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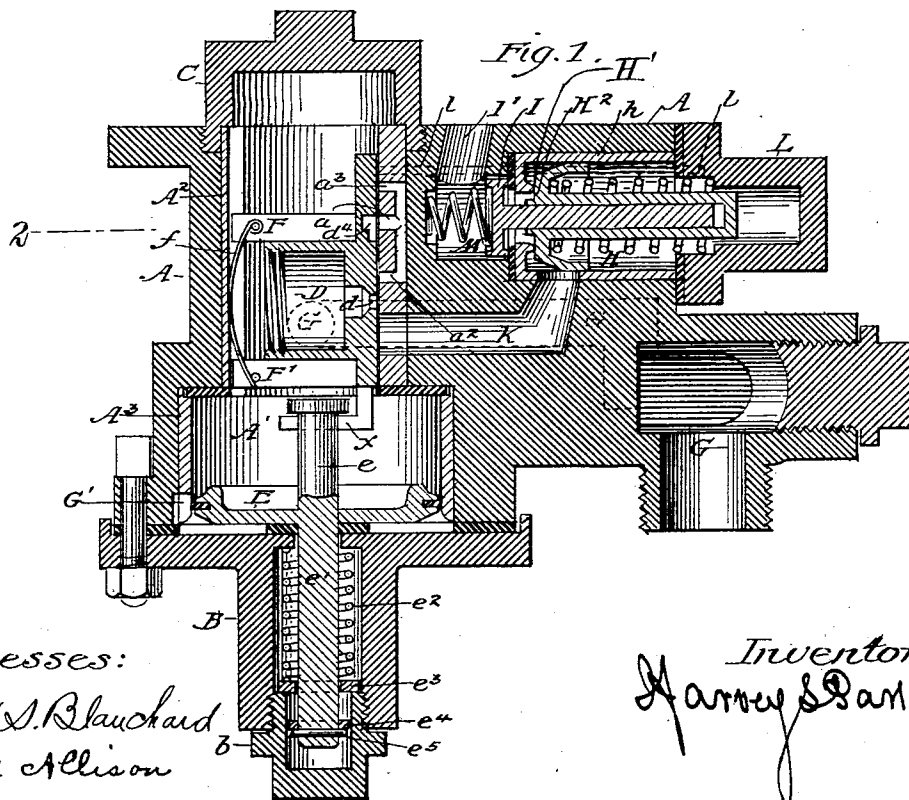
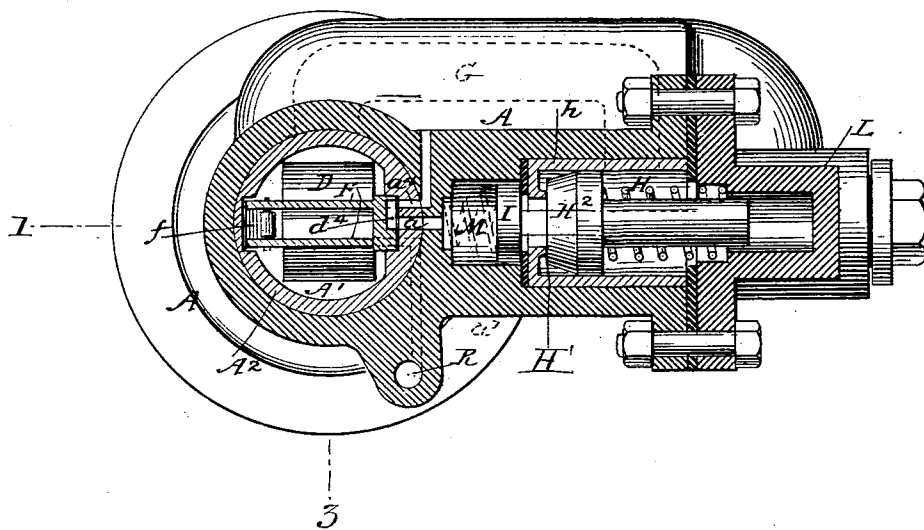
3 Sheets—Sheet 1.

H. S. PARK.
FLUID PRESSURE BRAKE.

No. 573,790.

Patented Dec. 22, 1896.

Fig. 2.



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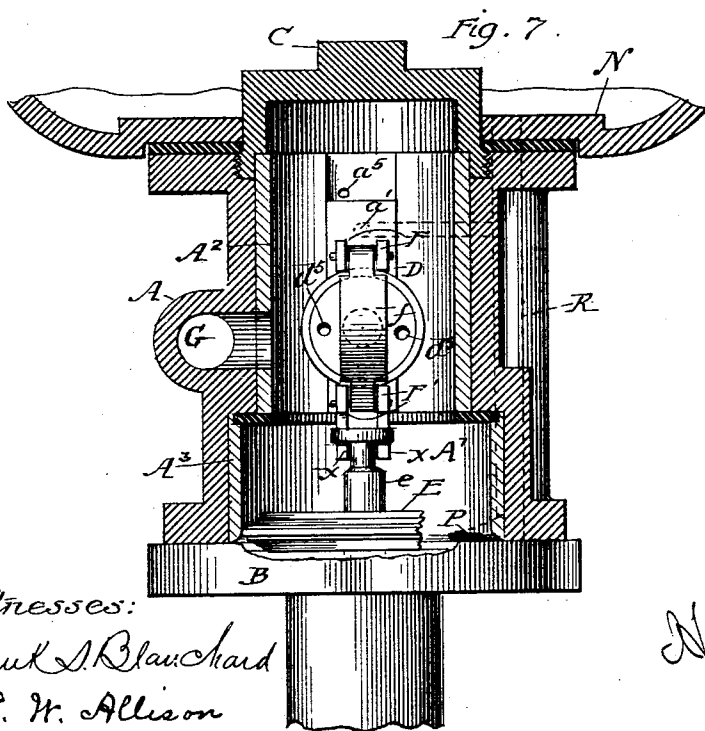
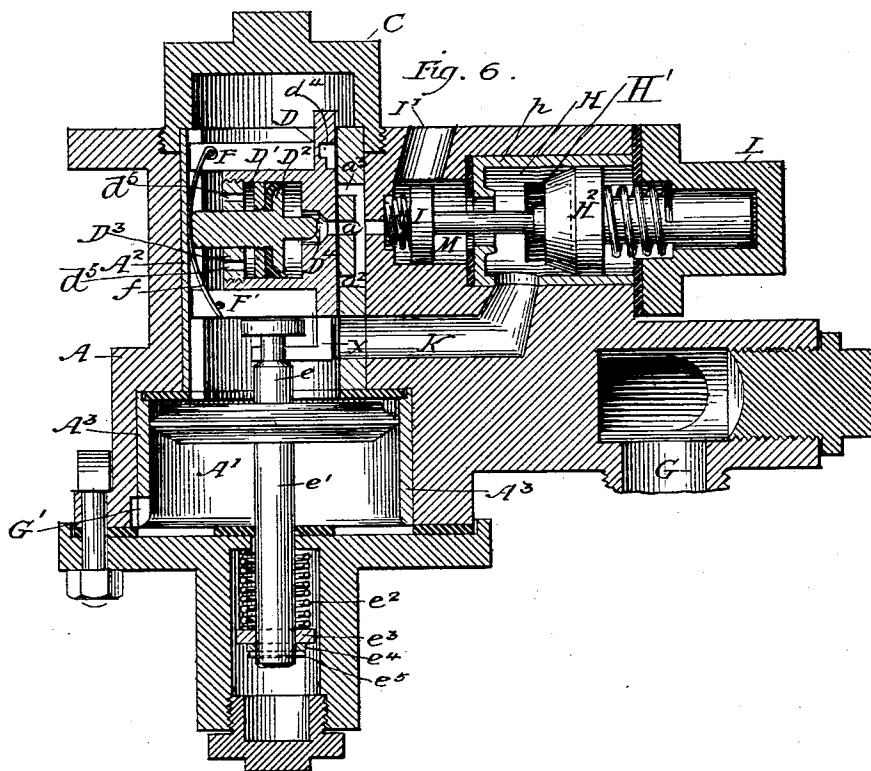
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Inventor:

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UNITED STATES PATENT OFFICE.

HARVEY S. PARK, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE CHICAGO BRAKE AND MANUFACTURING COMPANY, OF SAME PLACE.

FLUID-PRESSURE BRAKE.

SPECIFICATION forming part of Letters Patent No. 573,790, dated December 22, 1896.

Application filed June 22, 1896. Serial No. 596,485. (No model.)

To all whom it may concern:

Be it known that I, HARVEY S. PARK, a citizen of the United States, and a resident of the city of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Fluid-Pressure Brakes, of which the following is a specification.

The object of my invention is to provide a quick-acting brake which shall be simple in construction and positive and reliable in operation; and my invention consists in the features and details of construction hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a vertical longitudinal section on line 1 of Fig. 2; Fig. 2, a cross-sectional view on line 2 of Fig. 1; Fig. 3, a sectional view of a bushing for the valve-case forming a seating for the slide-valve of the device and taken on line 3 of Fig. 2; Fig. 4, a face view of the slide-valve of the device; Fig. 5, a longitudinal section also on line 1 of Fig. 2, but showing the position of the parts while making a service stop; Fig. 6, a longitudinal section also on line 1 of Fig. 2, showing the position of the parts in making an emergency stop; Fig. 7, a longitudinal section also on line 3 of Fig. 2; Fig. 8, a sectional view with the balancing-valve omitted, and Fig. 9 a face view of the slide-valve used in Fig. 8.

The casing A is provided with a chamber A', containing the working parts of the apparatus and composed of an inner and outer chamber of unequal diameters. The inner or smaller chamber is provided with a bushing A² and the outer or larger chamber with a bushing A³. The end of the inner chamber is closed by a cap C and the end of the outer chamber by a cap or casing B. The slide-valve D is located in the smaller part of chamber A' and is provided with a seat formed in the bushing A². Passages open upon this bushing and are controlled by this slide-valve, which constitutes the brake-release and emergency mechanism of the device. A piston E works in the outer end of chamber A' and is adapted to actuate the slide-valve by means of its stem e, whose head, in the inward travel

of the piston, abuts against arms extending from the slide-valve across chamber A'.

The slide-valve is actuated in the outward movement of the piston by the head of the stem abutting arms of lugs X, which extend from the slide-valve and are located one on each side of stem e, whereby the piston carries the slide-valve with it in its movements.

A gasket or seating of leather or other suitable material is fixed at the inner end of the larger part of chamber A' and held to its place by the bushing A³. This gasket forms a seating for the piston when it has made its full inward travel. The outer face of the piston is provided with a stem e', which reciprocates in a chamber formed in the casing B. A hollow cap b closes the end of this chamber, and its inner end forms a shoulder or flange in the chamber. Around the stem is arranged a spiral spring e², one end abutting the inner end of the chamber and the other abutting a loose collar e³, which normally rests against the flange formed by cap b. Near the free end of the stem and in the hollow cap a ring e⁴ is placed around the stem, smaller than the other ring and held in position by pin e⁵ through the stem.

On the slide-valve is formed a chamber D', provided at its upper end with a plug D³, having openings d⁵ to permit the air in the triple-valve chamber to enter the outer portion of chamber D'. A piston D² operates within the chamber and is provided on each side with a stem, hereinafter designated the "inner" and "outer" stem. The end of the inner stem forms a valve D⁴, and its function is to govern the passage d in the slide-valve. This valve is the service-valve of the device and controls the passage of reservoir-pressure to the brake-cylinder in service applications of the brakes. Besides the passage d the chamber D' is provided with ports and passages d' and d², opening on the face of the slide-valve. In the plug D³ are passages to permit train-pipe pressure from the chamber A' to enter therein against the outer face of piston D².

Arms F and F' extend from the rear of the slide-valve across chamber A' and travel in

a slot or guide cut in the bushing A^2 , and between the arms is fixed a spring f , pressing the slide-valve to its seat. When the piston D^2 has made its full outward travel, caused by the excess of pressure on the inner face of the piston in emergency action, the outer stem of the piston will abut spring f and press it against the bushing A^2 , and the air-pressure on the inner side of the piston and inner end of chamber D' will hold the slide-valve to its seat both in emergency action and also when the train-pipe accidentally parts.

The train-pipe connects with a passage G , which opens into the chamber in which the slide-valve operates, which may be termed the "triple-valve" chamber, and is in direct and constant communication therewith. The outer end of chamber A' is provided with a by-port G' and a port P , communicating with a passage R , extending to the auxiliary reservoir.

The direct or emergency passage K extends from the chamber A' through chambers H and I' , which are formed in the casing A . A piston H^2 travels in chamber H and is provided with a balancing-valve H' . In this chamber is a bushing h , forming a seating for the balancing-valve and also for the non-return valve I , located in the chamber I' . A hollow cap L closes the outer end of chamber H and forms a guide for the piston-stem. A passage I is formed in this cap and leads through the casing to port a^3 in the chamber A' , whereby train-pipe pressure is admitted behind piston H^2 . The passage M communicates between the brake-cylinder and chamber I' and also the auxiliary reservoir N , as hereinafter explained.

A port or passage a is formed in bushing A^2 and leads through chamber I' to the brake-cylinder through passage M . Ports a^2 and a^3 are also formed in the bushing and connect by a branch with port a . A port a' connects with passage R , leading from by-port P to the reservoir. Port or passage a^4 is the release-port leading to the atmosphere. These ports and passages are governed by the slide-valve, which is provided with the three ports d , d' , and d^2 , opening into chamber D' , and with the recess d^1 for connecting ports a and a^4 for releasing the brakes.

The operation is as follows: The air from the train-pipe enters the passage G and into the chamber A' , forcing the piston E to the position shown in Fig. 1. This action will open the by-port G' , and the air will pass through the by-port to the outer side of the piston, and will then enter the port P into the passage R , and through this passage to the auxiliary reservoir. The air will also pass from the passage R into the passage a' to the under side of the slide-valve. The air will enter from chamber A' into the chamber D' and seat the service-valve. Air will also pass through the port a^3 into passage l and behind the piston H^2 , forcing the same inward to the position shown in Fig. 1, seating the valve H' .

The train-pipe air having entered through the passage l will feed slowly past piston H^2 and into passage K to the under side of the slide-valve and balance the valve against train-pipe pressure on the opposing face. Likewise auxiliary-reservoir air being always in port a' against the under side of the valve will balance the same against the train-pipe pressure in chamber A' , so that the valve is balanced by train-pipe and auxiliary-reservoir air on one side of the valve, working against train-pipe pressure alone on the opposing side.

To set the brakes for a service stop with a partial pressure of auxiliary-reservoir air or the full pressure of the auxiliary reservoir, a slight reduction is made in the train-pipe pressure, causing the piston E to move inward, closing the by-port G' . The piston will travel until the flange or ring e^4 abuts the ring e^3 , at which time the spring e^2 will arrest the further travel of the piston unless a greater reduction is made in the train-pipe pressure. The piston carries the slide-valve with it to the position shown in Fig. 5, bringing the port d to coincide or connect with port a^2 in the bushing A^2 , when the air from the auxiliary reservoir will flow through the passage R into the passage and port a' and through the ports d^2 and d' into the chamber D' . The auxiliary-reservoir air on the inner side of piston D^2 will move it outward and unseat the valve D^4 and flow through passage P , port a' , port d' , passage d , passage a through chamber l' , and passage M to the brake-cylinder and set the brakes. When the air in the auxiliary reservoir has been reduced in pressure below that in the train-pipe, the train-pipe pressure will move the piston D^2 inward and seat the valve D^4 . If it is desired to set the brakes with a greater force, a further reduction is made in the train-pipe pressure, and when it is necessary to set the brakes with full auxiliary-reservoir pressure the slight reduction in the train-pipe is continued until the air-pressure is equalized between the auxiliary reservoir and the brake-cylinder. To release the brakes, the train-pipe pressure is restored, and the piston E will travel to its normal position, and the recess in the slide-valve will connect ports a and a^4 and release the brakes.

To set the brakes for an emergency, a reduction is made in the train-pipe pressure sufficient to have the pressure on the outer side of piston E overcome the resistance of the spring e^2 , when the piston will make its full travel and carry the slide-valve with it. During this movement of the valve the recess will connect the ports and passages a^3 and a^5 and the air behind the piston H^2 will flow through the passages l , ports a^3 and a^5 to the brake-cylinder, and the air on the opposing side of the piston will remove it outward. The further movement of the slide-valve will uncover the port K in the bushing A^2 , and the train-pipe air will flow from the chamber A' through the passage K , chambers H and

l', and passage M to the brake-cylinder. The slide-valve will connect passage a' with port d' and port d' with port a, and the auxiliary-reservoir air will flow through passage R, port a', and port d' into chamber D' and from this chamber directly out through port d and port a to the brake-cylinder, whereby the brakes will be set by train-pipe air augmented by auxiliary-reservoir air to produce quick action of all the brakes. During the movement of the slide-valve and before its full travel, as shown in Fig. 6, the recess d⁴ connects ports a³ and a⁵, and thus causes the exhaustion of the pressure into the brake-cylinder from behind the piston H². When the slide-valve has made its full travel, the recess will have passed said ports and closed them, preventing the air from flowing into the chamber behind the piston.

In setting the brakes for emergency stops, the auxiliary-reservoir air-pressure being on the inner side of piston D² greatly in excess of the train-pipe pressure on the opposite side, the piston will move to the position shown in Fig. 6, increasing the pressure in chamber D and holding the slide-valve to its seat against any pressure of auxiliary-reservoir air on the other side of the valve.

In the position shown in Fig. 6, the air behind the piston H² having already been exhausted and the port a⁵ closed and the slide-valve having uncovered port K, the train-pipe air removes piston H², lifting the non-return valve, and passes into the brake-cylinder. The reservoir-air now flows into the brake-cylinder, and the excess of pressure in the brake-cylinder over that in the train-pipe closes the non-return valve, while the spring behind the piston H² moves the piston inward and seats the valve H'. In case of the parting of the train-pipe and the entire emptying of the same and also chamber A' the auxiliary-reservoir pressure will force the outer stem of the service-valve heavily against the spring f, and the air-chamber D' will hold the valve D to its seat, preventing its lifting or leaking.

It is evident that the balancing feature of my invention may be omitted, although the device will be found to operate more satisfactorily and with a less reduction of train-pipe pressure when balanced, whereby it is possible to vent a larger amount of train-pipe air at a greater pressure to cause a higher equalization in the brake-cylinder. Fig. 8 shows the device constructed with the balancing-valve omitted.

It will be understood that the first travel of the slide-valve only operates the brake-release, while the service-valve admits auxiliary-reservoir air to the brake-cylinder, and that in its further travel the slide-valve not only vents the train-pipe air through the emergency-passage, but also vents the auxiliary-reservoir air to the brake-cylinder through a separate or emergency route, independent of the service-valve.

Although I have described more or less

precise forms and details of construction, I do not intend to be understood as limiting myself thereto, as I contemplate changes of form, proportion of parts, and substitution of equivalents as circumstances may render expedient without departing from the spirit of my invention, and, furthermore, where I have designated certain parts and passages by their reference-letters in the specification or claims it is obvious that I do so for clearness, and certainly not as intending to limit myself to their particular form and location shown in the drawings.

I claim—

1. In a brake mechanism, the combination of a train-pipe, an auxiliary reservoir, a brake-cylinder, a triple-valve casing having a triple-valve chamber in direct and constant communication with the train-pipe, a piston therein, and a slide-valve actuated by the piston and governing an emergency-passage from the chamber to the brake-cylinder.

2. In a brake mechanism, the combination of a train-pipe, an auxiliary reservoir, a brake-cylinder, a triple-valve casing having a triple-valve chamber in direct and constant communication with the train-pipe, a piston therein, a slide-valve actuated by the piston and governing an emergency-passage for venting train-pipe air to the brake-cylinder in emergency action, and a service-valve for controlling reservoir-pressure in service action.

3. In a brake mechanism, the combination of a train-pipe, an auxiliary reservoir, a brake-cylinder, a triple-valve casing having a chamber in direct constant communication with the train-pipe whose pressure completely fills the chamber, a piston therein normally forced to one end of the chamber and governing a by port or passage to the reservoir, means for preventing the backflow of pressure from the brake-cylinder and a slide-valve actuated by the piston and governing ports and passages leading from the chamber and reservoir to the brake-cylinder.

4. In a brake mechanism, the combination with the train-pipe, auxiliary reservoir and brake-cylinder, of a valve-casing having a triple-valve chamber into which the train-pipe leads, a piston therein normally forced against one end of the chamber, a slide-valve actuated thereby, an emergency-passage governed by the slide-valve and leading from the chamber to the brake-cylinder for venting train-pipe air thereto in emergency action, and a service-valve independent in action from the slide-valve and operated by reductions of train-pipe pressure to control reservoir-air in service action.

5. In a brake mechanism, the combination of a train-pipe, brake-cylinder, and auxiliary reservoir, a valve-casing having a chamber communicating constantly with the train-pipe, a slide-valve therein whose initial travel operates the brake-release and whose further travel vents train-pipe air from the chamber

to the brake-cylinder, and also controls the admission of reservoir-air, and a service-valve controlling reservoir-air in service action.

5 6. In a brake mechanism, the combination of a train-pipe, auxiliary reservoir, brake-cylinder, a piston-actuated service-valve admitting air from the reservoir to the brake-cylinder in service action and a slide-valve governing the brake-release, and both the train-pipe air and reservoir-air to the brake-cylinder in emergency action, the slide-valve acting independent of the service-valve piston in such emergency action.

15 7. In a brake mechanism, the combination of a train-pipe, auxiliary reservoir, brake-cylinder, a triple-valve casing having a chamber in direct and constant communication with the train-pipe, a piston therein, a slide-valve actuated thereby and governing the brake-release, and both the train-pipe pressure and the reservoir-pressure to the brake-cylinder in emergency, and a service-valve admitting air from the reservoir to the brake-cylinder in service action.

25 8. In a brake mechanism, the combination with a train-pipe, auxiliary reservoir and brake-cylinder of a valve-casing having a triple-valve chamber in direct connection with the train-pipe and provided with a by-port communicating through a passage with the reservoir, a piston in the valve-chamber controlling the by-port a slide-valve actuated by the piston and provided with a chamber, a service-valve located therein and controlling reservoir-pressure to the brake-cylinder in service action, a port or passage from the reservoir communicating with the slide-valve chamber in service action for the admission of air in service action and controlled by the service-valve, a port or passage leading from the slide-valve and forming a communication with the port or passage for the reservoir-air to flow direct to the brake-cylinder independent of the service-valve.

45 9. In a device for actuating railway-brakes, a balanced slide-valve actuating in a triple-valve chamber having direct and uninterrupted communication with a train-pipe, and governing a passage to the brake-cylinder whereby the train-pipe air is vented from the chamber to the brake-cylinder by the slide-valve.

55 10. In a brake mechanism, the combination of a train-pipe, auxiliary reservoir, and brake-cylinder, a valve-casing having a chamber communicating directly with the train-pipe and provided with a by-port communicating through a passage with the auxiliary reservoir, a piston in the valve-chamber controlling the by-port, a slide-valve actuated by the piston, a service-valve and a branch pipe or passage leading to the service-valve from said passage to the auxiliary reservoir, the pressure therefrom being controlled by the service-valve in service action.

11. In a brake mechanism, the combination

of a train-pipe an auxiliary reservoir, a brake-cylinder, a valve-casing having a chamber communicating constantly with the train-pipe, a slide-valve controlling the brake-release in partial travel and forming a direct communication between the train-pipe and brake-cylinder, in its full travel, through the valve-chamber and a separate valve governing the admission of auxiliary-reservoir air to the brake-cylinder in service action, and under control of train-pipe pressure.

12. In a brake mechanism, the combination of a train-pipe, an auxiliary reservoir, a brake-cylinder, a valve-casing having a triple-valve chamber in direct and constant communication with the train-pipe, a slide-valve governing the port of a direct emergency-passage from the valve-chamber to the brake-cylinder, a by-passage leading from the valve-chamber to the emergency-passage to supply the same with train-pipe air, and a balancing-valve in the emergency-passage.

13. In a brake mechanism, the combination of a train-pipe, auxiliary reservoir, and brake-cylinder, a valve-casing having a triple-valve chamber communicating directly with the train-pipe, a direct emergency-passage leading from the chamber to the brake-cylinder and governed by the slide-valve, such valve being balanced as to this passage by train-pipe pressure exerted on both faces, and a service-valve independent in action from the slide-valve and controlling auxiliary-reservoir pressure in service action.

14. In a brake mechanism, a slide-valve controlling passages to the brake-cylinder from the train-pipe and from the auxiliary reservoir in emergency action, such valve being balanced by train-pipe pressure and auxiliary-reservoir pressure exerted on one side of the valve train-pipe pressure alone exerted on the other side.

15. In a brake mechanism, the combination of a train-pipe, an auxiliary reservoir, a brake-cylinder, a valve-casing having a triple-valve chamber in direct and constant communication with the train-pipe, a piston therein, a slide-valve actuated by the piston and governing an emergency-passage from the train-pipe through the valve-chamber to the brake-cylinder, such slide-valve being balanced as to the emergency-passage by the same pressure exerted on both sides.

16. In a brake mechanism, the combination of a slide-valve and a fluid-pressure-controlled locking device for preventing the lifting of the slide-valve in emergency action.

17. In a brake mechanism the combination of a slide-valve and a locking device controlled by extreme excess of reservoir-pressure over train-pipe pressure, for preventing the lifting of the slide-valve in emergency action.

18. In a brake mechanism the combination of a slide-valve a spring holding the valve to its seat and a piston having a stem actuated by variations in train-pipe and auxiliary-reservoir pressure, and adapted to increase the

tension on the slide-valve, in the full travel of the piston in emergency action.

19. In a device for actuating railway-brakes, the combination of an emergency-valve and a service-valve device whose action in emergency application holds the emergency-valve to its seat.

20. In a brake mechanism, the combination of a casing having a triple-valve chamber, a piston-actuated slide-valve therein having an annexed chamber, a service-valve operating therein and governing the admission of reservoir-air in service application of the brakes, a spring for holding the slide-valve to its seat, and a stem adapted to increase the tension of the slide-valve on its seat, and operated by the service-valve in emergency action.

21. In a railway-brake mechanism, a slide-valve controlling train-pipe air from the triple-valve chamber through a direct passage to the brake-cylinder, in combination with a balancing-valve in the passage, and means whereby the balancing-valve is removed from the passage before the slide-valve acts for emergency purposes.

22. In a brake mechanism, the combination with a train-pipe, an auxiliary reservoir, and a brake-cylinder, of a triple-valve casing having a chamber in direct communication with the train-pipe, a slide-valve controlling the brake-release and provided with an annexed chamber communicating at one end with the triple-valve chamber, said slide-valve having a passage leading from its chamber to the brake-cylinder, and a service-valve controlling such passage and comprising a piston

traveling in the slide-valve chamber and provided with a stem, normally seated in said passage by train-pipe pressure entering the service-valve chamber from the triple-valve chamber and exerted upon the piston.

23. In a railway-brake mechanism, a balanced slide-valve controlling a direct passage to a brake-cylinder from a triple-valve chamber having constant and direct communication with a train-pipe.

24. In a brake mechanism, the combination of a train-pipe, brake-cylinder, an auxiliary reservoir, a valve-casing having a chamber communicating constantly with the train-pipe, means for preventing the backflow of pressure from the brake-cylinder a slide-valve therein whose initial travel operates the brake-release and whose further travel vents train-pipe air from the chamber to the brake-cylinder.

25. In a brake mechanism the combination of a train-pipe, auxiliary reservoir, brake-cylinder, a service-valve, mechanism for actuating the same directly by auxiliary-reservoir pressure upon reduction of train-pipe pressure for admitting pressure from the reservoir to the brake-cylinder in service action, and a piston-actuated slide-valve governing reservoir-pressure in emergency action and independent of the service-valve-actuating mechanism.

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Witnesses:

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