No. 732,856. PATENTED JULY 7, 1903.

W. K. M. HILDEBRAND.

DIRECT ACTING COMPRESSED AIR BRAKE.

APPLICATION FILED JUNE 16, 1902.

NO MODEL.

fig. 1.

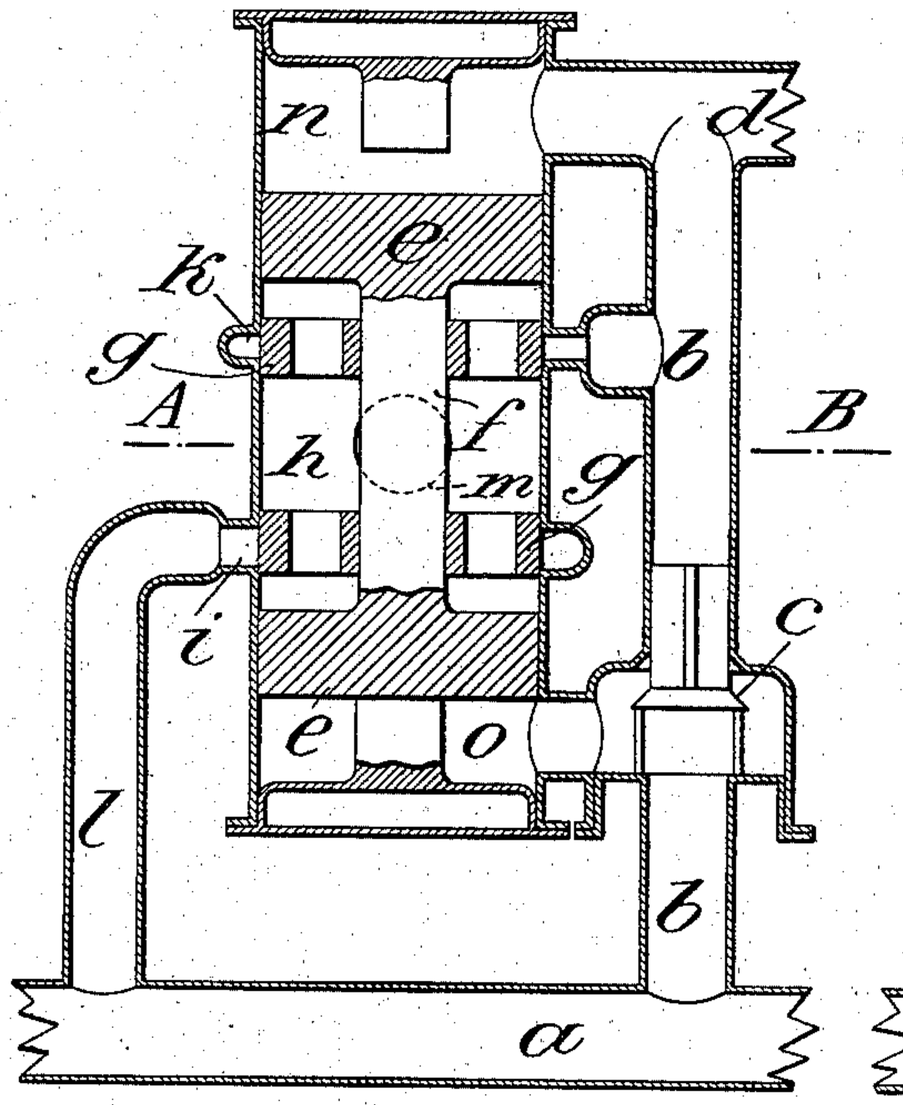


fig. 2.

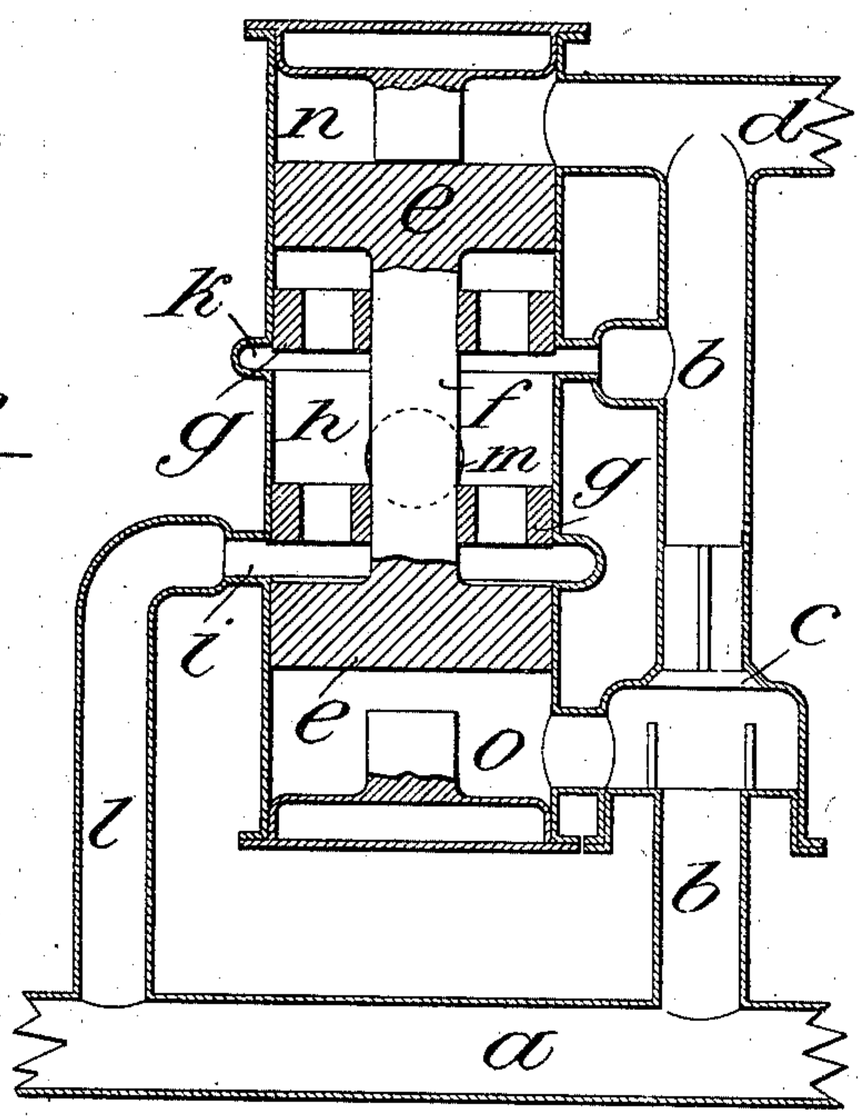
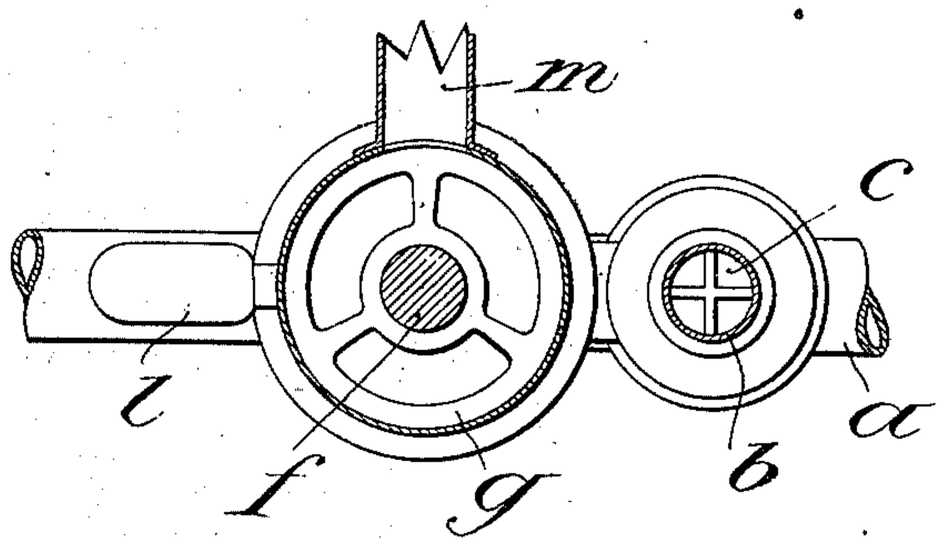


fig. 3.



Witnesses,

Edward T. Wray.

Howard Knight

Inventor,

Wilhelm Karl Max Hildebrand.

by Parker Earles

Attorney's.

No. 732,856. Patented July 7, 1903.

UNITED STATES PATENT OFFICE.

WILHELM KARL MAX HILDEBRAND, OF GROSS-LICHTERFELDE, NEAR BERLIN, GERMANY.

DIRECT-ACTING COMPRESSED-AIR BRAKE.

SPECIFICATION forming part of Letters Patent No. 732,856, dated July 7, 1903.

Application filed June 16, 1902. Serial No. 111,893. (No model.)

To all whom it may concern:

Be it known that I, WILHELM KARL MAX HILDEBRAND, engineer, a subject of the King of Prussia, German Emperor, residing at Berlinerstrasse 46, Gross-Lichterfelde, near Berlin, Germany, have invented certain new and useful Improvements in Direct-Acting Compressed-Air Brakes, of which the following is a specification.

My invention relates to a direct-acting compressed-air brake, by means of which even long trains may be rapidly and effectively braked.

Hitherto with direct-acting compressed-air brakes it has always been impossible to rapidly stop the train, owing to the not inconsiderable interval of time which the pressure requires for transmission from the foot-plate of the locomotive to the brake-cylinders of the rear carriages. This defect is overcome by means of the present invention.

For ordinary braking with my improved apparatus the air stored up in the main air-reservoir is conducted from the driver's foot-plate in a slow stream into the brake-pipe running throughout the length of the train and from there direct to the various brake-cylinders. For rapid braking, on the other hand, by increasing the pressure in the main pipe the direct path from the brake-pipe to the brake-cylinder is closed and valves connected with the brake-pipe actuated in such manner that the auxiliary air-reservoir located on each carriage is connected with the corresponding brake-cylinder and simultaneously with the brake-pipe. The air in the auxiliary reservoirs is thus employed for directly filling the corresponding brake-cylinder and simultaneously the current of air in the brake-pipe increased. At the same time the passage for the connection of the auxiliary reservoir with the brake-cylinder is relatively small, while the connection with the brake-pipe is larger. A large quantity of air, therefore, rushes first into the brake-pipe, so that the pressure in the latter is rapidly transmitted, and the air, even with the longest trains, almost simultaneously fills all the brake-cylinders.

One construction of my new apparatus is illustrated by the annexed drawings, in which—

Figure 1 is a vertical section of the device, the piston being at the bottom of its cylinder. Fig. 2 is a like view, the piston being at the top of the cylinder. Fig. 3 is a cross-section taken on the line A B of Fig. 1.

For ordinary braking the driver by slightly opening his brake-valve allows the air to slowly escape from the main air-reservoir into the brake-pipe *a*. From this it flows further through a branch pipe *b*, through the valve *c*, which is maintained in open position by gravity or spring-pressure, and through the pipe *d* direct to the brake-cylinder, to which this pipe is connected. The current of air in the valve *c* during this time is so small that it is unable to lift the valve, which accordingly remains open. The difference of pressure between the pipes *b* and *d* is consequently not great enough to lift the double piston *e e* of the distributing-valve *h*, connected to the brake-pipe. The top chamber *n* of the valve *h* is in direct connection with the pipe *d* and the bottom chamber *o* with the pipe *b*. This manner of braking, just described, in no way differs from any ordinary slow braking with direct-acting compressed-air brake. If, however, it is desired to brake rapidly, the driver must fully open his valve. The air from the main air-reservoir thus enters the pipe *a* suddenly and in large volume, so producing increased pressure. In passing further through the branch pipe *b* it will now close the valve *c*, which does not offer sufficient passage for it. The higher pressure in the pipe *b* and bottom chamber *o* of the valve *h* as compared with the pressure in the pipe *d* and top chamber *n* will now displace the double piston *e e*, with the rings *g g* rigidly mounted on its spindle, so as to occupy the position shown in Fig. 2. In this position the rings *g g* set free the recessed passages *i* and *k*, running around the cylinder *h*. The space between the two piston-heads *e e* is directly connected to the auxiliary air-receptacle by the pipe *m*. The air stored up in the auxiliary air-reservoir therefore, in the position of the valve shown in Fig. 2, flows through the passage *k* into the

portion of the pipe *b* above the valve *c* and further through the pipe *d* direct into the brake-cylinder, filling this instantaneously with air. At the same time the air of the auxiliary air-reservoir also passes through the perforations of the lower ring *g*, through the passage *i* and pipe *l* into the brake-pipe *a*, so that it can contribute to strengthen the current already present in it, and thereby assist the transmission of the braking action through the entire train. Since now the passage *i* is considerably wider than the passage *k*, a large quantity of air first flows into the brake-pipe, and thereby increases the current in the latter, so that in a minimum space of time the whole of the valves for rapid braking connected to the brake-pipe are actuated. Since the small section of the passage *k* retards the passage of air into the brake-cylinder, the brake-cylinder of the first carriage is not yet filled when the air begins to flow into the brake-cylinder of the last carriage, and the braking throughout the entire train takes place. The releasing of the brakes is produced by turning the driver's valve in such a position that the brake-pipe is in communication with the outer air. The air inclosed in the brake-cylinders then escapes through pipes *d* and *b*, past the opened valve *c* and the pipe *a*. Before the air has escaped from the brake-cylinder the equality of pressure in the chambers *n* and *o* has caused the double piston *e* to return to its original position, as shown in Fig. 1, so that the auxiliary air-reservoir has been cut off from pipe *a*, and therefore air cannot escape from the former.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A valve mechanism for direct-acting compressed-air brakes, comprising a valve *c* in the direct passage from brake-pipe to brake-cylinder, only closing at high pressure in the brake-pipe, and a distributing-valve *h* connecting the auxiliary air-reservoir with the brake-pipe and with the brake-cylinder, and only opening when said valve *c* closes, all substantially as and for the purposes described.

2. A valve mechanism for direct-acting compressed-air brakes, comprising a valve *c* in the branch between brake-pipe and brake-cylinder, only closing at high pressure in the brake-pipe, and a valve *h* consisting of a cylinder connected to the auxiliary air-reservoir, and having passages communicating above and below said valve *c*, a piston controlling said passages, and passages leading to the brake-pipe and the brake-cylinder also controlled by said piston, said valve *h* only opening when the valve *c* closes, all substantially as and for the purposes described.

3. A valve mechanism for direct-acting compressed-air brakes, comprising a valve *c* in the branch between brake-pipe and brake-cylinder, only closing at high pressure in the brake-pipe, and a valve *h* consisting of a cylinder connected to the auxiliary air-reservoir, and having passages communicating above and below said valve *c*, a piston controlling said passages, and passages leading to the brake-pipe and brake-cylinder also controlled by said piston, the former passage being considerably larger than the latter, so that the air from the auxiliary air-reservoir may first augment the current in the brake-pipe and then slowly fill the brake-cylinder, said valve *h* only opening when the valve *c* closes, all substantially as and for the purposes described.

Signed at Berlin this 29th day of May, 1902.

WILHELM KARL MAX HILDEBRAND.

Witnesses:

WOLDEMAR HAUPT,

HENRY HASPER.