

No. 760,187.

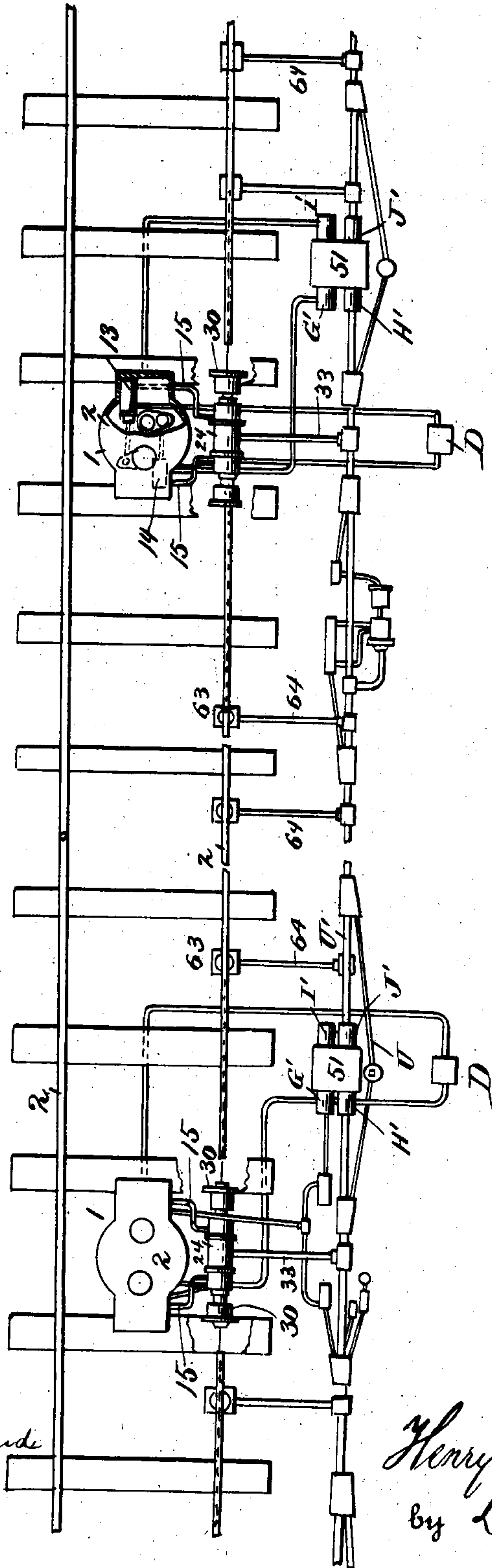
PATENTED MAY 17, 1904.

H. T. FARNSWORTH.
AUTOMATIC PNEUMATIC SIGNAL SYSTEM.

APPLICATION FILED JULY 29, 1903.

NO MODEL.

5 SHEETS—SHEET 1.



Witnesses
Wm. A. Curande
L. L. Burkett.

Inventor
Henry T. Farnsworth,
by Louis Bagger & Co.
Attorneys.

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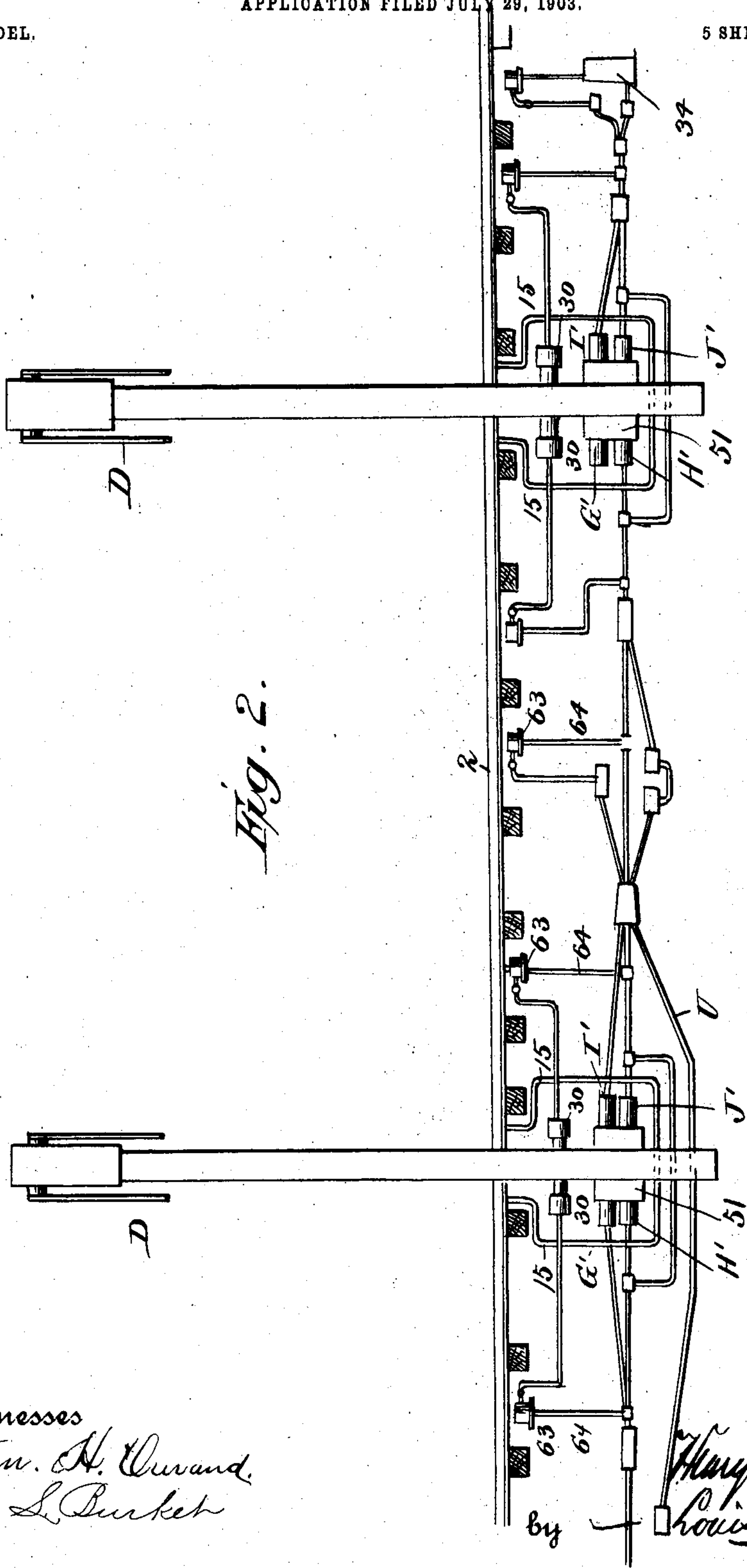
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Witnesses
Wm. H. Curand.
L. L. Burkett

Inventor

H. T. Farnsworth
by Louis Baggett & Co.
Attorneys

No. 760,187.

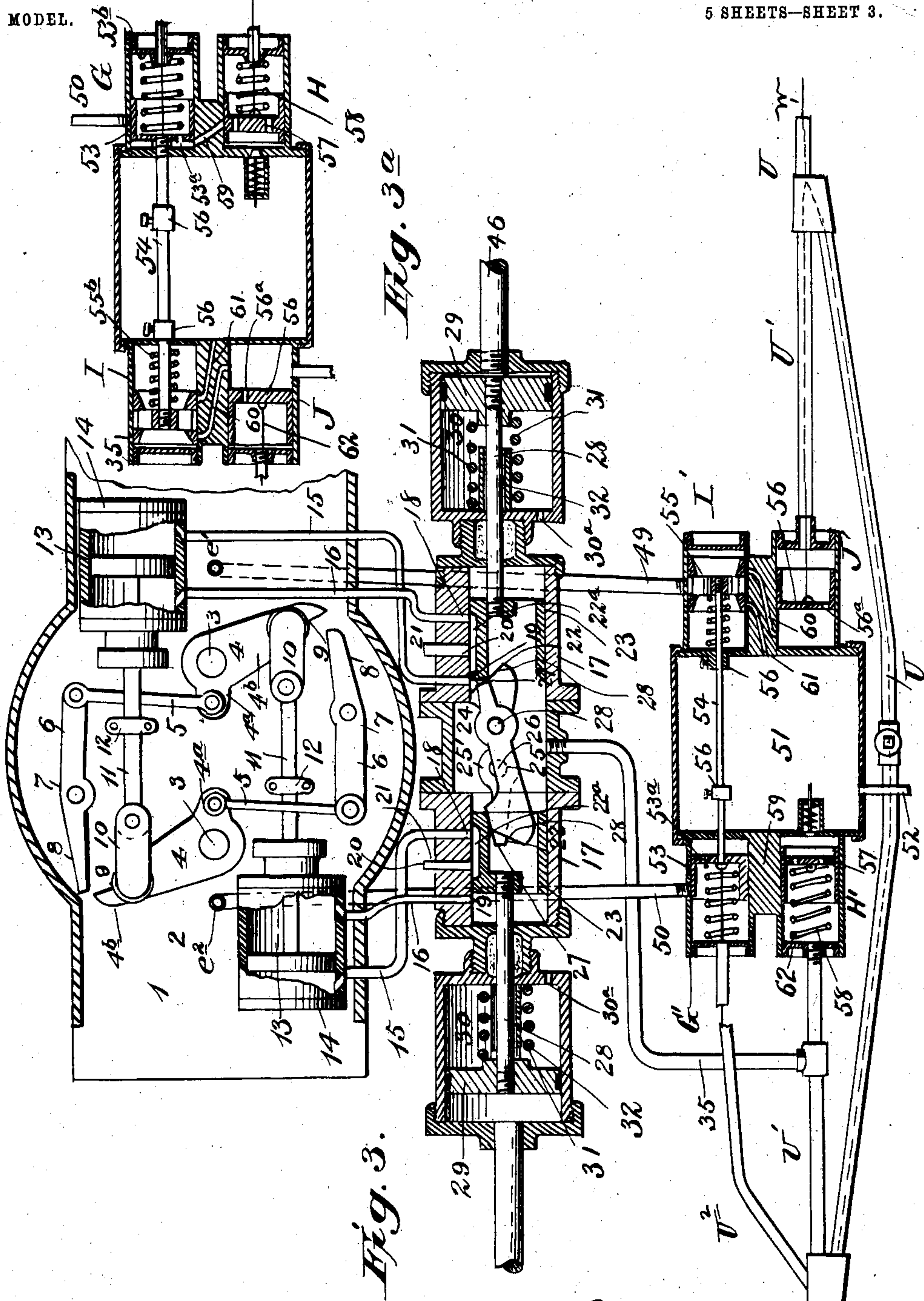
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Witnesses
Wm. H. Curand
L. S. Burket

Inventor
Henry T. Farnsworth
by Louis Gagner & Co.
Attorneys

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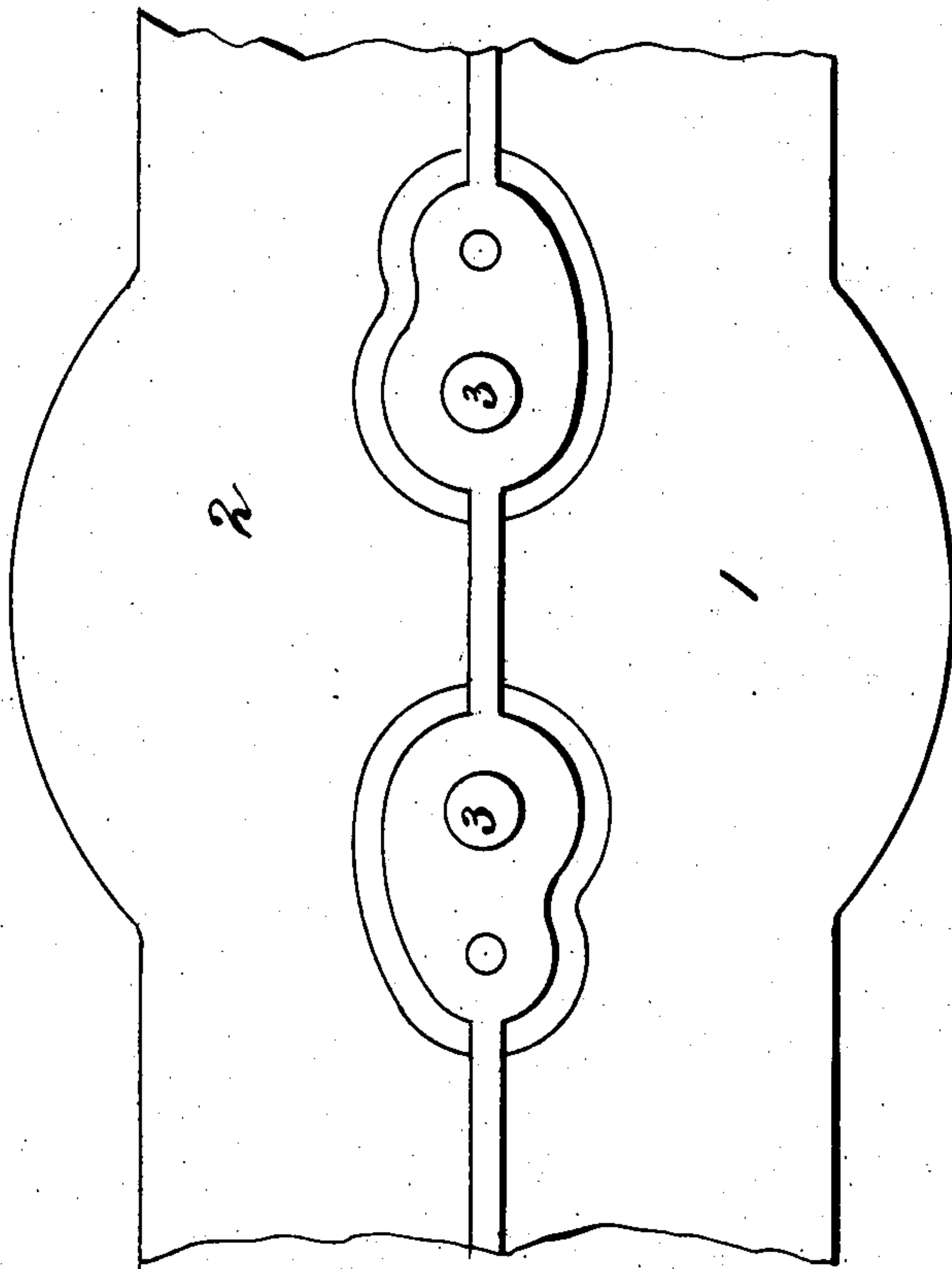


Fig. 4.

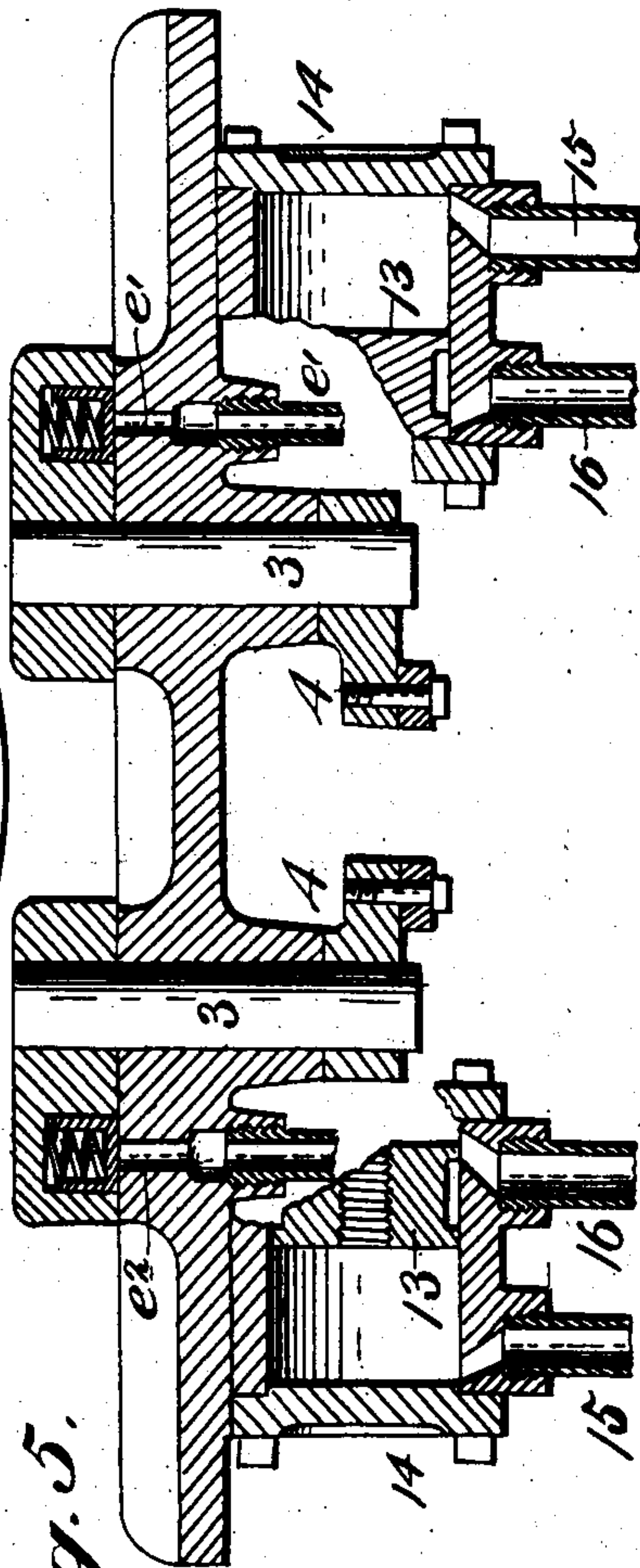


Fig. 5.

Witnesses
Wm. H. Curand
L. S. Tucker.

Inventor
Harry T. Farnsworth,
by Louis Gagger & Co.
Attorneys

No. 760,187.

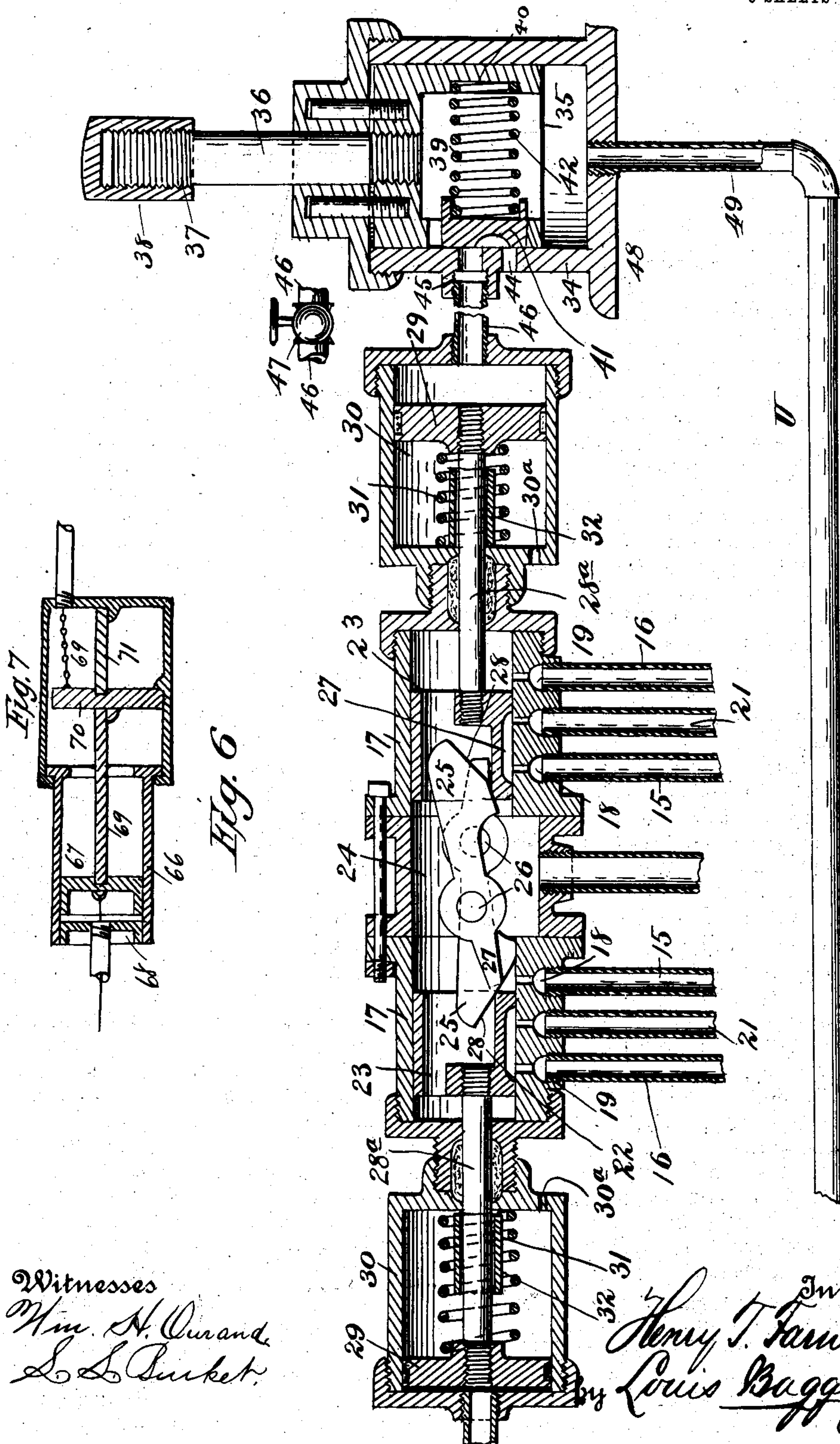
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APPLICATION FILED JULY 29, 1903.

NO MODEL.

5 SHEETS—SHEET 5..



Witnesses
Wm. H. Curand
L. L. Buckner

Inventor
Henry T. Farnsworth
by Louis Ragner & Co
Attorneys

UNITED STATES PATENT OFFICE.

HENRY T. FARNSWORTH, OF GLADE SPRING, VIRGINIA.

AUTOMATIC PNEUMATIC SIGNAL SYSTEM.

SPECIFICATION forming part of Letters Patent No. 760,187, dated May 17, 1904.

Application filed July 29, 1903. Serial No. 167,507. (No model.)

To all whom it may concern:

Be it known that I, HENRY T. FARNSWORTH, a citizen of the United States, residing at Glade Spring, in the county of Washington and State of Virginia, have invented new and useful Improvements in Automatic Pneumatic Signal Systems, of which the following is a specification.

My invention relates to pneumatic signal systems for railroads; and the object of the same is certain improvements on my system for which application, Serial No. 138,278, for United States Letters Patent has been made.

The invention consists of a novel construction which is fully described in this specification, and more specifically pointed out in the claims, and illustrated in the accompanying drawings, in which—

Figure 1 is a plan view of a section of my system shown in conjunction with a railroad-track shown in plan. Fig. 2 is a side elevation of the same with semaphore-masts. Fig. 3 is a horizontal section of a single nest. Fig. 3^a is a section of a lower air-box. Fig. 4 is a bottom plan of a twyer-base. Fig. 5 is a vertical transverse section thereof. Fig. 6 is a vertical longitudinal section of a double alarm-cylinder and one of the track alarm-cylinders. Fig. 7 is a longitudinal sectional view of an alarm-trap hereinafter referred to.

Like characters of reference designate like parts in the different views of the drawings.

The numeral 1 designates a base-plate located between the rails 2 of a railroad-track. These base-plates 1 are located at intervals of from one-fourth to one-half of a mile, as shown in Figs. 1 and 2. Two twyer-pipes e' and e'' pass through apertures in the base 1 and are designed to direct a blast of air issuing therefrom up and against a mechanism (not shown) carried by each locomotive and described in detail in my application for patent noted above, which mechanism is arranged to operate a visible and audible signal also carried by the locomotive to warn the engineer. The pipes e' and e'' are normally closed by caps 2^a, secured on vertical shafts 3, journaled in the base-plate

1 and rigidly keyed to elbow-levers 4, located beneath the base 1. The arms of the levers 4 are of unequal length. The shorter arms 4^a are pivoted to one end of link-bars 5, which are pivoted at their opposite ends to arms 6 of pivoted dogs 7, the heads 8 of which are arranged to be brought into engagement with the longer arms 4^b of the levers 4 to lock them for a purpose which will appear. The arms 4^b are notched at 9 to adapt them to be engaged by the heads 8 of the dogs, and said arms are pivoted to links 10, which are pivoted to the free ends of piston-rods 11, mounted in guides 12 and carrying pistons 13, which fit closed cylinders 14, secured to the base-plate 1. It is easily seen that when the pistons 13 are operated the movement will be communicated by the connecting mechanism to the caps 2^a, which will be operated thereby to alternately open and close the twyers e' and e'' . When one of the twyers is open—say e' —the arm 4^b of the lever 4, corresponding to the cap 2^a of e'' , will be engaged by the head 8 of the dog 7, connected to the lever 4, corresponding to the cap of the twyer e' . By this arrangement it is rendered impossible for both twyers e' and e'' to be uncovered simultaneously.

To supply motive power to the cylinders 14, pipes 15 and 16 are connected thereto on opposite sides of the pistons 13, and these pipes are connected at their opposite ends to a double-compartment valve-casing 17, each provided with three ports 18, 19, and 20. The pipes 15 and 16 communicate with the ports 18 and 19, respectively, and the port 20, located intermediate the ports 18 and 19, is connected to an exhaust-pipe 21, which communicates directly with the open air. Slide-valves 22 are mounted in the casings 17 and have a single chamber 22^a therein of sufficient length to cover and establish communication between any two adjacent ports of the set 18, 19, and 20. The valves 22 are longitudinally apertured at 23 to permit air to pass unobstructed from one end of the casing 17 to the other.

The casings 17 are connected to and com-

communicate by way of an open-ended chamber 24, in which are mounted two locking-dogs 25, pivoted on shafts 26, journaled in the walls of the chamber 24. The dogs 25 have square pointed or stub tails 27 and beveled-faced heads 28, the former being adapted to be raised on coming in contact with the rear ends of the slide-valves 22 to bring their tails 27 within the path of the valves 22 to prevent the rearward movement thereof. By virtue of this arrangement of the dogs 25 it will be seen that the chambers 22^a in both valves 22 cannot be covering the pairs of ports 18 and 20 at the same time, but may simultaneously cover the ports 19 and 20. This prevents a confusion of signals, as will further appear.

The slide-valves 22 are carried by the outer ends of piston-rods 28, connected to pistons 29, fitting closed cylinders 30, mounted in alinement with each other and with the valve-casings 17. Springs 31, located in the cylinders, bear on the pistons 29 and serve to normally hold them in the outer ends of the cylinders 30. Sleeves 32, mounted within the coils of the springs 31, serve as stops to limit the inward movement of the pistons to about half a full-stroke.

A small perforation 30^a in the inner head of each of the cylinders 30 permits the escape of imprisoned air, and thereby accelerates the movement of the pistons 29. A pipe 33 is connected to the chamber 24 and to a main-line air-pipe U, extending parallel to the track 1 and throughout the length thereof, as will be fully described. The mechanism contained in the casing 17 and cylinders 30 is designed to be operated indirectly by the train running on the track 1, and to render this possible an intervening device must be supplied in the form of a track alarm device A, buried in the ground beneath one rail of the track. The track alarm device A comprises a closed cylinder 34, provided with a snugly-fitting piston 35, carrying a stem 36, having a threaded upper end 37, which carries an adjustable cap 38, set to normally bear on the under side of a rail of the track. The piston 35 has a chamber 39 formed therein, which is open at the bottom and has an aperture 40 in one of its walls, in which aperture is seated a slide-valve 41, having a chamber 41^a therein. A spring 42 in the chamber 39 bears on the valve 41 and yieldingly holds it in its seat. The chamber 41^a serves to establish communication between two ports 44 and 45, formed in the cylinder 34. The port 44 communicates directly with the open air and the port 45 with a pipe 46, which is connected to the outer end of one of the cylinders 30. A check-valve 47, mounted in the pipe 46, prevents the return of air from the cylinder 30 in the cylinder 34, but per-

mits the flow of air from the cylinder 34 thereto via an aperture 41^b in the upper end of the slide-valve 41. A base 48 supports the cylinder 34, and a pipe 49 is connected to said cylinder and to the line-pipe U.

The cap 38 is always adjusted to engage the under side of the base of the rail, so that when a train comes along the rail will be depressed. The piston 35 and valve 41 will be thereby forced down, covering the exhaust-port 44 and opening the port 45.

The twyers *e'* and *e''* are connected to pipes 49 and 50, which are connected to cylinders G and G', respectively, connected to opposite ends of a casing or air-box 51, communicating with the open air via a pipe 52. Cylinders I and I' are located in alinement with the cylinders G and G', respectively, on opposite sides of the air-box 51 and are connected to said box. Pistons 53 fit the cylinders G and G' and are connected by piston-rods 54 to apertured pistons 55, fitting cylinders I and I'. Springs 53^b and 55^b bear on the pistons 53 and 55, respectively, and hold the pistons 53 and 55 in their normal positions with the pistons 53 and 55 covering the mouth of the twyer-pipes 49 and 50. Collars 56' are adjustably secured on the rods 54 and located within the box 51 to serve to limit the movement of the pistons 53 and 55.

To enable the pistons 53 and 55 to be operated, cylinders J J' and H H' are provided and connected to the air-box 51. The cylinders J and H are located in the same plane and in alinement with each other, as are also the cylinders J' and H'. Pistons 56, perforated at 56^a, fit the cylinders J and J', and pistons 57 fit the cylinders H and H'. Springs 58 bear on the pistons 57 and hold them in their normal positions, covering passages 59, establishing communication between the cylinders G and H and G' and H'. Passages 60 establish communication between the cylinders I and J, I' and J'. Passages 61 establish communication between the cylinders I I' and the air-box 51. Pipes U', respectively, are connected to the outer ends of the cylinders H, H', J, and J' and to the main pipe-line U. Wires 62 are mounted in the pipes U' and are attached to the pistons 56 and 57 and to a wire W, inclosed in the pipe U and extending the whole length thereof.

The pipe U is supplied with compressed air at a pressure between thirty and sixty pounds by compressors 63, located at intervals of several miles or less along the track and are connected to the pipe U by pipe 64. These compressors 63 are of any suitable type and are operated by independent means which must receive attention.

To enable the moving of a slide, the wash- ing away of a bridge, &c., to operate my sys-

tem to warn the locomotive-engineer, wires 65 are connected to any objects M, occupying threatening positions. These wires 65 are connected to trigger devices L, such as are described in my before-mentioned application and comprises a cylinder 66, containing a tightly-fitting piston 67 and connected to a wire 68, connected to the main wire W in the pipe U. The piston 67 is normally held in the forward end of the cylinder 67 by a brace 69, which bears on the piston 67 and on an upright trigger-bar 70, which is also held by a brace 71, placed in alignment with the brace 19. The wire 65 is connected to the upper end of the trigger 70. It is evident that when the object M moves it will pull on the wire 65 and displace the trigger-bar 70 to knock down the braces 69 and 71 and release the piston 67. The releasing of the piston 67 will, since the piston 57 is perforated at 57^a, permit the pressure in the pipe U and U' to force the piston 67 out of the limit of its travel, and since the piston 57 is connected thereto by wires W W' this piston will be displaced and thereby opening the port 59, so that air flows from the pipe U into the rear chamber of the cylinders G' and force the piston 53 to the outer end of its cylinder G' and uncover the pipe 50 and permit the air to flow to the twyer e'. The twyer-pipe 50 will remain open until the trap L is reset.

The pull on the wire W, caused by the springing of the trap L, will be communicated all along the line and will cause a blast of air to flow to all of the twyers e' or all of the twyers e', depending what sort of a pull was given the wire. Two traps L may be connected to a single slide to enable a signal to be dispatched in both directions from the slide.

After one of the traps L has been sprung and all of the twyers of one series—say all of the twyers e'—have been charged a train entering the eastern end of a block of my system will depress the rail B as it passes along, and will thereby operate the devices A, mounted beneath them adjacent to the nests in the manner hitherto described to permit air to flow from the pipe U through the branch pipe 49 into the cylinder 34 and into the pipe 46 via ports 41^b and 45 and into the outer end of the cylinder 30, thereby operating the piston 29 to move the slide-valve 22 to uncover the port 18 to allow air to flow into said port 1 from the pipe U' via the pipe 33 and flow through the pipe 16 into the cylinder 14 to operate the piston 13 to actuate the lever 4 and operate the cap to uncover the twyer e'. As the train progresses it will pass over the open twyer e', when the blast of air issuing therefrom will operate the alarm device carried by the locomotive to warn the engineer of the slide. If the slide M has been

connected to two devices L or located on opposite sides so that a signal was sent in both directions, a train entering the other end of the block would operate the devices A on the opposite side of the nest and open the twyer e', which will stand ready to blow a blast to operate the signal mechanism on the locomotive.

Several of the devices A may be attached to one of the cylinders 30, so in case one refuses to work the other may. Semaphores D may also be connected to my system to be operated by the devices A, cylinders 30 and pipe U, and the signal device on the engine thereby dispensed with.

I do not wish to be limited as to details of construction, as these may be modified in many particulars without departing from the spirit of my invention.

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

1. In a signal system, the combination of the casing having two ports therein, the piston mounted in said casing and carrying a piston-rod, an adjustable cap mounted on said piston-rod and designed to bear on the under side of a rail adapted to be operated by the depression of said rail, a spring-pressed slide-valve carried by said piston and located to establish communication between said ports, said casing being provided with an air connection, substantially as described.

2. In a pneumatic signal system, the combination of the casing mounted below the track-level, a piston fitting said casing, and carrying a piston-rod normally bearing on the under side of one of the rails of said track, a compressed-air connection for said cylinder, said casing having an exhaust-port therein and an outlet-port, a slide-valve mounted in said piston and arranged to regulate the flow of air through said ports, substantially as described.

3. In a pneumatic signaling system, the combination of two twyers, caps for opening and closing said twyers, shafts carrying said caps, levers mounted on said shafts, locking-dogs, means connecting said dogs and said levers, and cylinders provided with pistons mounted on piston-rods connected to said dogs, whereby said dogs are operated to engage said levers to prevent both twyers being open at the same time, substantially as described.

4. In a pneumatic signaling system, the combination of the two twyers provided with air connections, the caps mounted to open and close said twyers, the levers connected to operate said caps, the locking-dogs arranged to engage and lock said levers to prevent both twyers being open at the same time, and means controlled by compressed air for operating said levers, substantially as described.

5. In a pneumatic signaling system, the combination of two twyers provided with caps for said twyers, cylinders provided with pistons carrying piston-rods, means operated by
5 said piston-rods for operating said caps to open and close said twyers, two casings, air connections establishing communication between said cylinders and said casings, cylinders located
10 in alinement with said casings, and pistons fitting said cylinder and bearing piston-rods carrying slide-valves mounted in said casings and arranged to regulate the supply of air to said

first-mentioned cylinders, and dogs whereby one of said slide-valves is locked against movement to prevent both twyers being open at 15 the same time, substantially as described.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

HENRY T. FARNSWORTH.

Witnesses:

S. W. KEYS,

W. S. WILLIAMS.