

(No Model.)

3 Sheets—Sheet 1.

H. D. DUNBAR & W. L. AUSTIN.  
STEAM BRAKE VALVE.

No. 419,508.

Patented Jan. 14, 1890.

FIG. 1.

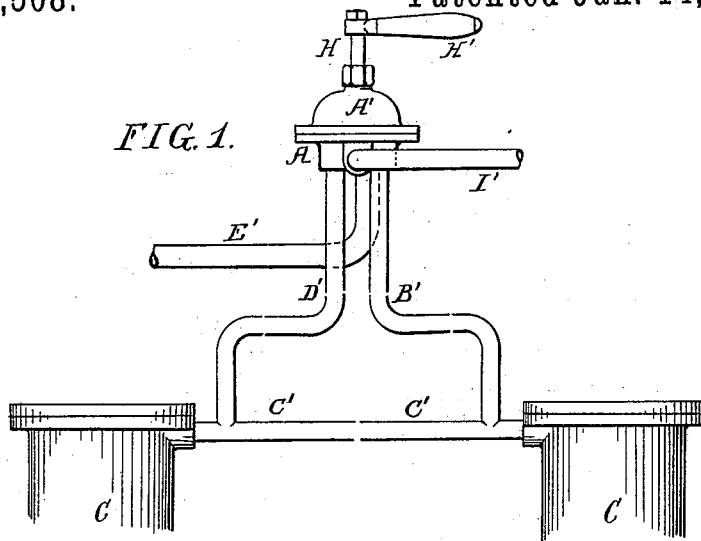
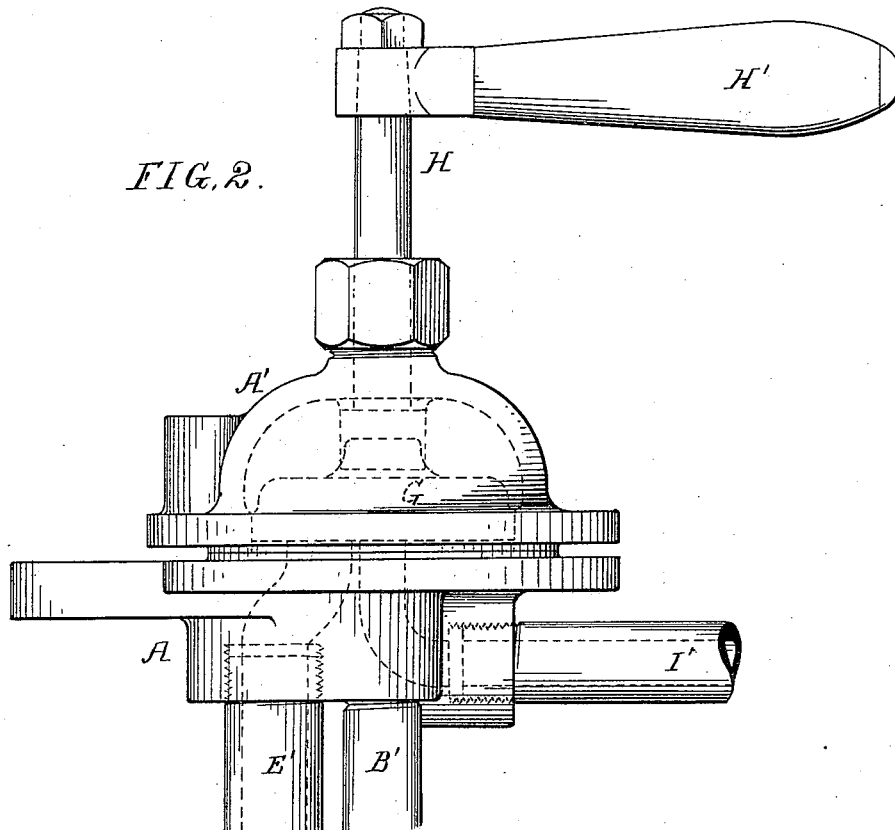


FIG. 2.



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FIG. 4.

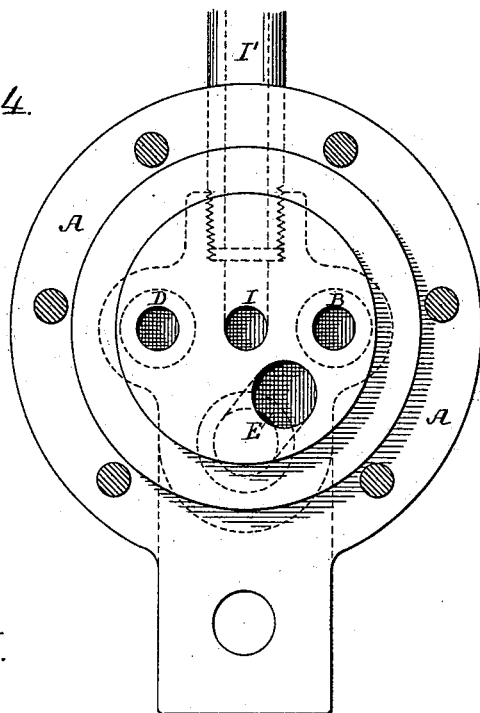


FIG. 5.

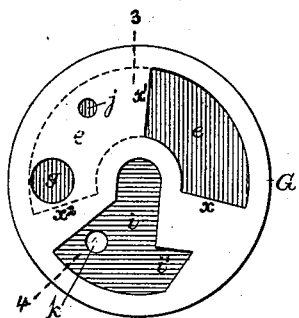


FIG. 6.

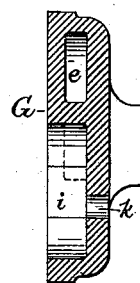
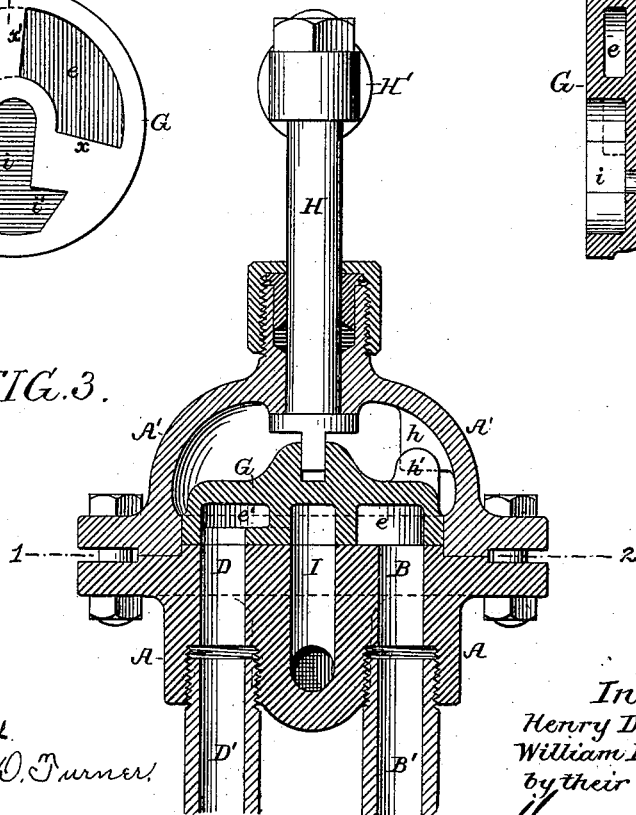


FIG. 3.



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FIG. 7.

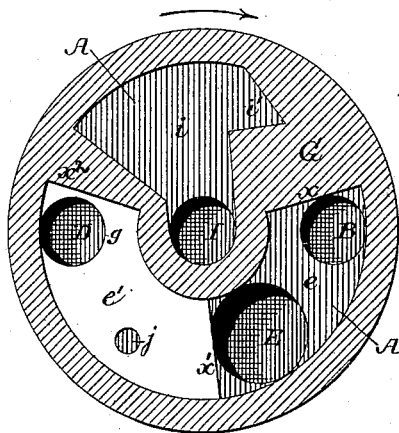


FIG. 8.

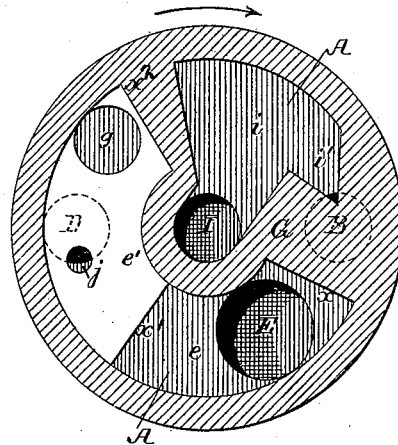


FIG. 9.

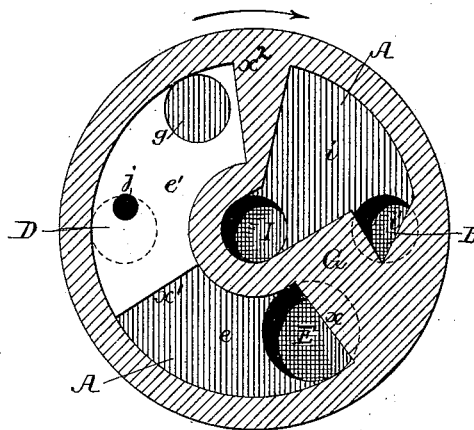
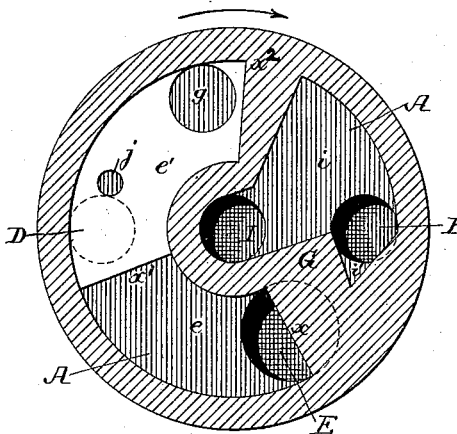


FIG. 10.



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# UNITED STATES PATENT OFFICE.

HENRY D. DUNBAR, OF HARTLAND, VERMONT, AND WILLIAM L. AUSTIN,  
OF PHILADELPHIA, PENNSYLVANIA.

## STEAM-BRAKE VALVE.

SPECIFICATION forming part of Letters Patent No. 419,508, dated January 14, 1890.

Application filed March 5, 1888. Serial No. 266,148. (No model.)

*To all whom it may concern:*

Be it known that we, HENRY D. DUNBAR, of Hartland, Windsor county, Vermont, and WILLIAM L. AUSTIN, of Philadelphia, Pennsylvania, both citizens of the United States, have invented certain Improvements in Steam-Brake Valves, of which the following is a specification.

The object of our invention is to so construct valve mechanism for steam-brakes, &c., that the pressure of steam admitted to the brake-cylinders can be regulated and the brakes applied to the wheels of the locomotive or cars with different degrees of pressure, and so that a circulation of steam through the pipes and passages can be constantly maintained, if desired, to prevent freezing of the water of condensation in said pipes or passages in cold weather.

20 In the accompanying drawings, Figure 1 is a diagram showing steam-brake cylinders having connections and valve in accordance with our invention. Fig. 2 is a side view of part of the same on a larger scale. Fig. 3 is a vertical section, partly in elevation, of our improved valve. Fig. 4 is a sectional plan on the line 1 2, Fig. 3, with the valve removed to show the valve-seat. Fig. 5 is an inverted plan view of the valve. Fig. 6 is a section of the valve on the line 3 4, Fig. 5; and Figs. 7, 8, 9, and 10 are diagrams showing the valve in different positions in respect to the ports of the seat.

The steam-brakes to which our invention more particularly relates are used to brake the wheels of a locomotive, and the valves regulating these brakes have been hitherto constructed so as either to apply full pressure to the brakes or to cut off the steam entirely; hence a light or gradually-increasing pressure could not be applied to the brakes, the usual plan adopted when the locomotive is traveling downgrade being to hold the brakes off until it is necessary to check the speed, and then to apply the brakes with full power until the momentum is checked, whereupon the brakes are again released, to be again applied when the speed becomes excessive, thus causing a series of sudden shocks

or jars, which are very injurious to the working parts of the engine.

By our invention we overcome the objection above described and provide a valve whereby any desired pressure of steam up to the full pressure of the boiler can be applied to the brakes and maintained as long as circumstances require by simply operating the handle of the valve.

Referring to the drawings, A is the main valve-casing, having the valve-seat *a*, I being the inlet-port, situated in the center of the casing and communicating with the supply-pipe I' at the side of the casing, as shown in Fig. 2, E being the exhaust-port, communicating with the exhaust-pipe E'.

B is the induction-port, communicating with the steam-brake cylinders C C through the pipes B' C', and D is the eduction-port, communicating with the cylinders through the pipes C' D'.

G is the valve, the under face of which rests upon the seat *a* of the valve-casing; said valve having formed in it an induction-chamber *i*, a portion *i'* of which is V-shaped, as shown in Fig. 5, for the purpose of gradually opening or closing communication between the induction-chamber and the steam-cylinders through the induction-port B, as described hereinafter. The valve G has also an eduction-chamber *e*, that portion of which between the lines *x x'*, Fig. 7, is open to the bottom of the valve, while the remaining portion from the line *x'* to the line *x<sup>2</sup>* has at the bottom a partition-plate *e'*, in which is the eduction-port *g* and a smaller port *j*. An opening *k* in the top of the valve provides for the passage of steam from the induction-chamber to the space above the valve, so that the steam-pressure on the valve will be slightly greater than the pressure beneath the same, thus causing the valve to seat itself at all times.

A' is a cap inclosing the valve G and secured to the casing A by means of screw-bolts.

The valve-spindle H is adapted to a pocket in the valve and passes through a stuffing-box in the cap A', said spindle being provided

with a suitable handle H', by which the valve may be turned, a stop *h* on the cap serving by contact with a lug *h'* on the valve G to arrest the movement of the latter when the port B is fully open.

The operation of the device is as follows: Referring to the diagrams, Figs. 7, 8, 9, and 10, Fig. 7 illustrates the valve in position to cut off the steam from the brake-cylinder C, the exhaust-pipe E' communicating through the medium of the pipes B', C', and D' and ports B, D, *g*, and E with said brake-cylinders. If the handle is operated to turn the valve to the position shown in Fig. 8, steam will enter the port B and circulate through the pipes B', C', and D', through the cylinders, and through the ports D and *j* and eduction-chamber *e* to the exhaust-port E, the inlet and outlet for the steam being about equal, and consequently no pressure being brought to bear upon the brakes; but if the handle is operated so as to turn the valve to the position shown in Fig. 9 the available area of the induction-port B is increased considerably without any corresponding enlargement of the area of the port *j*, thus giving a partial pressure to the brakes, sufficient in most instances to reduce the speed of the engine on downgrades. The valve can be held in this position while traveling downgrade, so as to properly reduce the speed of the locomotive, as it will be seen that the full pressure of the boiler is applied, minus the reduction due to leakage to the exhaust through the small leakage-port *j*. When full pressure is required, the valve is turned still farther, or to the position shown in Fig. 10, which entirely cuts off leakage to the exhaust and fully opens the induction-port B; hence it will be seen that any degree of pressure can be applied to the brakes.

Another important feature in this form of brake-valve is that the steam may be allowed to circulate through the brake-cylinders and their connecting-pipes in cold weather, when the steam is liable to condense quickly, so that the steam can be in constant circulation

through the cylinders and pipes, thereby preventing to a great degree the rapid condensation of the steam and preventing freezing of the water in the pipes, any condensed steam that may accumulate when the brakes are released being either vaporized or blown off by the full steam-pressure when the brakes are applied.

Although we have described our invention as applied to a locomotive-brake, it will be evident that it can be applied to other brakes, or to whistles and like devices as well.

We therefore claim and desire to secure by Letters Patent—

1. The combination of the valve-chest having an inlet-port, an exhaust-port, and induction and eduction ports communicating with the steam-brake cylinder or cylinders with a valve having induction and eduction chambers and having in the latter an exhaust-port and a leakage-port, said leakage-port being located as described in respect to the induction-chamber of the valve, whereby it will be open to the eduction-port of the chest when the induction-chamber of the valve is slightly open, all substantially as specified.

2. The combination of the valve-chest having inlet and exhaust and induction and eduction ports with the valve having induction and eduction chambers, said eduction-chamber having a partition with eduction and leakage ports, all substantially as specified.

3. The combination of the valve-chest having inlet and exhaust and induction and eduction chambers with the valve having an induction-chamber with tapering front end and an eduction-chamber having a partition with eduction and leakage ports, all substantially as specified.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

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Witnesses:

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