No. 652,960. Patented July 3, 1900.

M. J. FOYER.

PNEUMATIC CONVEYER.

(Application filed Oct. 9, 1899.)

(No Model.) 2 Sheets—Sheet 1.

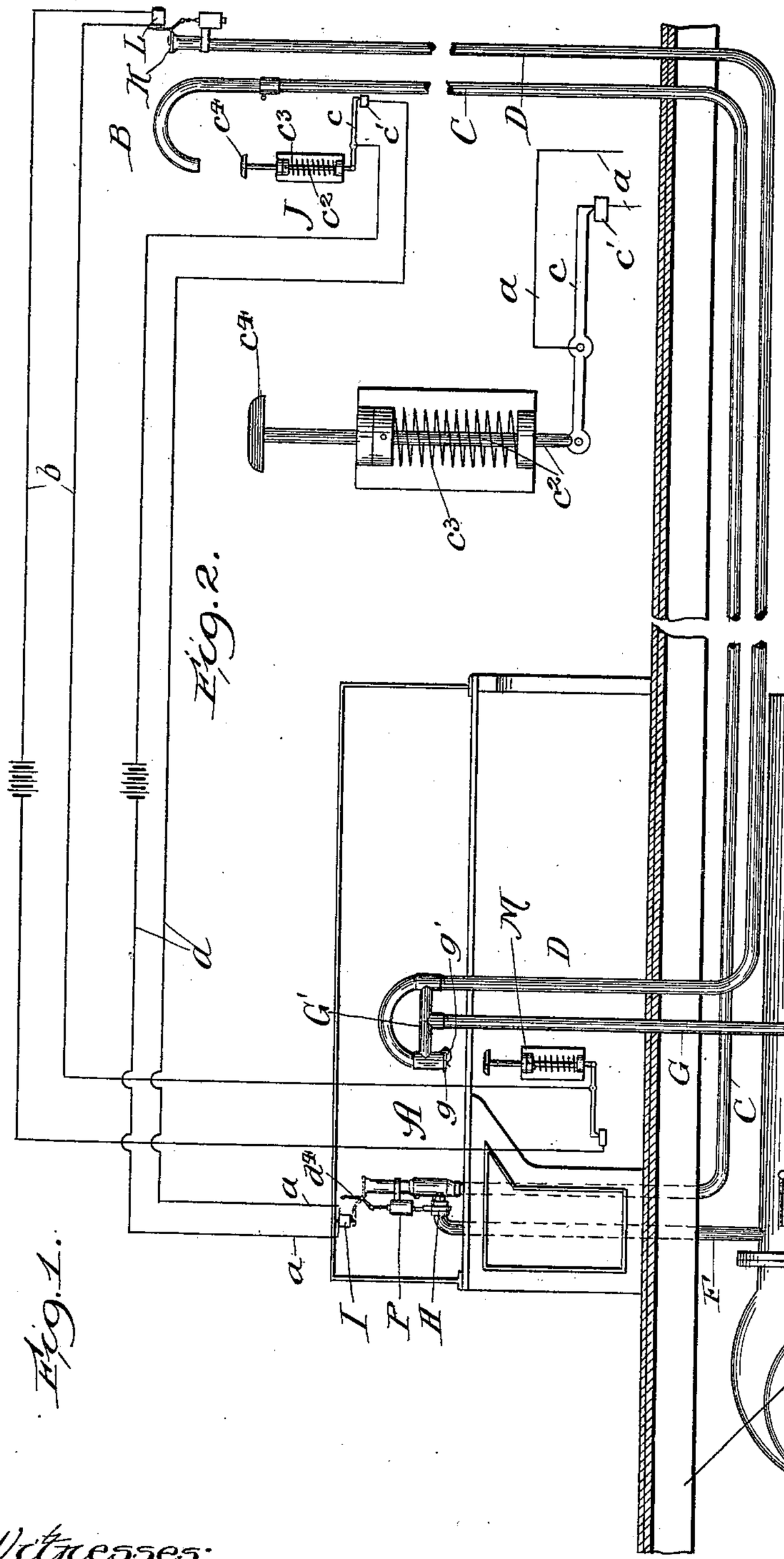

Fig. 2.

Fig. 1.

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Fig 3.

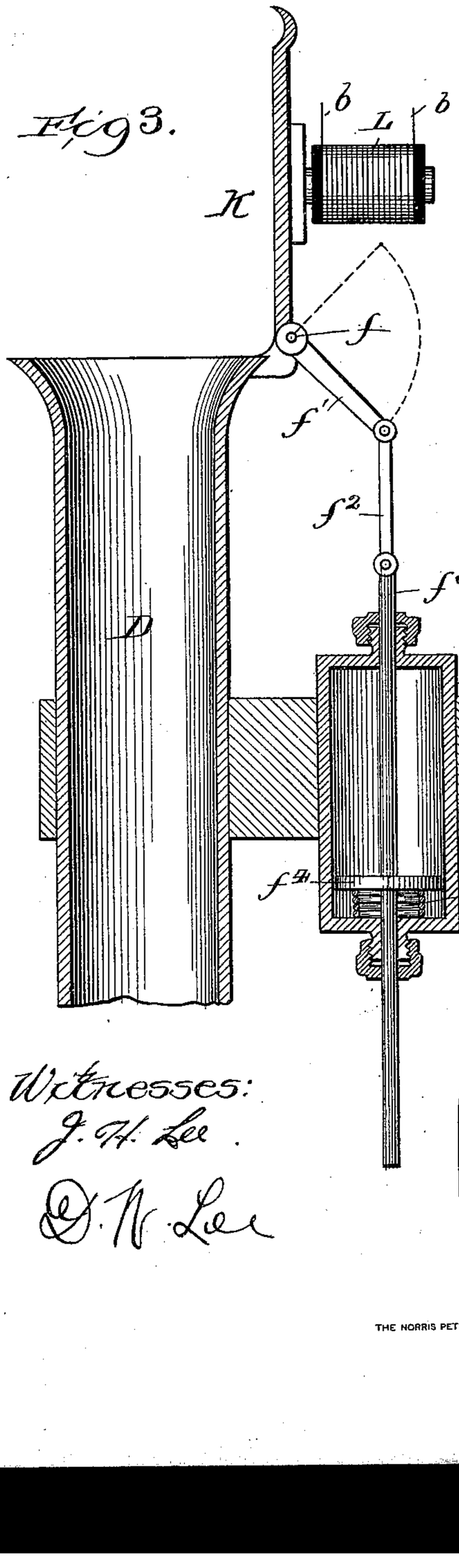
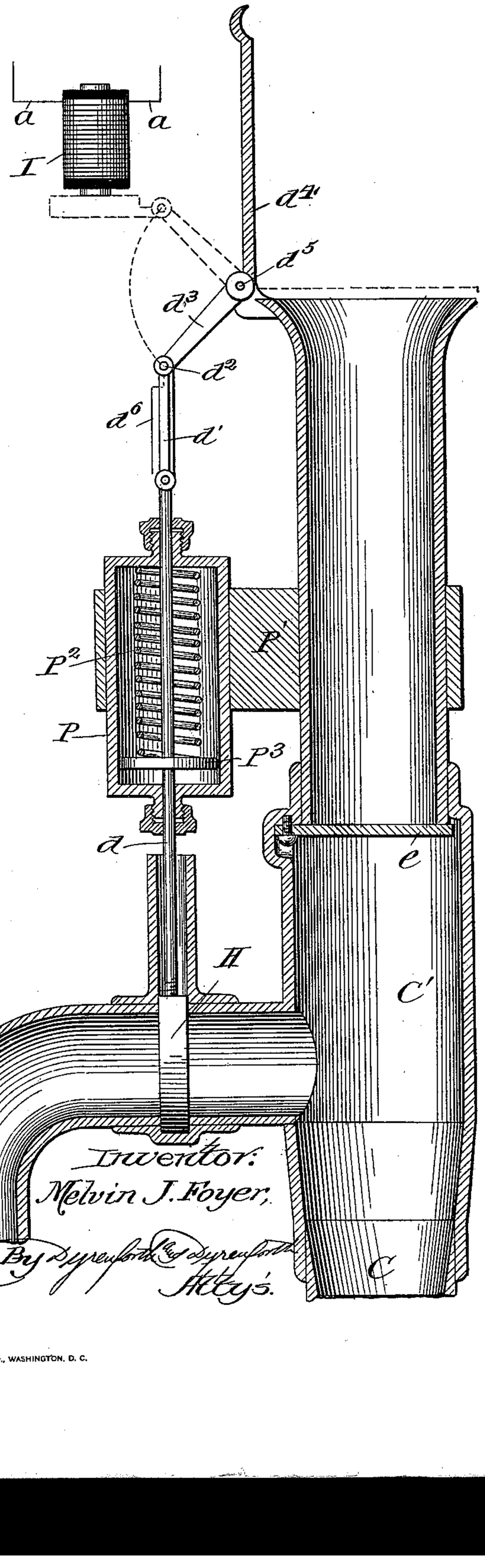


Fig 4.



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UNITED STATES PATENT OFFICE.

MELVIN J. FOYER, OF CHICAGO, ILLINOIS.

PNEUMATIC CONVEYER.

SPECIFICATION forming part of Letters Patent No. 652,960, dated July 3, 1900.

Application filed October 9, 1899. Serial No. 733,071. (No model.)

To all whom it may concern:

Be it known that I, MELVIN J. FOYER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Pneumatic Conveyers, of which the following is a specification.

My invention relates to an improvement in pneumatic conveying apparatus for use, among other situations, in conveying cash-carriers in large stores and in similar locations.

My object is to provide simple and inexpensive means for reducing to a minimum the power necessary to operate a pneumatic conveyer of this nature.

I accomplish my purpose by providing at the despatching ends of the conveying-tubes doors or valves controlling the admission of air at said ends and electromagnets for holding said doors or valves open for a short period and by further providing in the vicinity of the delivery ends of said tubes circuit-breakers adapted to be moved by the carriers in their passage through the tubes to temporarily deënergize the magnets and permit the doors or valves to close.

In the accompanying drawings, which illustrate a pneumatic conveying apparatus equipped with my improvements, Figure 1 is a view, diagrammatic in its nature, showing the general arrangement of the entire apparatus; Fig. 2, a detail of a circuit-breaker employed; Fig. 3, a sectional detail of the despatching end of the incoming collecting-tube and its attendant parts, and Fig. 4 a sectional detail of the despatching end of the outgoing distributing-tube and its attendant parts.

A represents a central or cashier's station; B, an outlying or salesman's station; C, an outgoing or distributing tube; D, an incoming or collecting tube; E, a blower having a high-pressure or delivery pipe E′ and a low-pressure or suction pipe E^2; F, an air-supply pipe connecting the pipe E′ to the tube C adjacent to its despatching end; G, an exhaust or suction pipe connecting the pipe E^2 with the tube D adjacent to its delivery end; H, a gate-like valve controlling the admission of compressed air from the pipe F to the tube C; I, an electromagnet for holding the valve H open during the admission of air; J, a circuit-breaker at the station B for deënergizing the magnet I; K, a door-like valve controlling the admission of atmospheric air to the tube D; L, an electromagnet for holding the door K open during the admission of air thereat; M, a circuit-breaker at the station A for deënergizing the magnet L, and N a pressure-actuated device connected with the system (shown connected with the pipe E^2) for controlling the speed of rotation of the blower.

The magnet I is shown connected with the circuit-breaker J by wires *a*, and the magnet L is shown connected with the circuit-breaker M by wires *b*. The circuit-breaker J comprises a pivoted lever *c*, one end of which rests upon a contact-point *c′* and the other end of which is pivotally joined to a vertical plunger c^2, which is normally held in its raised position by a spring c^3 and which is provided at its upper end with a disk c^4, located directly beneath the delivery end of the tube C in position to be moved by the carrier as it emerges from the tube. The circuit-breaker M is similar in construction and is located beneath the delivery end of the collecting-tube D.

The construction at the despatching end of the distributing-tube C is shown in detail in Fig. 4. The gate H is provided with a stem *d*, which projects upwardly and is pivotally joined to one end of a link *d′*, the latter being pivotally connected at its opposite end at a point d^2 to one end of an arm d^3, which is rigid with and in one movement serves to operate a door d^4, pivoted at d^5. The arm d^3 is provided with a rigid keeper or armature d^6, so located as to be brought into contact with the lower end of the core of the magnet I when the door d^4 is closed by the central operator in sending out a carrier from the central station. The stem *d* preferably passes through a cylinder or casing P, supported by a ring or bracket P′ and containing a spring P^2, confined between the upper end of the casing and the piston-head P^3 and which tends to keep the stem *d* and valve H depressed. The piston-head P^3 is of less diameter than its casing to permit the air to pass said head, and the air serves to slightly cushion the valve in closing. The pipe F is

curved at its upper end and extends horizontally to receive the gate H, opening into the tube C at an enlargement C′, which contains, above its junction with the pipe F, a downwardly-opening valve *e*, which yields to permit the passage of a carrier, but which closes to prevent air from blowing out.

The construction at the despatching end of the collecting-tube D is shown in detail in Fig. 3. The door K is pivoted at *f* and is provided with an arm *f′*, the upper end of which is connected by a link f^2 to the upper end of the plunger-rod f^3, which projects through a casing Q and is provided inside said casing with a piston-head f^4 and a spring f^5, which tends normally to close the door K.

The delivery end of the tube D is curved, as shown, and is in communication with the exhaust-pipe G at two points through a pipe G′, which forms a T with the pipe G. The end of the tube D is kept normally closed by a door *g* and spring *g′* bearing thereon.

The operation is as follows: Air is taken from the pipe E^2 and caused to accumulate in the pipe E′ by the blower, thus supplying the pipe F with compressed air and creating low pressure in the tube D. To send a carrier from station A, the operator inserts the carrier and closes the door d^4. The carrier drops past the valve *e*, and the closing of the door d^4 raises the keeper d^6 into contact with the core of the magnet I, at the same time lifting the gate H and admitting pressure to the tube C in the rear of the carrier. When the carrier reaches the delivery end of the tube C, it drops out onto the disk c^4 of the circuit-breaker J and interrupts the current of the circuit *a*, thereby deënergizing the magnet I and permitting the gate to close under the action of the spring p^2 in the casing P. To send a carrier from station B, the operator at said station lifts the door K, thereby bringing its metallic surface into contact with the core of the magnet L and then inserts the carrier. The latter is carried by atmospheric pressure to the delivery end of the tube D, where it arrives with sufficient momentum to force open the door *g* and depress the disk of the circuit-breaker M, thereby deënergizing the magnet L and permitting the door K to close.

It is necessary that the circuit-breaker be provided with a movable member extending into the path which the carrier traverses. It is not necessary, however, that said member be located at the extreme delivery end of the tube, but only that it be located at a great enough distance from the despatching end of the tube to permit admission of sufficient air to move the carrier properly to its destination. It is evident that where only sufficient air is admitted to the conveying-tubes to move the carrier properly the work done by the blower E in transferring air from the pipe E^2 to the pipe E′ is reduced to a minimum, which is the object sought.

The principle of my invention may be employed in systems which operate wholly by suction or reduction of pressure at the delivery ends of the tubes, in systems operating wholly by compressed air, and, as in the instance shown, in systems which operate by both compressed air and reduction of pressure or partial vacuum.

The details of construction may be varied as desired.

What I claim as new, and desire to secure by Letters Patent, is—

1. In pneumatic conveying apparatus, the combination of a low-pressure pipe, means for maintaining a reduction of pressure therein, a conveying-tube connected toward its delivery end with said low-pressure pipe, a door at the despatching end of said tube controlling the admission of atmospheric pressure thereto, an electromagnet for holding said door open during the admission of air, an electric circuit for said magnet, and a circuit-breaker in said circuit in the vicinity of the delivery end of said tube and provided with a movable part located in the path of the carrier and serving when moved by the carrier to deënergize the magnet and permit the door to close, substantially as and for the purpose set forth.

2. The combination of an outgoing distributing-tube, an incoming collecting-tube, a blower in communication at its high-pressure side with the despatching end of said distributing-tube and at its low-pressure side with the delivery end of said collecting-tube, a valve controlling the admission of air from said blower to said distributing-tube, an electromagnet, an armature for said magnet connected with said valve, a spring tending to hold said valve closed, an electric circuit for said magnet, a circuit-breaker in said circuit near the delivery end of said distributing-tube, a door at the despatching end of said collecting-tube, means tending to hold said door closed, an electromagnet for holding said door open during the admission of atmospheric pressure, an electric circuit for said last-named magnet, a circuit-breaker for said last-named circuit located in the vicinity of the delivery end of said collecting-tube, and means connected with said apparatus for regulating the speed of said blower, substantially as and for the purpose set forth.

3. In pneumatic conveying apparatus, the combination of a conveying-tube, a low-pressure pipe connected with the delivery end thereof near the point of discharge of the carrier, means for maintaining a reduction of pressure in said pipe, a door at the discharge end of said tube, means for holding said door normally closed, a door at the despatching end of said tube for controlling the admission of atmospheric pressure, means for holding said last-named door normally closed, an electromagnet for holding said last-named door open during the admission of air, an electric circuit for said magnet, and a circuit-breaker for said circuit located in the vicinity of the

delivery end of said tube for deënergizing the magnet to permit the door at the despatching end of the tube to close, substantially as and for the purpose set forth.

4. In pneumatic conveying apparatus, the combination of a conveying-tube, means for producing movement of air therethrough, a valve controlling the admission of air to the despatching end of said tube, a spring tending to hold said valve normally closed, an electromagnet provided with a movable armature serving to hold said valve open during the admission of air, an electric circuit for said magnet, a circuit-breaker in said circuit, located in the vicinity of the delivery end of said tube and in the path of the carrier, for deënergizing the magnet, and means for cushioning the movement of the valve in closing, substantially as and for the purpose set forth.

MELVIN J. FOYER.

In presence of—
D. W. LEE,
M. S. MACKENZIE.