No. 693,366. Patented Feb. 18, 1902.

B. H. BLOOD.

GENERAL CLASS OF TUBULAR DESPATCH SYSTEMS AND ESPECIALLY TO RECEIVING APPARATUS FOR INTERMEDIATE STATIONS.

(Application filed Aug. 20, 1900.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

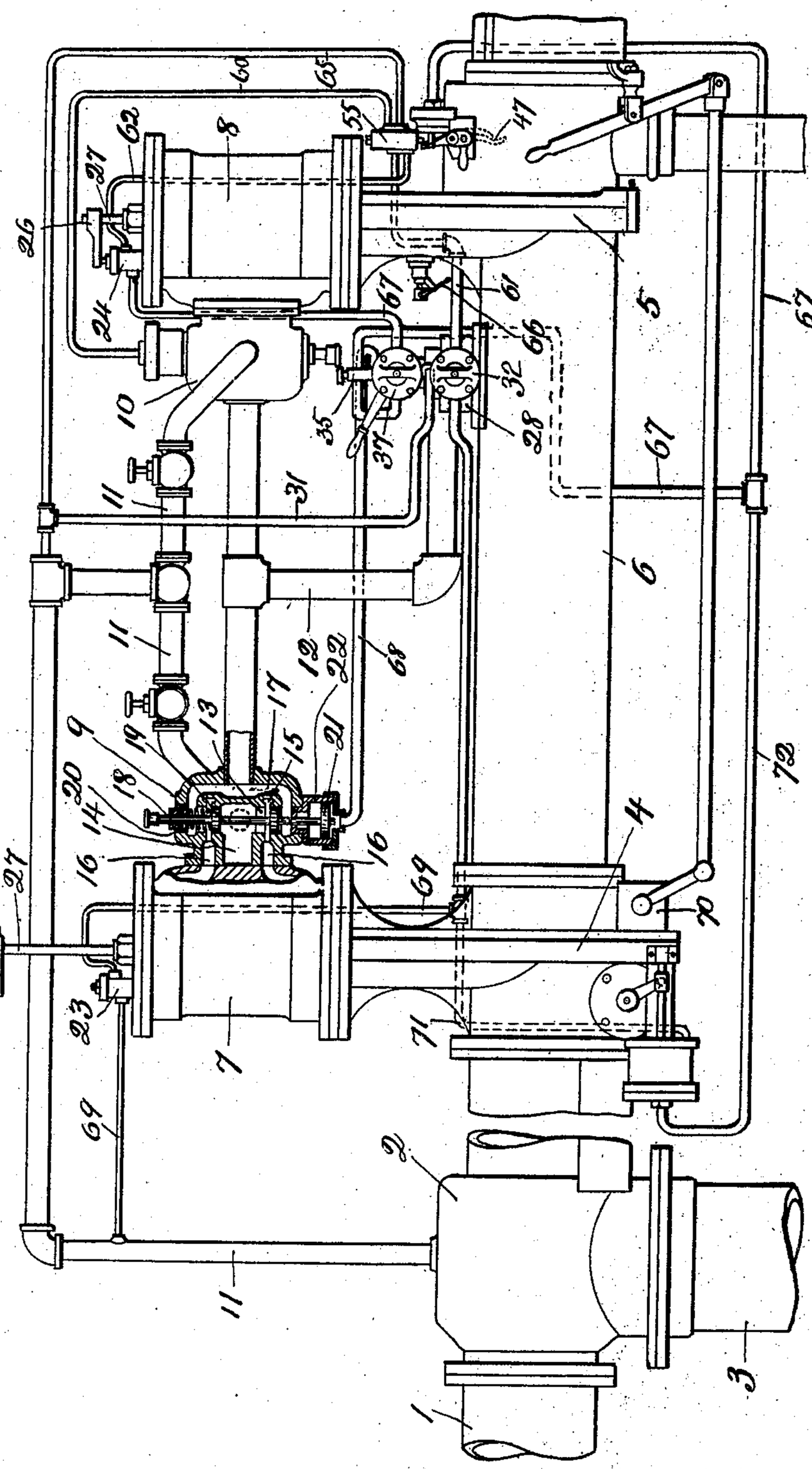

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Fig. 6.

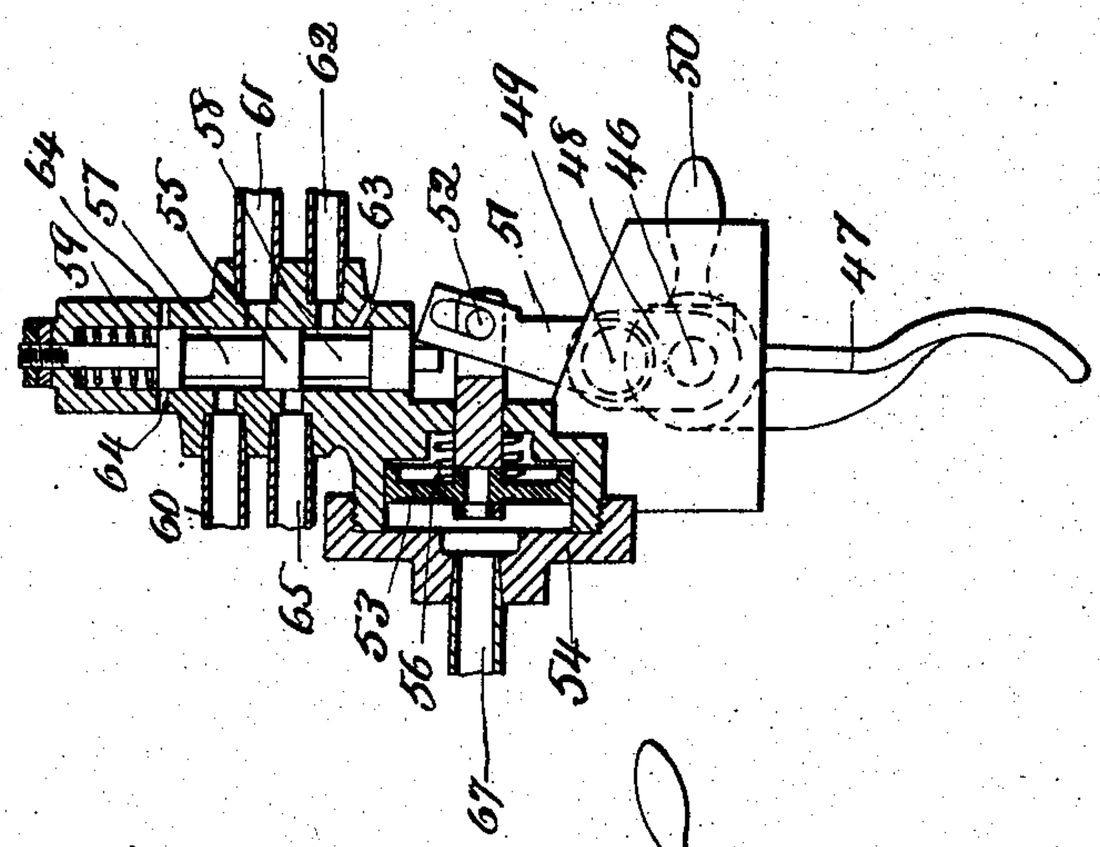


Fig. 5.

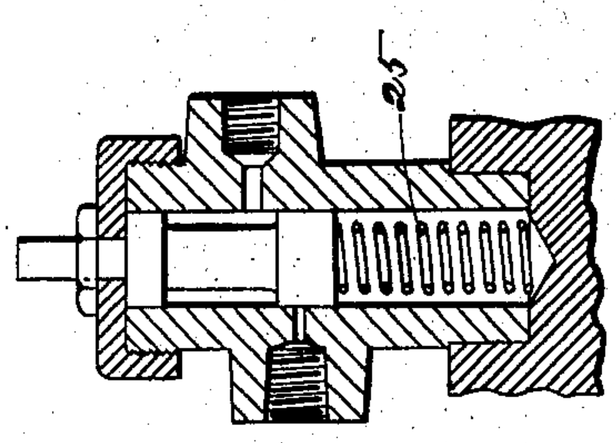


Fig. 4.

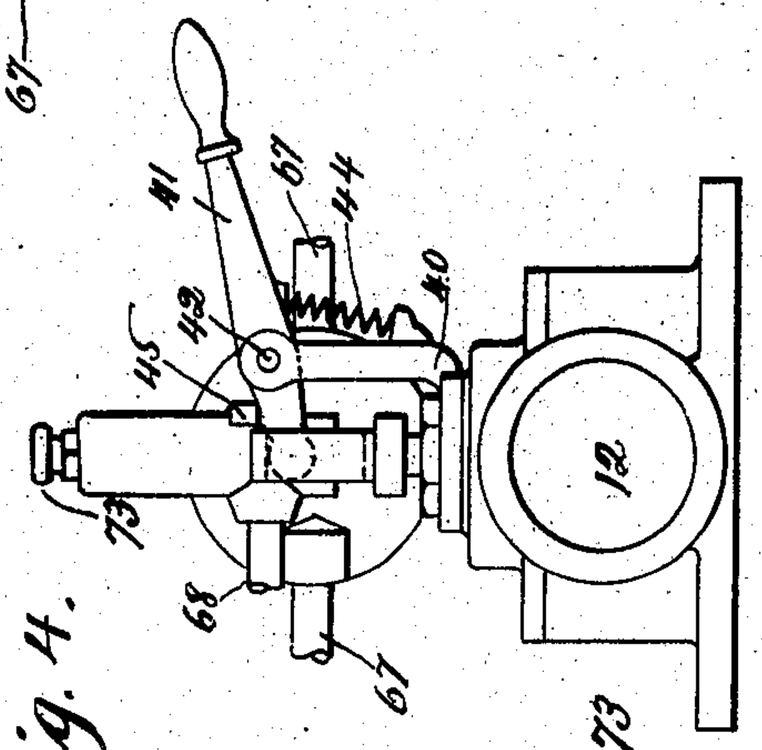


Fig. 2.

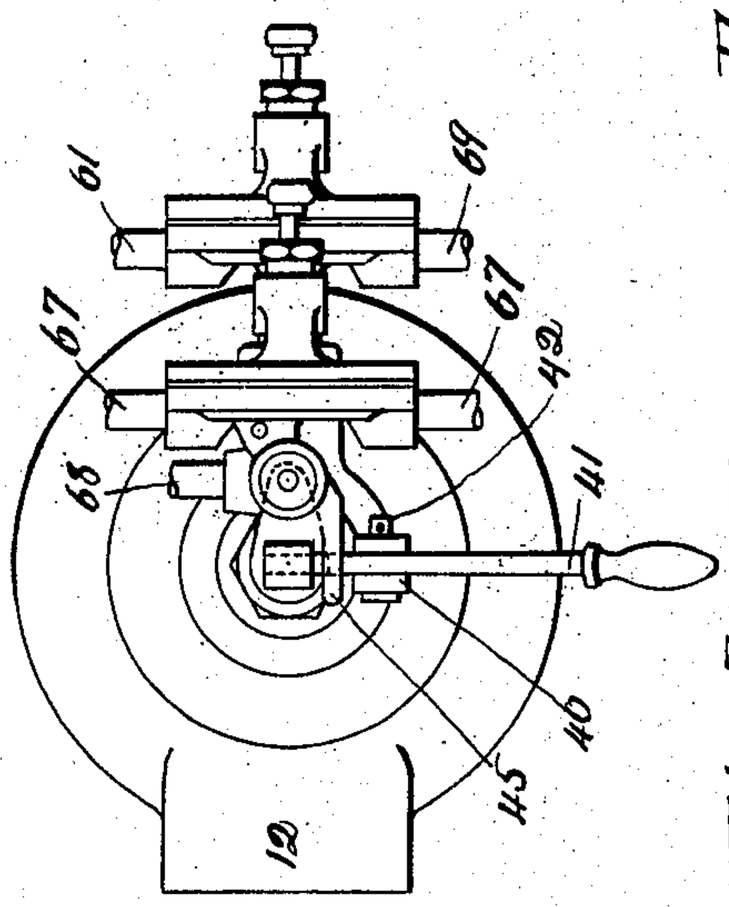
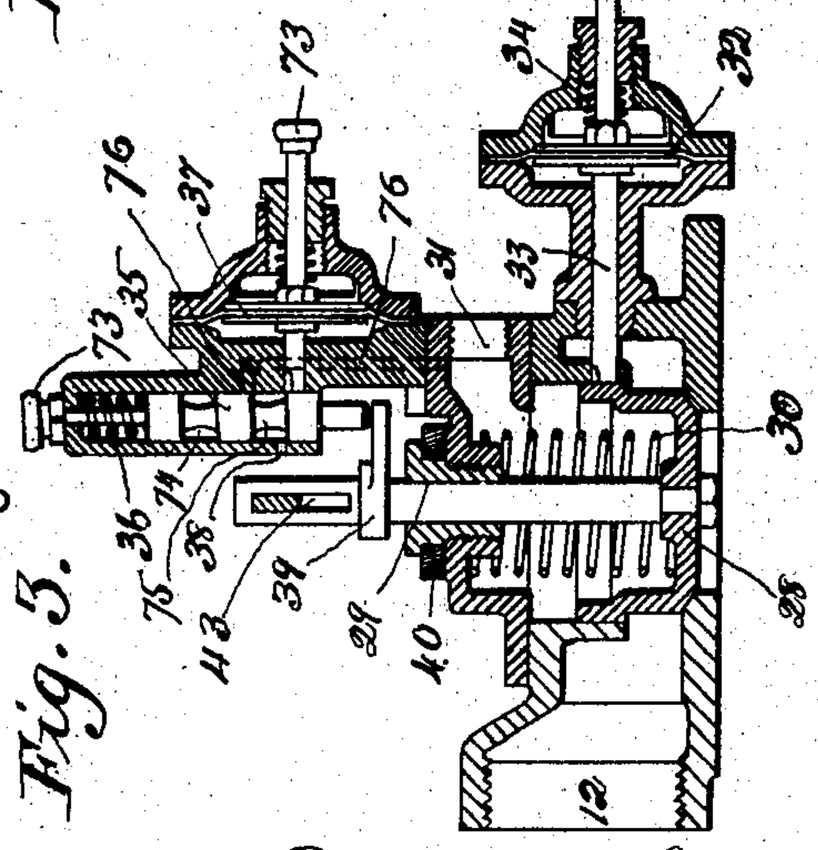


Fig. 3.



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UNITED STATES PATENT OFFICE.

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

GENERAL CLASS OF TUBULAR DESPATCH SYSTEMS AND ESPECIALLY TO RECEIVING APPARATUS FOR INTERMEDIATE STATIONS.

SPECIFICATION forming part of Letters Patent No. 693,366, dated February 18, 1902.

Application filed August 20, 1900. Serial No. 27,455. (No model.)

To all whom it may concern:

Be it known that I, BRYANT H. BLOOD, a citizen of the United States, residing at No. 84 St. James Place, borough of Brooklyn, city of New York, county of Kings, and State of New York, have invented a new and useful Improvement in the General Class of Tubular Despatch Systems and Especially to Receiving Apparatus for Intermediate Stations, of which the following is a specification.

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 that class of receiving and despatching stations located intermediate the source of motive power and the pressure-exhaust or terminal of the line, the objects of the invention being to provide a compact machine of as few moving parts as possible, embodying devices insuring the safe and positive receiving and despatching of the carrier, while maintaining a uniform pressure upon the line beyond such intermediate station during the operation of the machine. These objects I attain in the manner hereinafter set forth and particularly described, reference being had to the accompanying drawings, in which—

Figure 1 is a vertical longitudinal sectional view of a receiving mechanism constructed in accordance with my invention; Fig. 2, a plan view of excess-pressure valve mechanism; Fig. 3, a vertical section of same; Fig. 4, an end elevation of same; Fig. 5, a vertical section of a safety-insuring valve, and Fig. 6 a vertical section of a trip-finger valve mechanism.

Like reference characters refer to similar parts throughout the several views.

Referring to the drawings, 1 represents the end portion of a pneumatic transit-pipe having an enlarged section 2, from which the air escapes to a by-pass 3, which connects with the outgoing transit-pipe at a transmitting device (not shown) and allows of a free passage of air to the transit-pipe beyond at all times. Two gates 4 and 5 are located at either end of a receiving-chamber 6, forming a continuation of the transit-pipe 1, and are operated by pistons working in cylinders 7 and 8 either by air-pressure taken from the transit-pipe or an independent auxiliary source. Piston-valves 9 and 10, adapted to control the admission of air under pressure to the gate-pistons, are disposed upon the cylinders 7 and 8 in the manner of steam-chests, the air-pressure being supplied through pipe 11 and a pipe 12 provided for the exhaust.

The valves 9 and 10 each consist of a barrel 13, opening into a pressure-chamber 14, which receives the air under pressure directly from pipe 11, and annular ports 15, adjacent either end, communicating with ports 16, leading to either end of the cylinders. At either end of the barrel 13 is an exhaust-port 17, communicating directly with exhaust-pipe 12. A valve-stem 18 is provided with pistons 19, which fit snugly within the barrel 13, which valve-stem and pistons are normally held in the position shown in Fig. 1 by springs 20, the valves 9 and 10 being so disposed that pressure is normally maintained upon the bottom of the piston in cylinder 7, holding gate 4 open, and upon the top of the piston in cylinder 8, holding gate 5 closed. The valve-stems 18, carrying pistons 19, are operated by pistons 21, fast on said valve-stems, working in cylinders 22, the valve-stems being forced in one direction against the action of the springs 20 by air-pressure admitted to pistons 21 and returned by springs 20 when said pressure is exhausted.

On top of each of the cylinders 7 and 8 are mounted safety-insuring valves 23 and 24, respectively, (shown in detail in Fig. 5,) which are normally closed by the upward pressure of springs 25 and are depressed and opened by the contact therewith of lugs 26 upon extensions 27 of the piston-rods of the pistons in cylinders 7 and 8 when the gates 4 and 5, respectively, are entirely closed, but not before.

A valve 28 on a valve-stem 29 (shown in detail in Figs. 2, 3, and 4) is normally held seated in the wall of the chamber 6 by a spring 30, the pressure of the line being balanced through a pipe 31, leading from pipe 11 into the casing of the valve above the same. This valve 28 is adapted to be raised by the excess pressure in chamber 6 due to the compres-

sion of air before an entering carrier. A flexible diaphragm 32, carrying locking-pin 33, is normally held in position to catch and lock valve 28 by a spring 34 when said valve is raised and maintain the same in such raised position. Air being admitted behind the diaphragm 32 and working in opposition to spring 34 will withdraw pin 33, releasing and reseating valve 28.

A piston-valve 35, having two annular recesses 74 and 75, is normally held in its lower position by a spring 36 and is provided with a locking and releasing diaphragm 37, similar to diaphragm 32. The recess 74 opens communication through pipe 67 and the recess 75 between pipe 68 and port 76 when the valve is in its lower and upper positions, respectively, closing said communications in the respective opposite positions. A port 38 exhausts pipe 68 when valve 35 is in its lower position, but is closed when valve 35 is raised by lug 39 on valve-stem 29 of valve 28.

A bracket 40 is swiveled about the valve-stem 29. A hand-lever 41 is fulcrumed upon the bracket 40 at 42 and enters a slot 43 in the upper portion of the valve-stem 29 to turn the same approximately a quarter of a circle and also to raise valve 28 by the depression of its handle end when in such position. The slot 43 is made of such length as to allow of the raising and lowering of the valve 28 by the excess air-pressure without encountering lever 41, which is normally held in the position shown in Fig. 4 by a spring 44. A projecting lug 45 upon the casing of valve 35 is adapted to prevent the depression of lever 41 until it has been turned approximately a quarter of a circle and the lug 39 has been turned out of alinement with valve 35, thereby allowing valve 28 to be raised by hand without raising valve 35 and rendering the raising of both at once impossible by one movement of the hand-lever, which provision will be more fully appreciated hereinafter.

Just without the gate 5 a shaft 46 is mounted in the casting, carrying a finger 47, which projects into the path of the carrier and terminating at its upper end in a crank 48 and pin 49. The finger 47 is also provided with a hand operating-lever 50. Upon the pin 49 is loosely journaled one end of a link 51, the opposite end of which is provided with a slot accommodating a pin upon a rod 52. The rod 52 is secured to a piston 53, working in a cylinder 54, the movement of which piston alternately carries the link 51 into and out of alinement with a trip-valve 55, a spring 56, however, tending to normally hold the link in alinement with said valve. The valve 55 consists of a snug-fitting piston having two annular recesses 57 58. The valve 55 is normally held in the position shown in Fig. 6 by spring 59, the recess 57 establishing communication between two pipes 60 and 61 and recess 58 between a pipe 62 and an exhaust-port 63. The operation of this mechanism is as follows: The finger 47 being thrown up by the passage of a carrier draws down link 51, which normally rests against the end of valve 55, and spring 56 draws the link under said valve. When the carrier has passed finger 47, a spring on shaft 46 (not shown) causes the finger to assume its normal position, forcing the link, together with the valve 55, upward, the recess 57 establishing communication between pipe 60 and an exhaust-port 64 and the recess 58 between pipe 62 and a pipe 65. Air admitted to cylinder 54 will act upon piston 53 and force link 51 from under valve 55 and allow the latter to return to its original position under the influence of spring 59, where it will remain, holding the link 51 against the influence of spring 56 after the pressure upon piston 53 is removed.

A hand-valve 66 is provided for the purpose of exhausting chamber 6 by hand.

The operation and pipe connections of the receiver are as follows:

A carrier entering chamber 6 from transit-pipe 1 through open gate 4 produces an excess pressure between the carrier and closed gate 5 as the carrier cushions forward of the latter, which throws valve 28 upward to be locked in that position by the action of spring 34 on locking-pin 33 and at the same time exhausting the excess pressure from chamber 6 to pipe 12. As the valve 28 rises it carries valve 35 to its upper position, where it is locked by mechanism 37 in the same manner as valve 28 and establishes communication between the balance and supply pipe 31, leading from pipe 11 through a port 74, and a pipe 68, admitting pressure to valve 9 and operating the same, closing gate 4. The closing of gate 4 opens valve 23, which admits air under pressure from pipe 11 through pipe 69 to diaphragm 32, releasing and reseating valve 28, and at the same time passing on freely through pipe 61 and recess 57 in valve 55 and pipe 60 to valve 10, opening gate 5 and allowing the carrier to be ejected by pressure from the line through a damper-valve 70. The outgoing carrier throws up finger 47, drawing link 51 down, the spring 56 drawing it under the trip-valve 55, and the recovery of the finger by its spring forces the valve 55 to its upper position, exhausting pressure from the operating-piston of valve 10 through port 64, closing gate 5. Valve 55 in this position admits pressure from pipe 11 through pipe 65 to pipe 62 and valve 24; but valve 24 remains closed until gate 5 is entirely closed, when it is opened by lug 26, and pressure is admitted through pipe 67 to diaphragm 37, releasing valve 35, and after valve 35 falls passes on freely through recess 74 and pipe 67, releasing valve 55 through piston 53, spring 59 returning said valve to its original position.

It will be seen that it is impossible, owing to the disposition of valve 23, for gate 5 to automatically open before gate 4 has entirely closed, as the air-pressure for operating gate

5 must be admitted through valve 23, and the same may be said of gate 6 and valve 24. In fact, no part of this machine can possibly operate out of its predetermined time and place, as each function is entirely dependent upon its preceding function.

Branch pipes 71 and 72 lead from pipes 69 and 67, respectively, and supply a cushioning mechanism with a part of the air-pressure received by said pipes, which cushioning mechanism forms the subject-matter of application "A" of this series to W. A. H. Bogardus, Serial No. 26,493, of 1900.

Valves 9 and 10 are each provided with a knob 73 for hand operation, as are also locking mechanisms 37 and 32 and valve 35.

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

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

1. In a receiving apparatus for tubular transit systems, the combination with a receiving-chamber, pneumatically-operated gates therefor, and a main air-pressure supply for operating said gates, of a governing and controlling system consisting of pneumatically-operated valve mechanisms for said main air-pressure supply, an auxiliary air-supply for operating said valve mechanisms, an excess-pressure valve mechanism, a trip-finger valve mechanism and insurance valve mechanisms, said excess-pressure, trip-finger and insurance valve mechanisms so disposed and constituted as to render each function of the machine absolutely dependent upon the consummation of the preceding function, substantially as described.

2. In a receiving apparatus for tubular transit systems, a receiving-chamber, a gate at either end thereof, pneumatic operating mechanism for said gates, pneumatically-operated controlling-valves for said pneumatic operating mechanism, an excess-pressure valve for controlling said controlling-valves, and a trip-finger valve mechanism for returning said before-mentioned parts to their normal positions, substantially as described.

3. In a receiving apparatus for tubular transit systems, a receiving-chamber, entrance and exit gates therefor, pneumatic operating mechanism for said gates, pneumatically-operated controlling-valves for said pneumatic operating mechanism, an excess-pressure valve mechanism for operating said entrance-gate-controlling valve, a valve operated by the movement of said entrance-gate for operating said exit-gate-controlling valve, and a trip-finger valve mechanism for returning said before-mentioned parts to their normal positions, substantially as described.

4. In a receiving apparatus for tubular transit systems, a receiving-chamber, entrance and exit gates therefor, pneumatic operating mechanism for said gates, an air-supply for said operating mechanism, controlling means for said air-supply, pneumatic operating mechanism for said controlling means, an air-supply for said last-mentioned operating mechanism, an excess-pressure valve mechanism for controlling said last-mentioned air-supply, and a trip-finger valve mechanism for returning said before-mentioned parts to their normal positions, substantially as described.

5. In a receiving apparatus for tubular transit systems, a receiving-chamber, pneumatically-operated entrance and exit gates therefor, pneumatically-operated valves for said gates, an air-supply, an excess-pressure valve mechanism for admitting to and exhausting air-pressure from said entrance-gate-valve-operating mechanism, a valve operated by the movement of said entrance-gate adapted to admit air-pressure to said exit-gate-valve-operating mechanism, and a trip-finger mechanism for returning said before-mentioned parts to their normal position, substantially as described.

6. In a receiving apparatus for tubular transit systems, a receiving-chamber, pneumatically-operated entrance and exit gates therefor, pneumatically-operated valves for said gates, an air-supply, an excess-pressure-valve-operating mechanism for admitting to and exhausting air-pressure from said entrance-gate valve, a trip-finger valve for admitting air-pressure to and exhausting said exit-gate-valve-operating mechanism, a trip-finger mechanism for throwing said trip-finger valve, means governed by said excess-pressure valve for returning said trip-finger valve, means governed by said trip-finger valve for returning said excess-pressure valve, and insurance-valves, substantially as and for the purpose set forth.

7. In a receiving apparatus for tubular transit systems, in combination with a receiving-chamber, entrance and exit gates therefor, of an excess-pressure valve mechanism adapted to control said entrance-gate, insurance-valves adapted to insure the complete operation of said gates before permitting a succeeding operation, a trip-finger valve for controlling said exit-gate, locking and releasing means for said excess-pressure and trip-finger valves, said trip-finger valve adapted to control said excess-pressure-valve-releasing means, and said excess-pressure valve adapted to control said trip-finger-valve-releasing means, substantially as described.

8. In an excess-pressure-valve mechanism for tubular despatch systems, in combination with a chamber in which said excess pressure is generated, an excess-pressure valve seated in the walls, or passage leading therefrom, of said chamber and adapted to be raised by said excess pressure, a stem for said valve, a spring tending to seat said valve, a balance-pressure chamber, the normal pressure from the line admitted to which balances the normal pressure in said first chamber, a locking and releasing mechanism for said valve, a lug upon

said stem adapted to contact with and raise an auxiliary pressure-valve, with the raising of said excess-pressure valve, and means whereby said stem and lug may be turned out of alinement with said auxiliary pressure-valve to allow of the raising by hand of said excess-pressure valve alone, substantially as described.

9. In an excess-pressure-valve mechanism for tubular despatch systems, in combination with an excess-pressure valve, a stem therefor, means on said stem for raising an auxiliary pressure-valve, mechanism whereby said stem and means thereon may be rotated out of alinement with said auxiliary pressure-valve to allow of the raising of said excess-pressure valve alone, a lever for raising said excess-pressure valve, a lug or projection adapted to prevent the movement of said lever until said stem and means thereon have been rotated out of alinement with said auxiliary pressure-valve, substantially as described.

10. In combination with an excess-pressure valve of the character described, a stem therefor and a lug upon said stem for raising an auxiliary valve, of a hand-lever for raising said excess-pressure valve pivoted upon a revoluble bracket, the movement of said bracket adapted to revolve said stem and lug out of alinement with said auxiliary valve and the excess-pressure valve adapted to be raised on the depression of said lever when so revolved, said hand-lever normally held raised by a spring, and a stationary lug adapted to prevent the depression of said lever and consequent raising of the excess-pressure valve until the stem and lug have been so revolved out of alinement with said auxiliary valve, substantially as described.

11. In an excess-pressure valve for tubular transit systems, in combination with a receiving-chamber, a valve, a valve-chamber, a passage-way between said valve-chamber and receiving-chamber, a seat in said passage-way for said valve, said valve cylindrical in form and adapted to reciprocate within a cylinder located above said chamber, a spring normally tending to seat said valve, communicating means between said cylinder and the line through which normal pressure from the line is admitted to said cylinder balancing the normal pressure in said receiving-chamber and means for locking said valve in and releasing the same from its raised position, substantially as described.

12. In combination with an excess-pressure valve of the character described, a locking and releasing mechanism consisting of a shoulder on said valve, a pin mounted in the casing of said valve substantially at right angles thereto, a flexible diaphragm rigidly attached to said pin and adapted to reciprocate the same, a casing for said diaphragm, said pin projecting without said casing and provided with means for hand operation, a spring normally tending to throw said pin in engagement with said valve, an adjustable tension device for said spring and a port in the casing of said diaphragm, substantially as described.

13. In a machine of the character described, an auxiliary pressure-valve consisting of a barrel, a valve-piston, said valve-piston projecting below said barrel, upper and lower annular recesses in said barrel, a projecting upper portion of said valve-piston projecting without the barrel and provided with adjusting-nuts and means for hand operation, a spring normally tending to cause said valve-stem to assume its lower position, said upper annular recess opening communication between two ports when said valve-piston is in its lower position and closing the same when the valve-piston is raised, said lower annular recess opening communication between two ports when said valve-piston is raised and closing the same and opening communication between one of said ports and an exhaust-port when said valve-piston falls, and a locking and releasing mechanism for said valve-piston, substantially as described.

14. In combination with an auxiliary pressure-valve and a pneumatic locking and releasing device therefor, an air-pressure supply, means for conducting said air-pressure to said locking and releasing mechanism and from thence to said auxiliary pressure-valve, said valve being closed in its upper position but open in its lower position allowing said air-pressure to pass through, substantially as and for the purpose set forth.

15. In a machine of the character described, a trip-finger valve having a barrel, a valve-piston, two annular recesses in said piston, one of said recesses opening communication between two ports when said piston is in its lower position and between one of said ports and an exhaust-port when said piston is in its upper position, the other recess opening communication between two ports when said piston is in its upper position and between one of said ports and an exhaust-port when said piston is in its lower position, said piston projecting below and above said barrel, the upper end thereof provided with adjusting-nuts which also serve as a means of hand operation and a spring normally tending to hold said piston in its lower position, substantially as described.

16. In a trip-finger valve mechanism, in combination with a reciprocating valve, a pivoted trip-finger, a crank or eccentric thereon, a pin on said crank, a hand operating-lever for said finger, a link journaled on said pin adapted to be thrown into and out of alinement with said valve, a spring normally tending to draw said link into alinement with said valve, a piston working in a cylinder and provided with a piston-rod, said piston-rod suitably connected to said link and adapted to throw the same out of alinement with said valve when air-pressure is admitted to said piston, substantially as described.

17. In combination with a gate-operating

cylinder, piston and piston-rod, an insurance-valve, said valve adapted to be opened by being depressed, a spring normally tending to close said valve, said piston-rod projecting without the head of said cylinder and provided with a lug, said lug being adjustably mounted thereon and adapted to contact and depress said valve on the closing of the gate, substantially as described.

18. In receiving apparatus for tubular transit systems, the combination with a receiving-chamber, an entrance-gate for said chamber, an exit-gate for said chamber, pistons and cylinders for operating said gates, a main air-pressure supply for said cylinders, of a pilot-valve for admitting and exhausting said main air-pressure supply to and from either side of said entrance-gate piston, means normally causing said pilot-valve to assume a position maintaining said entrance-gate in an open position, pneumatic pilot-valve-shifting mechanism designed to shift said pilot-valve to its other position to close said entrance-gate, a pilot-valve for admitting and exhausting said main air-pressure supply to and from either side of said exit-gate piston, means normally causing said pilot-valve to assume a position maintaining said exit-gate in a closed position, pneumatic pilot-valve-shifting mechanism designed to shift said pilot-valve to its other position to open said exit-gate, an auxiliary air-supply pipe for conveying air under pressure to said exit-gate pneumatic pilot-valve-shifting mechanism, a normally closed valve in said pipe, means upon the movable member of said entrance-gate for opening said latter valve upon the complete closure of said entrance-gate, an excess-pressure valve in said receiving-chamber designed to be raised by an increase of pressure above the normal line-pressure, an auxiliary supply-pipe for conveying air under pressure to said entrance-gate pneumatic pilot-valve-shifting mechanism, a normally closed valve in said latter pipe designed to be opened by and upon the raising of said excess-pressure valve, substantially as described.

19. In receiving apparatus for tubular transit systems, the combination with a receiving-chamber, an entrance-gate and an exit-gate for said receiving-chamber, an auxiliary cushioning-chamber, auxiliary-cushioning-chamber-operating means and pneumatic controlling means for said two gates, of a common operating air-pressure supply for said auxiliary-cushioning-chamber-operating means and said exit-gate-controlling means, said common operating air-pressure supply controlled by said entrance-gate, substantially as described.

20. In receiving apparatus for tubular transit systems, the combination with a receiving-chamber, an entrance-gate and an exit-gate for said receiving-chamber, an auxiliary cushioning-chamber, auxiliary-cushioning-chamber-operating means, a trip-finger mechanism, returning means for said trip-finger mechanism, of a common returning air-pressure supply controlled by said exit-gate, substantially as described.

21. In receiving apparatus for tubular transit systems, the combination with a receiving-chamber of a normally open entrance-gate, means for closing said entrance-gate actuated by the excess pressure produced by an entering carrier, a normally closed exit-gate, means actuated by said entrance-gate to open said exit-gate upon the complete closure of said entrance-gate and a trip-finger without said exit-gate designed to be actuated by the carrier, a valve actuated by said trip-finger, an air-pressure supply designed to be admitted by said valve to mechanism for returning said several parts to their normal positions to actuate the same, substantially as described.

22. In receiving apparatus for tubular transit systems, the combination with a receiving-chamber, gates for said chamber and a system of pneumatically operated and controlled devices for actuating said gates, of a balanced excess-pressure valve communicating with said chamber, a valve controlling the air-pressure to said pneumatically operated and controlled devices, said valve actuated by said excess-pressure valve, a system of pneumatically operated and controlled devices for returning said parts to their normal positions, a trip-finger, a valve actuated by said trip-finger controlling the air-pressure to said latter pneumatically operated and controlled devices and a device actuated by the complete return to normal of the last of said pneumatically operated and controlled devices designed to return said latter valve to its normal position, 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.