

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.

