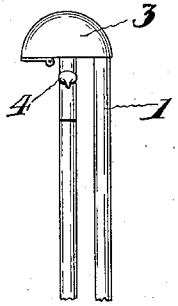
F. J. H. HAZARD.

PNEUMATIC DESPATCH SYSTEM.

APPLICATION FILED MAY 20, 1908.

1,025,803. Patented May 7, 1912.



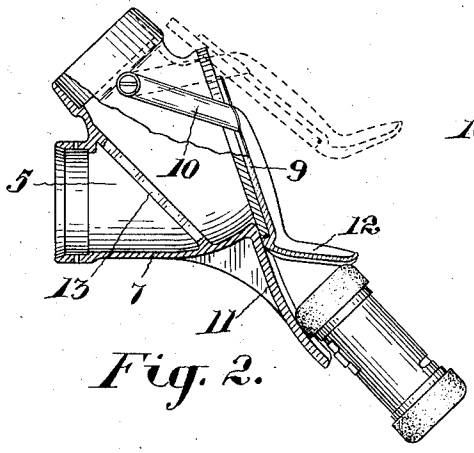


Fig. 2.

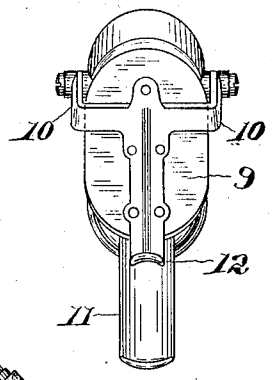


Fig. 3.

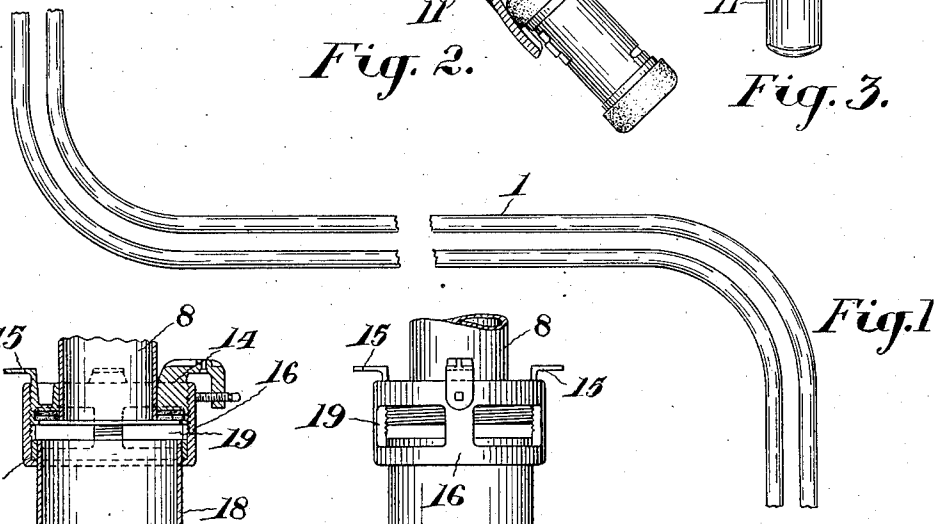


Fig. 1

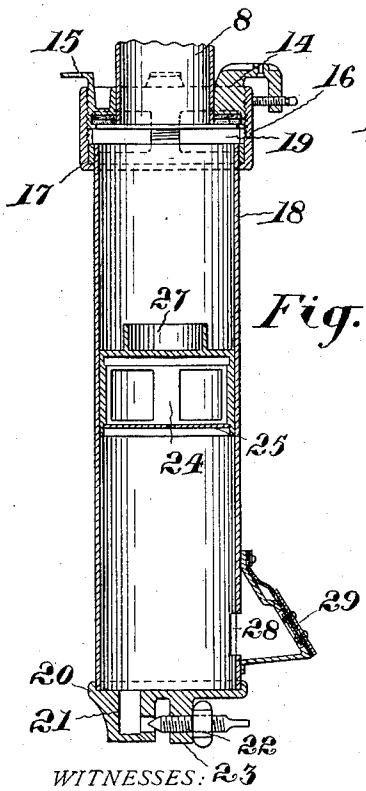


Fig. 4.

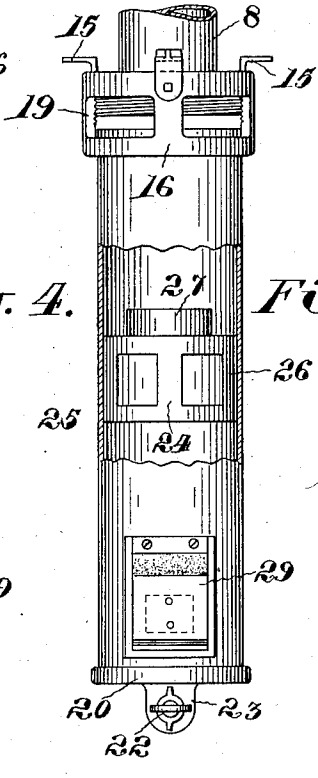
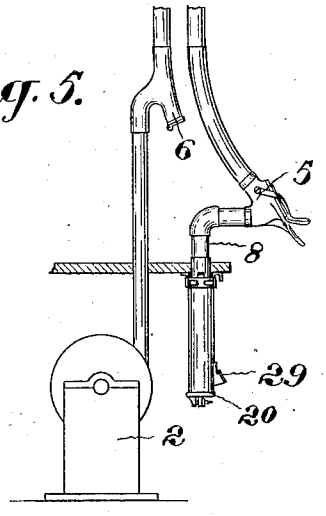


Fig. 5.



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UNITED STATES PATENT OFFICE.

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PNEUMATIC-DESPATCH SYSTEM.

1,025,803. Specification of Letters Patent. Patented May 7, 1912.

Application filed May 20, 1908. Serial No. 433,918.

To all whom it may concern:

Be it known that I, FREDERICK J. H. HAZARD, of the city of Toronto, in the Province of Ontario, Canada, have invented certain new and useful Improvements in Pneumatic-Despatch Systems, of which the following is a specification.

My invention relates to improvements in vacuo-despatch systems in which a vacuum is maintained in a number of lines by an air pump and particularly to systems provided with means whereby the lines are closed when no carriers are passing through them so that the duty put upon the exhauster is merely to move the volume of air contained in the percentage of the total number of lines actually in use and to maintain a slight vacuum in the lines not in use. Automatic closures for this purpose have been devised operable by pneumatic suction but have proved a little uncertain in operation owing to a tendency they have had to close prematurely if the vacuum rises above a given maximum or to fail to close if the vacuum falls below a given minimum.

My object is to devise a closure which may be accurately regulated to operate at the lowest vacuum likely to be met with and also regulated to insure its remaining open till a carrier placed in the line has passed out at the delivery point. The construction I have devised to effect this object comprises an air inlet, a closure for the inlet adapted to move toward the closing position as soon as a carrier is placed in the line or the line is closed, means for regulating the suction on the closure and means for controlling the rate of its movement toward the closed position.

Figure 1 is a side elevation partly broken away showing a single line of a vacuo-despatch system. Fig. 2 is a vertical, longitudinal section of an inlet trap. Fig. 3 is a front view of the trap. Fig. 4 is a vertical section of the terminal air inlet and its automatic closure. Fig. 5 is a front elevation of the same partly sectioned to show the valve forming the closure.

In the drawings like letters of reference indicate corresponding parts in the different figures.

Referring particularly to Fig. 1, 1 is a line of tubing connected in the usual manner with the exhauster 2. The line is shown provided at its upper end with the discharge trap 3 and inlet trap 4. Its lower end is also shown provided with the inlet trap 5 and the outlet trap 6. All traps are of ordinary construction with the exception of the inlet trap 5. The body of this trap is formed of the casting 7 suitably shaped for connection with the line 1 and the pipe 8 leading to the terminal air inlet hereinafter to be described. The casting 7 has an opening in front sloping upwardly and rearwardly to which is fitted a hinged cover or valve 9. For the purpose of hinging this cover it is preferably provided at the sides with the rearwardly extending arms 10 which at their rearward ends are suitably pivoted on the sides of the casting 7. The casting is also provided at the lower edge of the inlet opening with an outwardly extending tongue 11. The cover 9 is provided with the tongue 12 at an acute angle to the aforesaid tongue 11. The tongue 11 is preferably curved outwardly on a curve of a comparatively long radius toward the outer end and the tongue 12 is preferably turned up as shown on a curve of a short radius. In cross-sections toward their outer portions the two tongues have their adjacent surfaces concaved. The shape and arrangement of these tongues facilitate the introduction of the carrier or cartridge 0 as shown in Fig. 2, the object being to enable the operator by merely pressing the cartridge between the tongues to open the trap and permit of the cartridge being introduced into the line through the opening 5. The rearward extension of the pivot of the cover 9 through the arms 10 facilitates the raising of the cover through pressure on the under side of the tongue 12. The arms being carried well down the cover brings the arms more in line with the direction in which the strain due to the weight and air pressure on the cover is resolved than if the arms were connected nearer to the upper edge of the cover and renders the construction stronger.

The bar 13 serves to prevent the carrier as it is introduced from falling into the opening leading to the pipe 8. The pipe 8 has a casting 14 fitted about its lower end and provided with lugs 15 by means of which it may be secured beneath a floor or counter. This casting is threaded externally and upon it is screwed a flanged coupling 16 which engages a collar 17 formed

at the upper end of the tube 18. The coupling 16 is preferably free to rotate on the tube 18. In the coupling 16 are formed the air inlets 19. On reference to Figs. 4 and 5 it will be evident that the size of these openings may be easily regulated by screwing the coupling 16 up or down upon the casting 14. The lower end of the tube 18 is closed by the cap 20 through which is formed the air inlet 21. The passage of air through the inlet is controlled by the needle valve 22 threaded through a lug 23 as shown. The purpose of this valve is to control the admission of air below the closure or valve 24 which is slidable up and down in the tube 19. This valve comprises a pair of diaphragms 25 connected by a cylinder 26 preferably cut in segments as shown to decrease the weight of the closure. This valve or closure is provided with a collar 27 adapted to fit within the lower end of the pipe 8. Under the action of suction in the pipe the valve or closure 24 will rise, the rate of rising being governed by the adjustment of the needle valve 22, and it will be evident that there is practically no reduction of the area of the air inlet to the pipe 8 until just the instant before closure of the pipe occurs subsequent to the passage of the collar 27 within its lower end and by the contact of the closure with the casting 14. It is necessary that the valve shall drop quickly as soon as the line is opened by the introduction of the carrier and I therefore provide the tube 18 with an air outlet 28 which is governed by the outwardly opening flap or check valve 29 which permits of the freest possible outward movement of air but absolutely prevents any return movement.

The operation of the device is substantially as follows. Having ascertained what is the lowest vacuum that is likely to be found at any time under ordinary conditions, the air inlets 19 are adjusted by rotating the coupling 16 until the suction on the closure 24 is sufficient to insure it always rising as soon as the line is closed. The rate of this rise is then regulated by adjusting the needle valve 22 to insure that the valve or closure will not rise to the top of the tube and close the pipe 8 until the carrier has had time to move from one end to the other of the line and be discharged therefrom. The too rapid movement of the closure at the highest probable working vacuum in the line may thus be guarded against. The device having been adjusted, whenever the line is closed the valve or closure 24 will rise slowly in the tube 18 and will close the pipe 8, remaining closed as long as there is any suction in the line. As soon as one of the inlet traps in the line is opened permitting the free ingress of air into the system above the terminal air inlets, suction on the closure 24 is at once destroyed and the closure will drop rapidly to the bottom of the tube 18, the air beneath it being forced through the outlet 28 and the flap valve 29. As soon as the lower diaphragm 25 of the closure passes below the edge of the air outlet 28, an air cushion is formed which prevents jar or noise, the air being gradually forced out through the inlet 21. As soon as a carrier has been introduced through the inlet trap which has been opened, and the trap again closed, the suction on the valve or closure 24 is again established and the closure rises. Its rate of rising being such that it has not quite reached the upper end of the tube 18 at the time of the discharge of the carrier from the outlet trap. The opening of the outlet trap of course momentarily destroys the suction on the closure 24 but the exit of the carrier is so rapid that the trap through which it issued closes again before the closure 24 has dropped any appreciable extent in the tube 18. As soon as the carrier is discharged, the suction is of course, reëstablished and the valve completes its upward movement and closes the pipe 8. Of course every time a carrier is introduced into the system, the closure drops to the bottom of the tube 18 and therefore no trouble arises through the presence of several carriers in the system at one time, as the closure will not close the pipe 8 until the last carrier introduced has been discharged from the system.

What I claim as my invention is:—

1. In a vacuo-despatch system the combination of a line of tubing provided with a terminal air inlet; an exhauster connected with said line; and a closure for the air inlet adapted under the action of the vacuum alone to be moved continuously toward the closing position while a carrier is moving through the tubing and at a speed proportionate to the rate of movement of the carrier; and means for regulating the rate of movement of the closure.

2. In a vacuo-despatch system the combination of a line of despatch tubing provided with a terminal air inlet; an exhauster connected with said line; a closure for the air inlet adapted under the action of the vacuum alone to be moved continuously toward the closing position while a carrier is moving through the tubing and at a speed proportionate to the rate of movement of the carrier without effecting any reduction of the area of the inlet until just before closure takes place; and means for regulating the rate of movement of the closure.

3. In a vacuo-despatch system the combination of a line of tubing provided with a terminal air inlet; an exhauster connected with said line; a closure for the air inlet adapted under the action of the vacuum alone to be moved continuously toward the

closing position while a carrier is moving through the tubing and at a speed proportionate to the rate of movement of the carrier; means for regulating the rate of movement of the closure; and means for permitting a rapid reverse movement of the closure whenever the line is opened.

4. In a vacuo-despatch system the combination of a line of tubing provided with a terminal air inlet; an exhauster connected with said line; a closure for the air inlet adapted under the action of the vacuum to move toward the closing position while a carrier is moving through the tubing; and means for varying the size of the said air inlet.

5. In a vacuo-despatch system the combination of a line of tubing provided with a terminal air inlet; an exhauster connected with said line; a closure for the air inlet adapted under the action of the vacuum to move toward the closing position while a carrier is moving through the tubing without effecting any reduction of the area of the inlet until just before the closure takes place; and means for varying the size of the said air inlet.

6. In a vacuo-despatch system the combination of a line of tubing provided with a terminal air inlet; an exhauster connected with said line and a closure for the air inlet adapted under the action of the vacuum to move toward the closing position while a carrier is moving through the tubing; means for regulating the rate of movement of the closure; and means for varying the size of the said air inlet.

7. In a vacuo-despatch system the combination of a line of tubing provided with a terminal air inlet; an exhauster connected with said line; a closure for the air inlet adapted under the action of the vacuum to move toward the closing position while a carrier is moving through the tubing without effecting any reduction of the area of the inlet until just before closure takes place, means for regulating the rate of movement of the closure; and means for varying the size of the said air inlet.

8. In a vacuo-despatch system the combination of a line of tubing provided with a terminal air inlet; an exhauster connected with said line; a closure for the air inlet adapted under the action of the vacuum to move slowly toward the closing position while a carrier is moving through the tubing; means for permitting a rapid reverse movement of the closure whenever the line is opened; and means for varying the size of the said air inlet.

9. In a vacuo-despatch system the combination of a line of tubing provided with a terminal air inlet; an exhauster connected with said line; a closure for the air inlet adapted under the action of the vacuum to move slowly toward the closing position while a carrier is moving through the tubing without effecting any reduction of the area of the inlet until just before closure takes place; means for permitting a rapid reverse movement of the closure whenever the line is opened; and means for varying the size of the said air inlet.

10. In a vacuo-despatch system the combination of a line of tubing provided with a terminal air inlet; an exhauster connected with said line; a closure for the air inlet adapted under the action of the vacuum to move slowly toward the closing position while a carrier is moving through the tubing; means for regulating the rate of movement of the closure; means for permitting a rapid reverse movement of the closure whenever the line is opened; and means for varying the size of the said air inlet.

11. In a vacuo-despatch system the combination of a line of tubing provided with a terminal air inlet; an exhauster connected with said line; a closure for the air inlet adapted under the action of the vacuum to move slowly toward the closing position while a carrier is moving through the tubing without effecting any reduction of the area of the inlet until just before closure takes place; means for regulating the rate of movement of the closure; means for permitting a rapid reverse movement of the closure whenever the line is opened; and means for varying the size of the said air inlet.

12. In a vacuo-despatch system the combination of a line of tubing provided with a terminal air inlet; an exhauster connected with said line; a closure for the air inlet adapted under the action of the vacuum to move toward the closing position while a carrier is moving through the tubing; and governing means regulating the closing movement of the closure comprising means for assuring its closing movement under normal conditions at the lowest probable working vacuum in the line and means preventing its too rapid movement at the highest probable working vacuum in the line.

13. In a vacuo-despatch system the combination of a line of tubing provided with a terminal air inlet; an exhauster connected with said line; a closure for the air inlet adapted under the action of the vacuum to move toward the closing position while a carrier is moving toward the tubing; governing means regulating the closing movement of the closure comprising means for assuring its closing movement under normal conditions at the lowest probable working vacuum in the line and means preventing its too rapid movement at the highest probable working vacuum in the line; and means for permitting a rapid reverse movement of the closure whenever the line is opened.

14. A terminal air inlet regulator for vacuo-despatch systems comprising a vertical tube having an air inlet at its upper end and a small air inlet and a large air outlet at its lower end; a pipe connected with the upper end of the tube for connection with the system; a closure slidable in said tube and adapted to close the lower end of the pipe; and a check valve controlling the air outlet at the lower end of the tube.

15. A terminal air inlet regulator for vacuo-despatch systems comprising a vertical tube having an air inlet at its upper end and a small air inlet and a large air outlet at its lower end; a pipe connected with the upper end of the tube for connection with the system; a closure slidable in said tube and adapted to close the lower end of the pipe; a check valve controlling the air outlet at the lower end of the tube; and a regulating valve controlling the small air inlet at the lower end of the said tube.

16. A terminal air inlet regulator for vacuo-despatch systems comprising a vertical tube having an air inlet at its upper end and a small air inlet and a large air outlet at its lower end; a pipe connected with the upper end of the tube for connection with the system; a closure slidable in said tube and adapted to close the lower end of the pipe; a check valve controlling the air outlet at the lower end of the tube; and means for regulating the size of the air inlet at the upper end of the tube.

17. A terminal air inlet regulator for vacuo-despatch systems comprising a vertical tube having an air inlet at its upper end and a small air inlet and a large air outlet at its lower end; a pipe connected with the upper end of the tube for connection with the system; a closure slidable in said tube and provided with a collar adapted to fit into and close the lower end of the pipe; and a check valve controlling the air outlet at the lower end of the tube.

18. An inlet trap for pneumatic despatch systems provided with an outwardly extending tongue at the edge of its inlet opening; and a hinged cover or valve provided with a tongue at an angle to the aforesaid tongue whereby the introduction of a carrier between the two tongues serves to open the valve.

19. An inlet trap for pneumatic despatch systems provided with an outwardly extending tongue at the edge of its inlet opening; and a hinged cover or valve provided with a tongue at an angle to the aforesaid tongue, the two tongues having their adjacent surfaces transversely concaved, whereby the introduction of a carrier between the two tongues serves to open the valve.

20. An inlet trap for pneumatic despatch systems provided with an outwardly extending tongue at the edge of its inlet opening and a cover or valve provided with arms extending rearwardly at an angle to the plane of the inlet opening and provided also with a tongue at an angle to the aforesaid tongue whereby the introduction of a carrier between the two tongues serves to open the valve.

21. A terminal air inlet regulator for vacuo-despatch systems comprising a cylinder in communication with the system and having an air inlet, adjustable in area, at the end adjacent to the system; and a closure for the system adapted to reciprocate in said cylinder and close said communication.

22. In a vacuo-despatch system, the combination of a line of despatch tubing, an exhauster connected with said line, a terminal air inlet for said line comprising a chamber having an air inlet at one end and a closure therein adapted under the action of the vacuum alone to be moved continuously from the other end of said chamber to close said air inlet while a carrier is moving through the tubing, and without effecting any reduction of the area of the air inlet until just before closure takes place.

23. In a vacuo-despatch system, the combination of the line of tubing provided with a terminal air inlet; an exhauster connected with said line; a closure for the air inlet adapted under the action of the vacuum alone to be moved continuously toward the closing position while a carrier is moving through the tubing, and at a speed proportionate to the rate of movement of the carrier; and means for regulating the rate of movement of the closure comprising an air chamber in which the closure is movable and which is provided with a valve controlled air-inlet.

Dated at Toronto in the Province of Ontario, this 11th day of May 1908.

FREDERICK J. H. HAZARD.

Signed in the presence of—

J. EDW. MAYBEE,

F. W. MCKENDRICK.