B. C. BATCHELLER.

PNEUMATIC DESPATCH TUBE RECEIVING TERMINAL.

APPLICATION FILED SEPT. 23, 1911.

1,061,034.

Patented May 6, 1913.

5 SHEETS—SHEET 1.

FIG. 1.

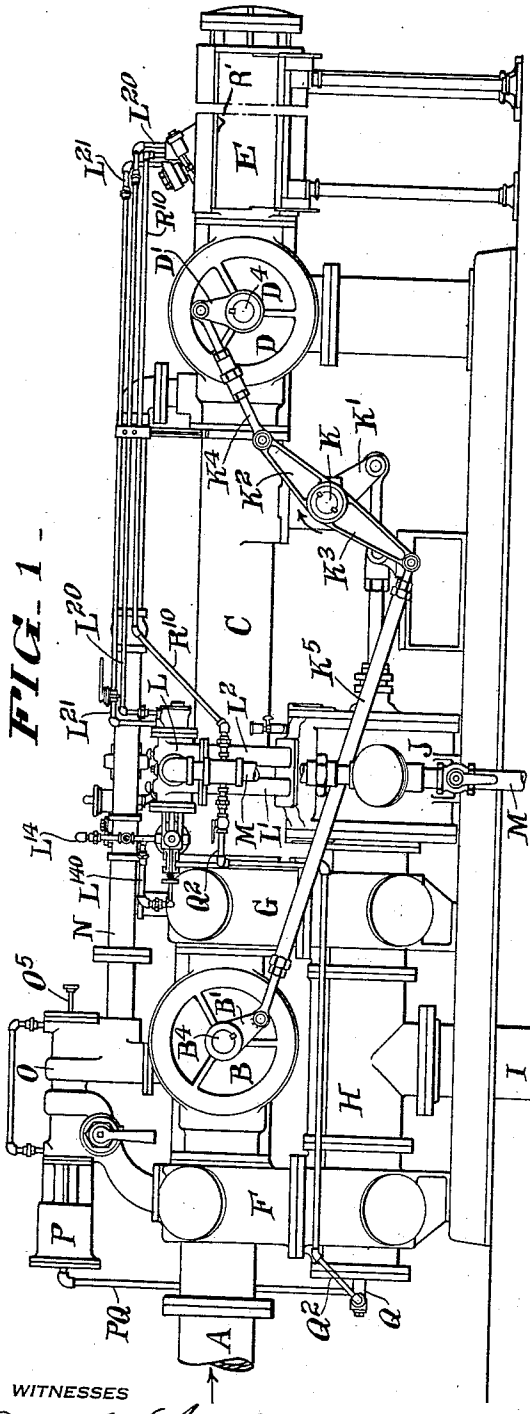
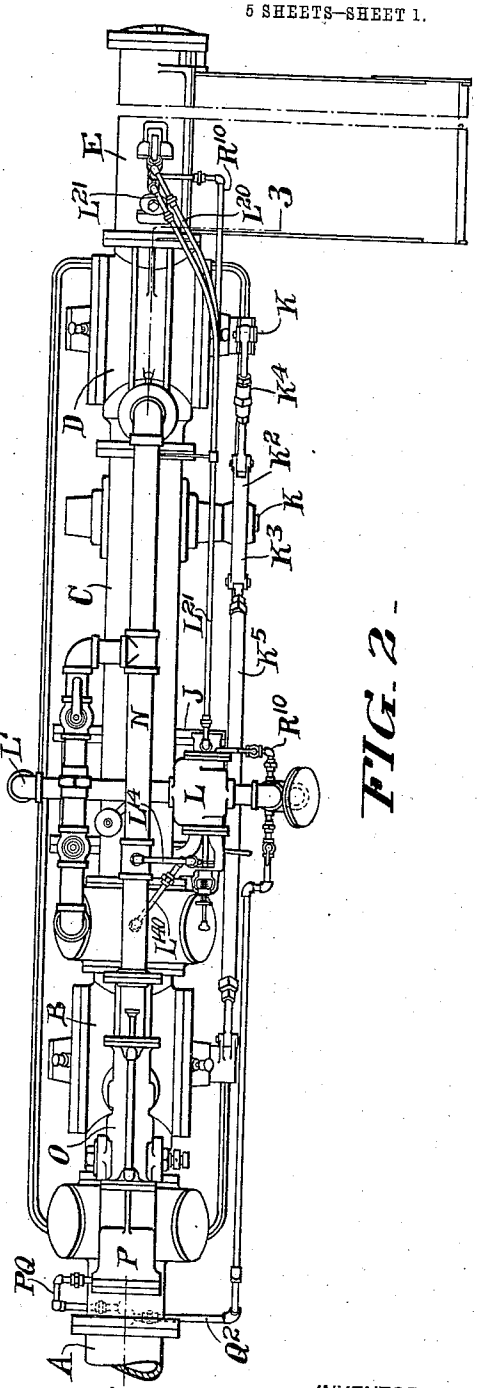


FIG. 2.



WITNESSES

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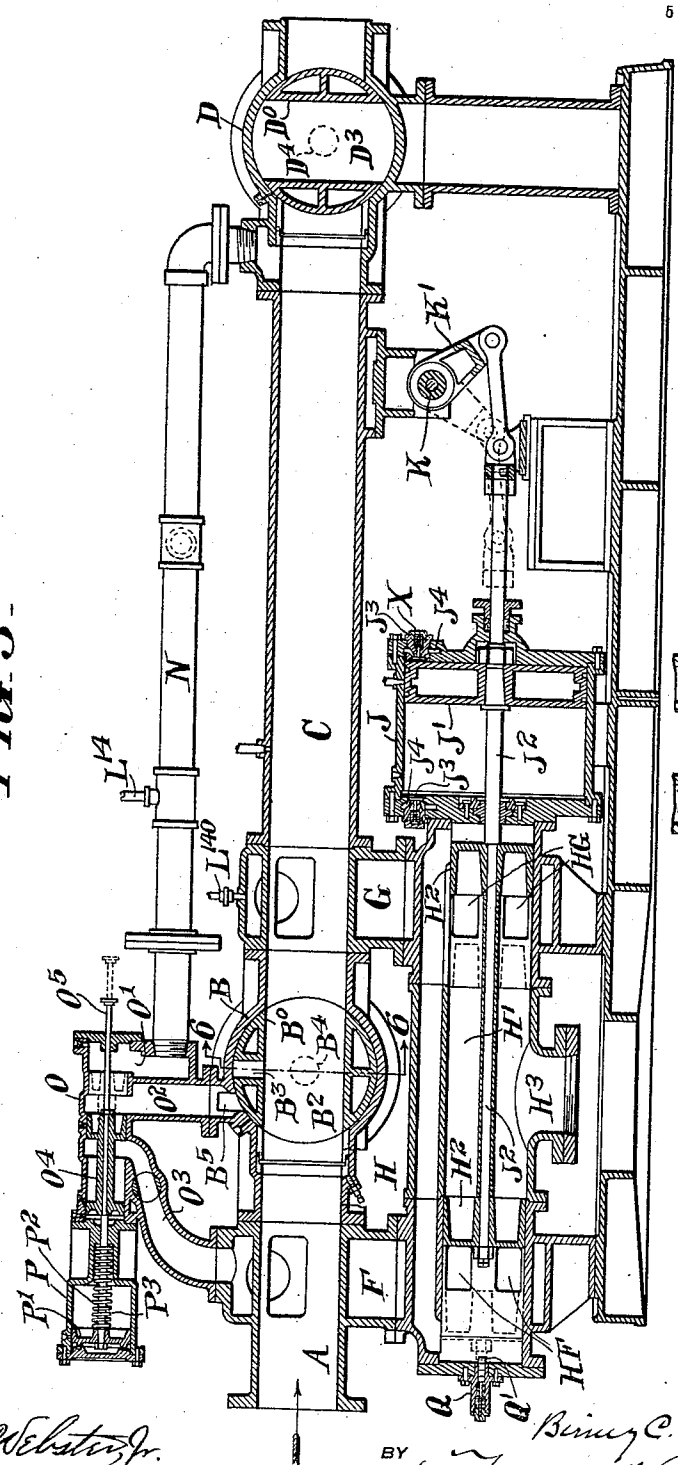
FIG. 3.



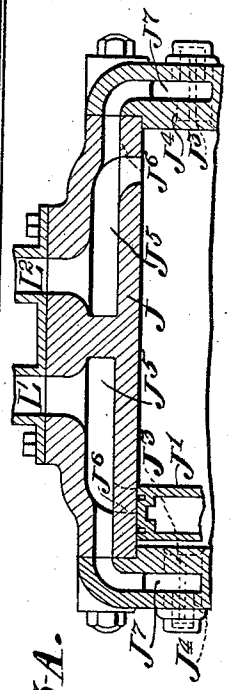


Fig. 3A.

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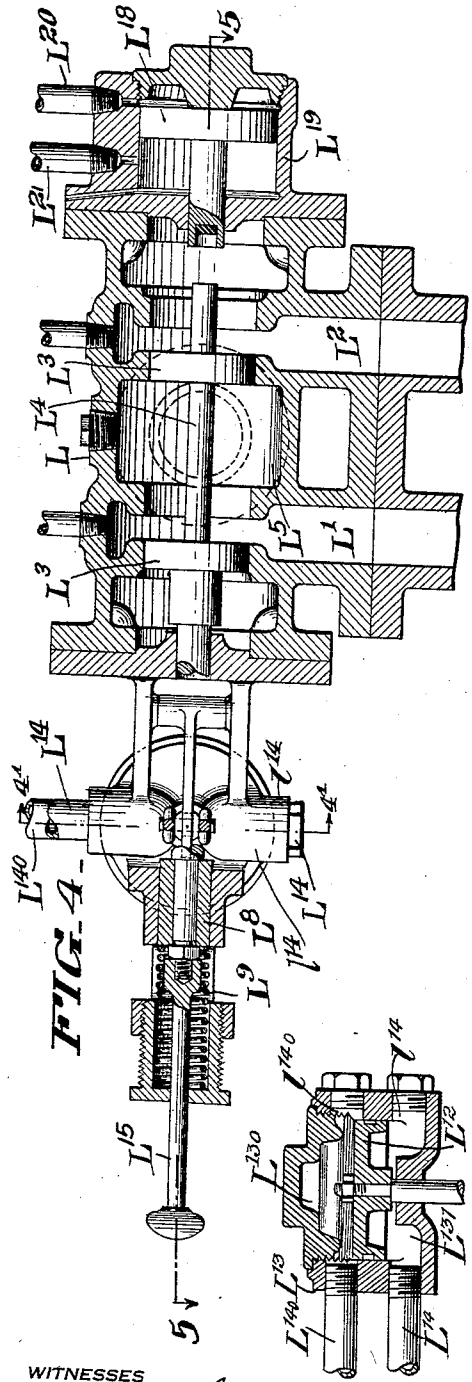

FIG. 4.

Fig. 4A.

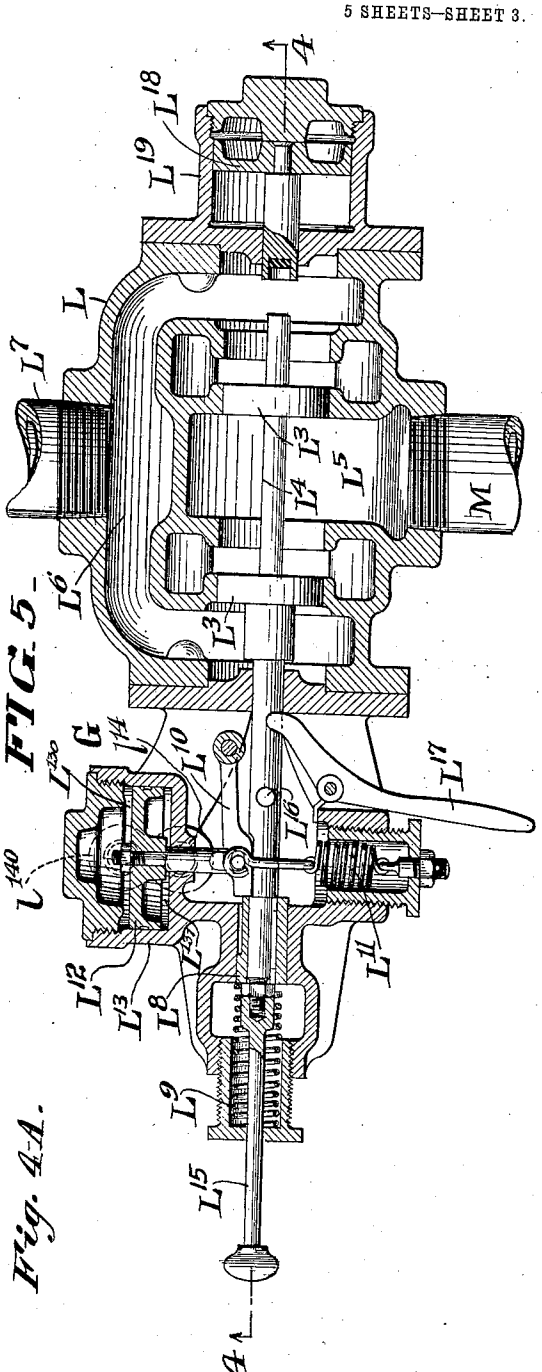

FIG. 5.

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FIG. 6.

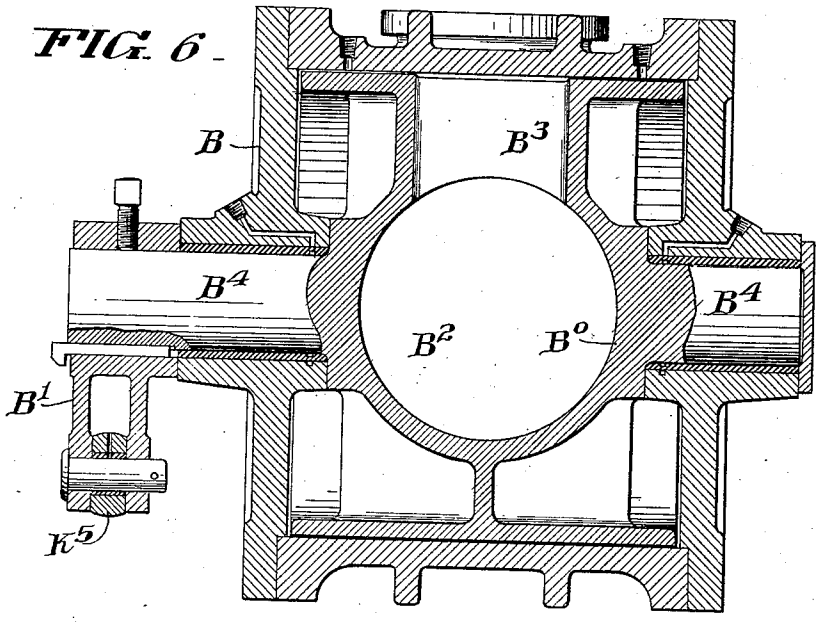

FIG. 7.

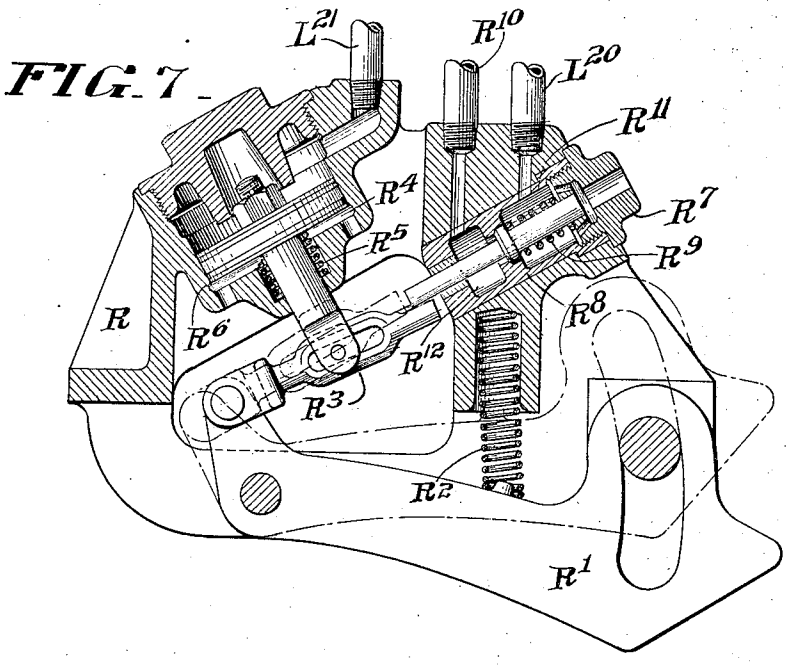

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FIG. 8.

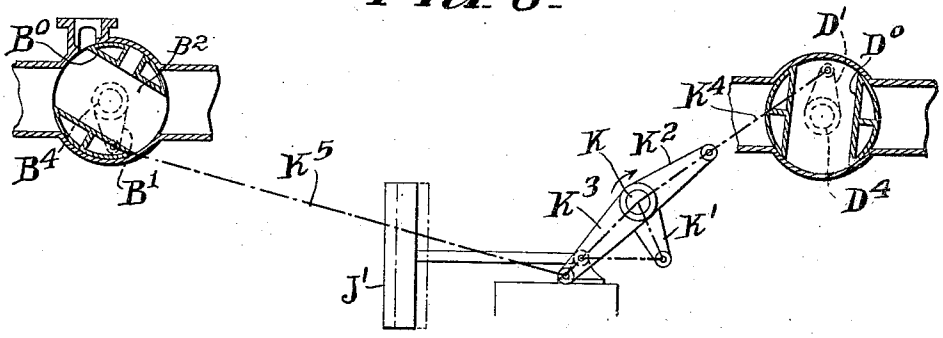


FIG. 9.

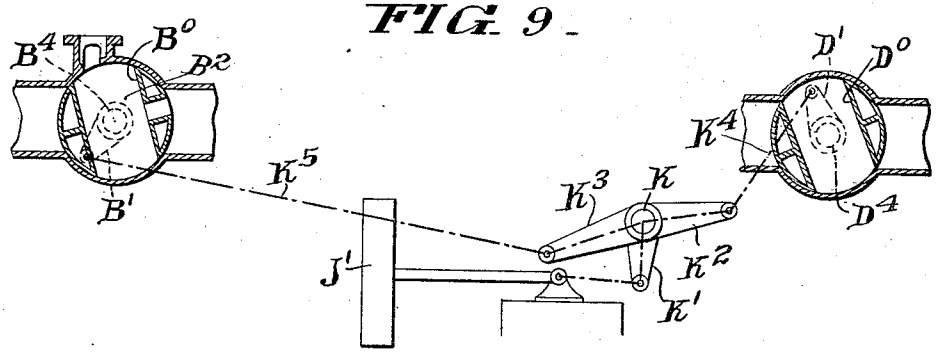
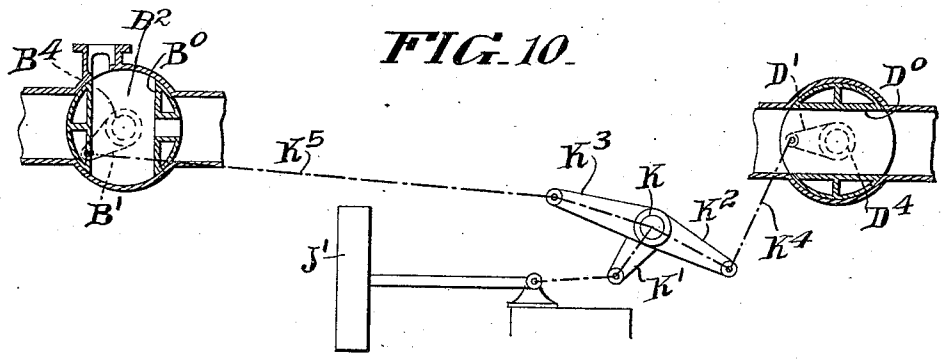


FIG. 10.



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PNEUMATIC-DESPATCH-TUBE RECEIVING-TERMINAL.

1,061,034. Specification of Letters Patent. Patented May 6, 1913.

Application filed September 23, 1911. Serial No. 650,917.

To all whom it may concern:

Be it known that I, BIRNEY C. BATCHELLER, a citizen of the United States of America, residing in the city of New York, borough of Brooklyn, and State of New York, have invented a certain new and useful Improvement in Pneumatic-Despatch-Tube Receiving-Terminals, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part thereof.

My present invention relates to despatch tube apparatus and consists in an improved receiving terminal for a pneumatic despatch tube system, and particularly for a system in which the dimensions of the carriers and transit tube are of the kind employed in the transmission of mail between the various postal stations of cities.

The object of the invention is the provision of a receiving terminal of the kind specified which is reliable in operation, comparatively simple in construction and which permits of an economy in the use of the air employed for driving the carriers through the transit tubing.

The various features of novelty which characterize my invention are pointed out with particularity in the claims annexed to and forming a part of this specification. For a better understanding of the invention, however, and the advantages possessed by it, reference should be had to the accompanying drawings and descriptive matter in which I have illustrated and described one form in which the invention may be embodied.

Of the drawings, Figure 1 is a side elevation of a portion of a despatch tube system including a receiving terminal constructed in accordance with the present invention. Fig. 2 is a plan view of the apparatus shown in Fig. 1. Fig. 3 is a section of a portion of the apparatus shown in Figs. 1 and 2, taken on the line 3—3 of Fig. 2. Fig. 3^A is a section of a portion of the operating cylinder taken on a diametrical plane slightly inclined to the plane of the section through said cylinder shown in Fig. 3. Fig. 4 is a sectional elevation of a portion of one of the controlling valve mechanisms employed, the section being taken on the line 4—4 of Fig. 5. Fig 4^A is a partial section taken on the line 4^A—4^A of Fig. 4. Fig. 5 is a sectional elevation taken on the line 5—5 of Fig. 4. Fig. 6 is a section through one of the main gates, taken on the line 6—6 of Fig. 3. Fig. 7 is a sectional elevation of carrier actuated valve mechanism forming a part of the terminal apparatus. Fig. 8 is a diagrammatic view illustrating the manner in which the main valves or main transit tube valves or gates are connected together, and Figs. 9 and 10 are diagrammatic views similar to Fig. 8 showing parts in different relative positions.

In the drawings, A, represents the end of the main transit tube at the receiving terminal; B, the gate, or rather the casing thereof, connecting the adjacent ends of the transit tube section A′ and a receiver chamber C.

D, represents the casing of a gate or valve connecting the opposite end of the receiver chamber C and the discharge tube section E.

F and G represent branch pipe connections from the transit tube A and the receiver chamber C, respectively, adjacent the gate B, to the casing H in which is mounted valve mechanism by which one or the other of the pipe sections F and G is connected to the outgoing conduit I through which flows the main current of air for driving the carriers through the system.

The gate member or valve proper, B°, in the casing B is in the form of a cylindrical member (see Fig. 6) provided with trunnions B^4, B^4, journaled in the casing B and formed with a central port or thoroughfare B^2 of the same diameter as, and adapted to be brought into alinement with the passages in the transit tube and receiver chamber. In addition the valve member B is provided at one side with a passageway B^3 adapted to connect the passageway B^2 with the receiver chamber C when the gate is in the closed position. To one trunnion B^4 is secured an operating arm B′ which is connected by a connecting rod K^5 to a lever arm K^3 secured to the rock shaft K. The valve or gate member D° in the casing D as shown is identical with the valve member BO except that it has no passage corresponding to the passage B^3. An operating arm D′ secured to one of the trunnions D^4 is connected by a connecting rod K^4 to another lever arm K^2 secured to the rock shaft K.

In the normal condition of the apparatus the gate D is closed and the gate B is open. By rotating the rock shaft K, however, the gate B may be closed and the valve D

opened. As shown in Figs. 1, 8, 9 and 10, the valves or gates have sufficient lap and the rock shaft K and the various link or connecting rods and crank arms are so set and arranged that the valve member B° closes and the valve member D° opens successively and the reverse movements of the two valve members take place in reverse order. While a movement of the rock shaft from the position, shown in, and in the direction of the arrow applied to, Figs. 1 and 8, begins the closing movement of the valve member B°, the initial portion of this movement of the rock shaft first rotates the valve member D° in the clockwise direction and then in the reverse direction and does not establish communication between the receiver chamber C and the exit chamber E through the thoroughfare or valve passage D^3 until the valve member BO is moved sufficiently to close communication between the transit tube A and the receiver chamber C through the thoroughfare B^2.

The rock shaft K is oscillated by the piston member J′ working in the cylinder J and having its stem connected to the arm K′ of the rock shaft by a suitable connecting rod. The stem J^2 of the piston J′ is extended at the rear to operate valve members H^2 which control ports HF and HG connecting the bypass channels F and G with the chamber H′ in the valve casing H, to the port H^3 of which the outgoing conduit I is directly connected. In the normal condition of the apparatus with the gate member B° directly connecting the transit tube A and receiver C, the ports HG are in communication through the chamber H′ with the outlet port H^3, while the ports HF are in communication with the equalizing space surrounding the wall of the chamber H′. When the gate member B° is closed and the gate member D° opens, the valve members H^2 are moved to connect the ports HF through the chamber H′ to the outlet port H^3, while the ports HG are then in communication with the equalizing space surrounding the chamber H′.

The movements of the piston J′ and consequently the positions of the valve members B°, D° and H^2 are directly controlled by a valve mechanism L. This mechanism comprises a casing formed with passages L′ and L^2 running to the left and right hand ends of the cylinder J, respectively, and each alternately connected, one to the inlet chamber L^5, and the other to the outlet chamber L^6 of the casing of the valve mechanism L.

As shown best in Fig. 3^A, which is a section taken on a diametrical plane at a slight angle to the plane of the section shown in Fig. 3, the lower end of the casing containing the passages L′ and L^2 is secured to the body of the cylinder J with the passages L′ and L^2 in register with corresponding channels J^5 formed in the cylinder wall and leading one toward each end of the cylinder. These channels open to the interior of the cylinder adjacent the corresponding ends of the cylinder through ports J^6, and each channel communicates with a corresponding channel J^7 in the adjacent cylinder head. Each channel J^7 opens to the interior of the cylinder through a port J^4 controlled by an inwardly opening check valve J^8. As the piston J′ approaches either end of the cylinder, it cuts off the corresponding port J^6 and is cushioned by the air trapped in the end of the cylinder. When thereafter pressure fluid is supplied to the corresponding channel J^5, the piston J′ is given its return movement by fluid admitted to the cylinder solely through the port J^4 until the previously closed port J^6 is opened, after which the pressure fluid is admitted to the cylinder through the two ports J^4 and J^6 at the end of the cylinder from which the piston is moving.

Pressure fluid, as compressed air, is supplied to the chamber L^5 from the supply pipe M and an exhaust pipe L^7 leads away from the chamber L^6. Communication between the passages L′ and L^2 and the chambers L^5 and L^6 is controlled by piston valve members L^3 mounted on a valve stem L^4. The valve stem L^4 is extended through the casing L at one end and is provided with a stop L^8 normally engaged by a pivoted pawl L^{10} which then holds the valve members L^3 in the normal position shown in Figs. 4 and 5 in which the pressure of the inlet chamber L^5 is transmitted to the left hand end of the cylinder J to thereby hold the piston J′ at the right hand end of the cylinder as shown in Fig. 3.

In the construction illustrated in the drawings, the stop at the outer end of the valve stem L^4 is formed by the inner end of a sleeve L^8 secured to the end of the valve stem L^4 and a spring L^9 bearing against the sleeve L^8 tends to force the valve members L^3 to the right when the release of the pawl L^{10} permits this movement. The pawl L^{10} is normally held in the locking position by a spring L^{11} but is automatically released at the proper instant by means of the piston L^{12} connected to the pawl and working in the chamber L^{13}. A pipe L^{140} connects the outer end L^{130} of the chamber L^{13} to the upper end of the bypass channel G. The pressure of the fluid supplied to the chamber L^{13} through the pipe L^{140} tends to hold the pawl L^{10} in the locking position. The inner end L^{131} of the chamber L^{13} is connected by a pipe L^{14}, in front of the pipe L^{140}, to a pipe N which is connected in turn to the receiver chamber C adjacent the gate D. In Figs. 4 and 5, l^{14} and l^{140} represent pipe connecting provisions at the underside

of the chamber L^{13}, alined with the provisions at the upper side of the chamber for connecting the pipes L^{14} and L^{140} respectively into the chamber L^{13}. The provisions l^{14} and l^{140} are plugged up in the arrangement shown but are adapted to have the pipes L^{14} and L^{140} connected to them when the valve L and attached parts are turned end for end. When this occurs the provisions shown as receiving the pipes L^{14} and L^{140} are plugged up.

When a carrier, passing with a considerable velocity from the transit tube A proper through the gate B enters the portion of the receiver chamber C to the right of the bypass channel G, it compresses the trapped air in the receiver chamber C between it and the gate D which is then closed, and this air forms a cushion which stops the carrier quickly but without shock. Owing to this compression of the trapped air the pressure in the front end of the chamber C rises above the pressure normally prevailing in the transit tube system. This increased pressure being transmitted to the inner end of the piston L^{13} causes the locking pawl L^{10} to be retracted, whereupon the spring L^9 throws the valves L^3 to the right. This connects the right hand end of the cylinder J to the supply pipe M through the valve chamber L^5 and passage L^2 and at the same time connects the left hand end of the chamber J through the passage L and outlet valve chamber L^6 to the exhaust pipe L^7. This causes the piston J′ to move to the left hand end of the chamber J′ and this movement of the piston closes the gate B and opens the gate D and shifts the valve members H^2 to open the connection F and close connection G. When the piston J′ reaches the left hand end of its movement the left hand end of the stem J^2 engages the stem Q′ of the valve Q, to thereby connect a pipe Q^2 leading from the pressure supply pipe M with a pipe PQ leading to the left hand end of a cylinder P. The pressure thus admitted to the cylinder P acts upon the piston P′ to force the latter to the right from the normal position, shown in Fig. 3, in which it is held by a spring P^2. On this movement of the piston P′ the stem P^3 of the latter engages a valve member O^4 working in a casing O and shifts the valve member O^4 from the full line position shown in Fig. 3 to the dotted line position shown in that figure, to thereby connect a passage O^3 leading from the top of the bypass channel F to a chamber or passage O^2. This permits air to flow from the transit tube A through passages O^3 and O^2 and port B^5 into the main thoroughfare B^2 of the valve member B° and from thence through the side passage B^3 into the rear end of the receiver chamber to drive the carrier from the receiver chamber through the gate member D° (then in the open position) into the discharge section E. The valve casing O is formed with a passage O′ normally connected to the passage O^2 but cut off therefrom by the valve member O^4 when the latter is moved out of its normal position. The pipe N, hereinbefore referred to, which is connected at one end of the receiver chamber adjacent the gate D, is connected at its rear end to the valve chamber O′ and serves as a means for permitting the pressure fluid at the rear end of a carrier in the receiver chamber C to exhaust at the same time the pressure fluid in front of the carrier exhausts when the gate member D° is moved to establish communication between the receiver C and the exit passage E. The exhaust from the rear of the carrier takes place through the valve passage B^3, main thoroughfare B^2, port B^5, passages O^2 and O′ and pipe N. This avoids any possibility of having the carrier forced against the gate member D° when the pressure in front of the carrier is released on the initial opening of gate D.

Since communication between chambers O^2 and O′ is cut off by the valve member O^4 before the latter opens communication between passages O^2 and O^3 there is no chance for air to flow out from the transit tube A proper through the valve casing D and pipe N. The excess pressure in the front end of the receiver chamber C is relieved, however, by the flow through pipe N chambers O′ and O^2 and port B^5 back into the transit tube A which takes place at that stage of the closing movement of valve B° in which the port B^5 is in communication with the transit tube through thoroughfare B^2. (See Fig. 8.)

The return movement of the piston J′ is brought about automatically by means of a piston L^{18} working in a cylinder L^{19} secured to the right hand end of the casing of the valve L and mechanism now to be described for varying the fluid pressure in the cylinder L^{19}. The outer end of the cylinder L^{19} is connected by a pipe L^{20} to the chamber R^{11} of a device R attached to the discharge section E. A second chamber R^{12} of the member R is connected by a pipe R^{10} to the pressure supply conduit M. A port connecting the passages R^{11} and R^{12} is controlled by a valve R^8 normally held closed by a spring R^9. A finger R′ pivoted to the casing of the member R is normally held by the spring R^2 in the position in which it extends into the discharge tube section E. A carrier passing into this tube and engaging the finger, first moves the finger outward and then permits it to move back to its original position. Pivoted to the finger R′ is a thrust member R^3 which in the normal condition of the apparatus laps the adjacent end of the stem of the

valve R^8. When the finger R′ is thrown outward by an inserted carrier the member R^3 is carried back of the stem of the valve R^8 and is then moved into alinement therewith by the spring R^5 acting on a piston R^4 to which the member R^3 is loosely connected. In consequence, when the movement of the carrier permits the finger R′ to again move inward, the tension of the spring R^2 acting through the finger R′ and member R^3 supplemented in practice by the weight of the finger R′ causes the valve R^8 to be moved by the member R^3 into the position in which the pipes L^{20} and R^{10} are connected. This transmits the pressure of the supply pipe M to the outer end of the cylinder L^{19} whereupon the piston L^{18} is forced inward and the stem of the piston engaging the valve stem L^4 returns the valve stem L^4 and the valve members L^3 to their normal positions. When this occurs the locking dog engages the stop sleeve L^8, the pressure at the inner end of the cylinder L^{13} having fallen to the pressure of the atmosphere in the meantime. The piston R^4 works in a cylinder R^6 to the outer end of which is connected a pipe L^{21} connected to the chamber L^{19} by a port uncovered by the piston L^{18} when the latter reaches its innermost position. When this occurs the pressure fluid transmitted to the outer end of the cylinder L^{19} by pipe L^{20} passes through the pipe L^{21} to the outer end of the cylinder R^6 and acting against the piston R^4 moves the latter to throw the thrust member R^3 out of line with the stem of the valve R^8. The valve R^8 is then closed by the spring R^9. This completes the cycle of operations incident to the receipt and discharge of a carrier and returns the receiver terminal apparatus to its normal condition ready to receive a subsequent carrier passing to it through the transit tube A.

Advantageously I provide the valve mechanism L with a manually actuated lever L^{17} adapted to engage the ends of a pin L^{16} passing through the valve stem L^4 and provide the valve stem L^4 with an external handle extension L^{15} whereby the valve mechanism may be manually adjusted when this is desirable. Similarly, I prefer to provide the valve member O^4 with an external handle O^5 to permit of its manual actuation when desired.

The operation of the apparatus disclosed will be apparent without further explanation.

The inherent simplicity and reliability of the mechanism disclosed and the economy in the pressure fluid that may be had by its use will be readily apparent to those skilled in the art.

While in accordance with the provisions of the statutes I have illustrated and described the best form of my invention now known to me, it will be apparent to those skilled in the art, that changes may be made in the form of the apparatus disclosed without departing from the spirit of my invention, and that certain features of the invention may sometimes be used with advantage without a corresponding use of the other features of the invention.

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

1. In a pneumatic despatch tube system, the combination with the transit tube, of a receiver chamber, a gate connecting the receiver chamber to the transit tube, a second gate at the outlet end of said chamber, said gates having lap permitting a limited movement of the gates when closed without opening the gateways controlled by them, and operating means for said gates comprising an oscillating member and links pivotally connected to said member and to said gates and so set that a single movement of said member in one direction will move the first mentioned gate from the open to the closed position and thereafter open said second gate without reopening the first mentioned gate.

2. In a pneumatic despatch tube system the combination with a transit tube, of a receiver chamber, a rotary gate connecting the transit tube and receiver chamber, a second rotary gate at the outlet end of said chamber, said gates having lap, permitting a limited movement of the gates when closed without opening the gateways controlled by them, and operating connections for said gates comprising a rocking member and links pivotally connected to said member and to said gates and so arranged that the first mentioned gate is moved from the open position into the closed position and the second gate is thereafter moved from the closed position into the open position without reopening the first mentioned gate on a single turning movement of said member in one direction.

3. In a pneumatic despatch tube system the combination of a transit tube, a receiver chamber, a gate connecting the transit tube and receiver chamber, a second gate controlling the outlet end of the receiver chamber, an outgoing conduit, separate pipes connecting said outgoing conduit to the transit tube and receiver chamber, respectively, adjacent the first mentioned gate, a valve mechanism for alternately opening one of said connections and closing the other, when the first mentioned gate is shifted from the open to the closed position, a gate operating motor comprising an actuating member and positive operating connections between said member and said gates and said valve mechanism.

4. In a pneumatic despatch tube system,

the combination with a transit tube, of a receiver chamber, a gate connecting said transit tube and receiver chamber, a second gate controlling the outlet from said receiver chamber, means for successively closing the first mentioned gate and opening said second gate on the passage of a carrier into said chamber, and provisions for simultaneously opening both ends of said chamber to exhaust prior to the discharge of the carrier from said chamber.

5. In a pneumatic despatch tube system, the combination with a transit tube of a receiver chamber, a gate connecting said transit tube and receiver chamber, a second gate controlling the outlet from said receiver chamber, means for successively closing the first mentioned gate and opening said second gate on the passage of a carrier into said chamber, and bypass provisions connecting the ends of said chamber and permitting both ends to exhaust simultaneously when said second gate opens.

6. In a pneumatic despatch tube system, the combination with a transit tube of a receiver chamber, a gate connecting said transit tube and receiver chamber, a second gate controlling the outlet from said receiver chamber, means for successively closing the first mentioned gate and opening said second gate on the passage of a carrier into said chamber, and bypass provisions connecting the ends of said chamber and controlled by the first mentioned gate and opened by the movement of the latter into the closed position.

7. In a pneumatic despatch tube system, the combination with a transit tube of a receiver chamber, a gate connecting said transit tube and receiver chamber, a second gate controlling the outlet from said receiver chamber, means for successively closing the first mentioned gate and opening said second gate on the passage of a carrier into said chamber, means operating in timed relation to the movements of said gates for placing the ends of said chambers in communication after the first mentioned gate closes and before the second gate opens and other means also operating in timed relation to the movement of said gates interrupting said communication and supplying compressed air to the rear end of said chamber after said second gate fully opens.

8. In a pneumatic despatch tube system, the combination with a transit tube, of a receiver chamber, a gate connecting said transit tube and receiver chamber, a second gate controlling the outlet from said receiver chamber, means for successively closing the first mentioned gate and opening said second gate on the passage of a carrier into said chamber, bypass connection between the front and rear ends of said chamber and including a port located adjacent the rear end of the chamber which is closed by the first mentioned gate when in the open position and opened when said gate is in the closed position, a valve mechanism operating in timed relation to the movement of said gates for closing said bypass connection at a point between said port and the front end of said chamber when said second gate is wide open and simultaneously therewith connecting the transit tube and the portion of the bypass between said point and said port.

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