No. 682,985. Patented Sept. 17, 1901.

C. A. GRAY.

PNEUMATIC DESPATCH TUBE SYSTEM.

(Application filed Apr. 5, 1901.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

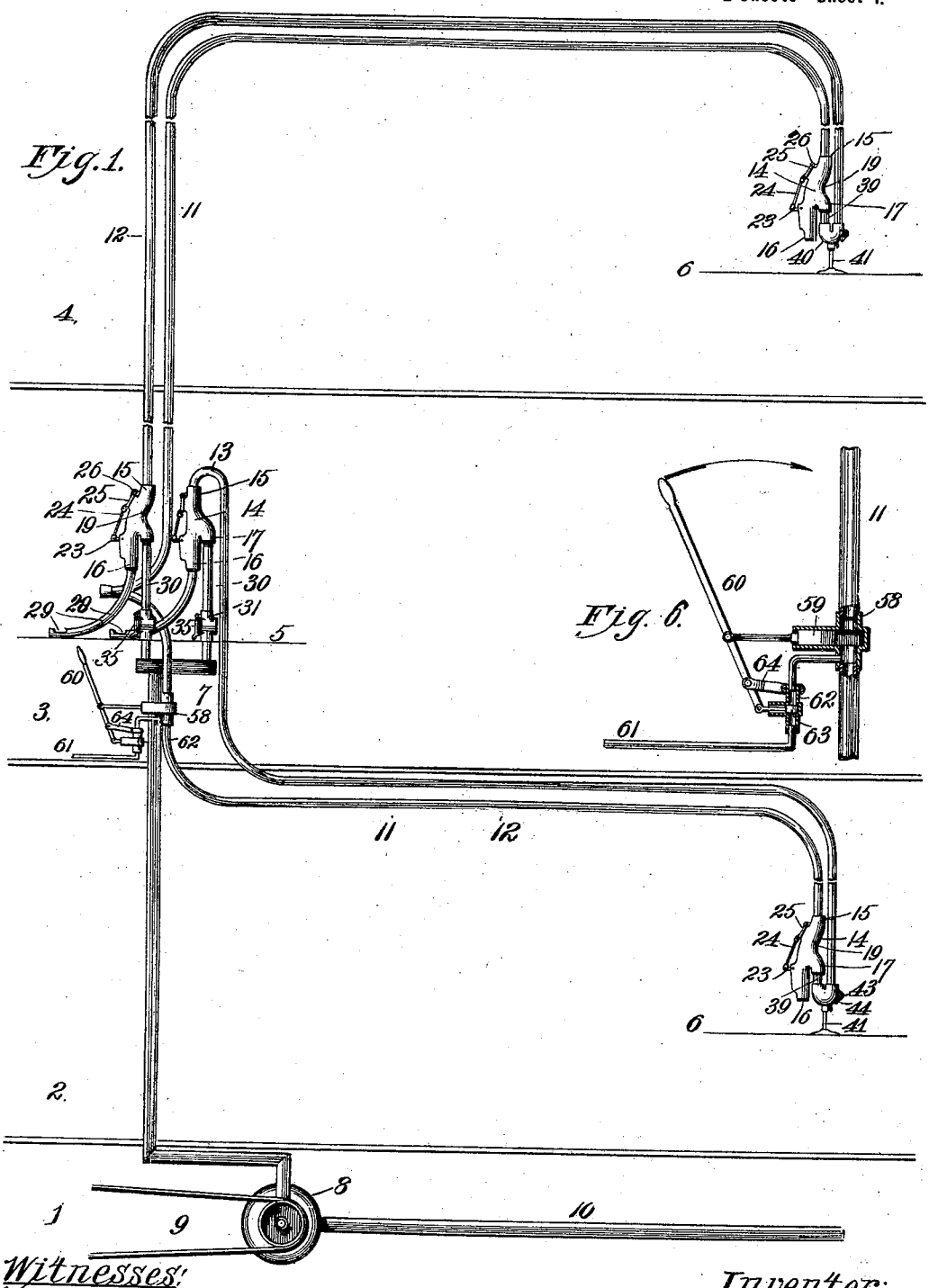


Fig. 6.

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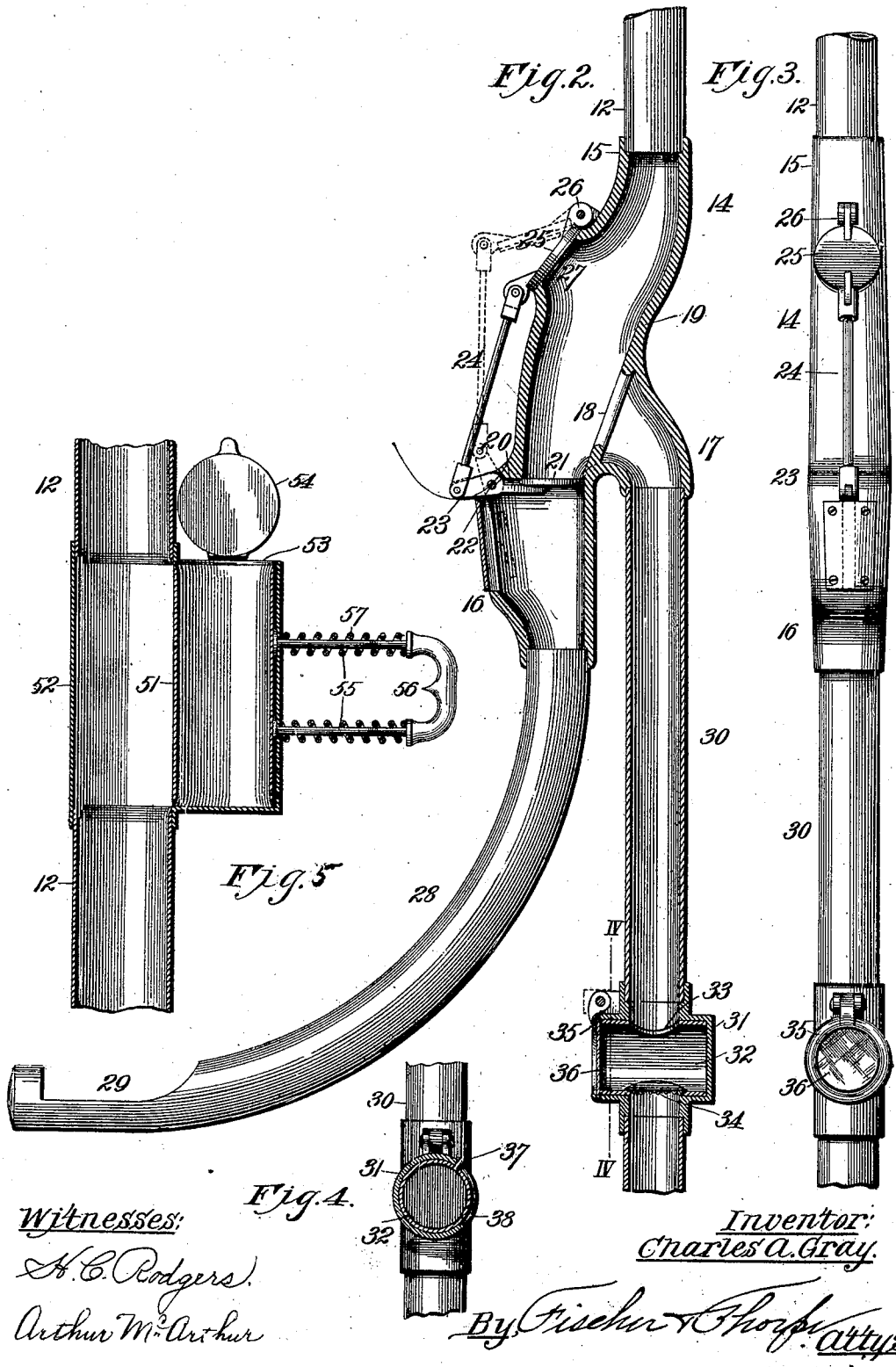
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(Application filed Apr. 5, 1901.)

(No Model.) 2 Sheets—Sheet 2.



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UNITED STATES PATENT OFFICE.

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PNEUMATIC-DESPATCH-TUBE SYSTEM.

SPECIFICATION forming part of Letters Patent No. 682,985, dated September 17, 1901.

Application filed April 5, 1901. Serial No. 54,563. (No model.)

To all whom it may concern:

Be it known that I, CHARLES A. GRAY, a citizen of the United States, residing at Kansas City, in the county of Wyandotte and State of Kansas, 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, and is designed more particularly as an improvement over the pneumatic-despatch tube on which Patent No. 641,384 was granted to myself, J. L. Jones, and L. M. Jones January 16, 1900, said structure being chiefly defective in that the carriers occasionally stick in the delivery-terminals and must be dislodged by extraneous means. The reason for this defect lies principally in the back pull of the air and in its tendency to short-circuit by passing up through the delivery-tube as the carrier passes the valve.

My primary object, therefore, is to provide means whereby the tendency of the air to exert a back pull or suction on the carrier or to short-circuit up through the delivery-tube shall be destroyed.

A further object is to provide means whereby the force of the air-current through a particular tube may be regulated and for intercepting articles accidentally drawn within the tube or escaping from the carrier while in transit.

A further object is to provide means for almost instantly ejecting a carrier or other object sticking in the tube at any point.

With these and other objects in view, as hereinafter appear, the invention consists in certain novel and peculiar features of construction and combinations of parts, as hereinafter described and claimed, and in order that it may be fully understood reference is to be had to the accompanying drawings, in which—

Figure 1 is a diagrammatic view of a pneumatic-despatch-tube system embodying my invention. Fig. 2 is a vertical longitudinal section of one of the delivery-terminals, and also shows the delivery-tube thereof and the return-tube and means for regulating the force of the air-current therethrough and for intercepting articles passing through said return-tube. Fig. 3 is a front view of the same with the delivery-tube omitted. Fig. 4 is a vertical section taken on the line IV IV of Fig. 2. Fig. 5 is a vertical longitudinal section of a tube leading to the cashier's station and provided with a valve mechanism for introducing a carrier into said tube without short-circuiting the air-current. Fig. 6 is a vertical section showing the mechanism for ejecting a carrier or other object sticking in the tube.

Referring now to the drawings in detail, where like reference-numerals designate corresponding parts, 1 designates the basement, and 2 the first, 3 the second, and 4 the third floors, of a store-building, and 5 and 6 respectively designate the cashier's and inspector's stations.

Located beneath the counter, preferably of the cashier's station, is the upper end of an air-conduit 7, leading to the blower or suctional fan-casing 8 in the basement, said blower being driven through the medium of a belt, as at 9, connected to an electric or other motor (not shown) and provided with a discharge-pipe 10, leading to the atmosphere.

11 and 12 designate tubes connecting the cashier's and inspector's stations, the former being adapted to convey carriers from the cashier's to the inspector's station and the latter from the inspector's to the cashier's station, and in all cases where tubes 12 lead upwardly to the delivery-station their upper ends are overturned through an arc, as at 13, for a purpose which hereinafter appears.

14 designates what I term the "delivery-terminals" of the tubes, said terminals being of tubular construction and each embodying a receiving-arm 15 at its upper end attached to tubes 11 and 12, accordingly as located at the inspector's or cashier's station, a delivery-arm 16 and a branch arm 17, the latter having its mouth contracted by a cross-bar 18 or otherwise for a purpose which hereinafter appears. In this connection it will be noted that in the terminals used in connection with ascending tubes 12—namely, those having the overturned ends 13—the receiving and delivery arms are in vertical alinement, whereas the terminals used in con-

nection with the tubes 12, through which the carriers have a straight and unobstructed fall, have their receiving-arms out of alinement with the delivery-arms, so as to provide a jog or shoulder 19 to check the speed of the descending carrier (not shown) and by diminishing the force of its impact on the valve, hereinafter described, lengthen the period of service of both.

At the juncture of the delivery-arm 16 with the body of the delivery-terminal a shoulder 20 is formed to provide a seat for the flap-valve 21, pivotally supported, as at 22, and provided with an outwardly-projecting arm 23, this valve being opened under the impact of the descending carrier, and in order to short-circuit the air-current, and thus prevent any back pull or suction upon the carrier, valve-arm 23 is pivotally connected by link 24 with the gravity-valve 25, the latter being pivoted, as at 26, to the terminal and normally closing an opening 27 therein at a point above valve 21 and diagonally opposite branch arm 17, the arrangement being such that with each opening of the valve 21, as by the impact thereon of a descending carrier, the synchronous unseating of valve 25 takes place to admit air by the shortest cut to the branch 17, and thereby eliminate any possibility of air being drawn up through the curved delivery-tube 28, depending from the receiving-arm 16 of the terminal, and thus retarding and sometimes arresting the movement of the carrier, which has to be released by extraneous means. The lower end of said curved delivery-tube is closed to arrest the carrier, and adjacent to said end is provided with a slot 29, through which it is withdrawn by the cashier for the usual purpose.

Depending from the branch arm 17 of each delivery-terminal of the cashier's station is the return-tube 30, leading to the air-conduit 7, and mounted on and forming a part of said return-tube adjacent to the delivery-tube 28 is a device for regulating the force of the air-current through the tube and for intercepting any articles drawn therein. This device is in the form of a coupling 31, provided with a cylindrical chamber open at its front end. Fitting rotatably in said chamber is a tubular valve 32, provided at diametrically opposite points with an opening 33 and a screen-covered opening 34. When said openings register with the upper and lower portions, respectively, of the return-tube, air is permitted to circulate; but any object drawn into the tube by the air-current is pocketed in said valve, as it cannot pass through the screen. It is under the observation of the cashier by reason of the fact that the front end of the coupling and tubular valve is closed by a hinged door 35, having a transparent panel 36. This door gives access to the valve, but before it is opened the circulation of air through the tube is cut off by grasping pin 37, projecting outward from the valve, and moving it to the lower end of slot 38 in the coupling, (see Fig. 4,) this operation disposing the non-perforated sides of the valve, in alinement with the return-tube, as will be readily understood. It will also be observed in this connection that said valve can be adjusted to regulate the volume and therefore the force of the air-current through the tube, it being obvious as a general proposition that the tubes which have the shortest vertical portions need the least volume or weakest current of air, while those adapted to convey the carriers the greatest distance in a vertical direction usually need the full volume or strongest current of air. Just what force of air-current it is desirable to maintain in a particular tube is best determined by experiment.

Depending from the branch arm 17 of the delivery-terminal at each inspector's station is a short return-tube 39, connected by a U-shaped pipe-coupling 40 to the contiguous end of tube 12, said coupling being preferably mounted upon a stand 41, secured to the counter and adapted to receive from the clerk the carrier charged with the amount and account of the sale in the usual manner. The coupling is provided with a hinged valve 43, automatically closed by a spring 44 and the suctional action of the air-current. In practice the clerk swings the valve open, inserts the carrier, and releases the valve, the spring closing it instantly in the usual manner. To this coupling and its mechanism no claim is made herein.

In all systems of the character forming the subject-matter of this application there is more or less annoyance caused by the insertion of a carrier in advance of one at that time ascending in the same tube or circuit, this short-circuiting of the air-current causing the said ascending carrier to drop within the tube and sometimes fall back on the cashier's counter. To eliminate this trouble, I may employ the valve mechanism shown in Fig. 5, whereby a carrier may be inserted in the tube in advance of an ascending carrier in the same tube without perceptibly checking the latter and therefore without causing it to drop. This mechanism comprises a tubular valve 51, arranged to be reciprocated laterally and form at times a part of tube 12, the coupling 52 within which said valve is mounted forming a continuation of tube 12 when said valve is out of alinement with the latter, at which time the carrier may pass through tube 12 and said coupling. To one side of the tube the coupling is provided with an end opening 53, with which the tubular valve 51 normally registers, said opening being ordinarily closed by a door 54, and in order to guard against the vibration of the building or other cause jarring valve 51 into the path of tube 12, and therefore in a position where the movement of the carriers would be interrupted, it is provided, preferably, with a pair of rods 55, united by a handle 56 at their ends and encircled by expansive springs 57,

the latter by pressure at their opposite ends against the coupling and said handle serving to hold valve 51 reliably in the position shown in Fig. 5, where it fits so snugly when the door 54 is opened that the air-current through tube 12 is not short-circuited, and consequently a carrier ascending therethrough rearward of the valve will not drop. For this reason the clerk can insert a carrier in tubular valve 51, then close door 54, and slide said tubular valve laterally until it registers accurately with and forms a part of the tube, when the departure of the carrier instantly takes place. Should an ascending carrier strike this tubular valve as it it moves in or out, its movement is checked momentarily, but it cannot drop, as will be readily understood.

For the purpose of quickly dislodging a carrier or other article sticking in the tube I provide the following construction: 58 designates a coupling mounted on and forming a part of each tube adapted to convey carriers to inspectors' stations, and 59 a reciprocatory gate-valve mounted in said coupling for the purpose of closing said tube to the passage of air when desired, the valve-stem being pivotally connected to the lever 60 for operation by the cashier. 61 designates an air-tube connecting a compressed-air tank (not shown) to the tube 12 just in advance of said gate-valve, and mounted on and forming a part of said air-tube 61 is a coupling 62, within which is mounted a gate-valve 63, having its valve-stem connected to the lower end of said lever, the lever being fulcrumed at a point between said valve-stems on an arm 64, projecting, preferably, from coupling 62, the arrangement being such that as the lever is turned, as indicated by the arrow, valve 59 is closed and valve 63 opened, thereby introducing air under heavy pressure through tube 12 for the purpose of dislodging any object sticking therein, valve 59 of course preventing such air from escaping up through the unobstructed part of the tube, as will be readily understood. To dislodge the article requires but a moment or two of time, and then the cashier restores said valves to their original positions.

In view of the fact that the function of the various parts has been explained in connection with the detailed description of such parts a recapitulation covering the entire operation is believed to be unnecessary, it being desirable to state, however, that the carriers are inserted by the cashier in the open ends of tubes 11 contiguous to the delivery-tubes, and therefore at a convenient point, and that the contraction of the mouth of the branch arm by means of the cross-bar or otherwise is simply for the purpose of preventing any possibility of the carrier being deflected out of its path, and therefore interrupting the operation of the particular connecting-tube until removed, it being obvious that, owing to the confined space in the terminal, it would be impossible, even without such cross-bar, for the carrier to pass through said branch arm.

It has not been attempted in Fig. 1 to arrange the parts in the exact relative positions they will occupy in practice, said view being simply an attempt to show in one figure a sufficiently complete diagram of the system to render it easily comprehensible, and in this connection it is to be understood that while I have illustrated and described the preferred embodiment of the various parts of the system such parts are susceptible of modification as regards form, proportion, detail construction, and arrangement without departing from the essential spirit and scope or sacrificing any of the advantages of the invention.

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

1. In a pneumatic-despatch-tube system, an air-tube, a delivery-terminal attached thereto and embodying a receiving-arm, a delivery-arm, and a branch arm between the receiving and delivery arms, a delivery-tube connected to the delivery-arm, a return or suction tube connected to the branch arm, a valve normally closing with a yielding pressure the delivery-arm at a point contiguous to the mouth of the branch arm, and a valve for admitting air to the branch arm at the instant the first-named valve is opened by the carrier, for the purpose of preventing air from being drawn up through the delivery-tube and interfering with the escape or ejectment of said carrier, substantially as described.

2. In a pneumatic-despatch-tube system, an air-tube, a delivery-terminal attached thereto and embodying a receiving-arm, a delivery-arm, and a branch arm between the receiving and delivery arms, a delivery-tube connected to the delivery-arm, a return or suction tube connected to the branch arm, a valve normally closing with a yielding pressure the delivery-arm contiguous to the mouth of the branch arm, a valve controlling access of external air to the branch arm with a yielding pressure, and connections between said valves whereby the opening of the first effects corresponding movement of the last, substantially as described.

3. In a pneumatic-despatch-tube system, an air-tube, a delivery-terminal attached thereto, and embodying a receiving-arm, a delivery-arm, a branch arm between the receiving and delivery arms, and an opening opposite the mouth of the latter, a valve closing the delivery-arm, and a valve closing said opening with a yielding pressure and linked to the valve of the delivery-arm and holding the latter normally closed with a yielding pressure, substantially as described.

4. In a pneumatic-despatch-tube system, an air-tube, a delivery-terminal attached thereto, and comprising communicating receiving, de-

livery and branch arms, the former projecting upwardly and the latter downwardly, and embodying also an opening contiguous to the junction-point of said arms, and a downwardly-disposed valve-seat at the mouth of the upper end of the delivery-arm, a valve for closing said seat and having its arm or stem pivoted in and projecting outwardly of the delivery-arm, a gravity-valve closing said opening with a yielding pressure, and a link pivotally connecting said valves with the arm of the first-named valve in order that the latter may be held normally against its seat, substantially as described.

5. In a pneumatic-despatch-tube system, a return-tube, a coupling therein, a door closing the front end of the coupling, a tubular valve in said coupling also open at its front end, and provided with a pair of openings normally registering with the tube, one of said openings being screen-covered, and means for adjusting said valve so as to regulate the force of the air-current therethrough or altogether cut off said current, substantially as described.

6. In a pneumatic-despatch-tube system, a return-tube, a slotted coupling therein, a transparent door closing the front end of said coupling, a tubular valve in said coupling also open at its front end, and provided with a pair of openings normally registering with the tube, one of said openings being screen-covered, and a pin projecting through the slot of the coupling for the purpose of adjusting said valve therein, substantially as described.

7. In a pneumatic-despatch-tube system, a tube, a coupling therein and normally forming a part thereof, and provided at one side of the tube with a door-controlled opening, and a reciprocatory valve within the coupling and adapted to receive a carrier inserted through said door-opening and deliver it to the tube without short-circuiting the air-current through the latter, substantially as described.

8. In a pneumatic-despatch-tube system, a tube, a coupling therein and normally forming a part thereof, and provided at one side of the tube with a door-controlled opening, a reciprocatory tubular valve within the coupling and adapted to receive a carrier inserted through said door-opening and deliver it to the tube without short-circuiting the air-current through the latter, and means to withdraw the tubular valve to its original position in alinement with the door-controlled opening, substantially as described.

9. In a pneumatic-despatch-tube system, a tube, a coupling therein and normally forming a part thereof, and provided at one side of the tube with a door-controlled opening, a reciprocatory tubular valve within the coupling and adapted to receive a carrier inserted through said door-opening and through it to the tube without short-circuiting the air-current through the latter, rods projecting from the tubular valve at the side most remote from the tube through said coupling, a handle upon their outer ends, and springs interposed between said coupling and said handle for the purpose of automatically returning the tubular valve to its original position, and maintaining it thereat against accidental movement, substantially as described.

10. In a pneumatic-despatch-tube system, an air-tube open at one end to receive objects, a delivery-terminal embodying a receiving-arm connected to the air-tube, a delivery-arm, and a branch arm, an air-return or suction tube connected to the branch arm, means for creating a suction in the air-return tube and in said first-named tube and delivery-terminal, a valve located on and controlling the passage of the first-named tube between its open end and delivery-terminal, a compressed-air pipe communicating with said tube between said valve and said delivery-terminal, a valve located on and controlling said compressed-air pipe, and means for synchronously seating one of said valves and unseating the other, substantially as described.

11. In a pneumatic-despatch-tube system, a return-tube, a coupling therein, a valve in the coupling, provided with a pair of openings normally registering with the tube, one of said openings being screen-covered, and means to adjust said valve to partially or entirely cut off the air-current through the tube, substantially as described.

In testimony whereof I affix my signature in the presence of two witnesses.

CHARLES A. GRAY.

Witnesses:
H. C. RODGERS,
G. Y. THORPE.