No. 770,938. PATENTED SEPT. 27, 1904.

F. S. SMITH.

PNEUMATIC DESPATCH SYSTEM.

APPLICATION FILED JAN. 5, 1904.

NO MODEL. 2 SHEETS—SHEET 1.

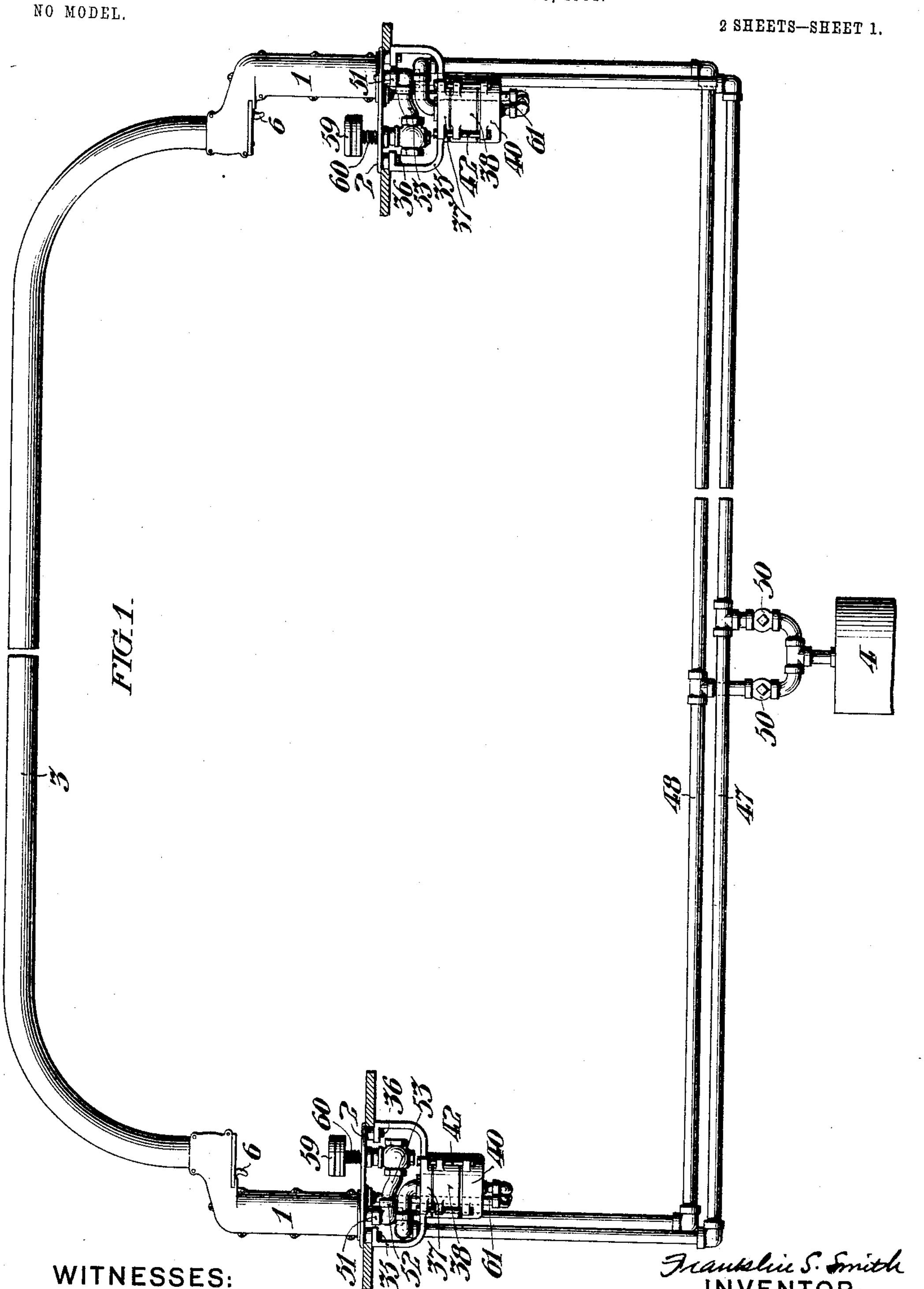

FIG. 1.

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NO MODEL. 2 SHEETS—SHEET 2.

FIG. II.

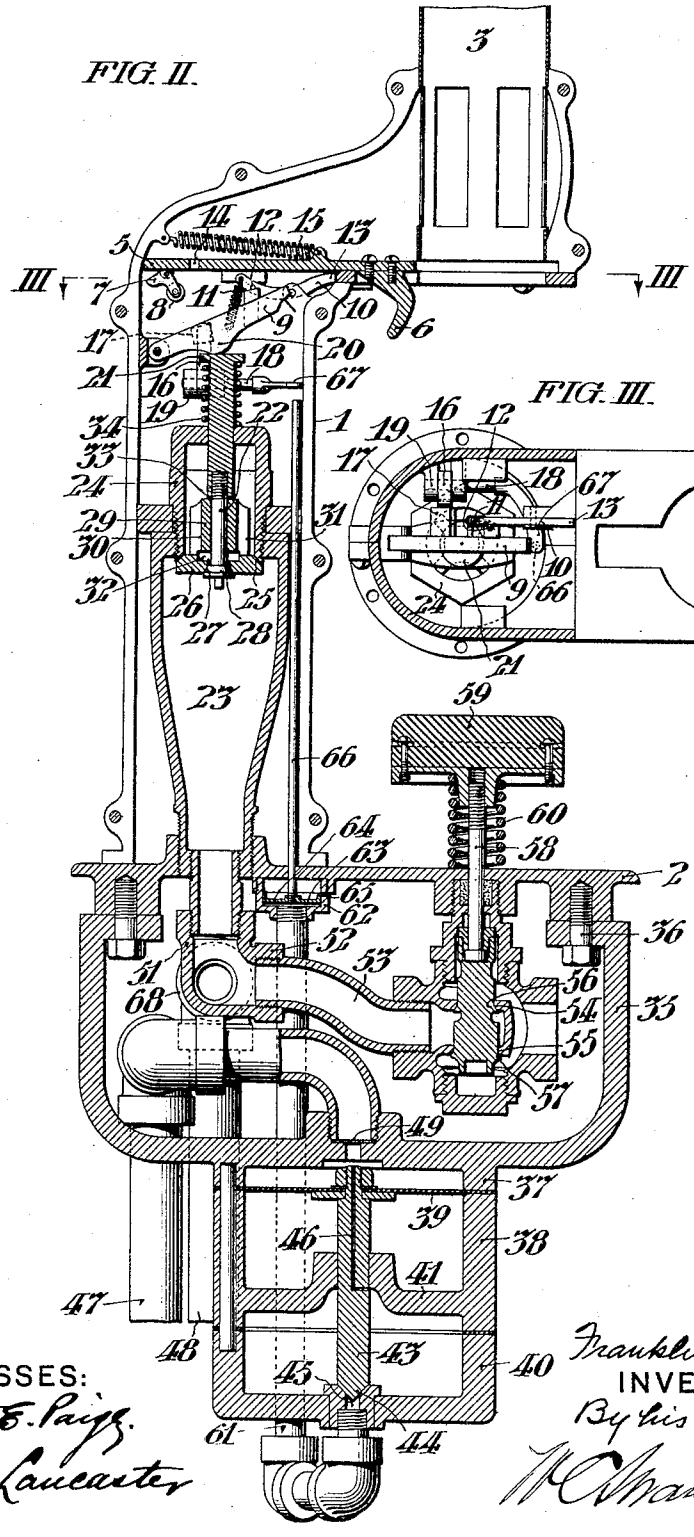

FIG. III.

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No. 770,938. Patented September 27, 1904.

UNITED STATES PATENT OFFICE.

FRANKLIN S. SMITH, OF PHILADELPHIA, PENNSYLVANIA.

PNEUMATIC-DESPATCH SYSTEM.

SPECIFICATION forming part of Letters Patent No. 770,938, dated September 27, 1904.

Application filed January 5, 1904. Serial No. 187,823. (No model.)

To all whom it may concern:

Be it known that I, FRANKLIN S. SMITH, a citizen of the United States, residing in the city and county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Pneumatic-Despatch Systems, of which the following is a specification.

This invention relates to pneumatic despatch systems, and its object is to improve the means for the transfer of packages or carriers containing packages from one point to another,—as, for instance, from one section of a store to another section thereof.

The invention resides in the combination and arrangement of the several parts of the system or apparatus, as hereinafter described in the specification, set forth specifically in the appended claims, and as illustrated in the accompanying drawings, in which,

Figure 1 is a view in elevation showing the general features of my improvement;

Figure 2 is a longitudinal section of one of the terminal members of the said system, and also showing in detail a portion of the operating mechanism of the system; and,

Figure 3 is a transverse section on the line 3 3 of Figure 2.

In the drawings,—

1 designates the terminals of my improved system provided or supported upon bases 2. 3 designates a tube connecting the said terminals, the respective ends of the said tube being normally open as is clearly indicated in Figure 2; 4 designates a source of supply of air or other suitable fluid under pressure which is adapted to be placed in communication with the terminals 1 and the tube 3. The said source of fluid supply is not placed in communication with the said tube except when it is desired to send a package through the tube. Normally, the said source of air or other fluid supply is separated from the interior of the terminal members by valve mechanisms, and the interiors of the terminal members are separated from the interior of the tube 3 by means of sliding doors 5.

The construction of the terminal members is identical, hence in the description of the said members, reference will be had to Figure 2, which is a section of the terminal member shown at the left hand side of Figure 1.

The sliding door 5 is provided with a finger piece 6, by means of which the said door is pulled from the position indicated in Figure 2 to a position beneath the lower end of the tube 3 to close the latter. In moving to the last mentioned position, an angular member 7, pivoted to the under side of the sliding door and depending therefrom, and provided with a roller 8 upon its lower end, engages a lever 9 pivoted to the interior of the casing of the terminal member 1 to depress the free end of the same.

10 designates a second lever mounted upon the interior of the walls of the said casing, the inner end of which is connected by means of a coiled wire spring 11 to the inner end of the lever 9. The wire spring 11 draws the inner end of the lever 10 downwardly as the inner end of the lever 9 is depressed.

The said inner end of the lever 10 is also provided with a pin 12 which is adapted to be engaged by the inner end of the said lever 9 as it moves upwardly, as will be hereinafter described more fully. The outer free end 13 of the lever 10 is adapted to engage a perforation 14 in the sliding door 5 so as to hold the same in what may be termed its open position; that is to say, in a position beneath the lower end of the tube 3 to close the latter. When the outer end of the catch lever 10 is removed from the perforation 14 to release the sliding door 5, the latter is returned to its normal position shown in Figure 2 by means of a coiled wire spring 15. The lever 9 is held in depressed position by means of an upright catch 16, which is adapted to engage a lug or projection 17 upon the said lever 9. As the door 5 is moved to the right in Figure II, in order to close the end of the despatch tube 3, the roller 8 upon the depending arm of the angular lever 7 secured to the lower side of the said door 5 contacts with the upper side of the pivoted lever 9 and depresses the same so that the lug or projection 17 thereon moves into position to be engaged by the catch 16. The catch 16 is pivotally mounted and its upper end is normally in the line of movement of the projection or lug 17. The latter in its downward movement strikes the upper end of the catch, displaces the same, and as soon as the said projection has passed

beyond the upper end of the said catch, the latter moves, by reason of the weight of the laterally extending arm secured to the pivot 18 of the said catch, into position above the said lug or projection and holds the lever 9 in depressed position until it is released by the means hereinafter described. The said catch is mounted upon a rotatable horizontal rod 18, which is supported upon the lugs 19, the latter being in turn supported upon the walls of the casing of the terminal 1.

The lower side of the lever 9 is provided with a projection 20, which is in engagement with the upper end of a valve-stem having an enlarged upper end portion 21 and a reduced lower end portion 22. The said valve-stem is connected to a couple of valves which close the upper end of a pipe or tube 23, which is connected to the source of air or gas supply 4.

24 designates a short cylinder, the lower end of which is provided with a valve seat 25, in which a valve 26 is adapted to be seated, and the upper edge of which is open, as clearly indicated in Figs. II and III. The upper end of the said cylinder 24 is provided with a perforated yoke which serves as a guide for the valve stem of the valve 26. The said valve 26 is provided with a central opening 27 through which the lower reduced end portion 22 of the valve stem passes. The lower portion of the opening 27 is enlarged to form a valve seat in which is seated the valve 28, secured directly to the lower end of the valve stem. The valve 26 is provided with an extension 29 which is provided with a perforation through which the lower reduced end portion 22 or the valve stem loosely passes. The said extension 29 is provided with concavities 30 upon four of its sides, the formation of the said concavities forming at the same time ribs 31 which are in slidable engagement with the sides of the cylinder 24.

The opening 27 in the valve 26 is connected by means of a rectangular opening or space 32 with the concavities 30, and consequently with the larger space within the cylinder 24, and also with the upper end of the terminal 1.

A shoulder 33 is formed between the enlarged upper end portion 21 and the reduced lower end portion 22 of the valve stem, which shoulder as the valve stem is moved downwardly comes into contact with the upper end of the extension 29. It will thus be seeen that in the operation of the valve mechanism, the small valve 28 is first opened, reducing somewhat the pressure of the air or gas against the lower side of the larger valve 26, thus reducing the amount of pressure which must be overcome when the shoulder 33 comes into contact with the upper end of the valve member 26.

It will be understood that the valve 26 remains opened during the time that the lever 9 is held in depressed position. The valves 26 and 28 are returned to their normally closed position as the lever 9 returns to its normal position indicated in Figure 2, by means of the coiled wire spring 34.

Located adjacent to each of the terminals 1 1 is what may be termed a controlling device which consists of a hollow cylindrical member, the interior of said device being separated into three compartments. The said cylindrical member is supported upon the base 2 of the terminal members by means of the arms 35 and screw-threaded bolts 36, as clearly indicated in Figure 2.

The said arms 35 are connected to the top member 37 of the said controlling device, the said top member being of inverted cup-shape, and being separated from the intermediate cup-shaped member 38 by means of a flexible diaphragm 39. The interior of the intermediate member 38 of the controlling device is separated from the interior of the lower or bottom member 40 of the said device by means of a transverse plate 41, which constitutes the bottom of the intermediate member 38. The said members 37, 38, and 40 are connected together by means of bolts 42, as indicated in Figure 1. Connected to the flexible diaphragm 39 is a rod 43 which extends downwardly through the plate 41 to the bottom of the member 40. The lower end 44 of the said rod 43 is cone-shaped as clearly indicated in Figure 2, and operates as a valve to open and close the opening 45 through the bottom of the said member 40. The space in the member 37 above the diaphragm 39 is connected with the space in the lower member 40 beneath the plate 41 by means of the passageway 46 through the rod 43, and the said space in the member 37 at the left hand side of Figure 1 is in communication with the source of air or other fluid supply 4 through the pipe 47, and the space in the member 37 at the other side of said Figure I is in communication with the source of air or other fluid supply through the pipe 48.

The lower end of the passageway 46 is located beneath the plate 41 in close proximity thereto so that the slightest upward movement of the rod 43 carries the lower end of said passageway to a position within the opening through the plate 41, so that all communication between the top and bottom compartments of the controlling device is closed.

The rod 43 which passes through the plate 41 does not fit absolutely air-tight therein, but is sufficiently loose to permit the air to pass slowly from the space below the plate 41 into the space between the said plate 41 and the diaphragm 39. It will therefore be seen that normally the air pressure in the three spaces is in equilibrium, that is to say, the air pressure in each of the three spaces is the same.

The source of air or other fluid supply 4 is connected to the respective terminals and controlling devices by means of the pipes 47 and

48, one end of each pipe being connected to a terminal and the other end thereof being connected to the controlling device adjacent to the other terminal, as clearly indicated in Figure 1.

A clack valve 49 is provided in the communicating passageway between the uppermost compartment of the respective controlling devices and the source of air or other fluid supply 4. The said valve is provided with a pin hole to permit of the slow passage of air from the source of air supply 4 into the controlling device. The said valve prevents the sudden pressure of the source of air or fluid supply upon the diaphragm to return the same to its normal position in which the opening 45 is closed by the cone-shaped end 44 of the rod 43.

Check valves 50 are provided in the connections between the respective pipes 47 and 48 and the source of air supply 4, their purpose being to prevent escape of air or other fluid through one of the pipes 47 or 48 from the uppermost compartment of one of the controlling devices, when the other one of the said pipes and the source of fluid supply are placed in communication with the tube 3 connecting the terminal members 1.

Referring to the drawings, it will be observed that the terminal shown at the left hand side of Figure 1, and which is the terminal illustrated in Figure 2, is in communication with the source of air supply 4 by means of the pipe 48, and that the adjacent controlling device is in communication with the said source of air supply through the pipe 47.

In Figure 2 the lower end of the tube 23 is shown as being connected to one of the branches 51 of a side outlet elbow. Another branch 68 of the said elbow is connected to the end of the pipe 48. A third branch 52 of the said side outlet elbow is connected to a tube or pipe 53, the end of which is provided with valve seats 54 and 55, in which valves 56 and 57 are seated.

The said valves 56 and 57 are integral and are connected to the same valve stem 58 which extends through the base 2 of the terminal 1, and is provided at its upper or outer end with a buffer 59 of any suitable or desirable construction. The valves 56 and 57 are held in normally closed position, as indicated in Figure 2, by means of a coiled wire spring 60 located between the lower side of the buffer 59 and the upper side of the base 2. The construction of the buffer and valve mechanism at the other terminal, that is, the terminal at the right hand side of Figure 1 is the same as that just described and which is illustrated in Figure 2, the only difference being that the pipe 53 is connected to the tube 47 instead of to the tube 48, as is shown in the said Figure 2.

When the buffer shown at the right hand side of Figure 2 is depressed, the valves corresponding to the valves 56 and 57 shown in Figure 2 will be opened so as to permit escape of air from the pipe or tube 53, whereby the pressure of the air in the tube 47 is diminished, which permits or occasions a corresponding decrease in the pressure of the air in the space above the diaphragm 39 shown in the controlling device illustrated in Figure 2, which is the controlling device at the left hand side of Figure 1. Such decrease in pressure permits an upward movement of the diaphragm 39, which upward movement causes an upward or longitudinal movement of the rod 43, which movement causes or occasions closure of the passage-way 46, and at the same time removes the cone-shaped end 44 from its seat to open the passage way 45.

The expansion of the air which has been contained within the member 40 beneath the plate 41 is transmitted through the pipe 61 to the lower end of a cylinder 62, within which a piston 63 operates. It is desirable that the opening 45 be kept open long enough to permit a sufficient expansion of the air in the lowermost compartment in the controlling device to raise the piston 63 a height sufficient to release the catch 16, and it is for this purpose that the valve 49 is provided.

Normally, the said piston rests upon the bottom of the said cylinder and is permitted to descend quickly to such position after it has been forced upwardly by means of a pin hole 64 extending through said piston which permits more or less rapid passage of the air through the said piston as it descends.

In order to prevent the piston moving upwardly too great a distance, an opening 65 is provided in the side of the cylinder 62. A rod 66 connected to the said piston extends upwardly through the base 2 of the terminal, the upper end of the said rod being located immediately beneath the end of a plate 67 connected to the rod 18. In moving upward the end of the said rod 66 comes into contact with the said plate 67 and causes rotation of the rod 18 so as to cause the catch 16 to disengage the lever 9 whereby the latter is released and is caused to move upwardly into the position indicated in Figure 2 by means of the coiled spring 34 about the enlarged upper end portion 21 of the valve stem.

In moving to the said position indicated in Figure 2, the free end of the said lever 9 comes into contact with the pin 12, moving the inner end of the lever 10 upwardly and at the same time moving the outer end downwardly so as to cause its disengagement from the perforation 14 to permit the return of the door 5 to its normal position indicated in Figure 2.

In the operation of the apparatus, a package is inserted into either of the open ends of the pipe or tube 3 after which the sliding door 5 is pulled into a position beneath the end of the said pipe 3 to close the same, the movement of the said door operating to open

the valves which close the pipe leading from either of the terminals to the source of air or other fluid supply.

Upon the opening of the said valves, the said air or other fluid which is under pressure rushes into the said tube 3 and forces the package through the said tube to the other end thereof. The package is discharged from the said other end against the adjacent buffer and causes a movement of the said buffer to open the valves 56 and 57 which permits the escape of the air or gas from the pipe 53, reducing the pressure in either the pipe 47 or 48, depending upon which of the buffers has been operated, and causing or occasioning a corresponding reduction of pressure in the space of the controlling device which is in communication with the opposite end of said pipe, that is, the end of the pipe farthest away from the buffer receiving the impact of the discharged package, whereby movement of the flexible diaphragm 39 is occasioned by the pressure of the air confined in the adjacent space beneath the said diaphragm, such movement of the diaphragm causing a movement of the rod 43 to unseat the valve 44 and open the passageway through the bottom of the member 40, and thereby create open communication between the space in the said member 40 and the cylinder 62. The expansion of the air in the said last mentioned space causes an upward movement of the piston 63 in the cylinder 62, which upward movement occasions the release of the catch 16 to permit the lever 9 to move upwardly, the latter movement being occasioned by the spring 34 which simultaneously occasions closure of the valves 26 and 28.

The upward movement of the lever 9 occasions an upward movement of the inner end of lever 10 and a corresponding downward movement of the outer end 13 thereof to disengage the same from the sliding door 5, whereby the same is permitted to return under the influence of the spring 15 to its normal position, which is indicated in Figure 2. The operation is the same whether the package be forwarded from one terminal or the other of the system.

Having thus described my invention, I claim—

1. A pneumatic despatch system comprising terminal members, a tube or other form of passageway connecting the said terminal members, means at each of the terminal members for closing the connection between the respective terminal members and the adjacent end portions of the said tube or passageway, the said means being movable to open either of the said terminal members, means for holding the said closing means in open position, and means for releasing the said means for holding the closing means in open position to permit the return of the latter to its normally closed position, the said releasing means comprising a source of air or gas under pressure, a pipe leading therefrom, one end of which is connected to a controlling device located adjacent to one of the said terminals and the other end terminating at a point adjacent to the other of said terminals, a valve for opening and closing the last mentioned end of the said pipe, the said valve having a stem, and a buffer attached to the said stem and located in advance of the open end of the tube or passageway connecting the said terminals and adapted to receive the impact of a package discharged from the said tube or passageway whereby the said valve is opened to permit the escape of the air therefrom thereby reducing the pressure of the air in the said tube and in the said controlling device.

2. A pneumatic despatch tube, connections for supplying compressed air or gas thereto, a self-closing valve for controlling the supply of compressed air or gas, a device for holding said valve open, and means for releasing the said device to permit the said valve to close, the said means comprising a movable diaphragm, and the spaces upon opposite sides of the said diaphragm being in communication with a source of air or gas under pressure.

3. A pneumatic despatch tube, connections for supplying compressed air or gas thereto, a self-closing valve for controlling the supply of compressed air or gas, a device for holding the said valve open, means for releasing the said device to permit the said valve to close, the said means comprising a movable diaphragm, and the spaces upon opposite sides of the said diaphragm being in communication with a source of air or gas under pressure, and means whereby the pressure of the air or gas upon one side of the said diaphragm is reduced.

4. A pneumatic despatch tube, connections for supplying compressed air or gas thereto, a self-closing valve for controlling the supply of compressed air or gas, a device for holding the said valve open, means for releasing the said device to permit the said valve to close, the said means comprising a receptacle, a movable diaphragm extending across the said receptacle, a source of air or gas under compression, the said air or gas being in communication with the respective sides of the said movable diaphragm, and means for reducing the pressure of the air or gas upon one side of the said diaphragm.

5. A pneumatic despatch tube, connections for supplying compressed air or gas thereto, a self-closing valve for controlling the supply of compressed air or gas, a device for holding said valve open, and means for releasing the said device to permit the said valve to close, the said means comprising a hollow cylinder, a piston adapted to operate in said cylinder, means adapted to release the said device carried by said piston, a receptacle containing

air under pressure, the said receptacle being in communication with the said cylinder, and a valve for opening the said communication to permit the passage of the expanding air or gas from the said receptacle to the said cylinder to occasion movement of the said piston to release the said device.

6. A pneumatic despatch tube, connections for supplying compressed air or gas thereto, a self-closing valve for controlling the supply of compressed air or gas, a device for holding the said valve open, and means for releasing the said device to permit the said valve to close, the said means comprising a hollow cylinder, a piston adapted to operate in said cylinder, the said piston being provided with a rod, which rod is adapted to contact with the device for holding the valve open, a receptacle containing air or gas under pressure, the said receptacle being in communication with the said cylinder, and a valve for opening the said communication to permit the passage of the expanding air or gas from the said receptacle to the said cylinder to occasion release of the said device.

7. A pneumatic despatch tube, connections for supplying compressed air or gas thereto, a self-closing valve for controlling the supply of compressed air or gas, a device for holding said valve open, means for releasing the said device, the said means comprising a hollow cylinder, a piston operating in the said cylinder, a receptacle adapted to receive air or gas under pressure, the said receptacle being divided into compartments by diaphragms extending across the same, one of the said diaphragms being flexible, a tube connecting one of the compartments of the said receptacle with the said cylinder, a valve for closing the opening into the said tube, the said valve being connected to the said flexible diaphragm, and means for occasioning a reduction of the pressure of the air or gas upon one side of the flexible diaphragm, whereby movement of the said diaphragm is occasioned to open the said valve.

8. A pneumatic despatch tube, connections for supplying compressed air or gas thereto, a self-closing valve for controlling the supply of compressed air or gas, a device for holding the said valve open, and means for releasing the said device to permit the said valve to close, the said releasing means comprising a source of air or gas under pressure, a pipe leading therefrom, one end of which is connected to a controlling device located adjacent to one end of the said tube, and the other end terminating at a point adjacent to the other end of the said tube, a valve for opening and closing the last mentioned end of the said pipe, the said valve having a stem and a buffer attached to the said stem and located in advance of the open end of the tube to receive the impact of a package discharged from the said tube, whereby the said valve is opened to permit the escape of the air or gas therefrom, thereby reducing the pressure of the air in the said tube and in the said controlling device.

In testimony that I claim the foregoing as my invention I have hereunto signed my name this 4th day of January, A. D. 1904.

FRANKLIN S. SMITH.

In presence of—

THOS. K. LANCASTER,

LAURA KLEINFELDER.