(No Model.) 3 Sheets—Sheet 1.

T. R. A. WEBER.

RAILROAD SIGNAL APPARATUS.

No. 360,496. Patented Apr. 5, 1887.

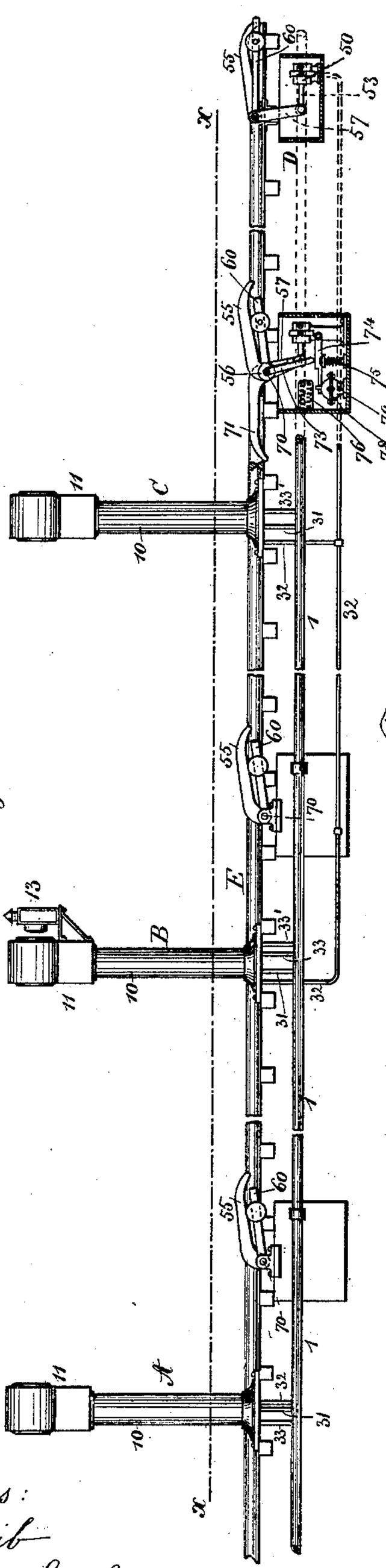

Fig. 2.

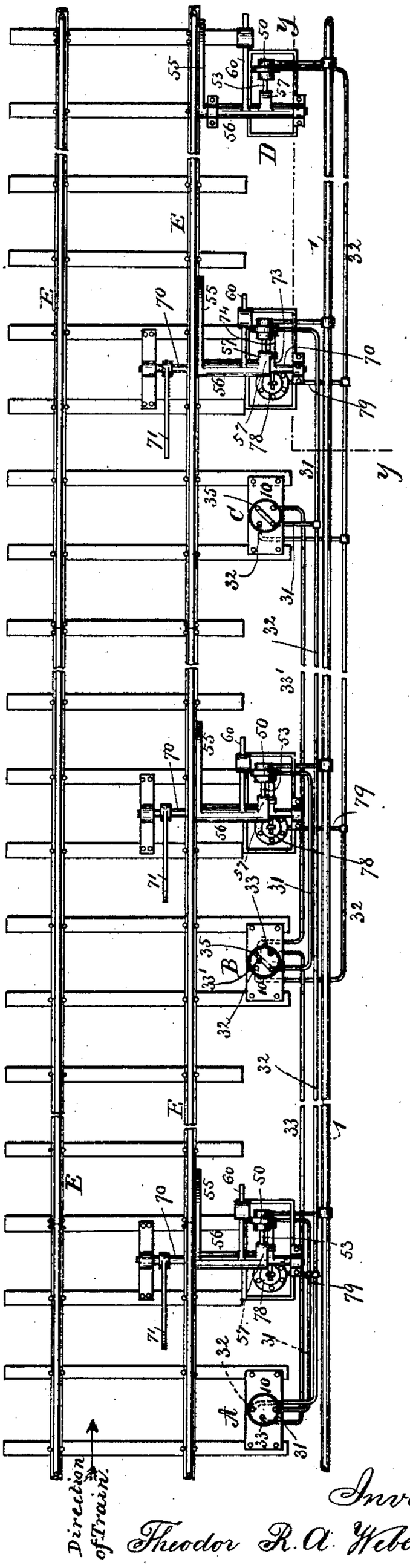

Fig. 1.

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Fig. 4.

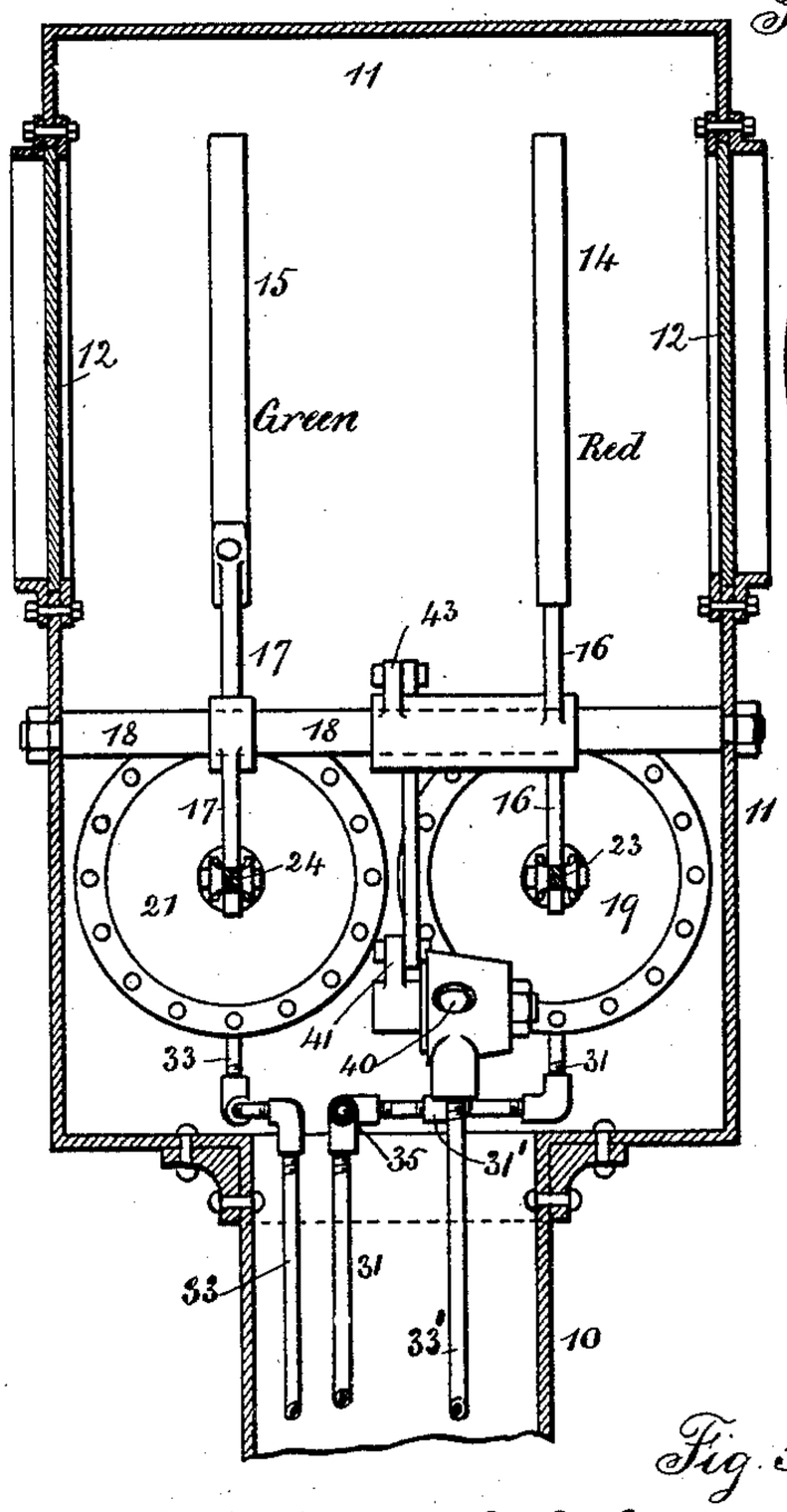


Fig. 3.

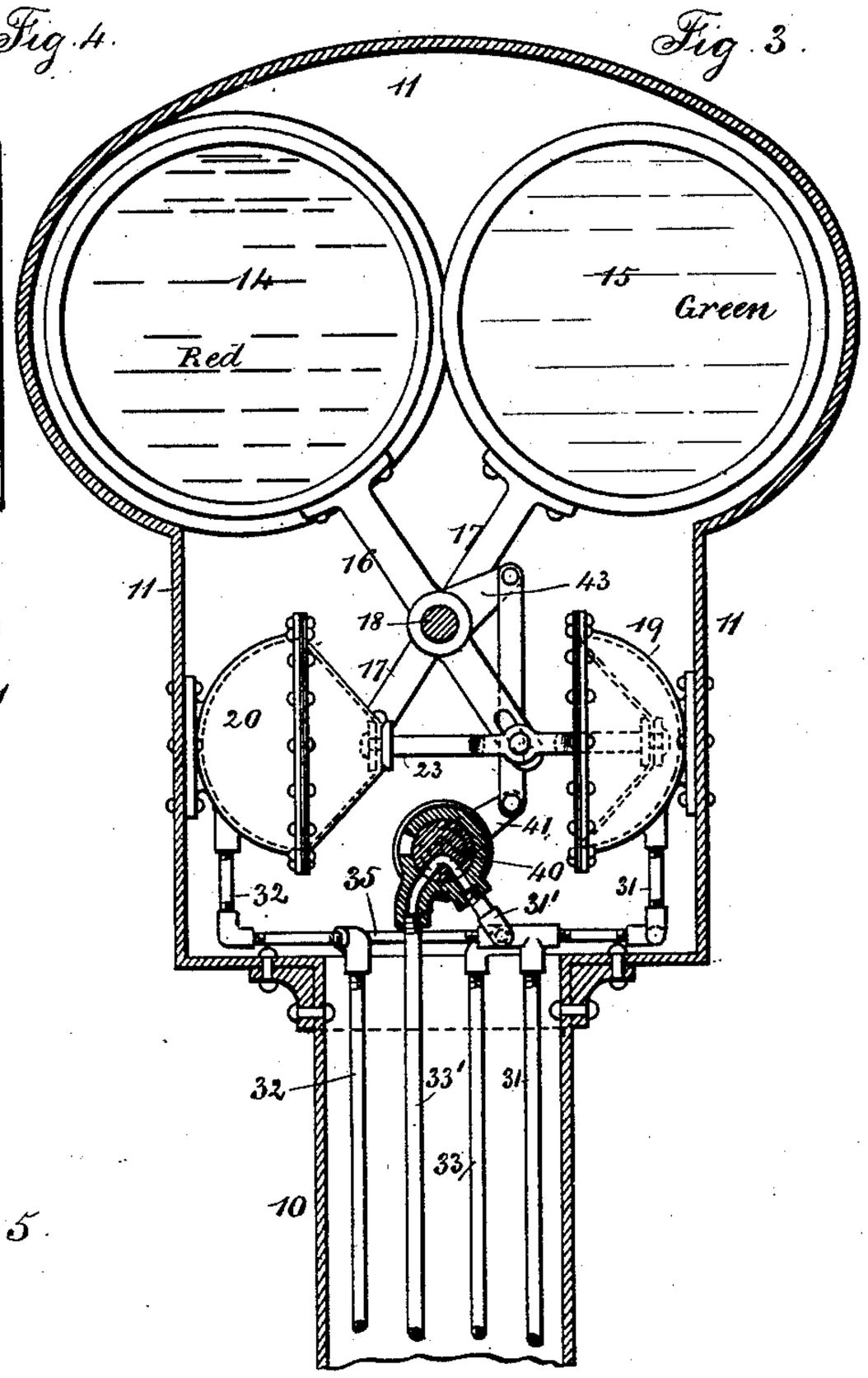
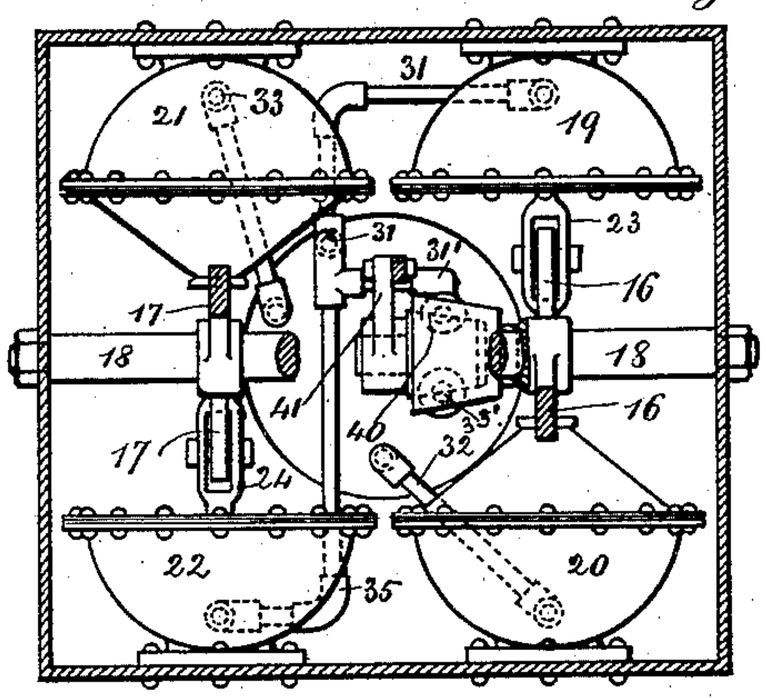
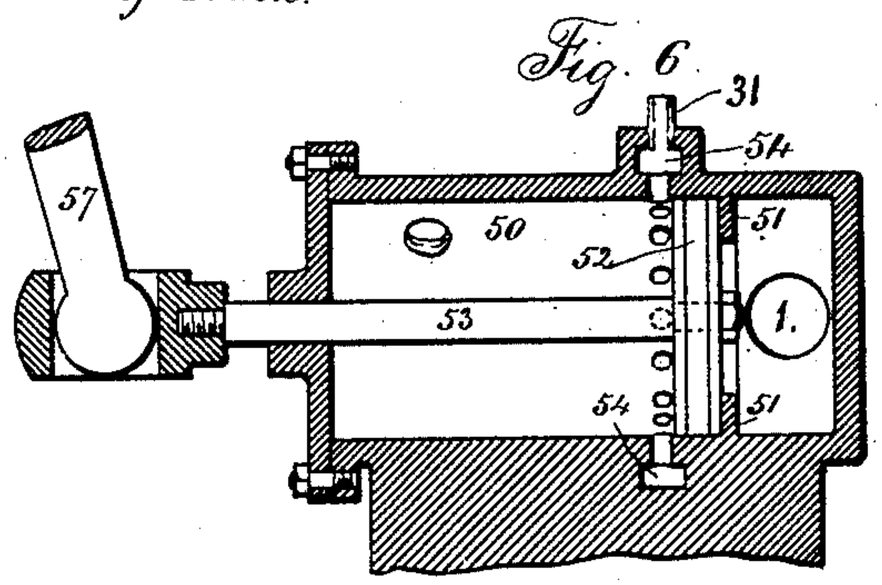


Fig. 5.



Direction of Train.

Fig. 6.



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RAILROAD SIGNAL APPARATUS.

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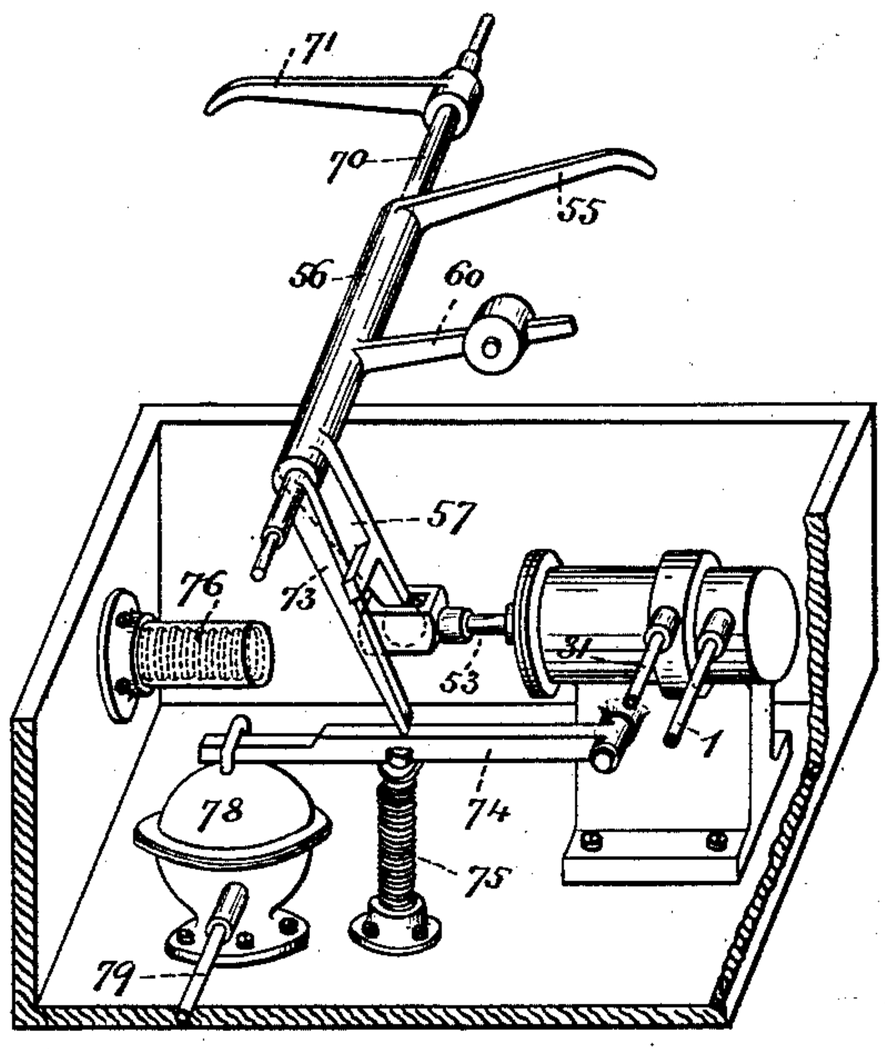
Fig. 7.



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Atty

UNITED STATES PATENT OFFICE.

THEODOR R. A. WEBER, OF NEW YORK, ASSIGNOR TO HIMSELF, CORNELIUS TIERS, AND ALEXANDER H. TIERS, OF NEW YORK, AND JOHN H. PENDLETON, OF BROOKLYN, NEW YORK.

RAILROAD-SIGNAL APPARATUS.

SPECIFICATION forming part of Letters Patent No. 360,496, dated April 5, 1887.

Application filed February 23, 1886. Serial No. 192,831. (No model.)

To all whom it may concern:

Be it known that I, THEODOR R. A. WEBER, of the city and State of New York, have invented an Improvement in Railway-Signals, of which the following is a specification.

The object of this invention is to present a series of signals to the engineer of a passing train by which he may know that the signals are being properly operated by his own train, that he may have a danger-signal always behind his own train, and that this danger-signal may be automatically removed when the next danger-signal is brought into view behind his train.

Presuming that a white light indicates a clear track for the train to proceed, a red light danger, and a green light safety, and at the same time indicates that the apparatus is in working order, the following signals will be given: As the train approaches signaling-point A, the lights at A B C are all white, on passing A a red signal is displayed, and a green signal brought into view at B. On passing B the green signal is changed to red, and a green signal brought into sight at C, the red signal at A continuing. On passing C the green signal is changed to red, a green signal brought into view at the next station ahead, should there be one, and the red signal at station A withdrawn to show white, and so on in succession. These signals may be placed all along the track—say at a quarter of a mile apart—and they will operate regularly in the succession named; or, if only three or four are used in succession near stations, they will be operated in the order named, and the last danger-signal will be withdrawn when the train has passed beyond the same and over an actuating mechanism without a signal-post, so that all the danger-signals are removed.

In the drawings, Figure 1 is a plan view below the line *x x*, Fig. 2, indicating the arrangements of the devices. Fig. 2 is a side elevation of the same, partially in section, at *y y*. Fig. 3 is a section of the signal-box transversely to the track. Fig. 4 is a section of said box longitudinally of the track. Fig. 5 is a sectional plan view of the signal-box. Fig. 6 is a longitudinal section of the valve-cylinder; and Fig. 7 is a perspective view illustrating the shafts and arms for moving the air-valve, &c. Figs. 3, 4, and 5 illustrate the connections at the station B.

The track E is of ordinary character, and the stations A B C D are at suitable distances apart. The pipe 1 extends either along the whole track, or else as far as the signaling system extends. The same is connected to an exhausting apparatus actuated by power, so that a vacuum is produced in said pipe 1, and the signals are actuated by atmospheric pressure at one side of a diaphragm septum or piston whenever the vacuum is allowed to act upon the other side. My system of successive signals before named may be brought into action by the vacuum through the agency of different mechanism from that next described; but I prefer such mechanism as simple and not liable to derangement.

Signal-box.—The post 10 supports a box, 11, which is preferably elliptical, with two plain glasses, 12, at the side and in line with each other, and a lamp, 13, should be provided for each box to illuminate the signal toward the approaching trains. Within the box are two signals—the red one, 14, and the green one, 15. These signals are transparent, preferably of glass, and set in frames upon the ends of levers 16 and 17, and these swing upon the pivots 18 by means of diaphragms attached at their edges to the hemispherical shells 19 20 21 22. The diaphragms face each other and are connected in pairs by the bars 23 24, and these are hinged to the levers 16 and 17, respectively.

There are pipes to the respective shells. When the vacuum acts through the pipe 31 in shell 19, the red signal 14 is brought into sight. When it acts in 20 through pipe 32, the red signal 14 is thrown back out of sight. When the vacuum acts in 21 through pipe 33, the green signal 15 is brought into sight, and when it acts in 22 through pipe 35 the green signal is thrown back out of sight.

The apparatus at station B is shown in Figs. 3, 4, and 5. The apparatus at station A is similar, except that there is no green signal or parts to operate the same, because, said station

A being the first one on the line, the green signal could not be operated before the train reaches the station, as is the case at station B. The cock 40 is turned by a handle, 41, connected to an arm, 43, upon the hub of the lever 16. When in one position, the plug opens a passage between the pipes 33′ and 31′. This occurs when the red signal 14 is displayed, and when the red signal is removed the plug is turned the other way to close the pipe 31′, and admits air into the pipe 33′ by an opening in the barrel of the cock. The pipe 31′ is a branch from the pipe 31 to the shell 19, and the pipe 33 from the shell 21 (at B) leads to the cock 40 at station A, (entering such cock in the position of the pipe 33′, Fig. 3;) hence when the red signal at station A is brought into view by the vacuum in 31 and 19 at that station A the cock 40 is turned and opens a passage for the vacuum to extend in its action to the next station, B by drawing the air out of the pipe 33, leading to the shell 21 at station B, and the vacuum being produced therein draws on the rod 24 and displays the green signal 15 at such station B, and when the red signal 14 at station A is swung back, as hereinafter described, the cock 40 at that station again closes pipe 31′ to vacuum and admits air into pipe 33. The atmospheric pressure, however, has been admitted into the pipe 31, shell 19, pipe 31′, pipe 33, at station A, by the gradual return of the piston-valve, hereinafter described, to the normal position, so as to allow the air to pass to the shell 21 at station B by the pipe 33; hence a vacuum can thereafter act in the shell 22 at station B to throw the green signal out of sight, as hereinafter described. The admission of the air at the valve 40 does not change the signals, but simply allows the pressures to be balanced.

The pipe 31, that passes to the shell 19, has a branch, 35, to the shell 22, so that when the vacuum is allowed to act in 19 to display the red signal 14 it simultaneously acts in 22 to throw the green signal of the same box back out of sight, and the green signal will remain in this position by its weight and leverage even after the atmosphere has been admitted into 31 and 35 and the pressures are equalized at opposite sides of the respective diaphragms, and when the vacuum is allowed to act in the pipe 32 and shell 20 to throw the red signal 14 out of sight it does not disturb the green signal in so doing.

The means for allowing the vacuum to act in the respective pipes may be of any desired character; but I prefer to use the cylinder 50, having a ring-seat, 51, against which the piston-valve 52 is drawn by the vacuum action in the pipe 1. This piston 52 has a rod, 53, by which it is moved, and passes the ring of ports to the annular passage 54, so that the vacuum acts therein and in the pipes leading therefrom.

I prefer to use an inclined arm, 55, upon a shaft, 56, with an arm, 57, to the piston-rod 53, and this arm 55 is adjacent to the track-rail, so that the wheels run over the same and move the piston-valve 52 and bring the vacuum into action. There is an arm, 60, on the shaft 56, and an adjustable weight that partially counterpoises the atmospheric pressure on the piston-valve, so that the same will close gradually after the train has passed.

The pipe 31 is connected at one end to the passage-way 54 around the cylinder 50, so that when the valve 52 is drawn from its seat 51 the vacuum in pipe 1 extends by 54 into pipe 31 and parts connected with it, and when the valve 52 is on its seat 51 the passage 54 and pipe 31 are open to the atmosphere. (See Fig. 6.) By bearing in mind the statements before made, it will now be understood that when the train passes station A it acts on the valve 52, admitting the vacuum to act through the pipe 31 to display the red signal at A, and the movement of the rod 23 and red signal and arms 43 41 turns the cock, allowing the vacuum action in the pipe 31 31′ at station A to extend by 33 to the shell 21 at station B, and display the green signal. When the train reaches B and moves the valve 52 at that station, the vacuum acts in 19 to display the red signal, and, acting simultaneously through pipe 35 and shell 22, throws back the green signal, and the cock 40 at station B opens the communication between 31′ and 33, leading to 21 at station C, throwing the green signal into view and still allowing the red signal at A to remain in view. When the train reaches station C, the vacuum is allowed to act in the pipes 31 and 35 to throw the red signal into view and move the green signal back at that station C, and at the same time to withdraw the red signal at station A, because the extension 32 of the pipe 31 goes from the station C to the station A, and connects with the pipe leading to the shell 20 at said station A.

If the system is extended along the entire track, all the signal-boxes will be alike, and all will have the connections shown as at station B. If the system commences with station A, there will be no green signal there, and if the system terminates at station C, then there will be an air-valve at station D, but no signal-post, and the vacuum-pipe, extending back from this valve, will be connected to both stations B and C to simultaneously withdraw the red signal by acting through pipe 32 in the shells 20.

In addition to the visual signals aforesaid, I make use of a mechanical signal to the train. With this object in view I make the shaft 56 tubular, and pass through the same the shaft 70, on one end of which is the arm 71, that is adapted, when elevated, to act upon a lever or any device on the train to ring the bell or blow the whistle. At the other end of the shaft 70 is an arm, 73, that is acted upon by a finger upon the arm 57 and pushed back and latched by the lever 74, the spring 75 throwing the

same up. The buffer 76 limits the movement and prevents concussion by the sudden movements of the parts.

There is an elastic diaphragm in the vessel 78, and a loop from the same to the end of the lever 74, and the pipe 79 from this vessel 78 connects with the pipe 32, so that the arm 71 remains in an elevated position to act upon the alarm if the train runs past the station where the red signal is displayed; but when the vacuum acts to throw back the red signal, it also draws down the diaphragm, unlatches the lever 73, and allows the arm 71 to drop out of the way.

I claim as my invention—

1. The combination, with the signal and the lever for moving the same, of two flexible diaphragms directly connected together and to the lever, and shells facing each other, and to which the edges of the respective diaphragms are connected, and vacuum-pipes leading to the respective shells, so that the signal is moved by drawing the diaphragm into the shell by the vacuum action, substantially as set forth.

2. The combination, in a signal-box, of two signals of different colors, levers for moving the same, diaphragms and shells in pairs, connected together and to the levers of the signals, and vacuum-pipes for actuating the signals, substantially as set forth.

3. In a system of railway-signals, the signal-boxes at suitable distances apart and the signals in the same, and the vacuum and connecting pipes arranged substantially as specified, and a valve acted upon by the passing train, and a second valve or cock acted upon by the signal, whereby a danger-signal is displayed at the station that is being passed, another signal is displayed at the next station ahead of the train, and the danger-signal at a station in the rear is withdrawn, substantially as set forth.

4. The combination, with the railway-signal and its actuating diaphragms, shells, and connecting-pipes, of a piston-valve, a lever acted upon by the train to move the same, a cylinder containing the valve, having a seat for such valve, a pipe connecting to the main exhaust or vacuum pipe and ports, and a passage-way around the cylinder, and a pipe leading to the signal-box, substantially as set forth.

5. The combination, with the visual signals and the box containing the same, of the diaphragms and shells for giving motion to the signals, the vacuum-pipes and valve acted upon by the passing train, a lever-arm to act upon a passing train and give an audible signal, a latch to retain such lever-arm in an elevated position, and a diaphragm acted upon by the vacuum to unlatch the lever-arm simultaneously with the withdrawal of the visual signal, substantially as set forth.

6. The combination, with a range of signal-boxes and the signals in the same, of a vacuum-pipe extending along the track to each signal-station included in the system, a valve actuated by the passing train to allow the signal to be changed by the vacuum action, and a valve connected with the vacuum-pipes for admitting or excluding air, and a connection from the same to one of the signals, whereby atmosphere is admitted after the signal has been turned by the vacuum action, substantially as set forth.

7. The combination, with a range of signal-boxes and the signals in the same, of a vacuum-pipe extending along the track to each signal-station included in the system, a valve actuated by the passing train to allow the signal to be changed by the vacuum action, and a cock moved by the signal, and a pipe extending to the next station ahead, whereby the vacuum is caused, also, to move another signal ahead of the moving train, substantially as set forth.

Signed by me this 18th day of February, A. D. 1886.

THEODOR R. A. WEBER.

Witnesses:

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WILLIAM G. MOTT.