No. 691,936. Patented Jan. 28, 1902.

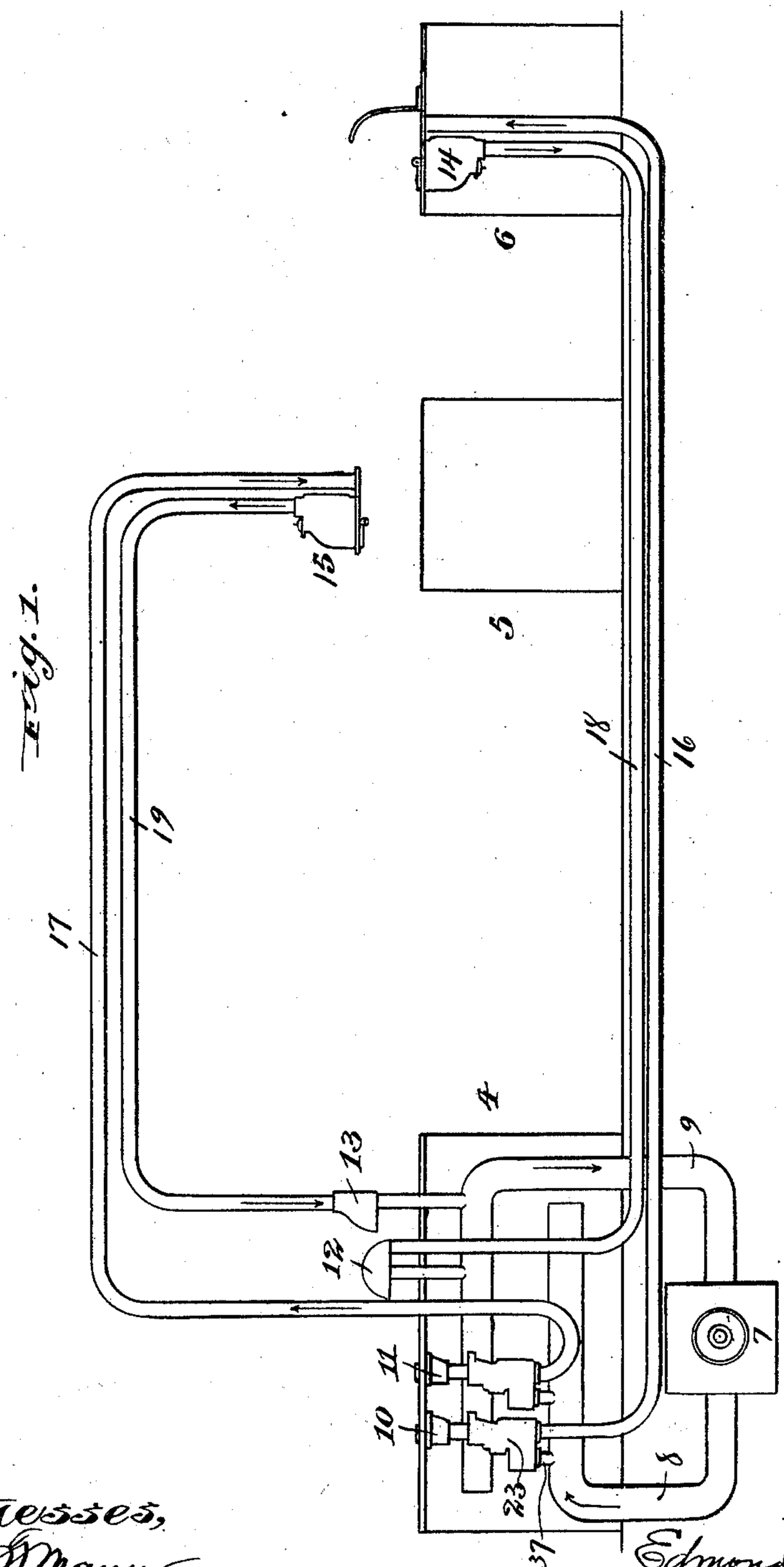
E. A. FORDYCE.

PNEUMATIC DESPATCH TUBE SYSTEM.

(Application filed Sept. 20, 1901.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.



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(No Model.) 3 Sheets—Sheet 2.

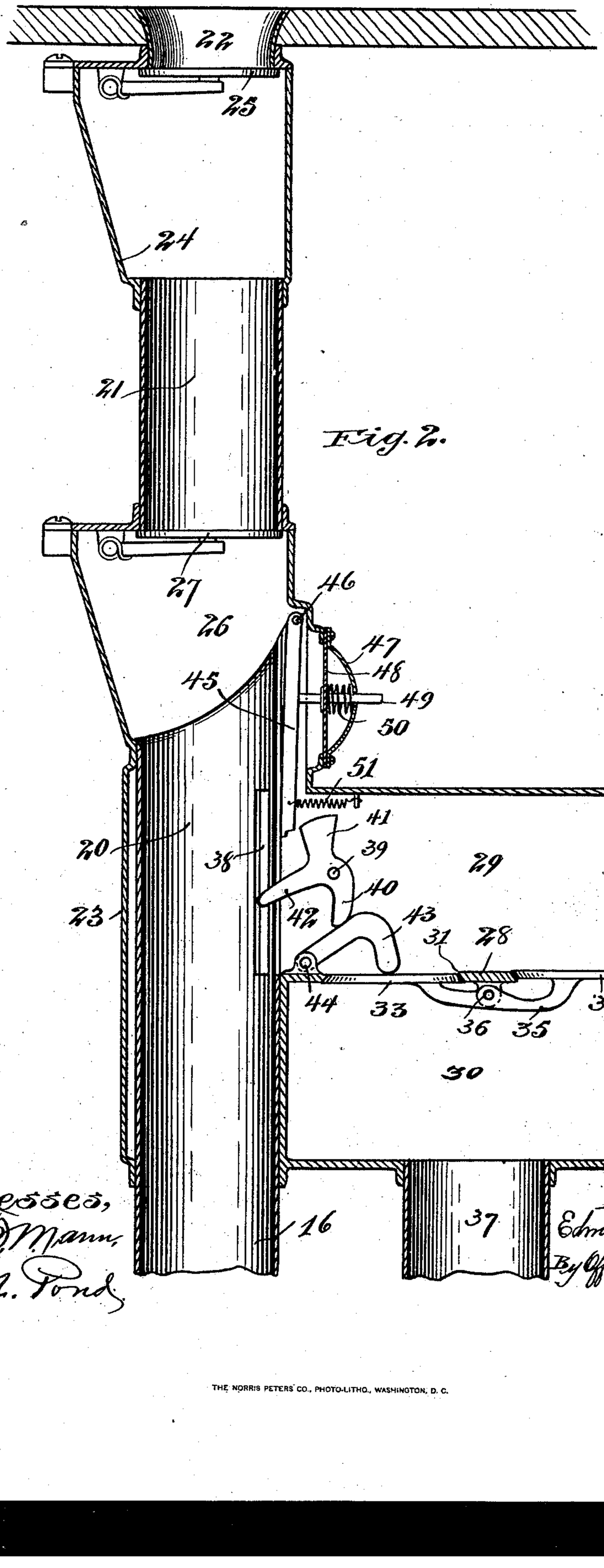

Fig. 2.

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(No Model.) 3 Sheets—Sheet 3.

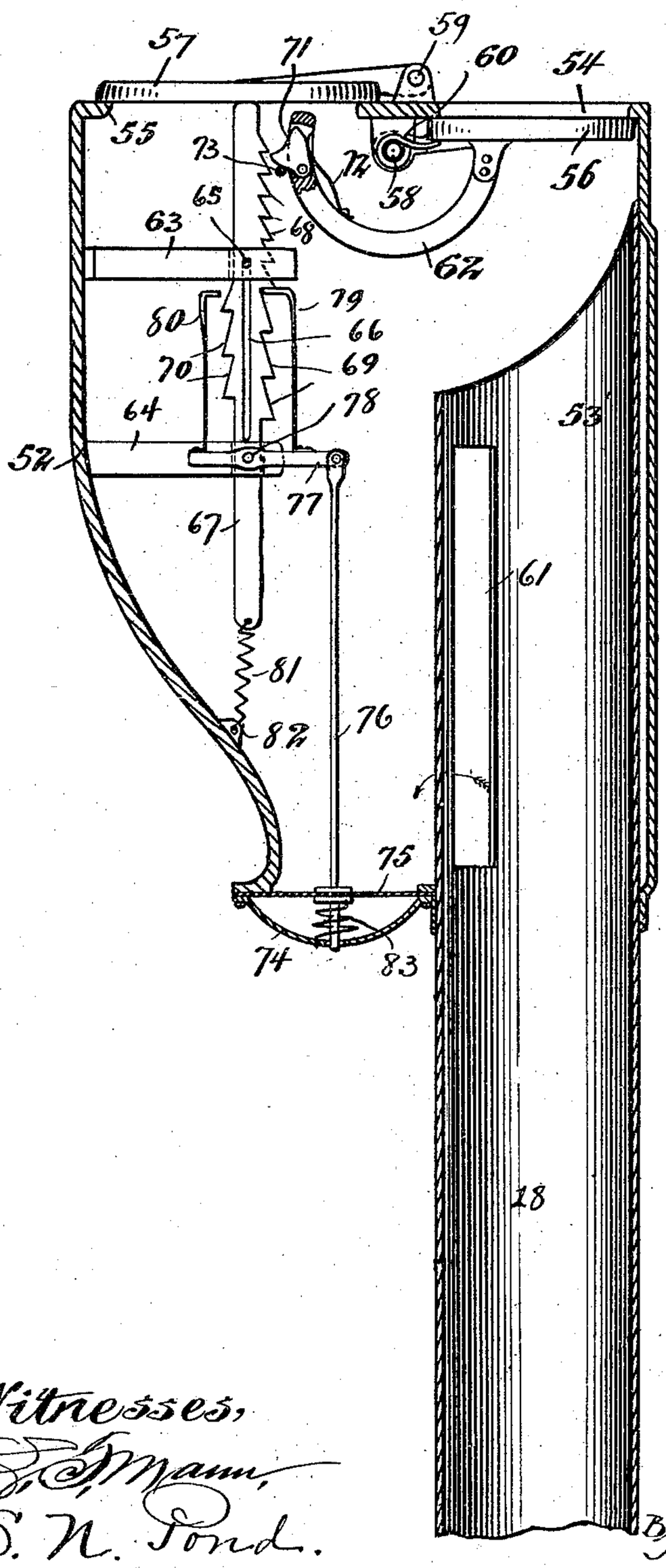

Fig. 3.

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UNITED STATES PATENT OFFICE.

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PNEUMATIC-DESPATCH-TUBE SYSTEM.

SPECIFICATION forming part of Letters Patent No. 691,936, dated January 28, 1902.

Application filed September 20, 1901. Serial No. 75,942. (No model.)

To all whom it may concern:

Be it known that I, EDMOND A. FORDYCE, of Chicago, Illinois, have invented certain new and useful Improvements in Pneumatic-Despatch-Tube Systems, of which the following is a specification.

My invention relates to pneumatic-despatch-tube systems, more especially adapted for store service in transmitting cash between a central cashier's station and a number of outlying salesmen's stations. In pneumatic-despatch systems of this class at present in practical service a continuous air-current, either a suction or pressure current alone or a combined suction and pressure current, is usually maintained throughout the entire system of tubes by means of a suitable blower or other air-moving device located at some convenient point in the system. Systems thus organized and operated have been found to be uneconomical by reason of the fact that the motive power thus furnished and constantly maintained throughout the entire system of tubes is far in excess of the actual needs and requirements of the system even at the busiest hours of service. The presence of this wasteful feature of operation has induced inventors and builders of this class of apparatus to seek for means whereby the expenditure of power throughout the system may be rendered and maintained substantially commensurate with the actual needs of service. One way in which this improvement has been sought in systems of limited capacity and somewhat intermittent service has resided in an automatic control of the motor operating the air-forcing device by the introduction of the carriers, thus rendering the system effective while a carrier was in transit and making it passive immediately upon the discharge of the carrier. This method of control, however, being obviously incapable of application to large and busy plants in which carriers are constantly in transit, a mode of control which has suggested itself for such large plants has consisted, generally speaking, in automatic means for cutting out of the system such tubes thereof as might be idle and maintaining the air-current only through such tubes as were in service at any given time. This latter mode of control, however, while practically perfect in theory, has been found somewhat difficult of successful execution and operation in practice, although several systems based on the principle announced have been devised and patented. While some of these systems have given tolerable satisfaction in service, nevertheless they have, so far as I am aware, all possessed a serious inherent limitation in that they permit but a single carrier to be in transit at a time in a tube, it being necessary to await the discharge of one carrier and the automatic resetting of the parts which control the air-current before a second carrier can be introduced.

My present invention relates to the last-described type of pneumatic-tube systems, being designed to operate under pressure on one side and under vacuum on the other; and the principal object of my invention is to provide a practical and operative system of the economical type referred to, but which shall possess the further capability of handling a plurality of carriers in transit at the same time.

A further object of the invention is to secure increased economy and efficiency of operation through the capacity of the apparatus to handle a plurality of carriers in transit at the same time, the system thus obviously requiring a less expenditure of power per carrier than where but a single carrier at a time can be transmitted.

A still further object of my invention is to render the operations of the system entirely automatic outside of the loading, unloading, and dropping of the carriers.

To the above ends my invention resides in a pneumatic-despatch-tube system and certain current-controlling mechanism therein automatically operated by the introduction and discharge of carriers, substantially as hereinafter described, and more particularly pointed out in the claims.

My invention in its preferred form is illustrated in the drawings accompanying this description, in which—

Figure 1 is a general view illustrating somewhat diagrammatically the disposition and arrangement of tubes and terminal devices employed in my present invention.

Fig. 2 is a central vertical section, on an enlarged scale, of the pressure sending-terminal at the cashier's station, showing the current-controlling devices automatically tripped by the carrier; and Fig. 3 is a view similar to Fig. 2 of the suction sending-terminal at an outlying salesman's station.

Referring to the drawings for a detailed description of the parts constituting my invention and their relation to the system in which they are employed, 4 indicates a central cashier's station, and 5 and 6 indicate outlying salesmen's stations, station 5 being provided with what are known in the art as "upward-sending and downward-delivery" terminals and station 6 with "downward-sending and upward-delivery" terminals.

7 indicates an air-forcing device, which may be a rotary blower of any approved type or an equivalent device for effecting an air-current through the tubes of the system and the propulsion of carriers therein. The pressure side of the blower 7 leads into a suitable trunk-tube or reservoir 8, which is closed at its outer end and is tapped by the sending-terminals at the cashier's station, and 9 indicates a similar closed trunk-tube or vacuum-reservoir connected to the suction side of the blower 7 and tapped by the receiving-terminals at the cashier's station.

10 and 11 designate a pair of sending-terminals at the cashier's station, and 12 and 13 designate a pair of receiving-terminals also located at the cashier's station.

14 designates the sending-terminal at the outlying station 6, and 15 designates the corresponding terminal at the outlying station 5, it being noted that the two terminals last named are of a similar construction, but occupy relatively inverted positions. A conveying-tube 16 connects the sending-terminal 10 with the outlying station 6, this tube extending downwardly beneath the floor and having an open upward delivery at its remote end, as shown, while a corresponding tube 17 connects the terminal 11 with the outlying station 5, this latter tube extending overhead between the cashier's and salesmen's stations and having an open downward-delivery end at the latter station. A downwardly-extending carrier-conveying tube 18 connects the sending-terminal 14 at station 6 with the delivery-terminal 12 at the central station 4, and a corresponding upwardly-extending tube 19 similarly connects the sending-terminal 15 at station 5 with the delivery-terminal 13 at the central station. The carriers are impelled by pressure in their rear from the terminals 10 and 11 through tubes 16 and 17, respectively, to their respective points of delivery at stations 6 and 5, while the carriers are drawn by suction in front thereof from the outlying terminals 14 and 15 through their respective conveying-tubes 18 and 19 to their respective delivery-terminals 12 and 13 at the central or cashier's station. This relative arrangement and disposition of tubes, terminals, and blower is substantially the same as that disclosed in Letters Patent No. 681,414, heretofore granted to me on August 27, 1901. I would here remark, however, that the described and illustrated manner of leading the several conveying-tubes is immaterial to the essence of my present invention in so far as the latter relates to a complete system, so long as the several parts of the system are connected up relatively in the manner shown and described.

Referring now more particularly to the construction of the sending-terminals 10 and 11 at the central station, which terminals are all alike, it will be observed that the sending-tube 16 or 17, as the case may be, extends upwardly in three interrupted sections 20, 21, and 22 through and beyond an air-tight box or casing of irregular form and designated in Fig. 1 by 23. The sections 21 and 22 are connected by an air-tight valve-chamber 24, the lower end of the flaring receiving-section 22 being closed by a spring-seated valve 25, and the sections 20 and 21 are similarly connected by an air-tight valve-chamber 26, the lower end of section 21 being similarly closed by a spring-actuated valve 27. The lower part of the casing 23 extends laterally of the tube-section 20 through a considerable space and is provided with a substantially central horizontal partition 28, dividing the same into upper and lower air-chambers 29 and 30, respectively. The partition 28 is provided with a pair of holes 31 and 32, so shaped as to provide seats for a pair of oppositely-opening plate-valves 33 and 34, respectively, these valves being united on their under surfaces by a rigid bent stem 35, which latter is pivoted in a suitable lug 36, depending from the under side of the partition 28 at a point diametrically intermediate the openings 31 and 32. From the described construction it will be seen that the valves 33 and 34 must operate in unison, the opening of one valve involving a corresponding opening to the same extent of the other valve. A peculiarity of these valves resides in the fact that the valve 33 is of greater diameter, and consequently possesses a larger area, than the valve 34, for a purpose hereinafter disclosed. The lower wall of the air-chamber 30 connects freely through a short tube 37 with the pressure trunk or reservoir 8. The upper air-chamber 29 connects freely through vertical slots 38 with the interior of the tube-section 20, and consequently with the sending-tube 16, of which the section 20 forms the upper end.

In the operation of sending a carrier the valves 33 and 34 are designed to be automatically opened by the carrier in its descent through the terminal to admit air-pressure to its rear and to be automatically maintained open while the carrier is in transit, and subsequently allowed to close upon the discharge of the carrier from the remote end of the line-tube. The mechanism which I have devised and found to work satisfactorily in carrying

out the function above stated comprises a trigger pivoted on a rod 39, extending between the sides of the upper air-chamber 29, this trigger having a downwardly-extending nose 40, an upwardly-extending sector-shaped member 41, and a laterally-extending finger 42, which latter is adapted in certain positions of the trigger to project through one of the slots 38 into the interior of the sending-tube and the path of the carrier therethrough. The nose 40 of the trigger rides over the back of a bent pusher 43, which is pivoted at 44 to an upstanding lug on the partition 28, the lower free end of the pusher bearing upon the upper surface of the valve-plate 33, approximately centrally thereof. From the foregoing it will be seen that a carrier descending through the tube and impinging the arm 42 of the trigger will rock the latter on its pivot 39 in such a manner as to effect the simultaneous opening of the valves 33 and 34 through the depression of the pusher 43. This operation serves to admit pressure from tube 37 through the chambers 30 and 29 and the slots 38 to the sending-tube in rear of the carrier. The valves 33 and 34 having been thus operated automatically by the carrier through the tripping mechanism described, it is necessary to provide means for retaining said valves in open position during the travel of the carrier to its destination and for subsequently closing said valves and shutting off the air-pressure upon the emergence of the carrier from the remote end of the tube. The means which I have devised for this purpose are as follows: 45 designates a latch suspended from its upper end on a pivot-pin 46 and normally occupying a position in the upper portion of the casing 23 which is just within the inner wall of the sending-tube. Directly opposite the latch 45 is a diaphragm-chamber 47, applied to the casing 23 and containing a flexible disk diaphragm 48, which latter carries fixed therein and centrally thereof a horizontal push-pin 49. The inner end of the pin 49 is adapted to abut the latch 45 and normally thrust the latter outwardly to an extent sufficient to free the lower end of the latch from the rounded upper surface of the sector member 41 of the trigger, the pin 49 being thus impelled by means of a coiled compression-spring 50, surrounding the pin and normally tending to thrust the diaphragm and the pin 49 carried thereby toward the latch 45. A light tensile spring 51, connecting the lower end of latch 45 with the top wall of the chamber 29, normally tends to throw the latch 45 in a direction to engage the trigger and opposite to the direction of thrust of pin 49.

The operation of the sending-terminal organized as above described will be readily understood from the foregoing description of its construction, but may be briefly set forth as follows, it being premised that the distance between the valves 25 and 27 is sufficiently in excess of the length of the carrier to enable the valve 25 to close before the carrier has opened the lower valve 27. The parts being in the relative positions illustrated in Fig. 2, a carrier inserted through the top section 22 of the terminal drops by gravity past the valves 25 and 27 successively, the two valves forming an effective air-lock or seal in rear of the carrier. Continuing its descent, the carrier strikes and depresses the inwardly-projecting end of the arm 42, thus rocking the trigger to a small extent sufficient to open the valves 33 and 34 by the depression of the pusher 43, it being here noted that the valves 33 and 34 normally remain closed by reason of the greater area which valve 33 presents to the air-pressure over valve 34. The instant these valves are opened the air-pressure finds its way through chamber 29 and slots 38 into the line-tube, this pressure finding an abutment against the closed valve 27 and the rear of the departing carrier. This pressure instantly becomes effective on the diaphragm 48 to such an extent as to cause the withdrawal of the pin 49 from the latch 45 and permit the light spring 51 to draw the lower end of the latch in a direction to meet and contact the upper member 41 of the trigger. This relative movement of the several parts results in locking the valves 33 and 34 open until the carrier has been discharged, whereupon the air-pressure in the line-tube being instantly relieved the spring 50 asserts itself upon the diaphragm 48, and the pin 49 is thrust inwardly by the diaphragm to strike the latch 45 and carry the lower end of the latter out of locking engagement with the trigger. The parts are then free to resume the positions illustrated under the action of the air-pressure in tube 37 tending to close valves 33 and 34.

Now it will be observed as an important capability of the mechanism last described that a plurality of carriers may, if desired, or if the demands of service necessitate, be despatched one immediately after another, the entire series being in transit at the same time. The double seal prevents the escape of pressure at the upper end of the terminal where two carriers may be introduced in close succession, and the pressure-admitting devices are not freed and restored to closing position until after the last carrier of the series has been discharged and the pressure thereby relieved. So far as I am aware I am the first to provide in my present invention a pressure sending-terminal which automatically cuts off the pressure upon the discharge of the carrier and which is further capable of accommodating a plurality of carriers in transit at the same time and cutting off the pressure with the discharge of the last carrier of the series. I do not, therefore, limit myself to the precise details of mechanism herein illustrated and described, since the latter may obviously be widely varied and still preserve the distinctive principle of my invention in this respect, which consists in positively opening the pressure-admitting valve by the in-

troduction of the carrier, maintaining said valve open by the confined pressure in rear of the carrier, and finally closing said valve through the relief of the pressure in the tube resulting from the discharge of the carrier.

As hereinabove stated, my invention contemplates the transmission of the carriers from the outlying stations to the central station by means of a suction maintained in the line-tubes in advance of the carriers. In order to make this side of the system equally capable with the pressure side in respect to its capacity to meet the demands of service, I have devised a form of sending-terminal 14 and 15 for use at the outlying salesmen's stations. This terminal in its constructional details is fully illustrated in Fig. 3, wherein 52 indicates a somewhat bowl-shaped air-tight casing, which receives through its lower end and adjacent the straight side thereof the upper end 53 of the sending-tube 18. The casing 52 has a pair of circular openings 54 and 55 formed through its top wall, these openings being of unequal sizes and adapted to be closed by lid-valves 56 and 57, which are hinged at 58 and 59 in suitable lugs on the top and bottom sides, respectively, of the top or cover of the casing. The valve 56 is normally closed by a spring 60, while the valve 57 depends on gravity for its closing movement or may be provided with a closing-spring, if found desirable or necessary. It will be observed that these valves, unlike the valves 33 and 34 of the pressure-terminal, are independently hinged and do not affect each other's action except in the manner hereinafter described. The air-suction normally existing in the tube 18 extends freely to the casing 52 and the space contained therein through the open upper end 53 of the tube; but in order to make the suction more effective in the lower portion of the chamber of the casing 52 I may aperture or slot, as at 61, that side of the tube which lies nearest the longitudinal axis of the casing.

To the under side of the valve 56 is rigidly secured a curved pusher-arm 62, the free end of which extends around the hinge 58 upwardly and nearly into contact with the under face of the valve 57, the function of this pusher-arm 62 being to open the valve 57 simultaneously with the opening of the valve 56, without, however, necessitating the corresponding simultaneous closing of said valve.

63 and 64 designate a pair of horizontally-extending bracket-arms secured one above the other to the inner wall of the casing 52 and lying directly beneath the opening 55 in the top or cover of said casing. The arm 63 has a laterally-extending pin 65, which plays in a slot 66, formed longitudinally and substantially centrally in a vertical reciprocable toothed bar 67, the upper end of which bar is adapted to impinge the lower face of the valve 57. The lower portion of the bar 67 may be conveniently held and guided in a vertical slot formed through the outer end of the arm 64, the described support of the bar 67 in the arms 63 and 64 thus insuring a true up-and-down travel of said bar through the mechanism next to be described.

It will be observed that the bar 67 is provided along the upper part of that edge thereof which lies nearest the pusher-arm 62 with a series of teeth 68, while both sides of said bar below the teeth 68 are provided with relatively offset teeth 69 and 70, the latter constituting parts of an escapement mechanism for controlling the descent of the bar 67. The free end of the pusher-arm 62 is vertically slotted and has pivoted therein a dog 71, which is normally thrust outward toward the teeth 68 of the bar 67 by means of a leaf-spring 72. A rod 73 extends across the side wall of the casing at such a height therein as to be engaged by the curved under edge of the dog 71 and tilt the latter out of engagement with the teeth of the stop-bar 67 when the valve 56 is closed and its connected pusher-arm 62 is in its lower position. To the lower end of the casing 52 is secured a diaphragm-casing 74, containing a diaphragm 75, which latter has connected therewith and passing therethrough a vertical rod 76. The upper end of rod 76 is pivotally united to the overhanging end of an escapement-lever 77, this latter being pivoted at 78 to the bracket-arm 64 and carrying on opposite sides of its fulcrum a pair of vertically-extending pawls 79 and 80, the upper inwardly-bent ends of which are adapted to alternatively engage the teeth 69 and 70, respectively, of the stop-bar 67. A light tensile spring 81 connects the lower end of the bar 67 with a fixed point or lug 82 on the inner wall of the casing 52 and normally tends to draw said stop-bar downward into its lowermost position, as shown, in which the pin 65 engages the upper end of slot 66 and the valve 57 is closed, with the upper end of bar 67 just contacting its under face. A similar tensile spring 83, located in the diaphragm-chamber, normally tends to draw the diaphragm 75 and its connected rod 76 in a downward direction. The operation of this vacuum-terminal, constructed as hereinabove described, is as follows: With the conveying-tube 18 empty and the blower exerting a constant suction through the tube, the parts will normally be in the relative positions illustrated, both the valves 56 and 57 being closed and the suction exerting an upward pull on diaphragm 75, and hence, through the connections described, throwing the pawl 79 into engagement with the uppermost of the teeth 69, while pawl 80 is free from the teeth 70, with which it coöperates at certain times. Upon the introduction of a carrier the valve 56 is of course swung downwardly on its hinge through substantially a swing of ninety degrees, which movement, through the pusher-arm 62, opens the valve 57 upwardly to a corresponding extent, thus permitting the free ingress of air in rear of the carrier and making the suction operative to impel

the carrier to its destination. As the pusher-arm 62 thus swings upwardly the dog 71 engages the topmost tooth of the stop-bar 67 and carries said bar upwardly to an extent sufficient to permit the pawl 79 to engage under the second tooth 69 and thus hold bar 67 in its elevated position before the dog 71 is carried out of engagement with its co-operating tooth by the continued upward and outward movement of the upper end of arm 62. As the valve 56 closes in rear of the carrier the pusher-arm 62 returns to the position shown in the drawings, and the dog 71 contacts the rod 73 and is thereby rocked out of line with the teeth 68. The valve-plate 57 follows the pusher-arm 62 in its downward movement until the under face of said valve contacts the top of bar 67, which, it will be remembered, has been raised and is held upward a distance corresponding to the distance between two adjacent teeth 69. The valve-plate 57 is thus held open sufficiently to allow free ingress of a current of air in rear of the carrier throughout the entire travel of the latter. As now the carrier discharges from the receiving-terminal 12 at the central station, the opening of the discharge-valve of said terminal 12 produces an instantaneous cessation of the vacuum effect, amounting to a pulsation of the current, and the diaphragm 75, responding to this instantaneous interruption of the suction, is drawn downwardly by the spring 83, thus through rod 76 and lever 77 withdrawing pawl 79 from the second tooth 69, and thus permitting bar 67 to drop until the pawl 80 is engaged by the topmost tooth 70. This action, however, is but instantaneous, since the suction is immediately thereafter resumed upon the closing of the terminal 12, this action resulting in again raising the diaphragm 75, throwing out the pawl 80, and permitting the bar 67 to drop still farther to the position illustrated, with pawl 79 under the first tooth 69 and both valves 56 and 57 closed. The tube 18 is then in a position of idleness or rest until the introduction of the next carrier, whereupon the tube again becomes "live," and the above-described operations are repeated. If now a second carrier be inserted before the first carrier has reached its destination and been discharged, the second downward swing of valve 56, and consequent upward movement of the dog 71, will result in still further elevating the stop-bar 67 through the space of another tooth 69. The stop-bar will then rest with its third tooth 69 engaged by pawl 79 until the first carrier discharges, thereby producing a pulsation of the current, as above described, and through the escapement mechanism lowering the bar 67 through the space of one tooth 69. The subsequent discharge of the second carrier acts in a similar manner to effect the still further lowering of bar 67 to the position illustrated, with the valves 56 and 57 closed. In a similar manner any number of carriers, not exceeding the number of teeth 69, may be despatched in close succession, all of them being in transit at once, and by the mechanism described the valve 57 will be raised step by step with the introduction of each succeeding carrier and will be similarly lowered step by step with the discharge of each succeeding carrier until with the discharge of the last carrier the valve 57 will always come to a closed position and the line-tube be rendered "dead." It will be observed that the rod 73 serves to hold the dog 71 out of engagement with the teeth 68 during the rest position of the arm 62, with valve 56 closed, thus permitting the step-by-step downward travel of bar 67 without interference by the dog.

From the foregoing it will be seen that in my improved system as hereinabove described both the pressure and the suction lines are active only when a carrier or a series of carriers is in transit therethrough. Since but a comparatively small proportion of the line-tubes of any system are in actual service at any given time, it follows that with my system herein presented a blower of much less capacity may be employed than in a system in which all the line-tubes are constantly maintained active and supplied with the motive current. The blower or other air-forcing device may, if found desirable, be provided with suitable pressure and suction relief valves for service in case the entire system should be idle for any appreciable interval while the blower is in operation; but under all ordinary and practical service conditions there will be sufficient connection with the atmosphere through the opening of the terminals in service and leakage to prevent an abnormal strain on the blower on either its suction or pressure side.

The vacuum-terminal shown in Fig. 3 and the station 6 in Fig. 1 as adapted for the downward despatch of carriers are equally well adapted for the upward despatch of carriers, as shown at station 5 in Fig. 1, by merely inverting the terminal, it being necessary in the latter case only to add a closing-spring to the valve 57.

It is obvious that the structural details of my invention as hereinabove disclosed may be considerably varied within the underlying principle thereof. The gist of my invention resides in a construction in which the line-tube is normally dead or inactive when the line is not in use, but which on the introduction of a carrier is automatically supplied with the motive current, which motive current is maintained during the travel of the carrier through the line and then automatically interrupted upon the discharge of the carrier at its destination, this mechanism possessing the further capability of permitting the transit of a series of carriers simultaneously through the line and effecting the application of the current with the introduction of the first carrier and the interruption of the current with the discharge of the last carrier

of the series. I prefer to combine these features in a system which utilizes both the pressure and suction capabilities of the blower, the former serving to propel the carriers from the central to the outlying stations and the latter serving to draw the carriers from the outlying stations to a central station, since I have found in practice that such an arrangement is far superior in respect to the economical results secured than one in which one side of the blower alone is used to supply the motive agent for the entire system. It will be obvious, however, that so far as the structural characteristics and capabilities of the terminal devices as shown in Figs. 2 and 3 are concerned they are equally capable of use in systems employing pressure and suction alone, respectively.

I claim—

1. In a pneumatic-despatch-tube system, the combination with a line-tube and means for supplying a pressure-current thereto, of a sending-terminal connected with said line-tube, a valve in said terminal controlling the admission of motive current to said line-tube, valve-opening mechanism adapted to be tripped by the carrier in its passage through the terminal, and a pressure-controlled locking device for the valve-opening mechanism which automatically locks the valve open while the carrier is in transit and permits the valve to close upon the discharge of the carrier, substantially as described.

2. In a pneumatic-despatch-tube system, the combination with a line-tube and means for supplying a pressure-current thereto, of a sending-terminal connected with said line-tube and through which the current is admitted to the latter, a valve in said terminal normally held closed by the pressure and controlling the admission of motive current to said line-tube, valve-opening mechanism adapted to be tripped by a carrier passing through the terminal, and a pressure-controlled locking device for the valve-opening mechanism, said locking device being rendered effective through the admission of pressure to the line-tube, and being thrown out of action to permit the closing of the valve on the intermission of the pressure resulting from the discharge of the carrier, substantially as described.

3. In a pneumatic-despatch-tube system, the combination with a line-tube, a sending-terminal connected therewith, and means for supplying a pressure-current to the tube through said terminal of a valve in said terminal normally held closed by the pressure and controlling the passage of the motive current, a valve-opening mechanism adapted to be actuated by a carrier passing through the terminal, and a spring-actuated pressure-controlled locking device for the valve-opening mechanism which automatically effects the locking of the valve-opening mechanism upon the introduction of pressure to the tube in rear of a carrier, maintains the valve-opening mechanism thus locked during the carrier's transit, and on the discharge of the carrier and the consequent interruption of the pressure releases the valve-opening mechanism and permits the valve to close, as set forth.

4. In a pneumatic-despatch-tube system, the combination with a line-tube and means for producing a suction-current therethrough, of a carrier-sending terminal at one end of said tube, and mechanism contained within the terminal and actuated by the carrier upon its introduction serving to lock the terminal open for the ingress of air in rear of the carrier during the latter's transit, and means responsive to variations in the suction effect serving to release said locking mechanism and thus to automatically close the terminal upon the carrier's discharge, substantially as described.

5. In a pneumatic-despatch-tube system, the combination with a line-tube extending between the cashier's station and an outlying salesman's station and means located at one end of said tube for producing a suction-current therethrough, of a carrier-sending terminal at the other end of said tube, and mechanism contained within the terminal and actuated by the carrier upon its introduction thereto, said mechanism serving to open the terminal to the atmosphere and lock it open during the transit of the carrier, and means responsive to variations in the suction effect serving to release said locking mechanism and thus to automatically close said terminal upon the discharge of the carrier, substantially as described.

6. In a pneumatic-despatch-tube system, the combination with a line-tube connecting a cashier's station with an outlying saleman's station and means located at one end of said tube for producing a suction-current therethrough, of a carrier-sending terminal at the other end of said tube, said terminal being provided with a valve for admitting the carrier and another valve for admitting air in rear of the carrier, and mechanism located within the terminal and actuated by the carrier serving to open the air-valve upon the introduction of the carrier and lock the same open until the carrier is discharged, substantially as described.

7. In a pneumatic-despatch-tube system, the combination with a line-tube connecting a cashier's and salesman's station and means located at one end of said tube for producing a suction-current therethrough, of a carrier-sending terminal at the other end of said tube, said terminal having carrier and air admission valves both of which are normally closed, a pusher-arm on the carrier-admission valve adapted to engage and open the air-admission valve simultaneously with the opening of the carrier-admission valve, a stop-bar engaging the air-valve and actuated through a limited distance by each opening of the carrier-valve, and an escapement mechanism op-

erated by pulsations of the current produced by the discharge of the carriers and controlling the movement of the stop-bar in a direction to permit the air-valve to close, substantially as described.

8. In a pneumatic-despatch-tube system, the combination with a line-tube connecting a cashier's and a salesman's station and a suction-blower located at one end thereof, of a carrier-sending terminal at the other end of said tube, said terminal having carrier and air admission valves which are normally closed when the line is inactive, a pusher-arm on the carrier-valve adapted to engage and open the air-valve, a longitudinally-movable stop-bar adapted to control the closing of the air-valve, means carried by said pusher-arm for giving the stop-bar a step-by-step movement in one direction upon the introduction of successive carriers, and an escapement mechanism controlled by pulsations of the current resulting from the discharge of the suction-carriers and serving to govern the step-by-step movement of the stop-bar to permit the air-valve to close upon the discharge of the last carrier of the series, substantially as described.

9. A combined pressure and suction pneumatic-despatch-tube system, comprising in combination line-tubes extending between a cashier's and a salesman's station, an air-forcing device interposed in said line-tubes and adapted to impel carriers therethrough by a pressure-current in one direction and a suction-current in the other, a pressure sending-terminal at one station and a suction sending-terminal at the other and devices within said terminals each of which is automatically actuated by a carrier on its introduction to admit the motive current to its respective line-tube during the transit of the carrier and cut it out upon the discharge of the carrier, substantially as described.

10. A combined pressure and suction pneumatic-despatch-tube system, comprising in combination line-tubes extending between a cashier's and a salesman's station, a blower interposed in said line-tubes and serving to impel carriers therethrough by a pressure-current in one direction and a suction-current in the other, a pressure sending-terminal at one station which is normally closed to the propelling-current, a vacuum sending-terminal at the other station which is normally closed to the atmosphere, and current-admitting devices within said terminals respectively which are actuated by the carriers upon their introduction, said devices serving to maintain their respective line-tubes operative while the carriers are in transit, and render the same inoperative upon the discharge of the carrier, substantially as described.

11. A combined pressure and suction despatch-tube system, comprising in combination line-tubes extending between a cashier's and a salesman's station, a blower at the cashier's station connected to one of said tubes on its pressure side and to the other on its suction side, a pressure sending-terminal at the cashier's station normally closed to the motive current, a suction sending-terminal at the salesman's station normally closed to the atmosphere, and current-controlled devices in said terminals respectively which are positively actuated by the first of the series of carriers introduced to render the tubes operative and which upon the discharge of the last carrier automatically render their respective line-tubes inoperative through the decrease in current tension thereby produced, substantially as described.

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