No. 714,873. Patented Dec. 2, 1902.

W. G. DAVIS.

PNEUMATIC CARRIER SYSTEM.

(Application filed Dec. 2, 1901.)

(No Model.) 2 Sheets—Sheet 1.

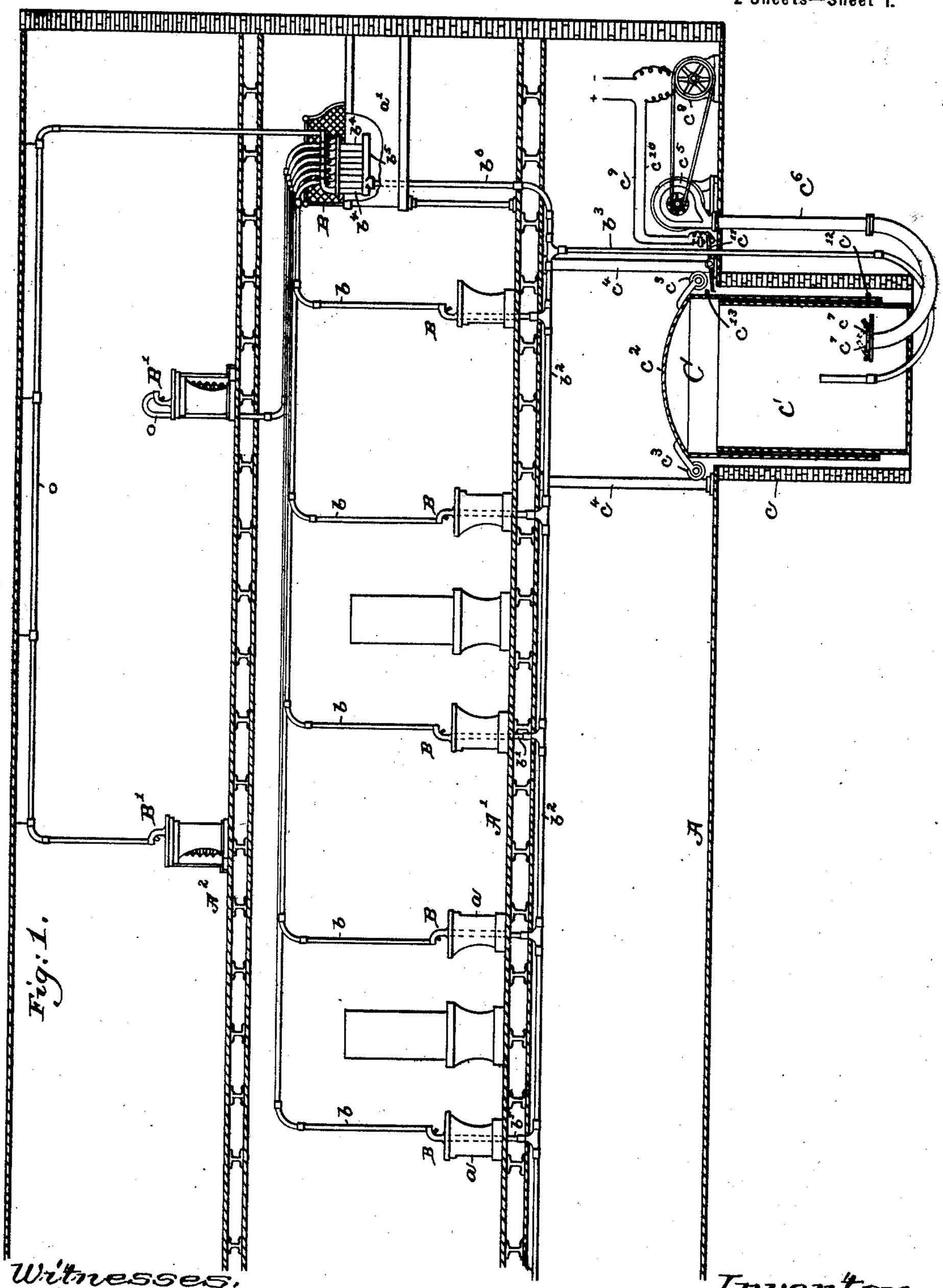

Fig. 1.

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Fig: 5.

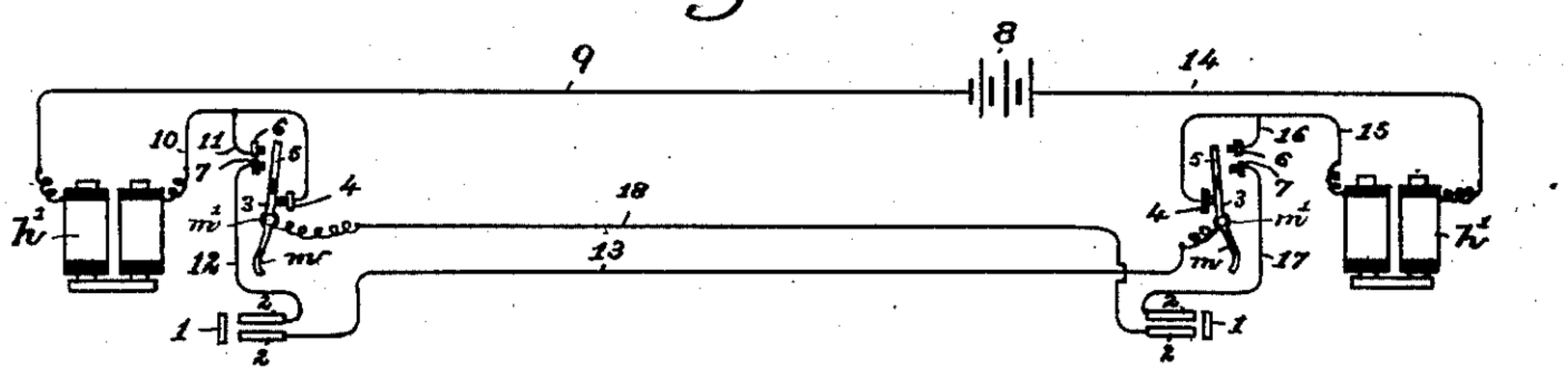

Fig: 3.

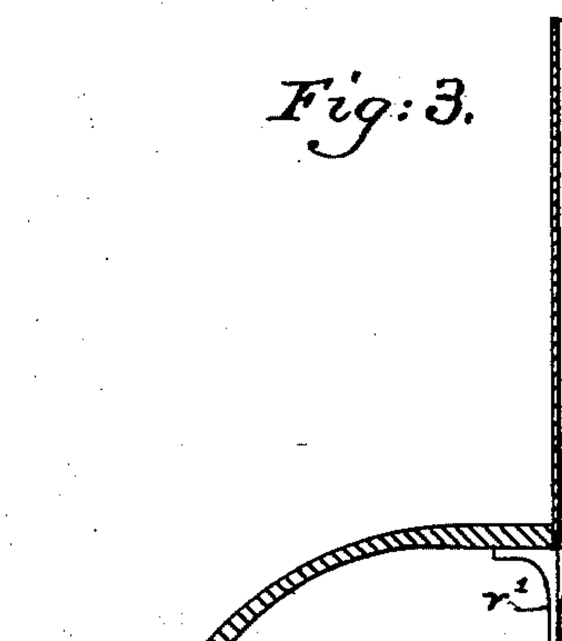

Fig: 2.

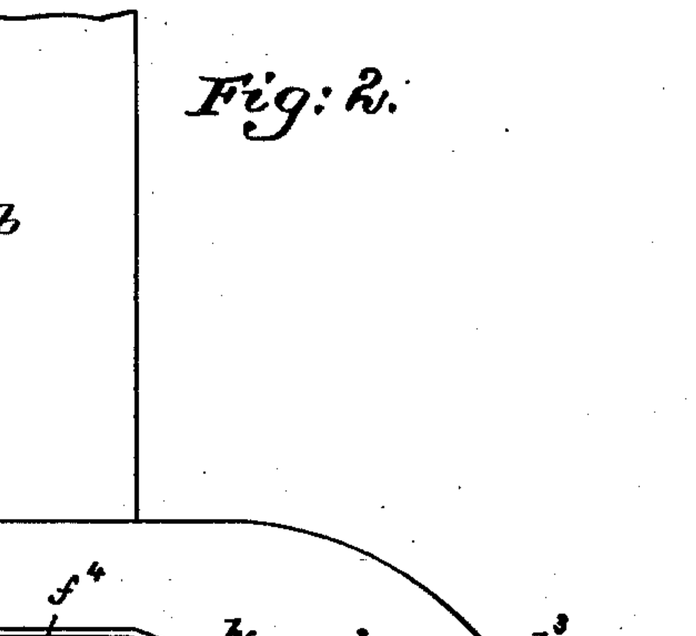

Fig: 4.

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UNITED STATES PATENT OFFICE.

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PNEUMATIC-CARRIER SYSTEM.

SPECIFICATION forming part of Letters Patent No. 714,873, dated December 2, 1902.

Application filed December 2, 1901. Serial No. 84,297. (No model.)

To all whom it may concern:

Be it known that I, WILBUR G. DAVIS, a citizen of the United States, residing at Newton, in the county of Middlesex and State of Massachusetts, have invented an Improvement in Pneumatic-Carrier Systems, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

My invention relates to pneumatic-tube systems for carrying cash, mail-matter, parcels, and the like; and the object of my invention is to simplify, improve, and cheapen the construction and cost of operation of such systems.

My invention will be best understood after a description of a system illustrating one embodiment thereof.

In the drawings accompanying this description, Figure 1, in diagram, partial section, illustrates one embodiment of my invention, the same as shown being adapted for use as a cash-carrier system. Fig. 2, in side elevation, shows the transmitter-head through which the carriers are inserted and received, the cover that normally conceals the electrical controlling devices being removed to expose such devices. Fig. 3 is a vertical longitudinal section through the transmitter, Fig. 2, looking from the opposite side thereof. Fig. 4 is a detail in elevation of a part of Fig. 2 viewed from the left of said figure, and Fig. 5 is a diagram illustrating the arrangement of electric circuits used in the embodiment of my invention here disclosed for controlling the transmitting or carrying apparatus.

In the embodiment of my invention selected for illustration herein and shown in the drawings, referring particularly to Fig. 1, A indicates the basement of a usual building or store, A′ the first or main floor thereof, and A^2 one of the floors above the first and which may be considered the second, fifth, or any other floor desired. Upon the first floor A′ are arranged usual counters *a a*, from which it is desired to transmit cash to the cashier's desk at *a′*. (Shown at the right, Fig. 1, and preferably somewhat elevated from the floor.)

Each transmitting-station or transmitter B is connected with the cashier's desk *a′* by its own separate transmitting-tube *b*, the several transmitting-tubes from the various transmitting-stations being grouped conveniently for the cashier at the latter's desk *a′*, where each is fitted with a transmitter B, which may be similar in all respects to the transmitters distributed at the various stations throughout the floor or building.

The several transmitters B B at the various transmitting stations or counters are shown connected by branches b' with a main supply pipe or conduit b^2, which is connected with any suitable source of pressure. As here shown, the said main pipe b^2 leads by a connection b^3 at the right, Fig. 1, to the bottom of a pressure-receiver C, into and above the bottom of which the upturned end of the said connection b^3 protrudes. This receiver C may be of any suitable or desired construction adapted to receive and contain or maintain air or other fluid under pressure. In the embodiment of my invention here shown the said receiver comprises a suitable pit *c*, built, it may be, of concrete or brick and within which is arranged the open-top tank *c′*, between which and the inner wall of said pit is left an annular space for the reception of the tubular wall of the movable or rising-and-falling receiver proper, c^2. The latter is provided at proper points in its circumference with guiding devices, such as the wheels c^3, running in contact with suitable guiding-posts c^4, which guide the said receiver in its vertical movements. At its lower end the tubular wall of said receiver is maintained immersed in water or other liquid, filling the annular space between the pit and the inner tank *c′*, thus providing in usual manner a receiver adapted to receive fluid, such as air under pressure, forced thereinto at a convenient time and maintained therein always under a pressure equivalent to the weight of the movable receiver c^2 and any additional weights that may be added thereto. The receiver may be charged from any suitable or desired source, I having herein shown for the purpose a typical blower c^5, the outlet-pipe c^6 from which enters the receiver through the bottom thereof, as shown, where it is provided with suitable check devices or valves, such as the hinged flap-valves c^7. This blower may be operated from any convenient source of power—such as a water-motor, steam-en-

gine, or electric motor—I having herein typified an electric motor at c^8, belted in convenient manner to and for operating the said blower.

I preferably place the motor-supply conductors c^9 c^{10} under the control of a switch, typified at c^{11}, and which when the receiver c^2 reaches its highest position is engaged by a lug c^{12} on the receiver and is moved thereby automatically to cut out and stop the motor until said receiver has fallen to its lowest desired position, when it will be engaged by another lug c^{13} on the receiver and moved again to start the motor for recharging.

As herein shown, the ends of the transmitting-tubes b b at the cashier's desk are joined by connections b^4 to a common head b^5, from which leads a pipe b^6, also in communication with the said receiver C, said pipe b^6 for convenience being herein shown as attached to the same pipe b^3 that supplies pressure to the main pipe b^2 referred to.

Suitable devices, to be described, are provided for placing either of the ends of the tubes b in communication with the pressure-supply connections b' b^4 to obtain the necessary pressure for driving the carriers in desired direction, according to the particular ends of the tubes at which the pressure is admitted. There is thus provided in the embodiment of my invention shown in Fig. 1 one or more normally dead transmitting-tubes b, leading from one to another of the points between which it is desired to convey carriers, meaning by "dead tubes" tubes through which normally pass no current or movement of air or other fluid sufficient to be utilized for conveying a carrier or carriers therethrough. There is also provided a common source of propelling pressure, herein a source of stored pressure created not at and for the transmission of each individual carrier, but created in advance and without reference to the transmission of any particular carrier, such pressure being accumulated and stored, so as to be drawn upon for the transmission of any carrier or carriers at any time. Finally, there is provided means for connecting this source of pressure when needed with each of the ends of the normally-dead transmitting-tubes b for propelling carriers through such tubes from one to the other of their ends in the desired direction, according to the particular ends at which the pressure is admitted.

Referring now to Figs. 2 to 5, inclusive, I will describe one form of transmitter or transmitter-head that may be employed at either end of the transmitting-tube for controlling the flow of fluid therethrough.

Referring first to Figs. 2 and 3, d is a head, preferably of cast metal, with a passage d' therethrough, said passage, for instance at its lower end, being connected with one of the main supply-pipe branches b', Fig. 1, and at its opposite or upper end connected, as indicated, with one of the ends of a normally dead transmitting-tube b. Between its two ends the passage d' is shown offset to provide an opening opposite the end of the transmitting-tube b, through which a carrier e may be inserted and received. This opening, which is the entrance-exit opening for the carriers, is provided with a suitable closure, shown as a hinged cap d^2, pivoted at its inner end at d^3 to the casting d and adapted when in its horizontal position (shown in full lines, Figs. 2 and 3) to close the said opening and when in its dotted position, Figs. 2 and 3, to uncover or open said opening. As here shown, the cap d^2 is provided behind its hinge or pivot d^3 with an inwardly-extended arm d^4, carrying a closure or valve d^5. When the cap d^2 is in position closing the entrance-exit opening referred to, this valve d^5 is swung to one side of the upright portion of the passage d' in the head d, thus establishing free communication through the passage and into the transmitting-tube b at its lower end. When, however, the hinged cap d^2 is dropped into its dotted position, Figs. 2 and 3, the valve d^5 is moved thereby into its horizontal dotted position, Fig. 3, against and in contact with a suitable seat d^6, provided therefor in the said passage d', thus completely cutting off communication between the main supply branch b' and the adjacent end of the said transmitting-tube. When therefore the entrance-exit opening is uncovered, pressure is cut off from the branch b'; but when the said entrance-exit opening is closed pressure is admitted from said branch to the adjacent end of the normally dead transmitting-tube. Access to the valve d^5 is had through a removable cover d^7, attached in suitable manner to the inner face of the upright arm of the casting d. The hinged cap d^2 and valve d^5, connected by the pivot-carrying arm d^4, may be conveniently inserted in operative position within the casting d by vertically slotting the wall between the entrance-exit opening and the cover-opening at d^7, this slot receiving the pivot-carrying arm d^4, which when inserted therein closes the slot, so that while the said cap and valve are readily removable at any time, yet when in position the slot is completely closed to prevent escape of air under pressure from within the casting d. The offset upper portion of the transmitter-head d is provided at its front face with a latch f, pivoted at f' and controlled by a spring f^2, that tends to move the said latch always into position where it will catch and lock the hinged cap d^2 when elevated into its closing position to prevent its being thrown back by the propelling pressure admitted to the transmitting-tube b. Obviously when this latch is turned back or released the said cap d^2 will drop into its dotted position under the action of gravity, supplemented by the pressure in the head d, which as soon as the valve d^5 is moved slightly from its full-line position, Fig. 3, acts behind said valve to push the latter positively to its seat.

Referring now to Fig. 2, there is arranged at one side of the head d a suitable controlling-box h, containing an electromagnet h', the armature-lever h^2 of which is shown fulcrumed at h^3 and acted upon by a suitable retractile spring h^4 or equivalent device for retracting said armature when said magnet is deënergized. The free end of the armature-lever h^2 is shown as notched at h^5 at its under side or otherwise suitably formed to engage a locking-arm, as h^6, fast on the protruding end of the cap-pivot d^3, so that when the said armature is attracted or is in its attracted position if the cap d^2 be in its lowest or dotted position the said arm h^6 will be in its vertical dotted position and will there be engaged by the notched end of said armature-lever and locked to positively hold the said cap in its open position, and thus prevent movement thereof into position to admit pressure to the adjacent end of the transmitting-tube at a time when, for instance, the said tube is being employed for the transmission of a carrier from the opposite end of the said tube. The latch referred to upon the front of the head d is shown as having its pivot-rod f' extended to one side, as indicated in Fig. 4, and provided opposite the end of the controlling-box h with an arm f^3, which enters the said box through the end thereof, as shown in Fig. 2. Overlying the inner end of this arm is one end of a locking-lever f^4, pivoted at f^5 and arranged with its other end overlying the free end of the armature-lever h^2, so that when the armature-lever h^2 is in its lowermost attracted position the locking-lever f^4 may vibrate freely upon its pivot to permit the latch f under the action of its spring f^2 to be thrown inward into its full-line position, Figs. 2 and 3, to engage and lock the cap d^2 in its elevated or closing position. When, however, the said armature-lever is elevated or retracted, its free end engages the locking-lever f^4 and depresses the outer end thereof upon the latch-arm f^3, thereby turning the said latch into its outermost or dotted position, Fig. 2, where it cannot engage the cap d^2 should said cap be moved into its elevated or closing position. Thus assuming the caps d^2 at the opposite ends of the tube b^2 to be in their lowermost dotted positions, Fig. 2, if one of the caps be raised into closing position and thereby close an electric circuit that will energize the magnets h' the cap so raised will be caught and locked by the freely-moving latch f, while the other cap remaining in its lowermost position will be locked in such position. If, however, while the magnets are deënergized and their armature-levers retracted either of the caps d^2 be raised into elevated or closing position, the latch f for that cap being thrown into its outermost position by the retracted armature-lever will be held from engaging said cap. Consequently it will drop immediately to its first or open position. Should a meddlesome person while the armature-levers are retracted press one of the latches f inward to its full-line position and then lift the cap d^2 until engaged by the said latch, the retractile spring h^4 of the armature-lever will immediately upon release of said latch return the same to its dotted position and again drop the hinged cap. The hub of the locking-arm h^6 of the pivot d^3 is shown provided with an arc-shaped contact-piece 1, insulated from the said arm h^6 and arranged to wipe over and make electrical contact between a pair of pens or springs 2 2, suitably mounted within the box h. At its upper end the head d is provided interiorly with a deflecting-switch, shown as a lever m, pivoted at m', and having an arm m^2 extended beyond said pivot and acted upon by a spring m^3, which moves said deflecting-lever normally inwardly to its dotted position, Fig. 3. The extended arm m^2 of this deflecting-lever is insulated between its ends, the portion 3 next the pivot thereof being arranged to engage a fixed contact 4 when the said lever is in its normal or dotted position, while the insulated end 5 of said lever is arranged to engage two fixed contacts 6 7 when the said lever is in its deflected or full-line position, Fig. 3. The hinged cap d^2 is provided with a locking projection $d^\times$, which stands behind the free end of this deflecting-lever m when said cap is raised and locks the said lever in its deflected position during such time as said cap d^2 remains in its elevated or closed position.

Referring to Fig. 5, the battery or other generator of electricity is indicated at 8. From one pole of this generator a wire 9 leads to the magnet h' at one of the ends—for example, the transmitting end—of one of the transmitting-tubes b. From this magnet a wire 10 leads to the contact 4 of the deflecting-switch lever m, and a branch 11 from said wire 10 leads to the contact 6 also of said lever. The remaining contact 7 of said lever is connected by a wire 12 with one of the contact springs or pens 2, that is acted upon by the hub of the locking-arm h^6, the other of said springs or pens 2 being joined by a wire 13 with the pivot of the deflecting-switch lever m at the remote end of said transmitting-tube—that is, at the cashier's end thereof. Commencing again at the generator 8 the remaining pole thereof is connected by a wire 14 with the magnet h' at the said remote or cashier's end of said transmitting-tube, said magnet in turn being connected by a wire 15 with the contact 4 of the deflecting-switch lever m at that end of the tube. The contact 6 at the same switch is connected by a wire 16 with the said wire 15, and the remaining contact 7 is connected by a wire 17 with one of the contact springs or pens 2 at that end of the tube, the other contact 2 being joined by a wire 18 with the pivot of the deflecting-switch lever m at the first or transmitting end of the said tube.

In the normal condition of the circuits, as indicated in Fig. 5, both magnets h' at opposite ends of the transmission-tube are in a

normally open circuit. Consequently there is no exhaustion or waste of current when the apparatus is not in use. By reason of this the magnets at both ends of said tube are normally deënergized and their armature-levers h^2 are normally retracted, thus holding the latch-levers f normally in dotted or disengaging position, so that it is impossible for a meddlesome person to lift the hinged cap d^2 at either end of the line into operative position without first introducing a carrier into the tube.

When it is desired to convey a carrier from one to the other end of the transmitting-tube, the operator places the carrier against or upon the face of the rest r, provided therefor upon the inner face of one of the caps d^2—for instance, at one of the remote transmitting-stations—and swings the said cap upward into its horizontal or full-line position, Figs. 2 and 3, thus passing the carrier e into the transmitter-head d and opposite or into the end of the normally dead transmitting-tube d in position to be acted upon and propelled through said tube. As the carrier enters the said head it engages the deflecting-switch lever m at the right, Fig. 3, and deflects the lever to the right toward the end wall of said head, and thereby moves said switch-lever to break the connection between the contact 4 and the section 3 of the lever and at the same time establish connection between the fixed contacts 6 and 7. This throws into circuit and energizes both magnets h' at both ends of the line just before the hinged cap d^2 reaches its most elevated or closing position, causing said magnets to attract their respective armature-levers and free the latch f at the transmitting-station to catch and hold the cap d^2 until the said latch is positively removed from engagement therewith. Simultaneously with this the energizing of the magnet at the remote end of the line attracts its armature-lever and causes the notched end h^5 thereof to engage the free end of the upright locking-arm h^6 thereat and lock in its open position the hinged cap at that end of the line. Thus the introduction of a carrier into the transmitter-head d by deflecting the switch-lever m thereat automatically cuts in both magnets at the opposite ends of the line and locks the raised cap in its elevated position and the remote cap in its open position. The circuit through the magnets at this time is as follows: from the battery 8 over wire 9, magnet h' at the transmitting end, wire 10, branch 11, fixed contacts 6 7, wire 12 through the two contact springs or pens 2 2 by way of the connecting-sector 1 on the raised cap, wire 13 to the remote end of the line, switch-lever m thereat, fixed contact 4, wire 15, magnet h', and wire 14 to the opposite pole of the battery. The deflecting-switch m having been locked in its deflecting position by the lug $d^\times$ upon the hinged cap d^2 as the latter approached its final elevated position, the condition of the circuits must remain the same during the entire period of transmission or flight of the carrier e, whether it be a few seconds or a few minutes in transit, and as the said carrier issues at the opposite end of the line it engages the deflecting-lever m at said remote end of the line and moves the latter from its position (shown in Fig. 5) to break the contact between said lever and the fixed contact 4, thereby breaking the circuit through said magnets h', deënergizing the latter, releasing the elevated cap at the transmitting end, and also releasing the cap at the said remote end preparatory to lifting thereof for return of the carrier. Immediately upon deënergizing of the said magnets h' and issuance of the carrier from the tube both switch-levers m at the opposite ends of the line under the action of their springs m^3 are returned to their original positions. (Shown in dotted lines, Fig. 3, and in diagram Fig. 5.) Precisely the same changes in circuit and locking and unlocking of the parts takes place upon return of the carrier from the remote or cashier's end of the tube to the transmitting end thereof and also upon transmission of a second carrier in the same direction as the first before return of the first through the said tube.

Mechanism such as described or equivalent mechanism makes it impossible for the operator at one end of the line—for instance, the receiving end—to lift the hinged cap thereat either idly or for the transmission of a carrier during any part of the time occupied in the transmission of a carrier through the tube in either direction. Consequently it is impossible for two carriers to be introduced into the same tube at the same time with the intent of propelling them in opposite directions.

To insure proper movement of the deflecting-switch lever m by the carriers as the latter are introduced into transmitters, I preferably employ one or more supporting-fingers r', Fig. 3, that compel the carrier to move the deflecting-switch lever when entering or passing into the tube.

Reverting now to Fig. 1, it is ordinarily the case in large buildings and department-stores that the more congested departments are upon the lower or ground floor or floors, and progressing up through the buildings the departments increase in extent, and consequently fewer transmitting-stations are required. Where there are but comparatively few of these transmitting-stations on the higher floors of the building, it is desirable to avoid the expense of carrying the pressure-supply pipes from the basement to the higher floors and thence to the more widely distributed transmitting-stations. To obviate the necessity for this excessive outlay in connection with the complete system upon the lower floor or floors with stored or common pressure at opposite ends of each transmitting-tube, my invention comprehends the use upon the higher floor or floors of normally dead transmitting-tubes supplied with

stored pressure at one of the ends thereof—for example, adjacent the cashier's desk—and the remote or transmitting ends being provided with independent, preferably manually-operable or foot-power-pressure-creating, devices of suitable type or construction. For instance, referring to said Fig. 1, I have shown on a higher floor two transmitting-stations B′ B′, the transmitters whereof are similar in construction and operation to the transmitters B B, heretofore described, as arranged upon the main floor. Each of these other transmitters B′ is connected, as by a pipe *o*, with the cashier's desk in a manner similar to the connection therewith of the transmitting-pipes *b b*, so that the cashier, with the stored or other pressure supplied through the pipe b^6, already described, may employ such pressure to lift the carriers from the cashier's desk through the various higher floors to the required point and deliver the same to the transmitting-points wherever located. For the return of these carriers from the transmitting-points to the cashier's desk, however, little, if any, pressure is required, as the action of gravity may be safely relied upon to continue the progress of the carriers when once set in motion. This enables me to employ at these remote higher stations inexpensive forms of pressure-supplying devices, I having here shown at the transmitting-stations B′ foot-power-pressure devices or bellows—such, for instance, as shown and described in Letters Patent issued to me December 29, 1885, No. 333,113, and which illustrate the common form of foot-power bellows employed in other systems even at the present time. By this means the salesman at any one of these higher and more remote stations may with slight effort exerted through the foot-power bellows project the carrier to any near point, from which it may descend mainly or wholly by gravity to the cashier's desk. Thus whether stored or accumulated pressure is employed to propel the carriers through the transmitting-tubes in opposite directions or whether the stored pressure is employed to propel the carrier in one direction and an independent device, such as the foot-power bellows, used to propel it in an opposite direction there is provided by my invention a normally dead transmitting-tube extending between the sending and receiving points. This permits an apparatus involving my invention to be constructed at a minimum expense, because it does not involve return-tubes between the cashier's desk and each transmitting-station, and my system is furthermore more economical in use, because the transmitting-tubes are normally dead, hence are not wasting power either by projecting air under pressure or drawing air under suction therethrough. Statistics show that in the usual form of pneumatic-tube system as generally installed in large stores with constant currents of air through the transmitting-tubes, under pressure or by suction, ninety-nine per cent. at least is of no use whatever and absolutely wasted, because it performs no work. My invention eliminates this tremendous waste of power by leaving the transmitting-tubes dead and conserving the power during such time, as any such tube is not required for the actual transmission of a carrier.

I prefer to employ in connection with my improved system a carrier which is spherical in shape—such, for instance, as shown in the section Fig. 3, where said carrier is shown as divided diametrically, with its opposite parts hinged together, as at *e′*, or otherwise separated and joined, whereby they may be opened sufficiently for the introduction and removal of the contents.

By employing a spherical carrier I am enabled to employ elbows or bends in the making of turns in the transmitting-tubes that are much shorter in radius than would be possible were I to employ carriers of cylindrical shape.

The shorter radius bends are in every way more economical than bends of a longer radius and also permit the tubes to be laid or installed with more freedom and with greater compactness than would otherwise be possible. Furthermore, spherical carriers permit of the transmitting-tubes being reduced in diameter to substantially the exterior diameter of the carriers instead of requiring the said tubes to be made much larger in diameter than the carriers when the latter are cylindrical and long in order to permit such carriers to pass through the turns.

While I prefer to employ air as the medium for transporting the carriers from point to point, yet obviously any other suitable fluid or medium may be employed.

I have herein illustrated and described my invention as employed in connection with cash-carriers; but obviously my invention is equally applicable and with even a larger measure of economy, both as to construction and operation, in connection with pneumatic-tube systems for the conveyance of mail, parcels, and other articles. Hence my invention is not restricted to any particular use. Neither is my invention restricted to the particular embodiment thereof, (here shown and described as a medium of illustration,) for obviously my invention may be varied without departing from the spirit and scope of the same.

Having described my invention and without limiting myself in the matter of details, what I claim, and desire to secure by Letters Patent, is—

1. A pneumatic-carrier system comprising a carrier, a normally dead transmitting-tube therefor, a reservoir containing air at a pressure at variance with the pressure in said tube, means to place said reservoir in communication with the end of said tube, to cause the difference in pressure between the air in said reservoir and that in said tube to establish propelling movement of air through said

tube, a closure for the opposite end of said tube and automatic means for holding said closure withdrawn from the end of said tube during flight of a carrier toward it through said tube.

2. A pneumatic-carrier system comprising a carrier, a normally dead transmitting-tube therefor, means to admit stored pressure at the end of said tube, a closure for the opposite end of said tube and automatic means for holding said closure withdrawn from the end of said tube during flight of a carrier toward it through said tube.

3. A pneumatic-carrier system comprising a carrier, a normally dead transmitting-tube therefor, means to admit stored pressure at each end of said tube, as required, and automatic means to prevent admission of such pressure at either end of said tube during the flight of a carrier thereto.

4. In a pneumatic-carrier system requiring greater effort to propel the carrier in one direction than in another, a carrier, a normally dead transmitting-tube therefor, means to admit stored pressure at the end of said tube requiring the greater effort for propelling said carrier therefrom, and an independent pressure-creating device to supply pressure at the opposite end of said tube which requires the lesser effort for propelling said carrier therefrom.

5. A pneumatic-carrier system comprising a carrier, a normally dead transmitting-tube therefor, means common to both ends of said tube to supply pressure at each, automatic means to prevent admission of such pressure at either end of said tube during the flight of a carrier thereto, and automatic devices for controlling said pressure-supplying means to maintain the pressure substantially uniform at all times.

6. A pneumatic-carrier system comprising one or more carriers, a plurality of normally dead transmitting-tubes, and means common to all said tubes to supply stored pressure to each, and automatic means to prevent admission of such pressure at either end of said tubes during flight of a carrier therethrough toward such end.

7. A pneumatic-carrier system comprising one or more carriers, a plurality of normally dead transmitting-tubes therefor, means to supply stored pressure to both ends of one or more of said tubes, and at one end only of other tube or tubes.

8. A pneumatic-carrier system comprising one or more carriers, a plurality of normally dead transmitting-tubes therefor, means to supply stored pressure to both ends of one or more of said tubes, and to one end only of other tube or tubes, and independent means to supply pressure to the opposite end of said other tube or tubes.

9. A pneumatic-carrier system comprising a carrier, a normally dead transmitting-tube therefor, means to maintain a variable supply of air under substantially uniform pressure, automatic means to replenish said supply, and means for connecting said supply with said tube.

10. A pneumatic-carrier system comprising one or more carriers, a plurality of normally dead transmitting-tubes, means common to all of said tubes to maintain a variable supply of air under uniform pressure, automatic means to replenish said supply, and means connecting said supply with the ends of said tubes.

11. A pneumatic-carrier system comprising a carrier, a source of pressure, a tube having its ends in connection with said source, means to maintain a part of the length of said tube normally dead, to conserve the pressure and to admit the latter through said normally dead portion in either direction for propelling said carrier therethrough, and means to prevent admission of such pressure through said dead part in one direction during the period of flight of the carrier therethrough in an opposite direction.

12. A pneumatic-carrier system comprising one or more normally dead transmitting-tubes, a supply-receiver therefor to maintain a variable quantity of fluid under substantially constant pressure, and means automatically to replenish said receiver.

13. A pneumatic-carrier system comprising one or more normally dead transmitting-tubes, an inverted vertically-movable pressure-receiver to contain propelling fluid under pressure therefor, with means to supply fluid under pressure to the interior of said receiver.

14. A pneumatic-carrier system comprising one or more normally dead transmitting-tubes, a vertically-movable inverted pressure-receiver therefor, means to supply fluid under pressure to said receiver, and means controlled by the said movable receiver in its different positions to govern the operation of said fluid-pressure-supplying means.

15. A pneumatic-carrier system comprising a source of stored pressure, having an outlet-conduit therefrom leading to variously-located transmitting-points, with branches connected with each and a conduit connection also to a receiving-point, and independent normally dead transmitting-tubes connecting said transmitting-points and said receiving-points.

16. In a pneumatic-carrier system the combination with a source of stored pressure, of a normally dead transmitting-tube adapted at one end to be placed in communication with said source, and a manually-operable pressure-creating device at the opposite end of said tube, both said source and said device furnishing pressure to operate through said tube.

17. In a pneumatic-carrier system a normally dead open-ended transmitting-tube, a supply-tube therefor containing stored pressure, means to close the end of said transmitting-tube and a simultaneously-operable

swing-valve pivoted at one side the axis of said supply-tube to open communication between said transmitting-tube and said supply-tube, and automatic means for and to lock said closing means and said swing-valve.

18. A pneumatic-carrier system comprising a normally dead open-ended transmitting-tube, a supply-tube therefor containing stored pressure, a swing-valve pivoted at one side the axis of said supply-tube normally closing said supply-tube, means connected with said valve for closing the open end of said transmitting-tube, and automatic locking means for positively locking said swing-valve and said connected means and common to both.

19. In a pneumatic-carrier system a transmitter containing an offset passage, a transmitting-tube connected with one end of said passage, and a pressure-supply tube connected with the other end thereof, a valve normally closing said offset passage, a cap to close the end of said transmitting-tube, an arm connecting said cap and valve and pivoted in a slot in the side wall of said passage substantially as described.

20. In a pneumatic-carrier system a transmitter containing an offset passage, a transmitting-tube connected with one end of said passage, and a pressure-supply tube connected with the other end thereof, a valve normally closing said offset passage, a cap to close the end of said transmitting-tube, an arm connecting said cap and valve and pivoted in a slot in the side wall of said passage, and a removable door in the wall of said passage to permit access to said valve, substantially as described.

21. A pneumatic-carrier system comprising a transmitting-tube, means separately connected with each end thereof to introduce pressure thereat, and means to render effective, pressure introduced at one end only of said tube during the period of flight of a carrier therethrough.

22. A pneumatic-carrier system comprising a transmitting-tube, means separately connected with each end thereof to introduce pressure thereat, and means dependent upon the introduction of a carrier to admit effective pressure to said tube at one end only during the period of flight of a carrier therethrough.

23. In a pneumatic-carrier system a transmitting-tube, closures for the ends thereof, and means to prevent simultaneous closure thereby of both ends of said tube.

24. In a pneumatic-carrier system a transmitting-tube, a movable cap closing the entrance thereto at each end, and means for preventing the placing of both said caps in operative closing position at any one time.

25. In a pneumatic-carrier system a transmitting-tube having an entrance-opening at its end, a movable cap to close said opening, and means dependent for its operativeness upon the introduction of a carrier to lock said cap in its position closing said opening.

26. A pneumatic-carrier system comprising a pneumatic tube having an entrance-exit opening at its end, a cap to close said opening, and means rendered operative by the presence of a carrier in said tube to lock said cap against movement into position closing said opening.

27. A pneumatic-carrier system containing a transmitting-tube having an entrance-exit opening at each end, a movable cap to close each of said openings, locking devices to lock in their closed positions the caps at opposite ends of said tube, said locking devices being capable of effective operation only on introduction of a carrier into said tube, and automatic means for admitting propelling pressure to said tube at the end closed by said cap.

28. In a pneumatic-carrier system, a transmitting-tube having an entrance-exit opening at or near each end, a cap to close each of said openings, locking devices for said caps to lock them respectively in their closed positions, said locking devices respectively being capable of effective operation only during flight of a carrier away from the locked cap, means set in operation by said carrier as it issues from the opposite end of said tube to release the locked cap, and automatic means for admitting propelling pressure to said tube at its end adjacent the locked cap.

29. In a pneumatic-carrier system a transmitting-tube having an entrance-exit opening at or near each end, movable closures for said opening, and electromagnetic locking means for locking said closures in open and closed positions at the proper times, and means operated by the carrier in its flight through said tube to control the circuits of said locking means.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILBUR G. DAVIS.

Witnesses:

EVERETT S. EMERY,

A. E. CHESLEY.