June 16, 1931. J. H. WOODS 1,810,547

BRAKE APPLICATION VALVE DEVICE

Filed April 7, 1930 2 Sheets-Sheet 1

Fig. 1

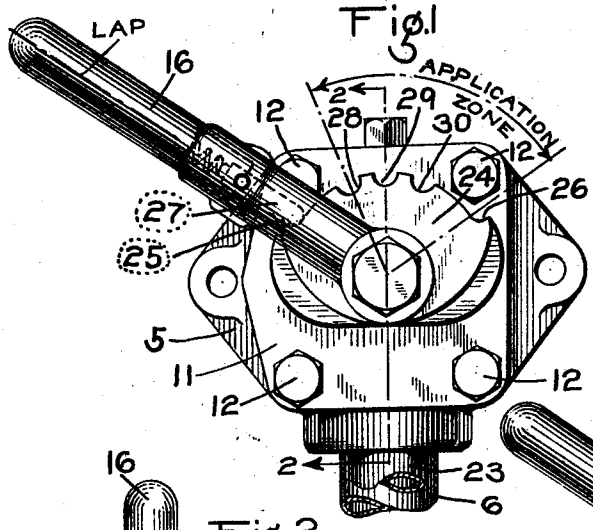


Fig. 3

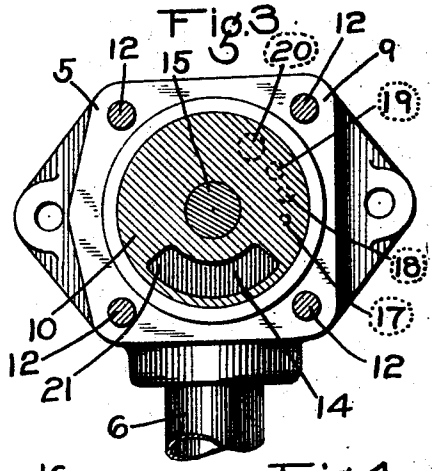


Fig. 2

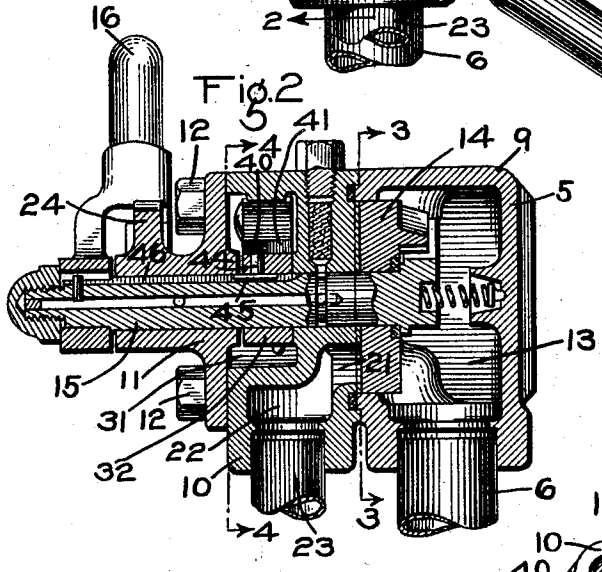


Fig. 4

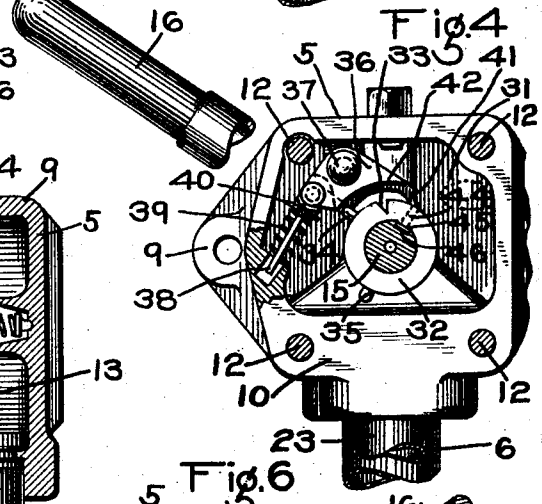


Fig. 5

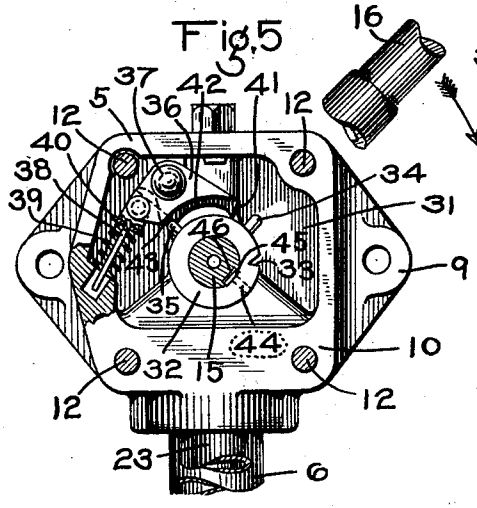
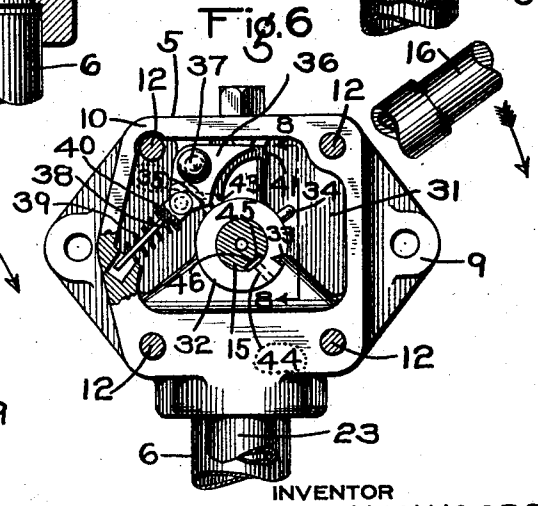


Fig. 6



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BRAKE APPLICATION VALVE DEVICE

Filed April 7, 1930 2 Sheets-Sheet 2

Fig.7

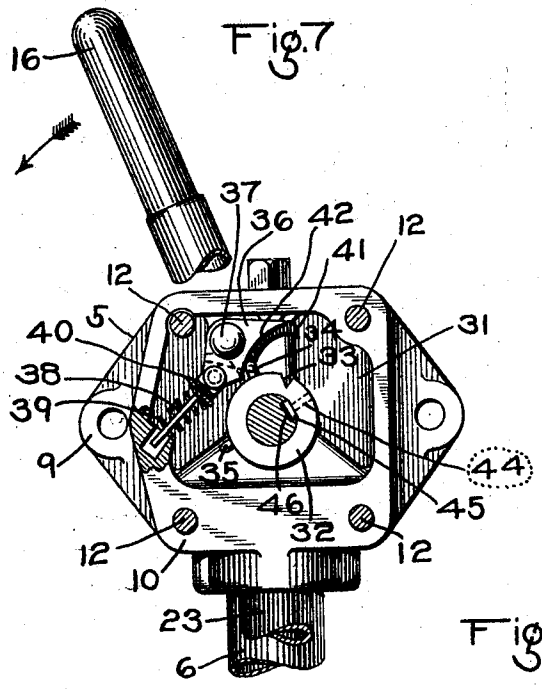


Fig.9

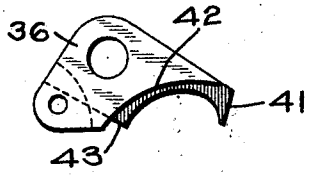


Fig.8

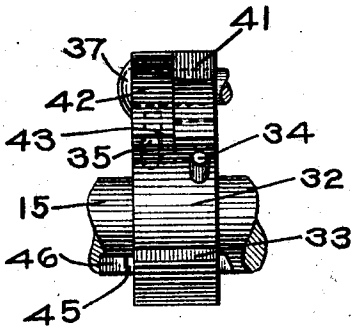


Fig.10

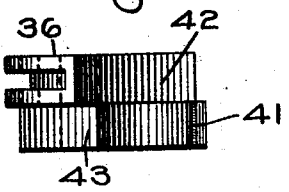
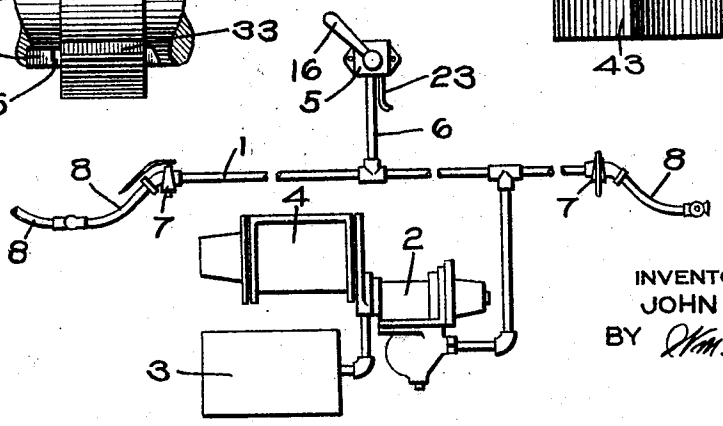


Fig.11



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Patented June 16, 1931 1,810,547

UNITED STATES PATENT OFFICE

JOHN H. WOODS, OF HAMILTON, ONTARIO, CANADA, ASSIGNOR TO THE WESTINGHOUSE AIR BRAKE COMPANY, OF WILMERDING, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA

BRAKE APPLICATION VALVE DEVICE

Application filed April 7, 1930. Serial No. 442,048.

This invention relates to fluid pressure brakes, and more particularly to a brake application valve device of the type which is adapted to be carried by a caboose or other rear car of a train, and through the medium of which, a trainman stationed on the rear car, may cause an application of the brakes to be effected at will.

By the use of such a valve device a trainman could, regardless of service requirements and to suit his own convenience, decrease the speed of the train without bringing the train to a stop. Such practice is very objectionable since it interferes with the proper control of the train, and therefore renders the operation of the train dangerous.

The principal object of my invention is to provide an application valve device which when applied to the rear car of a train, and operated to application position, must be operated to full application, or emergency position before it can be returned to lap or closed position, thus limiting the use of the valve device to occasions when it is necessary to bring the train to a stop, and also imposing the penalty of stopping the train in the event of a trainman attempting to decrease the speed of the train to suit his own convenience.

Another object of my invention is to provide an application valve device which when operated from its closed or lap position to an initial open or application position, cannot be returned to lap position until the device is first operated to full open or final application position.

A further object of my invention is to provide a brake application valve device having a lap or closed position and an application or open zone, and having means operative when the device is operated from lap position to the beginning of the application zone for preventing the operation of the valve device to lap position and operative when the device is operated to the end of the application zone for permitting the device to be operated to lap or closed position.

Other objects and advantages will appear in the following more detailed description of the invention.

In the accompanying drawings; Fig. 1 is a front elevational view of a brake application valve device embodying my invention, the operating handle of the device being shown in lap or closed position; Fig. 2 is a vertical sectional view of the same taken on the line 2—2 of Fig. 1; Fig. 3 is a sectional view taken on the line 3—3 of Fig. 2 and illustrates the relative positions of the discharge ports in the rotary valve and rotary valve seat when the rotary valve is in lap or closed position; Fig. 4 is a sectional view taken on the line 4—4 of Fig. 2 and shows the locking mechanism in its unlocked position with the device in lap or closed position; Figs. 5, 6 and 7 are sectional views similar to Fig. 4 and show the locking mechanism in its several operating positions throughout the application zone; Fig. 8 is an enlarged fragmentary side elevational view of a portion of the locking mechanism as viewed in the direction indicated by the arrows 8—8 in Fig. 6; Figs. 9 and 10 are enlarged detail side elevational and bottom plan views, respectively of the locking latch; and Fig. 11 is a diagrammatic view of one form of brake equipment embodying the invention.

In Fig. 11 of the accompanying drawings, the fluid pressure brake equipment of the rear car only of the train has been illustrated, and this equipment may comprise the usual train pipe 1, triple valve device 2, auxiliary reservoir 3, and brake cylinder 4, all of which parts and devices are associated with each other in the usual well known manner. This equipment may also comprise my improved brake application valve device 5, which is connected to the brake pipe 1 through a pipe 6, or any other suitable fluid pressure conductor.

The fluid pressure brake equipment for all of the other cars of the train may be the same as that for the rear car with the exception that the brake application valve device 5 may be omitted.

Each end of the brake pipe 1 is provided with an angle cock 7 having the usual hose 8 connected thereto for coupling with a like hose on the adjacent end of an adjacent car. When a train is made up, the coupling hose

between the adjacent ends of adjacent cars are coupled in the usual manner, the angle cocks 7 at the front and rear of the train are closed and all of the other angle cocks are open, so that in effect, the brake pipe is continuous from one end of the train to the other.

My improved brake application valve device 5 may comprise a casing having sections 9, 10 and 11 which are secured together by stud bolts 12.

The casing section 9 has a chamber 13 which is constantly connected to the brake pipe 1 through pipe 6, and contains a rotary valve 14 which is adapted to be rotated through the medium of a rotatable stem 15, which is journalled in the casing sections 10 and 11. The outer end portion of the stem 15 extends through the casing section 11, and has secured thereto an operating handle 16 by which the stem may be rotated.

The rotary valve 14 has ports 17, 18, 19 and 20 formed therein, which are so arranged in an arc of a circle that when the rotary valve is rotated they will be successively opened to an arcuate port 21 formed in the section 10 of the casing, which port 21 leads from the rotary valve seat to a chamber 22 formed in the casing section 10, said chamber being constantly connected to the atmosphere through a pipe 23.

The smallest port in the rotary valve is the port 17, and the diameters of the other ports are progressively increased so that the port 20 is the largest.

The casing section 11 is provided with a quadrant 24, having spaced stops 25 and 26, against which the usual spring-pressed pin 27, carried by the operating handle, is adapted to abut to stop the handle in lap and full application positions, respectively. Intermediate these stops, and correspondingly spaced with the ports 17, 18 and 19 in the rotary valve, the quadrant has formed therein, notches 28, 29 and 30 for the reception of the rounded outer end of the pin 27. As the handle 16 is operated, the pin 27, engaging the quadrant within the notches, offers a slight resistance to the operation of the handle, thus indicating to the operator the position of the rotary valve.

Contained in a recess 31, formed in the casing section 10, and removably secured to the stem 15, is a collar 32, having a notch 33, formed therein, and having radial projections 34 and 35, which are arranged in staggered relation and which, in the present embodiment of the invention, are in the form of pins rigidly secured to the collar.

Also contained in the recess 31 is a latch 36 which, intermediate its ends is pivotally connected to the casing section 10 by a pin 37. One end of this latch 26 is pivotally connected with a member 38 which is subject to the pressure of a spring 39 interposed between and engaging the casing and a collar 40 carried by the member 38. The free end of the latch is made in the form of a tooth 41, which is adapted to engage the collar 32 within the notch 33.

The underside of the latch is cut away at 42 for a portion of its thickness so that the projection 34, carried by the collar 32 will not interfere with the operation of the latch.

The end portion of the latch which is operatively connected with the member 38, is provided with a shoulder 43, which is disposed in the path of travel of the projection 35, carried by the collar 32, and is adapted to be operatively engaged by said projection as the valve device nears its full application or open position for the purpose of raising the latch, as will be hereinafter more fully described.

For the purpose of operatively connecting the collar 32 to the stem 15, a T-shaped pin is provided, having a shank 44, which fits in an opening formed in the collar nearer its front edge than its rear edge, and having a head 45, which fits in a groove 46, formed in the stem 15. This groove extends longitudinally from the outer end of the stem to a point adjacent the inner edge of the collar 32. In assembling the mechanism, the collar 32 is mounted on the stem 15, and pushed into place before the casing section 11 is placed into position. After the casing section is in position, excessive movement of the collar longitudinally of the stem will be prevented by the sections 10 and 11.

Since the T-shaped pin is located nearer the front edge of the collar 32, the head 45 of the pin will project slightly beyond this edge of the collar and if, in assembling the device, the collar should be accidentally reversed, this projecting portion of the head 45 will engage the stem at the inner end of the groove 46 and prevent the proper assembly of the collar 32 on the stem, and consequently, prevent the proper assembly of the casing section 11, relative to the casing section 10.

When a workman assembling the valve device finds that he cannot move the collar to its proper position, he will know that the collar must be reversed, thus insuring the proper positioning of the collar.

Assuming that the application valve device is in lap or closed position, as shown in Figs. 1, 2, 3, and 4, the operating handle 16 will be held against movement in an anti-clockwise direction by reason of the engagement of the stop 25, by the spring-pressed pin 27, the rotary valve will be in such a position that the ports 17, 18, 19 and 20 therethrough will all be lapped, the collar 32 will be in such a position that the notch 33 will be back of the tooth 41 of the latch 36, and the latch tooth 41 will be forced into contact with the outer surface of the collar

by the pressure exerted on the opposite end of the latch by the spring 39.

It will here be noted that a center line drawn longitudinally through the member 38, and the center of its connection with the latch will pass above the axis of the pin 37, so that the pressure of the spring will tend to rotate the latch in a clockwise direction.

When it is desired to operate the application valve device to effect an application of the brakes, the operator moves the operating handle 16 in a clockwise direction from its lap position as shown in Figs. 1, 2, 3 and 4, to any desired application position within the application zone, and consequently causes the rotaton of the stem 15, collar 32 and rotary valve 14.

When the operating handle 16 has been moved to the beginning of the application zone, in which the pin 27 engages the quadrant 24 within the notch 28, the port 17 in the rotary valve 14 is open to the port 21 in the casing section 10, and fluid under pressure will be discharged from the brake pipe 1 to the atmosphere at a restricted rate by way of pipe 6, chamber 13 in the casing section 9 of the application valve device 5, port 17 in the rotary valve 14, port 21 and chamber 22 in the casing section 10, and pipe 23, and an application of the brakes will result.

At substantially the same time, or slightly before the port 17 is open to the port 21, the notch 33 will be in line with the tooth 41 of the latch, and the pressure of the spring 39 will cause the latch to rotate in a clockwise direction, forcing the tooth 41 into said notch, there being sufficient clearance between the upper end of the projection 34 and the under side of the latch to permit the latch to move into the notch. The operator may now permit the operating handle to remain in this position until the train is stopped, or may move it to any of the other application positions to hasten the application of the brakes.

When the tooth 41 is in engagement with the collar 32 within the notch 33, the operator cannot move the handle from the first application position to lap position, but he can move the handle to any of the other application positions. When the handle is moved from the first application position toward the second application position, the tooth 41 will ride freely out of the notch 33.

Should the operator move the operating handle to the second or third application position, and then attempt to return the operating handle to lap position, the latch 41 will be moved into locking engagement with the collar 32, when the notch 33 is again in registration with the latch tooth 41, thus locking the valve device in its first application position.

Before the application valve device can be returned to lap position, it must be operated to full application position, and this operation will now be described.

As the handle is moved from its third application position toward its full application position, the projection 35, carried by the collar 32, engages the shoulder 43 of the latch 36, as shown in Fig. 5, and by the continued movement of the handle in this direction the projection 35 causes the latch 36 to rotate about the pin 37 in an anti-clockwise direction. As the latch 36 thus rotates, the latch too h 41 moves upwardly out of engagement with outer surface of the collar 32, while the other end of the latch moves downwardly. The spring 39 resists such movement until such time as the center line of the member 38 and the pivotal connection between the member and latch is in alignment with the center of the pivotal connection between the latch and the casing section 10. Now, just before or at substantially the same time as the handle is moved to its full application position at the end of the application zone, the member 38 will have been moved to such a position that the center line therethrough will be below the center of the pivot pin 37, so that the pressure exerted by the spring 39 will cause the latch to rotate to the position shown in Fig. 6, and will maintain the latch in this position so long as the handle is in an application position.

When the valve device is in full application position, all of the ports through the rotary valve are open to the port 21, so that a reduction in brake pipe pressure at a fast rate is effected, which reduction, would cause the fluid pressure brake equipment shown in Fig. 11 to operate to effect an emergency application of the brakes.

Since the latch 36 is held in such a position that the latch tooth 41 cannot engage the collar 32, the operating handle may be returned to lap position.

In returning the handle toward lap position, the projection 34 will, as shown in Fig. 7, be moved into engagement with the under side of the end portion of the latch, which is operatively connected to the member 38, at substantially the same time as the pin 27 is in engagement with the quadrant 24 within the notch 28. Now, as the movement of the handle 16 toward lap position is continued, the projection 34 causes the latch 36 to rotate in a clockwise direction against the pressure of the spring 39. At substantially the same time as the pin 27 of the handle rides out of the notch 28, and the port 17 in the rotary valve is closed, the latch will have been rotated to such a position that the pressure of the spring 39 will cause the latch to move into engagement with the outer surface of the collar 32, the notch 33 having been moved out of alignment with the latch tooth 41. The handle may now be moved to its final lap position, as shown in Fig. 1.

From the foregoing description it will be seen that if an application of the brakes is initiated by the use of my improved application valve device, the train will be brought to a stop before the device can be returned to lap position, thus limiting the use of the device to occasions when it is necessary to bring the train to a stop, or imposing the penalty of stopping the train in the event of a trainman attempting to decrease the speed of the train without bringing it to a stop.

While one illustrative embodiment of the invention has been described in detail, it is not my intention to limit its scope to that embodiment or otherwise than by the terms of the appended claims.

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

1. The combination with a fluid pressure brake application valve device having a lap position and an application zone, of means operative automatically upon the operation of said device from lap position to the beginning of said zone for locking said device against operation from the beginning of said zone to lap position.

2. The combination with a fluid pressure brake application valve device having a lap position and an application zone, of means operative automatically upon the operation of said device from lap position to the beginning of said zone for locking said device against operation from the beginning of said zone to lap position and operative automatically for unlocking said device when the device is operated to the end of said zone.

3. The combination with a fluid pressure brake application valve device having a lap position, a full application position and an intermediate application position, of means operative automatically upon the operation of said device from said lap position to said intermediate position for locking said device against return from said intermediate application position to lap position.

4. The combination with a fluid pressure brake application valve device having a lap position, a full application position and an intermediate application position, of means operative automatically upon the operation of said device from said lap position to said intermediate position for locking said device against return from said intermediate application position to lap position and operative automatically for unlocking said device when the device is operated to full application position.

5. In an application valve device for fluid pressure brakes, the combination with a casing having a fluid pressure inlet chamber and a fluid pressure outlet chamber, a valve normally closing communication from the inlet chamber to the outlet chamber and operative over a predetermined zone for opening communication from the inlet chamber to the outlet chamber, and means operative when said valve is moved to the beginning of said zone for locking said valve against its return to lap position from any position in said zone short of the end of the zone.

6. In an application valve device for fluid pressure brakes, the combination with a casing having a fluid pressure inlet chamber and a fluid pressure outlet chamber, a valve normally closing communication from the inlet chamber to the outlet chamber and operative over a predetermined zone for opening communication from the inlet chamber to the outlet chamber, and means operative when said valve is moved to the beginning of said zone for locking said valve against its return to lap position from any position in said zone short of the end of the zone, said means being rendered ineffective to lock said valve against its return to lap position when the valve is moved to the end of said zone.

7. In an application valve device for fluid pressure brakes, the combination with a casing having a fluid pressure inlet chamber and a fluid pressure outlet chamber, a valve normally closing communication from the inlet chamber to the outlet chamber and operative over a predetermined zone for opening communication from the inlet chamber to the outlet chamber, and means operative when said valve is moved to the beginning of said zone for locking said valve against its return to lap position from any position in said zone short of the end of the zone, said means being rendered ineffective to lock said valve against its return to lap position when the valve is moved to the end of said zone and being again rendered effective to lock said valve as the valve is returned to lap position.

8. In an application valve device for fluid pressure brakes, the combination with a casing having a fluid pressure inlet chamber, a valve normally closing communication from the inlet chamber to the outlet chamber and operative over a predetermined zone for opening communication from the inlet chamber to the outlet chamber, a stem for operating said valve, a collar on said stem, and a latch pivotally mounted on said casing movable into locking engagement with said collar when the valve is moved to the beginning of said zone to prevent the return of the valve to lap position and movable to a position where it is ineffective to engage said collar when the valve is moved to the end of said zone to permit the return of the valve to lap position.

9. In an application valve device for fluid pressure brakes, the combination with a casing having a fluid pressure inlet chamber and a fluid pressure outlet chamber, a valve normally closing communication from the inlet chamber to the outlet chamber and operative over a predetermined zone for opening com-

munication from the inlet chamber to the outlet chamber, a stem for operating said valve, a collar on said stem, and a latch pivotally mounted on said casing movable into locking engagement with said collar when the valve is moved to the beginning of said zone to prevent the return of the valve to lap position and movable to a position where it is ineffective to engage said collar when the valve is moved to the end of said zone to permit the return of the valve to lap position and again movable, when the valve is being returned from the end of said zone toward lap position, to the position to lock with said collar.

10. In an application valve device for fluid pressure brakes, the combination with a casing having a fluid pressure inlet chamber and a fluid pressure outlet chamber, a valve normally closing communication from the inlet chamber to the outlet chamber and operative over a predetermined zone for opening communication from the inlet chamber to the outlet chamber, a stem for operating said valve, a collar on said stem, a latch pivotally mounted on said casing movable into locking engagement with said collar when the valve is moved to the beginning of said zone to prevent the return of the valve to lap position and movable to a position where it is ineffective to engage said collar when the valve is moved to the end of said zone to permit the return of the valve to lap position, and means carried by said collar for controlling the operation of said latch.

11. In an application valve device for fluid pressure brakes, the combination with a casing having a fluid pressure inlet chamber and a fluid pressure outlet chamber, a valve normally closing communication from the inlet chamber to the outlet chamber and operative over a predetermined zone for opening communication from the inlet chamber to the outlet chamber, a stem for operating said valve, a collar on said stem, a latch pivotally mounted on said casing movable into locking engagement with said collar when the valve is moved to the beginning of said zone to prevent the return of the valve to lap position and movable to a position where it is ineffective to engage said collar when the valve is moved to the end of said zone to permit the return of the valve to lap position, and a plurality of projections on said collar adapted to engage said latch to control its operation.

12. In an application valve device for fluid pressure brakes, the combination with a casing having a fluid pressure inlet chamber and a fluid pressure outlet chamber, a valve normally closing communication from the inlet chamber to the outlet chamber and operative over a predetermined zone for opening communication from the inlet chamber to the outlet chamber, a stem for operating said valve, a collar on said stem, a latch pivotally mounted on said casing movable into locking engagement with said collar when the valve is moved to the beginning of said zone to prevent the return of the valve to lap position and movable to a position where it is ineffective to engage said collar when the valve is moved to the end of said zone to permit the return of the valve to lap position, means carried by said collar for controlling the operation of said latch, and means operative at one time for urging said latch toward said collar and operative at another time for urging said latch away from said collar.

13. In an application valve device for fluid pressure brakes, the combination with a casing having a fluid pressure inlet chamber and a fluid pressure outlet chamber, a valve normally closing communication from the inlet chamber to the outlet chamber and operative over a predetermined zone for opening communication from the inlet chamber to the outlet chamber, a stem for operating said valve, a collar on said stem, a latch pivotally mounted on said casing movable into locking engagement with said collar when the valve is moved to the beginning of said zone to prevent the return of the valve to lap position and movable to a position where it is ineffective to engage said collar when the valve is moved to the end of said zone to permit the return of the valve to lap position, means carried by said collar for controlling the operation of said latch, and means for securing said collar to said stem, said means being adapted to prevent the correct positioning of the collar on the stem when said collar is incorrectly placed on the stem.

14. In an application valve device for fluid pressure brakes, the combination with a casing having a fluid pressure inlet chamber and a fluid pressure outlet chamber, a valve normally closing communication from the inlet chamber to the outlet chamber and operative over a predetermined zone for opening communication from the inlet chamber to the outlet chamber, a stem for operating said valve, a collar on said stem, a latch pivotally mounted on said casing movable into locking engagement with said collar when the valve is moved to the beginning of said zone to prevent the return of the valve to lap position and movable to a position where it is ineffective to engage said collar when the valve is moved to the end of said zone to permit the return of the valve to lap position, means carried by said collar for controlling the operation of said latch, and a pin for removably securing said collar to said stem, said pin having a head adapted to engage said stem to prevent the correct positioning of the collar when the collar is incorrectly placed on the stem.

15. In a fluid pressure brake apparatus, the combination with a brake pipe, of a brake application valve device for controlling the venting of fluid under pressure from said

brake pipe to effect applications of the brake, said brake application valve device comprising a valve having a lap position for preventing the venting of fluid under pressure from the brake pipe and operative over an application zone for venting fluid under pressure from the brake pipe, and means operative automatically for locking said valve against its return to lap position from any position in the application zone short of the end of said zone.

16. In a fluid pressure brake apparatus, the combination with a brake pipe, of a brake application valve device for controlling the venting of fluid under pressure from said brake pipe to effect applications of the brake, said brake application valve device comprising a valve having a lap position for preventing the venting of fluid under pressure from the brake pipe and operative over an application zone for venting fluid under pressure from the brake pipe, and means operative automatically when said valve is moved from lap position to the beginning of the application zone for locking said valve against its return to lap position, said means being rendered ineffective to lock said valve against its return to lap position when said valve is moved to the end of the application zone.

In testimony whereof I have hereunto set my hand, this 31 day of March, 1930.

JOHN H. WOODS.