J. T. NEEDHAM.

PNEUMATIC DESPATCH TUBE APPARATUS.

APPLICATION FILED MAY 10, 1909.

976,744.

Patented Nov. 22, 1910.

2 SHEETS—SHEET 1.

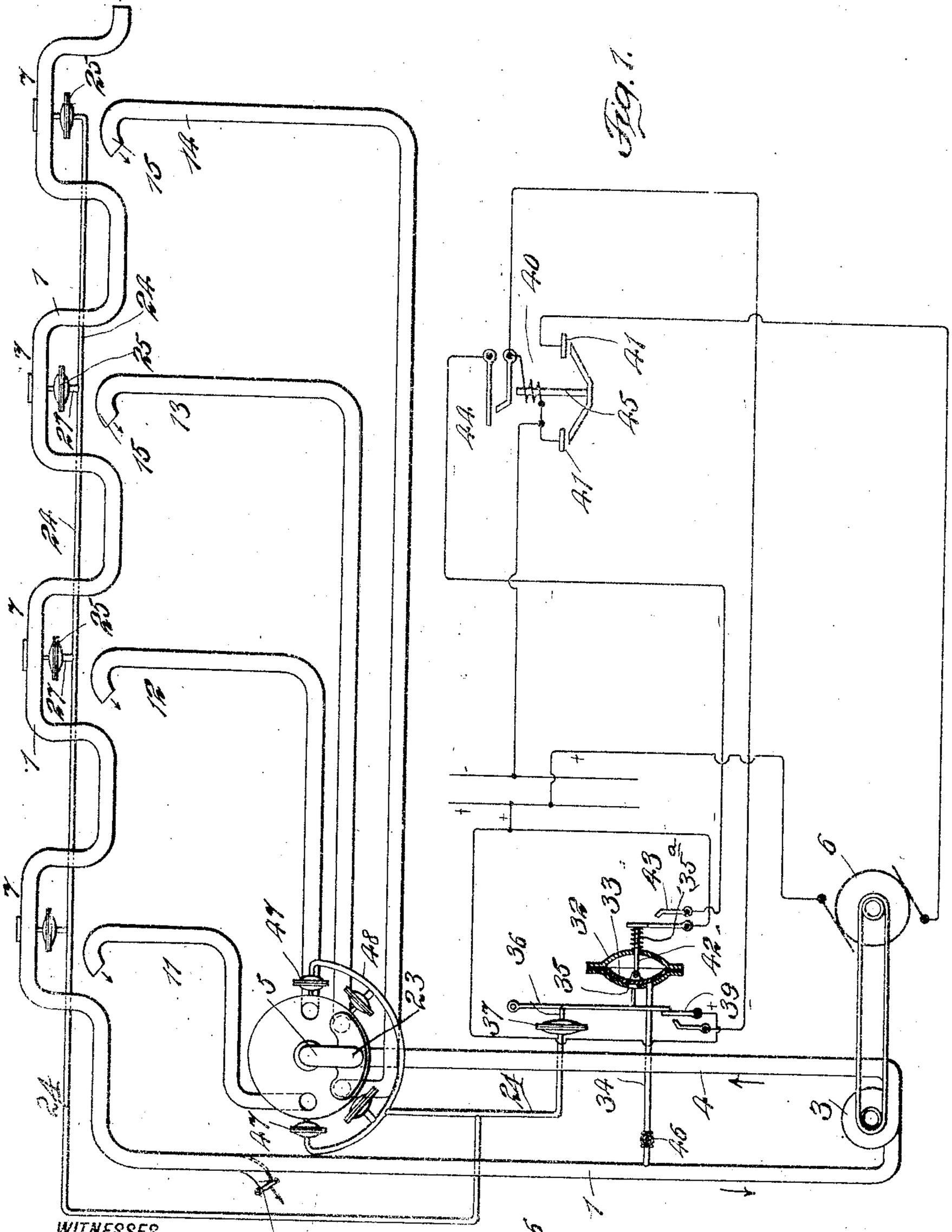

Fig. 1.

Fig. 1a.

WITNESSES

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2 SHEETS—SHEET 2.

Fig. 2.

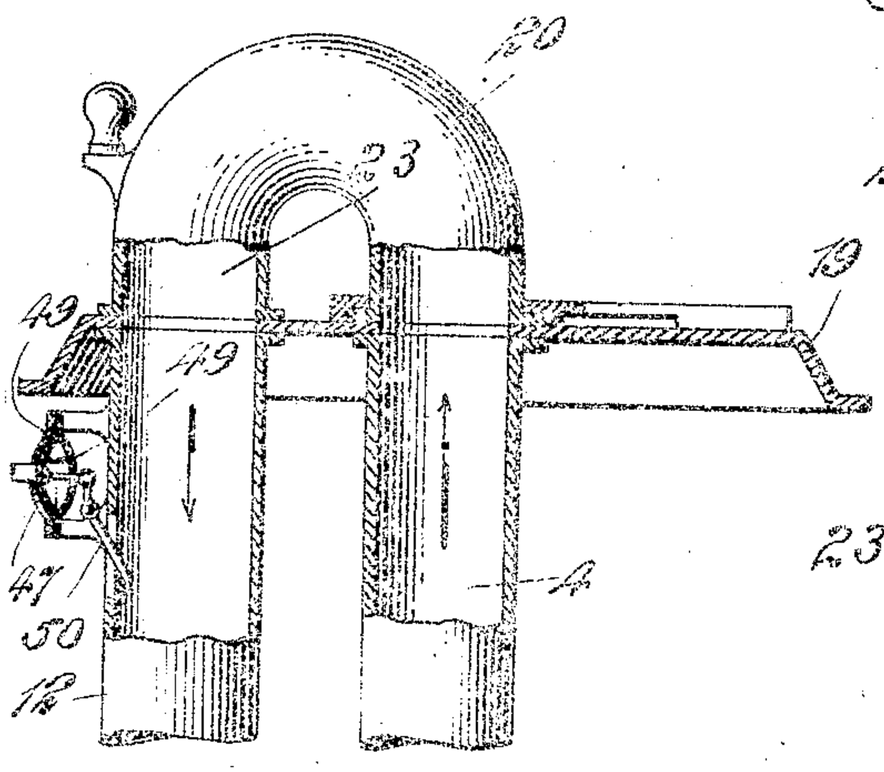

Fig. 3.

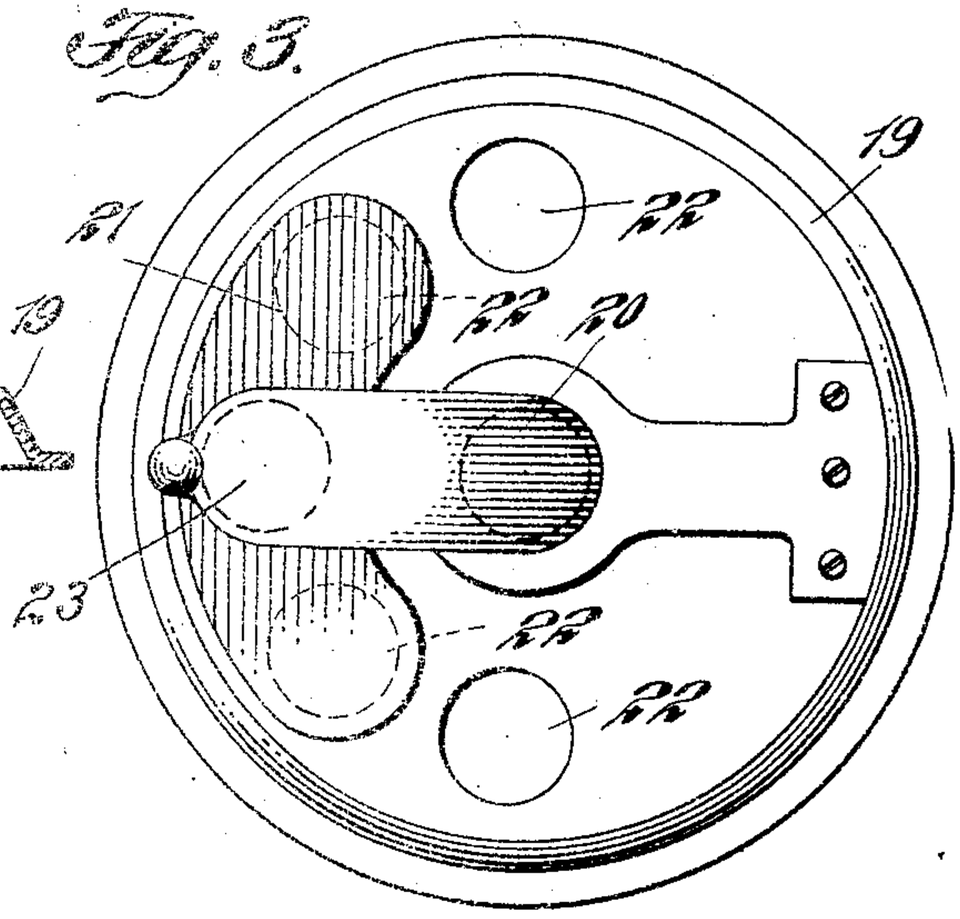

Fig. 5.

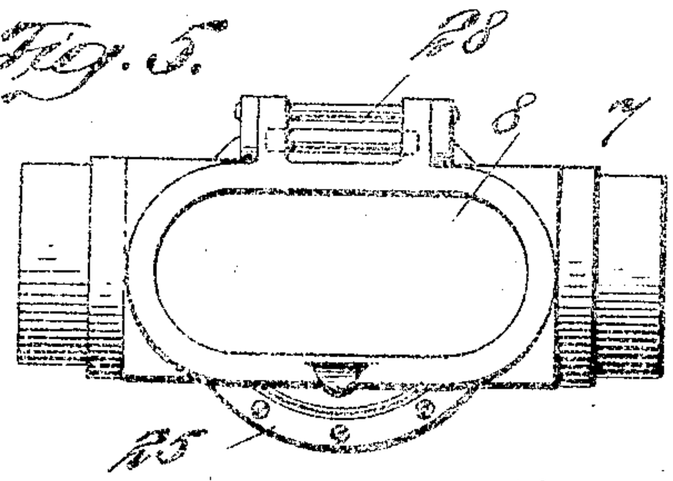

Fig. 4.

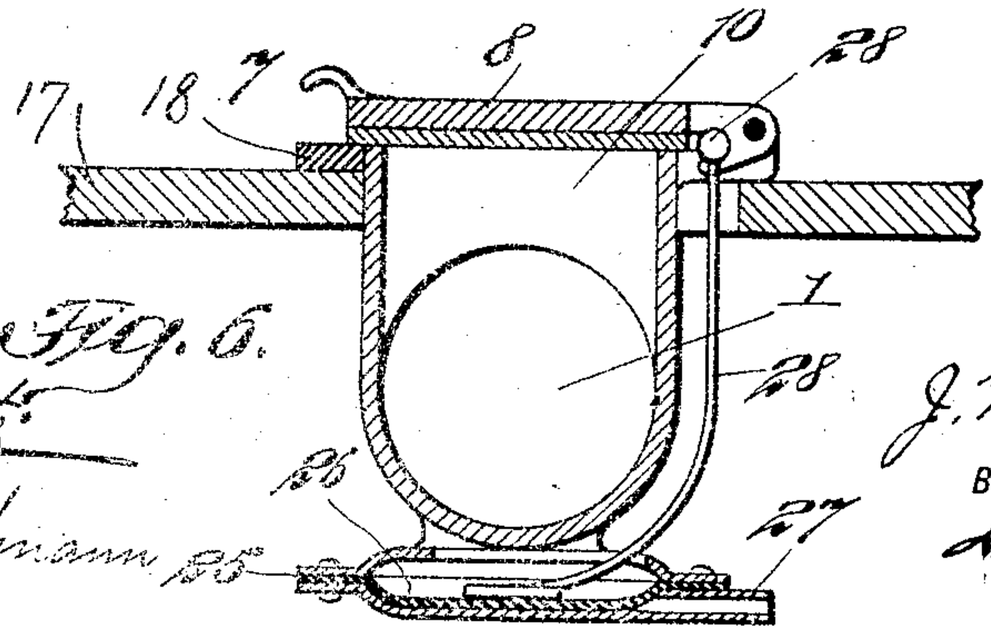

Fig. 6.

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UNITED STATES PATENT OFFICE.

JOHN T. NEEDHAM, OF NEW YORK, N. Y., ASSIGNOR TO INTERSTATE PNEUMATIC TUBE COMPANY, OF BROOKLYN, NEW YORK, A CORPORATION OF NEW YORK.

PNEUMATIC-DESPATCH-TUBE APPARATUS.

976,744. Specification of Letters Patent. Patented Nov. 22, 1910.

Application filed May 10, 1909. Serial No. 495,127.

To all whom it may concern:

Be it known that I, JOHN T. NEEDHAM, a subject of the King of Great Britain, and resident of the borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in Pneumatic-Despatch-Tube Apparatus, of which the following is a specification, reference being had therein to the accompanying drawings, in which—

Figure 1 is a diagrammatic view of the apparatus, the diaphragm chamber of the motor controlling means being shown in section; Fig. 1ª a detail sectional view of the suction chamber for controlling the motor starting means; Fig. 2 a vertical sectional view of the carrier transmitting device; Fig. 3 a plan view of the device shown in Fig. 2; Fig. 4 a vertical sectional view of the transmitting and discharging terminals; Fig. 5 a plan view of one of the transmitting terminals; and Fig. 6 a transverse vertical sectional view of one of the transmitting terminals.

One of the objects of this invention is to provide an apparatus wherein a plurality of transmitting terminals may be arranged on a single transmission tube leading to the central station and providing means at the central station for drawing air through said tube and forcing it out through a plurality of tubes each of which lead to a station, a shiftable means being provided at the central station for directing the blast of air to any one of the outgoing tubes.

Another object of the invention is to provide a power controlling means actuated from each receiving station whereby the blower, or other air moving means, will be stopped a predetermined time after the insertion of a carrier in any one of the many receiving terminals.

Referring to the various parts by numerals, 1 designates a single transmission tube leading from the various stations to the central station. This tube is provided with a discharge 2 through which all of the carriers are discharged at the central station. The outer end of this transmission tube is open and air is sucked or drawn through said tube by a rotary blower 3. From this blower a pressure pipe 4 leads to the central transmitting station 5, the blower 3 forcing the air through said pressure pipe to the central station. It will, therefore, be seen that the blower sucks the air through pipe 1 and forces it out through pipe 4. The blower is driven by an electric motor 6, this motor being automatically controlled by apparatus which will be hereinafter described.

The transmission tube 1 is provided with a plurality of receiving terminals or stations 7, each receiving terminal being provided with a hinged door 8 which closes the carrier-receiving opening 10. In operation the door 8 is lifted to permit a carrier to be dropped lengthwise in the tube, as indicated in dotted lines in Fig. 4, and then closed. A carrier dropped in any one of the receiving terminals will be carried through the tube 1 and discharged at 2 without interfering with the passage of any other carrier that may be in the tube.

From the central station return tubes 11, 12, 13 and 14 extend to the receiving terminals or stations, one return tube leading to each station. Each return tube is provided with a suitable discharge terminal 15 which delivers the carriers into the receiving basket or receptacle 16. I prefer to arrange the receiving terminals of the transmission tube and the discharge terminals of the return tubes as shown in Fig. 4. It will be noted that the transmission tube is arranged below the desk or table top 17, the door 8 being arranged to rest on a plate 18 secured to the top of the desk 17. The receiving baskets 16 are arranged on the top of the desk close to the receiving terminal and the discharge terminals 15 are arranged within said receiving baskets. This makes a very simple and convenient arrangement of the receiving and discharging terminals and does not interfere materially with the use of the desk or table for other purposes.

The side walls of the baskets 16 are recessed along their upper edges as at 16ª to form carrier-holding devices in which the carriers may be placed when not in use. The side walls of the baskets are connected together by transverse rods 16ᵇ for the purpose of bracing the basket and forming a protection for the discharging terminals 15.

At the central station is provided the transmitting device 5 so that the pressure pipe 4 from the blower may be connected to any one of the return tubes. To accomplish this I provide a horizontal circular plate 19 suitably secured to the central station desk top. In the center of this plate

a pneumatic switch 20 is swiveled, its swiveled end being in direct and constant communication with the upper end of the pressure pipe 4, said pipe being connected to the under side of the plate 19, as shown clearly in Fig. 2. The pneumatic switch is in the form of an arched pipe, the free or swinging end of the pipe being flush with the upper surface of the plate 19 and carrying a slide 21. The central station ends of the return tubes are connected to apertures 22 in plate 19. These apertures are arranged in an arc of a circle struck from the center of the pivoted end of the pneumatic switch, as indicated clearly in Fig. 1, so that by swinging said switch on its pivot the discharge end 23 thereof may be brought over the end of any one of the return tubes. By this means the pressure tube 4 may be connected to any one of the return tubes and the carriers forced through said connected tube to the discharge terminal at the distant end of said tube. The slide 21 extends laterally beyond the switch 20 sufficiently to prevent the uncovering of the return tube until the swinging end of the switch has been moved beyond the end of the return tube. This is of advantage for the reason that it is not desirable to uncover the return tube while air is being blown therein from the switch.

I have found that an apparatus constructed as described is so economical in the use of power and operates with such a low air pressure in the tubes that the motor and blower may be operated constantly. I prefer, however, to provide an automatic motor starting and stopping means adapted to be operated from each of the receiving terminals on the transmission tube. To this end I provide a small suction pipe 24 leading from all of the receiving terminals to the motor controlling means. At each receiving terminal is mounted a small diaphragm chamber 25 having mounted therein a diaphragm 26, said diaphragm chamber being connected by pipe 27 with the suction tube 24, as shown in Fig. 1. The diaphragm 26 is normally collapsed and closes the end of the pipe 27, as shown in Fig. 6. To the center of this diaphragm is connected a link 28 whose upper end is connected to the cover 8. It is clear that when the door 8 is opened the diaphragm 26 will be lifted thereby sucking air through pipe 27 and the suction pipe 24.

In a convenient position near the motor 6 is arranged the pneumatically operated motor controlling apparatus. This motor controlling means consists of a main diaphragm chamber 32 in which is arranged a main diaphragm 33. Connected to this chamber is an air exhaust pipe 34, said pipe being connected to pipe 1, as shown clearly in Fig. 1. The chamber 32 is provided with an inlet valve 35 which is connected to and operated by a lever 36. Close to this lever is arranged a small diaphragm chamber 37 containing a diaphragm 38 which is connected to the lever 36. To the chamber 37 the inner end of the suction pipe 24 is connected. Diaphragm 37 is normally collapsed as shown in Fig. 1ª, so that when air is drawn from said chamber through the suction pipe 34 upon the opening of one of the receiving doors 8 said diaphragm 37 will be moved and will swing the lever 36 on its pivot and open the inlet valve 35 of the main diaphragm chamber.

A pair of contacts 39 is arranged close to the end of the lever 36 and is adapted to be engaged by said lever, when the inlet valve 35 is opened, to close a circuit through the coil of a suitable starting solenoid 40. When said solenoid circuit is closed the motor circuit is closed through the contacts 41 and the motor will continue to drive blower 3 until the solenoid circuit is interrupted.

Connected to the main diaphragm 33 is a pin 42 which normally engages a pair of contacts 43, said contacts being arranged in a second solenoid circuit. In the second solenoid circuit is arranged a pair of contacts 44 which are adapted to be brought together by the core 45 of the solenoid when said core is moved by the solenoid coil.

At the receiving end of each return tube is arranged a diaphragm chamber 47 which is connected to the suction pipe 24 by pipe 48, said pipe connecting all of the diaphragm chambers 47 to the suction pipe as indicated in Fig. 1. In the diaphragm chamber is arranged a diaphragm 49 which normally closes the end of the pipe 48, as shown in Fig. 2. To this diaphragm is connected a lever 50 whose free end extends into the return tube and is adapted to be engaged by the carrier when said carrier is placed in the tube. It will be readily seen that when said lever 50 is moved outwardly by a carrier the diaphragm 49 will suck air through pipe 48 and pipe 24, thereby moving the diaphragm 38 and causing the operation of the motor. The motor, of course, will continue to operate until sufficient vacuum is produced in the vacuum chamber 32 to open the solenoid circuit and thereby stop the motor.

The operation of the motor controlling means may be briefly described as follows:— When any one of the terminal doors 8 is opened its diaphragm 26 draws air through the suction pipe 24 thereby moving inwardly the lever diaphragm 38 and opening the valve 35 of the main diaphragm chamber. The movement of the lever 36 closes the solenoid circuit through the contacts 39 thereby completing the motor circuit and starting the blower to draw air through the trans-

mission tube 1 and to blow it out through the delivery tube 4. When the valve 35 of the main diaphragm chamber is opened the diaphragm 33 will move inwardly under the influence of spring 35ª, thereby permitting the contacts 43 to engage each other to close the second solenoid circuit. By this means the motor circuit will be held closed by the solenoid and the contacts 39 may separate without affecting the position of the solenoid; and the motor will now continue to operate until sufficient vacuum has been produced in the main diaphragm chamber to return the diaphragm 32 to its normal position and thereby separate contacts 43. As soon as the terminal door 8 is closed the diaphragm 38 will be returned to its normal position and the inlet valve 35 will be closed. Vacuum will then be produced in the diaphragm chamber by exhaust pipe 34. The length of time required to develop the proper degree of vacuum may be regulated by a suitable valve 46 arranged in said pipe 34.

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

1. A pneumatic despatch tube apparatus comprising a single transmission tube, a plurality of receiving terminals in said tube separated a suitable distance from each other, a plurality of return tubes, a blower, means for operating said blower to draw air through the single transmission tube, a pressure pipe leading from the blower, a transmitting device connected to the receiving ends of all of the return tubes, and means for connecting the pressure pipe from the blower to the receiving end of any one of the return tubes.

2. A pneumatic despatch tube apparatus comprising a single transmission tube, a plurality of receiving terminals in said tube, a plurality of return tubes, a motor, means for driving said motor to draw air through the single transmission tube, a pipe connected to the pressure side of said blower, and movable means connected to said pipe and adapted to direct the air to the receiving end of any one of the return tubes.

3. A pneumatic despatch tube apparatus comprising a single transmission tube, a plurality of receiving terminals in said tube, a plurality of return tubes, a pressure pipe, a blower, means to operate said blower to draw air through the transmission tube and force it through the pressure pipe, and a pneumatic switch connected to the pressure pipe and adapted to be connected to the receiving end of any one of the return tubes.

4. A pneumatic despatch tube apparatus comprising a single transmission tube, a plurality of receiving terminals in said tube, a plurality of return tubes, a pressure pipe, a blower, means to operate said blower to draw air through the transmission tube and force it through the pressure pipe, a pneumatic switch connected to the pressure pipe and adapted to be connected to the receiving end of any one of the return tubes, and a slide carried by said pneumatic switch and adapted to extend laterally beyond the end of the switch.

5. A pneumatic despatch tube apparatus comprising a single transmission tube, a plurality of receiving terminals in said tube separated a suitable distance from each other, a plurality of return tubes, a blower, means for operating said blower to draw air through the single transmission tube, a pressure pipe leading from the blower, means for connecting the pressure pipe from the blower to the receiving end of any one of the return tubes, a timing device for said blower operating means, and means at each receiving terminal to independently set said timing device.

6. A pneumatic despatch tube apparatus comprising a single transmission tube, a plurality of receiving terminals in said tube separated a suitable distance from each other, a plurality of return tubes, a blower, a motor for operating said blower to draw air through the single transmission tube, a pressure pipe leading from the blower, means for connecting the pressure pipe from the blower to the receiving end of any one of the return tubes, a timing device for the motor operating means, and means at each receiving terminal to independently operate the timing device.

7. A pneumatic despatch tube apparatus comprising a single transmission tube, a plurality of receiving terminals in said tube separated a suitable distance from each other, a door for each of said terminals, a plurality of return tubes, a blower, means for operating said blower to draw air through the single transmission tube, a pressure pipe leading from the blower, means for connecting the pressure pipe from the blower to the receiving end of any one of the return tubes, a timing device for said blower operating means, and means actuated by each terminal door to independently set said timing device.

8. A pneumatic despatch tube apparatus comprising a transmission tube, a receiving terminal therefor, a blower for moving air therethrough, a motor for operating said blower, a motor circuit, a suction chamber, a diaphragm in said chamber, means operated by said diaphragm to close the motor circuit, a suction pipe connected to the suction chamber and leading to the receiving terminal in the transmission tube, and means at the receiving terminal to draw air through said suction pipe.

9. A pneumatic despatch tube apparatus comprising a transmission tube, a receiving

terminal therefor, a blower for moving air therethrough, a motor for operating said blower, a motor circuit, a suction chamber, a diaphragm in said chamber, means operated by said diaphragm to close the motor circuit, a suction pipe connected to the suction chamber and leading to the receiving terminal in the transmission tube, a diaphragm chamber at the receiving terminal connected to the suction pipe, a diaphragm therein normally closing the end of the suction pipe, means for moving said diaphragm to draw air through the suction pipe to operate the motor controlling means.

10. A pneumatic despatch tube apparatus comprising a transmission tube, a receiving terminal therefor, a door for said terminal, a blower for moving air therethrough, a motor for operating said blower, a motor circuit, a suction chamber, a diaphragm in said chamber, means operated by said diaphragm to close the motor circuit, a suction pipe connected to the suction chamber and leading to the receiving terminal in the transmission tube, a diaphragm chamber at the receiving terminal connected to the suction pipe, a diaphragm therein normally closing the end of the suction pipe, and means connected to the diaphragm and to the receiving terminal door to draw air through the suction pipe and operate the motor controlling means.

11. A pneumatic despatch tube apparatus comprising a single transmission tube, a plurality of receiving terminals in said tube, a plurality of return tubes, a blower, means for operating said blower to draw air through the single transmission tube, a pressure pipe leading from the blower, means for connecting the pressure pipe to the receiving end of any one of the return tubes, a timing device for the motor operating means, and means at the receiving end of each return tube for independently operating the timing device.

12. A pneumatic despatch tube apparatus comprising a single transmission tube, a plurality of receiving terminals in said tube, a plurality of return tubes, a blower, means for operating said blower to draw air through the single transmission tube, a pressure pipe leading from the blower, means for connecting the pressure pipe to the receiving end of any one of the return tubes, a timing device for the motor operating means, and means in the receiving end of each return tube adapted to be operated by the insertion of a carrier to independently operate the timing means.

13. A pneumatic despatch tube apparatus comprising a transmission tube, a receiving terminal therefor, a blower for moving air through said tube, a single suction pipe leading from the receiving terminal, a diaphragm chamber at the receiving terminal and connected to the suction pipe, the diaphragm therein normally closing the end of the suction pipe, a terminal door, a link connecting said door near its pivot to the diaphragm, whereby when the door is opened the diaphragm will be lifted to draw air through the suction pipe, a motor controlling means, and means connected with the suction pipe to start said motor controlling means when the terminal door is opened.

14. A pneumatic despatch tube apparatus comprising a single transmission tube, a plurality of receiving terminals in said tube, a central station, a plurality of return tubes extending from the central station to the receiving terminals in the transmission tube, a blower, means for operating said blower to draw air through the single transmission tube, a pressure pipe leading from the blower of the central station, means at the central station for connecting the pressure pipe to the receiving end of any one of the return tubes, a timing device for the blower operating means, and means at the central station for operating said timing device.

15. A pneumatic despatch tube apparatus comprising a single transmission tube extending to the central station, a plurality of receiving terminals in said tube adapted to receive carriers to be transmitted to the central station, a plurality of return tubes, one of said tubes extending from the central station to each of the receiving terminals in the transmission tube, said return tubes being normally open at both ends, a blower, means for operating said blower to draw air through the single transmission tube from end to end thereof, a pressure pipe leading from the blower and means for connecting the pressure pipe from the blower to the receiving end of any one of the return tubes.

16. A pneumatic despatch tube apparatus comprising a single transmission tube connecting a plurality of stations with a central station, a plurality of receiving terminals in said tube at outlying stations, a plurality of return tubes, one of said return tubes connecting the central station with each of the outlying stations and terminating adjacent to the receiving terminal in the transmission tube, a blower, means for driving said blower to draw air through the single transmission tube, a pipe connected to the pressure side of the blower, and movable means adapted to connect said pressure pipe to the receiving end of any one of the return tubes.

17. A pneumatic despatch tube apparatus comprising a single transmission tube connecting a plurality of outlying stations with a central station and having an air inlet beyond the last station on the line, a plurality of receiving terminals in said tube, one at each station, a blower connected to the said tube at a point beyond the central station, means for operating said blower to draw

air through said transmission tube, a plurality of return tubes, one of said tubes extending from the central station to each of the outlying stations, both ends of said return tubes being normally open and disconnected from the air moving means or blower and the central station end of each of said tubes being adapted to receive carriers, a pressure pipe connected to the blower and means adapted to connect the discharge end of said pressure pipe with the central station end of any one of the return tubes.

18. A pneumatic despatch tube apparatus comprising a single transmission tube, a plurality of receiving terminals in said tube, a central station, a plurality of return tubes extending from the central station to a point adjacent the receiving terminals in the transmission tube, a blower, a motor for operating said blower to draw air through the single transmission tube, a pressure pipe leading from the blower to the central station, means at the central station for connecting the pressure pipe to the receiving end of any one of the return tubes, a normally open motor circuit, an air controlled means for opening and closing said circuit, means at each receiving terminal for operating the motor circuit controlling means to close the circuit to start the motor and means whereby said motor controlling means will be returned to its normal inoperative position through the action of the blower.

19. A pneumatic despatch tube apparatus comprising a single transmission tube, a plurality of receiving terminals in said tube, a central station, a plurality of return tubes extending from the central station to a point adjacent the receiving terminals in the transmission tube, a blower, a motor for operating said blower to draw air through the single transmission tube, a pressure pipe leading from the blower to the central station, means at the central station for connecting the pressure pipe to the receiving end of any one of the return tubes, a normally open motor circuit, a motor circuit controlling means comprising a diaphragm, mechanical means for moving said diaphragm in one direction to close the motor circuit, a casing or shell inclosing said diaphragm, and an air pipe connecting said diaphragm chamber to the exhaust side of the blower whereby air will be gradually exhausted from said chamber and the diaphragm returned to its normal position to open the motor circuit.

20. A pneumatic despatch tube apparatus comprising a single transmission tube, a plurality of receiving terminals in said tube, a central station, a plurality of return tubes extending from the central station to a point adjacent the receiving terminals in the transmission tube, a blower, a motor for operating said blower, to draw air through the single transmission tube, a pressure pipe leading from the blower to the central station, means at the central station for connecting the pressure pipe to the receiving end of any one of the return tubes, a normally open motor circuit, a motor circuit controlling means comprising a diaphragm, mechanical means for moving said diaphragm in one direction to close the motor circuit, a casing or shell inclosing said diaphragm, an air pipe connecting said diaphragm chamber to the exhaust side of the blower whereby air will be gradually exhausted from said chamber and the diaphragm returned to its normal position to open the motor circuit, and an adjustable valve in said pipe.

21. A pneumatic despatch tube apparatus comprising a single transmission tube, a plurality of receiving terminals in said tube, a central station, a plurality of return tubes extending from the central station to a point adjacent the receiving terminals in the transmission tube, a blower, a motor for operating said blower to draw air through the single transmission tube, a pressure pipe leading from the blower to the central station, means at the central station for connecting the pressure pipe to the receiving end of any one of the return tubes, a normally open motor circuit, a motor circuit controlling means comprising a diaphragm, means for moving said diaphragm in one direction to close the motor circuit, a casing or shell inclosing said diaphragm, and an air pipe connecting said diaphragm chamber to the exhaust side of the blower whereby air will be gradually exhausted from said chamber and the diaphragm returned to its normal position to open the motor circuit.

22. A pneumatic despatch tube apparatus comprising a single transmission tube, a plurality of receiving terminals in said tube, a central station, a plurality of return tubes extending from the central station to a point adjacent the receiving terminals in the transmission tube, a blower, a motor for operating said blower to draw air through the single transmission tube, a pressure pipe leading from the blower to the central station, means at the central station for connecting the pressure pipe to the receiving end of any one of the return tubes, a normally open motor circuit, a motor circuit controlling means comprising a diaphragm, a casing or shell inclosing said diaphragm, an inlet valve for said casing, an exhaust pipe connected to said casing on the same side of the diaphragm as the inlet valve, said pipe being connected to the exhaust side of the blower, means to open the inlet valve, means to close the motor circuit when the inlet valve is opened, and means to open the motor circuit when the required degree of

vacuum is produced in the diaphragm chamber.

23. A pneumatic despatch tube apparatus comprising a single transmission tube, a plurality of receiving terminals in said tube, a central station, a plurality of return tubes extending from the central station to a point adjacent the receiving terminals in the transmission tube, a blower, a motor for operating said blower to draw air through the single transmission tube, a pressure pipe leading from the blower to the central station, means at the central station for connecting the pressure pipe to the receiving end of any one of the return tubes, a normally open motor circuit, a motor circuit controlling means comprising a diaphragm, a casing or shell inclosing said diaphragm, an inlet valve for said casing, an exhaust pipe connected to said casing on the same side of the diaphragm as the inlet valve, said pipe being connected to the exhaust side of the blower, a lever connected to said inlet valve, means adapted to be operated from the receiving terminals to move said lever and thereby open the inlet valve, electrical means operated by said lever to close the motor circuit and means to open the motor circuit when the required degree of vacuum is produced in the diaphragm chamber.

In testimony whereof I hereunto affix my signature in the presence of two witnesses this 3rd day of May 1909.

JOHN T. NEEDHAM.

Witnesses:
WM. R. DAVIS,
E. H. H. KAUFMANN.