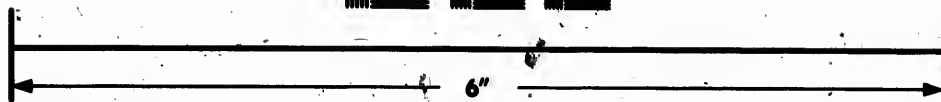
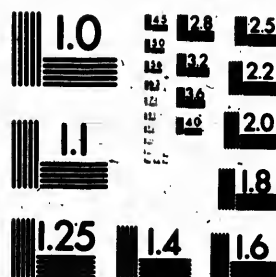
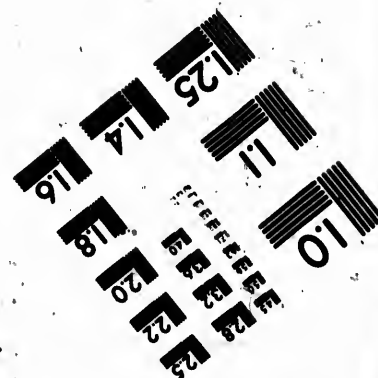


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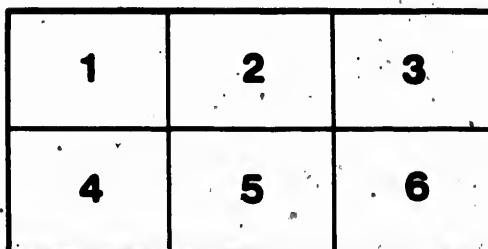
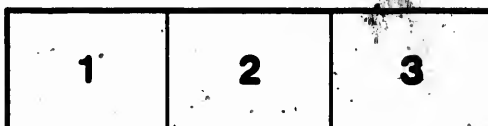
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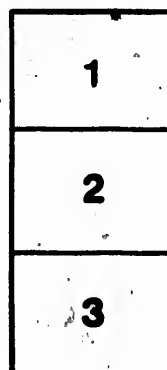
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GREAT WESTERN RAILWAY.

DESCRIPTION

OF AND

INSTRUCTIONS FOR WORKING

THE

CONTINUOUS

AUTOMATIC VACUUM BRAKE.

FEBRUARY, 1883.

DESCRIPTION.

1.—The Automatic Vacuum Brake stops the train by the application of the brake blocks to the tyres, in the same way as the ordinary screw brake; but the levers which apply the blocks instead of being worked by a screw are worked by a cylinder and piston, actuated by atmospheric pressure.

2.—The following are the principal parts of the apparatus on the carriages, the reference letters showing the corresponding parts on the diagrams on page 3, being—

- A Continuous Pipe, connected by flexible pipes between the carriages.
- B Hollow Piston Rod, connected by branch pipe to the continuous pipe.
- C Piston.
- D Cylinder, capable of moving freely up and down on the fixed piston, and connected at the bottom with the Brake Levers E.

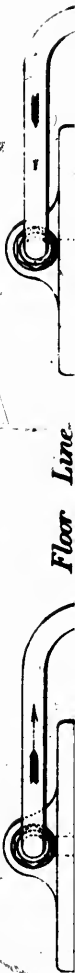
The Piston is packed with an india-rubber ring, so arranged that air can pass freely from the bottom of the cylinder to the top, but not from the top to the bottom. The piston rod is also packed with an india-rubber ring or gland.

3.—*Brake off.* The air is exhausted from the pipes and cylinders, by the ejector on the engine when the train is at rest, or by the air-pump on the engine when the train is in motion. The gauges on the engine and in the guards' compartments indicate the power available for stopping the train, and should show not less than 20 inches nor more than 30 inches of vacuum *when the train is running*. The vacuum being equal on both sides of the piston, the cylinder falls by its own weight and holds the brakes off the wheels. (See Fig. 1.)

4.—*Brake on.* The moment the air is admitted into the continuous pipe, whether by the engineman, or by the guard, or by the accidental severance of the couplings, it rushes through the continuous pipe down the hollow piston-rod into the *upper* part of the cylinder, and, pressing the india-rubber packing ring against the sides of the cylinder, seals the vacuum on the under side of the piston so that the pressure of air in the upper part of the cylinder, having nothing to balance it on the other side of the piston, thrusts up the cylinder and presses the brake blocks against the wheels. (See Fig. 2.)

5.—*Release of Brake.* When the brake has been applied it will remain on, unless released either by the exhaustion of the air from the upper side of the piston (see par. 3) or by the admission of air to the under side of the piston. In practice the latter mode is generally found convenient, and a small hole, *h*, is provided through which the air can slowly leak from the upper to the lower part of the cylinder and gradually release the brake. It is therefore necessary in the event of a train parting, for the guard in the rear portion at once to apply the hand brake, and to keep it screwed on until the train is again coupled to the engine.

6.—*Brake Setters.* In order to apply the brakes on each carriage in the train as nearly as possible at the same moment, it is necessary to admit the air to the continuous pipe in more than one place. For this purpose a valve or brake setter is provided in each guard's compartment, so constructed that any sudden increase of pressure in the pipe instantly causes the valve to open automatically and admit a supply of air, after which it closes again by its own weight. By lifting the handle attached to the brake setter, the guard can, on an emergency apply the brakes on the entire train.



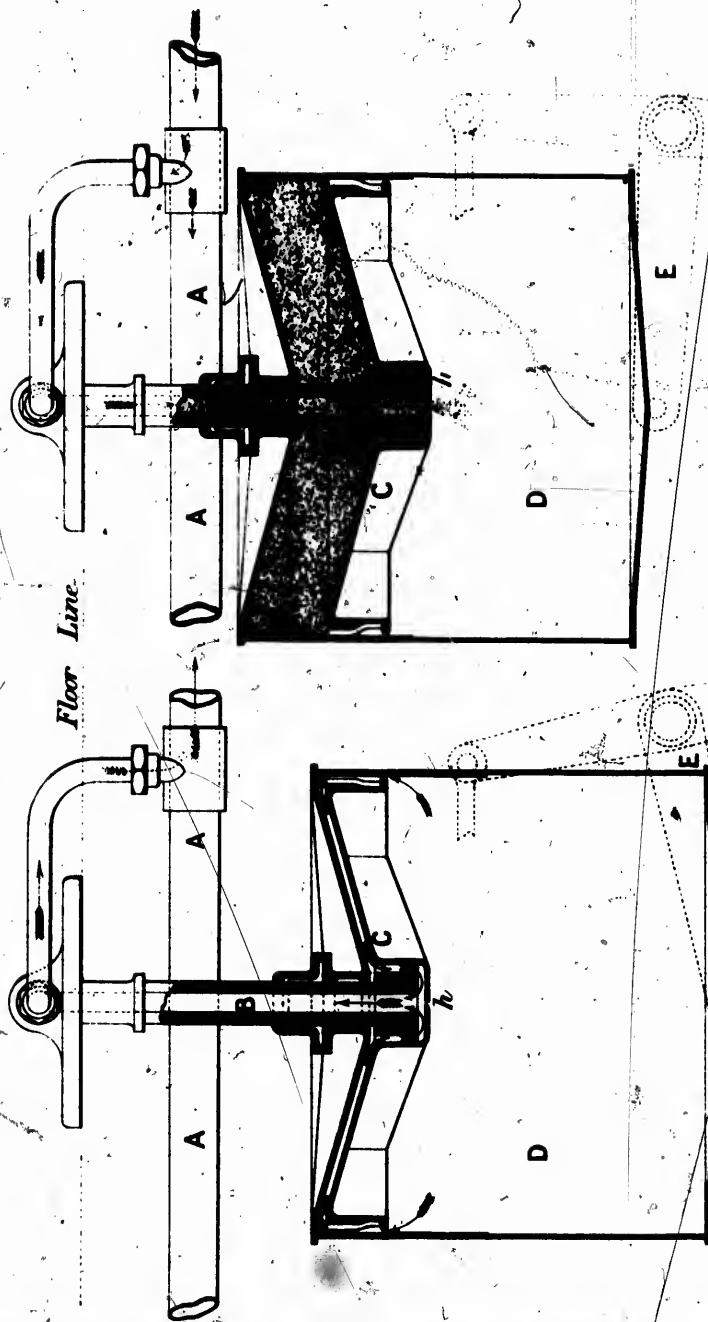


FIG. 2.
BRAKE ON.

FIG. 1.
BRAKE OFF.

INSTRUCTIONS FOR WORKING.

7.—In the formation of Trains when the whole of the coaches are not fitted with the Automatic Vacuum Brake those that are so fitted must be placed together, and next to the Engine. When the whole Train is not fitted, the Automatic Vacuum Brake must not be used for ordinary stoppages, but only in cases of emergency. In all cases where the Automatic Vacuum Brake is only partially fitted to a train, a Brake Van, or a Carriage, with a Guard in it must be the last Passenger Vehicle in the train, and this Guard must apply his hand-brake in running into all stations where the train is to be stopped.

8.—The Brake can be applied throughout the whole of the vehicles fitted with the apparatus, by the Engineman from the engine, or by the Guard from his van; but in order that this may be done, it is imperative that the flexible connections between each carriage, and between the engine and the train shall be properly coupled up.

9.—Guards must never apply the Automatic Vacuum Brake except in cases of absolute necessity, and whenever they do so a full report of the circumstances must be made on their journals; they must at all times be ready to apply the *hand-brake* should the driver call by whistle for its assistance.

10.—When the Automatic Vacuum Brake is to be used for the ordinary stoppage of trains it must be by the Engineman opening the air valve on the engine, but it must be done gradually and never suddenly or with full force except in cases of emergency.

11.—In approaching Junctions, Terminal Stations, or Stations at which other trains may be standing on the same line of rails, or Crossing Stations on Single-lines, the Automatic Vacuum Brake or Steam Brake must only be used in cases of emergency, the Enginemen taking care to reduce speed of the train in accordance with Rule No. 293, so that the train may be brought to a stand by the hand-brakes alone.

12.—In descending Inclines the engineman must, when necessary to reduce the speed, use the Automatic Vacuum Brake in preference to the hand-brakes.

13.—In running through Slip Stations after a slip carriage has been detached, the Vacuum Brake must not be used except in cases of emergency; if it is necessary to control the speed of the train, the *hand-brake* must be employed, and in any case the greatest caution should be used to prevent the slip carriage overtaking the train.

14.—The guard before giving the Signal to start at the commencement of the journey, and at stations where any of the flexible pipes have been coupled or uncoupled, must ascertain and inform the engineman:—

That *all* the flexible pipes are properly coupled up continuously throughout the train, and that the flexible pipes of the last Brake Vehicle is properly placed upon the stop plug.

The number of vehicles in the train fitted with the brake, the flexible pipes of which are coupled up to the Engine.

That at least 15 inches of Vacuum is indicated by the gauge in the rear gauge.

15.—The engineman before starting at the commencement of the journey, and also at stations where any of the flexible pipes have been coupled or uncoupled, must ascertain from the guard the number of vehicles in the train fitted with the brake, the flexible pipes of which are coupled up to the engine, and that a Vacuum of at least 15 inches is shown by the gauge in the rear van. He must also be careful to see:—

That the Vacuum pipe of his engine is properly coupled up to the leading vehicle in the train.

That at least 15 inches of Vacuum is indicated by the gauge on the engine.

16.—If, from any cause the engineman is unable to obtain at least 15 inches of Vacuum, he must inform the guard of the fact and they must work the train forward with the ordinary hand-brakes.

17.—When the pipes between the engine and train are disconnected, the couplings must be placed on the plug stops provided for the purpose. Detached carriages must always have the hose couplings placed on the plug stops.

18.—At any station where there is any likelihood of vehicles being put on or taken off, the Vacuum in the continuous pipe must be destroyed by opening the air valve on the engine, so that there may be no delay in coupling or uncoupling.

19.—As india-rubber is dissolved by oil or grease, it is most important that nothing of a greasy nature should be applied to, or allowed to reach the piston or piston rod. The only lubrication which is required is a little pure blacklead, which must be placed inside each cylinder by the persons appointed for the purpose. The other part of the brake must be cleaned and oiled by the examiners in the usual way.

20.—In the case of vehicles fitted with the combined Hand and Vacuum Brake, the guard must see before starting that the hand-brake is screwed full off, and the handle secured by means of the chain provided for the purpose.

21.—It is necessary that the words "Continuous Brake Train" shall be written at the top of the engineman's train bill and guard's report for every train fitted with the Automatic Vacuum Brake. It is also necessary for the engineman to show on his mileage ticket trains which have been worked by him with the continuous brake during the week.

22.—If from any cause the Automatic Vacuum Brake is not used, or fails to act when required, or if there is any irregularity in its working, a remark to that effect must be made by the engineman on his train bill, and by the guard on his report.

23.—Guards must take care during the journey that nothing in the Van is allowed to rest against or in any way interfere with the Lever of the Brake Setter.

W. DEAN,

Locomotive and Carriage Superintendent.

G. N. TYRRELL,

Superintendent of the Line.

November, 1881.—REVISED—February, 1883.

