(No Model.) 2 Sheets—Sheet 1.

C. W. HIGGINS.

AIR BRAKE MECHANISM FOR RAILWAY CARS.

No. 503,083. Patented Aug. 8, 1893.

Fig. 1.

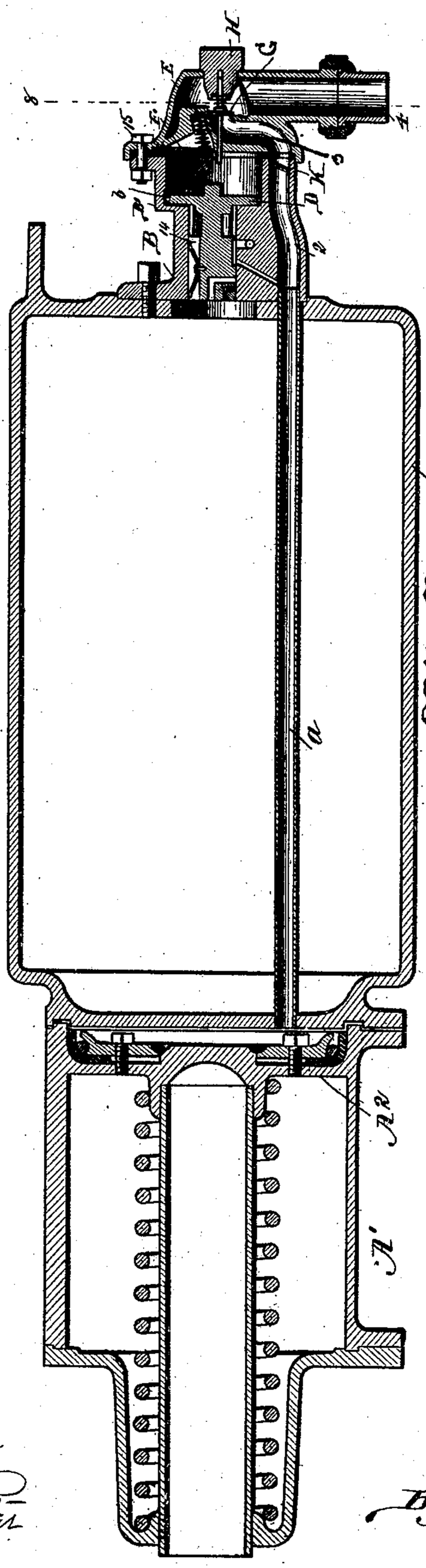
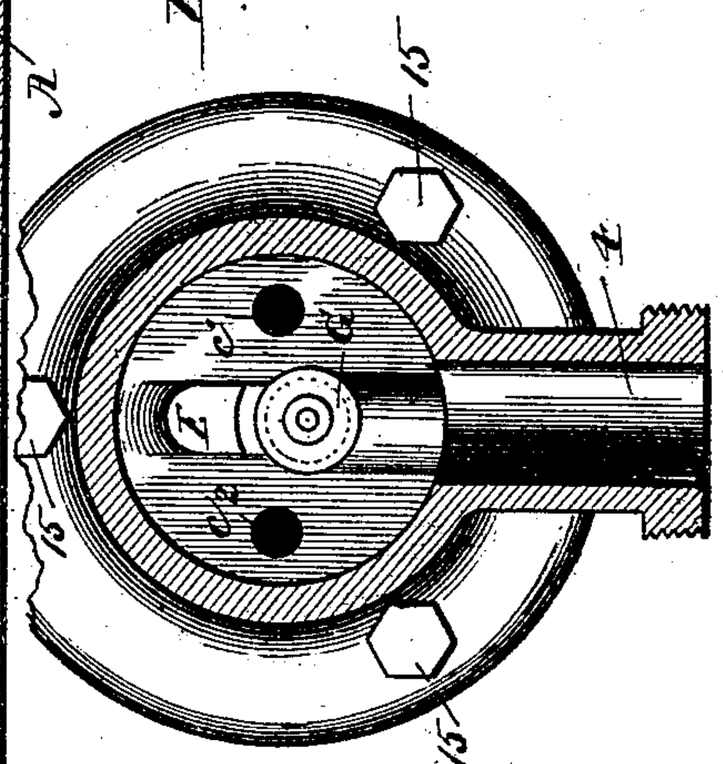


Fig. 3.



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(No Model.) 2 Sheets—Sheet 2.

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AIR BRAKE MECHANISM FOR RAILWAY CARS.

No. 503,083. Patented Aug. 8, 1893.

Fig. 2.

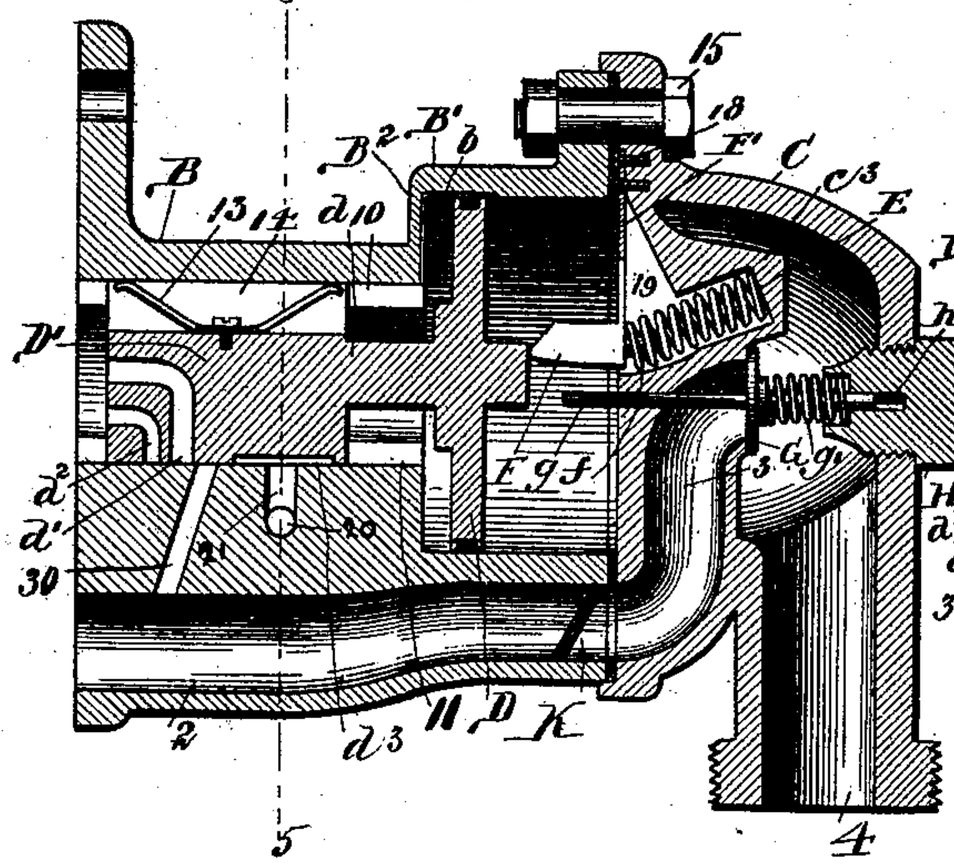


Fig. 3.

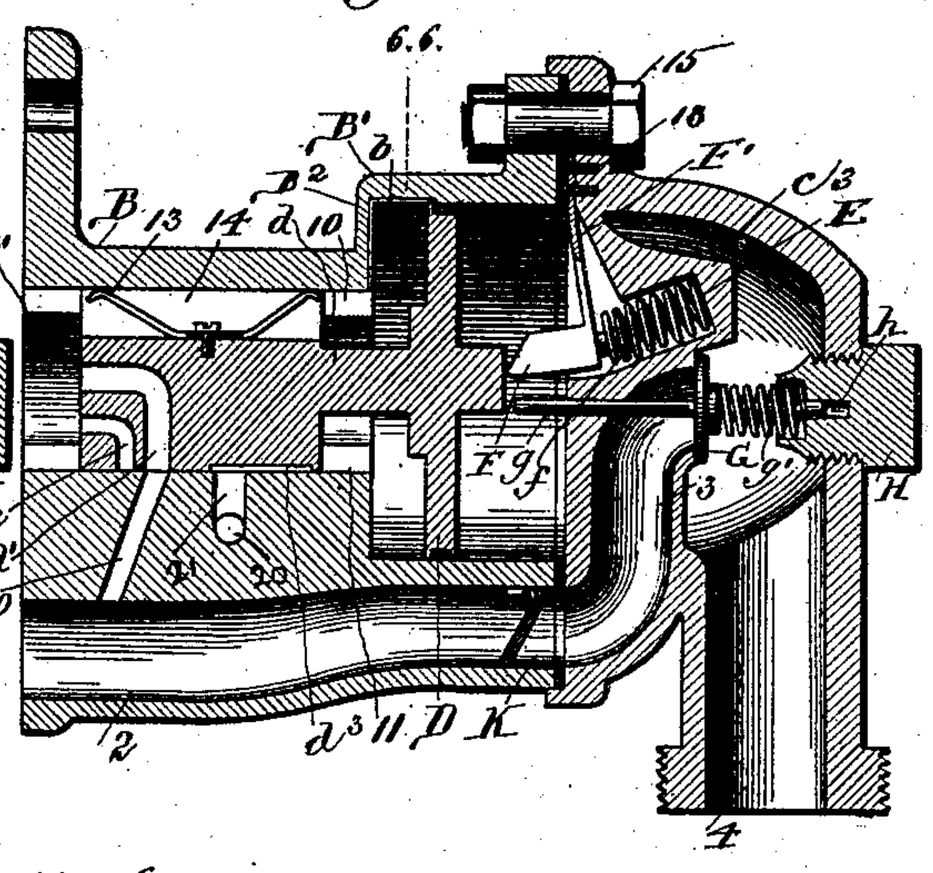


Fig. 6.

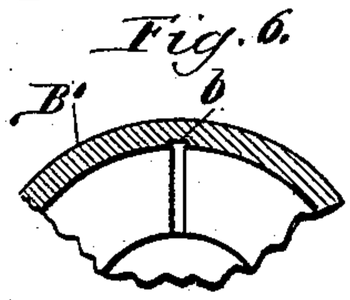


Fig. 5.

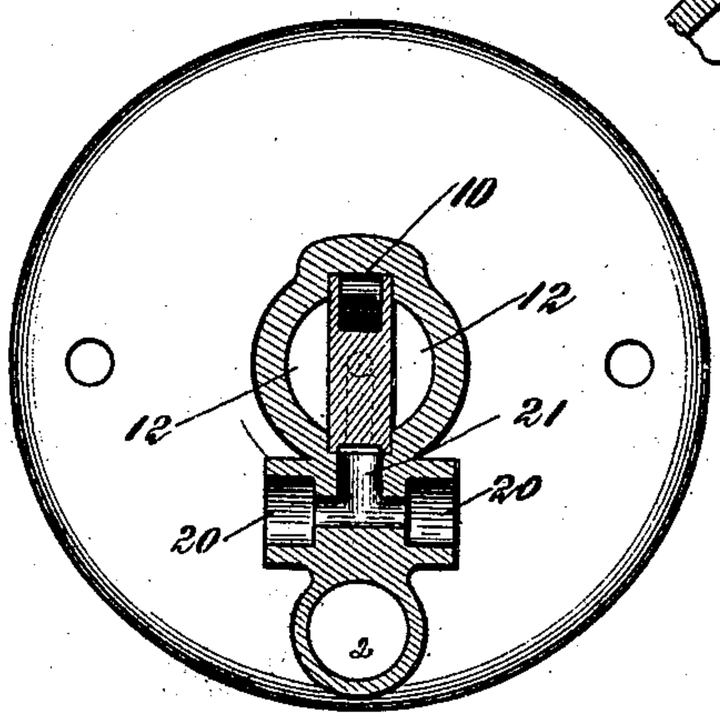


Fig. 7.

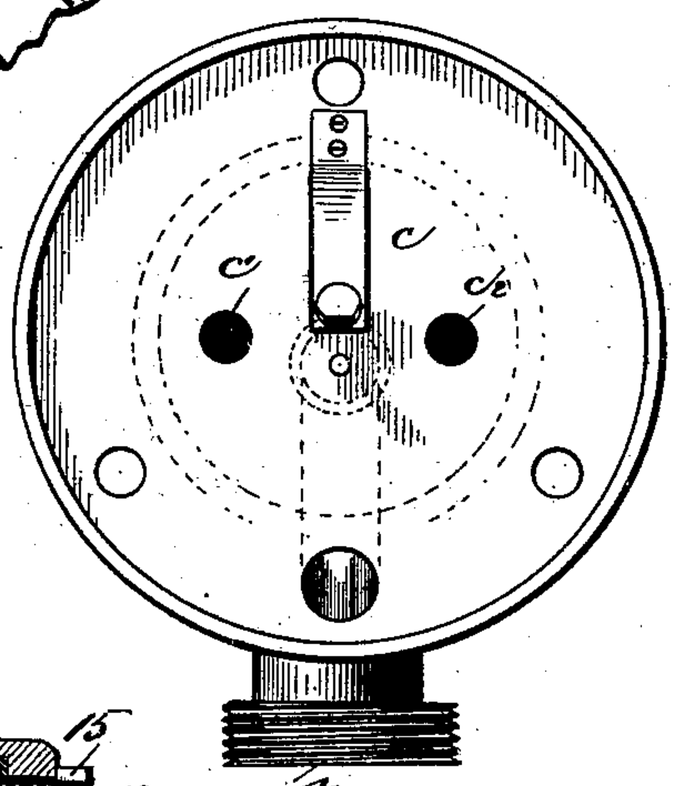
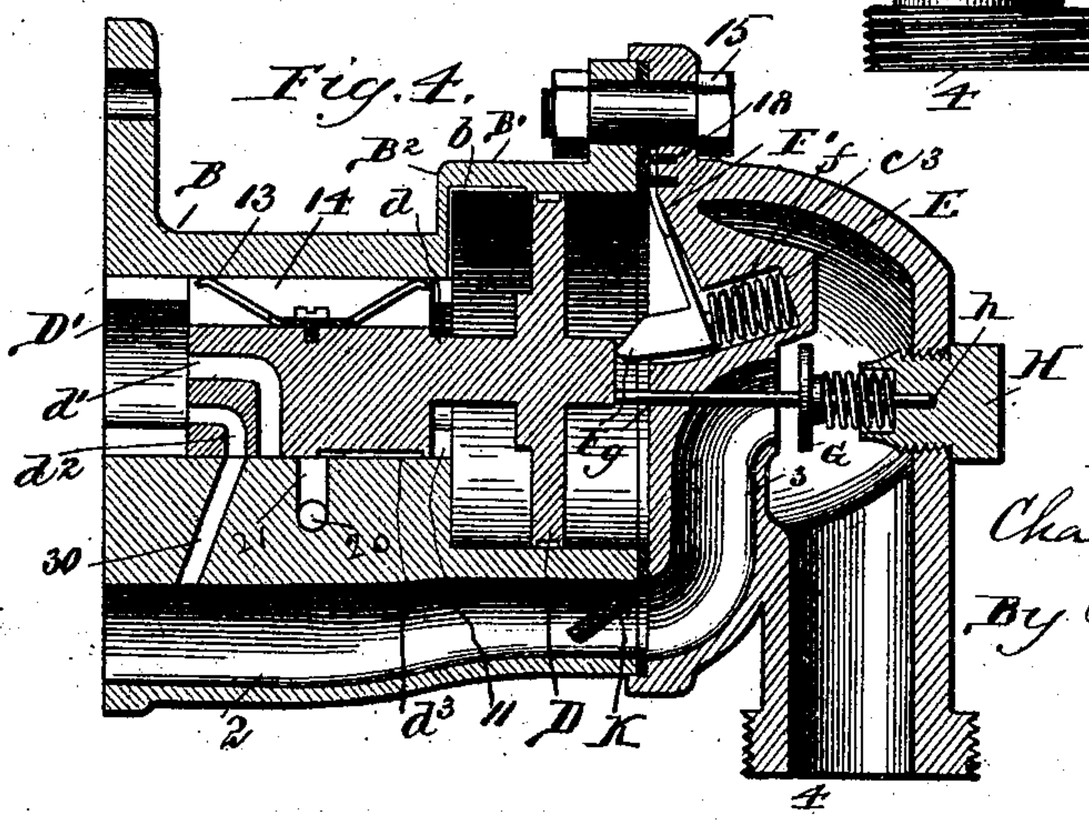


Fig. 4.



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UNITED STATES PATENT OFFICE.

CHARLES W. HIGGINS, OF FERNWOOD, ILLINOIS, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, OF THREE-FOURTHS TO JACOB B. KNUDSON AND HAROLD E. KNUDSON, OF SAME PLACE, AND LEONARD C. B. HOLMBOE, OF CHICAGO, ILLINOIS.

AIR-BRAKE MECHANISM FOR RAILWAY-CARS.

SPECIFICATION forming part of Letters Patent No. 503,083, dated August 8, 1893.

Application filed April 18, 1890. Serial No. 348,442. (No model.)

To all whom it may concern:

Be it known that I, CHARLES W. HIGGINS, residing at Fernwood, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Air-Brake Mechanism for Railway-Cars, of which I do declare the following to be a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My present invention has relation more particularly to what is known as the triple valve mechanism of air-brake apparatus, this triple valve mechanism serving to connect the brake-pipe to the auxiliary reservoir, and serving also to connect this reservoir with the brake-cylinder. The triple valve mechanism is arranged as well-understood in the art, so that by the variation of the air-pressure within the train-pipe, the valve mechanism will be shifted in such manner as to admit air from the auxiliary reservoir to the brake-cylinder to apply the brakes, and at the same time cut off communication between the brake-pipe and the auxiliary reservoir, and in such manner also as to restore the supply of air from the brake-pipe to the auxiliary reservoir, and at such time, permit the escape of air from the brake-cylinder to release the brakes.

The object of my present invention is to improve the construction of triple valve mechanism, and this object I have accomplished by the novel features of construction and combination of parts hereinafter described, illustrated in the accompanying drawings, and particularly pointed out in the claims at the end of this specification.

Figure 1 is a view in vertical longitudinal section through an auxiliary reservoir, and brake cylinder, of ordinary construction, and through a triple valve mechanism, of my improved construction attached thereto. Figs. 2, 3 and 4 are enlarged views in vertical longitudinal section through my improved valve mechanism, these several views showing the parts in different positions. Fig. 5 is a view in vertical transverse section on line 5—5 of Fig. 2. Fig. 6 is a detail fraction view in vertical section on line 6—6 of Fig. 3. Fig. 7 is a detached face view of the cap wherein the graduating spring and emergency valve are contained. Fig. 8 is a view in vertical section on line 8—8 of Fig. 1.

A designates the auxiliary reservoir and A′ denotes the brake cylinder conveniently attached thereto in any of the usual ways, as for example by means of the cylinder pipe *a*, that leads through the auxiliary reservoir A, and connects with the cylinder port or channel 2 in the body of the triple valve. The cylinder port or channel 2 leads from end to end of the body of the triple valve, and communicates with a channel 3 in the body of the cap or casing C, this channel 3 communicating with the train-pipe channel 4, to which the train-pipe will be connected in the usual manner. Within the piston valve chamber B′ of the triple valve body is located the piston D of the triple valve, the stem *d* of this piston having fixed thereto or formed in piece therewith, the slide valve D′. The portion of the body B of the triple valve wherein the stem *d* and slide valve D′ are held is provided with grooves 10 and 11 to form guide ways in which the edges of the slide valve D′ will move, and is formed also with lateral spaces 12 to permit the flow of air past the slide valve, from the piston valve chamber B′ of the triple valve casing into the auxiliary reservoir. The slide valve D′ is provided preferably with a spring 13 set within a suitable recess 14, of the slide valve, and serving to prevent the accidental slipping of the valve while allowing it to be freely moved.

The cap or casing C is formed separate from the piston valve chamber B′ of the triple valve body, and is connected thereto by suitable bolts 15 passing through flanges of the valve-body and of the cap or casing. The cap C is by preference formed as a hollow casting having a face plate *c* wherein are formed the air ports c' and c^2, one on each side of the channel or passage 3, and on the back of this face plate is formed a chamber c^3 to receive the graduating spring E. One end of this graduating spring sets within the chamber c^3 while its opposite end encircles a projection *f* extending backwardly from the buffer F

that is carried by the arm F′. This arm F may be formed in piece with or affixed to the buffer F, but by preference the arm is of spring metal attached as at 18 to the cap or casing C and arranged to move freely within the cut-away space 19 formed in the extension c^3, at the back of the face plate *c* of the cap or casing C.

Upon the inner face of the piston valve chamber B′ of the triple valve body is formed a small feed groove or passage *b* extending a short distance backward, and leading down the front face B^2 of the piston valve chamber to the space formed within the portion B of the valve body, (as shown more particularly in Fig. 6 of the drawings.) In the wall of the slide valve chamber B is formed one or more escape ports 20, leading to the outer air, and from these escape ports is extended also the escape port 21 leading to the slide valve chamber formed within the valve body. Through the valve body also is formed the supply passage or channel 30 that leads from the interior of the slide valve chamber B to the cylinder-port or channel 2. The slide valve D′ is provided with a main supply port or channel *d′* which leads from the end of the slide valve next the auxiliary reservoir to the side of the valve adjacent the supply passage or channel 30; and adapted to be brought coincident therewith as will presently more fully appear. By preference also the slide valve D′ is provided with a relief port or channel d^2 leading from the end of the slide valve opposite the auxiliary reservoir through the edge of the valve adjacent the passage or channel 30 and adapted to be brought coincident therewith. In the edge of the slide valve D′ is also formed the exhaust cavity d^3, this exhaust cavity being of sufficient length to span the distance between the escape passage 21 and the supply passage or channel 30, in order to release the pressure of air within the brake cylinder as will presently more fully appear.

The operation of so much of my improved apparatus, as has thus far been defined, will from the foregoing description be seen to be as follows: When the tripple valve mechanism is in its normal position that is to say when the brakes are out of action, the parts will be in the relative position shown in Fig. 1 of the drawings. At this time, the piston D by which the slide valve D′ will be controlled, will be at the extreme end of its piston valve chamber B′, and the slide valve D′ will occupy such position that the exhaust cavity d^3 will connect the supply passage or channel 30 with the escape port or channel 21, thereby permitting the air within the brake-cylinder to escape and consequently permitting the brakes to be drawn from off the wheels of the car. At such time, however, the pressure of air within the auxiliary reservoir A will be equal to the pressure of air within the train pipe, and the channel 4 leading thereto, since at such time, the supply of air from the air-pump of the locomotive, will pass through the channel 4 into the cap or casing C, through the port *c′* and c^2 of the plate *c*, into the piston valve chamber B′, and by way of the small feed passage *b* into the space around the stem *d* of the piston D, and thence through the passages 12 into the auxiliary reservoir A. If now, however, it is desired to apply the brakes gradually in order to decrease the speed of the train or slowly stop it, the engineer will operate the engineer's valve in the usual manner so as to slightly decrease the pressure of air within the train pipe, and consequently within the passage or channel 4 communicating therewith, and within the piston valve chamber B′ behind the piston D. As soon as this decrease of pressure within the train pipe occurs, the excess pressure within the auxiliary reservoir will force the piston D backward, as seen in Fig. 2 of the drawings, until the parts assume the position seen in Fig. 3 of the drawings, at which time the passage or channel *d′* of the slide valve D′ will come coincident with the supply passage or channel 30 that leads to the brake cylinder supply pipe 2, and consequently the air supply within the auxiliary reservoir A will pass through the channels 30 and 2, into the pipe *a*, and thence into the brake cylinder A′, causing a movement of the piston A^2 of this brake cylinder sufficient to gradually apply the brakes of the car. During its backward movement, the piston D will contact with the buffer F moving backward this buffer against the force of its spring arm F′ and the graduating spring E. By this backward movement of the slide valve D′, it is plain that the escape port 21 will be closed. As soon, however, as the pressure in the auxiliary reservoir has been reduced by expansion into the brake-cylinder, to such extent that this pressure becomes equal to that within the train pipe, the graduating spring E and the spring arm F′ will force forward the buffer F and the piston D until a blank part of the slide valve D′ passes over and closes the supply port or channel 30, thereby retaining within the brake cylinder its pressure, and applying the brakes with a force exactly proportionate to the reduction of pressure made in the train pipe by the engineer. If now the brakes are to be released in order to permit the train to go ahead or back, the engineer by the operation of the engineer's valve, will increase the pressure within the train pipe 4, thereby causing the piston D to move back to the position seen in Fig. 1, and causing the excess of air to pass through the small feed groove or channel *b* of the piston valve chamber B′ into and through the slide valve chamber B of the triple valve to the auxiliary reservoir, and at the same time the slide valve D′ will be moved forward until its exhaust cavity d^3 connects the supply channel 30 with the escape port or channel 21, and thereby permits the release of the air supply from the brake cylinder A′ by way of the pipe *a*, the

channel 2, the passage or channel 30, the cavity d^3, and the escape port 21.

In order to effect a sudden stopping of the train, I have provided an emergency valve G, this valve being located within the cap or casing C at the mouth of the channel or passage 3. The emergency valve G is carried by a stem *g*, the rear portion of this stem extending through a perforation formed for the purpose in the plate *c*, and the forward portion of the stem extending into a perforation *h* formed in the screw plug H held within a correspondingly threaded perforation in the cap or casing C. Upon the rear portion of this stem *g* is placed a coiled spring *g'*, a portion of this spring being held within a suitable seat formed in the screw-plug H. This spring *g'* serves to normally hold the emergency valve G against its seat, and prevent the direct passage of air from the train pipe and the passage 4 into the channel or passage 3. It will be observed that the forward end *g* of the emergency valve extends into proximity to the back portion or extension of the piston D, so that when the piston is moved a sufficient distance, it will contact with the end of the stem *g* and lift the emergency valve G from its seat. Hence it will be seen that if the engineer desires to suddenly stop the train, it will be only necessary to so decrease the pressure of air in the train pipe that the excess pressure within the auxiliary reservoir shall force the piston D backward until it not only contacts against and moves backward the buffer F, but also as seen in Fig. 4, strikes the stem *g* of the emergency valve G, thereby forcing backward and unseating this valve, and permitting the direct pressure of air to pass from the brake pipe and the channel *h* into and through the channels or passages 3, and 2, and the pipe *a* to the brake cylinder, and permitting also the passage of air from the auxiliary reservoir by the passage or channel d^2 in the slide valve D' into and through the channel 30 to the passage 2, and thence to the brake cylinder pipe *a* and the brake cylinder. Manifestly therefore when the emergency valve is unseated, the desired pressure within the brake cylinder will be effected, not merely by the passage of air from the auxiliary reservoir, but as well also by the straight air supply from the train pipe through the channels 4, 3, 2, and the brake cylinder pipe *a*.

In order to throw off the brakes after the sudden stopping of the train has been effected in manner last described, it is only necessary for the engineer to increase the pressure of the air supply within the train pipe, thereby causing the piston D to be forced inward to the position seen in Fig. 1 of the drawings. As the piston is thus forced inward the emergency valve G will return to its seat, the piston D will uncover the small feed groove *b* permitting the passage of air into the auxiliary reservoir and the slide valve D' will be moved inward until its exhaust cavity d^3 connects the passage or channel 30 with the escape port or channel 21 thereby permitting the release of the air pressure within the brake cylinder through the pipe *a*, channel 2, passage or channel 30, exhaust cavity d^3, and escape port or channel 21, so that the brakes will be thrown from off the wheels. In order to prevent the passage of air from the auxiliary reservoir back into the train pipe, when the supply within the train pipe has been diminished, to set the brakes, I prefer to place within the channel or passage 2 a back pressure valve K, opening inward only, as shown by dotted lines. Hence it will be seen that when either the passage d' or d^2 of the slide valve D' is brought coincident with the passage 30 that leads to the passage or channel 2, and the brake cylinder pipe *a*, the supply of air from the auxiliary reservoir will pass to the brake cylinder, and will be prevented by the back pressure valve K from passing into the channel 3 and unseating the emergency valve.

By providing the slide valve D' with the port d', as shown and by connecting this valve so that it shall move in unison with the piston D, the necessity is avoided for the use of any supplemental valve within the slide valve, and the construction is rendered much more simple and effective than in prior devices of this character with which I am familiar. So also, the provision of a supplemental channel d^2 in the slide valve D' insures a more ready passage of the air from the auxiliary reservoir to the brake-cylinder, when a sudden stopping of the train is desired. By the use of a spring arm F' for sustaining the buffer F, the force of the graduating spring E can be augmented as desired, and a more certain shifting of the piston D and the slide valve D' at the desired time can thereby be effected. The employment of a cap or casing C for sustaining the emergency valve and for forming the channels 3 and 4 also greatly simplifies the construction and is a material improvement not merely in that it enables the parts to be readily reached for cleaning and repairs, but because it enables a more direct supply of air from the train pipe through the passages or channels 4, 3, and 2 to the brake cylinder pipe *a*, and consequently insures a quicker action upon the piston of the brake cylinder when the brakes are to be suddenly applied.

The precise details of construction above set out may be varied by the skilled mechanic without departure from the spirit of the invention, and to such precise details therefore I do not wish the invention to be understood as restricted, nor do I wish the reference letters as hereinafter used in the claims to be understood as restricting the invention to the precise construction, location and arrangement of the parts designated by said reference letters as such letters are used to avoid confusion and not for the purpose of limitation.

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

1. The combination of a triple valve body having a suitable slide valve chamber and a suitable piston valve chamber, and having an air supply passage or channel leading from said slide valve chamber to a passage or channel connecting with the brake cylinder, a slide valve within said slide valve chamber provided with a passage or channel communicating with the auxiliary reservoir, and adapted to be brought coincident with the air-supply channel that connects with the brake cylinder, a suitable piston within the piston valve chamber, a perforated cap for said valve body, having channels or passages for connecting the train-pipe with the channel or passage of the valve body that leads to the brake-cylinder, an emergency valve located within said cap, and having a stem extending into position to be struck by the piston in its backward movement, and a graduating spring adapted to move said piston after said emergency valve has been restored to its seat, and by which the shifting of the slide valve can be effected to close the passage between the auxiliary reservoir and the channel that leads to the brake-cylinder, substantially as described.

2. The combination of a triple valve body having a slide valve chamber and a piston valve chamber and having an air supply passage leading from said slide valve chamber to a passage or channel connected with the brake cylinder, a slide valve within said slide valve chamber provided with a passage or channel communicating with the auxiliary reservoir and adapted to be brought coincident with the air supply channel that connects with the auxiliary reservoir, a piston within the piston valve chamber, to which piston the slide valve is fixed so that the valve shall partake of the entire movement of the piston, a graduating spring and a buffer with which said piston will contact, and a passage or channel connecting the triple valve body with the train pipe, substantially as described.

3. In triple valve mechanism, the combination with a suitable valve body, having a piston valve chamber, and a suitable slide valve chamber, and a suitable piston and slide valve located within said chambers, of a perforated cap for said valve body, said cap being provided with passages or channels for the flow of air from the train pipe to a passage or channel that leads to the brake cylinder, an emergency valve for obstructing the flow of air through the passages of said cap, a spring for holding said emergency valve to its seat, and a graduating spring independent of the emergency valve, and adapted to effect the movement of the piston and slide valve, without any shift of the emergency valve, substantially as described.

4. In triple valve mechanism, the combination, with a valve body having a slide valve chamber and a piston valve chamber and suitable ports and passages, and a slide valve and a piston within their respective chambers, and a cap for said body of an emergency valve arranged to be struck by the piston about the extreme of its movement, and a graduating spring arranged to operate independently of the emergency valve and adapted to effect the movement of the slide valve in ordinary operation without unseating the emergency valve, substantially as described.

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