No. 658,102. Patented Sept. 18, 1900.

C. S. BAVIER & J. R. HAWKES.

PNEUMATIC DESPATCH SYSTEM.

(Application filed Oct. 10, 1899.)

(No Model.) 2 Sheets—Sheet 1.

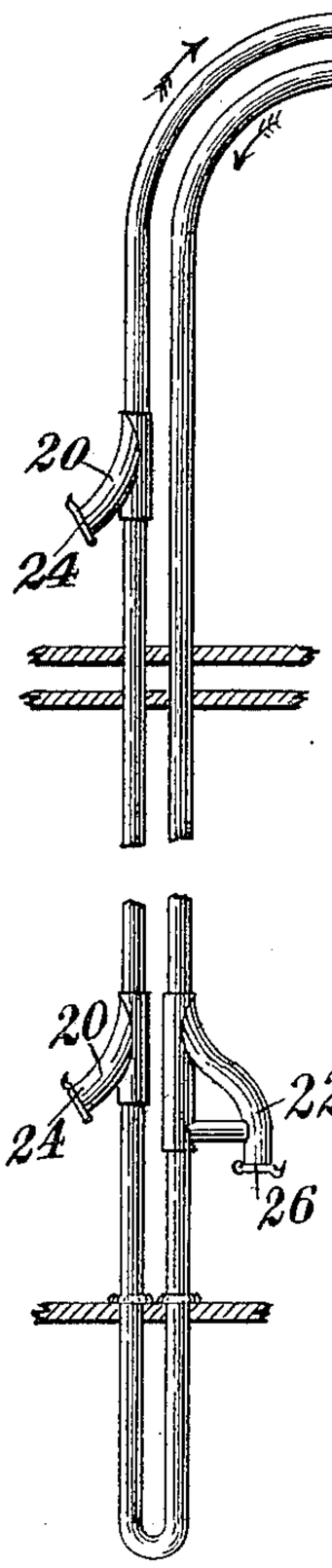
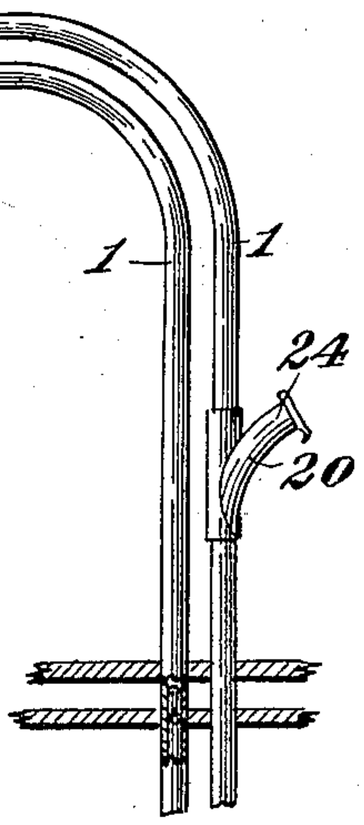
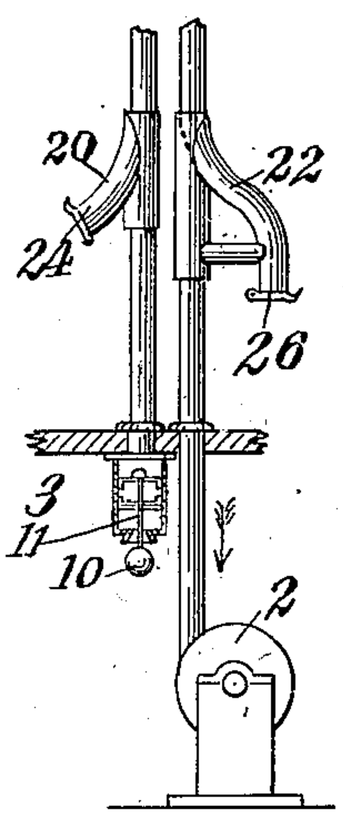


Fig. 1





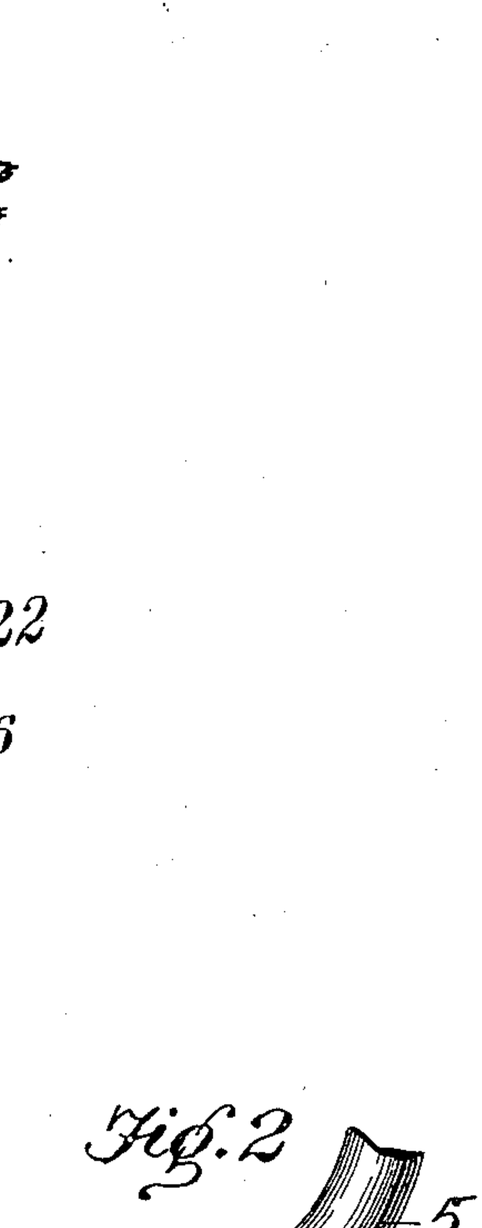


Fig. 2

Fig. 4

Fig. 3

WITNESSES:
Geo. B Rowley.
Reuben Katz

INVENTORS
Charles S. Bavier
James R. Hawkes
BY
Walter Brown
Their ATTORNEY

No. 658,102. Patented Sept. 18, 1900.

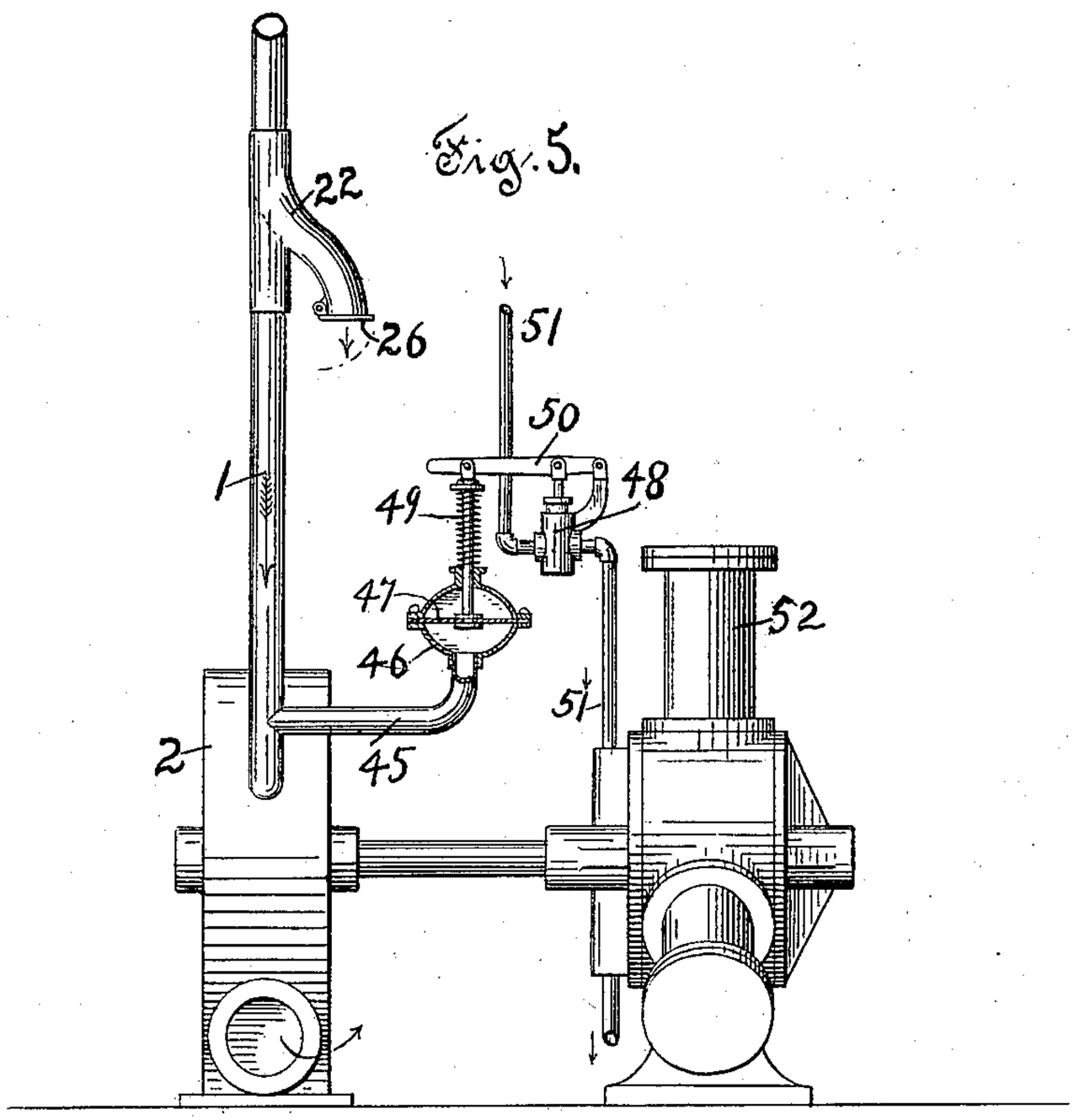
C. S. BAVIER & J. R. HAWKES.

PNEUMATIC DESPATCH SYSTEM.

(Application filed Oct. 10, 1899.)

(No Model.) 2 Sheets—Sheet 2.

Fig. 5.



Witnesses
Charles Kaninnann
Henry V. Brown.

Inventors
Charles S. Bavier
James R. Hawkes
By their Attorney
D. Walter Brown

UNITED STATES PATENT OFFICE.

CHARLES S. BAVIER AND JAMES R. HAWKES, OF NEW YORK, N. Y.

PNEUMATIC-DESPATCH SYSTEM.

SPECIFICATION forming part of Letters Patent No. 658,102, dated September 18, 1900.

Application filed October 10, 1899. Serial No. 733,124. (No model.)

To all whom it may concern:

Be it known that we, CHARLES S. BAVIER and JAMES R. HAWKES, citizens of the United States, and residents of the borough of Manhattan, in the city of New York, State of New York, have invented certain new and useful Improvements in Pneumatic-Despatch Systems, of which the following is a specification.

Our invention relates to improvements in pneumatic-despatch systems, especially such as are used for the transmission of cash-carriers in mercantile houses. In particular the invention relates to improvements in that class of systems wherein a partial vacuum is maintained in the line by an exhausting-engine, as a pump, and which systems are known as "vacuo" systems.

The object of our invention is to attain the highest practicable economy in the operation of vacuo systems by reducing the duty of the exhausting-engine, which is hereinafter termed the "exhauster," to the minimum required for the service actually performed when moving the carriers through the line, and our invention effects this result by providing a system wherein the line is closed when no service is being performed—that is, when no carrier is being despatched—so that then all the duty put on the exhauster is to maintain the requisite slight vacuum in the closed line; but which system is also such that a terminal air-inlet opens to the necessary degree to maintain the requisite movement of air through the line when one or more carriers are being despatched.

In the common vacuo system the extremity of the line farthest from the exhauster is always open and the exhauster is always required to do at least the work of moving the calculated volume of air through the line in the calculated time even if no carrier is in the line. Thus as in practice there are often considerable periods of time when no carriers are being despatched the work thrown on the exhauster is far in excess of what is needed to operate the line at those times when carriers are being despatched, and this unnecessary expenditure of energy renders such a system very wasteful of power. In our system, however, the air-inlet at the extremity of the line, called the "terminal" air-inlet, is normally—that is, when no carrier is being despatched—closed, as are also the valves or flaps at each of the despatching-inlets and at the discharge-outlets of the carriers. Normally, then, ours is a closed system, wherein all the work required of the exhauster is to merely maintain the requisite slight vacuum in the line, and the closure at the terminal air-inlet is such, whatever may be its details of construction, as to automatically open, when a carrier is in the line, to such an extent that the exhauster will develop the requisite current in the line to move the carrier to its destination and will automatically close when all the carriers that were in the line have passed out of the line at their discharge-outlets. The invention, therefore, is not limited to any special closing device, but equally covers all such devices which, in combination with the line and the exhauster, close the line when no carrier is being despatched and open it when one or more carriers is or are being despatched, thereby producing the economy of energy at which our invention aims.

Referring to the drawings which accompany the specification to aid the description, Figure 1 is a representation, partly broken and sectioned, of a vacuo system equipped with our invention. Fig. 2 is an elevation of one form of terminal air-inlet and closure, and Fig. 3 a view of the valve thereof from below. Fig. 4 is a vertical section of another modification of the terminal air-inlet and closure. Fig. 5 is an end elevation, on large scale, of the exhauster and engine which drives the same. Said figure also illustrates a convenient form of governor for controlling the exhauster according to the varying needs of the line.

Referring to Figs. 1 to 3, inclusive, 1 is the line or circuit of tubing, connected in any usual manner with the exhauster 2. For convenience said circuit 1 is arranged as a loop, with the terminal air-inlet 3 near said exhauster 2. In our invention said terminal air-inlet is provided with a closure, which operates automatically in such a manner as to close the said terminal air-inlet when the exhauster is running but no carrier is in the line and to open the said terminal air-inlet when one or more carriers are in the line.

Said closure can be constructed and arranged in many ways without departing from our invention, and we show two modifications thereof which work well in practice.

Referring to Figs. 2 and 3, which illustrate one of said modifications, the terminal air-inlet consists of a cylinder 4, connected with a curved branch 5 of the line 1 by a depending tube 6. In the lower head of said cylinder 4 is an air-inlet opening with a conical valve-seat 8, on which seats a light ball-valve 10 of any suitable material, as a thin rubber globe. The valve-stem 11 is guided through spiders fixed in said cylinder, and a nut on the end of the stem limits the amount of opening of the ball. Fixed on said stem 11 is a circular perforated plate 13, and turning within desired limits of motion on said stem in contact with said plate 13 is a similarly-perforated damper 15, the degree of opening of said damper being limited by a pin working in a slot 17 in the hub of said damper 15, it being understood that said plate 13 has all but an air-tight fit in the cylinder 4 and just so as not to touch the periphery thereof. Thus by adjusting the damper 15 the rate and friction of the incoming air and its tendency to raise and close the ball-valve 10 may be regulated as circumstances require. At suitable places along the line of tubing are despatching-inlets 20 20 for the insertion of the carriers and discharging-outlets 22 22, into which the carriers are shunted from the main line 1 and from which they are discharged in the usual manner. Said despatching-inlets are each closed normally air-tight by valves or flaps 24, which are normally held closed by the external air-pressure or by the usual springs or other devices, and said discharge-outlets 22 are each also normally closed air-tight by valves or flaps 26, which are normally held closed by the external air-pressure or by the usual springs or other suitable devices of such character that the impact of the cash-carriers when arriving at them will momentarily open the said valves 26 to permit said carriers to drop out, said valves immediately closing again automatically. Normally—that is, when no cash-carrier is in the line—the ball-valve 10 will be on its seat and all the valves 24 26 will be closed, and all the duty the exhauster 2 need then do is to maintain the normal small vacuum in the line, thereby reducing its necessary duty to a minimum. Now suppose the valve 24 of any despatching-inlet 20 is opened to insert a carrier. This opening momentarily reduces the vacuum by allowing some air to enter the line, and the valve 10 drops from its seat, opening the terminal air-inlet, which, as will be apparent, is at the remotest point of the line, measuring through the tubing, from the exhauster, and therefore beyond any despatching-inlet and any carrier that may be inserted into the line. There is now a movement of air through the line toward the exhauster, which when the cash-carrier is inserted moves said carrier toward the exhauster, and the valve 24 at that inlet where the carrier was inserted immediately closes. The pressure of the carrier introduces, as we have hereinbefore stated, additional resistance to the motion of the air, and valve 10 remains more or less open, allowing air to enter at the terminal air-inlet 3 to maintain the requisite current in the line to move the carrier through the line until it is discharged at the proper outlet. Immediately after the valve at the outlet closes the ball-valve 10 also closes and the exhauster again performs only its minimum duty. Suppose that while one carrier is traveling through another is inserted into the line. It may be either behind—that is, farther from the exhauster—or in front of—that is, between the first carrier and the exhauster. In the first case the insertion of the second carrier will not even momentarily have any practical effect on the first carrier; but the valve 10 may open a little more in accordance with the increased resistance in the line. In the second case the motion of the first carrier will be momentarily arrested or checked, and then when the valve of the despatching-inlet at which the second carrier was inserted closes the first carrier will again proceed toward the discharge-outlet, in both cases, of course, the second carrier also moving through the line and valve 10 opening according to the resistance in the line. When the first carrier drops out of its discharge-outlet, the second carrier will be momentarily arrested or checked and then as the valve of the discharge-outlet closes will continue on its journey, the valve 10 adjusting itself to the reduced resistance in the line. Thus under all conditions the valve at the terminal air-inlet 3 adjusts itself to the conditions of service in the line and reduces the duty of the exhauster to minimum required for that service.

Referring to Fig. 4, the depending tube 30 is preferably closed at its lower end, which has a small hole 40 and is provided with circumferential ports 31. A sleeve 34, provided with circumferential ports which in the open position register with the aforesaid ports 31, is preferably closed at the bottom and works with an easy approximately-tight fit on said tube 30, being stopped at its open-port position by a pin 36, which works in a slot 37. The ports and the weight of the sleeve are so adjusted that when no carrier is in the line the sleeve will be drawn up by the partial vacuum in the line and close the ports 31, but that when a carrier is in line the sleeve will descend to more or less open the ports, according to the resistance in the line, the operation of this form of closure being the substantial equivalent of the ball shown in Fig. 3.

Any suitable device may of course be used to automatically control the exhauster, according to the varying needs of the line. A suitable governor is shown in Fig. 3, consisting of a diaphragm 47 of the well-known type

in communication by tube 45 with the line-tube 1. Said diaphragm 47 controls the valve 48 on the steam-pipe 51 by the lever 50, and said valve controls the speed of the engine 52, which drives the exhauster 2, so that when the terminal inlet-valve is open, as when a carrier is in the line, the diaphragm 47 being raised by the spring 49, the valve 48 is opened and the engine and exhauster run at relatively-high speed, but that when the terminal inlet-valve and tube-line are closed, as when no carrier is in the line, the vacuum developed in tube 1 will draw down the said diaphragm, closing said valve 48 and slowing down the engine and exhauster.

A very important result of the operation of the closure of the terminal air-inlet is that the speed of the carrier can never exceed that which attends upon the incoming of the air at such a velocity as will close the terminal air-inlet, for should the carrier reach or exceed this speed the terminal air-inlet will be closed, producing a vacuum behind the carrier which will immediately reduce its speed to such degree as to permit the air-inlet to open again, and we can regulate this speed by adjusting the valve at the terminal air-inlet, so as to obviate the danger of accidents when the carrier reaches the discharge-outlets, which is a defect in present vacuo systems.

Now, having described our improvements, we claim as our invention—

1. A vacuo despatch system characterized by the combination of a line of tubing, an exhauster operatively connected therewith, and a terminal air-inlet having a closure which automatically shuts the air-inlet when no carrier is being despatched and automatically opens same when a carrier is being despatched, substantially as described.

2. The combination in a vacuo despatch system of a line of tubing, an exhauster operatively connected therewith, despatch-inlets and discharge-outlets normally closed, and a terminal air-inlet on said line remote from said exhauster provided with a closure which is arranged to automatically shut the said terminal air-inlet when no carrier is being despatched and automatically open it when a carrier is being despatched, substantially as described.

In testimony whereof we have signed our names hereto in the presence of two subscribing witnesses.

CHARLES S. BAVIER.
JAMES R. HAWKES.

Witnesses:
BERNARD J. ISECKE,
REUBEN G. KATZ.