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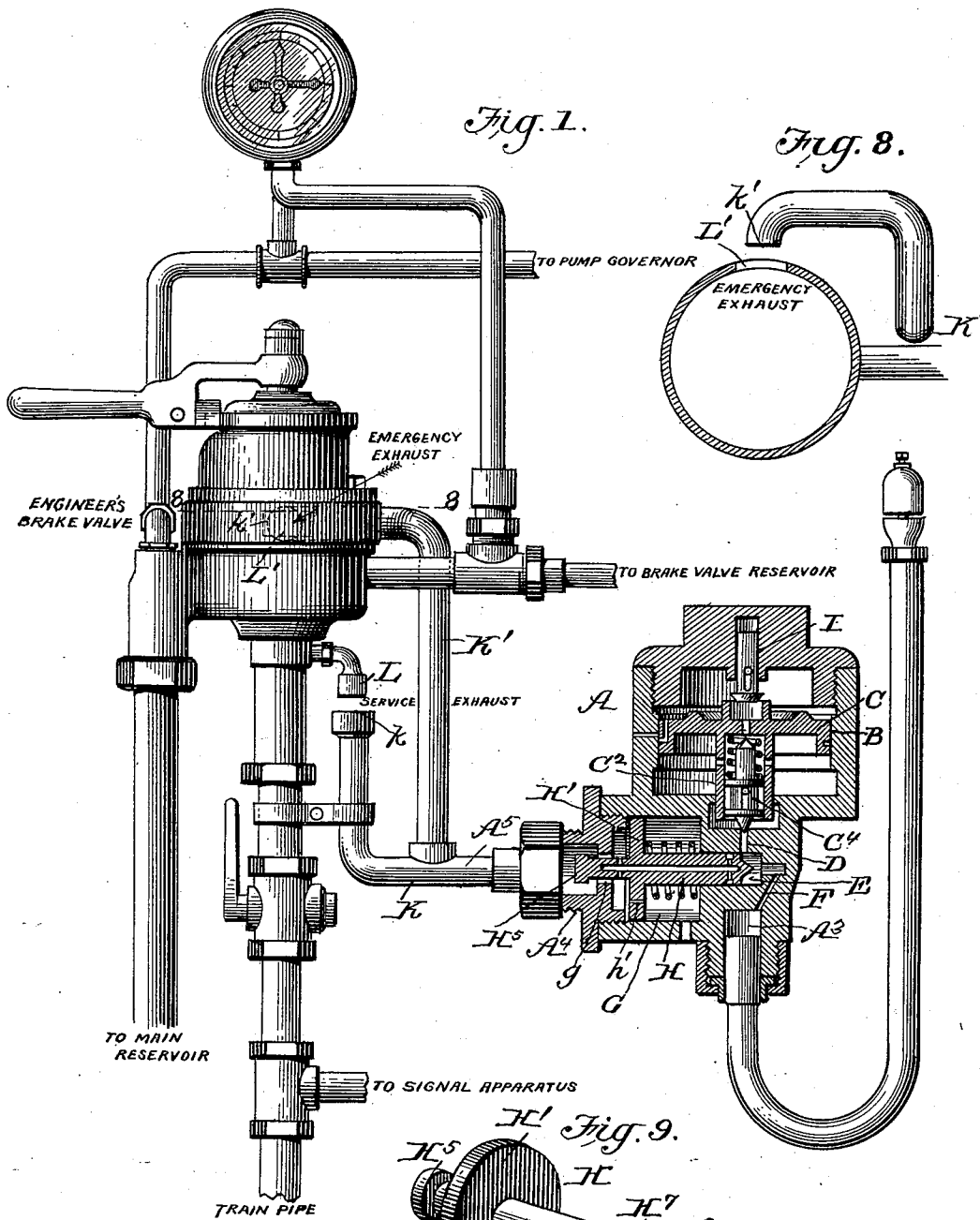
Patented May 27, 1902.

W. A. & B. S. H. HARRIS.
TRAIN SIGNALING APPARATUS.

(Application filed Nov. 4, 1901.)

(No Model.)

4 Sheets—Sheet 1.



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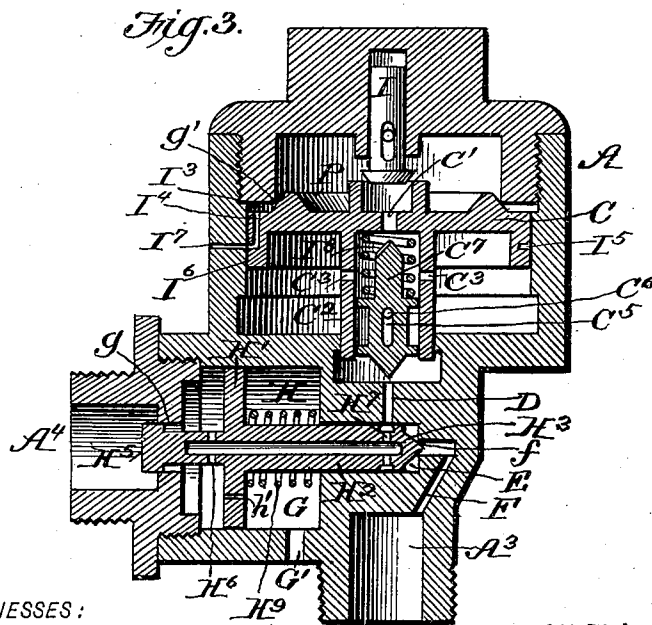
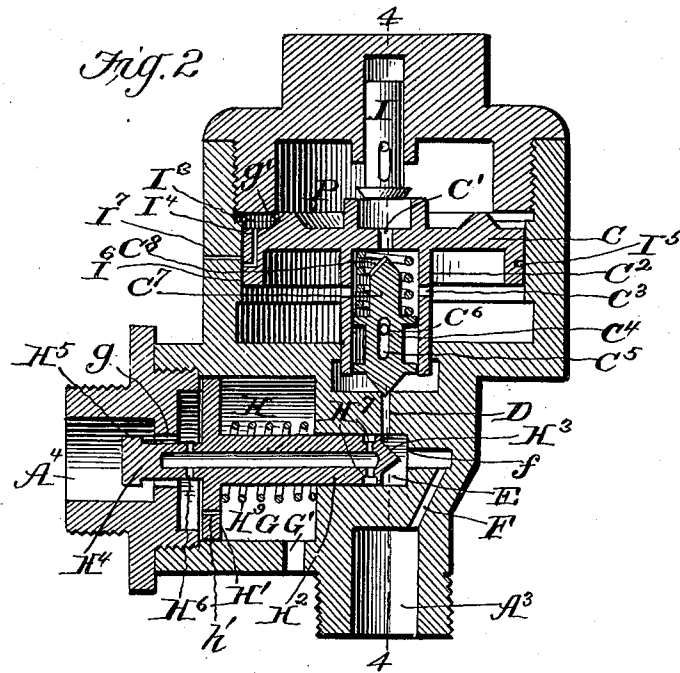
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Fig. 4.

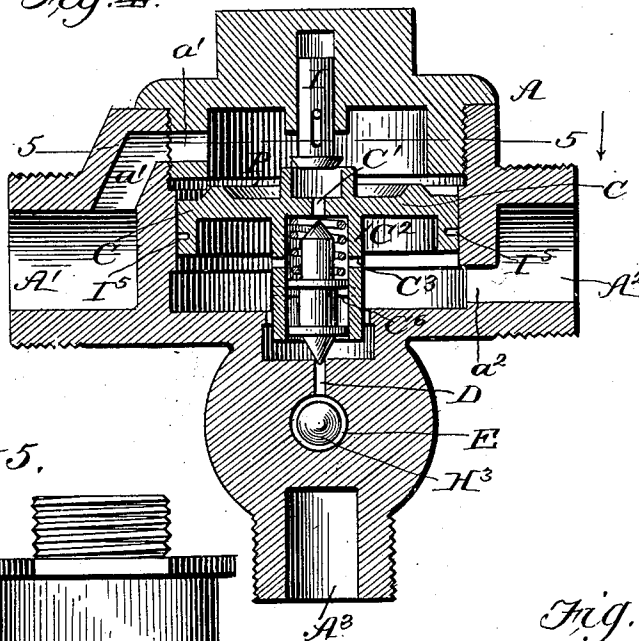


Fig. 5.

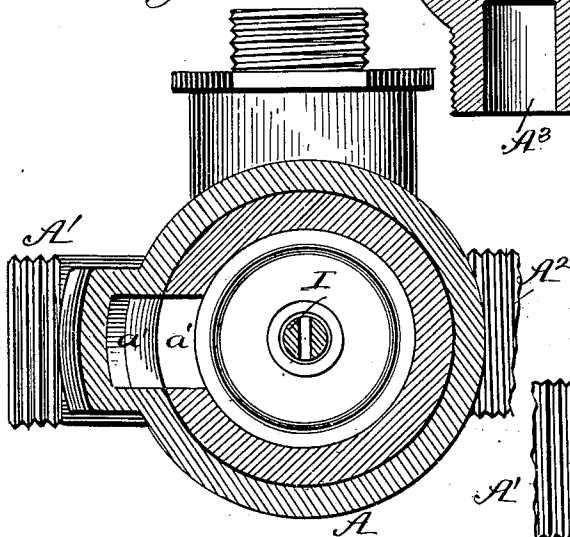
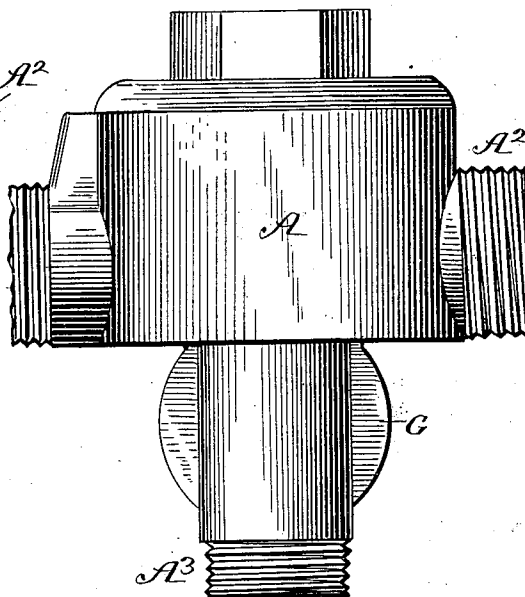


Fig. 6.



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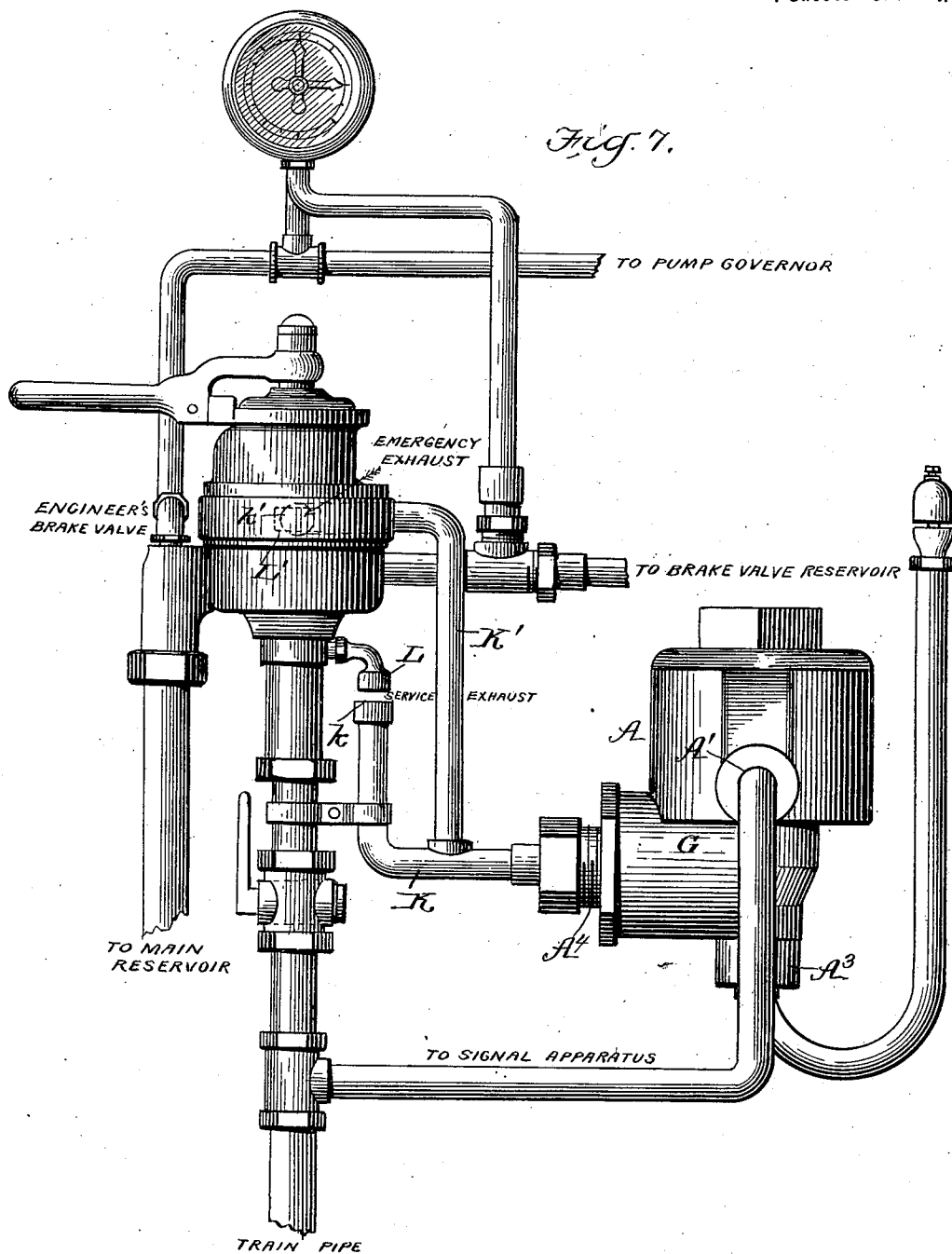
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TRAIN SIGNALING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 700,766, dated May 27, 1902.

Application filed November 4, 1901. Serial No. 81,125. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM A. HARRIS and BENJAMIN S. H. HARRIS, citizens of the United States, residing at Greenville, in the county of Greenville and State of South Carolina, have made certain new and useful Improvements in Train Signaling Apparatus, of which the following is a specification.

This invention is an improvement in train signaling apparatus, and particularly in that class of such devices represented in our former patent, No. 665,852, dated January 8, 1901; and the object of the present invention is to provide means operated by the exhaust in the application of the brakes by the engineer's brake-valve whereby to intercept the air passing from the signal-valve to the whistle, and so prevent the sounding of the whistle by any operation of the engineer's brake-valve in the application of the brakes.

The invention consists in certain novel constructions and combinations of parts, as will be hereinafter described and claimed.

In the drawings, Figure 1 is a sectional view of our improved signaling apparatus, showing the connections thereof with the operating devices. Fig. 2 is a vertical longitudinal section of the apparatus with the parts in normal position. Fig. 3 is a vertical longitudinal section of the apparatus, showing the parts in position as when the brakes are applied. Fig. 4 is a vertical longitudinal section of the apparatus on about the line 4 4 of Fig. 2. Fig. 5 is a horizontal cross-section of the apparatus on about line 5 5 of Fig. 4. Fig. 6 is an elevation of the signaling apparatus, taken in the direction indicated by the arrow 6 in Fig. 4. Fig. 7 is an elevation of the apparatus, showing the connections with the several parts. Fig. 8 is a detail cross-sectional view on about line 8 8 of Fig. 1, and Fig. 9 is a detail perspective view of the intercepting-valve.

In the construction shown we employ a casing A, which is provided with connections at A' with the train-line or brake-pipe, at A² with the whistle-reservoir, and at A³, leading to the whistle, and also with a connection at A⁴ for a pipe which leads to or adjacent to the exhaust-ports from the engineer's brake-valve. We also provide in the casing a cyl-

inder B for the piston C of the whistle-valve and arrange for the passage of the air from the connection A' of the train-line to pass at a' above the said piston C and also for the air to pass to and from the whistle-reservoir A² through a port a², opening below the said piston C, as shown in Fig. 4. The whistle-valve is of a special construction, as presently described, and controls the whistle-port D, which communicates with a passage E, which in turn communicates with a passage F, leading to the whistle connection A³, as shown in the drawings. Between the passages E and F we provide at f a valve-seat for a portion of the intercepting-valve, as presently described. Within the casing A we provide at G a cylinder for the intercepting-valve H, such cylinder communicating with the passage or guide-chamber E and also communicating, through an opening g, with the connection at A⁴, which is arranged to receive the exhaust from the engineer's valve, as will be described. The purpose of the intercepting-valve H is to prevent the sounding of the whistle in the application of the brakes and to prevent such whistle from sounding except when such signaling is desired. The whistle-valve has its piston C formed to operate in the cylinder B and is provided with a central port C' in line below the top valve I and is provided with a depending tubular stem C², having lateral ports C³ and supporting the whistle-valve C⁴, which is provided with a slot C⁵, entered by a pin C⁶, projecting from the tube C² into the bore of said tube and limiting the downward movement of the whistle-valve with respect to its piston. The whistle-valve has a portion C⁷ extended upwardly, with its end formed to enter the lower side of the port C' and restrict the said port when the whistle-valve piston is depressed. The end of this portion C⁷ is provided with a groove C⁸, which permits a limited passage of pressure when the whistle-valve piston moves downward to its lowermost position, as in the release of brakes. The whistle-valve will fit with comparative accuracy between the port D and the port C', so there will be no jamming of the parts in the said operation. In the present invention, as in the one patented, No. 665,852, as before referred to, the whistle-valve piston

is provided on its upper side with surfaces at P, which seat at g' in the uppermost position of the said piston and operate to divide or separate an annular space at the outer edge of the whistle-valve piston when such part is moved upward in the operation of sounding the whistle. This annular space at I^3 communicates by a small port I^4 with an annular groove I^5 , formed in the outer face of the rim I^6 of the whistle-valve piston, which groove registers when said piston is moved to its uppermost position with a port I^7 , leading through the casing to the atmosphere. Thus the air in the space I^3 exhausts to the atmosphere when the piston is moved to its uppermost position. The purpose of this construction and operation is to reduce the area of the whistle-valve piston exposed to pressure on its upper side when such piston is moved upward in sounding the whistle, so that the excess of exposed area on the under side of the piston will cause the pressure to hold the piston firmly to its seat and prevent a second sounding of the whistle from a single reduction because of the rebounding pressure or wave in the train-line or in the whistle-reservoir. Thus in sounding the whistle the whistle-piston will remain in its uppermost position until the pressure in the whistle-reservoir has been reduced sufficiently below that of the train-line for the train-line pressure to operate on the smaller area exposed to it to force the whistle-piston down to its normal position. It will be understood that in this operation the length of the blast of the whistle is in proportion to the difference of area provided, so the difference in area may be such as to get a long or short sound of the whistle, as may be desired, with the same slight or quick reduction of the train-line. This is important, as a reduction sufficient to get a desired sound of the whistle on a long train would have a tendency to affect the brakes; but with our present construction any reduction sufficient to create a wave in the train-line is all that is necessary, as the length of sound of the whistle is regulated by the differential area. In this operation of sounding the whistle the whistle-piston is lifted to such a position that its port C' will be closed by the top valve or check, and thus prevent the passage of pressure to or from the whistle-reservoir through the port C' in such operation. We have described the construction of the whistle-valve thus somewhat at length not because we claim such valve specifically herein, as such valve in its features, which differ from the patented construction before referred to, is included as part of the subject-matter of a separate application for patent, No 70,958, filed August 5, 1901, the purpose of the description of said valve in the present case being to make clear in this description the construction and operation of the entire apparatus without involving the necessity of reference to the pending application just referred to.

The purpose of our present invention is to provide means operated by the exhaust-pressure from the engineer's brake-valve which will prevent the sounding of the whistle by any reduction of pressure in the train-line effected by any operation of the engineer's brake-valve. In the present construction it will be noticed that by arranging the train-line pressure to pass above the whistle-piston and the whistle-reservoir pressure to pass below such piston the whistle-piston will move upward at every application of the brakes as well as in sounding the whistle. It therefore becomes desirable to furnish means for preventing the sounding of the whistle when the whistle-valve piston moves upward in the application of the brakes. To do this, we provide the so-called "intercepting-valve" H, which will now be described.

The intercepting-valve H is formed with a piston H' , which operates within the cylinder G, and with a tubular stem H^2 , which projects at its inner end within the chamber E and has the valve portion H^3 at its inner end to seat on the port f . The intercepting-valve also has the outwardly-projecting stem H^4 , which has a plug-valve H^5 at its outer end and is provided just outside the piston H' with the openings H^6 . The tubular stem H^2 is provided near its inner end with the lateral opening or openings H^7 , which register with the port D when the intercepting-valve is adjusted to the position shown in Fig. 3. The valve H is actuated outward by the spring H^9 , whose function is to move the valve H to the position shown in Fig. 2, this being effected by the tension of the spring H^9 operating upon the valve H, as will be readily understood. When the parts are adjusted to the position shown in Fig. 3, the plug-valve H^5 closes the opening g , which leads into the cylinder G, and so shuts off the passage of exhaust-pressure to the said cylinder.

The pipes leading from the connection A^4 are arranged to receive the exhaust-pressure discharged from the engineer's brake-valve. In the construction shown and as preferred instead of connecting the pipes K K' directly with the exhaust-ports of the engineer's brake-valve, so they would receive the exhaust-pressure directly, we prefer to arrange such pipes K and K' so they are disconnected from the engineer's valve and do not connect with any portion of the automatically-operating devices. By this means we avoid any choking of the exhaust, such as might result from a direct connection of the pipes K and K', and still secure sufficient pressure to properly operate the intercepting-valve in the operations, as will be described. To this end we open the pipe K at k and the pipe K' at k' , directly opposite, respectively, the exhaust-ports L and L', the former being the exhaust-port in the service application and the latter, L', the exhaust-port in the emergency application of the brakes. It will be noticed from Figs. 1, 7, and 8 that there is

a space or opening between the exhaust-ports and the pipes K and K', into which the exhaust-pressure is gushed, and so acts upon the air in the said pipes K or K' to secure the operation of the intercepting-valve. By this means we secure a sufficient pressure in the pipes K and K' to operate the intercepting-valve, and still avoid any connection whatever of the signaling apparatus directly with the exhaust-ports. This is important, as it reduces the number of connections with the automatic devices to the minimum, as it will be noticed that in the application of our improved signal there is only the single connection by means of the pipe M, which leads from the connection A' to the train-pipe.

It will be noticed that the piston H' is provided with a small hole or vent h', which may be desirable in operation, and that the cylinder G is provided close to its inner end with an opening G' to the atmosphere.

In the operation of the described devices it will be noticed that the intercepting-valve H will occupy the position shown in Fig. 2 at all times except when the brake is applied by the engineer's brake-valve. In such case the exhaust-pressure will operate upon the air in the pipes K or K' to throw the intercepting-valve to the position shown in Fig. 3, in which it will close the port F and will open communication between the port D and that portion of the chamber G lying outside the piston H'. The whistle-reservoir pressure will thus pass to a point outside the piston H' and operating upon said piston will hold the intercepting-valve in the position shown in Fig. 3 until the pressure in the whistle-reservoir is equalized with that in the train-line and the parts will be readjusted. As before suggested, the whistle-piston will move upward at every application of the brakes as well as in sounding the whistle. The whistle will not sound in any application of the brakes effected by any operation of the engineer's valve because the exhaust in either the service or emergency application will operate the intercepting-piston to open up communication between the whistle-valve reservoir and the chamber in front of the piston H' as well as to close the passage of air to the whistle, or, in other words, close the whistle-port f. The whistle-reservoir pressure operating on the outside of the piston H' will hold said piston in the position shown in Fig. 3 until the pressure is equalized with that in the train-line. This equalization takes place through the port in the whistle-piston raising the top check I off its seat, as shown in Fig. 3. It will be understood that the small hole or vent h' in the intercepting-piston is provided simply to permit the ready readjustment of the intercepting-piston by its spring when the pressure has equalized and the other parts have assumed their normal position. It will be understood from the foregoing that no reduction whatever in rear of the engineer's valve will have

any effect whatever upon the intercepting-piston, such intercepting-piston being only operated when the reduction of pressure in the train-pipe is effected by some operation of the engineer's brake-valve and then by the exhaust resulting from such reduction of pressure. In case of accidental parting of the train there will be a long clear sounding of the whistle, which will continue until the pressure in the whistle-reservoir has been reduced by its passage off through the whistle and through the whistle-piston and out of the train-line.

While the signal apparatus is shown in connection with the Westinghouse engine equipment, it is manifest it is capable of application to any of the well-known automatic systems of fluid-pressure brakes—such as what are well known as the "New York engine equipment or system of brakes," the "Standard system of brakes," and others well known to those skilled in the art.

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

1. In an apparatus substantially as described, the combination of the casing, the whistle-valve, an intercepting-valve by which to prevent the passage of pressure to the whistle, and means by which the said intercepting-valve may be automatically operated by pressure independently of that controlled by the whistle-valve.

2. The combination of the casing, the whistle-valve, and an intercepting device arranged beyond the whistle-valve and adapted to prevent the passage of pressure to the whistle when the whistle-valve is open in certain operations, and means by which the said intercepting-valve may be operated by the exhaust from the engineer's brake-valve.

3. The combination of the casing, the whistle-valve, and an intercepting-valve arranged to prevent the passage of pressure to the whistle when the whistle-valve is open in certain operations, said intercepting-valve being provided with a passage for the pressure from the whistle-valve reservoir when the said intercepting-valve is adjusted to intercepting position and with means for operation by such pressure.

4. The combination of the casing having a cylinder for the piston of the intercepting-valve, the whistle-valve, the intercepting-valve and means whereby the intercepting-valve may be operated by the exhaust from the engineer's brake-valve.

5. The combination with the casing having a cylinder for the piston of the intercepting-valve, whistle-port D and a valve-seat f and provided with a passage E, and the intercepting-valve arranged for operation by the exhaust-pressure from the engineer's brake-valve and having a piston operating in the cylinder of the casing, and a tubular stem operating in the chamber E and provided with

a valve portion to fit the seat *f* and a port communicating with its bore and arranged for registration with the whistle-port D.

6. In an apparatus substantially as described, the combination of the casing having a cylinder for the piston of the intercepting-valve and an opening *g* leading to said cylinder, the whistle-valve, the intercepting-valve having a piston operating in the cylinder of the casing and provided at its inner end with a portion by which to shut off the passage of pressure to the whistle and also provided at its outer end with a plug-valve to close the opening *g* leading to the cylinder for the said intercepting-valve piston.

7. In an apparatus substantially as described, the combination with the casing, the whistle-valve and connections whereby said whistle-valve will be caused to move upward in the service and emergency applications of the brakes by the engineer's brake-valve, and means operated by the exhaust-pressure from the engineer's brake-valve whereby to prevent the passage of pressure to the whistle in the said service and emergency applications of the brakes.

8. An apparatus substantially as described, comprising the casing, the whistle-valve, the engineer's brake-valve, and means operated by the exhaust-pressure from the engineer's brake-valve by which to prevent the sounding of the whistle in the service and emergency applications of the brakes by the operation of the engineer's brake-valve.

9. The combination in an apparatus substantially as described, of the casing, the whistle-valve, the engineer's brake-valve, connections whereby the whistle-valve will be opened in the service and emergency applications of the brakes by the engineer's brake-valve, and a device operated by the exhaust-pressure from the engineer's brake-valve and arranged to shut off the passage of pressure to the whistle when the whistle-valve is open in the service and emergency applications of the brakes by the engineer's brake-valve.

10. The combination of the engineer's brake-valve, and the train-line, of the signal having a casing, a connection between said signal and the train-line for the passage of train-line pressure between the train-line and signal, the whistle-valve, the intercepting device by which to prevent the passage of pressure to the whistle in the service and emergency applications of the brakes by the operation of the engineer's brake-valve and connections whereby the exhaust from the engineer's valve in such applications will operate the intercepting device to position to shut off the passage of pressure to the whistle.

11. The combination of the engineer's brake-valve, the signal apparatus including a whistle-valve, and an intercepting device arranged to shut off the passage of pressure to the whistle when the whistle-valve is opened in certain operations of the apparatus, and

means whereby the intercepting device will be operated by the exhaust-pressure from the engineer's brake-valve in the service and emergency applications of the brakes, said means being disconnected or free of any direct connections with the exhaust-ports of the engineer's brake-valve whereby the said exhaust-pressure will operate the intercepting device and yet may be discharged freely into atmospheric air.

12. An apparatus substantially as described, having the whistle-valve and provided with means operated by the exhaust-pressure from the engineer's valve in the emergency and service applications of the brakes whereby to prevent the passage of pressure to the whistle.

13. A signal apparatus comprising the casing, means connecting said casing with the train-line whereby it may be influenced by variations in pressure in said line, and controlling devices for the whistle including an intercepting device arranged for operation by the exhaust from the engineer's brake-valve and adapted when so operated to prevent the passage of pressure to the whistle.

14. The combination with the signal-casing and the whistle-valve, of the intercepting-valve arranged for initial operation by the exhaust-pressure from the engineer's brake-valve, and means whereby the said intercepting-valve may be held by the whistle-reservoir pressure in the position to which it is adjusted by the said exhaust-pressure.

15. The combination of the signal-casing, the whistle-valve, the intercepting-valve arranged to control the whistle-port and provided with a valve portion to shut off the passage of pressure to the whistle and the passage for the pressure from the whistle-reservoir, said intercepting-valve being also provided with a piston for operation by the exhaust from the engineer's brake-valve and with a valve portion for shutting off the passage of the exhaust-pressure to said piston after the initial movement of the intercepting-valve.

16. The signal apparatus comprising the casing, the whistle-valve arranged to be adjusted to open position in all operations of the brakes and in all signaling operations, and an intercepting device arranged between the whistle-valve and the whistle and adapted for operation, in the emergency and service applications of the brakes by the engineer's brake-valve, to position to shut off the passage of pressure to the whistle.

17. A signal device provided with means arranged for operation by the exhaust from the engineer's brake-valve, in the service and emergency applications of the brakes whereby to intercept the air passing from the signal-valve to the signal and so prevent the operation of the signal by any operation of the engineer's brake-valve in the application of the brakes.

18. The combination with the engineer's brake-valve and a signal apparatus, of a pipe or pipes leading from said signal and opening adjacent to the exhaust port or ports of the engineer's brake-valve whereby the exhaust-pressure discharging from said port will operate upon the air in said pipe, and devices in the signal apparatus arranged for operation by such exhaust-pressure.

19. A signal apparatus provided with means for operation by the exhaust-pressure from the engineer's brake-valve combined with the engineer's brake-valve having the exhaust ports and pipes connected with the signal and opening opposite the exhaust-ports of the engineer's brake-valve and spaced apart from said ports whereby the gush of air exhausted from said ports will operate the de-

vices in the signal and there will be no choking of the exhaust.

20. The combination of the engineer's brake-valve, the train-line, the signal having a casing, a whistle-valve and an intercepting-valve operating between the whistle-valve and the whistle, connection between the casing and the train-line whereby the whistle-valve will move upward in all applications of the brakes, and connections whereby the intercepting-valve will be operated by the exhaust-pressure from the engineer's valve.

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