

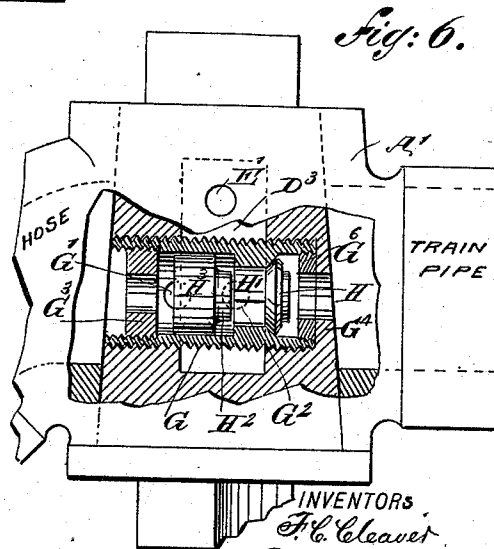
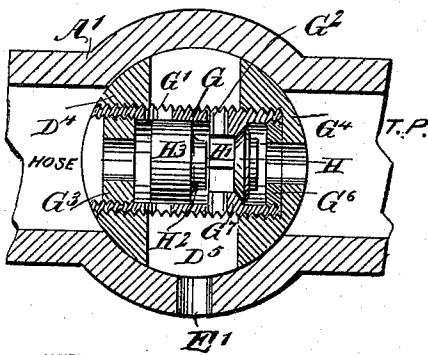
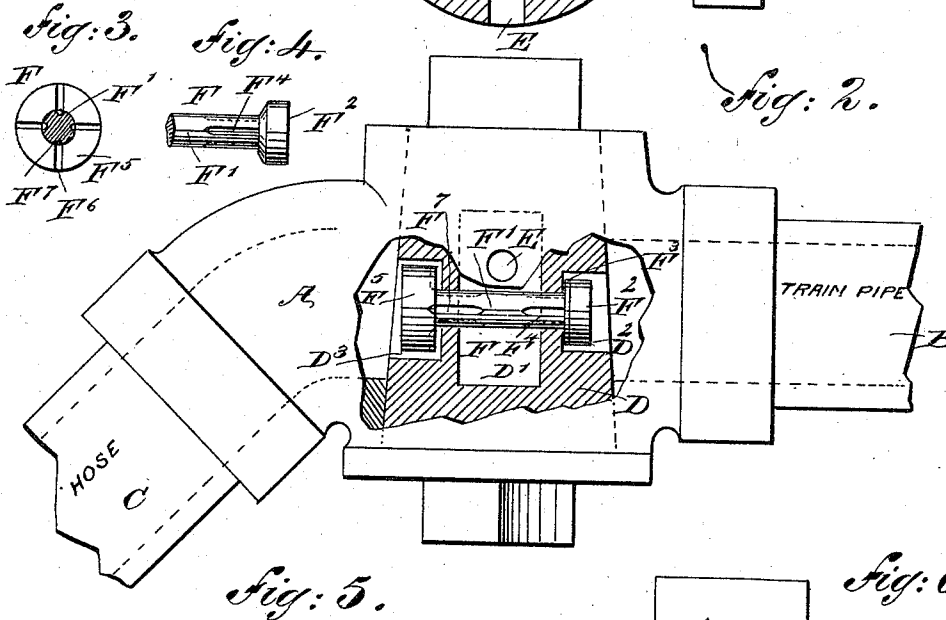
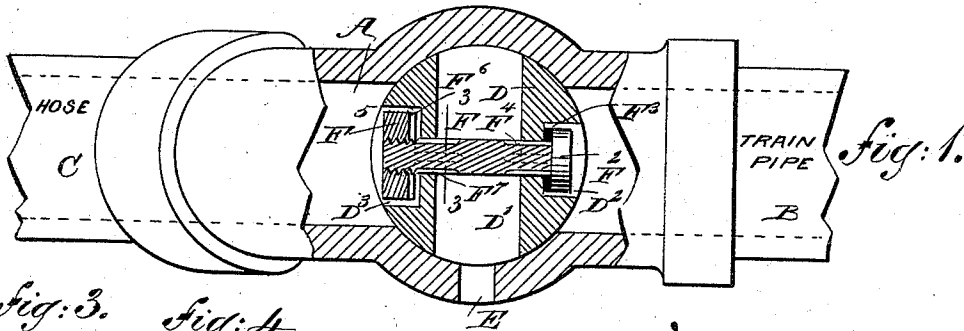
(No Model.)

2 Sheets—Sheet 1.

F. C. CLEAVER & J. D. MOORHEAD.
PLUG VALVE.

No. 537,750.

Patented Apr. 16, 1895.



WITNESSES:

Chas. Nida.
C. Sedgwick

INVENTORS
F. C. Cleaver
BY J. D. Moorhead
Munn & Co
ATTORNEYS

(No Model.)

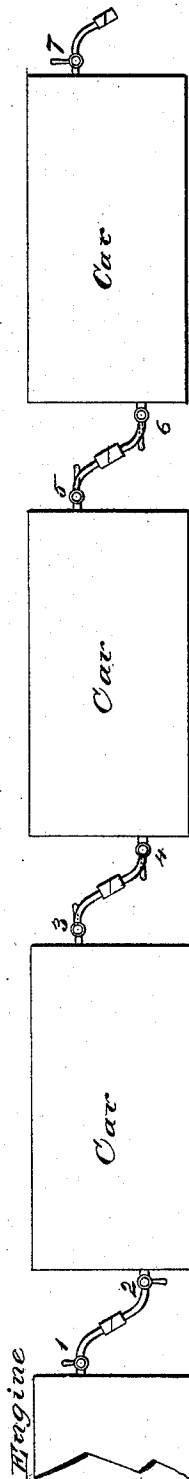
2 Sheets—Sheet 2.

F. C. CLEAVER & J. D. MOORHEAD.
PLUG VALVE.

No. 537,750.

Patented Apr. 16, 1895.

Fig. 7.



WITNESSES:

Chas. Nida.
C. Sedgwick

INVENTORS

F. C. Cleaver
J. D. Moorhead
BY *Munn & Co.*
ATTORNEYS.

UNITED STATES PATENT OFFICE.

FRANK C. CLEAVER AND JOHN D. MOORHEAD, OF TERRE HAUTE, INDIANA.

PLUG-VALVE.

SPECIFICATION forming part of Letters Patent No. 537,750, dated April 16, 1895.

Application filed December 20, 1893. Serial No. 494,168. (No model.)

To all whom it may concern:

Be it known that we, FRANK C. CLEAVER and JOHN D. MOORHEAD, of Terre Haute, in the county of Vigo and State of Indiana, have
5 invented a new and Improved Plug-Valve, of which the following is a full, clear, and exact description.

The invention relates to plug valves or stop cocks employed on the ends of a train pipe in
10 fluid pressure brakes, and its object is to provide a new and improved plug valve or stop cock, which is comparatively simple and durable in construction, not liable to get out of order,
15 and arranged in such a manner as to automatically set the brakes on one or both sections of the train in quick succession on closing one cock, and to relieve the hose between two cocks of adjacent cars of pressure, on closing both cocks.

20 The invention consists of certain parts and details, and combinations of the same, as will be hereinafter described and then pointed out in the claims.

Reference is to be had to the accompanying
25 drawings, forming a part of this specification, in which similar letters and numerals of reference indicate corresponding parts in all the figures.

Figure 1 is a plan view of the improvement
30 with parts in section and showing the plug in a closed position. Fig. 2 is a side elevation of the same with parts in section. Fig. 3 is a cross section of the auxiliary valve on the line 3—3 of Fig. 1. Fig. 4 is a side elevation of the small end of the auxiliary valve. Fig. 5
35 is a sectional plan view of a modified form of the improvement. Fig. 6 is a side elevation of the same with parts in section; and Fig. 7 is a plan view of a train equipped with the improvement.
40

The improved plug valve or stop cock as illustrated in Figs. 1, 2, 3 and 4, is provided with a valve body A connected at one end with the train pipe B, and at its other end with the
45 flexible hose C for connecting the train pipes of two adjacent cars with each other. In the valve body A is mounted to turn the plug D provided with the usual port D' adapted to connect the ends of the valve body with each
50 other to establish communication between the train pipe B and the hose C.

When the plug D is turned, as illustrated in the drawings, then the port D' is disconnected from the ends of the valve body and registers with an outlet opening E formed in
55 the sides of the valve body and leading to the outer air. In the plug D and at right angles to the port D' and passing through the same, is arranged an auxiliary valve F adapted to connect one or both ends of the valve body A
60 with the port D' and the outlet opening E, as hereinafter more fully described. This auxiliary valve F is preferably of the construction illustrated in Figs. 1, 2, 3, and 4, and comprises a stem F' fitted to slide transversely
65 across the port D' in bearings in the sides of the plug D.

On the end of the stem F' next to the train pipe B is formed or secured a small head F² adapted to be seated on a flexible seat F³ held
70 in an enlarged opening D² formed in the side of the plug D in that end of the valve body A leading to the train pipe B at the time the plug D is closed, as plainly illustrated in Figs. 1 and 2. On the same end of the stem F' are
75 also formed short longitudinally-extending grooves F⁴, so that when the valve is shifted to the right and the head F² is moved off its seat, then the said peripheral grooves F⁴ connect the train pipe with the port D', to permit
80 air to escape from the train pipe through the port D' and opening E to the outside. On the other end of the valve stem F' is secured a head F⁵ larger in diameter than the head F², and fitted to move in a recess D³ formed in
85 the side of the plug D next to the hose C. On the inner face of this head F⁵ are arranged radial grooves F⁶ leading to longitudinally-extending short grooves F⁷, formed in the end of the valve stem F' next to the said head F⁵.
90 Thus, when the latter is seated air can pass from the hose C through the registering grooves F⁶ and F⁷ into the port D', and out of the latter to the outer air by way of the outlet opening E. Now when this head F⁵ is
95 seated the other head F² is moved off its seat, and vice versa.

The operation is as follows: When the air brake system of the train and engine is charged with air the air pump or main reser-
100 voir being connected to the train pipe and the plug valve marked "1" in Fig. 7 at the rear of

the engine is turned into the position shown in Figs. 1 and 2, then the pressure of air at the hose end of the valve body A against the large head F^5 , will cause the valve F to shift from the left to the right, owing to the larger area of the head F^1 relative to the head F^2 . Thus, the head F^2 is unseated; while the head F^5 is seated in the recess D^3 , and air from the train pipe B under the engine can pass through the grooves F^4 into the port D' , and from the latter through the opening E to the outside, so that the air in the train pipe B is sufficiently reduced to set the brakes in the usual manner. As the head F^5 does not make a tight joint on its seat owing to the grooves F^6 , air will also escape from the hose C through the said grooves and the grooves F^7 , into the port D' and out of the same to the outer air through the opening E, so that the brakes on the train section next to the engine are set in the usual manner by the reduction of air in the hose C as above described, it being understood that the remaining plug valves in the train are open. Thus both ends of the valve release air almost simultaneously. It will be understood that the pressure in the train pipe in the rear of valve "1," Fig. 7, will be gradually reduced so as to hold the auxiliary valve open at the head F^2 for a certain length of time only after which the preponderance of pressure on the valve head F^2 , shifts the auxiliary valve to the left to seat the head F^2 , and prevent the further escape of air from the pipe connected to the engine, while the car brakes are set and remain set. As the back section of the train pipe has no way of being re-supplied with air under these conditions its pressure rapidly falls, while the section connected with the locomotive is connected through a large supply in the main reservoir with the pump, and consequently its pressure falls much slower than that in the rear end. It will be obvious that the dimensions of the valve heads and grooves or ports may be so calculated that the reduction of pressure in the pipe section connected to the locomotive will not be sufficient to set the brakes of the said section as long as the said pipe is connected to the air pump or the main reservoir. When, however, the said pump or reservoir is disconnected from the pipe, the reduction of pressure in the pipe section connected to the locomotive will be sufficient to set the brakes of the said section. Thus it will be seen that the engineer, by connecting the air pump or main reservoir with the train pipe, or disconnecting them therefrom, can determine whether on the closing of the improved valve, the brakes will be applied only in the rear of the closed valve, or throughout the entire length of the train.

When the plug valve marked "2" in Fig. 7 is closed, then the large area head F^5 of the auxiliary valve F is toward the locomotive, and as it does not close tight on its seat, it causes air from the front part of the train pipe

to escape to set the brakes on the locomotive, in case the train pipe on the locomotive should be disconnected from the supply of compressed air. When, however, the main reservoir is connected to the train pipe, the brakes in front of the plug valve 2, will not be applied, for the reason above set forth. At the same time that the valve is closed to allow the pressure to act on the auxiliary valve the latter valve is shifted to the right to unseat the head F^2 , so that air escapes from the train pipe under the cars to set their brakes. Ordinarily the plug valves are open as at "3," "4," "5" and "6" of Fig. 7, while the last plug valve "7" is closed.

It will be seen that when both plug valves are turned shut about simultaneously, then the hose pressure is so quickly relieved that the auxiliary valves are not forced open and the brakes on neither end are set, at the same time facilitating the uncoupling of the hose on account of having the pressure in the hose removed.

The auxiliary valve in the plug, as shown in Figs. 5 and 6, is in the shape of a piston valve of which the piston and the valve are disconnected, but they act in the same manner as the auxiliary valve F, above described, to accomplish the same result. In this case the valve body A' is provided with the plug G^4 formed with the port D^5 adapted to connect with the outlet opening E' in the side of the valve body A' , whenever the plug is closed, as shown in Figs. 5 and 6. Now, transversely to the port D^5 is arranged in the sides of the plug G^4 the auxiliary valve casing G provided with two sets of ports G^1 and G^2 connecting the interior of the casing G with the port D^5 . The ends of the casing G are closed by apertured plugs G^3 and G^6 opening into the opposite ends of the valve body A' at the time the plug G^4 is in a closed position. In the end of the casing G next to the plug G^6 is formed a valve seat G^7 on which is adapted to be seated a valve H provided with an inwardly-extending web H^1 adapted to be engaged by the reduced end H^2 of the piston H^3 fitted to slide in the casing G between the plug G^3 and the seat G^7 . The piston H^3 presents a large area to the air pressure from the train pipe B. Now, when the plug G^4 is closed with the train pipe charged with air, then the air pressure from the hose C on the large area of the piston H^3 , causes the latter to slide to the right so that its reduced end H^2 strikes the web H^1 and thereby unseats the valve H, to permit the air from the train pipe B to pass through the valve seat G^7 into the casing G, and from the latter through the port G^2 into the port D^5 and to the outer air by way of the opening E' . The movement of the piston H^3 to the right uncovers the port G^1 so that air from the hose C can exhaust into the casing G to the left of the piston H^3 and through the port G^1 , port D^5 and opening E' to the outside.

It is understood that by the reduction of

air in the train pipe B and the hose C, as previously described, the brakes are set in the usual manner.

Having thus fully described our invention, we claim as new and desire to secure by Letters Patent—

1. A plug valve provided with an auxiliary valve arranged in the valve and provided with heads of different areas, the larger head being provided with ports communicating with the port of the plug when the said head is seated, substantially as described.

2. A plug valve provided with an auxiliary valve mounted to slide transversely of the plug, said auxiliary valve comprising two heads of unequal size, the larger head being provided with radial grooves or ports, and a stem connecting the heads and provided with longitudinal grooves extending inward from the heads, substantially as described.

3. The combination with a plug valve, having an opening in each side of its plug at right angles to the port thereof, the outer ends of the openings being enlarged, of a stem fitted to slide in the said openings and provided with longitudinal grooves, and a head on each end of the stem in the enlarged portion of the said openings, the said heads being of un-

equal diameter and the larger head being provided with radial grooves, substantially as described.

4. A plug valve comprising a valve body adapted to connect with the train pipe and with the hose and provided with an air outlet in one side, a plug mounted to turn in the said valve body and having a port adapted to connect the ends of the said valve body with each other or to register with the said air outlet, an auxiliary valve fitted to slide transversely across the said plug port, to connect one or both ends of the valve body with the said port at the time the plug is closed and its port registers with the said air outlet, the said auxiliary valve being provided with heads of different areas, the larger head being provided on its inner face with grooves registering with longitudinal grooves on the stem between the two heads, the said stem being also provided with longitudinal grooves near the small head, substantially as shown and described.

FRANK C. CLEAVER.
JOHN D. MOORHEAD.

Witnesses:

DANIEL V. MILLER,
M. L. TAYLOR.