

(No Model.)

3 Sheets—Sheet 1.

M. E. BOULTER.

AUTOMATIC VALVE FOR TRACK SANDING APPARATUS.

No. 572,087.

Patented Nov. 24, 1896.

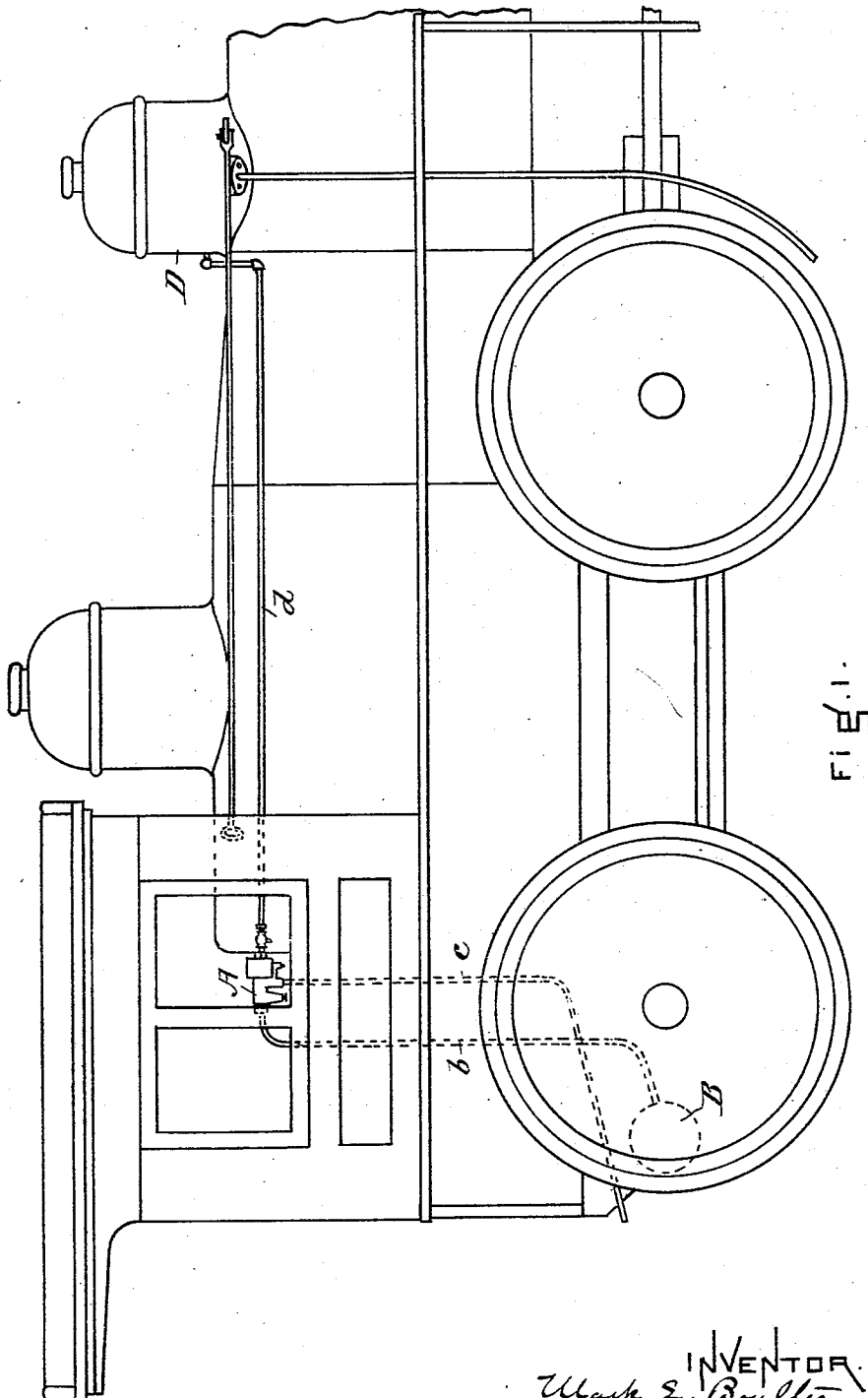


Fig. 1.

WITNESSES

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by his attys
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(No Model.)

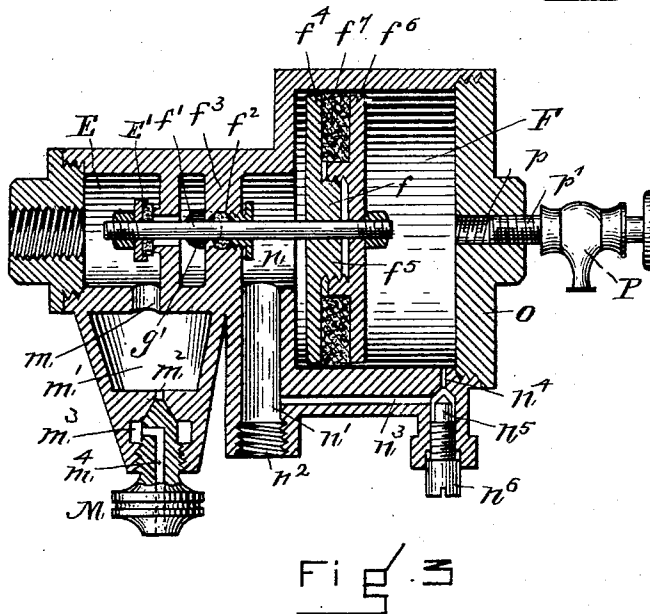
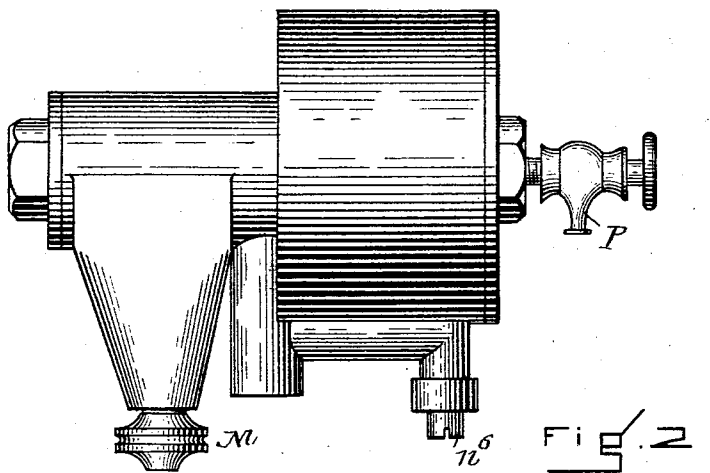
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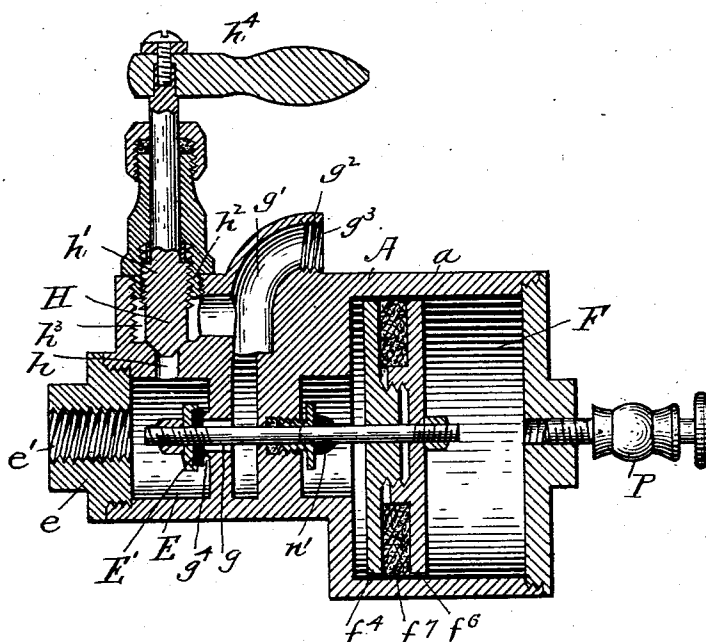


Fig. 4.

WITNESSES

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UNITED STATES PATENT OFFICE.

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AUTOMATIC VALVE FOR TRACK-SANDING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 572,087, dated November 24, 1896.

Application filed November 25, 1895. Serial No. 570,002. (No model.)

To all whom it may concern:

Be it known that I, MARK E. BOULTER, a citizen of the United States, residing at Somerville, in the county of Middlesex and State of Massachusetts, have invented a new and useful Improvement in Automatic Valves for Track-Sanding Apparatus, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification, in explaining its nature.

The invention relates to an automatic valve for track-sanding apparatus employing a blast or current of air in the feeding of sand therefrom interposed between the main air-reservoir, the train-line of an automatic air-brake system, and the sand-box, actuated by variations in the pressure of the air in the train-line, and which, upon such variations, caused by service stops or emergency stops, or both, serves to automatically feed or supply the sand-box with a sand-forcing blast or current.

It also consists of means organized with said valve for feeding air through it from the air-reservoir when the air-brake is not in operation. It further consists of means for controlling the action of the valve whereby it may be set to operate at every service stop of the air-brake or at emergency stops only.

Referring to the drawings, Figure 1 is a view in side elevation of a portion of a locomotive, representing my automatic valve in the cab of the locomotive and its pipe connections with the main air-reservoir, the train-line, and the sand-box. Fig. 2 is a view in side elevation, enlarged, of the valve. Fig. 3 is a view in vertical section thereof, and Fig. 4 is a view in horizontal section.

The valve A is preferably located in the cab and within reach of the engineer. It is adapted to receive air from the main cylinder B by means of the connecting-pipe *b*. It is connected with the train-line of the automatic air-brake by the pipe *c* and with the sand-box D by the pipe *d*. (See Fig. 1.) Any form of track-sanding apparatus or box using an air blast or current in feeding or expelling sand therefrom may be used.

The valve A has a casing *a*, which is provided with a valve-chamber E and a piston-

chamber F. The valve-chamber is connected with the main air-reservoir B or other source of air supply by a pipe *b*, which is coupled to screw-head *e*, which screws into a threaded extension of the valve-chamber and has the threaded inlet *e'*. There are preferably three outlets to this valve-chamber. One is the main outlet *g* to the passage *g'* from the exit *g*², of which the pipe *d* to the sand-box extends. This exit has an interior screw-thread *g*³ for receiving the threaded end of said pipe.

The main outlet *g* is surrounded by a raised valve-seat *g*⁴, which extends into the valve-chamber, and against which the valve E', contained in said valve-chamber, is closed to close the main outlet. The main outlet is opened and held opened, as will be hereinafter described, and when opened permits air from the main air-reservoir or other source of air supply to pass through the valve-chamber passage *g'* and a pipe to the sand-box or track-sanding apparatus. *h* is the second outlet from the valve-chamber. It is formed in the side wall of the chamber, and is adapted to be opened and closed by a valve H, having a threaded spindle *h'*, arranged to turn in the threaded cap *h*², which itself screws into the threaded hole *h*³ in the side of the main casing of the valve. The spindle has at its upper end a handle *h*⁴, by which it is turned and the valve opened or closed. The opening of the valve establishes a communication between the valve-chamber and the passage *g'*, by which air at any time can be supplied to the said passage *g'* and the pipe *d* and the sand-box regardless of the operation of the valve E'. This supplies the engineer with means which are not automatic for supplying the sand box or apparatus with air at any desired time, and especially when the air-brake is not being operated. *m* is the third outlet to the valve-chamber. This is simply a drip-outlet, by which water or other waste may escape to a receiving-chamber *m'* beneath, from which it may be emptied at any time through the escape-passage *m*², controlled by valve M, extending about the valve-seat when open, into the valve-chamber *m*³, and thence into the passage *m*⁴ in the valve M.

The piston-chamber F contains a piston *f*,

which is connected with the valve E' by a piston rod or stem f' , extending through a stuffing-box f^2 in the partition or diaphragm f^3 and through the main outlet g . This piston f may be of any desired construction. I have represented it as made of a plate f^4 , having a threaded hub f^5 , upon which is screwed a second plate f^6 , which has a threaded sleeve to engage the threaded hub, and which serves to clamp a packing f^7 against the plate f^4 . There is between the piston f and the diaphragm f^3 a chamber n , and this chamber is connected by a passage n' , having the threaded end n^2 , with the train-line by the pipe c . The chamber n is directly connected by means of the passage n' and small passage n^3 with the other side of the piston-chamber F, the small passage extending to and joining a still smaller passage n^4 , the size of which may be adjusted or varied by means of a valve n^5 , having the exposed end n^6 , by which it is adapted to be turned. Access to the piston-chamber is had by the head o , which screws into a threaded extension of the chamber, and in this head is a hole p , which receives a threaded pipe p' , at the outer end of which is a cock P, which provides means by which the pressure in the cylinder may be quickly reduced for the purpose of permitting the valve regulating the main outlet g to be instantly or quickly closed, if at any time it is desirable to do so.

In order to understand the automatic operation of the apparatus when the valve is automatically operated, it must be understood that normally the piston-chamber F on each side of the piston and the chamber n are filled with compressed air at the pressure of the air in the train-line and that the valve-chamber E is filled with air of the pressure of the main air-reservoir, which is considerably in excess of the pressure of the air in the piston-chamber and in the train-line, and which serves to press the valve E' against the valve-seat and maintains closed the outlet g , except when the train-brake is operated. Upon the operation of the train-brake there is an escape of air from the train-line, and this immediately causes a reduction of pressure in the chamber n and part of the piston-chamber connected therewith and permits the excess of air-pressure in the other part of the piston-chamber to move the piston sufficiently to open the valve E and permit the air to escape through the outlet g to the track-sanding apparatus, and thereby actuating it and causing sand to be delivered to the track while the brakes are being set. The piston is moved by this variation in pressure against the pressure in the valve-chamber E, because the area of the piston is enough larger than the area of the valve E' to enable the pressure in the chamber to so operate it, and the valve E' is held open until an equilibrium between the pressures upon each side of the piston is reestablished, or until the pressure upon the train-line side has been so much in-

creased that the pressure upon the valve is effective against the pressure in the valve-chamber.

Whether the valve operates for every service stop or for emergency stops only depends upon the size of the passage or connection n^3 n^4 , the passage being smaller for service stops than for emergency stops. The reason for this is found in the fact that the pressure in the train-line is not reduced so much or so rapidly in a service stop as in an emergency stop, and consequently the passage n^3 n^4 should be so small as to prevent an equalization of pressures upon each side of the piston taking place so rapidly as to prevent the pressure upon the outer side of the piston being for a while greater than that upon the inner side. If, however, the passage is increased in size to such an extent that for ordinary service stops there is a quick equalization of the pressures in the piston-chamber upon each side of the piston, then the piston will not be operated and the valve will not open, but this will not prevent the piston from actuating the valve.

In case there is such a rapid reduction of pressure in the train-line, such as ordinarily happens with an emergency stop, that passage n^3 n^4 is then insufficient in size to permit of an equalization of pressures rapid enough to prevent the actuation of the piston the variation in the size of this passage is accomplished by means of the regulating-valve n^5 above referred to.

In operation, upon the actuation of the train air-line brake, the valve having been set to operate for service stops, the track-sanding apparatus is set in operation simultaneously with the application of the brakes and sand delivered to the rails. If the apparatus is set for an emergency stop, then sand is not delivered at every service stop, but only at emergency stops. It will be understood that if it delivers for service stops it will also deliver for emergency stops; that is, when adjusted for service stops it will of course operate upon an emergency stop. When the train-brake is not operated, air may still be supplied to the track-sanding box or apparatus by means of the valve H, which is operated by the engineer at pleasure.

If for any reason it should be desired to close the valve G' suddenly, the valve P may be opened, reducing the pressure upon the piston f .

Having thus fully described my invention, I claim and desire to secure by Letters Patent of the United States—

1. The combination of an air-reservoir and train-line of an air-brake system with the sand-box and an intermediate valve, having a valve-chamber connected with the said air-reservoir and the sand-box, a piston-chamber connected upon one side with the train-line by a large passage, and upon the other side by a restricted or small passage a piston in said piston-chamber and a valve, the piston-

chamber and piston being of larger area than the valve, and the piston being connected with the valve, all as and for the purposes described.

5 2. In an automatic valve of the character specified, the combination of the valve-chamber connected with the air-reservoir and with the sand-box, a piston-chamber connected upon both sides with the train-line, the connection from one side being much smaller than that upon the other, and means for regulating the size of the said smaller passage, the said piston and piston-chamber being of larger area than the valve and the piston being connected with the valve, as and for the purposes described.

3. The combination of the air-reservoir and train-line of an air-brake system, a sanding device and an intermediate automatic valve connected with the air-reservoir, train-line and sanding device as specified, and adapted to be automatically actuated to open the connection between the air-reservoir and the sanding device upon the application of the train-brake, and means substantially as specified for varying the action of said automatic valve adapted to be set in advance of its action, and whereby it may be automatically operated for service stops or for emergency stops only, substantially as described.

4. The combination in an automatic valve of the character specified, of the casing *a*, the valve-chamber *E*, therein, the inlet *e'* to the valve-chamber, the outlet *g*, the passage *g'*, the relatively large piston-chamber *F*, the piston *f* contained therein, the piston-rod *f'* connecting it with the valve *E'* in the valve-chamber, the said valve *E'*, the piston being of larger area than the valve, the passage *n'*

from one end of the piston-chamber and the passage *n³, n⁴*, from the other end of the piston-chamber, all as and for the purposes described.

5. The combination of the valve-body having the valve-chamber *E* and threaded extension therefrom, the threaded cap *e* to screw into said extension, having the threaded hole *e'*, the diaphragm having the passage *g*, the outlet *g'* having the threaded end *g²*, the passage *h* between the valve-chamber and the outlet *g'* of the valve or cock *H* for controlling the same, the piston-chamber *F*, the piston *f* contained therein, the valve *E'*, the piston-rod connecting the piston with the valve, the diaphragm and stuffing-box *f²* supported thereby, the passages connecting the piston-chamber upon both sides of the piston with the train-line, the threaded hole *n²*, the regulator *n³* for regulating the size of the passage *n³, n⁴*, the relief-cock *P*, the drip-chamber *n'*, its connection *m* with the valve-chamber *E*, and its cock, substantially as described.

6. The combination in a valve of the character specified, of the valve-chamber *E'* connected with the air-reservoir and with the sand-box, its valve, the piston-chamber, piston *f*, of relatively large area, contained therein, adapted to be operated by variations of the air-pressure of the train-line upon either side thereof, and connected with the valve *E'* and the cock *P* for relieving or changing the pressure upon one side of the piston to permit the closing of the valve.

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Witnesses:

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