J. F. WEBB, Jr.

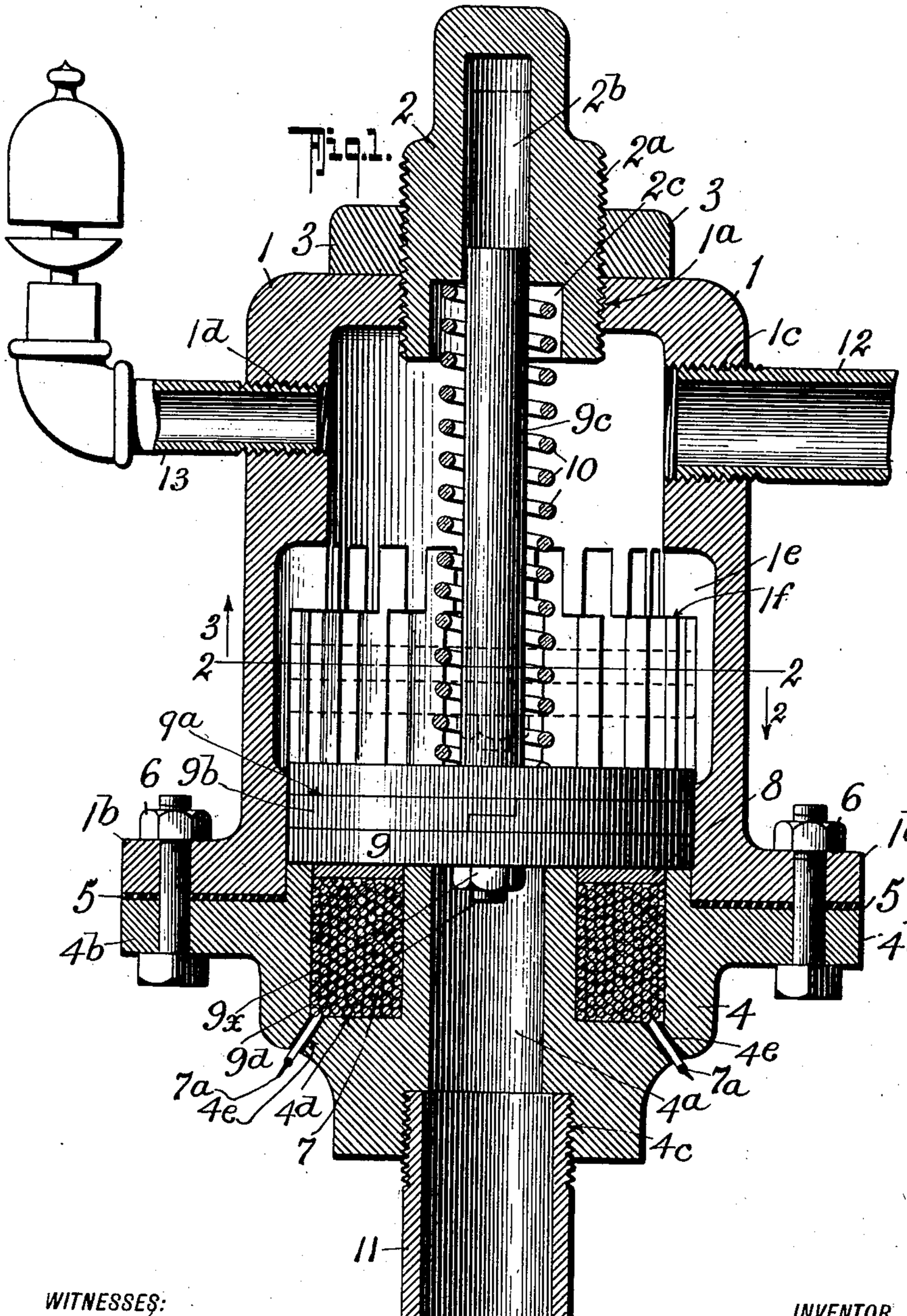
TRAIN STOPPING AND SIGNAL ACTUATING MECHANISM.

APPLICATION FILED MAR. 1, 1909.

948,361. **Patented Feb. 8, 1910.**

4 SHEETS—SHEET 1.

Fig. 1.



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4 SHEETS—SHEET 2.

Fig. 2.

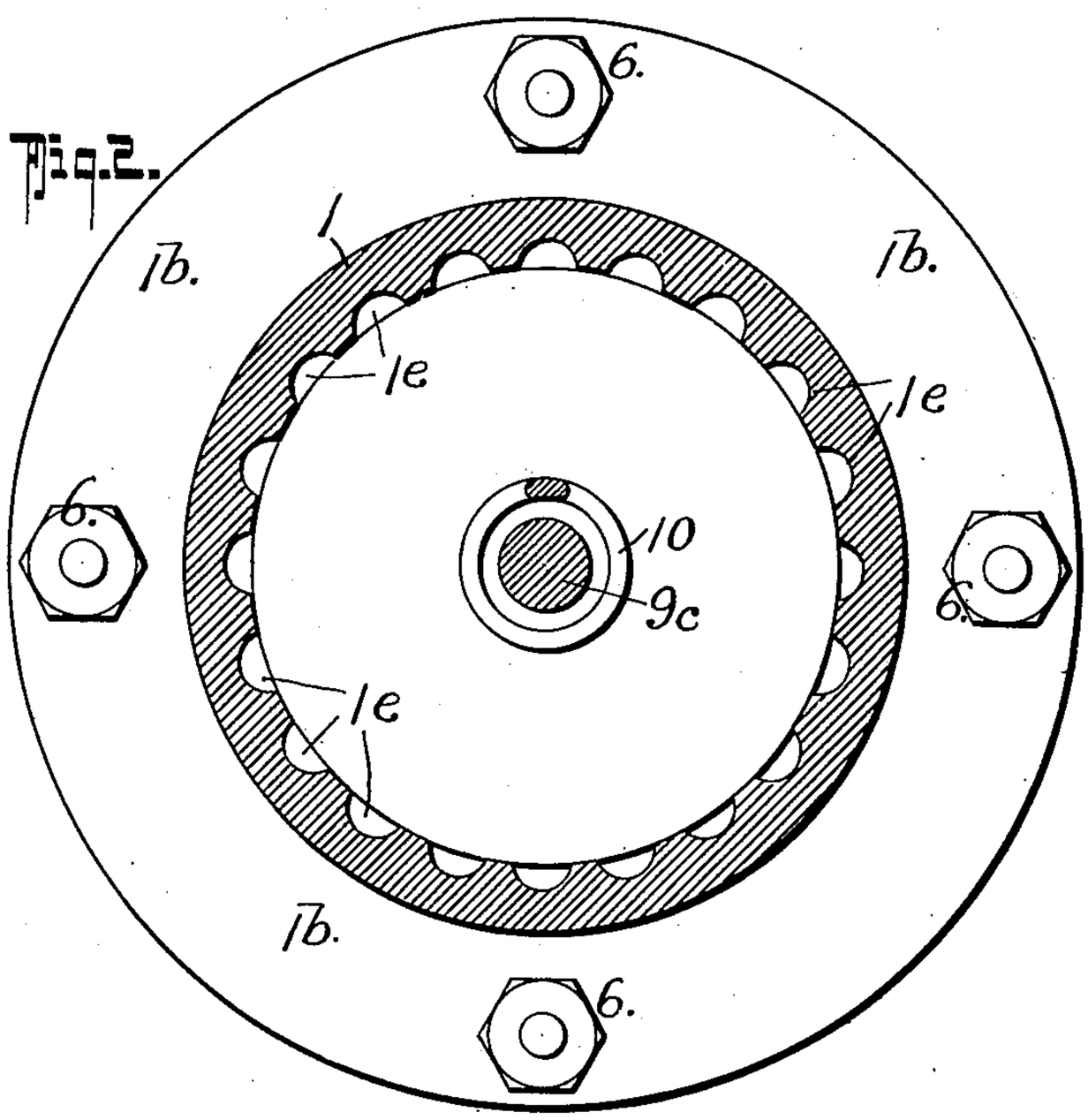
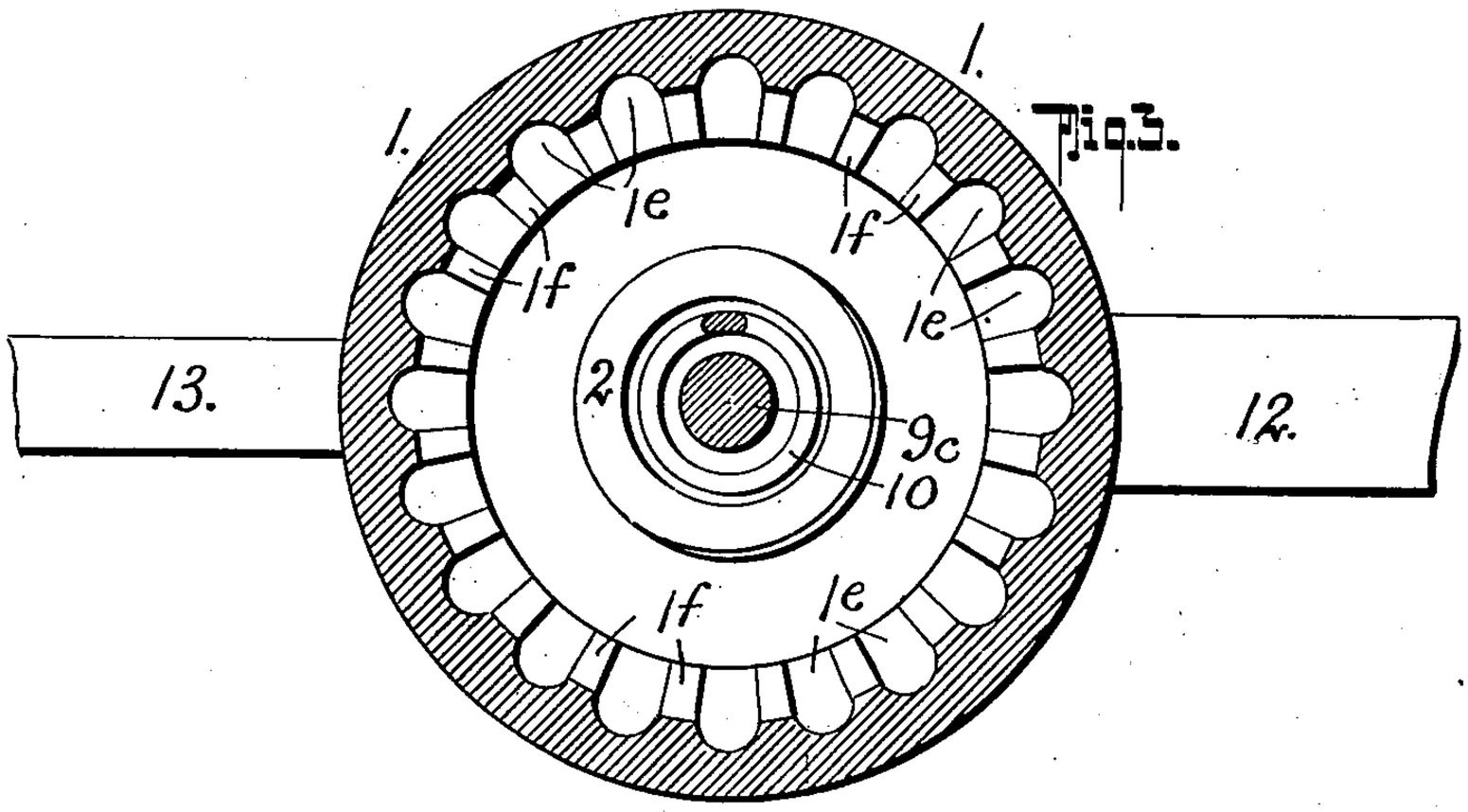


Fig. 3.



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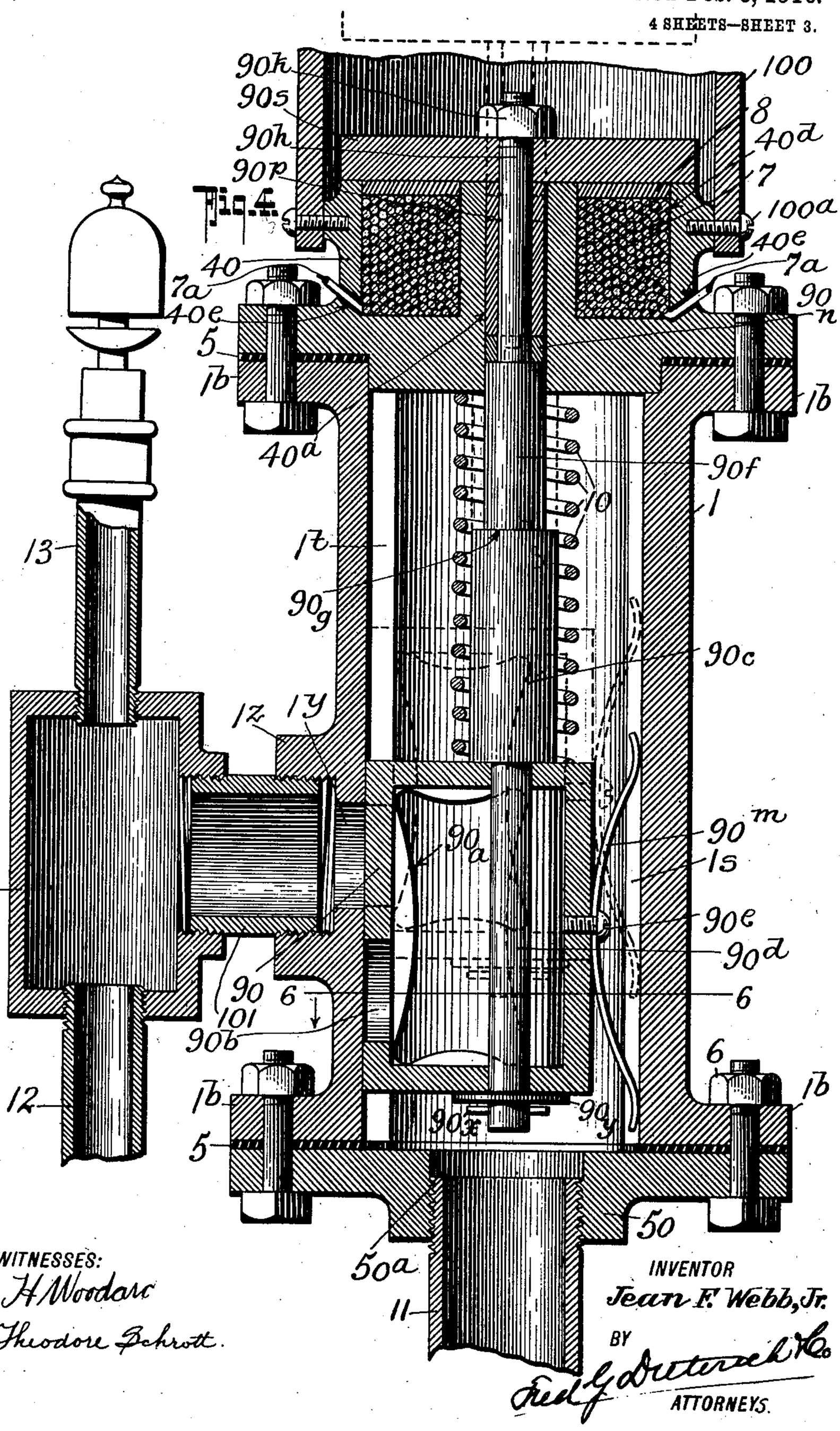
4 SHEETS—SHEET 3.

Fig. 4.



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4 SHEETS—SHEET 4.

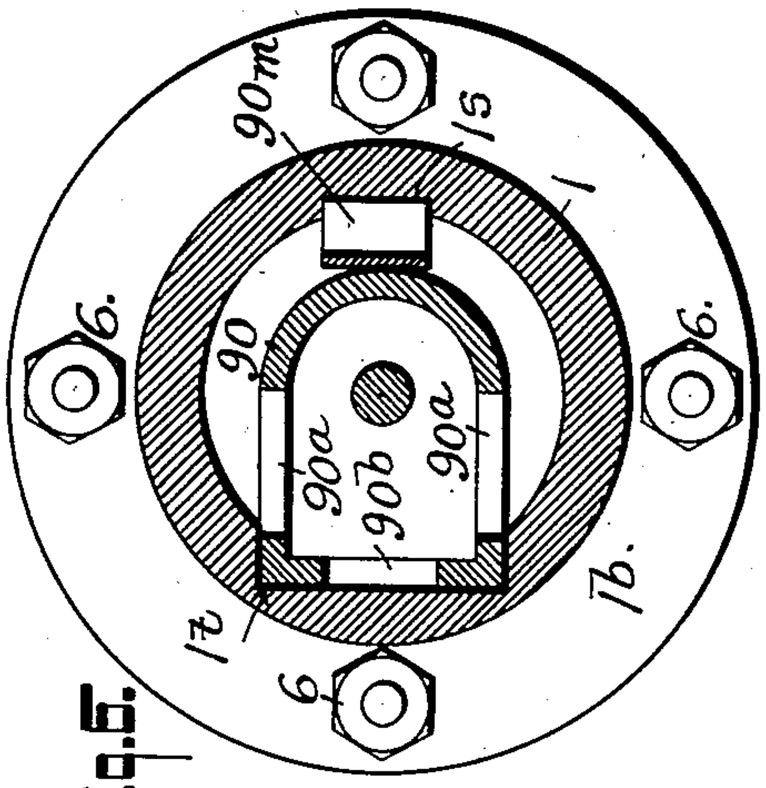

Fig. 6.

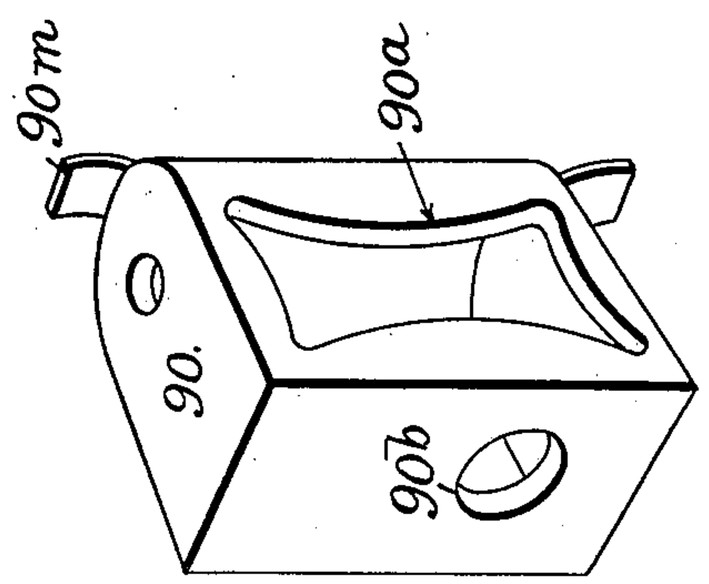

Fig. 7.

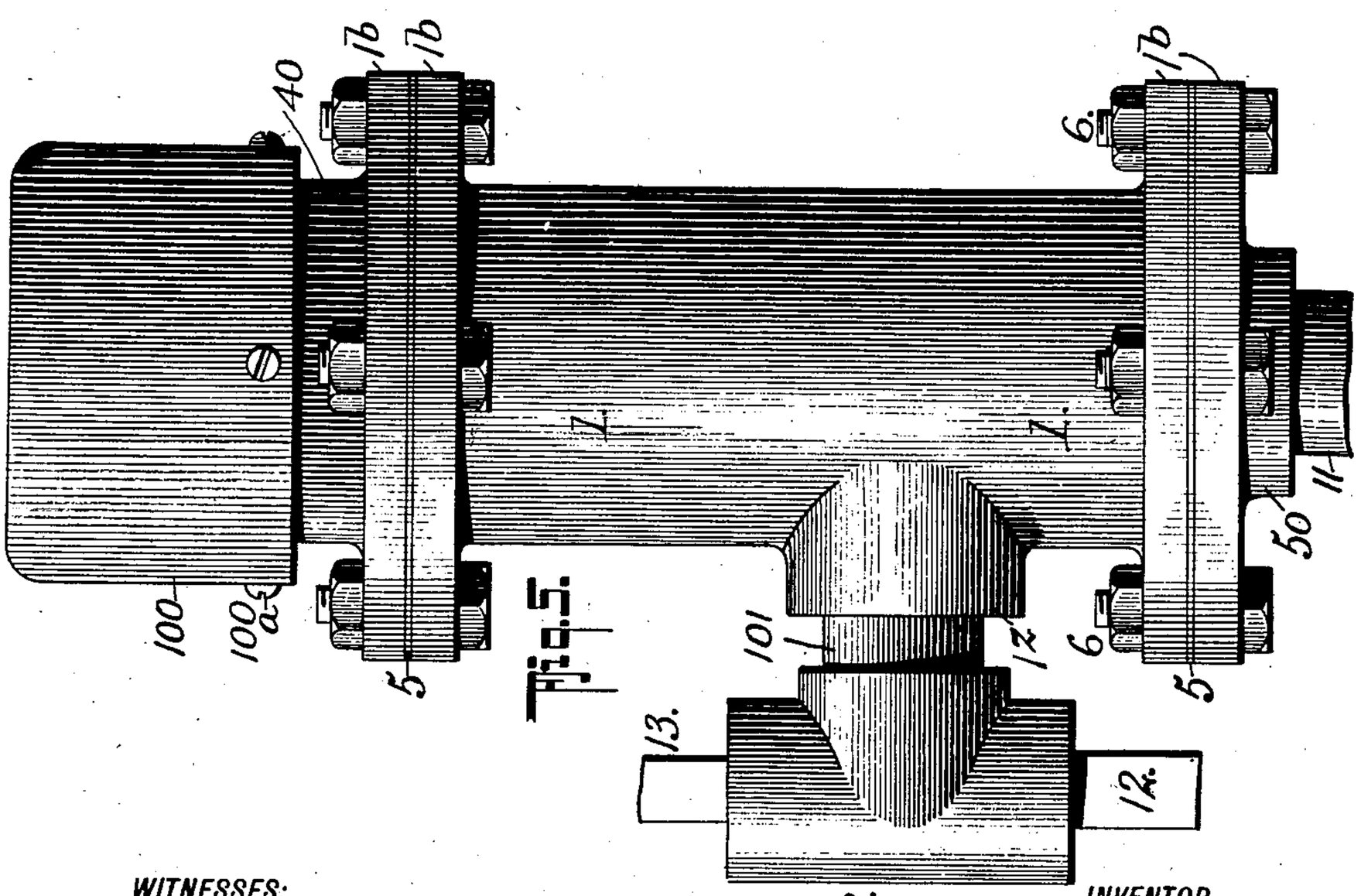

Fig. 5.

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UNITED STATES PATENT OFFICE.

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TRAIN-STOPPING AND SIGNAL-ACTUATING MECHANISM.

948,361. Specification of Letters Patent. Patented Feb. 8, 1910.

Application filed March 1, 1909. Serial No. 480,551.

To all whom it may concern:

Be it known that I, JEAN F. WEBB, Jr., residing at New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Train-Stopping and Signal-Actuating Mechanisms, of which the following is a specification.

My invention relates to that class of train stopping mechanisms wherein means are provided for setting the air brakes of a train at predetermined times, as when the train is in danger, or when it is desired to stop the train for any other purpose independently of the engineer.

Generically my present invention provides an air operated, electrically controlled valve mechanism connectible to the train pipe of an air brake system, the valve being normally maintained closed to keep the air pressure in the train pipe constant, by electromagnetic means, and upon the breaking of the electric circuit through the magnet the air pressure opens the valve and connects the train pipe with the atmosphere and with the engineer's signal whistle, to set the brakes and actuate the signal.

My invention also embodies those novel details of construction, combination and arrangement of parts all of which will be first fully described, then be specifically pointed out in the appended claims, and illustrated in the accompanying drawings, in which:—

Figure 1, is a central, vertical, longitudinal section and part elevation of the preferred form of my invention. Fig. 2, is a cross section on the line 2—2 of Fig. 1, looking in the direction of the arrow 2. Fig. 3, is a cross section on the line 2—2 of Fig. 1, looking in the direction of the arrow 3. Fig. 4, is a central, vertical, longitudinal section and part elevation of a modified form of my invention, the cap for the magnet armature being broken away. Fig. 5, is a side elevation of the form shown in Fig. 4. Fig. 6, is a cross section on the line 6—6 of Fig. 4, looking in the direction of the arrow. Fig. 7, is a perspective view of the slide valve.

Referring now to the accompanying drawings, in which like letters and numerals of reference indicate like parts in all of the figures, and referring particularly to Figs. 1 to 3, inclusive, of the drawings, it will be seen that 1 represents a dome-like cylinder whose upper wall is tapped at 1^a to receive the adjusting plug 2 which is threaded at 2^a to enter the tapped aperture 1^a, and which has a central bore or pocket 2^b to receive the valve stem 9^c. The bore or pocket 2^b in the cap 2 is countersunk at 2^c to receive the spring 10, while a jam nut 3 serves to lock the plug 2 in its adjusted positions. The cylinder 1 has a flange 1^b to which the cylinder head 4 is bolted through the flange 4^b by bolts and nuts 6, a gasket 5 being interposed between the flanges 1^b and 4^b to effect an air-tight joint. The cylinder 1 has its inner wall grooved or corrugated as at 1^e and has a shoulder 1^f against which the piston valve 9 may abut when the valve is open. The valve 9 is secured to the stem 9^c by a nut 9^x on the threaded projection 9^d and the valve 9 has a peripheral groove 9^a in which a split metallic packing ring 9^b is held. The cylinder head 4 has its bore 4^a countersunk and tapped as at 4^c to receive the pipe 11 which connects with the train pipe (not shown) of an air brake system. The head 4 is bored to form a pocket 4^d in which the magnet wire 7 is wound to form an iron-clad electromagnet, the wire being held in place by a non-magnetic ring 8. Suitable apertures 4^e are provided to permit passage of the terminal wires 7^a of the magnet 7. The cylinder 1 is tapped at 1^c to receive a pipe 12 that leads to atmosphere and it is also tapped at 1^d to receive the pipe 13 that communicates with the engineer's signal whistle (not shown). The combined cross sectional area of the pipes 12—13 is, in practice, preferably made slightly less than that of the pipe 11 so that some of the air will be caused to pass through the pipe 13 and operate the whistle.

In operating the preferred form of my invention which is shown in Figs. 1 to 3, inclusive, the magnet is energized at all normal times to retain the piston valve 9 on its seat on the cylinder head, thus forming a closed magnetic circuit with the piston valve 9 as the armature and keeping the air passage through the valve mechanism closed, thus maintaining the pressure in the train pipe. In the retention of the piston valve 9 on its seat, as shown in Fig. 1, the spring 10 may be made to assist to the desired de-

gree by the plug 2. Should, for any reason, the circuit through the magnet 7 be broken, as for instance when one of the wires in the magnet circuit breaks, or when the magnet circuit is open through the medium of suitable circuit controlling devices, etc., the air pressure in the pipe 11 will force the piston valve 9 upwardly to the position shown in dotted lines in Fig. 1, and permit the air to pass around the piston valve 9 through the grooves 1^e and exhaust to atmosphere through the pipes 12—13, the air which passes through the pipe 13 being exhausted to atmosphere via the engineer's signal whistle, as before stated. The reduction of the air pressure in the train pipe, due to the opening of the valve mechanism shown in Fig. 1, serves to set the air brakes, and the escaping air through pipe 13 serves to notify the engineer that the valve has opened, it being understood that the brakes are set in the usual manner, the action of the valve mechanism, constituting my invention, being similar to that of the conductor's valve in an air brake system. Upon the closure of the circuit through magnet wire 7, the piston valve 9 (forming the armature of the magnet) will, when the air pressure has been sufficiently decreased be brought down and held by the magnet, assisted by spring 10, to again close the air passage through the cylinder and prevent further escape of air, thus restoring the equilibrium of the air in the train pipe connection 11, and consequently in the train pipe.

In the form of my invention shown in Fig. 4 *et seq.*, it will be noticed that the cylinder 1, instead of being of dome shape is of the ordinary cylinder type and provided with two sets of flanges 1^b to which the cylinder heads 40—50 are respectively connected by bolts and nuts 6, gaskets 5 being interposed to effect steam-tight joints. On the inner side of the cylinder 1 grooves 1^s—1^t are diametrically oppositely formed, that, 1^t being of greater width to receive the slide valve 90 while the groove 1^s receives the spring 90^m that presses the slide valve 90 against the cylinder 1. The cylinder 1 also has an outlet port 1^y formed through a lug 1^z which is bored and tapped to receive a coupling 101 that is tapped into a T-joint 102 to which the pipe 12—13 connect instead of connecting directly with the cylinder 1, as in the form shown in Fig. 1. The slide valve 90 has a port 90^b adapted to register with the cylinder port 1^y at times, and the valve 90 is formed in the nature of a hollow valve having openings 90^a in its side walls to permit access of the air to the interior of the valve to pass through the port 90^b when it registers with the port 1^y. The pressing spring 90^m is secured to the valve 90 by a screw 90^e, or in any other suitable manner. The valve stem 90^c is formed of several diameters, one section 90^d of which passes through the valve 90 and carries a washer 90^y and cotter pin 90^x to hold the valve 90 on the stem, the valve 90 abutting the portion of greatest diameter of the stem 90^c. The stem 90^c has a portion 90^f to project into the bore 40^a of the cylinder head 40 to form a shoulder 90^g with the main portion of the valve stem 90^c. A spring 10 serves to aid in holding the valve 90 in its normally closed position. Projecting upwardly from the reduced portion 90^f of the valve stem 90^c is a portion of lesser diameter 90^h that projects through the bore 40^a and carries an armature 90^s for the electromagnet formed by the cylinder head 40 and the energizing wires 7. A spacing bushing 90^p surrounds the rod portion 90^h of the valve stem as does also a split metallic packing ring 90^n while a nut 90^k secures the armature 90^s in position on the valve stem portion 90^h. The cylinder head 40 is bored at 40^d to receive the wires 7 of the electromagnet, the terminals 7^a of which pass through apertures 40^e, suitably located in the head 40, while a non-magnetic plate 8 holds the wires 7 in position. A cap 100 is secured at 100^a to the cylinder head 40 over the armature 90^s to project the same. The lower cylinder head 50 is bored and tapped at 50^a to receive the pipe 11 that connects with the train pipe of the air brake system.

It is to be noted that with the form of my invention shown in Fig. 4, *et seq.*, the air presses equally on all parts of the valve 90, except that there is an upward pressure against the valve 90 in excess of the downward pressure to a degree equal to the pressure on an area equal to the cross sectional area of the section 90^f of the valve stem at all times, while the valve 90 is closed. In the practical application of this form of my invention when the magnet 7 is deënergized, the armature 90^s will be released and the upward air pressure against the valve 90 will force the valve 90 from the position shown in full lines in Fig. 4 to the position shown in dotted lines in Fig. 4, to permit air to pass through the ports 90^b and 1^y into the T-joint 102 from which it passes to atmosphere through the pipe 12 and to the engineer's signal whistle, through the pipe 13 as in the other form of my invention. The shoulder 90^g serves to limit the upward movement of the valve 90 when the ports 90^b and 1^y are in register.

I have shown no particular means or mechanism for energizing and deënergizing the magnet 7 as that will form the subject-matter of other applications. It sufficies to say, however, that the magnet 7 is normally energized by being connected in a closed electric circuit which electric circuit may be controlled in any approved manner whereby when the circuit is broken the armature of

the magnet 7 will be released to open the valve, thus my improved valve mechanism shown in the drawings is primarily an air operated electromagnetically controlled valve mechanism for air brake systems and train stopping mechanisms.

From the foregoing description taken in connection with the accompanying drawings, it is thought the complete construction, operation and numerous advantages of my invention will be readily understood by those skilled in the art to which the invention appertains.

What I claim is:

1. A valve mechanism for air brake systems comprising a casing or cylinder having an opening in communication with the atmosphere, a head for said cylinder having a passage adapted to communicate with the train line of an air brake system, a valve for preventing passage of air through the casing from the head opening to the opening to atmosphere, and an electromagnet device for retaining said valve closed.

2. A valve mechanism for air brake systems comprising a casing or cylinder having an opening in communication with the atmosphere, a head for said cylinder having a passage adapted to communicate with the train line of an air brake system, a valve for preventing passage of air through the casing from the head opening to the opening to atmosphere, an electromagnetic device for retaining said valve closed, and means for assisting the operation of said electromagnetic means in holding the device closed.

3. A control valve for air brake systems comprising a cylinder, a closure head therefor having a passage through the same, an outlet to the cylinder in communication with the atmosphere, a valve operating within the cylinder to prevent communication between the head passage and the outlet to atmosphere when in one position, means permitting passage of the air from the cylinder head opening to the outlet to atmosphere when the valve is in an open position, an electromagnet, a valve stem, and means carried by the valve stem and serving as an armature for said magnet to retain the valve closed when the magnet is energized and prevent passage of air from the cylinder head passage to the outlet to atmosphere.

4. A control valve for air brake systems comprising a cylinder inclosing a chamber, a head for said cylinder, said cylinder having an outlet to atmosphere, means coöperatively connecting said cylinder with the engineer's signal whistle, said cylinder head having a bore to receive magnet wire and form an iron-clad magnet, means for admitting air under pressure into the cylinder, means controlled by said magnet for cutting off the passage of air through the cylinder from the admission means to the outlet ports.

5. A control valve for air brake systems comprising a cylinder inclosing a chamber, a head for said cylinder, said cylinder having an outlet to atmosphere, means coöperatively connecting said cylinder with the engineer's signal whistle, said cylinder head having a bore to receive magnet wire and form an iron-clad magnet, means for admitting air under pressure into the cylinder, means controlled by said magnet for cutting off the passage of air through the cylinder from the admission means to the outlet ports, and means for assisting the electromagnet in controlling said air passage cutting out means.

6. A control valve for air brake systems comprising a cylinder inclosing a chamber, a head for said cylinder, said cylinder having an outlet to atmosphere, means coöperatively connecting said cylinder with the engineer's signal whistle, said cylinder head having a bore to receive magnet wire and form an iron-clad magnet, means for admitting air under pressure into the cylinder, means controlled by said magnet for cutting off the passage of air through the cylinder from the admission means to the outlet ports, means for assisting the electromagnet in controlling said air passage cutting out means and means for adjusting said assisting means to vary the degree of its assistance.

7. A control valve for air brake systems comprising a dome-like cylinder having an open end surrounded by a flange, a cylinder head for said open end having a flange opposed to that of the cylinder, means passing through said flanges for securing the cylinder and cylinder head together, said cylinder head having an air passage connectible with a train pipe of an air brake system, said cylinder and said cylinder head having a valve seat, a piston valve operating in the cylinder for engaging said seat to cut off the passage of air into the cylinder, said cylinder head having a bore, magnet wires wound in said bore to form an electromagnet to retain said piston valve on its seat when the magnet is energized, said valve adapted to move off of its seat under air pressure when the magnet is deënergized, said cylinder having an air outlet and means formed in the cylinder walls for shunting the air around the piston valve when off of its seat.

8. A control valve for air brake systems, comprising a dome-like cylinder having an open end surrounded by a flange, a cylinder head for said open end having a flange opposed to that of the cylinder, means passing through said flanges for securing the cylinder and cylinder head together, said cylinder head having an air passage connectible

with a train pipe of an air brake system, said cylinder and said cylinder head having a valve seat, a piston valve operating in the cylinder for engaging said seat to cut off the passage of air into the cylinder, said cylinder head having a bore, magnet wires wound in said bore to form an electromagnet to retain said piston valve in its seat when the magnet is energized, said valve adapted to move off of its seat under air pressure when the magnet is deënergized, said cylinder having an air outlet, means formed in the cylinder walls for shunting the air around the piston valve when off of its seat, a valve stem for said valve, and means surrounding the valve stem and engaging the piston valve for normally tending to retain said piston on its seat.

9. A control valve for air brake systems comprising a dome-like cylinder having an open end surrounded by a flange, a cylinder head for said open end having a flange opposed to that of the cylinder, means passing through said flanges for securing the cylinder and cylinder head together, said cylinder head having an air passage connectible with a train pipe of an air brake system, said cylinder and said cylinder head having a valve seat, a piston valve operating in the cylinder for engaging said seat to cut off the passage of air into the cylinder, said cylinder head having a bore, magnet wires wound in said bore to form an electromagnet to retain said piston valve on its seat when the magnet is energized, said valve adapted to move off its seat under air pressure, when the magnet is deënergized, said cylinder having an open outlet, means formed in the cylinder walls for shunting the air around the piston valve when off its seat, a valve stem for said valve, means surrounding the valve stem and engaging the piston valve for normally tending to retain said piston on its seat, and means for adjusting said last named means to vary its tension.

10. A control valve for air brake systems comprising a domelike cylinder having an open end surrounded by a flange, a cylinder head for said open end having a flange opposed to that of the cylinder, means passing through said flanges for securing the cylinder and cylinder head together, said cylinder head having an air passage connectible with a train pipe of an air brake system, said cylinder and said cylinder head having a valve seat, a piston valve operating in the cylinder for engaging said seat to cut off the passage of air into the cylinder, said cylinder head having a bore, magnet wires wound in said bore to form an electromagnet to retain said piston valve on its seat when the magnet is energized, said valve adapted to move off of its seat under air pressure, when the magnet is deënergized, said cylinder having an air outlet, means formed in the cylinder walls for shunting the air around the piston valve when off of its seat, and means engaging the piston valve for normally tending to retain said piston valve on its seat.

11. A control valve for air brake systems comprising a domelike cylinder having an open end, a cylinder head secured to said cylinder over said open end, said cylinder head having an inlet port, said cylinder having a pair of outlet ports, the combined cross sectional area of which is slightly less than that of the inlet port, a valve which when held in one position will cut off passage of air through the cylinder from the inlet to the outlet ports, means when the valve is in another position for opening communication between the inlet and outlet ports, and electromagnetic means for retaining the valve in a position to normally cut off communication between the inlet and outlet ports, said valve adapted to open under air pressure.

12. A control valve for air brake systems comprising a dome-like cylinder having an open end, a cylinder head secured to said cylinder over said open end, said cylinder head having an inlet port, said cylinder having a pair of outlet ports, the combined cross sectional area of which is slightly less than that of the inlet port, a valve which when held in one position will cut off passage of air through the cylinder from the inlet to the outlet ports, means when the valve is in another position for opening communication between the inlet and outlet ports, electromagnetic means for rotating the valve in a position to normally cut off communication between the inlet and outlet ports, said valve adapted to open under air pressure, and means independent of the electro magnetic means and tending to hold said valve in its closed position.

13. A control valve for air brake systems comprising a dome-like cylinder having an open end, a cylinder head secured to said cylinder over said open end, said cylinder head having an inlet port, said cylinder having a pair of outlet ports, the combined cross sectional area of which is slightly less than that of the inlet port, a valve which when held in one position will cut off passage of air through the cylinder from the inlet to the outlet ports, means when the valve is in another position for opening communication between the inlet and outlet ports, electromagnetic means for retaining the valve in a position to normally cut off communication between the inlet and outlet ports, said valve adapted to open under air pressure, means independent of the electromagnetic means and tending to hold said valve in its closed position, and means for varying the holding power of said last named means.

14. A control valve for air brake systems comprising a dome-like cylinder having an

open end, a cylinder head secured to said cylinder over said open end, said cylinder head having an inlet port, said cylinder having a pair of outlet ports, the combined cross sectional area of which is slightly less than that of the inlet port, a valve which when held in one position will cut off passage of air through the cylinder from the inlet to the outlet ports, means when the valve is in another position for opening communication between the inlet and outlet ports, electromagnetic means for retaining the valve in a position to normally cut off communication between the inlet and outlet ports, said valve adapted to open under air pressure, a spring coöperating with the valve and normally tending to force it to its closed position together with means carried by the cylinder and engaging said spring for adjusting its tension.

15. A control valve for air brake systems comprising a dome-like cylinder having an open end, a cylinder head secured to said cylinder over said open end, said cylinder head having an inlet port, said cylinder having a pair of outlet ports, the combined cross sectional area of which is slightly less than that of the inlet port, a valve which when held in one position will cut off passage of air through the cylinder from the inlet to the outlet ports, means when the valve is in another position for opening communication between the inlet and outlet ports, electromagnetic means for retaining the valve in a position to normally cut off communication between the inlet and outlet ports, said valve adapted to open under air pressure, a spring coöperating with the valve and normally tending to force it to its closed position together with means carried by the cylinder and engaging said spring for adjusting its tension, said last named means comprising a plug threaded into the cylinder wall and engaging said spring.

16. A control valve for air brake systems comprising a dome-like cylinder having an open end, a cylinder head secured to said cylinder over said open end, said cylinder head having an inlet port, said cylinder having a pair of outlet ports, the combined cross sectional area of which is slightly less than that of the inlet port, a valve which when held in one position will cut off passage of air through the cylinder from the inlet to the outlet ports, means when the valve is in another position for opening communication between the inlet and outlet ports, electromagnetic means for retaining the valve in a position to normally cut off communication between the inlet and outlet ports, said valve adapted to open under air pressure, a spring coöperating with the valve and normally tending to force it to its closed position together with means carried by the cylinder and engaging said spring for adjusting its tension,—said last named means comprising a plug threaded into the cylinder wall and engaging said spring, said plug having a bore, and a valve stem carried by the valve for entering the said bore.

17. In a train stopping mechanism, the combination with the engineers' whistle and the train pipe of the air brake system, of a valve mechanism connected between the train pipe and the signal whistle, means for admitting air under pressure against the valve to tend to open said valve, electromagnetic devices for normally holding said valve closed against the air pressure, said valve when open serving to reduce the air pressure in the train pipe to set the brakes and simultaneously actuate the whistle and mechanical means tending to hold said valve closed against the air pressure to assist said electro-magnetic devices.

18. A brake setting valve for air brake and train stopping systems, comprising a dome-like cylinder having an open end a cylinder head secured over said open end to form a closure therefor, said cylinder head having a magnet wire receiving bore opening into the cylinder, a magnet wire wound therein to form an electromagnet, a retaining ring carried by said cylinder head for holding said wire in place, said cylinder head having a central passage adapted to communicate with the train pipe of an air brake system, a piston valve operable within said cylinder and adapted to seat against said head to close the central passage thereof, said piston valve serving as an armature for the electromagnet, said cylinder having its walls provided with by-pass grooves for shunting air around the piston valve when in its open position, said cylinder having air outlets, said cylinder having a bore of two diameters to form a shoulder to limit the movement of the piston.

19. A brake setting valve for air brake and train stopping systems, comprising a dome-like cylinder having an open end, a cylinder head secured over said open end to form a closure therefor, said cylinder head having a magnet wire receiving bore opening into the cylinder, a magnet wire wound therein to form an electromagnet, a retaining ring carried by said cylinder head for holding said wire in place, said cylinder head having a central passage adapted to communicate with the train pipe of an air brake system, a piston valve operatable within said cylinder and adapted to seat against said head to close the central passage thereof, said piston valve serving as an armature for the electromagnet, said cylinder having its walls provided with by-pass grooves for shunting the air around the piston valve when in its open position, said cylinder air outlets, said cylinder having a bore of two diameters to form a shoulder to limit the movement of the pis-

ton, means within the cylinder for engaging the piston valve and normally tending to hold it against the cylinder head, and means passing through the aperture in the closed end of the cylinder for engaging said last named means to vary its operative force.

20. A brake setting valve for air brake and train stopping systems, comprising a dome-like cylinder having an open end, a cylinder head secured over said open end to form a closure therefor, said cylinder head having a magnet wire receiving bore opening into the cylinder, a magnet wire wound therein to form an electromagnet, a retaining ring carried by said cylinder head for holding said wire in place, said cylinder head having a central passage adapted to communicate with the train pipe of an air brake system, a piston valve operatable within said cylinder and adapted to seat against said head to close the central passage thereof, said piston valve serving as an armature for the electromagnet, said cylinder having its walls provided with by-pass grooves for shunting the air around the piston valve when in its open position, said cylinder having air outlets, a valve stem or rod secured to said piston valve and means for guiding said valve stem.

21. A brake setting valve for air brake and train stopping systems, comprising a dome-like cylinder having an open end, a cylinder head secured over said open end to form a closure therefor, said cylinder head having a magnet wire receiving bore opening into the cylinder, a magnet wire wound therein to form an electromagnet, a retaining ring carried by said cylinder head for holding said wire in place, said cylinder head having a central passage adapted to communicate with the train pipe of an air brake system, a piston valve operatable within said cylinder and adapted to seat against said head to close the central passage thereof, said piston valve serving as an armature for the electromagnet, said cylinder having its walls provided with by-pass grooves for shunting the air around the piston valve when in its open position, said cylinder having air outlets, said cylinder having a bore of two diameters to form a shoulder to limit the movement of the piston, a valve stem for said valve, a plug threaded through the top wall of said cylinder and having a chamber to receive said valve stem and guide the same.

22. A brake setting valve for air brake and train stopping systems, comprising a dome-like cylinder having an open end, a cylinder head secured over said open end to form a closure therefor, said cylinder head having a magnet wire receiving bore opening into the cylinder, a magnet wire wound therein to form an electromagnet, a retaining ring carried by said cylinder head for holding said wire in place, said cylinder head having a central passage adapted to communicate with the train pipe of an air brake system, a piston valve operatable within said cylinder and adapted to seat against said head to close the central passage thereof, said piston valve serving as an armature for the electromagnet, said cylinder having its walls provided with by-pass grooves for shunting air around the piston valve when in its open position, said cylinder having air outlets, said cylinder having a bore of two diameters to form a shoulder to limit the movement of the piston, a valve stem for said valve, a plug threaded through the top wall of said cylinder and having a chamber to receive said valve stem and guide the same and a coil spring surrounding the valve stem to engage said valve and said plug.

JEAN F. WEBB, JR.

Witnesses:
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GEO. P. ELDRIDGE.