No. 738,102. PATENTED SEPT. 1, 1903.

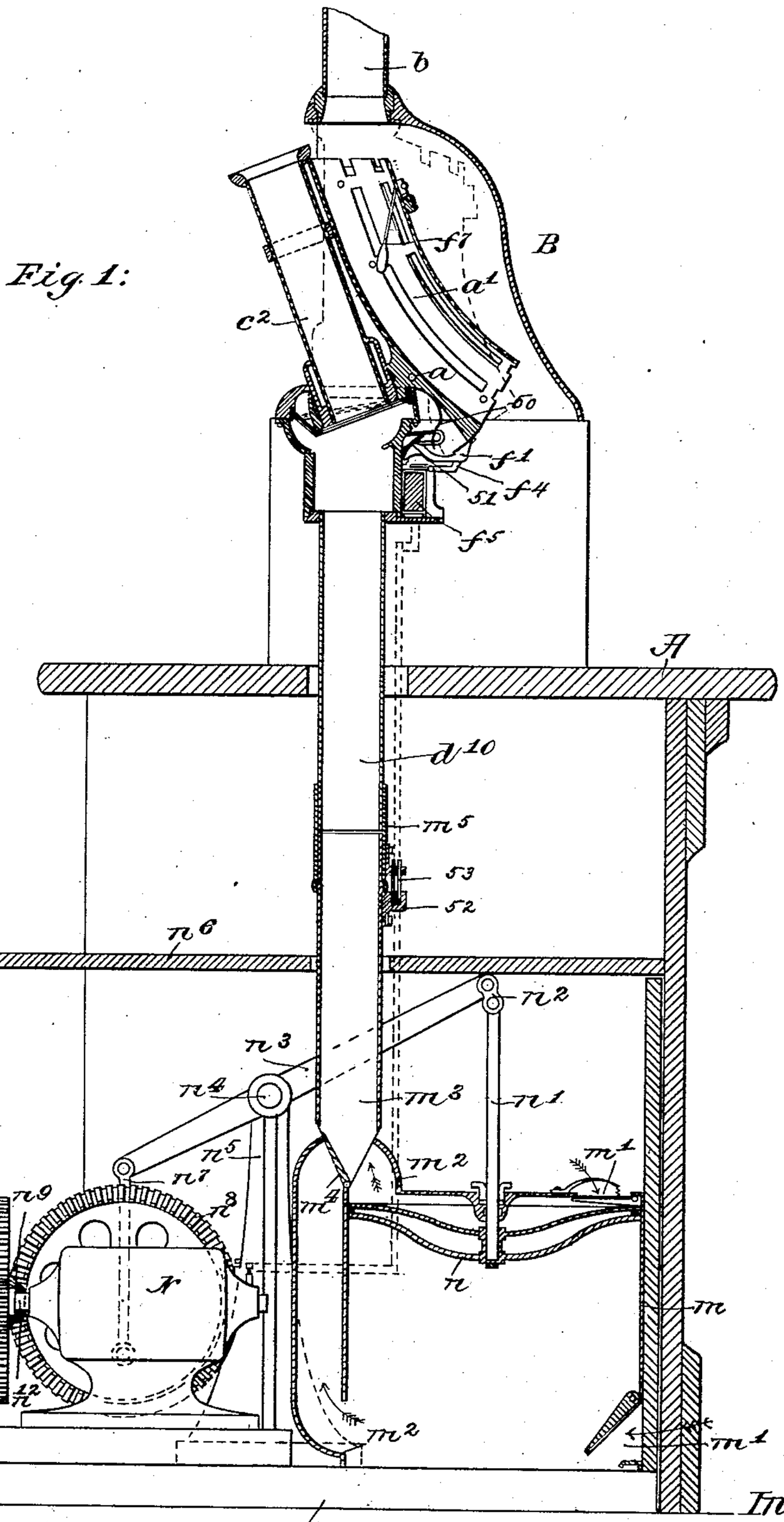
W. G. DAVIS.

PNEUMATIC CARRIER SYSTEM.

APPLICATION FILED JAN. 2, 1903.

NO MODEL. 3 SHEETS—SHEET 1.

Fig. 1:



Witnesses,
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NO MODEL. 3 SHEETS—SHEET 2.

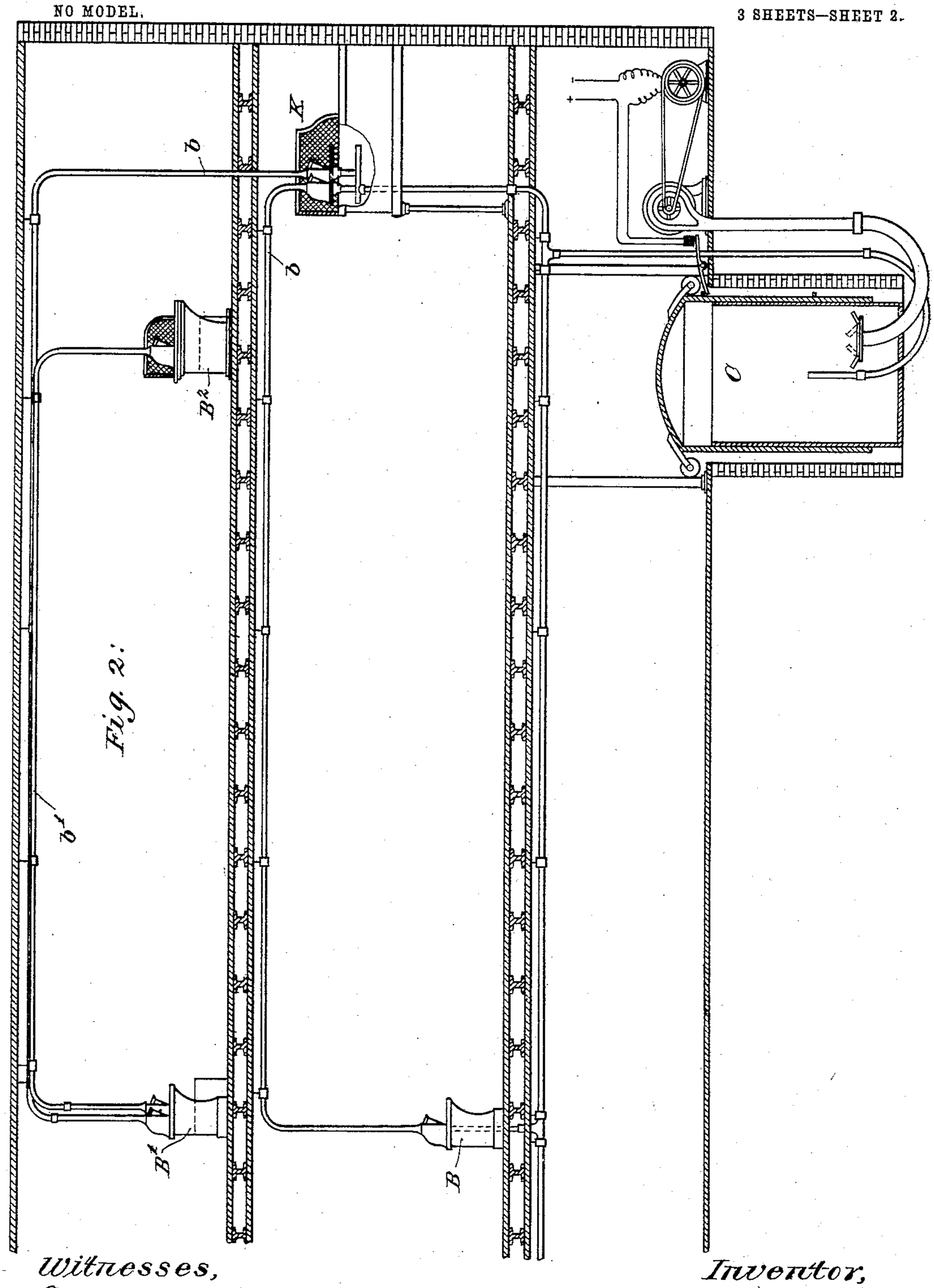

Fig. 2.

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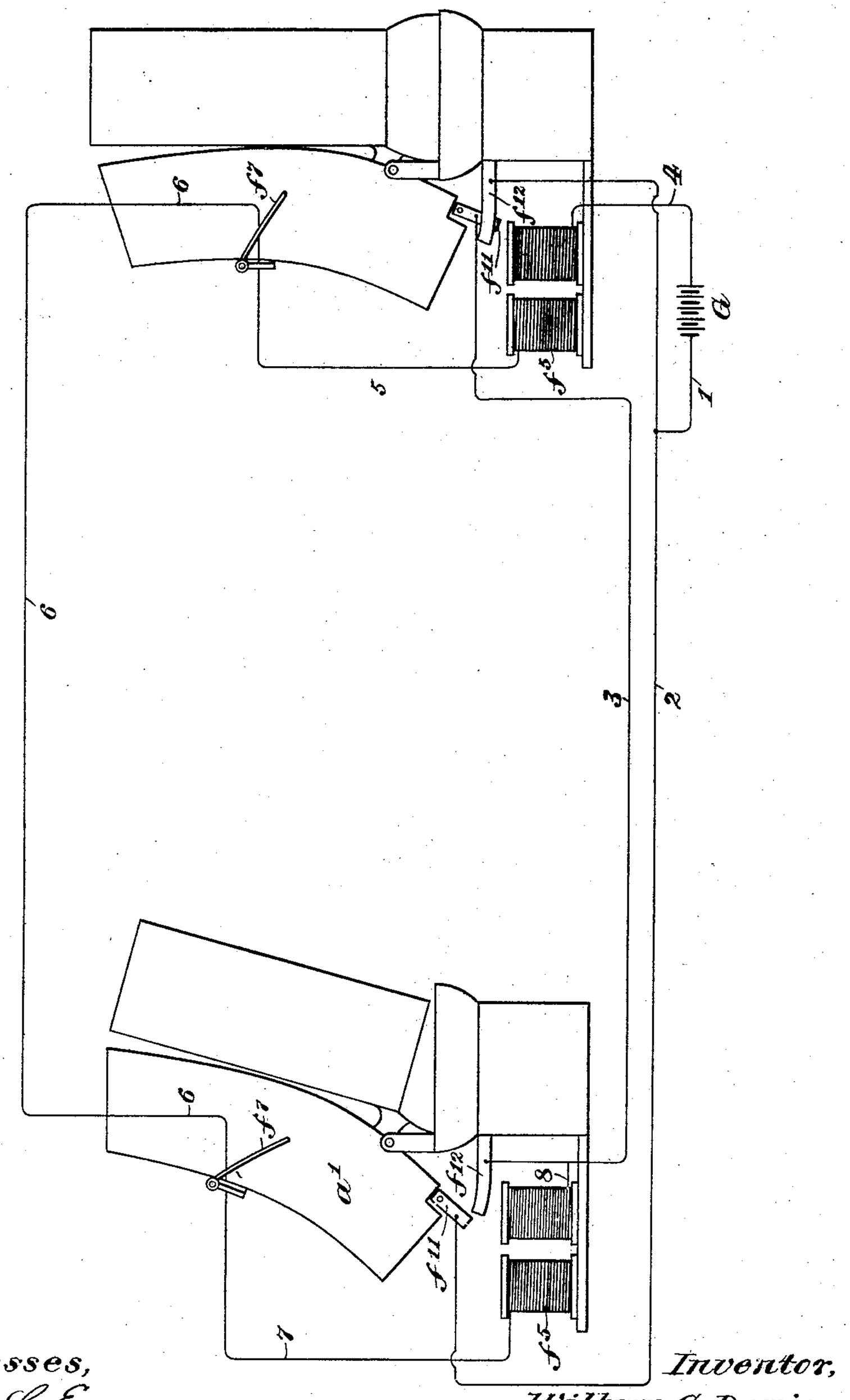
PNEUMATIC CARRIER SYSTEM.

APPLICATION FILED JAN. 2, 1903.

NO MODEL. 3 SHEETS—SHEET 3.

Fig. 3:



Witnesses,
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No. 738,102. Patented September 1, 1903.

UNITED STATES PATENT OFFICE.

WILBUR G. DAVIS, OF NEWTON, MASSACHUSETTS, ASSIGNOR TO THE SINGLE TUBE TRANSMISSION COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MAINE.

PNEUMATIC-CARRIER SYSTEM.

SPECIFICATION forming part of Letters Patent No. 738,102, dated September 1, 1903.

Application filed January 2, 1903. Serial No. 137,378. (No model.)

To all whom it may concern:

Be it known that I, WILBUR G. DAVIS, a citizen of the United States, residing in the city of Newton, county of Middlesex, and Commonwealth 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 is an improvement in pneumatic-carrier systems for the carriage of cash, mail, parcels, &c.

Prior to my invention systems of this kind have usually employed pressure obtained from a single central point and distributed therefrom to the various transmitting-points, or when the business will not justify such an installation the variously-distributed transmitting-points have been provided with foot-power devices to furnish the required pressure for propelling the carriers to their destination. Frequently, however, foot-power devices are inadequate or require too much effort for their operation in propelling the carriers for the required distances, and this frequently where, for other reasons, it is not desired to install the other or central distribution system. My invention aims to meet these conditions by providing a system involving one or more isolated stations equipped with pressure-creating devices respectively operated by electric or other motors, whereby without manual effort sufficient pressure may be quickly generated for propelling the carrier any desired distance.

My invention will be best understood from a description of one embodiment thereof shown in the accompanying drawings.

Referring to the drawings, Figure 1 in vertical section shows a pressure-creating device illustrating one embodiment of my invention; Fig. 2, a diagrammatic view illustrating the application of my invention in a typical store-service system; and Fig. 3, a diagram showing the arrangement of locking-circuits.

In the particular embodiment of my invention selected for illustration herein and shown in the drawings, referring first to Fig. 1, A indicates a usual counter, beneath which it is intended this entire device may be conveniently placed. The device itself comprises a base M, upon one end of which is mounted the cylinder m, provided at its ends, respectively, with inlet-ports, as m' m', controlled by suitable valves. Outlet parts, as m^2 m^2, communicate with a common outlet-pipe m^3 under the control of a single swing-valve m^4. Within the cylinder m is a piston n, mounted on the end of a piston-rod n', which may be reciprocated in desired manner from any desired motor. In the present instance said piston is driven through a link n^2 from the rocker n^3, fulcrumed at n^4 in a suitable standard n^5, mounted on the base M. The removable box or shell n^6, suitably perforated to provide for a free supply of air to the pressure-creating device, is employed to cover and protect the working parts of this apparatus. At its opposite end the rocker n^3 is connected by a pitman n^7 with a crank on the wheel n^8, crown-toothed to mesh with and be driven by a pinion n^9 on the gear n^{10}. The gear n^{10} in turn is driven by a pinion n^{11} on the shaft n^{12}, herein of an electric motor N, also mounted on said base. Operation of the motor thus operates to reciprocate the pump-piston to deliver air or fluid under pressure through the pipe n^3. Upon the counter A may be arranged any suitable transmitting or transmitting-receiving devices for the carriers. I have here shown a combined transmitter-receiver c^2 a', pivoted at a to enable it to be tipped into position with either the transmitter or receiver opposite the end of the transmission-tube b. Such transmitter-receiver is described in my Patent No. 735,861, granted August 11, 1903, to which reference may be had, if desired, although as here used the valve d^2 of said patent is unnecessary. The transmitter-receiver is locked in either of its extreme positions by a dog f', controlled by the armature-lever f^4 of an electromagnet f^5. Whenever the magnet-circuit is closed, the transmitter-receiver at each end of the tube is locked in one of its extended positions. When a carrier is received through

the receiver a', it deflects the switch f^7 and breaks the circuit long enough to deënergize the magnets and release the parts. The locking is here and preferably by electricity, and in Fig. 3 I have illustrated the system of locking which I prefer to employ and which is substantially as shown in my Patent No. 735,861, referred to. Referring to said figure, the battery or generator G is connected by a wire 1 with the wire 2, the latter joined at one of its ends to a movable contact f^{11} on the receiver a' at one of the stations, the other end of said wire 2 being joined to the fixed contact f^{12} at the opposite end of the line. The fixed contact f^{12} at the former station is connected by wire 3 with the movable contact f^{11} at the latter station. The opposite pole of the battery G is connected by wire 4 with the magnet f^5 at the last-mentioned station, thence by wire 5 with the releasing-switch f^7, thence by wire 6 with the releasing-switch f^7 at the first-mentioned station, thence by wire 7 to the magnet f^5 thereat, thence by wire 8 with the wire 3, previously referred to. When the transmitters c^2 at both stations are in their forward or inclined positions, all the circuits from the battery G are broken by separation of the fixed and movable contacts f^{12} f^{11} at the two stations. Hence the respective magnets f^5 are deënergized and both transmitters are free to be tipped into vertical position for use. If now a carrier be inserted in one of the transmitters—for instance, that at the right, Fig. 3—and said transmitter tipped inward into its vertical position for transmission of a carrier, this inward movement of said transmitter will close the battery-circuit at the contacts f^{11} f^{12}, thereby completing the circuit, which will energize the distant magnet f^5 and through its armature f^4 raise its locking-lever f' to lock the receiver thereat in receiving position. The magnet f^5 at the transmission-station is also energized and through its locking-lever f' locks its transmitter in vertical or transmitting position, as shown in dotted lines, Fig. 1. When the carrier issues through the receiver at the remote end of the line, it deflects the switch f^7 thereat, breaks the electric circuit, and frees both armatures and their locking-levers, thus freeing both instruments for the sending of a second carrier in the same direction or for the return of a carrier in the opposite direction. The locking and unlocking is effected in substantially the same manner from both ends of the line, and further description is therefore unnecessary. By this means after having moved one transmitter into transmitting position it is impossible to return it to its original position or to move the remote receiver from receiving position until the carrier has completed its flight, and when released both transmitters gravitate to their outward inclined positions, thereby to be in readiness to receive carriers for transmission.

Referring to Fig. 1, the supply-pipe d^{10} of the transmitter is shown connected with the delivery-pipe m^3 by a slip joint or sleeve m^5, which if raised disconnects the adjacent ends of said pipes and permits the base M to be withdrawn with all its working parts and, if desired, quickly replaced by another.

A switch-arm 50 on the transmitter-receiver coöperates with a fixed contact or contacts 51 on the base of the transmitter-head to close the motor-circuit thereat and start the motor whenever the transmitter is moved into transmitting position. The motor and pump when started continue the operation to provide the pressure required for transmission of the carrier until the latter, issuing through the receiver at the opposite end of the transmission-tube, deflects the switch f^7 thereat and breaks the circuit of the locking-magnets f^5. This permits the transmitter-receiver at the transmission end of the line to gravitate forward, as described, into the full-line position, Fig. 1, breaking the motor-circuit at the switch 50 51 and stopping the motor, and since the two transmitters cannot be moved into vertical transmitting position at one and the same time, the first one moved locking the other, as described, against movement, it follows that the motors and their pressure-creating devices, the operation of which is governed by the positions of the respective transmitters, likewise cannot be set in operation at the same time. Consequently it is impossible to create in the tube at the same time opposing pressures, which of course would prevent the movement of a carrier in either direction.

To facilitate connecting and disconnecting the motor-circuits for removal of the motor, I have connected the motor-wires to a plate 52, with which coöperate a pair of plugs 53, constituting the terminals of the line-wires, and the plate 52 and plugs 53 may conveniently be placed, respectively, on the slip-sleeve m^5 and one of its adjacent pipe ends m^3 or d^{10}, whereby movement of said sleeve to disconnect and connect said pipes will simultaneously and automatically break or close the motor-circuit.

Referring to Fig. 2, which illustrates the use of devices embodying my invention, K indicates, for example, a cashier's desk, to which lead various tubes b and b from distant transmitting or sub station B and B'. The ends of the tubes at the cashier's desk and at the station B may be supplied with stored pressure, as from the receiver C, after the manner described in my United States Patent No. 714,873, dated December 2, 1902. The station B' is equipped with a motor device, such as illustrated in Fig. 1, the same supplying not only the tube b, but also a second tube b', leading, it may be, to a station B^2, which latter may also be equipped with a device like Fig. 1. This illustrates the use of my invention, for on the busy floors or portions of a building stored pressure may be used, as between the cashier's desk A and a

frequently-used station B, which may be conveniently supplied with pressure from a central point, as the receiver C. The station B′, if inaccessible from the receiver C or if so located or operated under such conditions as to make it undesirable to supply it from C, may be provided with a device embodying my invention, which will return the carriers to the cashier's desk or send carriers to another point, as B^2, which may be even more remote from the central source of power-supply C. Thus my invention has a convenient use in connection with systems using stored pressure or pressure generated by a generating unit applied where desired, as at B^2.

My apparatus (shown in Fig. 1) furnishes the highest economy, since it is in operation only when propelling a carrier or carriers through a tube or tubes, it being understood, of course, that when it is used to supply a plurality of tubes the use of a transmitter for any one of the tubes will cause operation of the motor. The apparatus Fig. 1 also provides sufficient power and capacity for propelling carriers through the longest tubes, combined nevertheless with the utmost flexibility of installation, for they may be located anywhere in the building without the necessity of connecting them with a common source of pressure, as heretofore.

My invention is not limited to the particular embodiment shown in Fig. 1, nor to the particular installation, Fig. 2, but may be variously embodied and installed within the spirit and scope of my invention.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A pneumatic-carrier system employing a normally dead transmission-tube and having one or more motor-driven substation pressure-creating devices.

2. A pneumatic-carrier system having a principal source of propelling pressure and one or more intermittently-operable motor-driven substation pressure-creating devices.

3. In a pneumatic-carrier system, the combination with a transmission-tube, of a motor-driven pressure-creating device therefor, and means to set the same in effective operation upon the presentation of a carrier in a transmitting position within said tube.

4. In a pneumatic-carrier system, the combination with a transmission-tube of a motor-driven pressure-creating device therefor, and means to set the same in operation upon the presentation of a carrier in a transmitting position within said tube.

5. In a pneumatic-carrier system, the combination with a transmission-tube of a pressure-creating device therefor, an electric motor for operating said device and means to start said motor upon the presentation of a carrier in transmitting position, within said tube.

6. In a pneumatic-carrier system the combination with a transmission-tube of a pressure-creating device therefor, a motor for operating said device, means to start said motor for propelling a carrier through said tube upon the presentation of the same in a transmitting position within said tube and means operated by exit of said carrier at the receiving end of said tube to stop said motor.

7. In a pneumatic-carrier system the combination with a transmission-tube having a movable transmitter at its end, of a motor-operated pressure-creating device for said tube and means operated by movement of said transmitter to set said motor in effective operation.

8. In a pneumatic-carrier system the combination with a transmission-tube having a movable transmitter at its end, of a motor-operated pressure-creating device for said tube and means operated by movement of said transmitter to set said motor in effective operation, also to stop such operation.

9. In a pneumatic-carrier system the combination with a transmission-tube, of a reciprocatory pressure-creating device therefor, a motor for operating said device, means to start said motor for propelling a carrier through said tube upon the presentation of the same in a transmitting position within said tube, and means operated by exit of said carrier at the receiving end of said tube to stop said motor.

10. In a pneumatic-carrier system the combination with a transmission-tube, of a reciprocatory pressure-creating device therefor, a motor for operating said device, and means to start said motor for propelling a carrier through said tube upon the presentation of the same in a transmitting position within said tube.

11. A pneumatic-carrier system comprising a central receiving-station, means to supply propelling pressure thereat, a normally dead transmission tube or tubes and one or more substations and motor-driven pressure-creating devices thereat.

12. A pneumatic-carrier system comprising a plurality of distributed motor-driven pressure-creating devices and normally dead transmission-tubes leading therefrom to desired points.

13. A pneumatic-carrier system comprising a central station, means to supply carrier-propelling pressure thereat, one or more normally dead transmission-tubes leading therefrom, and one or more substation motor-driven pressure-creating devices connected by tube with said central station.

14. A pneumatic-carrier system comprising a plurality of distributed motor-driven pressure-creating devices, transmission-tubes leading therefrom to desired points, and means to operate said devices only during transmission of carriers therefrom through their respective tubes.

15. A pneumatic-carrier system comprising a plurality of distributed motor-driven pressure-creating devices, transmission-tubes

leading therefrom to desired points, carrier-despatch means for said transmission-tubes, and means to operate said pressure-creating devices only on movement of said carrier-despatch means.

16. A pneumatic-carrier system containing a plurality of motor-driven pressure-creating devices, transmission tube or tubes connecting the same in desired manner, and means to prevent simultaneous effective operation of opposed pressure-creating devices connected with the same tube.

17. In a pneumatic-carrier system the combination with a transmission-tube of carrier-despatch means therefor, a pressure-creating device for said tube, a motor for driving said device operated by movement of said carrier-despatch means and means operated by exit of the carrier at the receiving end of said tube to stop said motor.

18. A pneumatic-carrier system containing a plurality of motor-driven pressure-creating devices, transmission tube or tubes connecting the same in desired manner, and means to prevent simultaneous effective operation of opposed pressure-creating devices connected with the same tube.

19. A pneumatic-carrier system containing a plurality of pressure-creating devices, a transmission-tube connecting the same, means for introducing a carrier at each end of said tube, means to prevent simultaneous operation of said carrier-introducing means at opposite ends of said tube, and means controlled by said carrier-introducing means for controlling the operation of the said pressure-creating devices.

20. A pneumatic-carrier system containing a plurality of pressure-creating devices, a tube connecting the same, movable transmitters at opposite ends of said tube, means to lock one of said transmitters in non-transmitting position when the other is moved into transmitting position, and starting and stopping means for the respective pressure-creating devices operated by movement of their respective transmitters.

21. In a pneumatic-carrier system, a transmission-tube, transmitters at opposite ends thereof, pressure-creating devices for supplying pressure respectively at opposite ends of said tube, and means to prevent operation of either of said pressure-creating devices during the flight of a carrier toward the corresponding end of said transmission-tube.

22. A pneumatic-carrier system containing a plurality of intermittently-operable motor-driven substation pressure-creating devices.

23. In a pneumatic-carrier system the combination of a central receiving-station, a substation, means for creating a propelling movement of air to propel a carrier from said central station to said substation, and a motor-driven propulsion device for said substation.

24. In a pneumatic-carrier system the combination of a central receiving-station, a substation, means for creating a propelling movement of air to propel a carrier from said central station to said substation, carrier-despatch apparatus at said substation and a motor-driven propulsion device for said substation operated through movement of said carrier-despatch apparatus.

25. In a pneumatic-carrier system, the combination with a transmission-tube of a motor-driven reciprocatory pressure-creating device connected therewith.

26. In a pneumatic-carrier system, a pressure-creating device, a driving-motor therefor mounted therewith upon a portable base, said pressure-creating device having means for removably connecting the same with the transmitting-tube of a transmitting-station.

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

WILBUR G. DAVIS.

Witnesses:

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THOMAS B. BOOTH.