E. A. FORDYCE.

PNEUMATIC DESPATCH TUBE APPARATUS.

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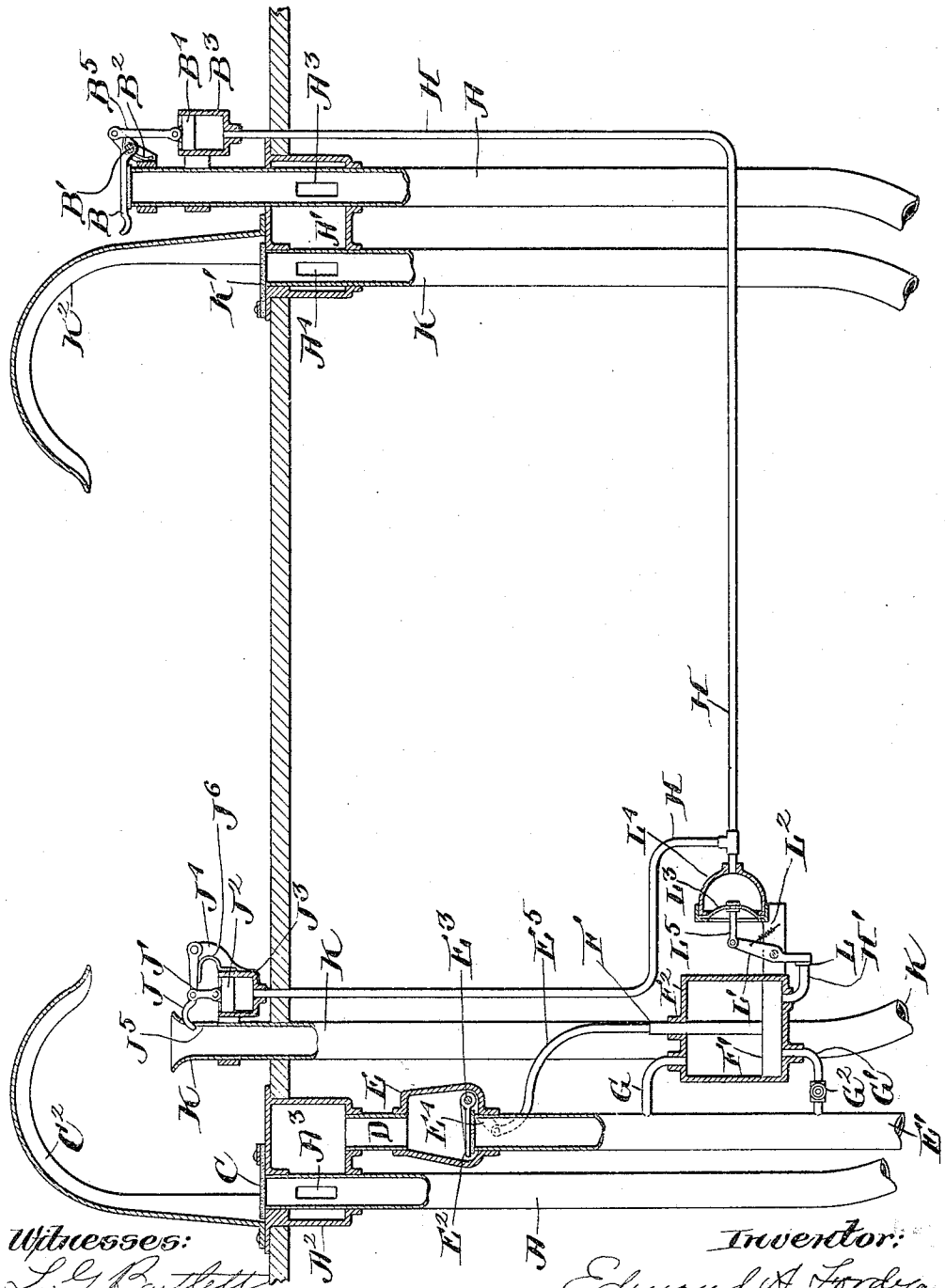

Witnesses:
L. G. Bartlett
A. L. Messer

Inventor:
Edmund A. Fordyce
by O. C. Gilmore
Atty.

UNITED STATES PATENT OFFICE.

EDMOND A. FORDYCE, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO AMERICAN PNEUMATIC SERVICE COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF DELAWARE.

PNEUMATIC-DESPATCH-TUBE APPARATUS.

1,138,206. Specification of Letters Patent. Patented May 4, 1915.

Application filed April 15, 1907. Serial No. 368,190.

To all whom it may concern:

Be it known that I, EDMOND A. FORDYCE, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Pneumatic-Despatch-Tube Apparatus, of which the following is a specification.

This invention relates to improvements in pneumatic despatch tube apparatus, and its object is to provide an apparatus on the vacuum principle through which a current of air is permitted to pass only during the interval necessary for the transmission of carriers.

Another object is to automatically control and start a current of air within the system upon the insertion of a carrier for transmission.

In the accompanying drawing which illustrates a construction embodying my invention, the figure is a side elevation partly in section showing the controlling mechanism in normal position.

A represents a transit tube connected at one end with a terminal A′ at a sub station and at the opposite end to a terminal A^2 at the cashier's or central station; at the terminal A′ and at the terminal A^2, the tube A is in communication therewith through slots A^3 located in said tube. The upper end of the transmission tube A at the sub station is closed by an inlet valve B and at its opposite end at the central station is closed by a delivery valve C as shown; the terminal A^2 is connected by pipe D with the chamber E, said chamber E being adapted to communicate through a tube E′ with a suitable source of vacuum. The upper end of the tube E′ is normally closed by valve E^2, pivoted at E^3, and said valve is provided with a crank arm E^4 to which is pivotally connected the rod E^5 secured to the piston rod F adapted to operate within the cylinder F^2, where such rod is connected with the piston F′. The exhaust tube E′ communicates with the upper part of the cylinder F^2 by pipe G and to the lower part of the cylinder F^2 by pipe G′; this pipe G′ is controlled by an adjustable needle valve G^2, the operation of which will be hereinafter described. The cylinder F^2, the piston F′ and their connections constitute a fluid-pressure motor for operating the valve E^2.

Connected with the terminal A′ and communicating therewith through slots A^4, is a transmission tube K extending from the central station. The end of the said tube K at the central station has a bell-mouth for the insertion of carriers for transmission to a sub-station. The end of the tube K at the sub-station is controlled by an ordinary delivery valve K′.

Connected with the lower part of cylinder F^2 beneath the piston F′ is an air inlet pipe H′ normally closed by the valve L mounted on the lever L′ and held in position by a spring L^2. The lever L′ is connected by a rod L^5 with a diaphragm L^3 mounted within the diaphragm chamber L^4; the diaphragm L^3 is open at the outer side to the atmosphere and the chamber L^4 is connected by tubes H one of which is connected with a cylinder J^3 at the central station and the other with a cylinder B^3 at the sub-station. The diaphragm L^3, the chamber L^4 and their connections comprise a fluid-pressure controller for actuating the fluid-pressure motor to operate the valve E^2.

Mounted within a cylinder J^3 is a piston J^2 connected by means of a link J′ with a trip lever J which is pivoted at one end to an extension J^4 of the cylinder J^2, the other end projecting through a slot J^5 into the path of the carriers in the bell-mouth K. The lever J is held upward by means of a spring J^6; at the sub-station mounted within the cylinder B^3 is a piston B^4 connected by means of a link B^5 with an arm extending from the valve B which is pivoted at B′. The valve B is normally held closed by a spring B^2.

The operation is as follows: when a carrier is to be despatched from a sub-station to the central station, the valve B is opened by the operator and the movement transmitted through link B^5 and piston B^4 causes an impulse of air to pass through the tube H and into the diaphragm chamber L^4 forcing the diaphragm L^3 outward, opening the valve L and admitting air through the tube H′ into the cylinder F^2 forcing the piston F′ upward and through rod E^5 and crank E^4 opening the valve E^2 causing the tube D and chamber E to be placed in communication with the source of vacuum. In the meantime the valve B having been released by the operator, the said valve B and piston B^4 resume their normal position by action of the spring B^2, and the pressure within the chamber L^4 is relaxed permit-

ting the diaphragm L^3 to resume its normal position and the valve L to close the tube H' to the atmosphere by means of the spring L^2. The air now entering the bell-mouth at the central station, passes through the tube K, slots A^4, terminal A', slots A^3 and into the tube A, driving the carrier through said tube A toward the central station. The valve L having closed as heretofore described, permits the air beneath the piston F' to be gradually exhausted through the tube G', allowing the piston F' to gradually drop by gravity and closing the valve E^2. The drop of the piston F' and the closure of the valve E^2 is timed by the needle valve G^2, which is adjusted to allow said valve E^2 to close immediately after the carrier has discharged through the valve C and into the rack C^2 at the central station. The cashier at the central station desiring to despatch a carrier to the sub-station, inserts the carrier X into the bell-mouth of the tube K and the carrier engaging the trip lever J forces the piston J^2 downward and causes an impulse of air to be transmitted through the tube H, and acting upon the diaphragm L^3 opens the valve L admitting air to the cylinder F^2, and opening the valve E^2 as hereinbefore described. The air now entering the bell-mouth drives the carrier X through the tube K and by the time the carrier has discharged through the valve K' and into the rack K^2 at the sub-station, the valve E^2 has been closed and the current of air shut off. After the passage thereover of the carrier X, the trip J is immediately caused to resume its normal position by the spring J^6 and the valve L is permitted to be closed by the spring L^2.

In my Patent No. 813,636, dated February 27, 1906, I disclosed a pneumatically operated means for opening an air valve, not dissimilar in some respects to the means employed herein for the actuation of the valve E^2. In said patent, as in the present case, the valve-opening means was directly controlled by a pilot valve, substantially corresponding to the valve L herein; but said valve in my prior construction was in turn controlled from the sending stations or terminals through the instrumentality of an electric circuit or circuits; whereas in the present case the distant control of the valve L is effected through fluid pressure apparatus. Several advantages reside in this latter construction over that previously disclosed by me; it being frequently found, in practice, undesirable or objectionable to extend the electric wires through a store or other building, owing, in some cases, to the possibility of short circuiting to these wires from high potential leads which may happen to be in the immediate vicinity of said wires. Furthermore, if the battery or other source of current employed in the construction described in my said patent, should fail, or if indeed the controlling circuit be otherwise impaired, it is obvious, of course, that the requisite distant control of the main air valve could not be had and the system would therefore be rendered substantially inoperative until the trouble with the electric circuit had been located and rectified. Where such a simple mechanism as is employed in the present construction for the distant control of the pilot valve is utilized, the likelihood of the system being rendered inoperative for any reason in connection with said control is materially less than in the electric control above referred to.

The present system is in many cases cheaper to install than my former system and furthermore the resistance to the opening of the valve B or to the insertion of the carrier at K, offered to the hand of the operative by the compressed air in tubes H and associated parts practically serves as a means to indicate to him that this portion of the apparatus is operating as it should; whereas in the electrically controlled apparatus no variation in resistance offered by the carrier to the hand of the operative, when being inserted, occurs when the electric circuit is out of order. Several other minor advantages reside in the present construction such as, for example, the impossibility of the operative becoming electrically shocked, which is apt to happen where electric apparatus of any description is employed unless extreme care be taken to effect proper insulation of parts.

I am also aware that pneumatically actuated mechanism has been used in other arts than that to which the present invention relates; but to the best of my knowledge, the application of fluid-impulse actuated controlling mechanism has never been employed heretofore in this art in any such manner as has hereinbefore been described as a means for accomplishing the objects set forth.

In conclusion I desire to point out that in my preferred form of apparatus the pilot valve controlling diaphragm may be separately and independently actuated from a plurality of relatively remote points or stations by fluid pressure means; while the creation of a pneumatic impulse for controlling said diaphragm by the mere act of inserting a carrier in a transmission tube or by the act of opening a valve which normally closes said tube, is believed to be distinctively new.

It will be observed that I have exemplified two closely related forms of apparatus for establishing or creating the fluid pressure impulse in the tubes H whereby to cause the actuation of the diaphragm L^3. In one of these forms of apparatus, *i. e.* that shown to the left in the figure, the insertion of the car-

rier effects a depression of the member J which results in a corresponding movement of the piston J^2; while in the other form shown to the right in the figure, the upward movement of the valve or cover B causes a corresponding downward movement of the piston B^4. In other words, the parts J and B are respectively the operating members of the two pressure creating pumps in question; and it will be further noted that in both cases the operating member in question normally extends into the path which a carrier must traverse to be despatched from the station at which such operating member is disposed, whereby to normally insure that said member shall be so displaced as to impart the requisite fluid-pressure impulse to the device which controls the piston F'. While, therefore, it is admittedly old to employ fluid pressure actuated means to effect movement of some element at a distance, the arrangement or disposition of the operating member, by the actuation of which the requisite pressure impulse is established, in the path of a carrier to be transmitted, is believed to be broadly new.

Having thus described the nature of my invention and set forth a construction embodying the same, what I claim as new and desire to secure by Letters Patent of the United States is:

1. In a pneumatic despatch tube system, a station, a transit tube for the transmission of carriers from said station, means for establishing a carrier transmitting flow of air in said tube, a controlling device for said means adapted to respond to a fluid-pressure impulse, and means, including auxiliary tubing leading from said station to said device, for imparting a fluid-pressure operating impulse to said device from said station, said last mentioned means also including a pump and an operating member therefor which normally extends into the path which a carrier must traverse to be despatched from said station, whereby to normally insure that said member shall be operatively displaced to operate said pump and thereby impart said impulse to said device through said auxiliary tubing whenever a carrier is to be despatched.

2. In a pneumatic despatch tube system, transmission tubing having terminals, a pipe having air therein normally at a different pressure from the air in said tubing, said pipe adapted to be placed in communication with said tubing to establish a carrier propelling current of air through the latter. a valve controlling communication between said pipe and tubing, a second valve disposed at one of said terminals, a fluid pressure controlling device adapted to be rendered operative by a movement of said second valve, fluid pressure operated means to control said first valve, and a pipe connecting said controlling device and said last mentioned means.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses, this tenth day of April A. D. 1907.

EDMOND A. FORDYCE.

Witnesses:
R. L. Messeo,
A. R. Larrabee.