No. 711,196. Patented Oct. 14, 1902.

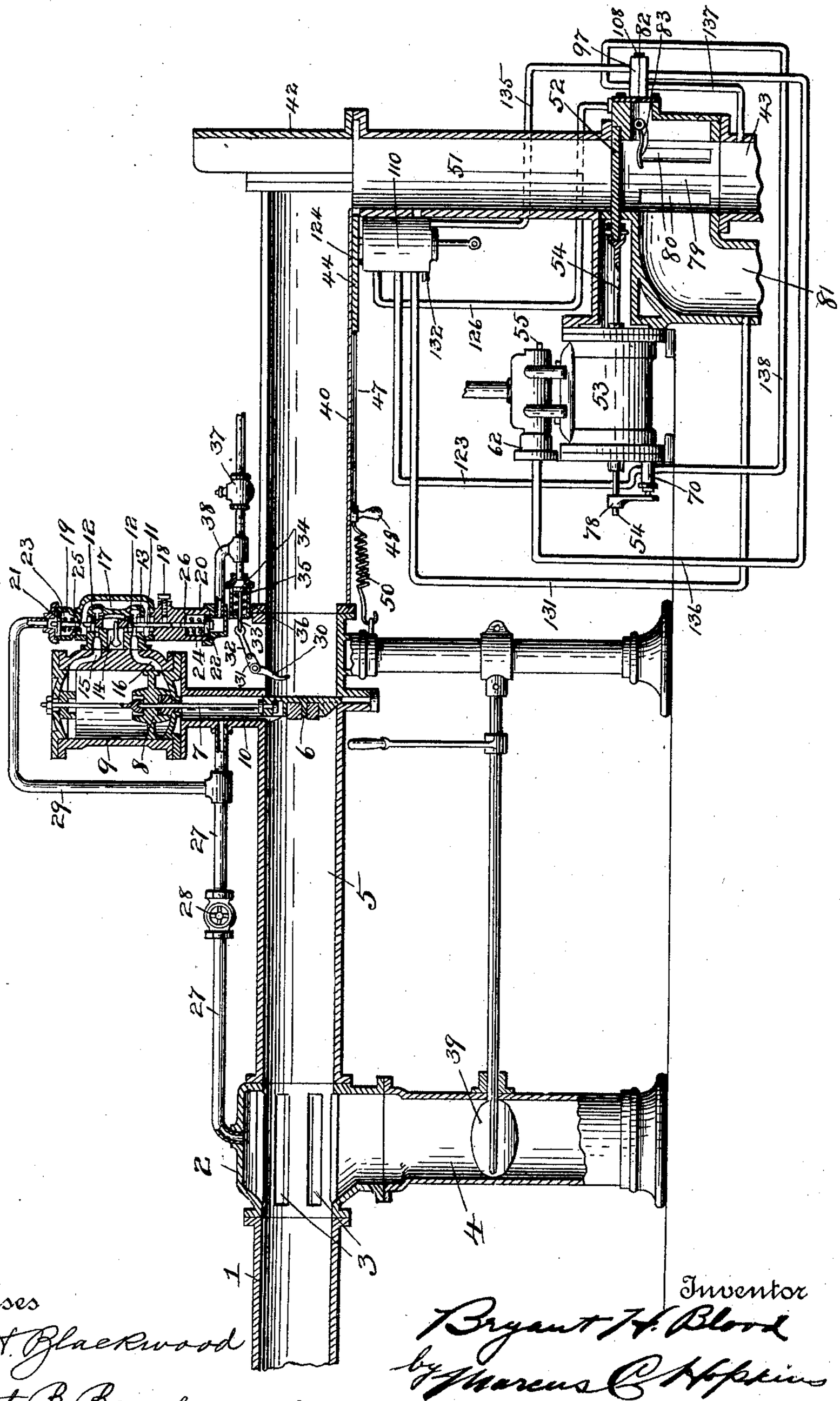
B. H. BLOOD.

SENDING APPARATUS FOR TUBULAR TRANSIT APPARATUS.

(Application filed Nov. 3, 1900.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.



Witnesses
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(No Model.) 3 Sheets—Sheet 2.

Fig. 4.

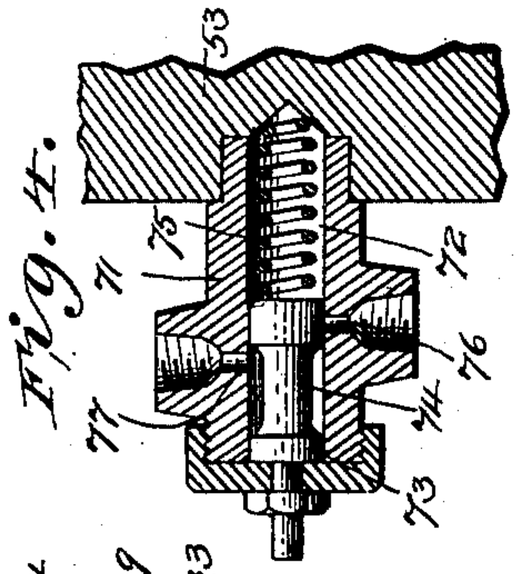

Fig. 3.

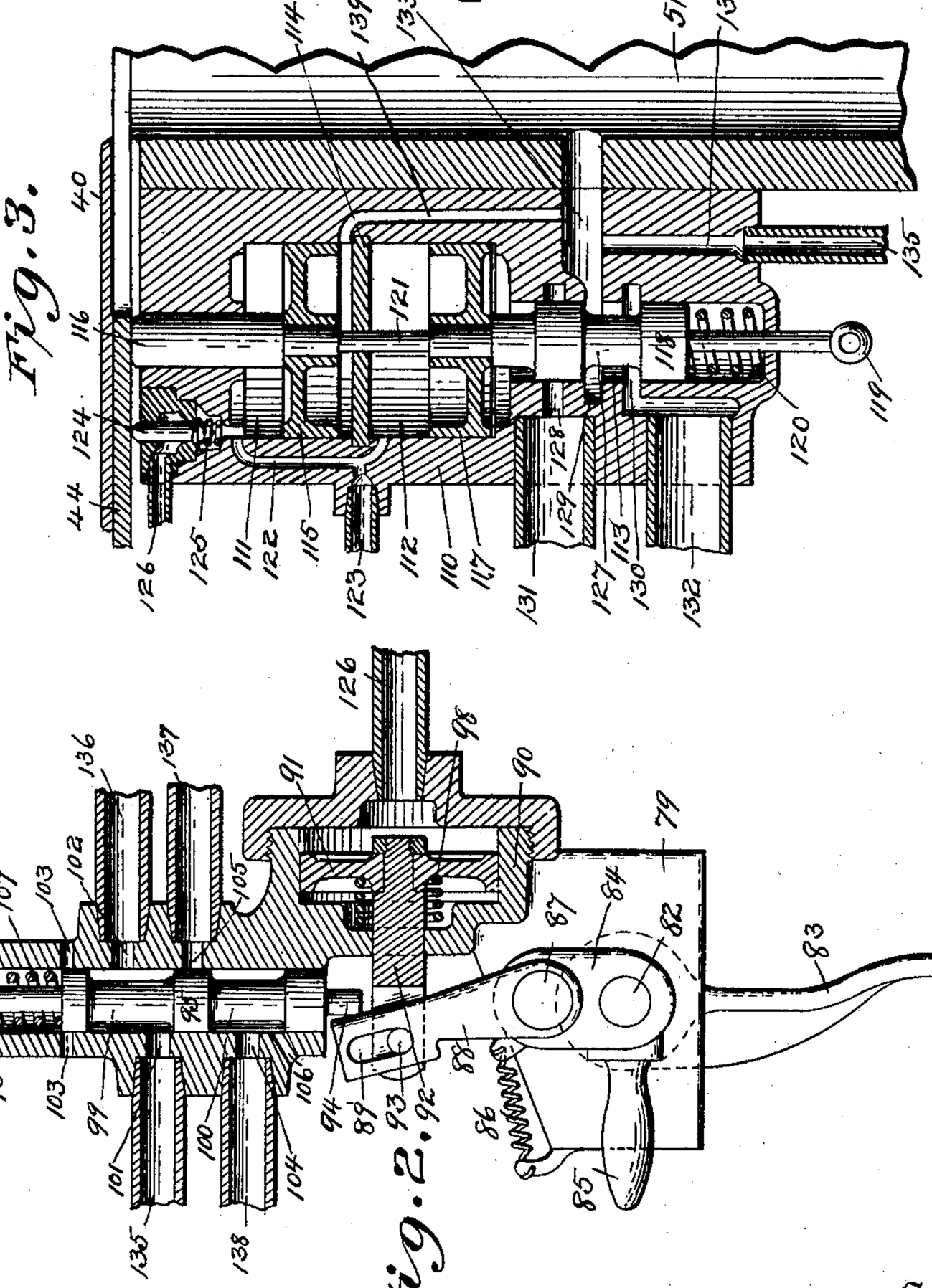

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Fig. 6.

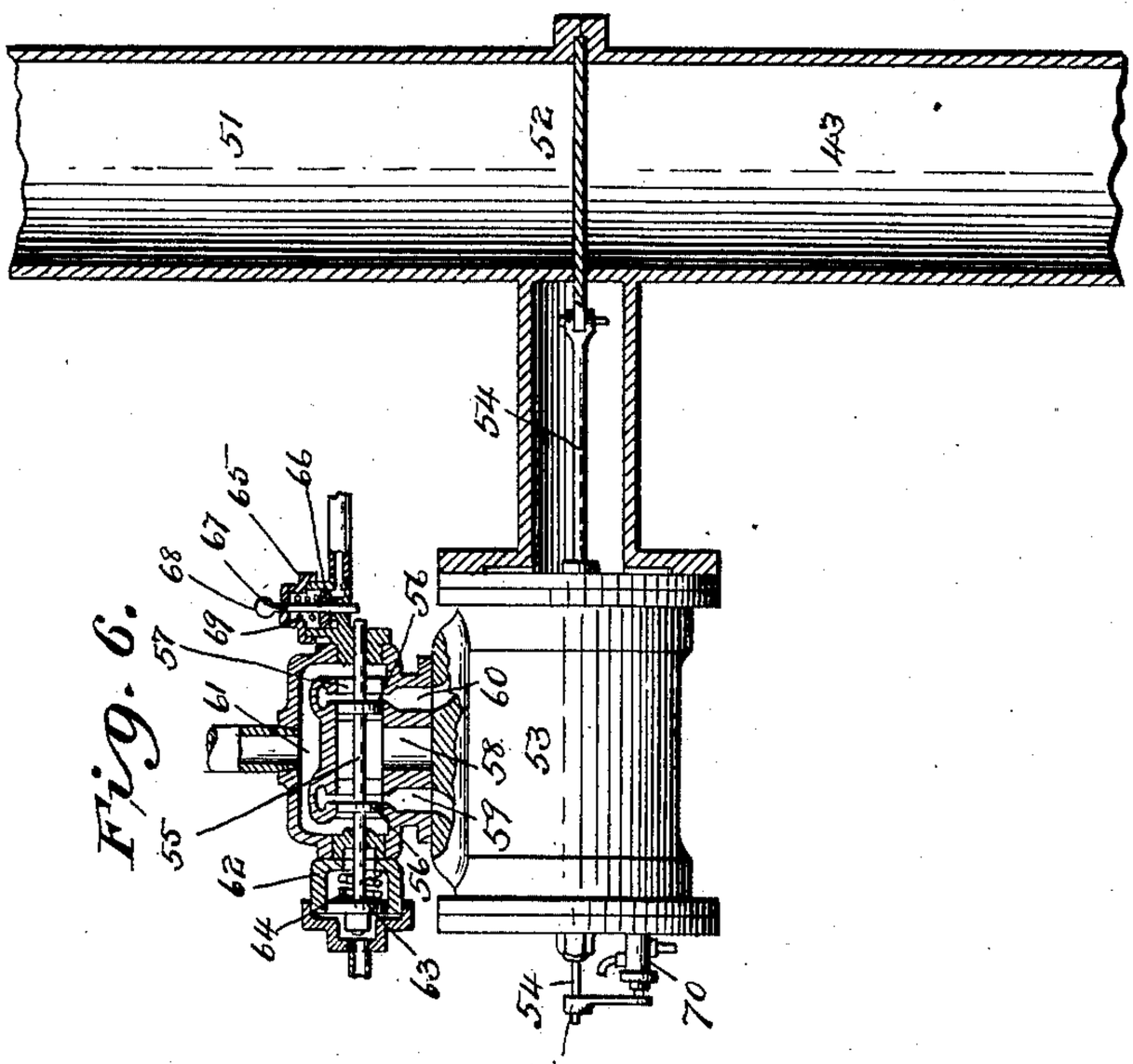
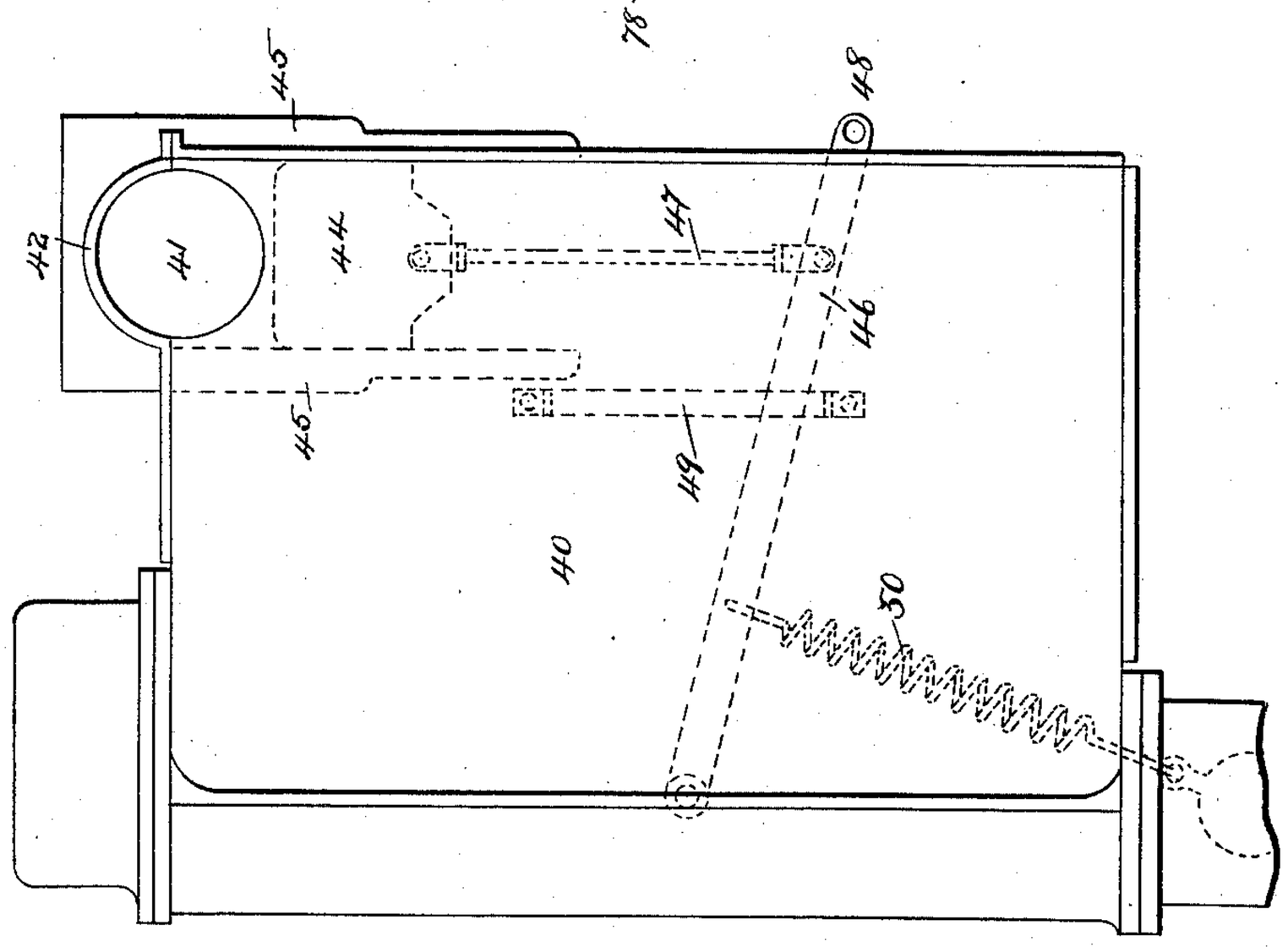


Fig. 5.



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UNITED STATES PATENT OFFICE.

BRYANT H. BLOOD, OF NEW YORK, N. Y.

SENDING APPARATUS FOR TUBULAR TRANSIT APPARATUS.

SPECIFICATION forming part of Letters Patent No. 711,196, dated October 14, 1902.

Application filed November 3, 1900. Serial No. 35,388. (No model.)

To all whom it may concern:

Be it known that I, BRYANT H. BLOOD, a citizen of the United States, residing in the city of New York, in the county of Kings and State of New York, have invented new and useful Improvements in Sending Apparatus for Tubular Transit Apparatus, of which the following is a full, clear, and exact specification, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in receiving and despatching mechanism for use in connection with the general class of pneumatic-despatch systems in which air under pressure is utilized as a motive force, and the present improvements relate particularly to mechanism by which the several parts of such a machine are operated and governed and the consecutive functions of said parts more simply and positively produced, and also to means for bringing a carrier within the receiving-chamber gradually and without rebounding.

The objects of my invention are to produce a more efficient and simple machine capable of performing the functions assigned to it in a safe and positive manner and the elimination of complicated machinery and jarring parts in the more delicate portions thereof. These objects I attain in the manner set forth and particularly described, reference being had to the accompanying drawings, in which—

Figure 1 is a vertical longitudinal section of my entire machine; Fig. 2, a sectional detail of trip-finger valve mechanism; Fig. 3, a sectional detail of locking-bolt and valve mechanism; Fig. 4, a detail section of insurance-valve; Fig. 5, a plan of sending-table and upper-gate mechanism; and Fig. 6, a sectional detail of lower-gate valve mechanism.

Referring to the drawings, for the sake of clearness I will take up the receiving and sending portions of my machine separately, although they together form but one machine complete.

The receiving mechanism is shown in Fig. 1, in which 1 is a section of incoming transit-pipe; 2, a lantern-casting therein, provided with ports 3, leading to exhaust-pipe 4. A receiving-chamber 5 forms a continuation of the transit-pipe 1 beyond the lantern-casting 2 and is normally closed at its outer end by a pneumatically-operated gate 6. The gate 6 is rigidly connected by a connecting-rod 7 with piston 8, working in cylinder 9, and said gate and connecting-rod are adapted to move in a chamber 10 of the gate-casting. The cylinder 9 is provided with a reciprocating valve-stem 11, carrying pistons 12 12 and working in barrel 13, which valve-stem 11 and pistons 12 12 admit pressure from a supply-pipe entering a chamber 14 of the valve-casing through annular port 15 to the upper side of the gate-piston 8 when said valve-stem 11 is in its upper position and exhausts air from the under side of piston 8, through annular port 16, to an exhaust-pipe leading from a chamber 17 of the valve-casing. The reverse of this operation is accomplished when valve-stem 11 assumes its lower position. A tension device 18, consisting of a contact-block, a spring, and an adjusting-screw, is provided to hold the valve-stem 11 in whichever position it is thrown to by the friction of the contact-block against the valve-stem, which block is so held by the spring. At either end of the valve-casing and in line with the valve-stem 11 are placed two cylinders 19 and 20 and pistons 21 and 22, working, respectively, in said cylinders. Springs 23 and 24 hold the pistons 21 and 22 in the outward positions normally. The pistons 21 and 22 are provided with piston-rods 25 and 26, respectively, which are adapted to abut the ends of the valve-stem 11 when moved from their outward position. The spring 23 is strong enough to overbalance the line-pressure. The chamber 10 is connected with the lantern-casting 2 or transit-pipe 1 by a pipe 27, in which is disposed a hand regulating-valve, such as an ordinary globe-valve 28. The cylinder 19 is connected with the chamber 10 by a pipe 29. Just without the gate 6 is pivoted a trip-finger 30, which has a crank portion 31, which crank portion 31 is connected by a link 32 with a piston-rod 33, rigidly attached to a piston 34, working in a cylinder 35. The piston 34 and its connections are held normally in their outward position by a spring 36, disposed back of piston 34 and bearing against the end of cylinder 35. The cylinder 35 is provided with an intaking check-valve 37 and is also connected by a pipe 38 with cylinder 20. A

damper-valve 39 is provided in the exhaust-pipe 4.

Having now described the receiving mechanism, I will now proceed to describe the sending apparatus.

The carrier on issuing from the receiving mechanism slides out upon the table 40. In the table 40, preferably in the near right-hand corner thereof, I provide a circular aperture 41, having a carrier-guide 42 vertically secured at one side thereof. Beneath this circular opening 41 is vertically placed the sending end of the outgoing transit-tube 43. A gate 44 is provided to close the opening 41, (see Fig. 5,) which gate slides in guides 45 45 and is connected to a hand-lever 46 by a link 47. The hand-lever 46 has a handle 48 at its outer end and is pivoted to the table 40 at its opposite end. A guide 49 may be provided for hand-lever 46. A spring 50 is secured to hand-lever 46 and table 40 and normally tends to keep gate 44 open. A chamber 51, somewhat longer than a carrier, is formed in the outgoing transit-pipe 43 by the disposition of a gate 52 therein. The gate 52 is rigidly connected with a piston in a cylinder 53 by a piston-rod 54, which projects clear through the outer end of the cylinder 53. The cylinder 53 is provided with a valve having a valve-stem 55, carrying pistons 56 56 and working in a barrel 57. The valve-stem 55 and pistons 56 56 when in their left-hand position admit air under pressure from a supply-pipe entering a chamber 58 in the valve-casing through an annular port 59 to the left-hand side of the piston in cylinder 53 and exhaust air from the right-hand side of the piston in cylinder 53 through an annular port 60 to an exhaust-pipe leading from a chamber 61 in the valve-casing. The reverse of this operation is accomplished when valve-stem 55 assumes its right-hand position. On the left-hand end of the valve-casing is placed a cylinder 62, in which works a piston 63, said piston being fast on valve-stem 55. A spring 64, placed back of piston 63 and bearing against the end of cylinder 62, normally holds piston 63 and valve-stem 55 in their left-hand position. At the right-hand end of the valve-casing and secured thereto is placed a cylinder 65, in which works a piston 66, rigidly attached to a piston-rod 67, which piston-rod 67 projects through both ends of the cylinder 65. The outer end of the piston-rod 67 is provided with a knob 68 for hand operation. The piston-rod 67 is so placed that when it assumes its downward position its lower end will cross the path of movement of the valve-stem 55. A spring 69 normally holds the piston-rod 67 in its upward or outward position. Upon the outer end of the cylinder 53 is mounted an insurance-valve 70, (shown in detail in Fig. 4,) which consists of a casing 71, provided with a barrel 72, in which a valve-piston 73, having an annular recess 74, works. A spring 75 normally holds the valve-piston 73 in its outward position, cutting off communication between two ports 76 and 77 in the casing 71; but communication is established between said ports 76 and 77 when the valve-piston is depressed through annular recess 74. A lug 78 is secured upon the outward-projecting end of piston-rod 54, which depresses valve-piston 74 of insurance-valve 70, when the gate 52 is entirely closed, and not before. Just below the gate 52 a lantern-casting 79 is placed, having ports 80, leading from the compressor-pipe 81. Just without the gate 52 and in an extension of the lantern-casting 79 is pivoted a shaft 82, carrying a trip-finger 83, which shaft 82 passes through the lantern-casting 79 to the outside and is there provided with a crank 84 and a hand-operating handle 85. (See Fig. 2.) The crank portion 84 is connected with the casting 79 by a spring 86, adapted to normally hold the shaft 82, trip-finger 83, and crank 84 in the normal position shown in Fig. 2. The crank 84 is provided with a pin 87, on which is journaled a link 88, having a slot 89 therein. A cylinder 90 is placed adjacent the shaft 82 and fixed to or made integral with the casting 79 and in which a piston 91 works, said piston 91 carrying a piston-rod 92, which has a pin 93, which engages with the slot 89, whereby the movement of the piston 92 carries the link 88 into and out of alinement with a projecting portion 94 of a valve-piston 95, working in a barrel 96 in valve-casting 97, integral with or affixed to the casting 79. A spring 98 normally tends to hold the piston 91 in its outward position and the link 88 in alinement with the projecting portion 94 of the valve-piston 95. The valve-piston 95 is provided with two annular recesses 99 and 100, the upper recess 99 adapted to establish communication between two ports 101 and 102 in the casting 97 when the valve-piston 95 is in its lower position and between port 102 and an exhaust-port 103 when the valve-piston 95 is in its upper position. The lower recess 100 is adapted to establish communication between two ports 104 and 105 when the valve-piston 95 is in its upper position and between port 105 and an exhaust-port 106 when the valve-piston 95 is in its lower position. A spring 107 is disposed between the upper end of the valve-piston 95 and the end of the barrel 96, normally tending to keep the valve-piston 95 in its lower position. Adjusting-nuts 108 are threaded on the upper end of a projection 109 of the valve-piston 95 to limit the fall of the valve-piston 95, said nuts engaging with the upper end of the casting 97 when the valve-piston 95 is in its lower position. The adjusting-nuts 108 also serve as a means of hand operation.

I will now describe the locking and valve mechanism shown in Fig. 3 of the drawings. In the casing 110 of this valve mechanism are the two cylinders 111 and 112 and the valve-barrel 113. The cylinders 111 and 112 are

separated by a partition 114, and both cylinders and the valve-barrel are in alinement. A piston 115 works in the cylinder 111 and carries affixed to it a piston-rod or bolt 116, which passes clear through the upper end of the valve-casing 110 and serves as the gate-locking bolt. A piston 117 works in cylinder 112 and carries affixed to it the valve-piston 118, working in barrel 113. This valve-piston 118 has an extended portion terminating in an eye 119, serving for means whereby an ordinary counter may be attached as well as for a means of hand operation. A spring 120 is placed under the valve-piston and bearing on the lower end of the barrel 113, tending to keep the valve-piston 118 and the piston 117 in their upper position. A pin 121 is slidably mounted in a central aperture in the partition 114 and is adapted to abut both of the pistons 115 and 117. However, this pin may be made integral with one of the pistons, if so desired. It will therefore be seen that the action of spring 120, forcing up piston 117, will also force up piston 115 and bolt 116. A port 122 connects the upper ends of the two cylinders 111 and 112. The port 122 is connected with port 77 of the insurance-valve 70 by a pipe 123. A pin-valve 124 at the top of the casting 110 is normally held closed by a spring 125, but has a rounded top end which allows it to be depressed by the passage of the gate 44, opening communication between port 122 and cylinder 90 through a pipe 126. The valve-piston 118 is provided with an annular recess 127, which is adapted to establish communication between two ports 128 and 129 when the valve-piston 118 is in its upper position and between port 129 and a port 130 when the valve-piston 118 is in its lower position. A pipe 131 connects port 128 with any suitable air-supply, preferably the line. Port 130 connects with exhaust-pipe 132.

Having now described the several parts of my improved device, I will follow out and describe the operation of the same, first of the receiving apparatus and afterward of the sending mechanism. A carrier arrives through transit-pipe 1 and passes ports 3, cushioning in the chamber 5, which is closed by gate 6. It has often happened heretofore that the rebound of the carrier or successive rebounds due to the cushioning in chamber 5 has carried the carrier back, blocking up the ports 3 and obstructing the free passage of air out of the tube or onto the line beyond. To obviate this trouble, I have placed a by-pass 27 from the outer end of the chamber 5 to the transit-tube at or back of the ports 3 and placed a regulating-valve 28 therein. By this arrangement I am able to allow the air forward of the carrier in chamber 5 to gradually ooze back to the line, coaxing the carrier as slowly as desired into the chamber 5 and freeing the ports 3. The excess pressure generated in chamber 5 by the impetus of the carrier as it enters is carried through pipe 29 to cylinder 19 and there acts on balanced piston 21. The piston 21 being balanced only to line-pressure is thrown down by this excess pressure, carrying piston-rod 25 down. Piston-rod 25 abuts valve-stem 11, throwing it down and admitting air under pressure from chamber 14 through port 16 to the under side of piston 8, raising piston 8 and gate 6. As soon as gate 6 is raised the pressure from the line will push the carrier out of chamber 5 onto table 40; but if said line-pressure is too weak to push the carrier out with the exhaust open the damper 39 may be momentarily partly or wholly closed, allowing the pressure to back up and push the carrier out. As the carrier passes beyond the gate 6 it strikes the finger 30 up, drawing by means of the connections the piston 34 back against the pressure of spring 35 and sucking in air through the check-valve 37. When the carrier has passed beyond the finger 30, the spring 35 returns the piston 34 and other parts to their normal positions, forcing in a puff the air drawn in through check-valve 37 through pipe 38 to cylinder 20, where it forces up piston 22, which carries piston-rod 26 up, abutting valve-stem 11 and carrying that up to its upper position, admitting air to the upper side of piston 8 and closing gate 6. The operation is now complete and the machine in readiness to receive another carrier.

The operation of the sending apparatus is as follows: The operator takes the carrier to be sent and places it in the aperture 41, aided in so doing by the guide 42, and lets it drop upon the gate 52. He then closes the upper gate 44 by means of the handle 48 and lever 46, and when the gate 44 is entirely closed it passes from above the bolt 116 and allows the same, together with the intermediate parts, to be thrown up by the action of spring 120, securely locking the gate 44 from being opened by the spring 50 or lever 46, and at the same time the recess 127 in the valve-piston 118 establishes communication between ports 128 and 129, allowing air under the line-pressure to flow from the supply-pipe 131 through a port 133 to the chamber 51, balancing the pressure on either side of the gate 52, so that the same may be opened without undue friction. At the same time that pressure is admitted to the chamber 51 pressure is admitted through a port 139 to the under side of piston 115, reinforcing the action of spring 120 in holding bolt 116 in place behind gate 44 and making it impossible to open gate 44 while pressure is on chamber 51. At the same time pressure is also passed from port 133 through port 134 and pipe 135 to port 102 in the trip-finger valve and thence through recess 99 and port 101 and pipe 136 to cylinder 62, throwing piston 63 and valve-stem 55 to the right and admitting air-pressure to the right-hand side of the piston in cylinder 53, opening gate 52 and letting the carrier fall into the outgoing pipe 43, and as soon as it passes the ports 80 the air-current from said ports will carry it on its way; but immediately it passes

through gate 52 it encounters trip-finger 83 and throws it back, the crank portion 84 drawing the link 88 down and the spring 98 drawing the link into alinement with and under projecting portion 94 of valve-piston 95, and as soon as the carrier passes the finger 83 the spring 86 carries the shaft 82 to its normal position, the crank 84 moving the link 88 upward, and the link 88 being under the valve-piston 95, that is also moved to its upper position, closing communication between ports 101 and 102 and exhausting cylinder 62 through pipe 136, port 102, and exhaust-port 103, the spring 64 returning valve-stem 55 to its original position, admitting pressure to the left-hand side of the piston in cylinder 53 and closing gate 52. At the same time the raising of valve-piston 95 opens communication between ports 104 and 105 and air under pressure flows from the transit-pipe or other suitable source through pipe 137, recess 100, pipe 138 to insurance-valve 70, which will be opened when the gate 52 is entirely closed, and on through pipe 123 to port 122, and thence to the upper sides of the pistons 115 and 117. The piston 117 will first be thrown down against the pressure of spring 120 and carry with it valve-piston 118, the recess 127 establishing communication between the port 133 and exhaust 132, thereby exhausting the pressure from chamber 51 to that of the atmosphere. At the same time pressure is exhausted from the under side of piston 115 through port 139, when pressure from port 122 on top of piston 115 will withdraw bolt 116 and the gate 44 will fly open under the action of spring 50. As the gate 44 flies open, it depresses the pin-valve 124 and admits pressure from port 122 through pipe 126 to cylinder 90, which acting on piston 91 throws link 88 out from under projecting portion 94 of valve-piston 95 and allows valve-piston 95 to drop under the influence of spring 107, which cuts off pressure from the pistons 115 117 and allows the spring 120 to force bolt 116 up against the face of the now open gate 44, ready to spring back of and lock the same, and also opens communication between ports 101 and 102 to allow the passage of air when any shall be admitted by the upward movement of the bolt 116, and also opens communication between port 104 and exhaust-port 106, thus exhausting pressure from cylinder 90 through pipe 126, pin-valve 124, port 122, pipe 123, open insurance-valve 70, pipe 138, port 104, recess 100, and exhaust-port 106, thereby allowing spring 98 to draw link 88 against projecting portion 94 of the valve-piston 95, so that the link will jump under the projecting portion 94 when drawn down by the crank 84. All the parts are now in their original position ready for the sending of another carrier.

When it is desired to prevent by a time mechanism the sending of carriers too closely together, I provide the cylinder 65 and its piston 66. Any of the ordinary time mechanisms may be used. For instance, the mechanism for producing the time interval is set by the opening of gate 44 and while running cuts off pressure from a source of air-pressure, but when the time is up allows the pressure to proceed to the cylinder 65, the operation being as follows: the gate 44 flying open after a carrier sets in motion the time mechanism, which cuts off pressure from cylinder 65 and allows spring 69 to throw piston-rod 67 into the road of the valve-stem 55, which will prevent the operation of the valve-stem 55 and the consequent opening of gate 52 until the time is up and the time mechanism has opened the valve and allowed air under pressure to raise piston 66 and rod 67 out of the road of the valve-stem 55, when the gate will be opened. When no time element is desired, this device may be left off.

It is obvious that various changes may be made in the construction and details of my invention without departing from the spirit of my invention.

Having now described the several parts of my invention and the operation of the same, what I claim, and desire to secure by Letters Patent, is—

1. In apparatus for tubular transit systems, a sending-chamber, a manually-operated entrance-gate for said chamber, a pneumatically-operated exit-gate for said chamber, substantially as described.

2. In apparatus for tubular transit systems, a sending-chamber, an entrance-gate for said chamber, a hand-lever for closing said gate and means for automatically opening said gate, substantially as described.

3. In apparatus for tubular transit systems, a sending-chamber, an entrance-gate therefor, a hand-lever for closing said gate, means for automatically opening said gate, a locking-bolt designed to lock said entrance-gate when closed, an exit-gate, and means for withdrawing said locking-bolt and releasing said entrance-gate upon the complete closure of said exit-gate, substantially as described.

4. In apparatus for tubular transit systems, a sending-chamber, a manually-operated gate and a pneumatically-operated gate, means for opening said pneumatically-operated gate upon the complete closure of said manually-operated gate, a trip-finger without said chamber and means controlled by said trip-finger for closing said pneumatically-operated gate, and means for opening said manually-operated gate upon the complete closure of said pneumatically-operated gate, substantially as described.

5. In apparatus for tubular transit systems, a sending-chamber, an entrance-gate for said chamber, a hand-lever for closing said entrance-gate, a spring for opening said entrance-gate, a spring-pressed locking-bolt designed to automatically lock said entrance-gate upon the complete closure thereof, an exit-gate for said chamber, a piston rigidly connected to said gate, a cylinder for said piston, a pilot-valve for said cylinder, a valve

controlled by said locking-bolt designed to admit air under pressure from a main supply to said sending-chamber when said locking-bolt assumes its locking position, a spring-returned piston rigid with said pilot-valve, a cylinder for said latter piston, communication between said sending-chamber and said latter piston for admitting air-pressure from said chamber to said latter piston to operate said pilot-valve to admit air under pressure to said first-mentioned piston to open said exit-gate, and means controlled by a trip-finger without said chamber for returning said several parts to their normal positions, substantially as described.

6. In apparatus for tubular transit systems, the combination with a sending-chamber and a manually-closed gate therefor of a locking-bolt for said gate, a piston fast upon said bolt, a cylinder for said piston, a valve for admitting air under pressure to said chamber, a piston fast upon said valve, a cylinder for said latter piston, said locking-bolt and valve capable of abutment, a common spring tending to throw said locking-bolt into its locking position and said valve into position for admitting air to said chamber, an air-supply common to both said cylinders designed to influence said pistons in opposition to said spring to unlock said gate and move said valve to a position to exhaust said chamber, the valve and locking-bolt being capable of individual movement that the influence of the air-pressure may be first exerted upon the valve-piston and the pressure removed from the said chamber and afterward, the tension being removed from said gate, the full pressure may be exerted to withdraw said bolt, substantially as described.

7. In a machine of the character described, the combination with a sending-chamber, an entrance-gate therefor, a trip-finger without said chamber, a valve operated in one direction by said trip-finger and a supply of air under pressure, of pneumatic means for returning said trip-finger valve to its original position, a valve closed when said gate is completely closed and opened by the partial or complete opening of said gate admitting air under pressure from said supply to said pneumatic valve-returning means, substantially as described.

8. In apparatus for tubular transit systems, the combination with a sending-chamber, of a manually-operated gate and a pneumatically-operated gate, pneumatic operating mechanism for said pneumatically-operated gate controlled by said manually-operated gate, substantially as described.

9. In apparatus for tubular transit systems, the combination with a sending-chamber, of a manually-operated gate, a pneumatically-operated gate, pneumatic operating mechanism for said pneumatically-operated gate, a locking and unlocking device for said manually-operated gate, controlling mechanism for said pneumatic operating mechanism actuated by said locking and unlocking device, substantially as described.

10. In apparatus for tubular transit systems, the combination with a sending-chamber, of a manually-operated gate, a pneumatically-operated gate, pneumatic operating mechanism for said pneumatically-operated gate, controlling mechanism for said pneumatic operating mechanism actuated by said manually-operated gate and a trip-finger mechanism for returning the several gates and parts to their normal positions, substantially as described.

11. In apparatus for tubular transit systems, the combination with a sending-chamber, a manually-operated gate and a pneumatically-operated gate, of a locking-bolt for said manually-operated gate, and a valve actuated by said bolt adapted to admit air-pressure to said sending-chamber and to control said pneumatically-operated gate, substantially as described.

12. In apparatus for tubular transit systems, the combination with a sending-chamber, a manually-operated gate and a pneumatically-operated gate, a locking-bolt for said manually-operated gate, a valve for admitting air-pressure to said sending-chamber and controlling said pneumatically-operated gate, a common spring for actuating said bolt and valve, pneumatic means for returning said valve, and pneumatic means for withdrawing said bolt, substantially as described.

13. In apparatus for tubular transit systems, the combination with a sending-chamber and entrance and exit gates therefor, of a locking-bolt for said entrance-gate, a valve, a common spring to actuate said bolt to lock said entrance-gate and said valve to admit air-pressure to said sending-chamber and to pneumatic means for opening said exit-gate, pneumatic means for withdrawing said locking-bolt, and pneumatic means for actuating said valve to exhaust said sending-chamber, substantially as described.

14. In apparatus for tubular transit systems, the combination with a sending-chamber, and entrance and exit gates therefor, of a lever for operating said entrance-gate, a spring normally holding said entrance-gate in its open position, a locking-bolt for said entrance-gate, a spring normally holding said bolt in its normal position, a piston on said bolt, a cylinder for said piston, and an air-supply pipe leading to said cylinder, said air-supply adapted to withdraw said bolt from the locking position, substantially as described.

15. In apparatus for tubular transit systems, the combination with a sending-chamber and entrance and exit gates therefor, of two tandem cylinders, pistons in said cylinders, a pin capable of longitudinal movement adapted to abut said pistons, a locking-bolt fast to one of said pistons, a valve-stem fast to said other piston, a common spring normally holding said pistons in one position,

pipes leading to said respective cylinders, an air-pressure supply adapted to enter said cylinders and throw said pistons to their other position, substantially as described.

16. In apparatus for tubular transit systems, the combination with a sending-chamber, and entrance and exit gates therefor, of a lever for operating said entrance-gate, a spring normally holding said entrance-gate in its open position, two tandem cylinders, pistons in said cylinders, a locking-bolt carried by one of said pistons adapted to snap up behind and securely lock said entrance-gate in its closed position, a common spring normally holding said pistons in the position for locking said gate, a valve carried by said other piston adapted to admit air-pressure from an air-supply to said sending-chamber when said pistons are acted upon by said spring and exhaust said pressure from said chamber to the atmosphere when said pistons assume their other position, a pin capable of longitudinal movement adapted to abut said pistons, said pin placed in alinement with said pistons, and an extended portion of said valve adapted to be connected with and operate a counter, substantially as described.

17. In apparatus for tubular transit systems, the combination with a spring-opened and manually-closed entrance-gate, a spring-locking and pneumatically-released locking mechanism for said entrance-gate, a pneumatically-operated exit-gate, a controlling-valve for said pneumatically-operated exit-gate, a spring-returned piston for operating said controlling-valve, and an air-supply of a valve actuated by said locking mechanism adapted to admit air under pressure from said air-supply to said spring-returned piston opening said exit-gate, a double valve, a trip-finger mechanism for operating said double valve, said double valve adapted to cut off pressure from said spring-returned piston and exhaust the same when actuated by said trip-finger and admit air-pressure to said pneumatically-released locking mechanism, releasing the same and opening the entrance-gate, a pin-valve actuated by said entrance-gate, a spring-returned snap-piston adapted to return said double valve, said pin-valve adapted to admit air-pressure to said spring-returned snap-piston, and said double valve when returned adapted to exhaust said pneumatically-released locking mechanism and said spring-returned snap-piston, substantially as described.

18. In apparatus for tubular transit systems, the combination with a pneumatically-operated lock-releasing mechanism, an entrance-gate adapted to be unlocked thereby, an air-supply for operating the same and an exit-gate, of an insurance-valve adapted to be opened by said exit after the same is entirely closed, said insurance-valve disposed in said air-supply, substantially as described.

19. In a machine of the character described, the combination with the sending-chamber and the exit-gate pilot-valve, of a trip-finger valve, a trip-finger for actuating said valve, a spring-returned piston fast on said pilot-valve, a cylinder for said piston, communication between said sending-chamber and said trip-finger valve and said trip-finger valve and said cylinder, said trip-finger valve normally opening communication between said chamber and said cylinder but closing said communication and exhausting said cylinder when actuated by said trip-finger, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

BRYANT H. BLOOD.

Witnesses:

GEORGE E. PHELPS,

GEO. G. GRIEST.