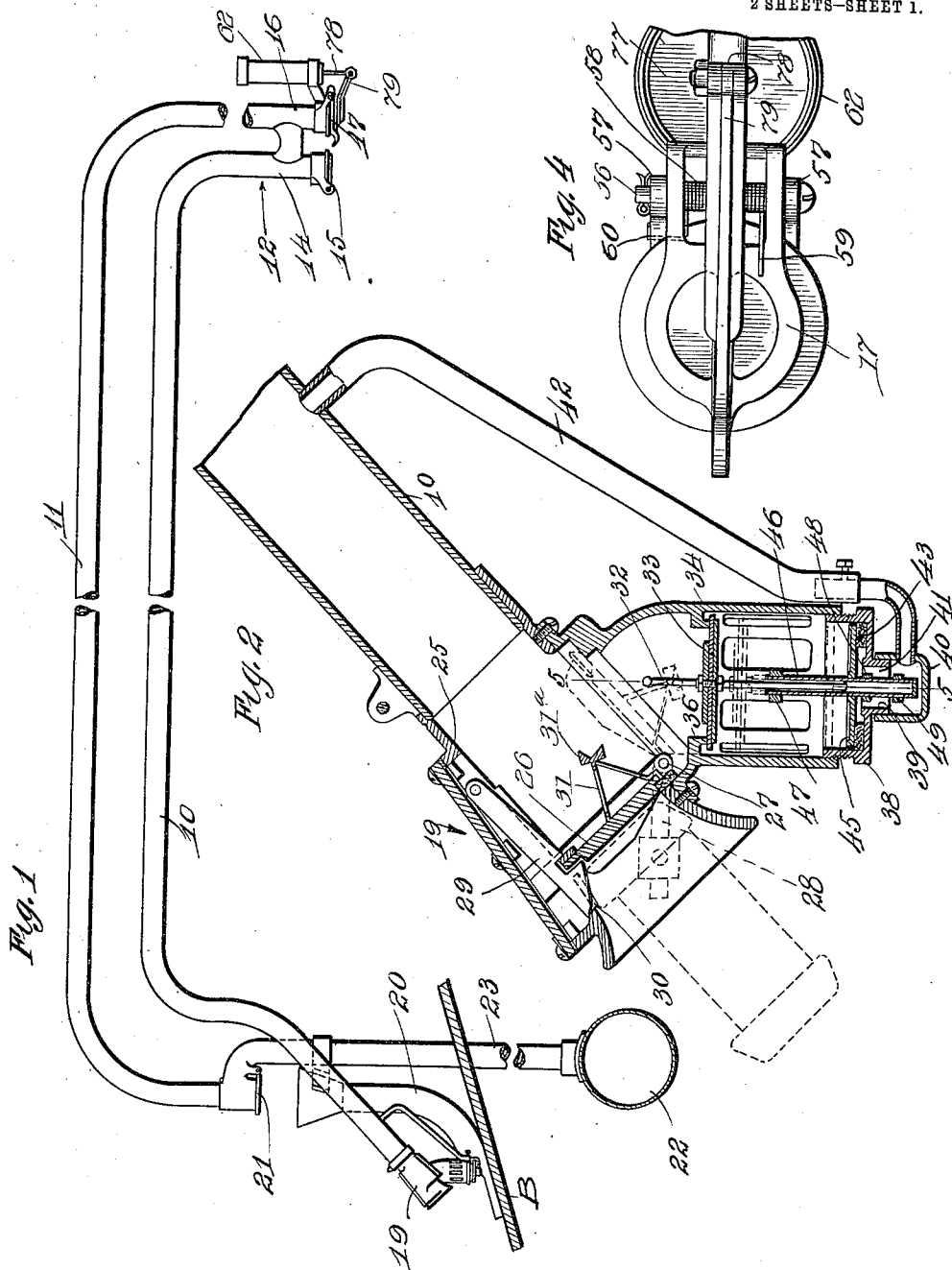


F. H. WOLEVER.
PNEUMATIC DESPATCH TUBE SYSTEM.
APPLICATION FILED NOV. 10, 1910.

1,008,627.

Patented Nov. 14, 1911.

2 SHEETS-SHEET 1.



WITNESSES

Harry S. Gaither
William Goldberger

INVENTOR

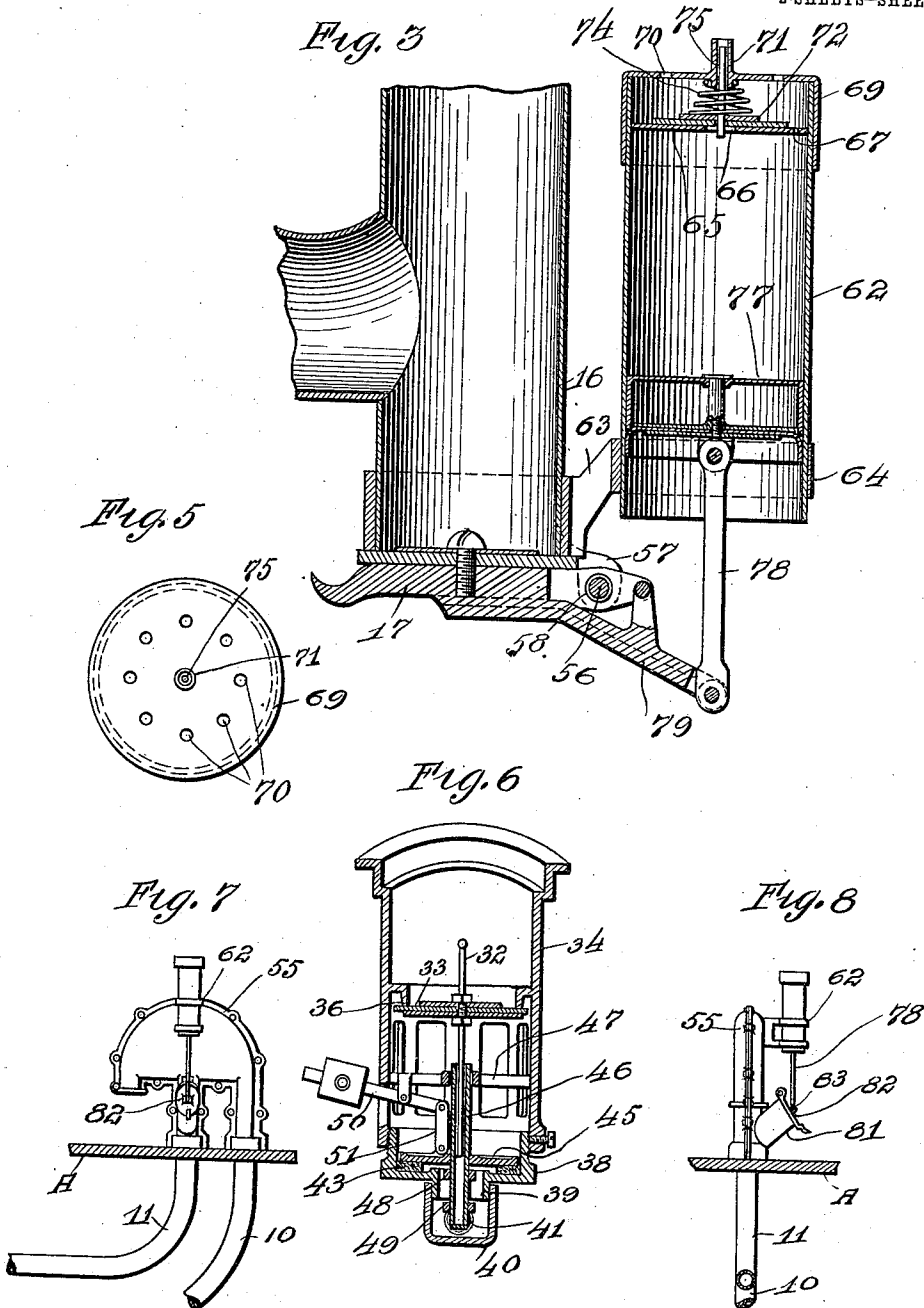
FRANKLIN H. WOLEVER
by *William H. Hall*
his
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Harry S. Gauthier
William Goldberger.

INVENTOR

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UNITED STATES PATENT OFFICE.

FRANKLIN H. WOLEVER, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-FOURTH TO ROSE FEIST, ONE-FOURTH TO MARY E. WOLEVER, AND ONE-HALF TO GUSTAVUS F. BERGER, ALL OF CHICAGO, ILLINOIS.

PNEUMATIC-DESPATCH-TUBE SYSTEM.

1,008,627.

Specification of Letters Patent. Patented Nov. 14, 1911.

Application filed November 10, 1910. Serial No. 591,629.

To all whom it may concern:

Be it known that I, FRANKLIN H. WOLEVER, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Pneumatic-Despatch-Tube Systems; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the characters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in pneumatic despatch tube systems and refers more specifically to means for economizing power used in operating such systems, to improvements in sending terminals of such systems through which the cartridges are delivered to the system, and to means for rendering positive the action of delivery of air to the system during the time the cartridges are being transmitted therethrough in such a way as to prevent the premature closing of the air inlet to the system before cartridges have been discharged therefrom.

My improvements are more especially applicable to that class of pneumatic despatch tube systems in which the sending and delivery terminals are normally closed and the tubes normally sealed during periods of non-use of the system, so as to avoid the wasteful use of power to move the air through the tubes when the system is not in use. When a cartridge is inserted into one of the sending terminals air is admitted to the system and its admission continues as long as a cartridge is in transit there-through; and when the cartridge is discharged the system is automatically sealed. A complete system of the type herein illustrated, and to which my invention is shown as applied, usually embraces a plurality of loops extending from a number of salesman's stations to a single cashier's station, with the discharge end of each salesman's return tube connected with a common vacuum trunk line. I have herein shown but a single loop connecting a salesman's station with a cashier's station. The invention is however capable of adaptation to pneumatic despatch tube systems differing specifically from that shown herein.

In the drawings,—Figure 1 is a diagrammatic view, with parts broken away, of a portion of a pneumatic despatch tube system equipped with my improvements. Fig. 2 is an axial section of the cashier's sending terminal and a portion of the adjacent end of the cashier's sending tube. Fig. 3 is an axial section of the salesman's sending terminal with controlling means therefor. Fig. 4 is a partial bottom plan view of the parts shown in Fig. 3. Fig. 5 is a plan view of the cylinder shown in Fig. 3. Fig. 6 is a partial vertical section on line 5—5 of Fig. 2. Figs. 7 and 8 are a side elevation and an edge view, respectively, of a modified form of sending and delivery terminal, with my improvements applied thereto.

As shown in the drawings, 10 designates the cashier's sending tube and 11 the salesman's return tube. Said tubes are connected at the salesman's station A by a combined down-discharge receiving and sending terminal, designated as a whole by 12 in Figs. 1 and 2.

The receiving terminal 14 at the salesman's station A has a spring-closed gate which is normally closed and opens downwardly to permit a cartridge to be discharged from the terminal. The sending terminal 16 at the salesman's station has a spring-closed gate 17 that is adapted to be opened by hand to insert a cartridge into the salesman's sending tube and to be closed under the influence of a controlling device which serves to prevent the gate being suddenly closed, as will be hereinafter more fully described.

At the cashier's station B the cashier's sending tube is provided with a sending terminal 19, which, as herein shown, is made generally like the sending terminal illustrated in my prior United States Patent, No. 965,494, granted July 26th, 1910. The salesman's return tube 11 discharges into a consecutive receiving terminal 20 of usual form, and said tube is normally closed by a spring-closed gate 21 which is opened by the impact of a cartridge thereagainst to permit the delivery of the cartridge to the terminal 20. The said return tube is connected at a point above the gate 21 with a vacuum trunk line 22 through the medium of a pipe 23.

The cashier's sending terminal 19 is like

the terminal shown in my aforesaid prior Patent, No. 965,494, it comprising a section 25 having a bell shaped mouth which is normally closed by a self-closing gate 26 hinged on the rod 27, and held normally closed by the weighted lever 28 or equivalent closing means. The gate is locked in its closed position by a notched gravity latch 29 which engages the rim of the gate, and the outer beveled end 30 of said latch is located in the path of an entering cartridge in such a way that when the cartridge is inserted into the terminal the latch is lifted to free it from the gate, whereupon the gate may be pushed open by the cartridge to the position indicated in dotted lines in Fig. 2. When the gate swings back to its closing position the latch automatically engages the rim thereof to lock it closed.

The gate 26 is provided on its inner surface with a V-shaped bracket or arm 31 provided at its end with a concave contact device 31^a that is adapted, when the gate is opened by the act of inserting a cartridge into the terminal, to strike the upwardly projecting end of the stem 32 of a check valve 33 that is located in the air inlet branch 34 which communicates with the terminal just inside the self-closing gates 26 thereof. The upper side of the check valve is subject to the low pressure normally existing in the system and is normally held by atmospheric pressure, acting on the lower side of the same, against the annular seat 36 within the inlet branch to close said branch. The said bracket or arm 31 is arranged at such an inclination to the plane of the gate that when the gate is swung inwardly the contact piece 31^a strikes the end of the stem 32 squarely, with a result of unseating the check valve without binding or wedging the parts. The concavity of the contact piece has the effect to center it upon the stem, and the easy engagement of the parts is facilitated by rounding the upper end of the stem or providing the same with a knob. The branch is slitted or otherwise perforated to freely admit air thereto beneath the check valve. The gate 26 is provided with a central thickened projection which fits the bore of the mouthpiece of the lower side thereof, as shown in Fig. 2, so as to improve the air joint between the gate and mouthpiece to prevent air leaking into the cylinder.

The lower end of the branch is closed by a cap or closure 38 having a central nipple 39 upon which is fitted a cap 40, constituting together with the cap 38 a closed chamber 41. Said chamber is connected, as by the pipe 42, with the cashier's sending tube so as to establish in said chamber the same pressure as in the sending tube. Preferably, and in accordance with the present invention, said pipe 42 enters the cashier's sending tube a

substantial distance from the gate 26, the distance shown being one or more cartridge lengths. There is arranged within the lower end of the cap 38 an annular ring 43, made preferably of rubber or like yielding material, which constitutes a seat for piston 45 which fits tightly in the cylindric portion of the cap and is subjected at its lower side to the working pressure of the cashier's sending tube and at its upper side to atmospheric pressure. Said piston has a hollow stem 46 which is guided in spiders 47, 48 in the branch 34 and the nipple 39, respectively, and is capable of a rising and falling movement in the cylindric cap, the rising movement being limited by a stop 49 on the lower end of said hollow stem. The stem when in its uppermost position constitutes a support for the check valve 33 when the latter occupies its lower or open position. The lower end of the stem 32 of the check valve enters and has guiding engagement with said hollow stem 46.

A pivoted, weighted lever 50 (Fig. 5) is connected to the piston 45 by the link 51 and tends to lift the piston from its seat 43 and to raise the stem 46 toward the check valve disk 33 in the manner described in my aforesaid prior patent; and such lifting tendency is counteracted at times when the system is sealed by reason of the low pressure in the chamber 41 acting on the lower side of said piston. When a cartridge is inserted into the tube the contact piece 31^a of the gate 26 is swung inwardly against the check valve stem 32 and forcibly opens said check valve to permit air to freely enter the system through the perforated inlet branch around said valve. The gate 26 closes immediately, through the action of its self-closing means, (the weighted lever 28 as herein shown) but the valve 33 remains open to admit air to the system until the cartridge is discharged from the system at the terminal 14. When the cashier's sending tube is thus opened atmospheric pressure is established on both sides of the piston 45, through the openings in the inlet branch 34 and the pipe 42, and when the pressure is thus equalized on both sides of the piston the weighted lever 50 acts to raise the piston and its hollow stem to the dotted line position indicated in Fig. 2. The hollow piston stem is thus raised into position to support the check valve. Should a momentary change of speed of the cartridge occur, or should other conditions arise which would suddenly reduce the pressure in the cashier's sending tube, thereby tending to close the valve 33 against its seat and cut off supply of air to the system, such reduced pressure will be transmitted through the pipe 42 to the closed chamber 41 below the piston and thereby draw the piston and its hollow stem downwardly and lower the support for the air inlet check

valve 33. When the support for the check valve is thus lowered the said valve is permitted to drop away from its seat by gravity to prevent a premature closing of said valve, as fully set forth in my aforesaid prior patent. I have found that the connection of the pipe 42 with the cashier's sending tube at a substantial distance from the cashier's sending terminal gate adds materially to the certainty of operation of this feature of the device, inasmuch as it effects a more prompt transmission of variations of the sending tube pressure to the chamber 41 than in the construction shown in my aforesaid patent, wherein the passage connecting said chamber and tube communicates to said tube through the air inlet branch.

The operation of the check valve 33 and its controlling mechanism is substantially the same as set forth in my aforesaid prior Patent, No. 965,494. The piston 45 and its stem 46 constitutes means to support the check valve 33 in its open position, said support being capable of rising and falling under the influence of the weighted lever 50 and the partial vacuum in the chamber 41 below the piston 45. Upon the occasion of a momentary drop in pressure in the despatch tube tending to prematurely close the check valve 32, the influence of such lower pressure or partial vacuum will manifest itself on the lower side of the piston 45 so as to lower the check valve support, and permit the check valve to fall farther away from its seat and thus prevent its premature closing. The check valve 33 is likewise opened to admit air to the system at a time when a cartridge is inserted into the salesman's sending terminal, by reason of the raising of the pressure in the system when said latter terminal is opened.

In order to prevent a sudden lowering of the pressure in the salesman's sending tube, due to the abrupt closing of the gate 17 at the salesman's sending terminal, which reduction of pressure will tend to prematurely close the check valve 33, and cut off the flow of air to the system, I have provided a controlling device for the sending gate of the salesman's sending terminal which operates to retard the closing movement of said gate and thereby build up the pressure in the system in a manner to avoid the premature closing of the air inlet check valve. Such controlling device may be applied to the down-discharge terminal shown in Fig. 1 or the up-discharge terminal 55 shown in Figs. 7 and 8. The gate 17 shown in said Figs. 1, 2 and 3 has a pintle or hinge rod 56 that engages lugs 57, 57 which extend laterally from the terminal. A volute spring 58 surrounds the hinge rod, with one end 59 engaged with the gate and the other end 60 engaged with one of the hinge lugs 65 and acts to normally hold the gate closed.

Located at the side of and generally parallel to the salesman's sending terminal is a cylinder 62, it being herein shown as supported from the salesman's sending terminal 16 by means of a bracket 63 and a ring 64 surrounding said cylinder. The cylinder is open at its lower end and is provided near its upper end with a diaphragm 65 having a central opening 66 and having also near its margin a small leak opening 67.

69 designates a cap which has a tight slip fit over the upper end of the cylinder. The end wall of said cap is provided with a plurality of apertures 70 and with a central nipple 71 located axially over the aperture 66 of the diaphragm 65.

72 designates a check valve disk which is pressed upon the upper side of the diaphragm 65 to close the opening 66 therein by means of a spring 74, and said valve disk is provided with a guide stem 75 arranged within the spring 74 and having guiding engagement at its outer end with the cap nipple 71. Contained within the lower end of the cylinder 62 is a piston 77 capable of reciprocating in the cylinder. The said piston is connected by a link 78 with an arm 79, shown as made integral with and extending laterally and downwardly from the gate 17, the link 78 being pivoted at its ends to said piston and to said arm, as best shown in Fig. 3.

When the sending gate 17 is opened to admit a cartridge to the salesman's sending terminal, the piston 77 is forced upwardly in the cylinder and is permitted to rise freely by reason of the fact that the check valve 72 opens against the action of its spring 74 to permit the air above the piston to escape through the check valve opening 66 and the openings 70. When the gate is released it is swung to its closing position by its actuating spring 58. The closing movement of the gate is however retarded by reason of the fact that the check valve disk 72 is pressed to its seat to close the opening 66 as soon as the piston 77 begins to move downwardly to follow the closing movement of the gate and the only air which can enter the cylinder 62 above the retreating piston is that which enters through the leak opening 67. Consequently the downward movement of the piston and the closing movement of the gate will be relatively slow, thus preventing an abrupt closing of the gate and giving time to build up the pressure in the system and thereby avoid a premature closing of the air inlet check valve 33 at the cashier's station. The leakage of said air to the cylinder behind the piston instead of providing the leak opening 67, but the latter arrangement is preferable, inasmuch as the opening may be made of such size as to accurately time

the retarded closing movement of the sending gate to correspond with the length of the line and other conditions. For instance, if the cartridge be lightly loaded, or if the speed of the motor which operates to produce the vacuum in the main vacuum trunk be varied or by reason of irregularities of operation of other branches of the system the travel of the cartridge may be accelerated to such extent as to suddenly lower the pressure in the tube behind the cartridge, thereby increasing the velocity of the air passing into the system through the inlet branch, with the result of closing the check valve. The arrangement shown provides means for loading the despatch tube line behind the traveling cartridge so that the check valve will not tend to be closed upon the closing of the salesman's sending gate when a cartridge is inserted into the system.

The combined sending and delivery terminal 55 shown in Figs. 6 and 7 is formed with an intake mouth 81 arranged at an oblique angle to the sending tube 11 and the sending gate 82 thereof is arranged obliquely to the link 78 that connects said gate with the piston of the controlling cylinder 62, said link being pivotally connected at 83 with a lug arranged centrally of said gate.

So far as is concerned the application of the slowing down or retarding device to the salesman's sending terminal, the same may be used with other forms of inlet valve mechanisms. The retarding device has been found, however, to be particularly adaptable to the type of inlet valve mechanism herein shown.

The terms "cashier's station" and "salesman's station" as herein employed to distinguish certain stations of the system herein illustrated are not intended as limiting terms, it being understood that either of the terminal fixtures is capable of use at or adaptation to either station.

I claim as my invention:—

1. In a pneumatic despatch tube system, the combination with the sending terminal tube and a gate to normally close the tube, of an air inlet branch opening into said tube beyond the gate, a check valve for closing said branch and arranged to open the branch when a cartridge is inserted into the tube, and a member movable toward and from the check valve arranged to support the check valve in its open position, said supporting member being subjected at one side to atmospheric pressure and at its other side to the pressure in the tube above said check valve through a conduit which opens into the tube at a substantial distance beyond said branch.

2. In a pneumatic despatch tube system, the combination with the sending terminal tube and a gate to normally close the tube, of an air inlet branch opening into the tube

beyond the gate, a check valve to close said branch and arranged to open the branch when a cartridge is inserted into the tube, and controlling means for said check valve comprising a supporting member movable toward and from the check valve and adapted to support the valve in its open position, a variable pressure chamber, one wall of which comprises said supporting member, a conduit connecting said chamber with the tube and opening into the tube at a substantial distance beyond said branch, whereby said supporting member is subjected at one side to the pressure within the tube, and said support being subjected at its other side to atmospheric pressure and means tending to move the supporting member toward the check valve when pressure on opposite sides of the supporting member is equalized.

3. In a pneumatic despatch tube system, the combination with a pair of normally closed despatch tubes extending between and connecting a cashier's and a salesman's station and having receiving and delivery terminals at said stations, an air passage connecting said tubes at the salesman's station, and a vacuum pipe connected with the salesman's return tube at the cashier's station, of an air inlet branch opening into the sending tube at the cashier's station, a check valve for normally closing said branch arranged, to be opened when a cartridge is inserted into the sending terminal at either station, controlling means for said check valve to prevent premature closing thereof and a controlling mechanism for the sending gate at the salesman's station arranged to retard the closing movement of said latter gate.

4. In a pneumatic despatch tube system, the combination with a despatch tube extending between and connecting two stations and having vacuum means for moving air therethrough and normally closed, self-closing gates for said tube at said stations which are opened to admit cartridges to the tube, of an air inlet branch opening into the tube adjacent to one of said gates, a check valve to normally close said branch and arranged to be opened when either of the gates is opened to admit a cartridge to the tube, controlling means for said check valve comprising a supporting member movable toward and from the check valve to support the valve in its open position and means whereby the valve supporting member is lowered away from the check valve to permit said valve to be lowered from its seat upon a sudden reduction of pressure in the despatch tube, and controlling means connected to the gate remote from said branch adapted to retard the closing movement of said latter gate.

5. In a pneumatic despatch tube system, the combination with a despatch tube extending between and connecting two sta-

tions and vacuum means for moving air therethrough, and normally closed, self-closing gates for said tube at said stations which are opened to admit cartridges to the tube, of an air inlet branch opening into said tube adjacent to one of said gates, a check valve to normally close said branch and adapted to be automatically opened when either of said sending gates is opened to admit a cartridge to the tube, controlling means for said check valve comprising a supporting member movable toward and from the check valve in its open position, said member being subjected at one side to atmospheric pressure and at its other side to the pressure in the tube and provided with means tending to move it toward said check valve, and controlling means connected to the gate remote from said inlet branch to retard the closing movement of said latter gate.

6. In a pneumatic despatch tube system, the combination with a despatch tube extending between and connecting two stations and having vacuum means for moving air therethrough, and normally closed, self-closing gates for said tube at said stations which are opened to admit cartridges to the tube, of an air inlet branch opening into the tube adjacent to one of said gates, a check valve to normally close said branch and adapted to be automatically opened when either of said sending gates is opened to admit a cartridge to the tube, controlling means for said check valve comprising a variable pressure chamber connected by a conduit with the despatch tube, a supporting member movable toward and from the check valve to support the valve in its open position, and having means tending to move it toward said valve, the supporting member being subjected at one side to the pressure of said variable pressure chamber and at its other side to a constant pressure, and controlling means connected to the gate remote from said inlet branch to retard the closing movement of said latter gate.

7. In a pneumatic despatch system, the combination with a despatch tube extending between and connecting two stations and having vacuum means for moving air therethrough, and normally closed, self-closing gates for said tube at said stations which are opened to admit cartridges to the tube, of an air inlet branch opening into the tube adjacent to one of said gates, a check valve to normally close said branch and adapted to be automatically opened when either of said sending gates is opened to admit a cartridge to the tube, controlling means for said check valve comprising a member movable toward and from the check valve end arranged to support said valve in its open position, said supporting member being subjected at one side to a constant pressure

and at its other side to the pressure in the tube through a conduit which opens into the tube at a substantial distance beyond said branch, and controlling means connected to the gate remote from said branch for retarding the closing movement of said latter gate.

8. In a pneumatic despatch tube system, the combination with a pneumatic despatch tube extending between and connecting two stations and having vacuum means for moving air therethrough and normally closed, self-closing gates for said tube at said stations, of an air inlet branch opening into the tube adjacent to one of said gates and provided with a check valve which is normally closed and is adapted to be opened when a cartridge is inserted into the tube, and a controlling device for the gate remote from said branch comprising a cylinder, a piston therein, means for connecting the piston with the gate to move the piston toward one end of the cylinder when the gate is being opened, means whereby the piston is freely movable in the cylinder when the gate is being opened and checking means acting on the piston to retard the closing movement of the gate.

9. In a pneumatic despatch tube system, the combination with a pneumatic despatch tube extending between and connecting two stations and having vacuum means for moving air therethrough and normally closed, self-closing gates for said tube at said stations, of an air inlet branch opening into the tube adjacent to one of said gates and provided with a check valve which is normally closed and is adapted to be opened when a cartridge is inserted into the tube, and a controlling device for the gate remote from said branch comprising a cylinder closed at one end, a piston therein connected with said latter gate, the closed end of the cylinder having an opening normally closed by a check valve to permit the piston to move toward said closed end of the cylinder when the gate is being opened and arranged to close said opening to prevent air passing therethrough into the cylinder when the piston moves away from said closed end of the cylinder and means affording a limited leakage of air to the cylinder behind the piston.

10. In a pneumatic despatch tube system, a tube arranged to be normally sealed and connected with means for exhausting air therefrom, a sending terminal for the tube having a hinged, self-closing gate, an air inlet branch opening into the tube in rear of said gate, a check valve for closing said branch and subjected at one side to the air pressure within the tube and at its other side to a constant pressure, said check valve being provided with an upward extension and a contact member having a concave face for contact with said extension and connect-

ed to the gate by means which spaces the
contact member a distance inside the gate,
said contact member being arranged at such
an inclination to the plane of the gate that
5 the concave face thereof strikes said extension at a substantial normal angle to unseat the valve when the gate is opened.

11. In a pneumatic despatch tube system,
the combination with a sending terminal
10 provided with a self-closing, swinging gate,
of an air inlet branch opening into the tube
adjacent to said gate, a check valve for closing said branch and provided with an extension by which to unseat the valve, and
15 a contact member having a concave face for

contact with said extension and attached to
and spaced a distance from the gate and arranged at such an inclination to the gate
that its concave face strikes said extension
at a substantial normal angle to unseat the
20 valve when the gate is opened.

In testimony, that I claim the foregoing
as my invention I affix my signature in the
presence of two witnesses, this 18th day of
November A. D. 1910.

FRANKLIN H. WOLEVER.

Witnesses:

WILLIAM L. HALL,

WILLIAM GOLDBERGER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."
