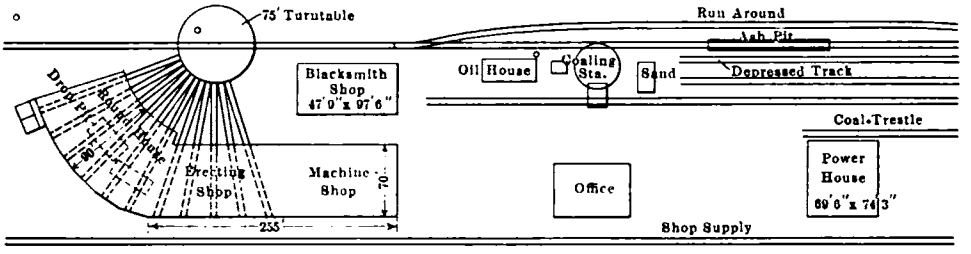
Locomotive Shops at Cape Charles, Va.

VERY COMPLETELY EQUIPPED SHOPS HAVE RECENTLY BEEN ERECTED AT THIS POINT TO CARE FOR THE POWER OF THE NEW YORK, PHILADELPHIA & NORFOLK RAILWAY, NOW A PART OF THE PENNSYLVANIA SYSTEM.

On the division of the New York, Philadelphia & Norfolk Railway from Delmar south, there are 37 engines at present regularly assigned, and during the busy season, which covers usually about three months, there are about 50 engines regularly on this division. The headquarters for this power is at Cape Charles, the southern end of the road, and new shops have just been put into operation at that point giving facilities for making all repairs, with the exception of heavy boiler work, on the regularly assigned power. Although these shops are relatively small they have been very completely equipped with modern appliances of all kinds, and present an excellent example of a suitable and convenient arrangement for a shop of this size.



GENERAL PLAN OF CAPE CHARLES SHOP.

The machine and erecting shop is enclosed in a brick building 70 by 250 ft., and a six-stall section of the roundhouse forms an extension on one end of this building, as is shown in the plan. With this arrangement the five tracks in the erecting shop are located so as to radiate from the turntable and the necessity for a transfer table is eliminated. While this plan requires slightly more room in the erecting shop it is on the whole an excellent scheme for a shop of this size. The method of operation consists of taking the locomotive into the roundhouse to the drop pits, removing the wheels, placing two shop trucks under the frames and then drawing it on to the turntable and placing it on any pit in the erecting shop. Although no crane has been installed in the machine and erecting shop at present, runways have been provided for a 10-ton crane, which will be installed later. The structure enclosing the machine and erecting shop is most substantial, heavy brick walls and steel roof trusses in a single span. A louve is provided in the center of the roof for the full length of the building and the windows swing on a horizontal axis, being controlled from the floor in sections by a "straight push" sash operator installed by the G. Drouvé Co.

The roundhouse has a span of 90 ft. and the wooden roof truss here employed required the locating a row of posts 25 ft. from the outer circle. The louve in this section of the building is provided with ventilators on both sides. Throughout this structure and the others natural lighting has been given careful attention and the window area is almost the maximum. In the machine shop a plank floor is employed, while the erecting shop and roundhouse have a wooden block floor. The artificial lighting throughout is by mercury vapor lights.

GENERAL VIEW OF THE ERECTING SHOP.

The tools are electrically driven, the larger ones having individual motors, as is shown in the following list:

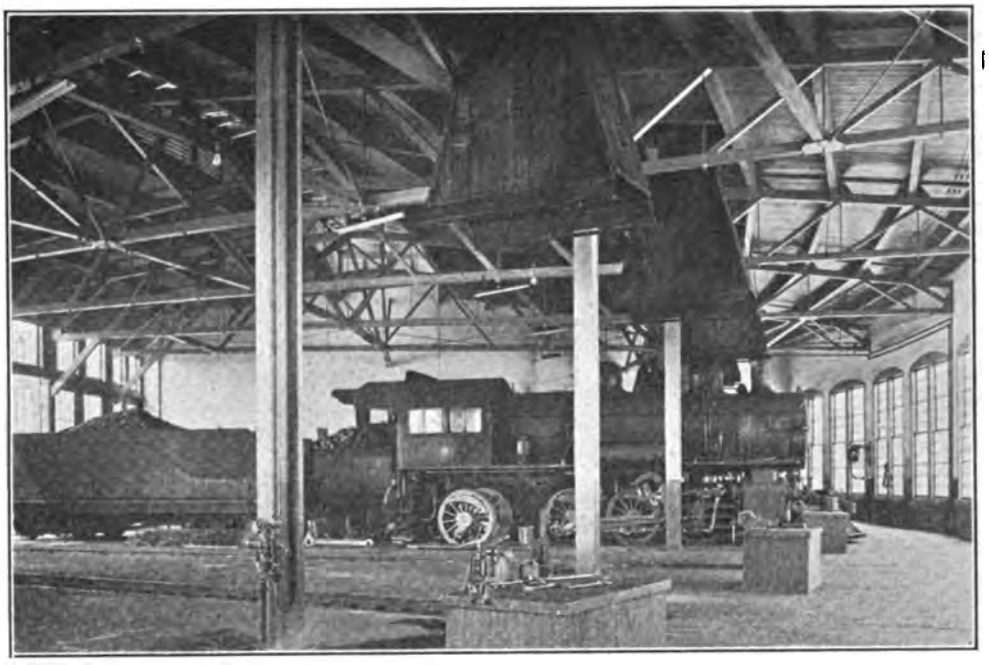
TOOLS.	MOTOR.
Niles planer	7½ h. p.
30 in. American "patented head" lathe	10 "

TOOLS.	MOTOR.
Group	7½ h. p.
16 in. Blair lathe.	
18 in. American lathe.	
18 in. Lodge & Shipley lathe.	
Group	7½ "
18 in. Lodge & Shipley lathe.	
28 in. Lodge & Shipley lathe.	
36 in. Niles lathe.	
Williams pipe machine	3 "
Group	5 "
Acme double head bolt cutter.	
Williams bolt cutter.	
Emery wheel.	

a clear open head space for the crane and liberal length of belt without complication.

In the roundhouse there are good-sized benches between each of the pits, which have a vise and are arranged as lockers for other tools. The heating throughout this section and the other buildings is by direct radiation from steam pipes in the pits and along the side wall.

A 75 ft. turntable is contained in a concrete pit, floored with concrete, and is driven by a McGrath pneumatic turntable tractor manufactured by the Draper Mfg. Co., Port Huron, Mich.

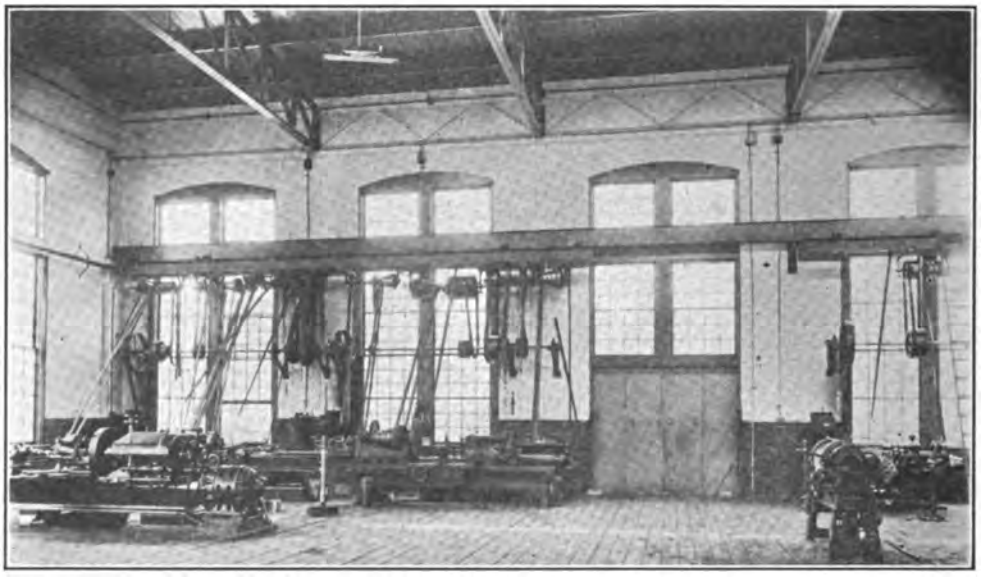


INTERIOR OF ROUNDHOUSE—CAPE CHARLES SHOPS.

TOOLS.	MOTOR.
Bickford radial drill	5 h. p.
Dill slotter	5 "
Group	7½ "
Niles slotter.	
Gould & Eberhardt shaper.	
Brown & Sharpe milling machine	5 "
Group	3 "
Reamer grinder.	
Drill grinder.	

In addition to the space occupied by the machine tools there is a liberal amount of floor area left for benches and the usual tinsmith, air brake and other bench work equipment is provided. Other tools required, as for instance a driving wheel lathe, boring mill, etc., will be added in the near future. One of the illustrations shows the arrangement of countershaft along the side wall, used in connection with the group drive. This gives

The equipment for boiler and blacksmith shop work is contained in a brick building with a wooden roof truss and cinder floor, measuring 50 by 100 ft., located conveniently as is shown in the general layout. In this building is the following equipment: Flue cutting machine, furnace, welding machine, swedging machine, testing machine and annealing furnace. This group is driven by a 7½ h.p. motor. In the opposite corner is a flanging fire with its clamp, and a pair of hand bending rolls; nearby is a hand shear, a Hilles & Jones punch and shear driven by a 5 h.p. motor; a 1,100 lb. steam hammer; a 600 lb. steam hammer, both provided with jib cranes and each served by three open fires.



A CORNER OF THE MACHINE SHOP, SHOWING ARRANGEMENT OF COUNTERSHAFT WITH GROUP DRIVE.

A large power house supplies light and power for the yards, depot and the offices scattered throughout the terminal. This has been housed in a most attractive building 70 x 75 ft. which contains three 200 h.p. boilers, hand fired, and two 175 k. v. a. three-phase, 60 cycle, 2,400 volt generators, each driven by a 14 x 18 in. slide valve engine. In the fire room there are two fire pumps, each having a capacity of 500 gallons per minute, also boiler feed pumps and general water service pumps in duplicate. A large feed water heater comprises a portion of the equipment. The water supply for the plant is obtained from 40 driven wells near the power house. In the engine room in addition to the generators there is a 20 k.w. motor generator set for exciting and a similar size turbo-generator set used for starting the alternators. The current leaves the power house at 2,400 volts and is transformed by static transformers before entering the various buildings where it is to be used, and it is delivered to the motors at a pressure of 220 volts. In the power house is also the air compressor which has a capacity of 690 cu. ft. of air per minute. Two 25-light mercury rectifier sets have been installed for the current which is to light the yard, the lamps there being for direct current. The switchboard and all equipment throughout the powerhouse is of the highest character and was carefully installed. Space is provided for additional equipment to increase the present capacity by 50 per cent.

A two-story and basement storehouse and office building of 50 x 72 ft. has been constructed. An electric elevator of 6,000 lbs. capacity has been installed in the store section. In this building, as well as in the offices of the various foremen, the light is by tungsten lamps instead of the Cooper-Hewitt mercury lamps generally used. The oil house is 22 x 53 ft. and contains the usual tanks and arrangement for storage and delivery of oil and waste. The ash pits are of the standard Pennsylvania type and coaling is done by a clam shell bucket on a stationary jib crane operated by a steam hoisting engine.

Ample provision for protection from fire is had by means of the 6 in. fire main, in the form of a loop surrounding the plant, supplying the various plugs throughout the yard and the hose reels in the interior of the various buildings. Two 50,000 gallon steel tanks provide the storage and the pressure for ordinary service. Toilet and wash rooms with hot and cold water and expanded metal lockers have been installed throughout the shop for the comfort and convenience of the employees.

RIGID VS. NON-RIGID FREIGHT TRUCKS

W. J. SCHLACKS.

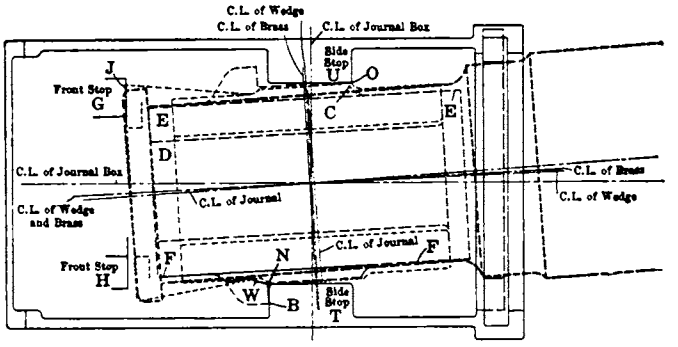
All the recent discussions on rigid vs. non-rigid freight trucks have not called attention as to whether discussions were based on the trucks being rigid or non-rigid in a vertical or a horizontal plane. A few years ago trucks, rigid in the horizontal plane as well as in the vertical plane, had considerable vogue, but there are not very many of them purchased at this time.

The rigid trucks in the horizontal plane were condemned because of the fact that it takes only three points to determine a plane, so that when the fourth wheel found a low spot in the track it was relieved of carrying its proportion of the load because the other three wheels determined the horizontal plane of the truck. We may assume, therefore, that all the recent discussion on rigid or non-rigid trucks is in the vertical plane; that is, whether a truck should be so constructed as to hold the axles perpendicular to the side frames.

The recent excellent report of Prof. Louis E. Endsley of Purdue University* shows that the total movement of some of the non-rigid trucks which ran out of square was as much as 5 61-100 in., half of which, 2 8-10 in., is the amount the truck ran out. Since then trucks have been found with a total movement of 6¼ in. of the side frames, or 3⅛ in. out of square.

To determine the position of the M. C. B. parts, such as brass, wedge and journal in the journal box, and in an effort to determine how much of a part was played by the journal box and contained parts in resisting the trucks running further out of square, the plan view of the journal box and contained parts, with the truck 5¼ in. out of square, is herewith reproduced.

It will be noted that there is not room enough in the M. C. B. journal box for the M. C. B. contained parts, with a truck so far out of square. The distance between the centers of the journals as measured on a line perpendicular to the side frame is reduced about ¼ in., due to the angularity of the axle. This causes the brass to take up the play allowed between the rear of the wedge and the flange on the brass, which forces the wedge towards the front stops. It will also be seen that the wedge laps over the front stop "G" at the point "J" about 1-32 in. The brass laps over the collar of the journal at the point



"D" about 1-16 in. by the side lug on the brass, binding the side stop "T" of the box at point "B." Both wedge and brass bind on the side stop "T" at "N" and "B," and on the side stop "U" at "C" and "O." The lines "EE" and "FF" of the brass are considerably out of parallel with the lines of the journal.

It has been determined from this that a truck would not run so far out of square without something in the journal box yielding, either by springing or breaking, and from the information gained through laying out the drawing as illustrated, it was concluded if these trucks really ran out of square excessively, and if the truck depended on the cramping of these parts to resist its running more out of square, the parts that were called upon to resist this excessive movement must indicate the trouble by excessive wear or breakage. The inspection of a number of these trucks in a high percentage of cars, showed brasses with the lugs broken off, as indicated by the line "W" in the drawing. Some of these trucks seemed to have no other means of holding them square except by the angularity of the journal, causing a binding of the brass and wedge between the side stops of the box, and the binding of the wedge on the front stop "G" of the box. This, if the brass or the wedge or the front stop of the wedge does not break, must cause excessive end wear of the journal collars and brass, and a diagonal wear of the brass or bearing on the journal, all of which must conduce towards increased liability of hot boxes and excessive frictional resistance.

From the number of brasses found with broken side lugs, it is fair to assume that a high proportion of these trucks depend on this resistance in limiting the distance they run out of square. It is interesting to note that on inspection of a large number of cars whose trucks were constructed in a manner that was meant to hold them square, that there was only one brass found with the side lug broken off, and that was on a truck, the spring plank of which was made of two angle irons securely riveted to arch bar columns, and in this truck one of the angle irons had broken, which made of it a flexible truck.

THE CHICAGO & NORTHWESTERN RAILWAY has an extensive spring making department in its smith shop at Chicago. New springs for all the locomotives on the system—1,700 engines—are made and old ones repaired at this plant.

* See AMERICAN ENGINEER, May, 1911, page 192.