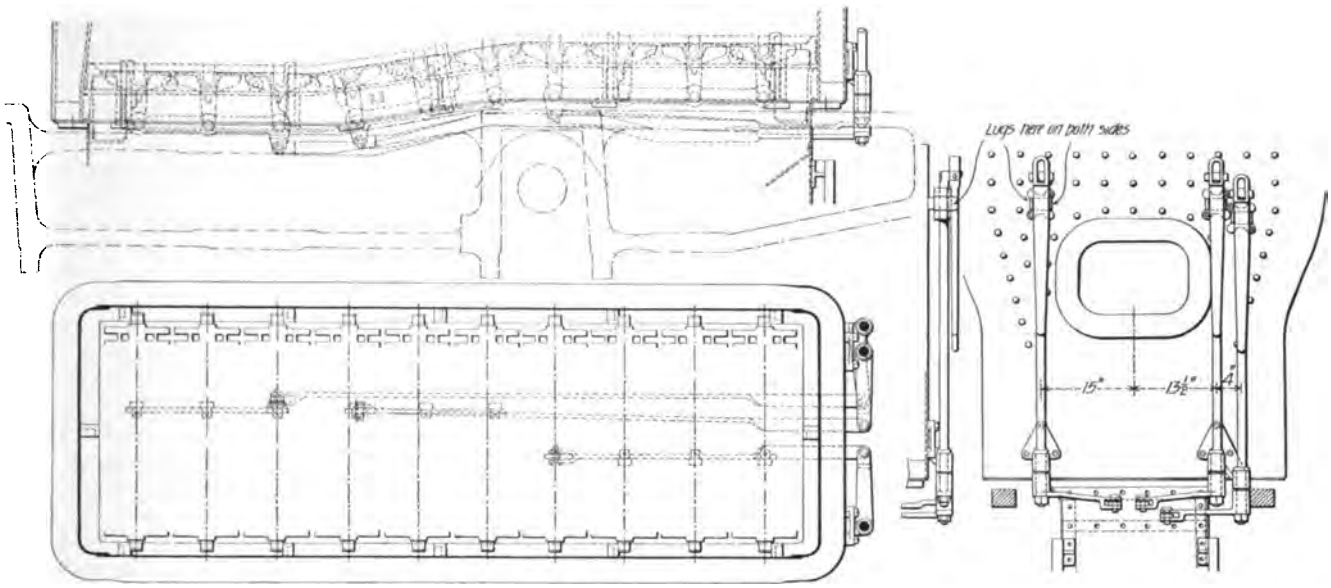


ARRANGEMENT OF GRATES AND ASH PAN FOR BITUMINOUS COAL—PENNSYLVANIA RAILROAD.

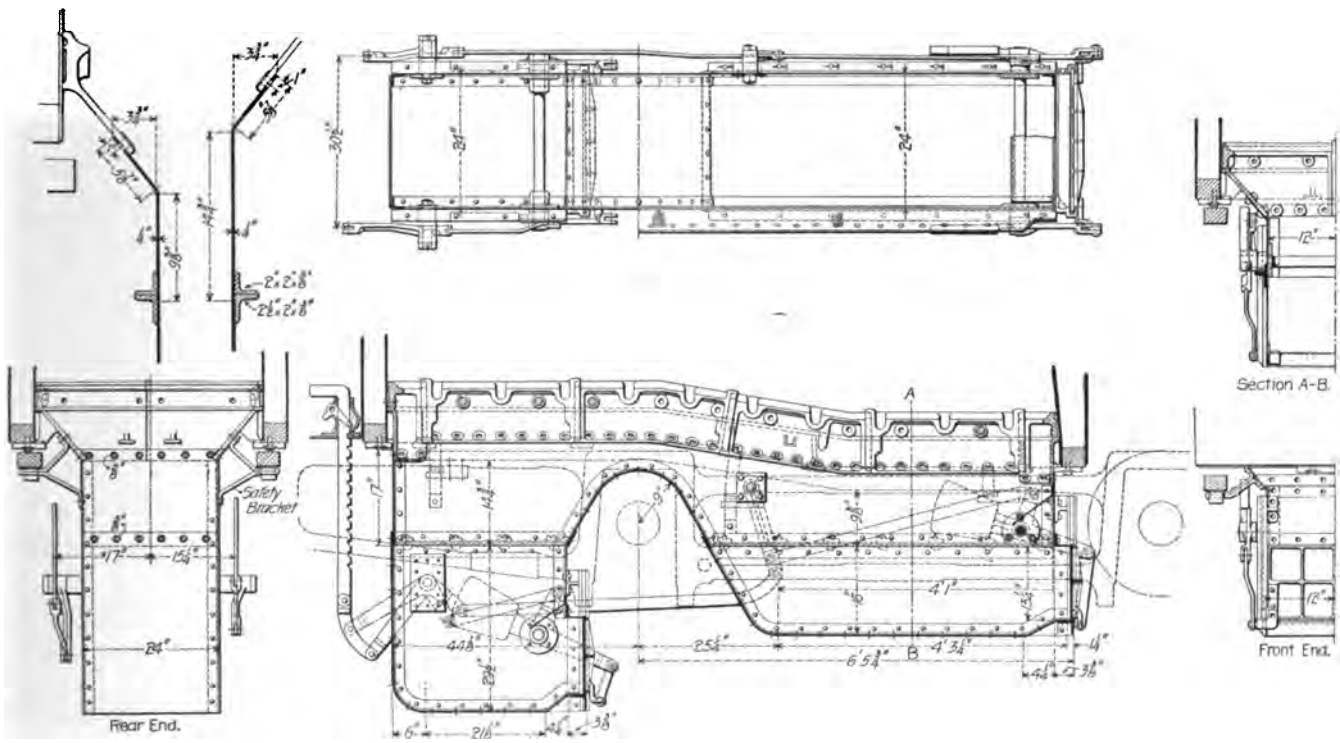
GRATES, ASH PANS AND DAMPERS FOR ANTHRACITE AND BITUMINOUS COAL LOCOMOTIVES.

Pennsylvania Railroad Practice.

In the efforts of many railroad officers to improve in the use of locomotive fuel the very important factor of proper regulation of the admission of air through the grates is neglected, and the design of ash pans and dampers needs more thought than it usually receives. This becomes apparent on examining the usual crude and loose-fitting dampers with their attachments for regulating the amount of air admitted. It is difficult to make a hinged sheet iron damper tight even when new, and it is not easy to obtain a fine adjustment of the area of opening with a device that opens like a hinged door. A sliding cover of substantial and close-fitting construction seems advantageous, and if such dampers are arranged to be easily worked and regulated it seems reasonable to expect that they will be carefully used by enginemen who try to save coal. It is also important to prevent air from getting into the firebox around the edges of the grates, and through the courtesy of the officers of the mechanical department of the Pennsylvania Railroad, we present several engravings showing carefully considered practice as applied to grates on a type of standard locomotives on that road for both anthracite and bituminous coal. The grates, their supports and rocking mechanism, the arrangement of the ash pans and the damper attachments are illustrated. They are those of the "Class L" engines, an extended description of which was printed in our issue of August, 1896, page 166.

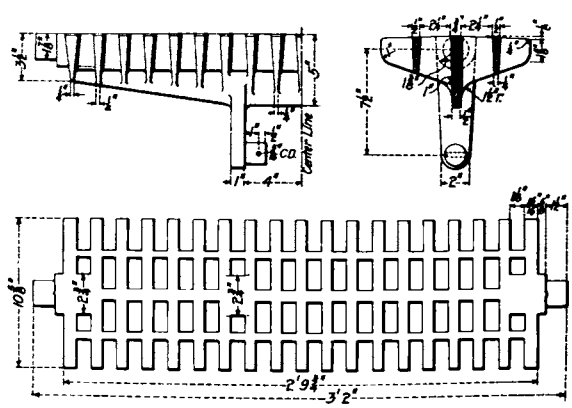


Shaking Grate for Anthracite Coal—Class L Locomotives.



ARRANGEMENT OF GRATES AND ASH PAN FOR ANTHRACITE COAL—PENNSYLVANIA RAILROAD.

For anthracite coal 10 shaking grates are used, occupying the entire length of the firebox, and for bituminous coal the forward end for about 33 inches is taken up by dead plates, back of which is a perforated drop grate 14 inches wide. In some of the later types of engines it has been found necessary to increase the number of shaking grates in order to prevent the coal from being dragged up towards the tube sheet by the draft, but the ash pan and grate-bearer arrangement has not been changed. For bituminous coal the grate fingers are 10 inches long, measured from the end of one of them to the end of the one opposite to it, the bars are ⅞ inch wide and the spaces between them are of the same width as the bars. The grates are sometimes connected and operated together, and sometimes are divided into two sections, depending upon the number of shaking bars used. For anthracite coal the grates



Detail of Anthracite Grate Bar.

are divided into three sections, the fingers of the individual bars being 10⅝ inches long and ¾ inch wide, with spaces 1 1/16 inches wide.

The grate bars are carried by bearing castings, formed into flanges at their bottom edges for the attachment of the ash pans. These castings are held to the side of the firebox by studs, and are also held by lugs bolted to the bottom of the mud ring. Special efforts are made to close up all openings around the sides of the firebox, to exclude cold air from coming into contact with the firebox sheets, and also to keep the flame away from them. The access of air to the firebox close to the sheets causes high local heating, that resembles blow-pipe action and shortens the life of the sheets. These grate bearers are grooved to receive a rope of asbestos packing between the castings and the firebox sheets, making a tight joint around the edges of the grates.

The ash pans are of plate, with angle frames, and they are bolted to the flanges of the grate bearer frame. Additional safety brackets, bolted to the under faces of the engine frames, are used to prevent the ash pan from falling in case of breakage of the grate bar frame, and the weight of the grate, coal and ash pan is not carried exclusively by the studs that secure the grate supports to the firebox sheets. The damper openings are large, permitting of easily cleaning out the ashes.

In this design the dampers slide vertically. They are of cast iron and fit closely in grooves. Their weight is balanced, in order to render them easy of operation. While the arrangement of dampers at the front and rear ends of the ash pan works very well for bituminous coal, it does not give entire satisfaction with anthracite, and the drawing of the latter arrangement shows the dampers in the front of the front half and also in the front of the rear half of the pan, the rear portion being extended downward below the level of the front portion. The same damper rigging and cast iron sliding dampers are used in both cases. This mechanism, while rather elaborate, has been found satisfactory, and it does not get out of order. Its chief feature, aside from tightness when closed, is the ease of adjustment by means of the notched rods extending through the deck of the cab. The rods are held by latches that are encased in the housings which guide the rods, and coal is prevented from clogging the latches. To lower a rod, the man places his foot on the opposite end of the bell crank that forms the latch, releasing it.

The shaking levers for operating the grates are permanently attached to the shaking shafts, and when raised to a horizontal position the slot in the head engages with the crank on the top of the shaft, but when out of use the lever hangs vertically, and before putting it into this position the grates must be returned to their normal position. This is to protect the tips of the grate bars from being burned by careless firemen. The design throughout is substantial, and is worthy of being considered permanent construction, which is too much to say of common practice in this regard.

NEW YORK RAILROAD CLUB.

Mr. Charles Hansel, M. Am. Soc. C. E., General Manager of the combined National and Union Switch and Signal companies, read an able and comprehensive paper on railway signaling at the January meeting of the New York Railroad Club, illustrated by stereopticon. The paper combined technical signal engineering with elementary explanation of the mechanical interlocking and presentation of the principles involved in the use of the electric train staff. The author gave operating men a great deal to think about, particularly in connection with the definitions of the home block and advance block signals established by the American Railway Association, and suggested the use of a distinctive semaphore signal for the block signal where the home signal is also used. This signal has two arms on the same spindle, the front one having a square end and the other a notched end. The paper was suggestive, and copies should be secured by those who have to do with signaling and train operation.

COMPOUND CONSOLIDATION LOCOMOTIVES, NORTHERN PACIFIC RAILWAY.

The Schenectady Locomotive Works have just built 14 two-cylinder compound consolidation engines for the Northern Pacific Railway, the design of which is interesting in comparison with the powerful compounds of the mastodon type by the same builders, illustrated in our issue of March, 1897, page 97. This road has considered the compound locomotive with special care, and its past and future experience with a large number of engines of this type may be studied with profit.

Through the courtesy of Mr. William Forsyth, Superintendent of Motive Power of the road, we have received a photograph and particulars of the new type that is known as Class Y. We understand that the same boiler is used, with 2,923 square feet of heating surface. The total weight of the Class Y is 3.200 pounds more than that of Class X, the mastadons, and the weight on the drivers of Class Y is more by 19,000 pounds. The weight per driving wheel of Class Y is 21,125 pounds, which is 2,375 pounds greater per wheel than that of Class X. These weights render the new design suitable for pushing on heavy grades and also for road work. The cylinders of both types have the same diameter, 23 and 34 inches, but the stroke of Class Y is 34 inches, an increase of 4 inches over Class X, while the driving wheels are of the same diameter in both. We are informed that the new engines are expected to develop a drawbar pull of 40,000 pounds at a speed of 10 miles per hour. The working steam pressure will probably be about 210 pounds per square inch, although the boilers are built to carry 225 pounds. The small diagram of the engine gives the chief dimensions and the photograph shows the engine to be remarkably symmetrical for a large one. The tires of the second and third pairs of driving wheels are plain, the flanges of the forward tires being set ⅜ inch narrow in gauge in order to throw more of the work of guiding the engine upon the truck wheels. It will be noticed that the sand boxes used in backing are hung under the running boards.

General Dimensions.

Gauge	4 ft. 8½ in.
Fuel	Bituminous coal
Weight in working order	189,200 lbs.
" on drivers	169,000 lbs.
Wheel base, driving	14 ft. 8 in.
" " rigid	14 ft. 8 in.
" " total	23 ft. 3 in.

Cylinders

Diam. of cylinders	H.P. 23 in. L. P. 34 in.
Stroke of piston	34 in.
Horizontal thickness of piston	4¾ and 5¾ in.
Diam. of piston rod	3¾ in.
Kind " " packing	Cast iron
Size of steam ports	H. P. 18 in. x 1⅝ in. L. P. 23 in. x 2¼ in.
" " exhaust "	H. P. 18 in. x 3 in. L.P. 23 in. x
" " bridges	1⅜ in.

Valves.

Greatest travel of slide valves	6 in.
Outside lap " " "	H.P. 1¼ in. L. P. 1 in.
Inside " " " "	¼ in.
Lead of valves in full gear	⅛ in. blind

Wheels, Etc.

Diam. of driving wheels outside of tire	55 in.
Metal " " " centers	Cast steel
Tire held by	Shrinkage
Driving box material	Main, cast steel; 1st, 2d and 4th, steeled cast iron.
Diam. and length of driving journals	Main, 9 in. diam 1st, 2d and 4th, 8½ in. dia. x 10 in.
" " " " side rod crank pin journals	2d, 5½ in. x 5 in.; 1st and 4th, 5 in. dia. x 3¾ in.
" " " " main crank pin journals	Main, side, 7½ in. x 5¼ in.; 6½ in. diam. x 6 in.
Engine truck, kind	2 wheel swing bolster
" " journals	6 in. diam. x 11 in.
Diam. of engine truck wheels	30 in.

Boiler.

Style	Extended wagon top
Outside diam. of first ring	72 in.
Working pressure	225 lbs.
Fire box, length	120 3-16 in.
" " width	42 in.
" " depth	F., 77 in.; B., 73¼ in.
" " plates, thickness—sides, 5-16 in.; back, 5-16 in.; crown, ⅜ in.; tube sheet, ½ in.	
" " water space—front, 4½ in.; sides 3½ to 4 in.; back, 3½ to 4½ in.	
" " crown staying	Radial stays, 1¼ in.
" " stay bolts	Ulster special iron, 1 in. diam.
Tubes, number of	330
" diam.	14 ft.
" length over tube sheets	144 in