No. 793,675. PATENTED JULY 4, 1905.

M. D. MOORE.

PNEUMATIC RAILWAY SIGNAL.

APPLICATION FILED AUG. 27, 1904.

4 SHEETS—SHEET 1.

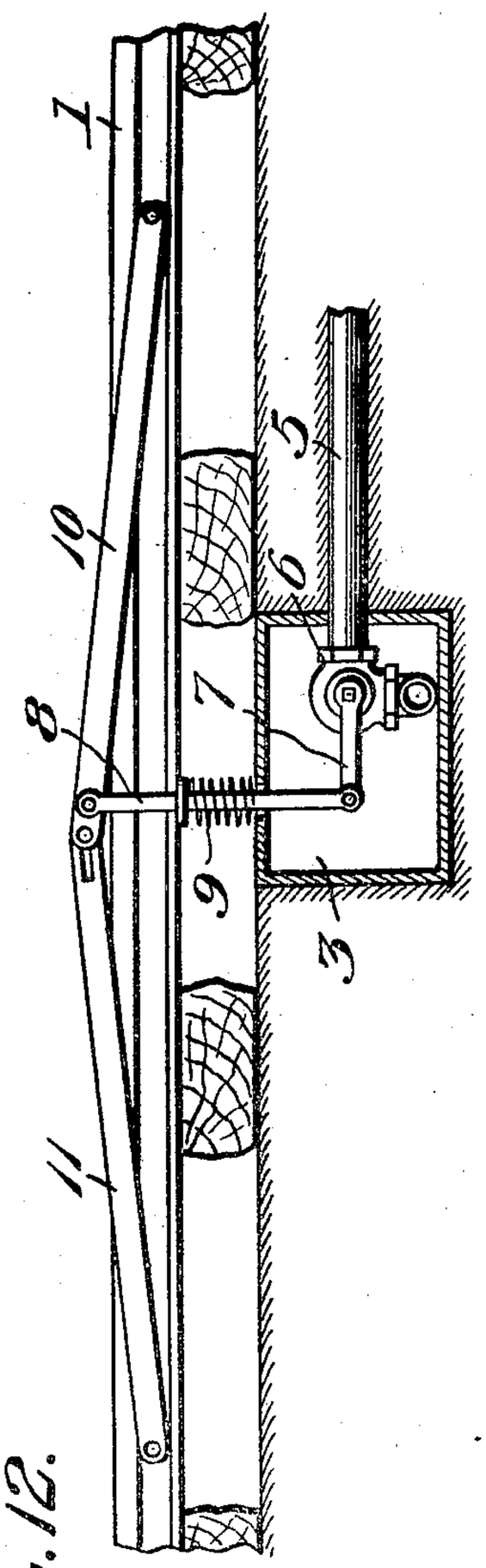

Fig. 12.

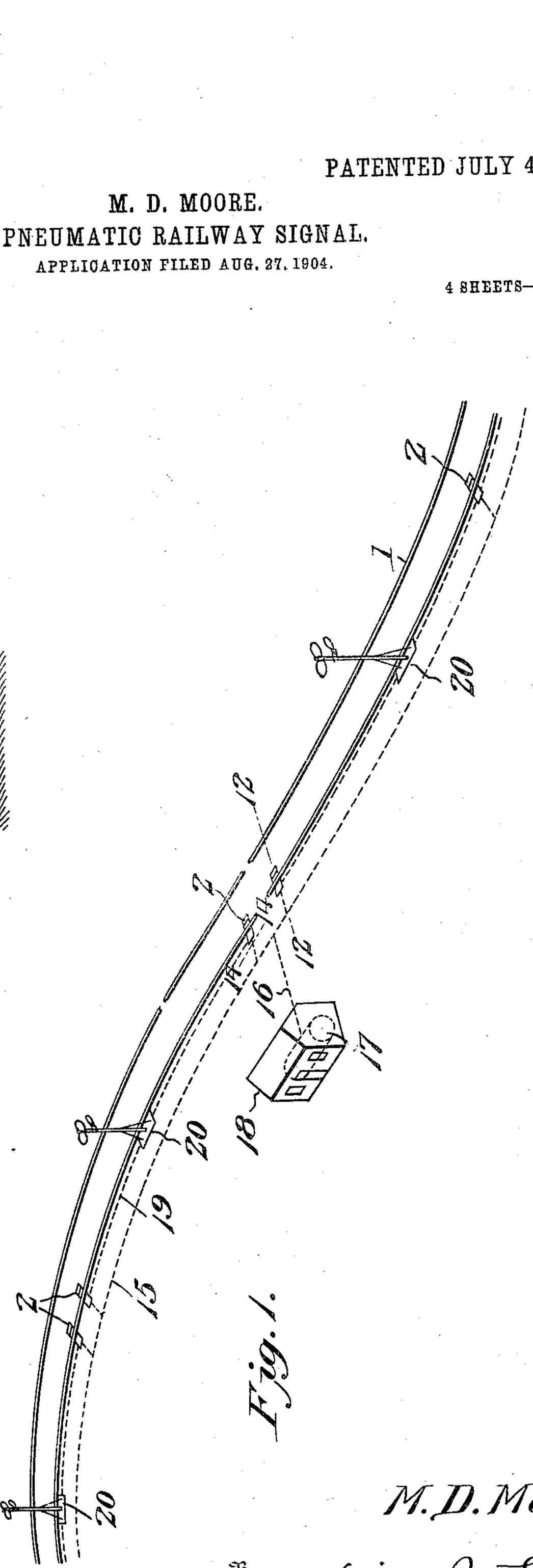

Fig. 1.

Witnesses

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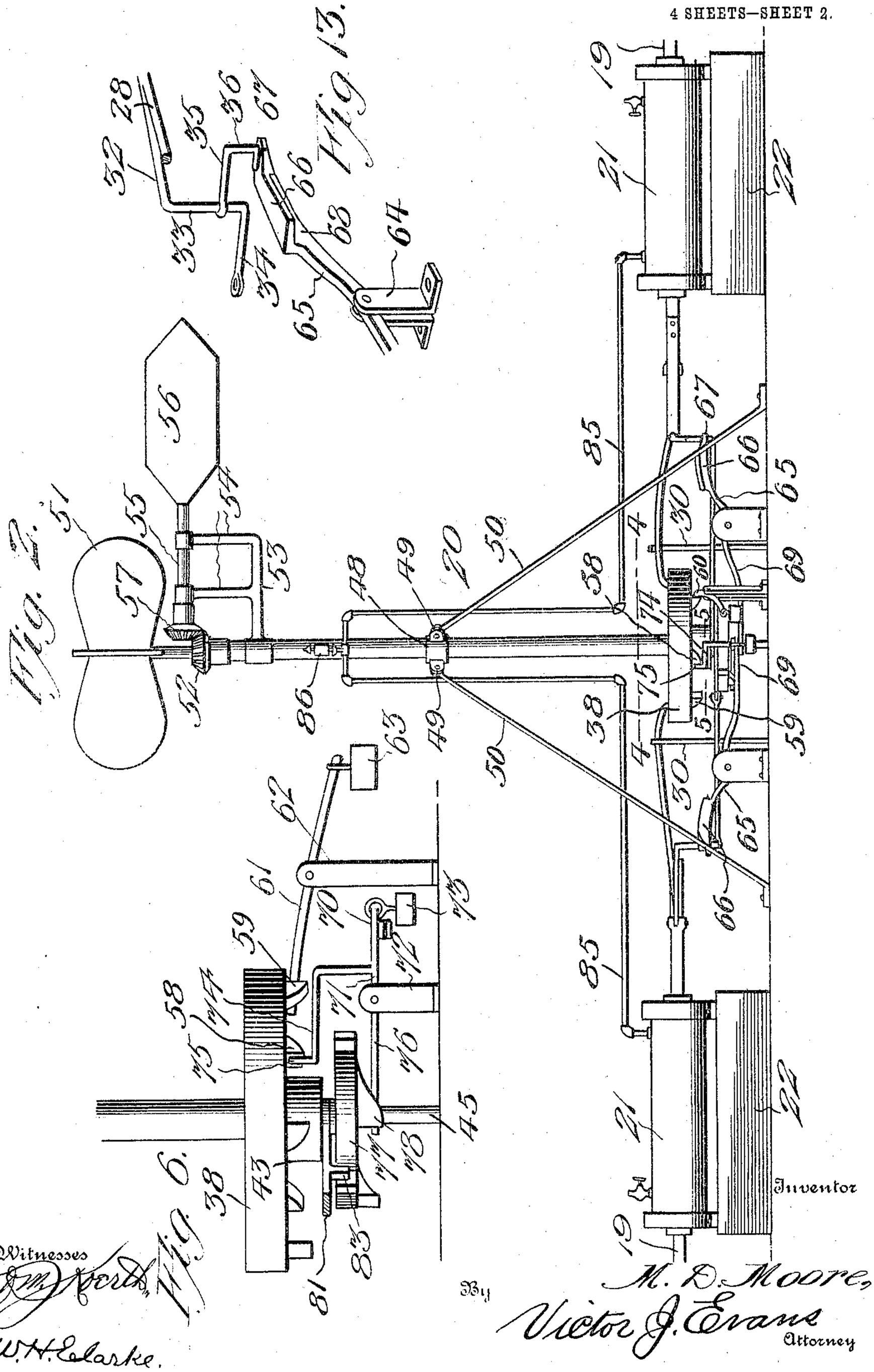
4 SHEETS—SHEET 2.



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4 SHEETS—SHEET 3.

Fig. 9.

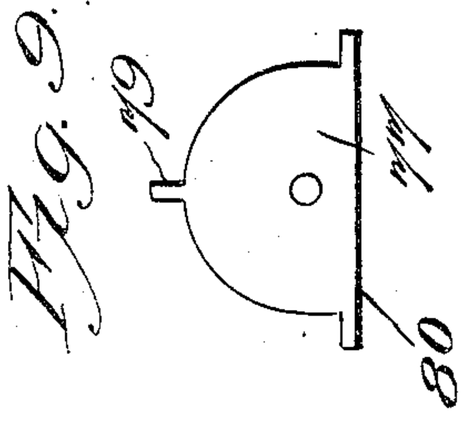
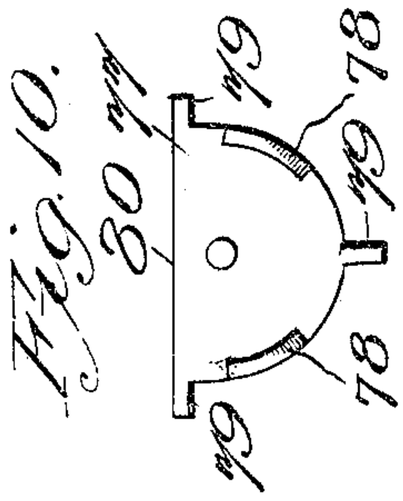
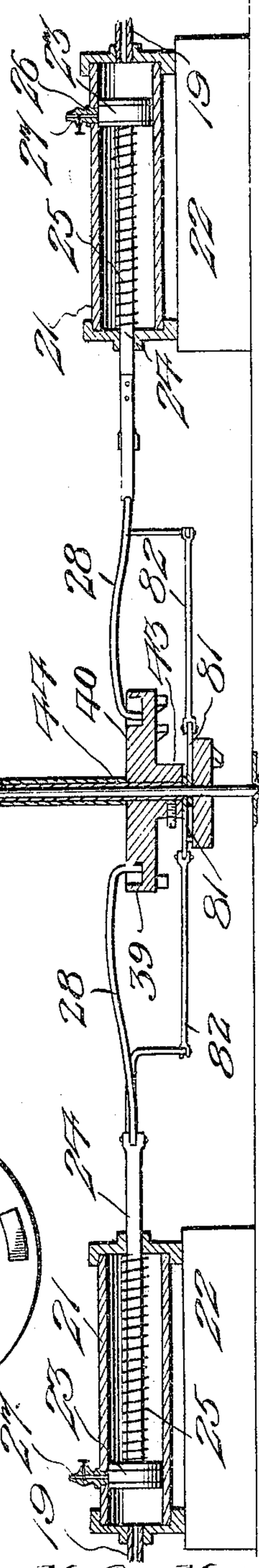


Fig. 10.





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Witnesses

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4 SHEETS—SHEET 4.

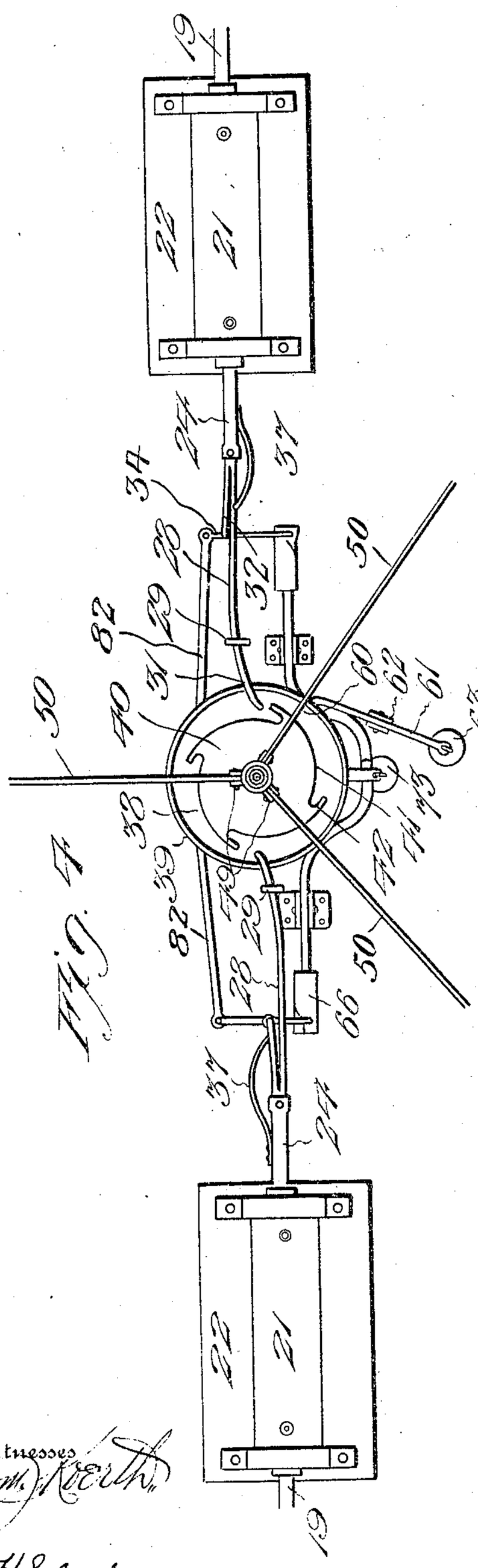

Fig. 4.

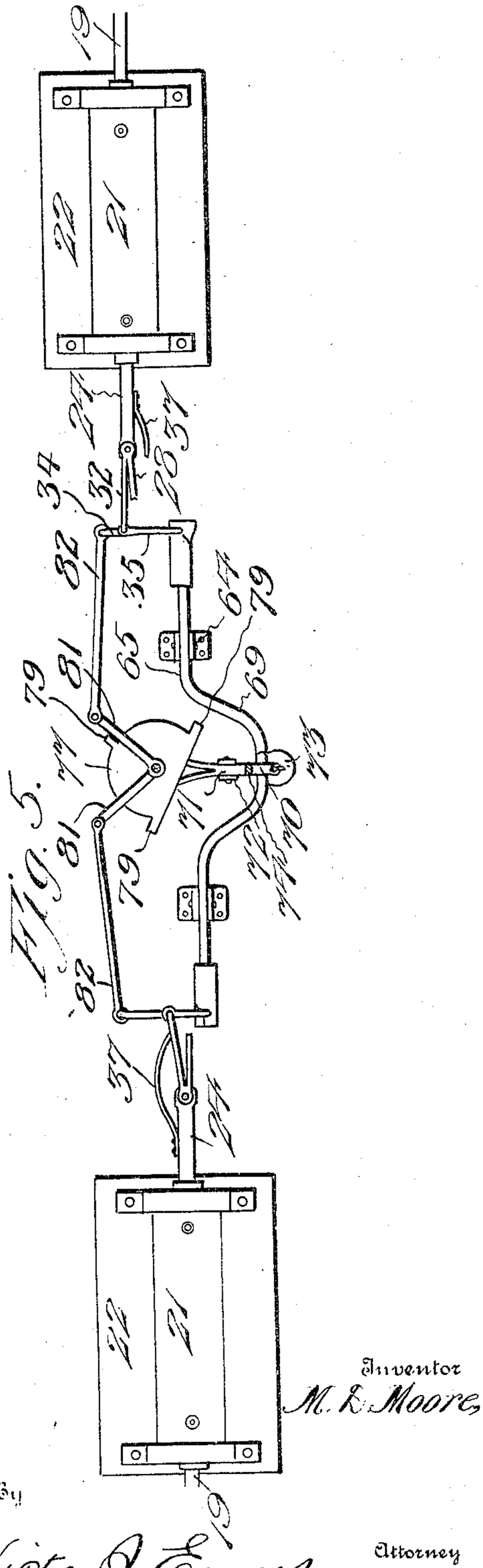

Fig. 5.

Witnesses
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No. 793,675. Patented July 4, 1905.

UNITED STATES PATENT OFFICE.

MARCUS D. MOORE, OF WAVELAND, INDIANA, ASSIGNOR OF TWO-FIFTHS TO JOHN W. GILLAND, OF WAVELAND, INDIANA.

PNEUMATIC RAILWAY-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 793,675, dated July 4, 1905.

Application filed August 27, 1904. Serial No. 222,420.

To all whom it may concern:

Be it known that I, MARCUS D. MOORE, a citizen of the United States, residing at Waveland, in the county of Montgomery and State of Indiana, have invented new and useful Improvements in Pneumatic Railway-Signals, of which the following is a specification.

This invention relates to pneumatic railway signaling apparatus.

The object of the invention is to improve the signaling apparatus set forth in United States Patent No. 714,595, granted to me November 25, 1902, so as to adapt said apparatus to operate two independent signals instead of one.

With the foregoing and other minor objects in view, which will appear as the description proceeds, the invention resides in the construction and arrangements of parts, which will be more fully hereinafter set forth.

In the drawings, Figure 1 is a diagrammatic view in perspective of a section of a railway equipped with the improved signaling apparatus. Fig. 2 is a side elevation of a signal-stand embodying the features of the invention, showing the semaphore-operating mechanism. Fig. 3 is a longitudinal vertical section through the stand shown by Fig. 2. Fig. 4 is a horizontal section on the line 4 4, Fig. 2. Fig. 5 is a horizontal section on the line 5 5, Fig. 2, showing the cylinders for the pistons and coöperating lever mechanism in top plan view. Fig. 6 is an elevation of a part of the controlling mechanism looking at the same in a plane at an angle to the similar mechanism, as shown by Fig. 2. Fig. 7 is a top plan view of a controller connected to the semaphore devices. Fig. 8 is a bottom plan view of the controller. Fig. 9 is a top plan view of a locking-head for a part of the semaphore devices. Fig. 10 is a bottom plan view of the head shown by Fig. 9. Fig. 11 is a detail perspective view of one of the arms coöperating with the locking-head. Fig. 12 is a longitudinal section on the line 12 12, Fig. 1, on an enlarged scale. Fig. 13 is a detail view of the mechanism for operating the trip-lever.

Similar numerals of reference are employed to indicate corresponding parts in the several views.

The improved mechanism, which will be hereinafter specifically set forth, contemplates the impartation of a rotary motion to a semaphore or signal pole or staff and also to auxiliary semaphore mechanism, so that signals or semaphores supported by the pole or staff will be disposed in required position to indicate danger or safety in accordance with the location of a train or engine in different portions of a block. While it is preferred to use semaphores, it will be understood that any other mechanism may be utilized to serve the object of the invention; but by preference a semaphore is illustrated in the accompanying drawings. At night lights of different colors may be displayed in various positions by the signaling mechanism, and such changes may be made in the signaling devices controlled by the improved mechanism as to adapt the latter to the requirements of different railroad systems.

The numeral 1 designates a line of railway to which the signaling apparatus is applied. At proper distances in the track at the terminals of each block-section and extending in succession as may be required track-lever mechanisms 2 are arranged and all of such mechanisms are of similar construction and each comprises a box or housing 3, preferably rectangular in contour and of such dimensions as may be requisite to serve the purpose and provide room for the mechanism mounted therein. A pipe connection 5 projects into the outer end of the box 3 and has a valve 6 with a stem-operating arm or extension 7, to which is movably attached one end of a link-rod 8, projecting upward through the casing, surrounded by a coil-spring 9. The opposite end of said rod 8 is pivotally connected to the meeting ends of track-levers 10 11, which are mounted adjacent to the track and are adapted to be depressed by a car-wheel. The coil-spring 9 holds the track-levers normally elevated and the valve 6 normally closed. As a car-wheel strikes the track-levers the valve is opened.

The pipes 5 connect with a supply or distributing line of pipe or with a suitable conduit 15, arranged adjacent to the railway, as clearly shown by Fig. 1, and connecting with the distributing pipe or conduit 15 is a supply branch 16, running to and connecting with a compressed-air tank or plant 17 within an inclosure 18. The valves 6 intersect the pipes 5 and tubular signal-stand connections 19, running in opposite directions from the boxes or inclosures to signal-stands 20, where certain mechanism is located and operative by pneumatic pressure to set signals held by the stands in different positions, as will be more fully hereinafter explained. The signal-stands 20 are located at regular intervals along the length of the railway to designate blocks or sections and the signal devices held thereby are controlled in their operation solely by the actuation of the track-rail levers heretofore set forth and car-wheels engaging said levers. The distributing pipe or conduit 15 will have a uniform pressure established therein throughout the entire length thereof and the air therefrom will be economically used by the release means consisting of the track-levers controlling the valves 6 in view of the automatic closing operation of said levers when the car-wheels have passed the same.

Each signal-stand 20 includes the same organization of elements and is arranged to have the signals thereof actuated by trains or cars moving in opposite directions toward the same. Each signal-stand organization includes opposite cylinders 21, supported on suitable beds or bases 22, the pipes 19 from the boxes 3 connecting with the outer ends of the said cylinders. The cylinders 21 have pistons 23 mounted therein, one in each, and projecting inwardly from each piston through the inner head of its cylinder is a piston-rod 24, surrounded by a spring 25, bearing at its opposite terminals respectively against the piston and the inner end or head of the cylinder. The springs 25 cause the pistons and their rods to return to normal position within the cylinders when the air-pressure is shut off from the said cylinders. It will be understood that a certain air-pressure will be required to operate the pistons and mechanism which they actuate, and to compensate for excess of such determined pressure each cylinder has a vent-valve 26 near its outer end provided with an adjustable plug or similar device 27 to control the opening through the valve and regulate the amount of air allowed to escape therethrough. By this means a relief is provided to prevent injury to the mechanism directly operating the signals. The vent-valve 26 in connection with each cylinder also allows the air to escape behind the piston when the air-pressure is cut off from the cylinder after the signals have been set in order to always have the signal-operating mechanism in position for subsequent actuation without requiring manual adjustment or resetting.

Extending inwardly from each piston-rod 24 is an actuating-arm 28, slidable through an eye 29 on the upper end of a standard 30, the inner free end of the arm 28 being curved laterally, as at 31, and the similar ends of both arms curved in reverse directions, as clearly shown by Fig. 4. Extending from the outer terminal of each arm 28 is an auxiliary or branch arm 32, having a depending right-angular member 33 and a lower horizontal member 34. A wiper or pressure extension 35 is secured to the member 33 and projects outwardly at an angle to the latter in direction reverse to the member 34 and is formed with a looped terminal 36. The outer end of the arm 28 is movably connected to the inner terminal of the piston-rod 24, so that said arm, as well as the auxiliary carried thereby, may have a slight lateral movement, and after the arm operates to perform its function in relation to the mechanism which will be hereinafter explained it is restored to normal position by a spring 37, secured to the piston-rod and engaging the said arm. The opposing ends of the arms 28 movably extend over a controller or actuating-disk 38, having a surrounding upstanding flange 39 and provided with a horizontally-disposed actuating-disk 40, provided with four convex guide edges 41 at the periphery, terminating successively in seats 42 to receive the ends of the arms 28. The controller 38 has a central depending collar 43, which is secured to the lower terminal of an elongated sleeve 44, surrounding a rotatable staff 45, which projects above the upper end of the sleeve and also below the controller, and is mounted in a base socket or step 46. The sleeve 44 and staff 45 are surrounded partially by a supporting-inclosure 47, having a band 48 attached to the intermediate point thereof, and provided with ears 49 to receive the upper ends of brace-rods 50, which are connected at their lower ends at different points on the support for the signal-stand mechanism to maintain the signal devices in upright position. On the upper end of the staff 45 is a four-bladed semaphore 51, having the blades thereof differently colored in accordance with any desired signal system. In lieu of the four-bladed semaphore it will be understood that a like device, having a less number of blades, may be used, and in some instances lights may be employed in connection with the blades or replace the latter. On the upper end of the sleeve 44 a bevel-pinion 52 is secured, and on the upper end of the inclosure 47 the one terminal of a bracket 53 is attached and provided with upwardly-projecting arms 54, forming bearing means for the spindle or stem 55 of a single semaphore-blade 56, serving as an auxiliary signal means suitable for use at railway-cross-

ings. The inner end of the spindle or stem 55 has a bevel-gear 57 secured thereon and held in continual mesh with the bevel-gear 52.

It will be seen from the foregoing that the two semaphore-signal devices are arranged to have independent movement, and the actuation of the controller 38 will result in an operation of the semaphore-blade 56 and turn the latter either from a horizontal to a vertical position, or vice versa. Depending from the bottom of the controller 38 are inner lock-teeth 58 and outer stop-teeth 59 in concentric relation, the angular engaging terminals of the said teeth being in reverse position and both having lower downwardly-inclined edges, as clearly shown by Fig. 2. The stop-teeth 59 are engaged by the inturned end 60 of a limiting-lever 61, fulcrumed at an intermediate point in the upper end of an upright 62 and having a weight 63 attached to the outer end, which normally holds said inner end of the lever closely against the under side of the bottom of the controller. The function of this limiting-lever is to prevent the controller from turning backward, so that the signal devices will remain in proper position, a suitable device, hereinafter described, engaging the teeth 58 and preventing accidental forward rotation of the controller.

Near each auxiliary arm 32 is a standard 64, in the upper end of which the intermediate portion of a trip-lever 65 is pivotally held and has its outer end provided with a trip-head 66, with a rear lateral extension 67, on which the looped end 36 of the pressure extension 35 has normal bearing. The upper surface of the trip-head 66 is of such contour that when the looped terminal or end 36 moves thereover the outer extremity of the lever 65 will be depressed and the inner extremity of said lever elevated. This depression will be effective until the looped terminal 36 slips off the inner end of the head 66, and at such time the function for which the trip-lever 65 has been devised will have been performed, and the looped terminal 36 then passes below and under the head 66, through a groove 68, back to the extension or projection 67, the said rearward movement of the terminal 36 taking place when the piston-rod and piston, which has been set in motion, retracts after the air-pressure has been cut off. The inner extremity 69 of the lever 65 is deflected outwardly and then longitudinally, the inner end of one lever extending over and contacting with the other under the outer extremity 70 of a transversely-extending catch 71, fulcrumed at an intermediate point in the upper end of a standard 72, the outer end 70 of the catch having a weight 73 secured thereto and normally holding the inner opposing ends of the levers 65 in depressed condition to elevate the heads 66 at the outer ends of said levers. The catch 71 has an upwardly-extending locking-arm 74, with an angular terminal 75, to engage the teeth 58, and is also provided with a horizontal locking-arm 76, which extends under an actuating-head 77, fixed on the staff 45 below the collar 43 of the controller 38, and terminally coöperates with and enters into locking engagement with relation to teeth 78, depending from the said head. The head 77 controls the operation of the staff 45 and must be released approximately simultaneously with the release of the controller 38, and it will be seen that when either of the trip-heads 66 is depressed and the inner extremity of the lever 65 connected thereto is raised the catch will be raised at its outer extremity and the terminals of the arms 74 and 76, adjacent to the teeth 58 and 78, lowered to clear such teeth and permit the rotation or actuation of the controller 38 and the head 77, it being understood that as the controller 38 rotates the lever 61 will be depressed by the inclined sides of the teeth 59. The head 77 is preferably of the form shown by Figs. 5, 9, and 10 and has stops or peripheral projections 79 adjacent to the straight edge 80 thereof and at a central point in a plane at right angles to said straight edge. A pair of arms 81 have their inner ends loosely held on the staff 45 between the collar 43 of the controller and the head 77. The outer end of each arm is attached to the inner terminal of a link 82, pivotally connected at its outer end to the member 34 of the auxiliary arm 42, so that each arm 81 will be simultaneously operated with the movements of the arms 28 and 32. The arms 81 each have a depending projection or contact-finger 83 to engage the stops or projections 79 of the head 77, the said arms 81 being normally arranged, as shown by Fig. 5.

From the foregoing it will be seen that the controller 38 and head 77 will be released for movement just prior to the forceful contact of the end of either arm 28 with the adjacent seat 42 of the disk 40 of said controller and before the contact projection 83 on one of the arms 81 is brought into engagement with the adjacent stop 79 of the head 77. After the head 77 and controller 38 have been released the signal devices will be set.

It will be understood that any suitable system of signals may be used, as the present invention relates only to the means of actuating the signals and not to the signals themselves.

One of the signals of the present device is used, preferably, at railway-crossings to notify foot-passengers that a train is approaching, and the other signal is for the use of trainmen.

In Fig. 2 a system of piping 85 has been shown in a conventional manner as connecting with each of the pistons 23 and with any suitable form of whistle 86. It will be understood that as either one or the other of the

pistons in the cylinders 21 is actuated the air compressed therein will escape through the piping 85 and will sound the whistle 86. This mechanism will be found convenient for use at railway-crossings.

The operation of the improved signaling apparatus will be apparent from the foregoing description in connection with the drawings. It will be apparent that when the wheel of a passing train strikes the track-levers 10 11 the pneumatic valve 7 will be opened automatically to permit the entrance of pneumatic pressure to one of the cylinders 21, thus actuating the piston therein. The movement of the piston through the actuating-arm 28 will impart to the controller 38 a one-quarter revolution, thus turning the semaphore 56 from a vertical to a horizontal position, or vice versâ. Through the auxiliary arm 32 and mechanism connected therewith the trip-lever 65 will be operated to move the catch 70 out of engagement with the teeth of the controller 38 and the head 77. The links 81 and 82, connected with said auxiliary arm 32, will impart to the head 77 a partial turning movement to change the semaphore 51 from one position to another. By reason of the fact that independent links 81 and 82 are employed for connecting the auxiliary arm of each piston with the head 77 the operation of one piston will not affect or interfere with the operation of the other.

The object of the trip-lever 65 and the mechanism connected therewith is to permit the actuation of the signals at the proper time and to hold said signals in proper position when they are not being actuated.

Changes in the precise embodiment of invention illustrated and described may be made within the scope of the following claims without departing from the spirit of the invention or sacrificing any of its advantages.

Having thus described the invention, what is claimed as new is—

1. In a railway signaling apparatus, a pneumatic system, a cylinder connected therewith and having a piston, means controlled by a train for actuating the piston, a rotary staff, a rotary sleeve surrounding the staff, signaling means operated by the staff, independent signaling means operated by the sleeve, and mechanism connected with the piston for operating the staff and sleeve.

2. In a railway signaling apparatus, a pneumatic system, a cylinder connected therewith and having a piston, means controlled by a train for actuating the piston, a rotary staff, a head upon the staff, said head having teeth thereon, a sleeve surrounding the staff, a controller upon the sleeve, said controller having two sets of teeth thereon, a limiting-lever adapted to engage one set of teeth on the controller, a catch having an arm adapted to engage the other set of teeth on the controller and a second arm to engage the teeth on the head, a trip-lever coöperating with said catch, an auxiliary arm upon the piston having an extension coöperating with the trip-lever, a link connection between said auxiliary arm and said head, and an actuating-arm upon said piston adapted to contact with said controller.

3. In a railway signaling apparatus, a plurality of cylinders having pistons, a rotary staff having signaling means connected therewith, a rotary sleeve surrounding the staff and having signaling means connected therewith, a controller upon the sleeve, said controller having two sets of teeth thereon, a head upon the staff, said head having teeth and stops thereon, a plurality of links pivotally mounted upon the staff and each having a contact-finger to engage the stops or projections of the head, a limiting-lever adapted to engage one set of teeth upon the controller, a catch having an arm adapted to engage the other set of teeth upon the controller, and an arm adapted to engage the teeth upon the head, a plurality of trip-levers coöperating with the catch, mechanism connected with one of the pistons and adapted to actuate one of the trip-levers, mechanism connected with the other piston and adapted to actuate the other trip-lever, mechanism connecting each piston with one of the links, and mechanism upon each of the pistons to actuate the controller.

4. In a railway signaling apparatus, a pneumatic system, a cylinder connected therewith and having a piston, a vent-valve connected with the cylinder, means controlled by a train for actuating the piston, and means operated by the piston for actuating a plurality of independent signals.

5. In a railway signaling apparatus, a pneumatic system, a valve connected to said system, a plurality of track-levers for actuating said valve, a cylinder connected with said system and having a piston, a vent-valve connected with said cylinder, and an actuating-arm and an auxiliary arm pivotally connected with said piston, a spring upon the piston contacting with the actuating-arm, a trip-lever having a trip-head formed with a groove, a pressure extension connected with the auxiliary arm and adapted to move over the trip-head and return through the groove, a catch coöperatively related to the trip-lever, said catch having a pair of arms, a rotary staff, a head on said staff having stops or projections and teeth adapted to be engaged by one of the arms of said catch, a sleeve surrounding the staff, a controller upon the sleeve adapted to be operated by said actuating-arm, said controller having two sets of teeth, one set of said teeth being engaged by the other arm of said catch, a limiting-lever adapted to coöperate with the other set of teeth on said controller, signaling means connected with said staff, signaling means connected with said sleeve, a link pivotally connected with said staff and having a contact-finger adapted to engage the stops or

projections on said head, and mechanism connecting said link with said auxiliary arm.

6. In a railway signaling apparatus, a pneumatic system, a cylinder connected therewith and having a piston, means for actuating the piston, a signal-staff, a signal operated by said staff, a sleeve surrounding said staff, a signal operated by said sleeve, and means controlled by the piston for actuating said staff and the sleeve.

7. In a railway signaling apparatus, a pneumatic system, a plurality of signaling devices, a pair of cylinders located upon opposite sides of said signaling devices, a piston in each of said cylinders, mechanism connecting each of said pistons with said signaling devices, and means for actuating said pistons.

In testimony whereof I affix my signature in presence of two witnesses.

MARCUS D. MOORE.

Witnesses:
E. N. MYERS,
ED MOORE.