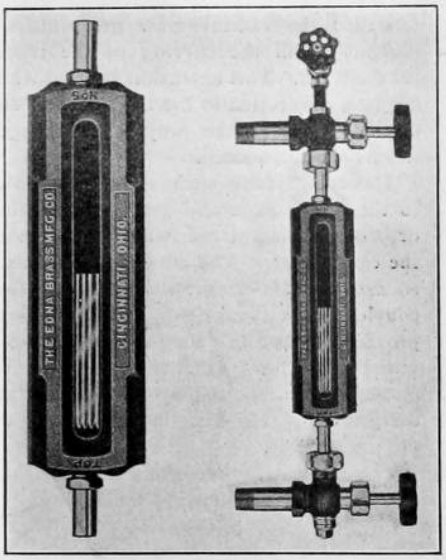
or preferably immediately after the hydrostatic test has been made, the dome cap and throttle standpipe must be removed, so that the interior of the boiler can be inspected as well as conditions will permit. After any defective parts found have been repaired, the boiler must be fired up and the steam pressure raised to not less than the allowed working pressure, and the boiler and appurtenances carefully examined. All cocks, valves, seams, bolts and rivets must be tight under this pressure, and all defects disclosed must be repaired.

All rigid staybolts must be tested at least once each month, and immediately after each hydrostatic test, by tapping each bolt with a hammer and noting from the sound of vibration of the sheet whether or not the bolt is broken. This test can also be made with the boiler full of water, providing it has a pressure of not less than fifty pounds.

Flexible staybolts, with caps, must be tested at least once every 18 months, by having the cap removed. Flexible staybolts without caps must be tested each month, same as rigid staybolts.

Steam gauges must be tested at least once every three months, or when any irregularity is reported The test is to be made by removing the steam gauge from the boiler and mounting it, together with an accurate test gauge, on fittings provided for that purpose, whereby a pressure applied to the steam gauge can be compared with that applied to the test gauge.



FIGS. 4-5. REFLEX WATER GAUGE. EDNA BRASS MFG. COMPANY.

Safety valves must be tested once every three months, by having the boiler fired up and the fire forced to see that the safety valves lift at the desired pressure and relieve the boiler from any accumulation more than 5 per cent above the allowed steam working pressure.

Water glasses, valves and gauge cocks must be tested each trip by being opened and closed to see that the water level is properly registered. They must also be kept clean and free from scale by being cleaned once each month. Injectors must be tested before each trip by being actually operated.

These tests are to be made as described above, the calculation of the factor of safety, of course, depending upon the railroad company. The other tests can be made by the inspector personally, or can be made by any one designated for the purpose by the railroad company, the inspector to be an actual witness of the tests."

A Giant Gondola for the Virginian

Heavy Gondola Carrying Coal and Rough Freight—Built for Weighty Service—Can Be Dumped by Being Turned Upside Down—Heavy Six-Wheel Truck—Steel Wheels

Four experimental gondola cars for the Virginian Railway of 120 tons each have been built as a starter for the carrying of coal from the mines to tidewater, at which point they are dumped by special apparatus. The floors of these cars are not designed to let any of the load pass through. The cars are so constructed that the side construction will carry the bulk of the load, while the centre of the car, composed of an H-section, is principally reserved for pulling and buffing. The H-section is 12-ins. deep, and weighs 84.5 lbs. a foot. It approaches to within about 24 ins. of the plane of the bolsters at each end. It is here fastened to a heavy centre plate and draw casting, which takes the National radial draw gear.

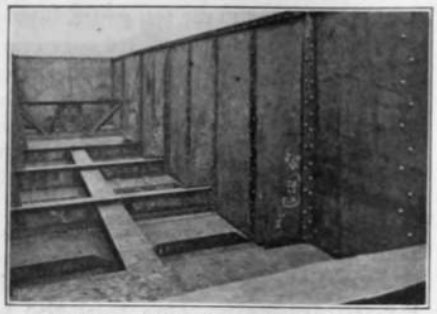
The weight of the load between the bolsters is carried to the sides through four built-up sections surrounding the centre sills at each end. By thus suspending the floor plates from the under side of the built-up girders, and exposing the centre sill in the loading space, several hundred cubic feet has been gained in the loading space, which adds materially to the carrying capacity of the car. The floor plates between the transverse girders, are made stiff by the use of heavy angles. The plates are made out of ¼-in stuff, principally to resist the effects of corrosion, and, of course, for strength as well. To prevent the lodgment of coal back of the upper flange of the center sill girder, during the dumping operation, the space is occupied by an oak filler block, securely held in place.

The central depression of the car floor is 30 ft. long. The sides and ends of the car are composed of ¼-in. plates. The sides are further strengthened against any tendency to bulge, by the use of five 3-in. cross-tie sections, weighing 9 lbs. a foot, and two similar sections are put in a transverse position to stiffen the end walls of the car. Additional rigidity is secured by the interior gusset plates which are used. A heavy bulb-angle is run round the top and a proportional angle is placed at the bottom. A further purpose of the exterior cross-tie side post is to make a bearing in the cradle of the dumping apparatus, by which the contents of the

HEAVY GONDOLA CAR FOR EXPERIMENTAL PURPOSES, ON THE VIRGINIAN.

car are most thoroughly unloaded.

The trucks which carry the car are



INTERIOR OF VIRGINIAN GONDOLA.

two in number, each having six wheels. The trucks are of the Lewis pattern, the frame being hinged over the centre wheel. In this car the American Steel Foundries Company furnished the truck and Davis steel wheels are used. The truck bolster is made in the form of a spider, spanning the central axle and transmitting the load to each of four points. Each corner of the bolster is carried on helical springs and on the apex of each is a Stuki roller side bearing. The journal boxes are of the well known McCord type, made of pressed steel. The Davis steel wheels are 33 ins. in diameter, and are mounted on M. C. B. standard axles designed to carry 50,000 lbs. each, with 6 x 11 ins. journals. The wheel base of the truck is 9 ft. and each truck weighs 16,350 lbs.

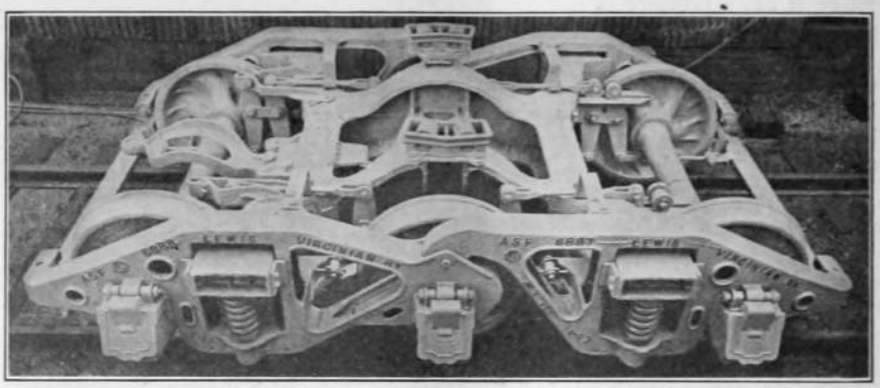
There is one feature of the trucks not generally used. It is an extension casting projecting over the axle nearest the end of the car. The purpose of this is to influence the radical draw gear, in accordance with the curving of the truck on the track. This extension is fitted with a spring connection to the truck frames so that nothing in the way of breakage strains are introduced.

The radial draw gear is pivoted close to the center plate and gear housing, the draw gear being placed immediately above the center plate. The latter are machined so as to secure a uniform bearing. The couplers have shanks 6 by 8 ins. and are provided with lugs on the heads and guard arms to prevent excessive side motion. The lateral play allowed on the carry iron is 7¼ ins. on either side of the center line.

The principal dimensions and weights are given in the following table:

Length of body, inside, 50 ft. Width, inside, 9 ft. 8½ ins. Width, over all, 10 ft. 3½ ins. Depth, at ends, 7 ft. 4⅛ ins. Depth, at middle, 8 ft. 7⅛ ins. Height from top of rail, 11 ft. 1½ ins. Length over faces of couplers, 53 ft. 7 ins. Distance between truck centers, 37 ft. 4¾ ins. Wheel-base of each truck, 9 ft. Weight of each truck, 16,350 lbs. Weight of car, including trucks, 73,900 lbs. Capacity, full level, 3,785 cu. ft. Capacity, full level, 218,000 lbs. Permissible overload, 10 per cent. Load per axle, with 10 per cent. overloaded added, 52,283 lbs. Weight of each wheel is about 665 lbs.

The tare weight of the car is 73,900 lbs. This includes the weight of both trucks. When to this is added the full car capacity of 218,000 lbs., we have 291,900 lbs. Taking 10 per cent. of 218,000 we get in all 313,700 lbs. This is carried on six axles, or 52,283 lbs. for each. This gives a wheel load of 26,141 lbs. per wheel.



LEWIS PATTERN TRUCK USED UNDER VIRGINIAN GONDOLA.

United States Rolling Stock for France

The first locomotive for American war service railroads in France was completed in 20 working days, and engines of this type are now being turned out at the rate of about 30 per day. Nearly 680 of these locomotives and over 9,000 standard-gauge freight cars are on order. Other narrow-gauge rolling stock for transportation along the battle front are also on order, and additional orders for both narrow and standard-gauge equipment are likely to be placed in the future.

The first order for war locomotives was placed with the Baldwin Locomotive Works, Inc., of Philadelphia on July 18, and the first engine completed on August 9. This was nothwithstanding the fact that the boiler was constructed specially for this type of engine and was fitted with a superheater. In other respects the locomotive is similar to locomotives built by the Baldwin Works, Inc., for the British Government. It is not as powerful a type as that used on many roads in the United States, but on a road where the heaviest engines haul a train of about 90 loaded freight cars, this war locomotive is expected to take 60 loaded cars. Like all the rest of this equipment, it is painted a battleship gray and bears the letters "U. S. A.," designating the United States Army. The locomotive weighs 166,400 lbs., with a tender of about 275,000 lbs.

A modern army requires an adequate system of railways for moving troops and supplies to the front, and for distributing ammunition to the batteries on the firing line. The present war has demonstrated that success or failure depends very largely upon the extent to which transportation facilities are provided.

With the entrance of the United States into the war, the government became a purchaser of railway locomotives, cars and supplies. Last July an order was placed with the Baldwin Locomotive Works for 150 standard-gauge freight locomotives, all of which were to be completed by October 1, that is in 75 days. A similar order was placed with the American Locomotive Company.

WAR LOCOMOTIVE BUILT IN THE U. S. FOR FRANCE.

In general design these locomotives are similar to a large number which have been built for service in France. This fact simplified the preliminary work, and rapid