No. 622,135. Patented Mar. 28, 1899.

J. J. FINNEY.

AUTOMATIC FLUID PRESSURE BRAKE.

(Application filed Dec. 27, 1897.)

(No Model.)

Fig-1

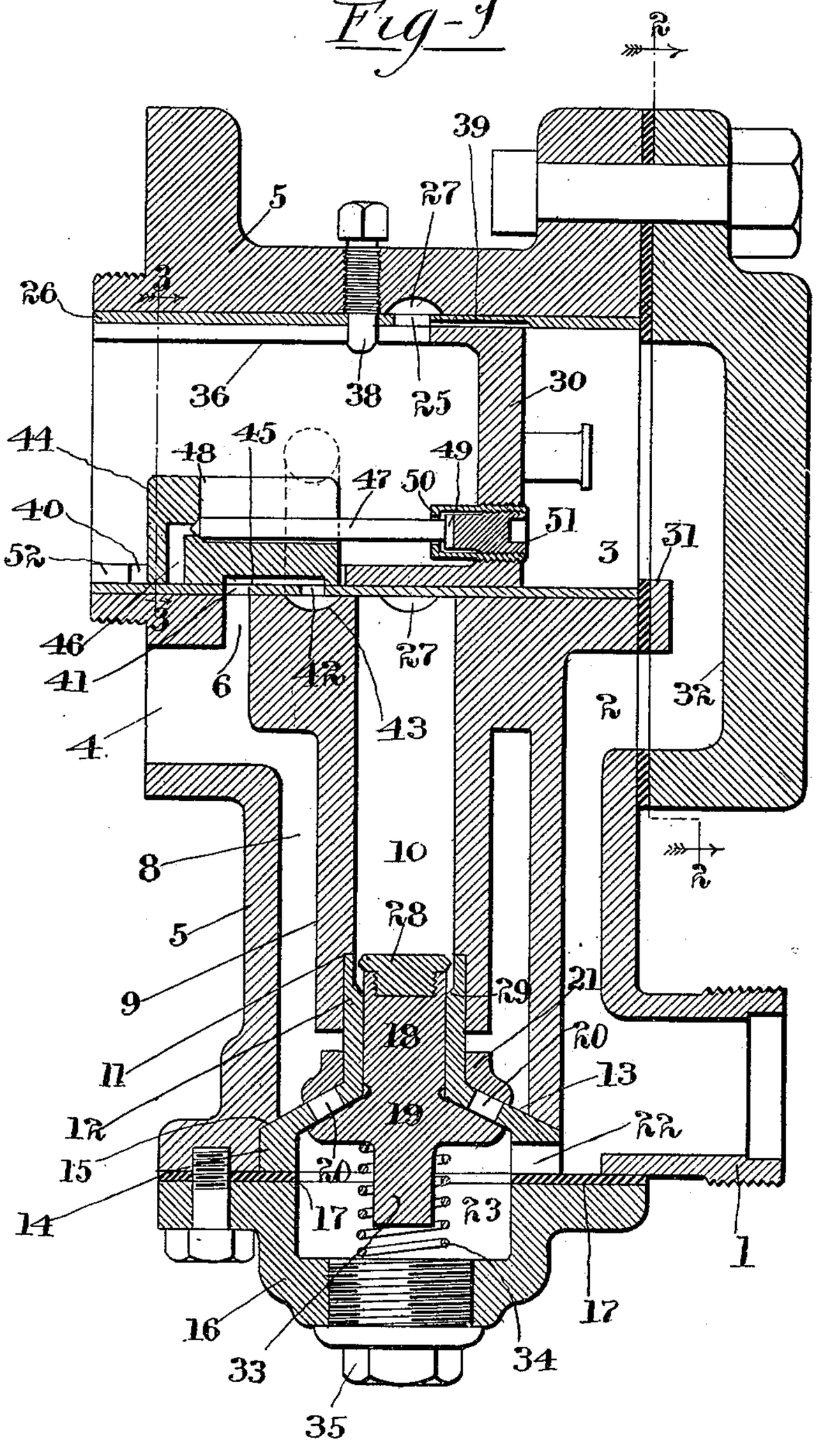


Fig-2

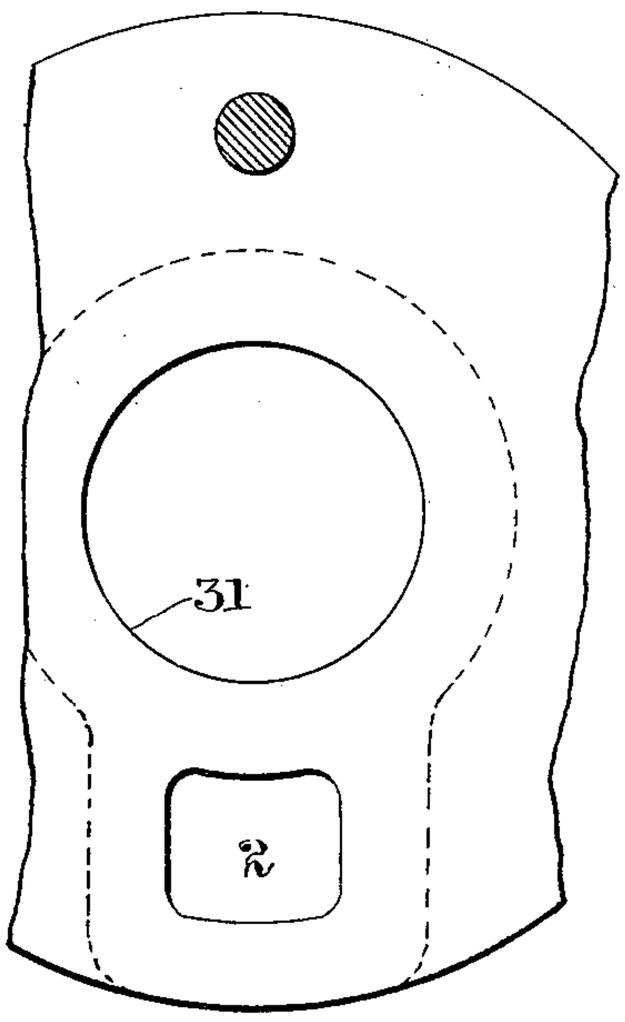
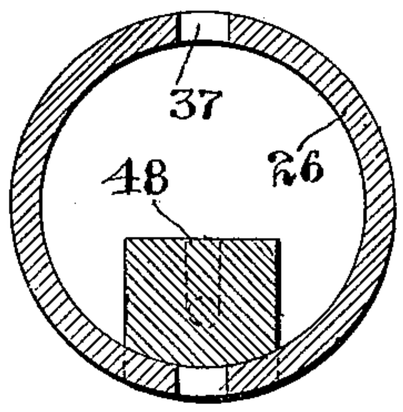


Fig-3



Witnesses
Harold G. Bartlett.
Edna B. Johnson.

Inventor
James J. Finney
by Elliott & Hopkins
his Attys.

UNITED STATES PATENT OFFICE.

JAMES J. FINNEY, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO JOSEPH H. CHANDLER, OF SAME PLACE.

AUTOMATIC FLUID-PRESSURE BRAKE.

SPECIFICATION forming part of Letters Patent No. 622,135, dated March 28, 1899.

Application filed December 27, 1897. Serial No. 663,484. (No model.)

To all whom it may concern:

Be it known that I, JAMES J. FINNEY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Automatic Fluid-Pressure Brakes, of which the following is a full, clear, and exact specification.

My invention relates to triple valves and to the quick-acting valve mechanism usually employed in connection with or adjacent to the triple valve for causing free or abnormal exhaustion of train-pipe pressure, whereby the passage between the brake-cylinder and the auxiliary reservoir is opened to its maximum capacity and the brakes instantly applied with full force for making what is known as an "emergency" stop; and my present improvements have more specific reference to that species of this class of devices in which the pressure exhausted is led from the train-pipe directly into the brake-cylinder, and thus utilized in applying the brakes instead of being discharged into the atmosphere.

My invention has for its primary object to provide an improved and simple form of train-pipe discharge-valve mechanism whereby a sudden excessive reduction of pressure in the train-pipe will throw open the train-pipe valve or emergency exhaust-valve and admit the pressure from the train-pipe directly into the brake-cylinder, but prevent a reverse movement of the pressure, or, in other words, prevent back pressure from the brake-cylinder from acting against and tending to unseat such emergency exhaust or train-pipe discharge valve.

A further object of my invention is to provide improved and simple means by which to expose the local train-pipe discharge-valve to train-pipe pressure on one side and continually to auxiliary pressure on the other side, whereby it will be opened by the auxiliary pressure when abnormal reduction takes place in the train-pipe for emergency application without permitting the pressure from the auxiliary or from the brake-cylinder to escape past the train-pipe discharge-valve.

With these ends in view my invention consists in certain features of novelty in the construction, combination, and arrangement of parts by which the said objects and certain other objects hereinafter appearing are attained, all as fully described with reference to the accompanying drawings and more particularly pointed out in the claims.

In the said drawings, Figure 1 is a vertical longitudinal section of a triple-valve mechanism equipped with my improvements. Fig. 2 is a detail view looking into the triple-valve casing from the left on the line 2 2, Fig. 1; and Fig. 3 is a detail section taken on the line 3 3, Fig. 1.

In carrying out my invention I expose or subject the emergency exhaust-valve or local train-pipe discharge-valve to train-pipe pressure on one side and to auxiliary-reservoir pressure on the other side, so that under normal conditions this valve will be held to its seat by the preponderance of pressure in the train-pipe. The seat for this valve is formed in a diaphragm or web interposed at a point between the brake-cylinder passage and the train-pipe, and the said valve is located against this diaphragm or web on the side next the train-pipe, while on the opposite side I form what might also be termed a "valve-seat," and against this I place a check-valve to prevent back pressure from the brake-cylinder from acting directly against the first said valve or the valve which I have herein termed the "emergency exhaust" or "train-pipe discharge" valve. The pressure on one side of this train-pipe discharge-valve is direct train-pipe pressure, while that on the other side is indirect or stored train-pipe pressure accumulated in the auxiliary reservoir and which continually exerts a tendency toward the train-pipe discharge-valve for forcing the latter from its seat as soon as the train-pipe pressure has been abnormally reduced; but this auxiliary-reservoir pressure is prevented from escaping past the said discharge-valve by a valve which seats when the discharge-valve opens.

Referring now more particularly to the drawings, 1 represents the train-pipe, from which leads a passage 2 to the main abutment-chamber 3, as usual, and 4 represents the brake-cylinder passage, which enters the casing 5, and, besides having an upwardly-extending connection 6 with the triple valve, con-

nects with a downwardly-extending passage or chamber 8, which constitutes a valve-chamber, and formed in the casing 5 and depending in the chamber 8 is a neck 9, constituting a pressure-accumulating chamber 10. The lower open end of this neck 9 is counterbored, as shown at 11, and fitted therein is the upper end or neck 12 of a funnel-shaped piece whose conical portion 13 constitutes the diaphragm or web located between the brake-cylinder passage and train-pipe and forming the double valve-seat hereinbefore referred to. Around the lower edge of the conical portion 13 is formed a downwardly-extending flange 14, which is fitted snugly in a suitable recess in the bottom of the casing 5, the lower edge of the conical portion 13 being abutted against a complementary shoulder 15, constituting the top of such recess. Secured to the bottom of the casing 5 is a flanged removable cap 16, which abuts firmly against the lower edge of the flange 14 and holds the same snugly in its socket against the shoulder 15, a gasket or packing 17 being interposed between the cap 16 and flange 14 to prevent leakage.

The interior of the straight or neck portion 12 of the funnel portion constitutes a guide for a piston or abutment 18, formed on a conical valve 19, which fits against the under side of the web 13 and when against its seat, as shown in the drawings, closes a number of exhaust-passages 20, formed through the web 13, and seated against the opposite or upper side of this web 13, so as to cover the said passages 20, is a check-valve 21, which is of annular form surrounding the neck 12 and is guided in its rising-and-falling movements by such neck. When the valve 19 is unseated or lowered, the pressure or air (entering from the train-pipe through a port 22, formed in the flange 14, into chamber 23, constituted below the valve 19 by the flange 14 and a depression in the cap 16) will rise through the passages 20 and, after lifting or unseating the check-valve 21, will pass upwardly into the valve-chamber 8, and thence into the brake-cylinder via the passage 4. This abnormal reduction in the train-pipe of course shifts the triple valve to its extreme or emergency position and throws open the maximum extent of the passage 6 to the full head of pressure in the auxiliary reservoir. This unseating of the valve 19 for effecting this abnormal reduction in the train-pipe is occasioned by the pressure of the air accumulated in the chamber 10, which exerts a continual downward pressure against the piston or abutment 18. The pressure is admitted to the chamber 10 directly from the slide-valve chamber through a port 25, preferably formed directly through the bushing 26, which is surrounded by a channel 27, formed in the casting in the usual manner and communicating with the chamber 10, so that the upper side of the valve 19 is continually exposed to auxiliary-reservoir pressure, while the lower side is exposed to direct train-pipe pressure through the port 22. When a sudden excessive reduction takes place in the train-pipe, however, the air stored in the chamber 10, in its attempt to escape into the chamber 23 to supply the reduction taking place in such chamber, will force the valve 19 open, as before described. Inasmuch as the piston 18 must work more or less freely, there is likelihood of the air escaping from the auxiliary and brake cylinder past the valve 19 and into the train-pipe, which would be objectionable should it be desired to keep the brakes applied any considerable length of time on occasions, for instance, when one or more cars are side-tracked and detached from the engine, and in order to guard against this result I provide the upper end of the abutment or piston 18 with a downwardly-seating valve 28, having screw-threaded or other suitable connection therewith, and the upper end of the neck 12 is chambered out to form a valve-seat 29. Thus when the piston 18 descends under the pressure in chamber 10 the valve 18 will hermetically close the lower end of such chamber and prevent the brakes from leaking off, while the valve 21 prevents direct leakage from the brake-cylinder.

The lower side of the valve 19 may be provided with a depending stem 33 for the purpose of holding in place a coil-spring 34, sleeved thereon and serving to return the valve 19 to its seat in the event of the differential areas being insufficient to effect this result. The spring 34 rests upon a removable plug 35, screwed into the bottom of the chamber 23. By removing the plug 35 any waters of condensation accumulated in the chamber 23 or neighboring cavities of the mechanism may be drained off, and by removing the cap 16 the funnel-shaped diaphragm, as well as the valves assembled therewith, may be entirely removed.

With the main abutment of the triple valve constructed in the usual way pressure from the auxiliary reservoir is liable to leak past such abutment and flow back into the train-pipe even when the abutment is at the extremity of its outward movement. As a safeguard against this and in order to cut off absolutely all possibility of escape from the brake-cylinder or the auxiliary reservoir when the parts are in the position of emergency application I constitute the outer end of the main abutment 30 a valve and which when the abutment is at the extremity of its outward movement seats against a valve-seat 31, which may, if desired, be formed on the removable cap 32 of the triple-valve casing, such valve-seat 31 being in the form of an annular flange of less diameter than the bushing 26 and, if desired, a gasket 31ª being interposed between the cap 32 and bushing 26, so as to make a tight joint and serve as a soft seat for the end of the abutment 30. The main abutment 30 is also provided at its inner side with a tubular or cylindrical extension whose upper side (or which at any other

convenient point) may be provided with a slot 37, into which engages a guide-pin 38, entering through the casing 5, thus holding one end of the slot 37 normally in communication with the port 25 in the bushing 26, so as to keep the auxiliary reservoir continually in communication with the channel 27, the feed-passage for supplying the auxiliary reservoir from the train-pipe being shown at 39 and formed through the bushing 26 over the top of the main abutment and having its inner end in communication with the port 25. This passage 39 is of such extent that when the main abutment 30 shifts to the right communication between the train-pipe and the auxiliary reservoir will be closed, as will be understood. The lower side of this extension 36 is provided with an aperture 40, so as to expose the bottom side of the bushing 26, through which are formed ports 41 42, communicating with the brake-passage 6 and atmosphere-exhaust 43, respectively, and placed in this aperture 40 is the main slide-valve 44, which rests upon the bushing 26 and has its lower face ground in a form complementary to the contour of the bushing. The slide-valve 44 is provided with the usual passage 45, which serves to place the brake-cylinder in communication with the exhaust-port 43 when the valve is shifted to the left under the increase of train-pipe pressure in the act of releasing the brakes. It is also provided with the vertical service-application port or passage 46, which when the valve is properly shifted to the right coincides with the brake-passage 6. The slide-valve is given these movements by the engagement therewith of the shoulder constituted by the left end wall of the aperture 40, and this aperture is of greater length than the slide-valve, so as to permit of a certain amount of lost motion, or, in other words, permit the main abutment and its extension 36 to move a certain extent without altering the position of the slide-valve, thus providing for the unseating of the graduating-valve 47 when the main abutment moves to the right under the reduction of train-pipe pressure in the act of applying the brakes and for the seating of the valve 47 when abutment 30 moves to the left. The seat for the graduating-valve 47 is formed at the upper end of the passage 46, so that when in position against its seat, as shown in Fig. 1, the passage 46 will be closed. The graduating-valve 47 rests freely within and is guided by a slot or channel 48, formed in the top of the slide-valve, and its end is coupled to the main abutment or to some other part moving in unison therewith by means of a universal or flexible joint, which I will now describe and which allows the graduating-valve to adapt itself to any irregularity in the movement of the slide-valve with relation to the main abutment. This joint preferably consists in providing the valve-stem 47 with a head 49, which is located within a socket 50, the end of the socket being apertured for the passage of the stem of the valve 47 and permitting of free movement of such stem without allowing the head to pull out. This socket 50 is preferably screwed into the main abutment, and into the socket is screwed a plug 51, which abuts against the inner side of the head 49 and holds it in place, the plug 51 being adjustable, so as to regulate the freedom of movement of the valve-stem. When a sudden excessive reduction of pressure takes place in the train-pipe, throwing the abutment 30 to the extremity of its movement on the right, the slide-valve is carried entirely beyond the brake-cylinder passage 6, and the entire area of such passage 6 is exposed to the pressure in the auxiliary reservoir through a passage 52, formed in the bottom of the cylindrical extension 36 and in line with the passage 6.

By this construction of triple-valve mechanism it will be seen that I am enabled to shift the slide-valve back and forth with the main abutment without depending upon frail connections between the graduating-valve and such abutment, and, furthermore, the manufacture of the device is greatly facilitated and cheapened by reason of the simplicity of the mechanism and the ease with which the parts may be removed and repaired.

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

1. A valve mechanism for fluid-pressure brakes having in combination a train-pipe, an auxiliary reservoir, a brake-cylinder, a passage between the brake-cylinder and train-pipe, a train-pipe discharge-valve closing said passage, a passage between the auxiliary reservoir and train-pipe, a piston located in said second passage and having operative relation to said valve at one end and a second valve located at the other end of and being connected to said piston and adapted to close said second passage under the influence of the auxiliary-reservoir pressure whereby backflow from the auxiliary reservoir to the train-pipe will be prevented when said train-pipe discharge-valve is unseated, substantially as set forth.

2. A valve mechanism for fluid-pressure brakes having in combination a train-pipe, an auxiliary reservoir, a passage connecting said auxiliary reservoir with the train-pipe, a piston arranged in said passage and having a valve at each end projecting circumferentially therefrom and said valves seating toward each other and in opposite directions, and a local discharge or exhaust leading from the train-pipe and being closed by one of said valves, substantially as set forth.

3. A valve mechanism for fluid-pressure brakes having in combination a train-pipe, the casing 5 having the chamber 8, the depending neck 9 in said chamber having communication with auxiliary-reservoir pressure, the funnel-shaped diaphragm having neck 12 removably seated in the lower end of neck 9

and being provided with valve-seat 29 and apertures 20, the piston 18 having valve 19 closing said apertures 20, the valve 28 connected to the piston and adapted to rest upon seat 29, and the valve 21 subjected to brake-cylinder pressure and closing said apertures 20, substantially as set forth.

4. A valve mechanism for fluid-pressure brakes having in combination a triple-valve casing, a main abutment therein having an apertured extension, a slide-valve having a port through its upper portion and resting freely in the aperture of and projecting through said extension and a graduating-valve having operative connection with said abutment and seating against but detached from said slide-valve, substantially as set forth.

5. A valve mechanism for fluid-pressure brakes having in combination a triple-valve casing, a main abutment therein having a cylindrical extension provided with a bottom aperture and a slot, a pin engaging in said slot for preventing the rotation of said abutment, a slide-valve resting in said aperture, a pressure-storing chamber having communication with the auxiliary reservoir through said slot and an emergency exhaust-valve exposed to the pressure of said chamber on one side and to train-pipe pressure on the other side, substantially as set forth.

6. A valve mechanism for fluid-pressure brakes having in combination a triple-valve casing, the main abutment therein having an extension provided with an aperture, a slide-valve projecting through and being of less diameter than said aperture and the graduating-valve having operative connection with said abutment and resting upon said slide-valve, substantially as set forth.

7. A valve mechanism for fluid-pressure brakes having in combination a triple-valve casing provided with the brake-passage 6, a main abutment in said casing having a cylindrical extension provided with the aperture 40 and passage 52 adapted to communicate with the brake-passage 6, and a slide-valve resting freely in said aperture and being actuated by said cylindrical extension, substantially as set forth.

8. A valve mechanism for fluid-pressure brakes having in combination a triple-valve casing, a main abutment therein, a slide-valve having operative relation to said abutment, a graduating-valve disconnected with said slide-valve and being provided with a head 49, a socket inclosing said head 49 and having attachment to said abutment and an adjustable plug secured in said socket for confining the movement of said head, substantially as set forth.

JAMES J. FINNEY.

Witnesses:
EDNA B. JOHNSON,
F. A. HOPKINS.