(No Model.) 2 Sheets—Sheet 1.

G. B. WILLIAMS.

AIR SIGNALING APPARATUS.

No. 446,275. Patented Feb. 10, 1891.

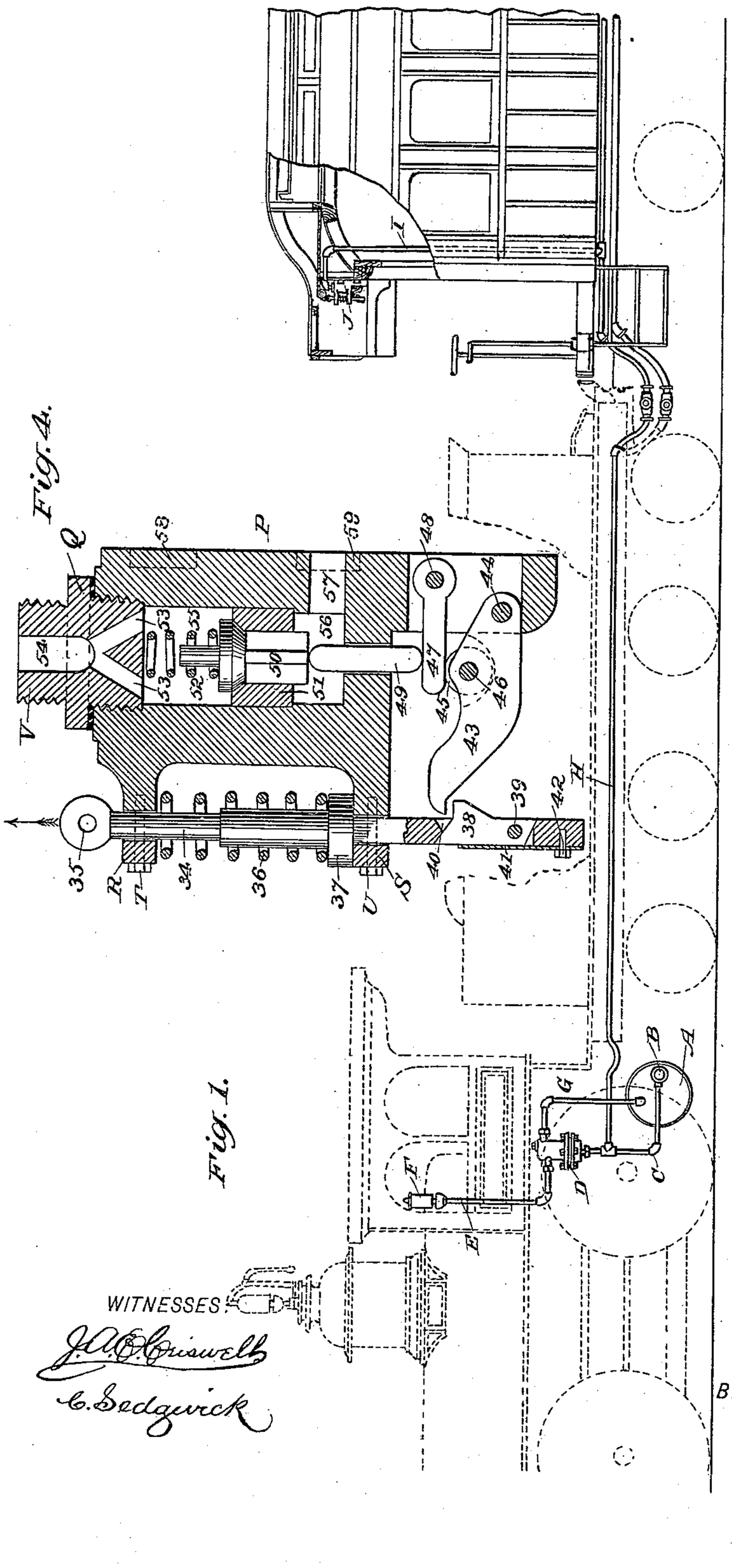

Fig. 1.

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

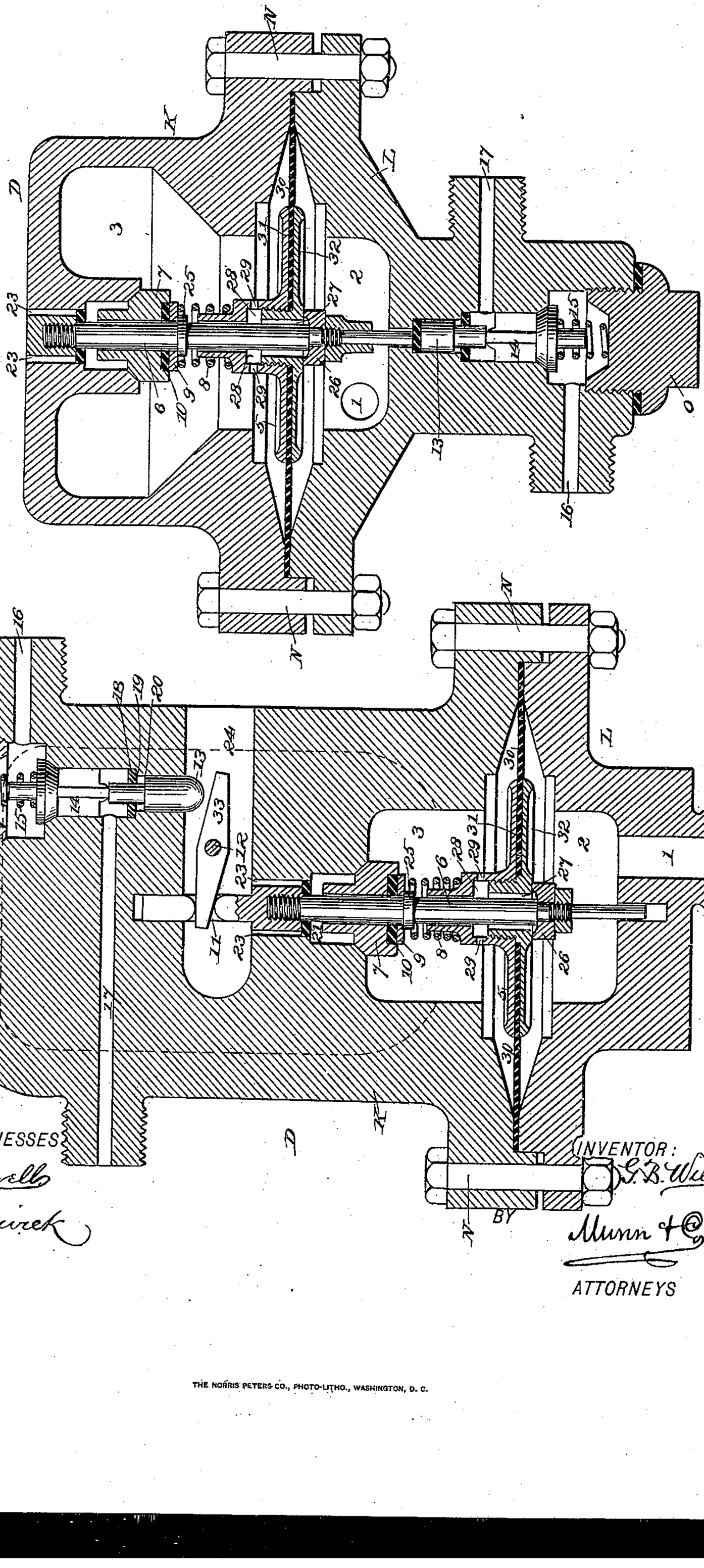

Fig. 2.

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UNITED STATES PATENT OFFICE.

GEORGE BAYLEY WILLIAMS, OF PORTLAND, OREGON.

AIR SIGNALING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 446,275, dated February 10, 1891.

Application filed January 14, 1890. Serial No. 336,879. (No model.)

To all whom it may concern:

Be it known that I, GEORGE BAYLEY WILLIAMS, of Portland, in the county of Multnomah and State of Oregon, have invented a new and Improved Air Signaling Apparatus, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved air signaling apparatus which is simple and durable in construction, very effective and reliable in operation, and specially designed to transmit accurately and promptly any desired signals from the conductor to the engineer of the train by means of compressed air.

The invention consists principally of a conductor's valve of special construction and of a whistling device controlled from the said conductor's valve.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar figures and letters of reference indicate corresponding parts in all the figures.

Figure 1 is a side elevation of the improvement as applied, parts being in section. Fig. 2 is an enlarged sectional side elevation of the whistling device. Fig. 3 is a like view of a modified form of the same, and Fig. 4 is an enlarged sectional side elevation of the conductor's valve.

Air signaling apparatus of the type as now used, of which the Westinghouse apparatus is the best-known example, is uncertain and unreliable in its action on account of radical defects in its construction. One defect consists in there being no automatic regulation of the amount of compressed air to be exhausted from the signaling-pipe through the conductor's valve for each time it is desired to sound the signaling-whistle. Another defect consists in the signaling-reservoir pressure being exerted on a piston or diaphragm in opposition to the signaling-pipe pressure on its opposite side, the result being that when an unreasonable amount of air is exhausted from the signaling-pipe for the purpose of causing one sound of the signaling-whistle it requires so long a time for the signaling-reservoir pressure to be reduced a like number of pounds by escaping through the signaling-whistle that any attempt to cause one or more additional sounds of the whistle only results in one long meaningless sound. A third defect resulting from it is that the pressures in signaling pipe and reservoir may be so greatly reduced in short trains by unreasonable exhausts as to leave no reliable and effective operative pressure in either.

In order to remedy the foregoing-recited defects in my invention, I provide, first, a conductor's signaling-valve, in which the exhaust from the signaling-pipe is automatically regulated by means of a trigger device; secondly, a whistling-valve or engineer's signaling-valve, the operative pressure for moving piston or diaphragm of same in opposition to the pressure in the signaling-pipe being used for no other purpose, and is contained in a chamber small enough to have such pressure quickly reduced to an equality with the pressure in the signaling-pipe after each sound of the signaling-whistle; thirdly, a secondary connection between the main reservoir and the signaling-valve in order that the main-reservoir pressure may be used for sounding the whistle.

This apparatus, presently to be described, though primarily designed for use on trains, may also be employed in signaling operations generally both in connection with or as part of a stationary apparatus.

The signaling-reservoir A on the locomotive is provided at one end with a reducing-valve B, connected by the pipe C with the whistling device D, from which leads a pipe E to a whistle F of any approved construction. The whistling device D is also connected by a pipe G directly with the signaling-reservoir A, as plainly shown in Fig. 1. The pipe H leads from the pipe C to the several cars of the train, and from this pipe extend the branch pipes I, one on each car and supporting at their upper ends the conductor's signaling-valve J.

The whistling device D is provided with a casing K, on the lower end of which is secured a cap L by bolts N.

In the casing K is arranged the diaphragm 5, similar in construction to the Westinghouse device, and comprising the two disks 31 and 32, screwed together at the center and holding between them the flexible diaphragm 30. The seating of nut 26 on diaphragm 5 is also

the same as in the Westinghouse device, as are also the spring 8 and the passages 27, 28, and 29 between chambers 2 and 3, formed in the said casing K by the diaphragm 5. Into the chamber 2 leads the aperture 1, connected with pipe C.

The stem 6 is provided with a collar 25 and slides loosely in a check-valve 7, and the joint is kept packed by the combined action of spring and air pressure exerted on metallic washer 9, seated on packing 10. A secondary packing 21 is applied where the stem 6 is screwed into an enlarged part of the same, which contains leakage-grooves 23 and either a slot or outside grooves 11 for engaging the end of lever 33, pivoted on pin 12 and working in a chamber 24. The opposite end of lever 33 is adapted for moving pin 13, held to slide in the upper part of casing K and connected with a valve 14, held on its seat by a spring 15, resting with its upper end on cap O. The seat of valve 14 is connected at its lower end with the passage 17, leading to pipe E, while the upper end of the seat connects with passage 16, leading to pipe G. When the lever 33 moves the pin 13 upward, the valve 14 is unseated, the spring 15 is compressed, and the pressure in the reservoir A is overcome, thus allowing air from the reservoir A to pass through pipe G, passage 16, past check-valve 14, through passage 17 and pipe E to the signaling-whistle F.

In order to prevent the escape of compressed air from the reservoir past pin 13 and through chamber 24 to the atmosphere, a packing 18 is interposed, and the shoulders 19 in casing and 20 on pin 13 are so arranged that they will be in the same plane and flush and a tight joint insured whenever valve 14 is forced open. The exhaust-valve 7 may be located elsewhere, be actuated by suitable leverage, and cause an exhaust from chamber 3 either to the atmosphere or into chamber 2 or signaling-pipe without departing from the spirit of my invention, the stem 6, however, being suitably packed air-tight, as shown. The opposite end of stem 6 may be used for forcing open valve 14 directly, as shown in Fig. 3, without the intervention of leverage, without departing from the spirit of my invention, passages 16 and 17, as well as valve 14, spring 15, and plug O being in such case at the opposite end of valve and included in cap L instead of in casing K.

The reservoir A, as shown in Fig. 1, is the usual main reservoir; but it is evident that the pressure in any other suitable reservoir, either of air or steam, including the main air-pipe, may be used for sounding the whistle without departing from the spirit of my invention, which consists, essentially, in obtaining pressure for sounding the whistle from any adequate source whatever except from the chamber 3, or the chamber which contains the pressure which actuates the diaphragm, so as to result in the sounding of the whistle.

The conductor's valve J is constructed as follows: The casing P contains the valve 50, moving in casing 51, which valve is held to its seat by the spring 55, resting against nipple Q, to which is connected the signaling-pipe H at V. A pin 49 rests on valve 50, and a friction-lever 47, pivoted on pin 48, rests on pin 49. Lever 43, pivoted on pin 44, has a wheel 45, pivoted on pin 46, which rests on lever 47. The casing P has flanges in which are bearings for stem 34, which is held in place by caps R and S, which are fastened to the flanges by means of bolts T and U. The part of stem moving in bearings S is preferably rectangular, while the part of stem that moves in bearing R is preferably circular in section. Stem 34 is held in its normal position by a spring 36 pressing against the annular shoulder 37 on the one end and against flange of casing and cap R at the other end.

In a slot in stem 34 is a trigger device 38, pivoted on pin 39, and held to its normal position by means of flat steel spring 41, fastened to stem 34 by means of bolt or screw 42, said trigger 38 being adapted to actuate lever 43 and unseat valve 50 whenever the stem 34 is pulled in the direction of the arrow by means of a signaling-rope fastened through hole 35.

Dotted lines 58 and 59 indicate flanges through which are passed bolts to secure the valve in position.

The operation of the conductor's signaling-valve is as follows: It being desired to reduce the pressure in the signaling-pipe for the purpose of causing the signaling-whistle to be sounded, the conductor pulls the signaling-cord and the stem 34 in the direction of the arrow, when the trigger 38 forces lever 43 inward, pressing pin 49 against and unseating valve 50, when part of the pressure in signaling-pipe will escape to the atmosphere through passages 54 and 53, chamber 52, by valve 50 into chamber 56, and through exhaust-outlet 57. During the further movement of stem 34 the trigger 38 will pass entirely by lever 43, when the combined spring and compressed-air pressure exerted on valve 50 will seat said valve and force pin 49 and levers 47 and 43 back to their normal positions. The strain on signaling-cord being slackened, the spring 36 will force stem 34 back to its normal position, carrying trigger 38 past lever 43, the trigger 38 on the way being forced back into slot 40, so as to readily pass lever 43, and this having been done the trigger 38 is forced outward again to its normal position by means of spring 41, after which the operation can be repeated with similar results as many times as may be desired.

The use of wheel 45 and lever 47 can be dispensed with without departing from the spirit of my invention; also, slide, rotary, or gate valves may be actuated by a trigger device, so as to automatically regulate the amount of each separate exhaust from the signaling-pipe without departing from the spirit of my invention.

The several parts of my invention are ca-

pable of being used separately in combination with other kinds of air signaling apparatus, and are as much included in my invention as when the several parts are used conjointly.

The operation of the improved signaling apparatus is as follows: It being desired to sound the signaling-whistle F, the conductor's signaling-valve J on the car will be opened a definite time by means of a trigger device and automatic release, which will correspondingly reduce the pressure in signaling-pipe C and chamber 2, when the preponderance of pressure in chamber 3 will force diaphragm 5 outward, and by means of the seat on nut 26 will carry stem 6 in the same direction. Stem 6 will move freely through check-valve 7, which will remain seated by means of the air-pressure in chamber 3 and the expansive force of spring 8 exerted on washer 9 after the same has been relieved from the pressure of collar 25 on stem 6. The first result of the outward movement of diaphragm 5 and stem 6 is that lever 33 will be moved by means of the engaging-slot 11 in stem 6, so as to force pin 13 against valve 14 and open the latter, so that air will pass from the signaling-reservoir through passages 16 and 17 to the signaling-whistle and sound the latter. The further outward movement of diaphragm 5 and stem 6 will bring packing 21 against check-valve 7, forcing same open and allowing the air in chamber 3 to be exhausted to the atmosphere through leakage-grooves 23 and chamber 24 till the pressures in chambers 2 and 3 are equal, or nearly so. The first result of the reduction of pressure in chamber 3 through the exhaust of same to the atmosphere will be the seating of valve 14 and the cessation of sound of the whistle. When the pressures in chambers 2 and 3 have become equal, the check-valve 7 will again be seated and the apparatus will all be in its normal position. By this time also the trigger device attached to conductor's signaling-valve J on the car will have been carried back to its normal position and have a new grip on the valve, so that when the cord is again pulled the valve will be again opened with precisely the same results as before, the sounding of the whistle F included. These results are reliable and certain, regardless of the number of pounds of air-pressure there may be in chambers 2 and 3 at the time. Whenever the pressures are equal, the apparatus is in its normal position, whatever the pressure may be. When the pressure in chamber 2 is reduced and the diaphragm moves out sufficiently to sound the whistle, it will as certainly move farther till it opens valve 7 and causes a reduction of pressure in chamber 3, which reduction will cease when the pressure in chamber 3 equals the pressure in chamber 2, and the apparatus will then be in its normal position, as shown. The action of the mechanism is not tardy, because it is in no way dependent on the flow of air to the signaling-whistle. When the pressures in chambers 2 and 3 become somewhat depleted, as soon as the signaling is over the pressure in signaling-pipe and chamber 2 is gradually restored to the maximum. This equalizes into chamber 3, because while nut 26 cannot move farther inward the diaphragm 5 is forced away from same, which allows air from chamber 2 to pass through passages 27, 28, and 29 into chamber 3 till the pressures in chambers 2 and 3 have equalized, or nearly so, when the expansion of spring 8 will cause diaphragm 5 to seat against nut 26. The inner movement of diaphragm 5 is limited by its sleeve coming in contact with collar 25 of stem 6, at which time the disk 31 will also seat.

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

1. In an air signaling apparatus, the combination, with the whistling or signaling valve, of the conductor's valve comprising a case having passages 54 57, valve 50 therein, spring 55, which holds valve 50 to its seat and closes the communication between the passage 54 to the train-signaling pipe and the exhaust to the atmosphere through passage 57, the trigger operating stem 34 and its spring 36, catch 38 and its spring 41, and with levers 43 47 and pin 49, or other suitable connections between trigger device and valve 50 to automatically limit the exhaust from train-signaling pipe 54 when the conductor pulls the signaling-cord attached to stem 34 at 35, substantially as shown and described.

2. In an air signaling apparatus, the combination, with the whistling or signaling valve, of the conductor's valve comprising a valve normally seated and severing the communication between the train-signaling pipe and the atmosphere, with a trigger device for operating said valve to automatically limit the exhaust from the train-signaling pipe to the atmosphere when said valve is opened by pulling the signaling-cord, substantially as shown and described.

3. The combination, in an air signaling apparatus, with the whistling or signal-sounding valve, of a conductor's signaling-valve having an inlet for compressed air, an outlet to the atmosphere, and a valve controlling communication between said inlet and outlet and provided with an operating-lever, an operating-stem provided with a pivoted trigger, into the path of which the said lever normally projects, the said trigger being constructed to release the lever when the stem moves in one direction and in the return movement of the stem to be swung outwardly by the end of the lever and again snap under it, substantially as set forth.

4. In an air signaling apparatus, the combination, with the conductor's valve, of a whistling-valve comprising a casing, the diaphragm 5, held within the casing, the chamber 2 at one end of said diaphragm in communication with the train-signaling pipe, the supplemental chamber or reservoir 3 at the

opposite side of the casing, the passages 27, 28, and 29 between chambers 2 and 3, the spring 8, the stem 6, and check-valve 7, closing passages 23 to atmosphere, with valve 14, normally held to its seat by spring 15, to sever the communication between the main reservoir through passage 16 and the whistle through passage 17, and connections between stem of diaphragm 5 and valve 14 for the purpose of forcing open valve 14 and allowing the main-reservoir pressure to flow into passage 17 and sound the signaling-whistle coincidently with a sufficient reduction of pressure in train-signaling pipe 1, caused by opening said conductor's valve, substantially as shown and described.

5. In an air signaling apparatus, the combination, with the conductor's valve, of a whistling-valve comprising a casing, the diaphragm 5, held within the casing and provided with a stem, the chamber 2 at one side of the diaphragm in communication with the signaling-pipe, which is fed from the main reservoir, the supplemental chamber or reservoir 3 at the opposite side of the diaphragm, having communication only with the signaling-pipe and the atmosphere, the passages 27, 28, and 29 between chambers 2 and 3, the spring 8, the check-valve 7, the passages or grooves 23, leading from chamber 3 to atmosphere, the check-valve 14, its operating-pin 13 in line with said stem, spring 15, passage 16 from main air-reservoir, and passage 17 to whistle controlled by said check-valve, substantially as shown and described.

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Witnesses:
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