No. 775,199. PATENTED NOV. 15, 1904.

C. R. TRAXLER.

RAILWAY SIGNAL.

APPLICATION FILED DEC. 31, 1903.

NO MODEL. 4 SHEETS- SHEET 1.

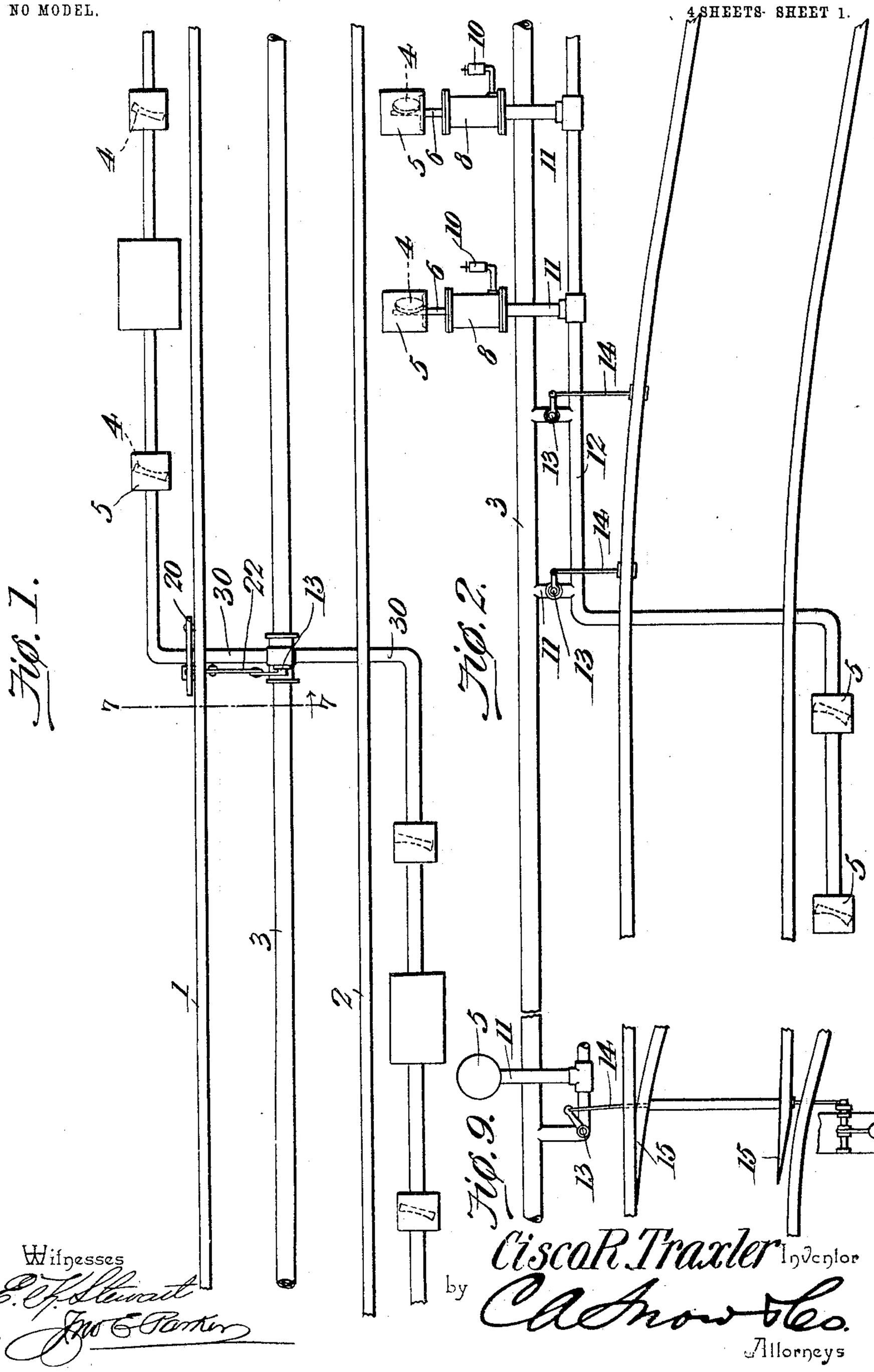

Fig. 1.

Fig. 2.

Fig. 9.

Witnesses
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NO MODEL. 4 SHEETS—SHEET 2.

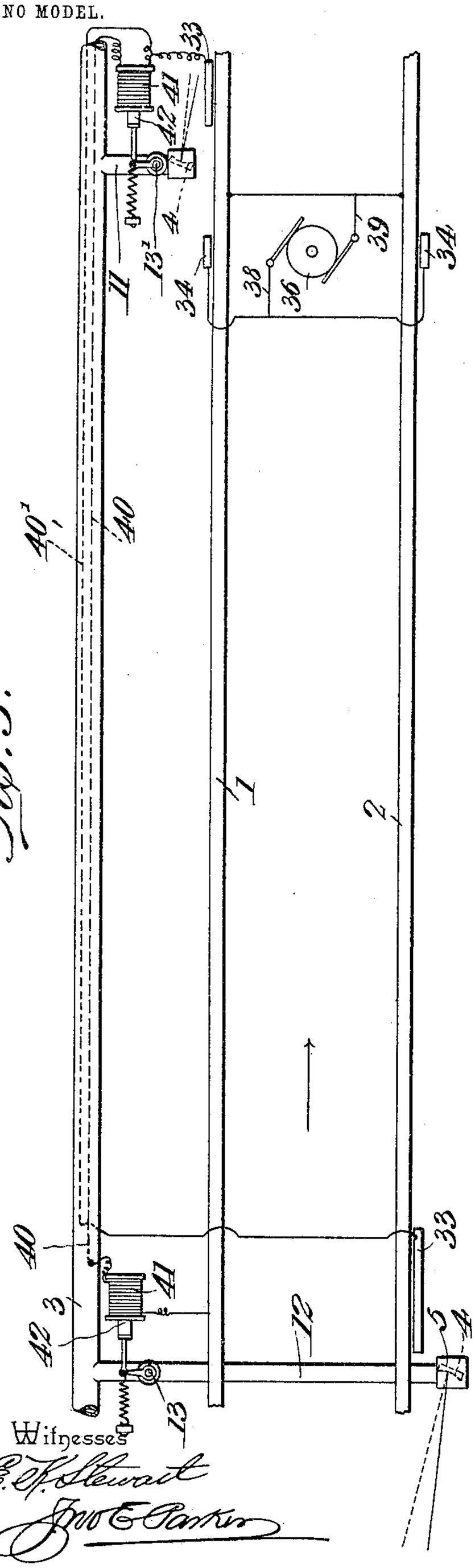

Fig. 3.

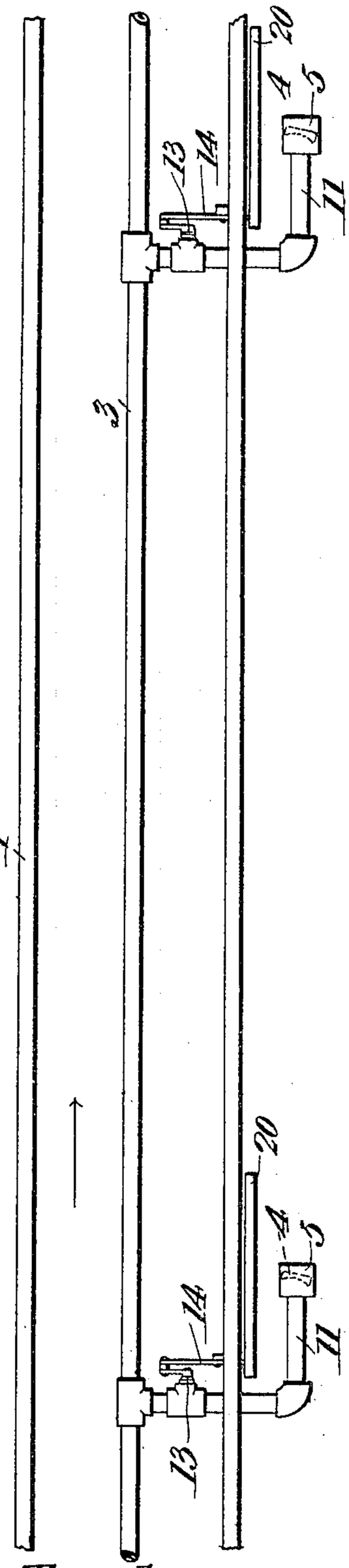

Fig. 4.

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NO MODEL. 4 SHEETS—SHEET 3.

Fig. 5.

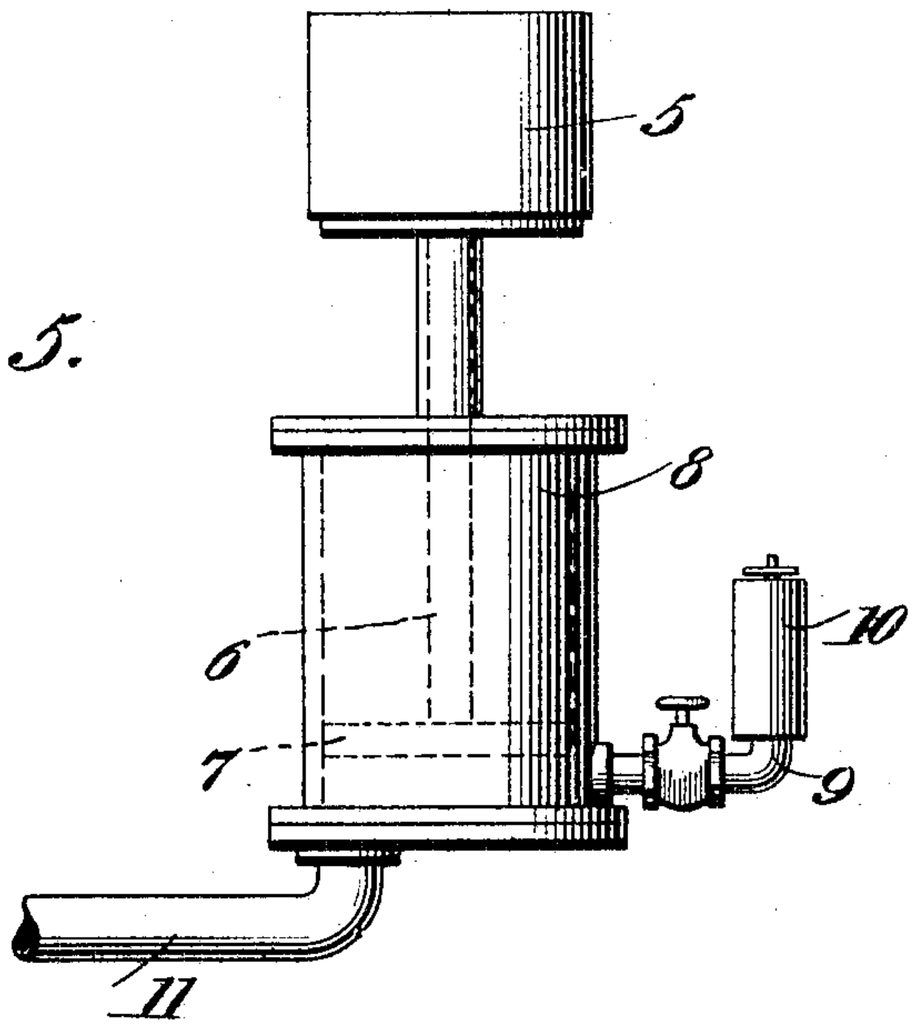


Fig. 6.

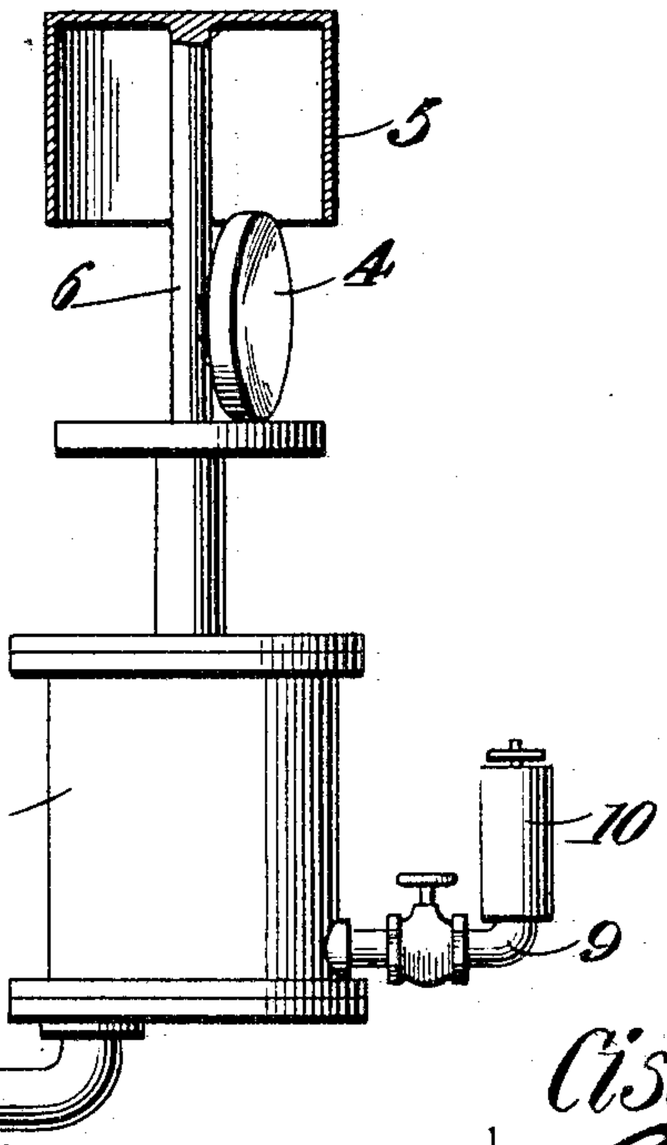
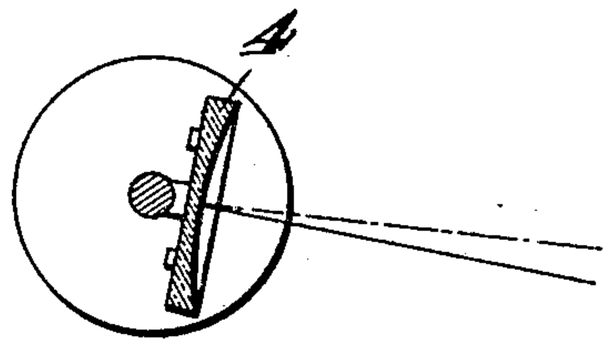


Fig. 11.



Witnesses

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RAILWAY SIGNAL.

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NO MODEL. 4 SHEETS—SHEET 4.

Fig. 7.

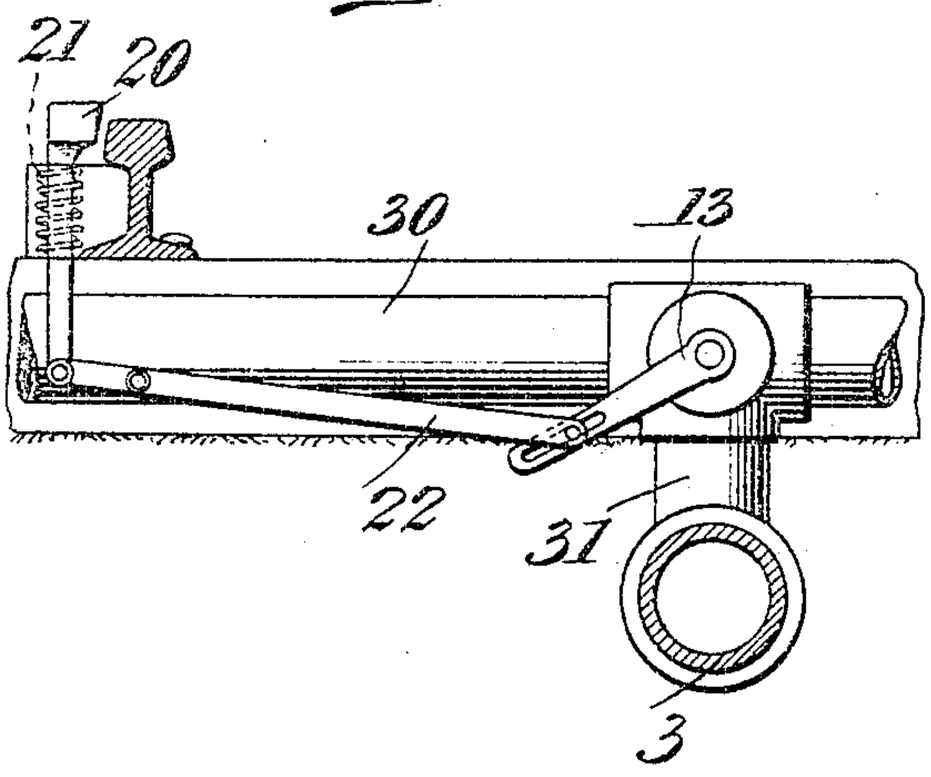


Fig. 8.

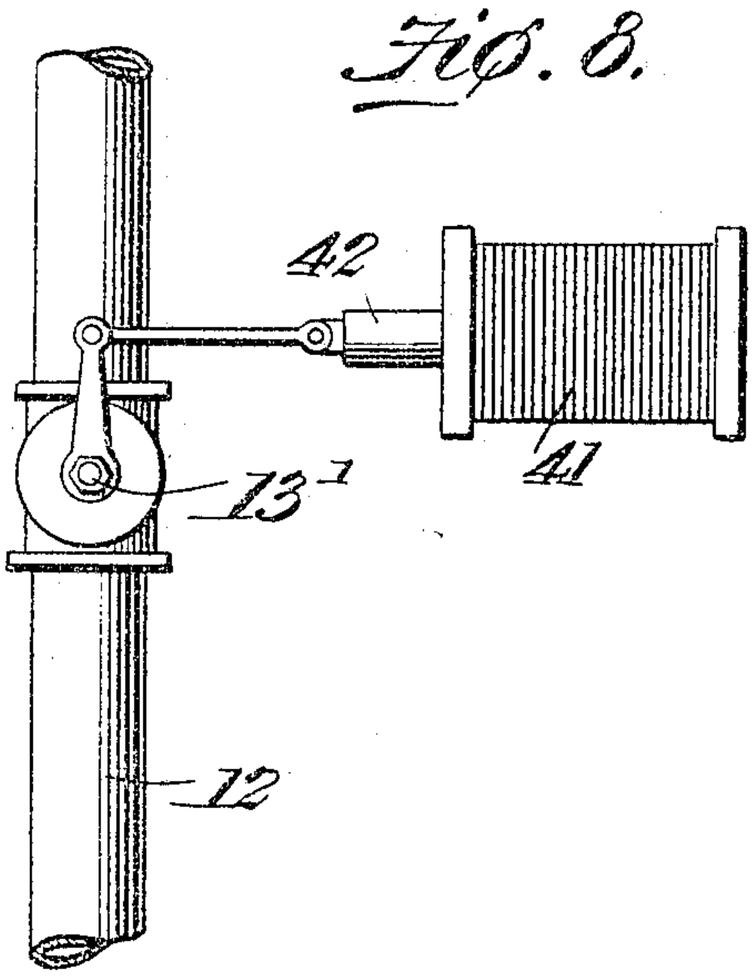


Fig. 12.

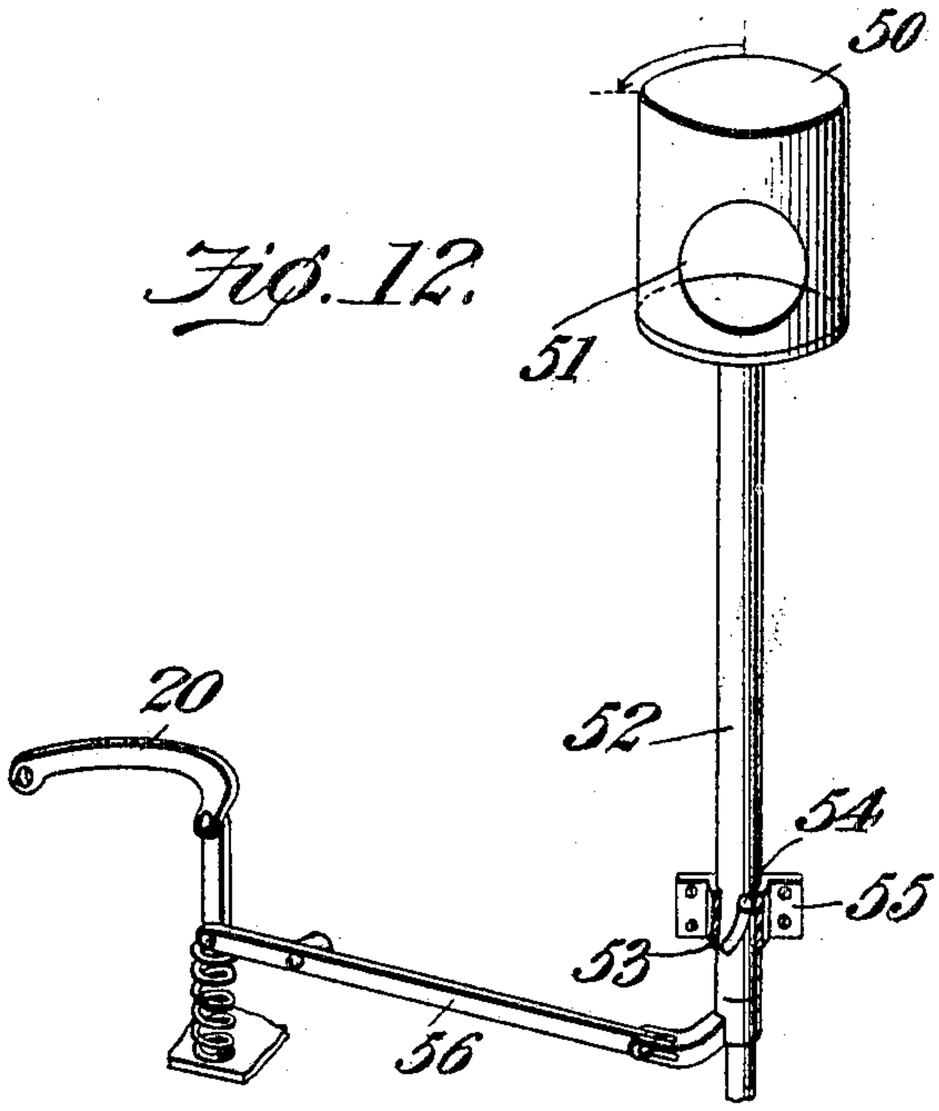
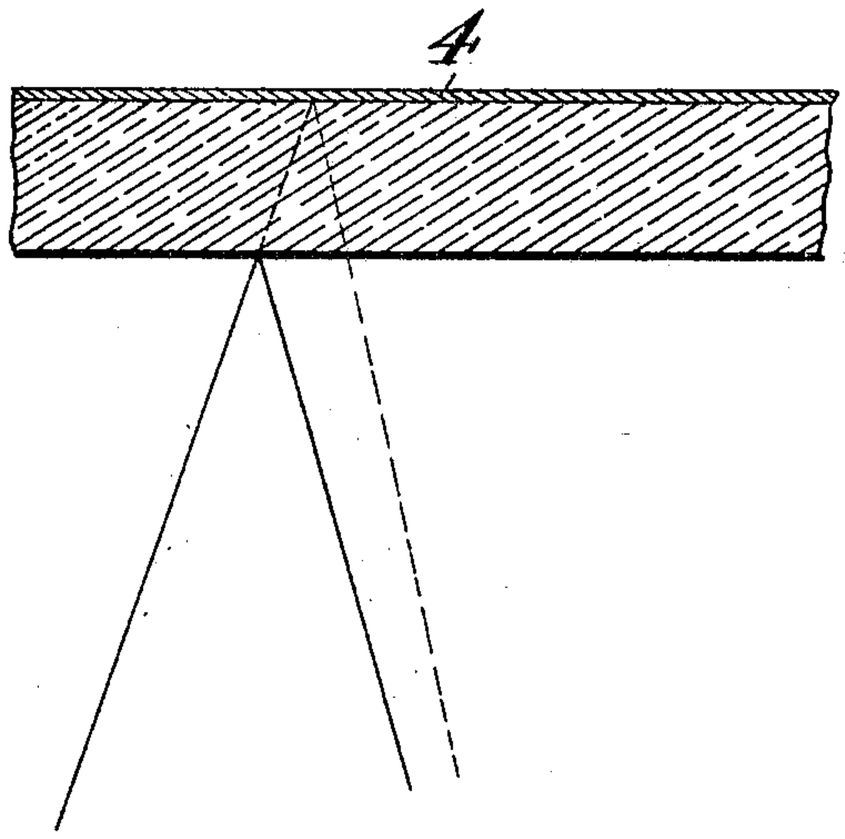


Fig. 10.



Witnesses

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No. 775,199. Patented November 15, 1904.

UNITED STATES PATENT OFFICE.

CISCO R. TRAXLER, OF WINSTON SALEM, NORTH CAROLINA.

RAILWAY-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 775,199, dated November 15, 1904.

Application filed December 31, 1903. Serial No. 187,332. (No model.)

To all whom it may concern:

Be it known that I, CISCO R. TRAXLER, a citizen of the United States, residing at Winston Salem, in the county of Forsyth and State of North Carolina, have invented a new and useful Railway-Signal, of which the following is a specification.

This invention relates to certain improvements in railway-signals and railway signal mechanisms of that general class employed for displaying a signal to an approaching train in the event of open switches, the movement or breakage of rails, or in block systems the approach of trains within a danger limit.

One of the objects of the invention is to provide a signaling mechanism which will automatically display a signal visual and audible in its character when a train approaches a dangerous position, whether it be in the nature of another train or an open switch, spreading of the rails, or such other damage as may ordinarily occur in the operation of railway systems.

A further object of the invention is to provide means whereby an approaching train is warned by a signal of distinctive character which at night will reflect the light-rays of the locomotive-headlight and throw a strong light across the track or directly against the cab in accordance with the position of the engine, so that an engineer cannot pass the signal without observing it.

A still further object of the invention is to provide signaling means whereby at the end of each block or at other predetermined points a plurality of signals will be displayed, so that in the event of the train passing the first of the signals a second will attract attention.

A still further object of the invention is to provide signaling means which will automatically display a danger-signal should one of the rails move from position.

A still further object of the invention is to provide for the display of a danger-signal in case a switch is misplaced.

A still further object of the invention is to provide a signaling system in which a pipe or tube extending throughout the signaling limit is employed as a compressed-air reservoir and connected to auxiliary operating means that are automatically set into operation on the passage of a train or in case of accident, so that all of the signals may be positively operated from a central source of power.

A still further object of the invention is to provide signal-operating mechanism of electropneumatic character wherein the air-conducting pipe or tube is employed also as a protective conduit for the current-conducting wires.

With these and other objects in view, as will more fully hereinafter appear, the invention consists in the novel construction and arrangement of the system and its operative mechanism hereinafter described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in the form, proportions, and minor details of the invention may be made without departing from the spirit or sacrificing any of the advantages of said invention.

In the drawings, Figure 1 is a diagram illustrating a single-track railway provided with block-signals arranged in accordance with the invention. Fig. 2 is a similar view illustrating the signaling system as employed for the purpose of detecting and in displaying an alarm or signal in the event of a displaced rail. Fig. 3 is a diagram of a single-track system illustrating a block-signaling system in which the signal-controlling mechanism is set into operation partly by means of electromagnets. Fig. 4 is a diagram of a portion of a two-track railway system, showing the arrangement employed for the display of rear-end signals. Fig. 5 is an elevation of one of the signaling mechanisms, the signal being concealed. Fig. 6 is a similar view, partly in section, showing the signals exposed. Fig. 7 is a detail view showing the preferred arrangement of the valve-actuating mechanism. Fig. 8 is a similar view showing an electromagnetically-operated valve. Fig. 9 is a plan view of a signaling mechanism as arranged for use in connection with a switch. Fig. 10 is a detail view of one of the reflectors employed as a visual signal. Fig. 11 is a sectional plan view showing the arrangement of one of such mirrors. Fig. 12 is a detail perspective view illustrating a modification of the mirror-shield.

Similar numerals of reference designate cor-

responding parts in all the figures of the drawings.

The system and apparatus forming the subject of the present invention may be used in connection with either single-track or double-track railways, and its application to both classes is illustrated in the accompanying drawings.

In Fig. 1 there is shown a portion of a railway system including traffic-rails 1 and 2. Arranged parallel with the tracks is a pipe or tube 3, that extends from a central power-station for any desired distance along the track, and at the power-station is an air-compressing means whereby the pressure of air is maintained in the tube.

At such points as may be desired are arranged signaling devices and operating mechanisms that vary in their character to an extent dependent upon the work which they are to perform; but in each case it is preferred to employ a reflecting-signal 4, that is formed of glass, polished metal, or such other material that when exposed to the light-rays of the locomotive-headlight will reflect a dazzling light which will instantly attract the attention of the engineer, and these reflectors are arranged at such an angle with respect to the line of the road that the light-rays reflected from the mirror will be directed against the engine or in some cases across the roadway, the signal being of such a pronounced character as to invariably attract the attention of the engineer.

The reflector 4 is normally concealed by a shield 5, which may be moved to expose the reflecting-surface, and this shield may be movable either vertically or laterally, or it may be in the form of a revoluble cylinder having at one point an opening for exposing the reflector.

In Fig. 5 the shield is shown as connected to a vertically-movable rod 6, that is secured at its lower end to a piston 7, arranged within a cylinder 8, the piston-packing being of such character as to prevent the leakage of air. At the lower end of the cylinder is connected an auxiliary chamber 9, that is connected to a whistle 10 and which also forms a vent for the discharge of the air which operates the piston. When air under pressure is allowed to pass into this cylinder, the piston is raised and the shield 5 is moved in such manner as to expose the reflecting-surface 4. The vent leading to the whistle-chamber is comparatively small; but air will pass to the whistle in sufficient quantities to sound an audible alarm during all the time the signal is being elevated. The vent to the signal-chamber is so small that after the air-pressure is shut off the air in the cylinder can escape but slowly, and a comparatively long time will elapse before the shield again covers the reflecting-surface. During the downward movement of the shield the air will pass to the whistle, so that the audible alarm will be sounded so long as the visual signal is displayed.

At each point where a signal is to be displayed there is arranged an auxiliary air-pipe 11, that is connected by one or more branch pipes 12 to the main air-pipe 3, and in each of the branches is a cock 13, which may be turned in case of derangement of any portion of the system in order to allow air to flow from the main pipe to the auxiliary pipe, and said auxiliary pipe is connected to the lower end of the cylinder 8 and serves as a duct for the compressed air employed as a signal-actuating means.

To sound a signal and to display the reflecting-surface in case of movement of a rail, as in accidental spreading of a rail on a curved or on any other portion of the road-bed, the traffic-rails are connected at intervals to the cocks 13 by means of bars or fingers 14, so that should one of the traffic-rails move in such manner as to alter the road-gage the nearest cock will be opened and the compressed air allowed to flow to the signaling means.

The signaling mechanism may be operated in a somewhat similar manner for the purpose of displaying a danger-signal in case of an open switch, an open drawbridge, or similar derangement, and in Fig. 9 there is shown a switch-point 15, connected by one of the arms or fingers 14 to a cock 13, so that when the switch is in the wrong position, either open or closed, the compressed air may be allowed to flow from the main pipe 3 to the cylinder 8 and display the visual signal and sound the audible signal.

In the operation of double-track roads, where trains run in one direction on one track and in the opposite direction on the other track, the modern block systems seek only to protect the rear of the train, and in carrying out the present invention provision is made for the display of rear-end signals of the same type as those already described; but as an additional precaution the signals are plural in character, so that an engineer on reaching the first signal will understand that it is displayed merely as a caution signal and must have his train under control. When reaching the second signal, it will be his duty to stop until the shield again covers the reflecting-surface, so that the train ahead will be protected from a rear-end collision, and in this connection it is to be observed that between each of the shield-operating cylinders and the whistle-chamber a controlling-valve is placed, so that the area of the vent may be properly regulated and the signal prevented from movement to safety position until a predetermined period of time has elapsed. This period will of course depend on the nature of the traffic and the distance between the different signals; but in every case the valve should be adjusted so

that the following train cannot encroach on the time period of a preceding train.

In order to operate the block-signal system, it is preferred to employ a small section of flange-rail 20, disposed alongside of one or the other of the traffic-rails in such position that it may be engaged and depressed by the wheels of a passing train. This flange-rail is preferably tapered or inclined in order to avoid unnecessary jar when it is engaged by the wheels of a train, and it is supported by a suitable spring 21, that serves as a restoring means after the train has passed. The flange-rail is connected by an arm 22 to one of the cocks 13, and when said cock is open air is allowed to flow to the auxiliary pipe 11 and from thence to a pair of signals 4, that are spaced at suitable distances from each other—in practice from five hundred to one thousand yards apart—so that the engineer will first see the caution-signal and then a second or danger signal. When these signaling devices are employed in connection with block systems of the character specified, the character of the first signal may differ from that of the second or danger signal, as by changing size or change of color, especially where the reflecting-surfaces are formed of glass or such other material as will change or alter the color of the light-rays, so that the first signal which the engineer sees will be the universal caution or green signal and the second the red or danger signal.

The invention is further applicable to single-track systems where trains travel in opposite directions on the same track, and in Fig. 4 there is shown a system of this character in which the number of signals is multiplied in order to display a plurality of signals to trains which may approach in either direction.

Adjacent to the end of the block is placed one or more of the flange-rails 20, and the main air-supply pipe 3, which is preferably underground, is connected to an auxiliary pipe 30 by means of a branch pipe 31, having a suitable valve 13 connected to the flange-rail. The auxiliary pipe 30 is carried by the ties and its central portion extends transversely across the road-bed, while the opposite ends extend respectively in opposite directions parallel with the rails and connected to signaling devices of the character previously described, so that a passing train will actuate all four of the signals, and thus notify trains approaching in both directions of impending danger.

In single-track railways it is further desirable to establish positive blocks at certain points, so that when a train enters a given block it will automatically set danger-signals at both the entrance and the exit ends of that block, so that no train can enter an occupied block. In carrying out this portion of the invention the compressed-air tube is connected to signaling devices arranged at opposite ends of the block, as shown in Fig. 3, and at the ends of the block are contact brushes or strips 33 for engagement by contact-plates 34, carried by but insulated from the locomotive or tender, and one of these plates is arranged on each side of the train, so that the contact will take place without regard to the direction of movement of the train. On each train, preferably on the tender of the locomotive, is a source of electrical energy, shown in the present instance as in the form of a dynamo 36, of which one brush is connected by a wire 38 to both plates 34. The opposite brush is connected by a wire 39 to the metal of the engine and, of course, to the traffic-rail or ground. Through the main air-pipe extend two insulated current-conducting wires 40 and 40′, the pipe serving in this instance both as an air-duct and as a protective device for the wire. The wire is connected with two electromagnets 41, that are employed in series with a source of electrical energy on the train whenever one of the plates 34, carried by the train, engages a brush 33. When this occurs at the entrance of a train into a block in either direction, the electromagnets at both ends of that block will be energized. The electromagnets are preferably in the form of solenoids, and their cores are connected to air-cocks 13′, controlling the flow of air from the main pipe to the signal-actuating cylinder. Both of the signals will be simultaneously set to danger position, and the vents serving as air-escapes from the cylinders will be so adjusted as to maintain the signals in proper position for a length of time sufficient to enable the train to travel from one end of the block to the other.

It is evident that the signaling system may be further employed in connection with railways where separate tracks are used for trains traveling in opposite directions, respectively. Thus in Fig. 4 is shown a single signal at the entrance end of each block, so that a train traveling in the direction of the arrow will actuate and display a rear-end signal each time it enters a block. This is in accordance with the modern practice of rear-end protection.

The signal-shield may be of the construction illustrated in Fig. 12, wherein the shield-casing 50 is in the form of a cylinder having a display-opening 51. The cylindrical shield is mounted at the upper end of a shaft 52, having a cam-slot 53 near its lower end, and entering this slot is a pin 54, that is carried by a fixed bracket 55. The shaft is connected by a suitable lever 56 to one of the flange rails or shoes 20 to be depressed by the wheels of a passing train, and when the shaft is elevated it will also be turned in the direction of the arrow in order to move the display-opening opposite the signal.

Having thus described the invention, what is claimed is—

1. In railway signaling devices, a reflecting-

surface, means for covering the same, and automatic means for moving the cover to expose the reflecting-surface.

2. In railway signaling devices, a reflecting-surface, a cover therefor, and automatic means for moving the cover to expose the reflecting-surface.

3. In railway-signals, a reflecting-surface, a protecting-cover therefor, and automatic means for exposing the reflecting-surface.

4. In railway-signals, a reflecting-surface, a protecting-cover therefor, a compressed-air cylinder, a piston arranged therein, and connected to the cover, and automatic means for governing the flow of air to said cylinder.

5. In railway-signals, a visual and an audible signal, a cylinder having a vent leading to the audible-signal-actuating means, a piston disposed in the cylinder and connected to the visual signal, a source of compressed-air supply, and automatic means for permitting the flow of compressed air to the cylinder, and from thence to the vent thereby to act both signals.

6. In railway-signals, visual and audible signals, a cylinder having a vent in communication with the audible signal, a piston disposed in the cylinder and operating the visual signal, means for controlling the flow of compressed air into the cylinder, the vent serving as a passage for air and the sounding of the audible signal during all the time the visual signal is displayed.

7. In railway-signals, a visual signal, an audible signal, a cylinder, a piston arranged therein and connected to the visual signal, means for supplying compressed air to the cylinder to operate the piston, and an adjustable means for controlling the discharge of air from the cylinder to the audible signal and the time period during which the signal is displayed and the audible signal sounded.

8. In railway-signals, a reflector, a vertically-movable cover forming a shield for the reflector, a cylinder, a piston disposed therein, and connected to the cover or shield, means for automatically controlling the flow of air into said cylinder, a whistle-chamber, a whistle, and a valved connection between the whistle and the whistle-chamber.

9. In railway signaling systems, a compressed-air duct extending parallel with the road-bed, a signal-displaying device, a valved connection with the displaying device and the duct, and arms connecting the traffic-rails and valve whereby movement of the rails will cause opening movement of the valve.

10. In railway-signals, a compressed-air duct extending parallel with the road-bed, a signaling means having valved connection with the duct, a movable switch-point, and means connecting the switch-point to the valve so that movements of the switch-point will be transmitted to the valve.

11. In railway signaling systems, a compressed-air duct parallel with the road-bed, signals arranged at points distant from each other, signal-operating means, electromagnetically-controlled valves for placing the duct in communication with the operating means, a current-conductor passing through the duct and protected thereby, stationary contacts arranged on the road-bed and forming circuit-terminals, a source of electric energy arranged on each train and contact members carried by the train and connected to said source of electrical energy, said contacts being adapted to engage the road-bed contacts and complete the circuit.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

CISCO R. TRAXLER.

Witnesses:

J. Ross Colhoun,

C. E. Doyle.