E. B. PERRINE.

PNEUMATIC DESPATCH TUBE APPARATUS.

APPLICATION FILED JUNE 22, 1914.

1,180,603.

Patented Apr. 25, 1916.

3 SHEETS—SHEET 1.

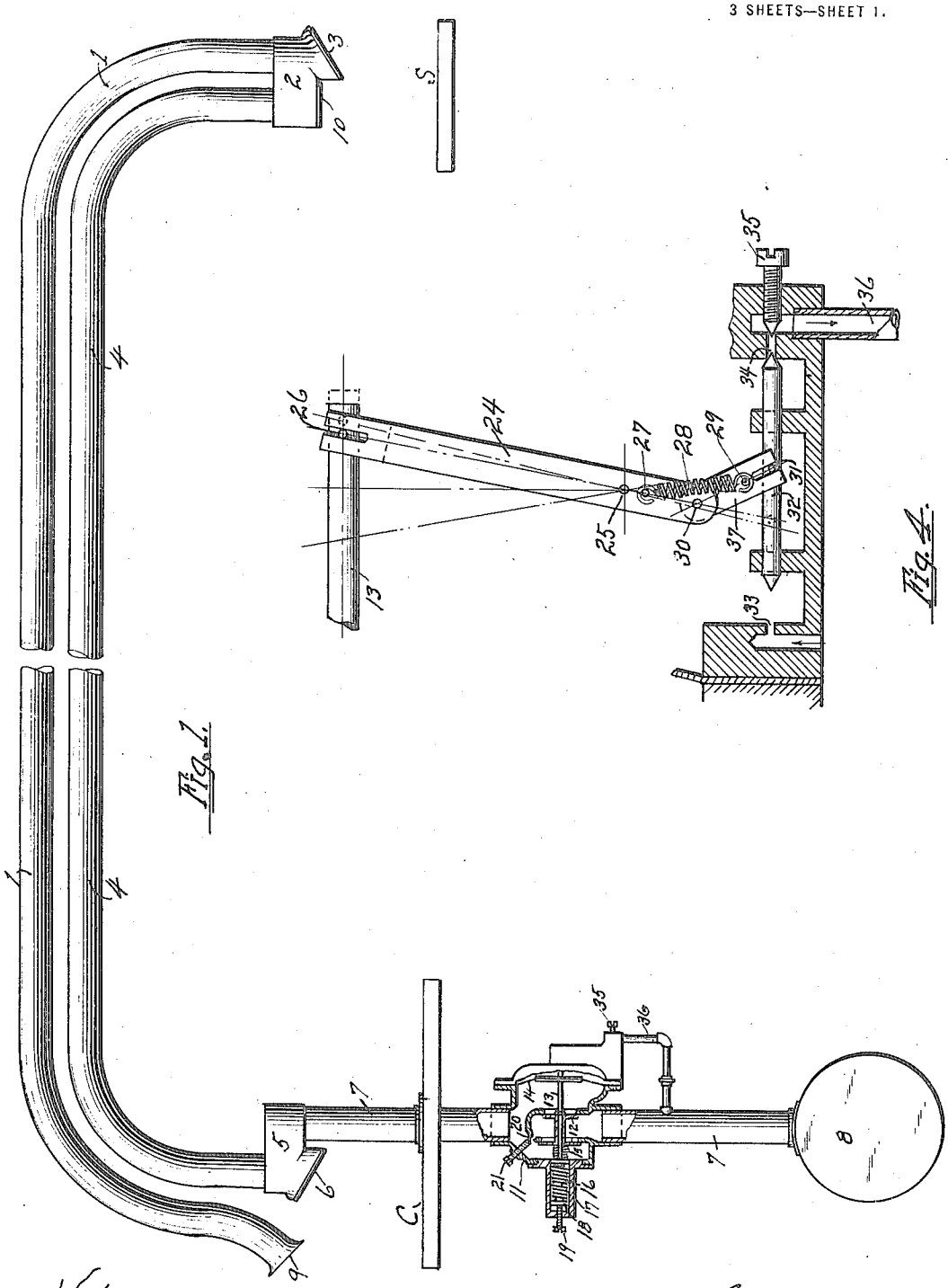


Fig. 1.

Fig. 4.

Witnesses:
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Inventor:
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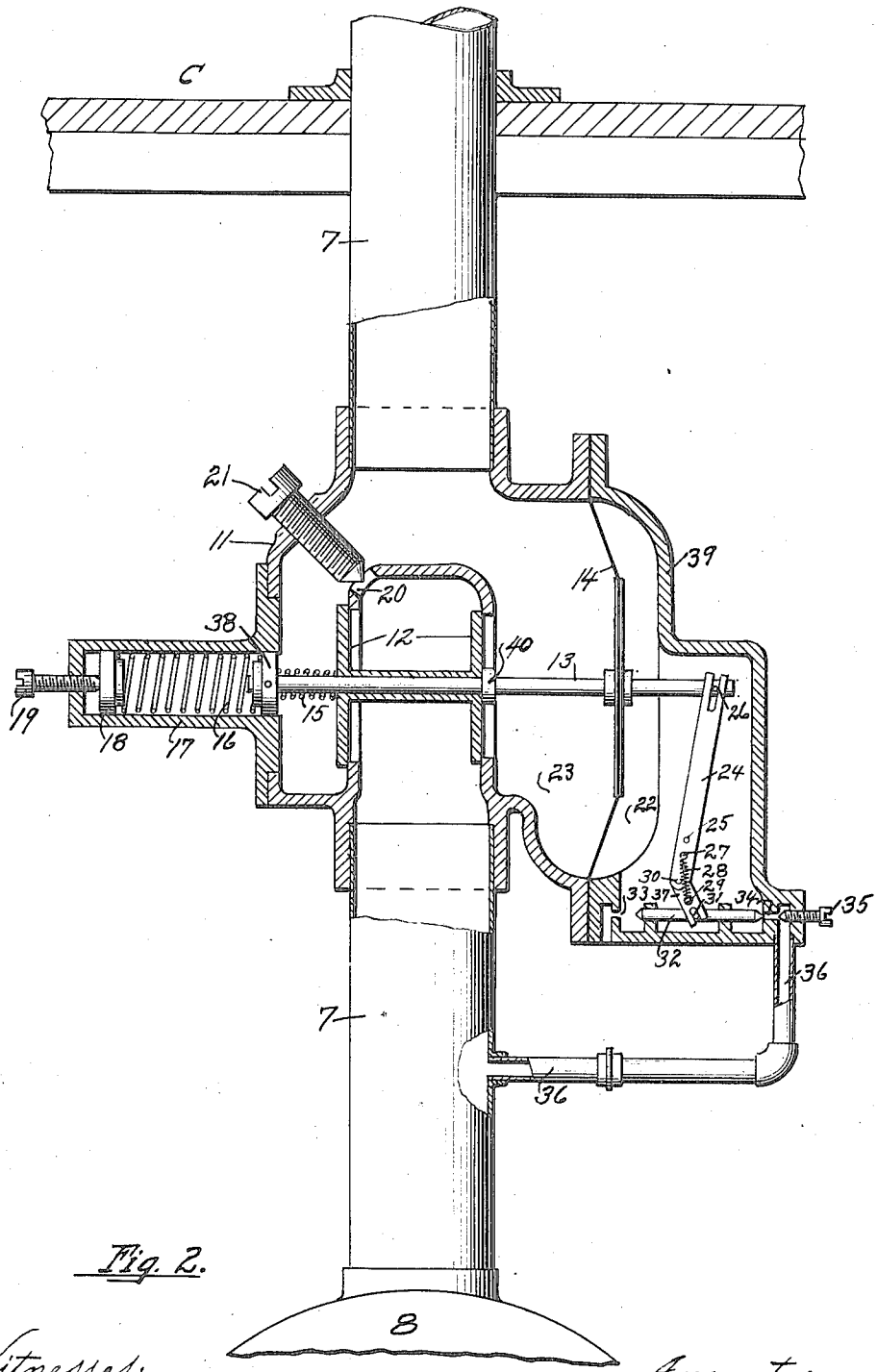


Fig. 2.

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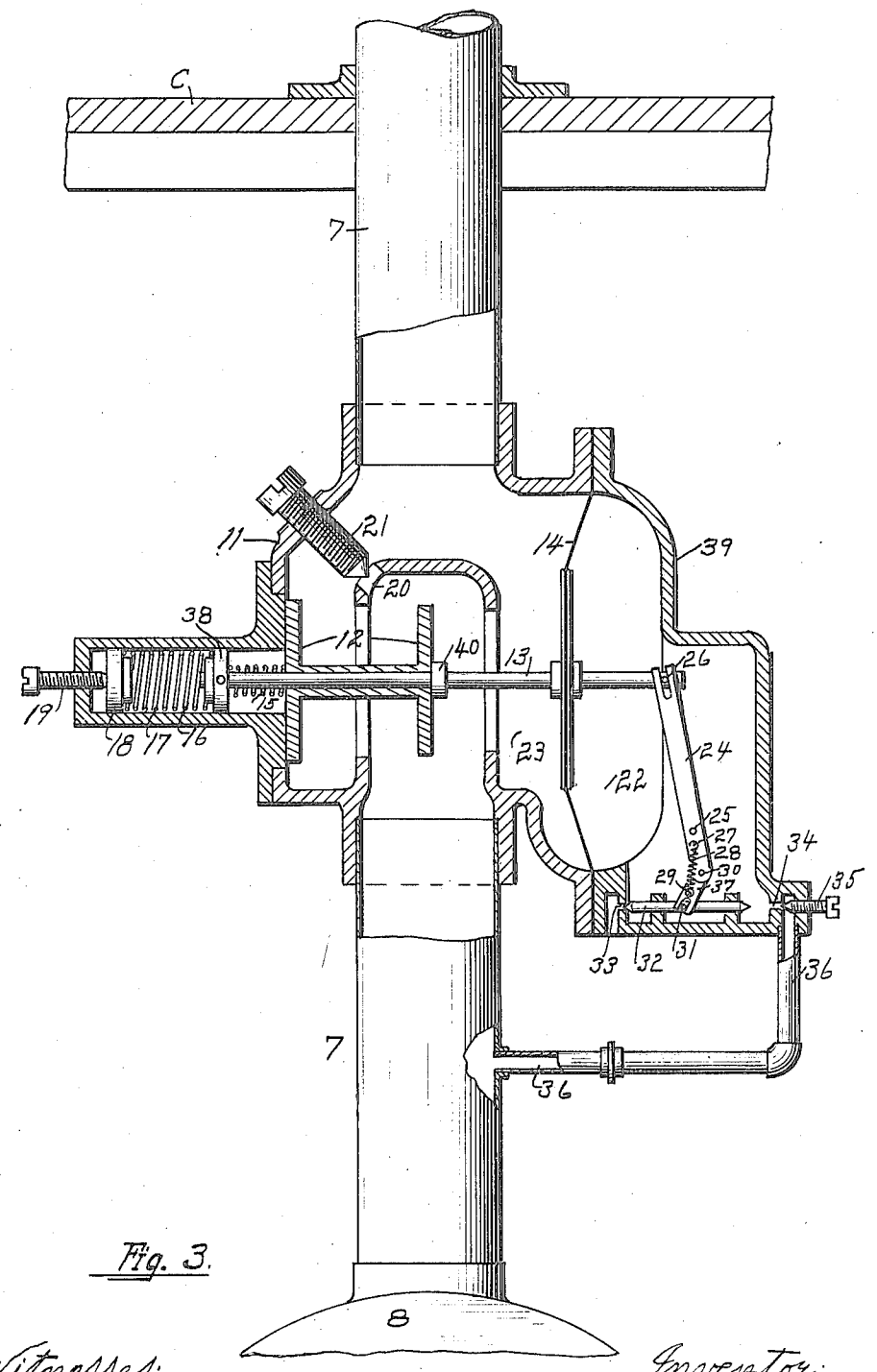


Fig. 3.

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UNITED STATES PATENT OFFICE.

EMMETT B. PERRINE, OF CHICAGO, ILLINOIS.

PNEUMATIC-DESPATCH-TUBE APPARATUS.

1,180,603. Specification of Letters Patent. Patented Apr. 25, 1916.

Application filed June 22, 1914. Serial No. 846,451.

To all whom it may concern:

Be it known that I, EMMETT B. PERRINE, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Pneumatic-Despatch-Tube Apparatus, of which the following is a specification.

My invention relates to improvements in pneumatic despatch tube apparatus; and its object is to devise an apparatus on the vacuum principle which is economical and effective and through which a minimum quantity of air passes when no carriers are in transit.

Another object of this invention is to provide means operative upon the despatching of a carrier to admit a maximum amount of air for driving said carrier and for maintaining the flow of air until the carrier has delivered at its destination after which the flow is automatically reduced to a minimum.

In the accompanying drawings, which illustrate a construction embodying my invention, Figure 1 is a diagram of a circuit of pneumatic transmission tubes showing the controlling mechanism connected therewith and in normal position. Fig. 2 is an enlarged elevation, partly in section, of the controlling mechanism in normal position. Fig. 3 is a similar view to Fig. 2, showing the parts in operative position when a carrier is despatched. Fig. 4 is an enlarged section showing one of the valves, in normal position, hereinafter described.

Like letters of reference refer to like parts throughout the several views.

C represents a central station which is connected by the transit tube 1 with the discharge terminal 2 controlled by the usual valve 3 at the sub-station S.

4 is a return transit tube connecting the terminal 2 with the discharge terminal 5 controlled by the delivery valve 6 at the central station C.

7 is a vacuum tube connecting the terminal 5 with the usual vacuum drum 8.

9 is a bellmouth or despatching inlet for inserting carriers into tube 1 and 10 is a closed despatching inlet located at the sub-station S for inserting carriers into tube 4.

Interposed in the vacuum tube 7 is a casing 11 in which is arranged the normally closed pressure balanced valve 12 movably mounted on stem 13 which is connected to diaphragm 14. Valve 12 is normally held in position against lug 40 on stem 13 by pressure of spring 15 acting against the guide collar 38 secured to stem 13. Said collar 38 slides in guide cap 17 and receives thrust of spring 16 which is under a tension regulated by screw 19.

20 is a port connecting vacuum tube 7 above valve 12 with vacuum tube 7 below valve 12.

21 is a regulating screw controlling the amount of air passing through port 21.

Diaphragm 14 is so mounted in casing 11 that its inner face is constantly in communication with the vacuum in the tube 7 above valve 12. The outer face of diaphragm 14 is inclosed by the cover 39 forming a chamber 22 which communicates with the atmosphere through port 33 and with vacuum tube 7 below valve 12 through port 34. Passage of air through said ports 33 and 34 is controlled by valve 32.

24 is a lever pivoted on pin 25 secured to cover 39.

26 is a pin carried by stem 13 and engaging in slot of lever 24.

37 is a lever pivoted on pin 30 to lever 24. Said lever 37 has slot engaging pin 31 carried by valve 32.

28 is a spring under tension attached to lever 24 by pin 27 and to lever 37 by pin 29.

36 is a continuation of port 34 to vacuum tube 7 below valve 12.

35 is a timing screw to regulate the amount of air passing through port 34.

The operation of the apparatus is as follows: In the normal or non-operating position of the apparatus as shown in Figs. 1, 2 and 4, a minimum or restricted flow of air is maintained through the inlet 9, tubes 1, 4 and 7, thence through port 20 to drum 8. Valve 32 is in position covering port 34, port 33 is open and admitting atmospheric pressure to chamber 22, valve 12 is closed, and chamber 23 is carrying a minimum vacuum. To despatch a carrier from station C to sub-station S, the operator inserts the carrier into bellmouth 9 thereby restricting the passage of the normal minimum flow of air through transit tube 1 and causing the vacuum in the chamber 23 to increase until the diaphragm 14 is drawn back against the tension of spring 16 opening the valve 12 allowing a maximum flow of air through tube 7 to drum 8 driving the carrier toward the sub-station S. In the meantime the movement of the diaphragm 14 has acted through the stem 13 to pin 26 engaging in slot of le-

ver 24 and through said lever 24 until lever 37 actuated by tension of spring 28 and engaging pin 31 moves valve 32 to position covering port 33 and uncovering port 34. The chamber 22 is now closed to atmosphere and the air is slowly exhausted through port 34 regulated by timing screw 35 equalizing the pressure on diaphragm 14 so that when carrier has delivered at sub-station S the valve 12 is closed by spring 16 and the air flow is again reduced to the minimum and passing through port 20. The closing of valve 12 reduces the vacuum in chamber 23 thereby producing an unbalanced pressure on diaphragm 14 and causing a continued movement in the closing direction of stem 13 until the said movement acting through lever 24 causes lever 37 actuated by tension of spring 28 to move valve 32 to position closing port 34 and opening port 33. The chamber 22 is now subjected to atmospheric pressure, the diaphragm 14 returns to normal position, and the apparatus is in position ready for the despatching of another carrier.

In despatching a carrier from sub-station S to central station C, the operation of the mechanism is identical with that heretofore described, the carrier being inserted in the inlet 10 and the inlet closed when the vacuum in chamber 23 will increase causing the valve 12 to open allowing the carrier to be transmitted to station C when the said valve 12 will close. In case a number of carriers are despatched in succession, the valve 12 will open upon the insertion of the first carrier and close at the timed interval for delivery of said carrier, but if there is a carrier still in the transit tube, the said valve will re-open immediately and continue to repeat the operation until all carriers are delivered from the transit tubes.

Having thus described my invention and set forth a construction embodying the same, what I claim as new and desire to secure by Letters Patent of the United States is—

1. A pneumatic despatch tube apparatus, comprising a transmission tube, an exhaust tube connected therewith, a unitary valve chamber forming a portion of the exhaust passageway and provided with means normally to permit a minimum flow of air therethrough, a normally-closed valve adapted to permit maximum flow of air, and means controlled by the movement of air through the tubes for operating said valve.

2. A pneumatic despatch tube apparatus, comprising a transmission tube, an exhaust tube connected therewith, a unitary valve chamber forming a portion of the exhaust passageway, a valve seat extension in said chamber having two sets of apertures, one for permitting minimum and the other maximum flow of air through the exhaust tube, a valve normally closing one set of apertures so as to permit minimum flow of air, and means in the valve casing controlled by the state of vacuum in said casing and the exhaust tube for operating the valve to open the tube for maximum flow of air.

3. A pneumatic despatch tube apparatus, comprising a transmission tube, an exhaust tube connected therewith, a fixed closure in said exhaust tube having two apertures, one for permitting minimum and the other maximum flow of air through the exhaust tube, a valve normally closing one aperture so as to permit minimum flow of air from the transmission tube through the other aperture, and means operated by the creation of vacuum in the tubes due to closing of the transmission tube by the introduction of a carrier therein for operating the valve to open the tube for maximum flow of air.

4. A pneumatic despatch tube apparatus, comprising a transmission tube, an exhaust tube connected therewith, a fixed closure in said exhaust tube having two apertures, one for permitting minimum and the other maximum flow of air through the exhaust tube, a valve normally closing one aperture so as to permit minimum flow of air from the transmission tube through the other aperture, means for positively regulating the amount of air flowing through the minimum aperture, and means operated by the creation of vacuum in the tubes due to closing of the transmission tube by the introduction of a carrier therein for operating the valve to open the tube for maximum flow of air.

5. A pneumatic despatch tube apparatus, comprising a transmission tube, an exhaust tube connected therewith, a unitary valve chamber forming an enlargement of said exhaust tube, a closure extension in said chamber having a pair of concentric apertures in the walls thereof for permitting maximum flow of air through the exhaust tube and another aperture for permitting minimum flow of air through the exhaust tube, a double valve normally spring-held to close said concentric apertures, and means operated by the creation of vacuum in the tubes due to closing of the transmission tube by the introduction of a carrier therein for operating the valve to open the tube for maximum flow of air.

6. A pneumatic despatch tube apparatus, comprising a transmission tube, an exhaust tube connected therewith, a unitary valve chamber forming a portion of the exhaust passageway and provided with means to permit at all times a minimum flow of air therethrough, a normally-closed valve adapted to permit maximum flow of air and a flexible diaphragm in the chamber for actuating the valve having one side exposed to the vacuum of the chamber and the exhaust tube and the other side exposed to at-

mospheric pressure whereby the raising of vacuum in the chamber due to closing of the transmission tube by the insertion of a carrier will cause operation of the diaphragm and valve to open the tube for maximum flow of air.

7. A pneumatic despatch tube apparatus, comprising a transmission tube, an exhaust tube connected therewith, a unitary valve chamber forming a portion of the exhaust passageway and provided with means to permit at all times a minimum flow of air therethrough, a normally-closed valve adapted to permit maximum flow of air, a flexible diaphragm in the chamber for actuating the valve having one side exposed to the vacuum of the chamber and the exhaust tube and the other side exposed to atmospheric pressure whereby the raising of vacuum in the chamber due to closing of the transmission tube by the insertion of a carrier will cause operation of the diaphragm and valve to open the tube for maximum flow of air, and means operated by movement of said diaphragm to close to atmosphere that part of the chamber at the side of the diaphragm which was subject to atmospheric pressure prior to movement of the diaphragm.

8. A pneumatic despatch tube apparatus, comprising a transmission tube, an exhaust tube connected therewith, a unitary valve chamber forming a portion of the exhaust passageway and provided with means to permit at all times a minimum flow of air therethrough, a normally-closed valve adapted to permit maximum flow of air, a flexible diaphragm in the chamber for actuating the valve and dividing said valve chamber into two parts the outer of which is normally subject to atmospheric pressure whereby an increase of vacuum in the chamber due to closing of the transmission tube by the insertion of a carrier will cause operation of the diaphragm and valve to open the tube for maximum flow of air, normally-closed means connecting said outer portion with the exhaust tube, and means operated by the diaphragm for opening said connection from the exhaust tube to the outer portion and closing said outer portion to atmosphere.

9. A pneumatic despatch tube apparatus, comprising a transmission tube, an exhaust tube connected therewith, a fixed closure member in said exhaust tube having an enlarged aperture for permitting maximum flow of air and a smaller aperture for permitting minimum flow of air, a valve normally closing said enlarged aperture, and means operated by the creation of vacuum in the tubes due to closing of the transmission tube by the introduction of a carrier therein for operating the valve to open the tube for maximum flow of air.

10. A pneumatic despatch tube apparatus, comprising a transmission tube, an exhaust tube connected therewith, a unitary valve chamber forming a portion of the exhaust passageway and provided with means to permit at all times a minimum flow of air therethrough, a normally-closed valve adapted to permit maximum flow of air, a flexible diaphragm in the chamber for actuating the valve and dividing said valve chamber into two parts the outer of which is provided with two ports, one running to atmosphere and the other connecting with the exhaust tube outside of said chamber, a sliding valve adapted to open and close said ports alternately, and means connected with said diaphragm for operating said valve.

11. A pneumatic despatch tube apparatus, comprising a transmission tube, an exhaust tube connected therewith, a unitary valve chamber forming a portion of the exhaust passageway and provided with means to permit at all times a minimum flow of air therethrough, a normally-closed valve adapted to permit maximum flow of air, a flexible diaphragm in the chamber for actuating the valve and dividing said valve chamber into two parts the outer of which is provided with two ports, one running to atmosphere and the other connecting with the exhaust tube outside of said chamber, a sliding valve adapted to open and close said ports alternately, a pivoted lever operated by said diaphragm, an arm pivoted to said lever and engaging said sliding valve, and a spring connecting said lever and arm and adapted to operate the valve in opposite directions when the lever is moved to throw the line of action of the spring at either side of the point of pivotal connection between the lever and the arm.

12. A pneumatic despatch tube apparatus, comprising a transmission tube, an exhaust tube connected therewith, a unitary valve chamber forming a portion of the exhaust passageway and having a closure provided with means to permit at all times a minimum flow of air, a flexible diaphragm in the chamber exposed to atmosphere at one side and to the vacuum of the chamber and exhaust tube at the other side, a valve for permitting maximum flow of air connected with and adapted to be operated by the diaphragm, a spring holding the valve and diaphragm of sufficient strength to prevent the diaphragm from moving into the vacuum of the chamber when the minimum flow of air is unrestricted, an increase in vacuum in the chamber due to closing of the transmission tube by the insertion of a carrier overcoming the action of said spring and causing operation of the diaphragm and valve to open the tube for maximum flow of air.

13. A pneumatic despatch tube apparatus, comprising a transmission tube, an exhaust tube connected therewith, a unitary valve chamber forming a portion of the exhaust

passageway and having a closure provided with means to permit at all times a minimum flow of air, a flexible diaphragm in in the chamber exposed to atmosphere at one side and to the vacuum of the chamber and exhaust tube at the other side, a stem connected with said diaphragm, a valve for opening the closure to permit maximum flow of air slidably mounted upon the stem and spring-held in operative position thereon, a spring engaging said stem of sufficient strength to hold the diaphragm from movement into the vacuum of the chamber and exhaust tube when the minimum flow of air is unrestricted, an increase in vacuum in the chamber due to closing of the transmission tube by the insertion of a carrier overcoming the action of said spring and causing operation of the diaphragm and valve to open the tube for maximum flow of air.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses, this eighteenth day of June, A. D. 1914.

EMMETT B. PERRINE.

Witnesses:

D. A. MARIENHOFF,

C. J. MURRAY.