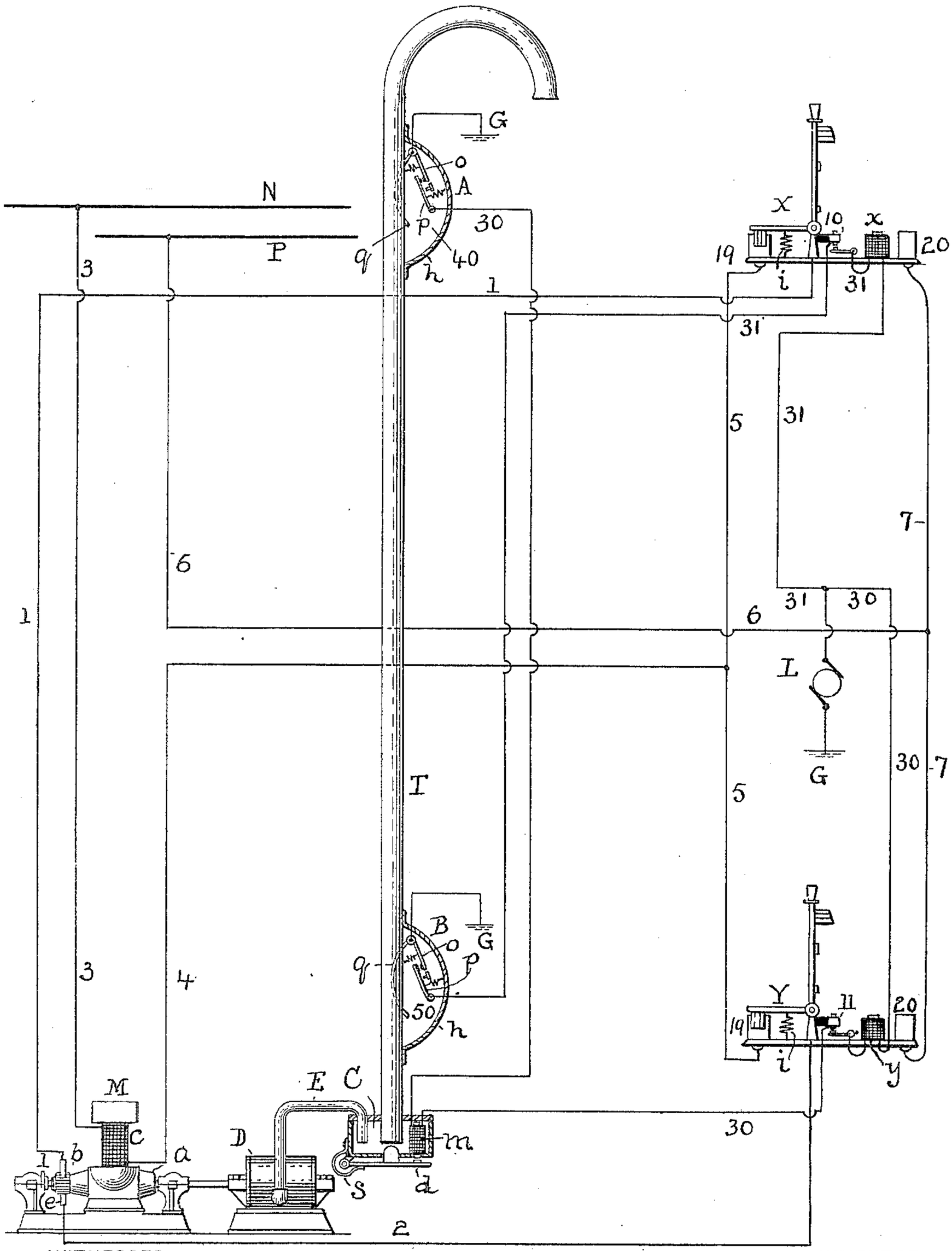
No. 640,386. Patented Jan. 2, 1900.

S. F. JONES.

PNEUMATIC TRANSFER TUBE SYSTEM.

(Application filed May 17, 1899.)

(No Model.)



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PNEUMATIC-TRANSFER-TUBE SYSTEM.

SPECIFICATION forming part of Letters Patent No. 640,386, dated January 2, 1900.

Application filed May 17, 1899. Serial No. 717,145. (No model.)

To all whom it may concern:

Be it known that I, STERNS FRANCIS JONES, a citizen of the United States, residing in the city of New York, county and State of New York, have made certain new and useful Improvements in Pneumatic-Transfer-Tube Systems, of which the following is a specification.

The object of my invention is to improve the receiving-box and the arrangement thereof used in connection with pneumatic-transfer tubes in which the moving air-current is caused to take either of two directions for the purpose of transferring a carrier in either direction, as by the use of a single air-pump and a motor capable of operation to pump air in either direction.

The general arrangement of transfer-tube upon which this improvement is founded is shown and described in United States Letters Patent No. 543,184, dated July 23, 1895, issued to Francis W. Jones.

My improvement consists in providing a receiving-box at one station having a cover biased to remain normally closed by means of a spring or equivalent device; but this bias is comparatively weak to permit of overcoming it by the impact of a carrier. During the movement of the air-current in one direction suction reinforces the tendency of said spring to close the door. When the air-current is in the reverse direction, a holding-magnet in a local circuit reinforces the tendency of said spring to retain the door closed. There is a circuit-closer operated by the starting-switch, and a circuit-breaker operated by the moving carrier located at the distant station. The same circuit controls the operation of the air-pump. As the carrier passes this circuit-breaker the pump is stopped and the gate is relieved from the control of the holding-magnet, the door resumes its normal condition, and the station is always ready to receive a carrier while the tube is idle.

The accompanying drawing illustrates my invention.

A and B are two stations connected by the pneumatic-transfer tube T.

D is an air-pump operated by any suitable motor to produce an air-current in tube T in either direction. I prefer an electric motor M. For the purpose of starting, stopping, and reversing this motor there are two switches X and Y, one at each station. Normally the motor and pump are at rest and the switches are retracted and in the position shown. When X is shifted, the air-current is in one direction. When Y is shifted, the air-current is in the opposite direction. With the electrical connections as shown, shifting switch X draws air from A toward B. The switches X and Y are substantially alike. The electrical connections are as follows: The movable contact or lever of X is connected by wire 1 with motor-brush *b*. The lever of Y is connected by wire 2 with motor-brush *e*. One terminal of the motor-field coil is permanently connected with the negative main-circuit lead N by wire 3. The opposite field-coil terminal is connected by wires 4 and 5 with the two corresponding contacts 19 of switches X and Y. The positive main-circuit lead P is connected to corresponding contacts 20 of X and Y by wires 6 and 7.

The air-pump D is connected by a branch tube E with the tube T through the receiving-box C, having a hinged door *d*, normally closed by a spring *s* of just sufficient strength to overcome the gravity of *d*.

When the air-pump is operated to draw air into or down the tube, the door *d* is drawn and held closed. When the pump forces air into the tube in an upward-moving current, the door *d* would have a tendency to be blown open. To prevent this, I provide a holding-magnet *m*, having its armature fixed to door *d*. There is a local circuit for each station. The circuit for station A includes the local generator L and the conductor 31, in which are included the holding-magnet *x* for the movable contact of switch X, a circuit-closer 10, controlled by switch X, and a circuit-breaker 50 at or near station B, which is operated by an arriving or passing carrier, all as described in the patent above referred to. Station Y has a similar local circuit, including generator L, conductor 30, the holding-magnet *y* for the movable contact of switch Y, a circuit-closer 11, controlled by switch Y, and a circuit-breaker 40 at or near station A, operated by an arriving or passing carrier. The magnet *m* for holding door *d* is included in this circuit 30.

G indicates the earth or return-circuit connection.

The automatic circuit-breakers 40 and 50 are alike and are operated by an arriving or passing carrier. Each circuit-breaker consists of two spring-retracted pivoted arms *o* and *p*. Fixed to the arm *o* is a curved arm *q*, extending through a slot in the tube. A housing or air-tight inclosure *h* incloses the circuit-breaker and slot in each instance. A passing carrier strikes the curved arm *q*, forcing it outwardly, and breaks the contact between *o* and *p*, opening the circuit temporarily.

The operation of the apparatus is as follows: The parts are shown in their normal position, with the air-pump at rest. Station B desires to send a carrier to station A. The door *d* is pulled down, the small cylindrical leather carrier is inserted, the door closing forces the carrier upward into the tube, the switch Y is moved, contact is broken at 19 and made at 20, circuit may be traced from the main lead P via 6 7 20 to 2, *e b l* to 19 of X, 5 4 *c* 3 to negative lead N, the motor starts, and air is forced or driven through the tube T from B to A. This would force the door *d* open; but the magnet *m* holds the door owing to the fact that when switch Y was shifted the local-circuit closer 11 was closed, the local circuit being completed from generator L via 30, magnet *y*, and magnet *m* to circuit-breaker 40 at station A. The magnet *y* holds switch-arm Y against the force of its retracting-spring *i*, and magnet *m* holds door *d* against the force of the air-current. When the carrier reaches circuit-breaker 40 at station A, it strikes the arm *q*, temporarily breaking circuit. This demagnetizes *y*, releasing switch-arm Y, circuit is permanently broken at 11, and the motor stopped. All parts have now resumed their normal position, as illustrated. Station A now desires to send a carrier to B. The carrier is placed in the open end of the tube at A and switch X shifted. Circuit is broken at 19 of X and completed at 20 of X. The result is that current flows in the field-coils of M the same as before; but it is reversed in its direction through the armature-coils of M, the direction of rotation is reversed, and the motor draws air downward from A toward B and also draws the door *d* more tightly closed, thus coöperating with spring *s*. The closing of switch-arm X on point 20 also closed the local circuit 31 at point 10. Magnet *x* is energized and holds the arm of X against the force of its retractor *i*. The carrier moves from A to B, and when passing circuit-breaker 50 at B temporarily breaks the circuit. This deënergizes magnet *x*, the switch-arm of X is released, and normal conditions are restored. The impetus of the moving carrier overcomes the force of spring *s* and the carrier drops out.

By the use of the described improvement the station from which carriers are sent by a driven current of air is always in condition to receive a carrier by a current of air drawn in or moving in a relatively opposite direction to the first-named.

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

1. The combination with a tube connecting two stations, of a door in said tube at one station, a device for imparting a bias or closing tendency to said door, an electromagnet having its armature fixed to said door, a reversible air-pump, a motor therefor, means for reversing said motor including an electric circuit, a switch controlled by an electromagnet, a second circuit including both electromagnets with a circuit-closer at one station and an automatic circuit-breaker at a second station.

2. The combination with a tube connecting two stations of a door in said tube at one station, means for imparting a closing tendency to said door, an electromagnet having its armature fixed to said door, a reversible air-pump, a suitable motor for said pump, means for reversing said motor including an electric circuit, an operating-switch for said circuit, a magnet to hold said switch in one of two positions, a separate electric circuit containing the door-controlling and the switch-controlling magnets with means for automatically breaking said circuit at both stations substantially as described.

3. The combination of a transfer-tube connecting two stations, a door in said tube at one station, an air-pump and a motor for alternately drawing and driving air through said tube, a main electric circuit to control said motor, switches at each station to control said circuit, a magnet to control said door, a local circuit for said magnet, a circuit-closer in said circuit operated by the switch at one station and a circuit-breaker in said local circuit operated by the passing carrier at the other station.

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