E. FLINT.

VACUO-DESPATCH SYSTEM.

APPLICATION FILED NOV. 27, 1908.

973,931. **Patented Oct. 25, 1910.**

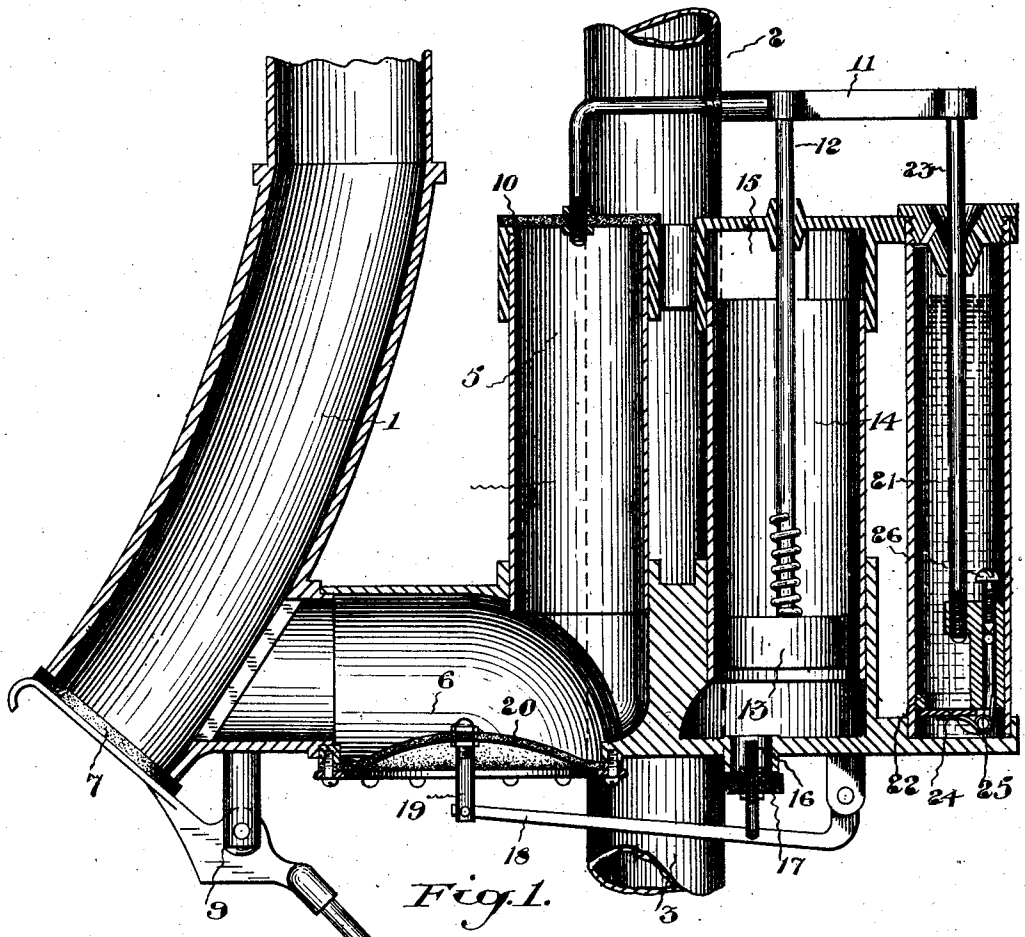

Fig. 1.

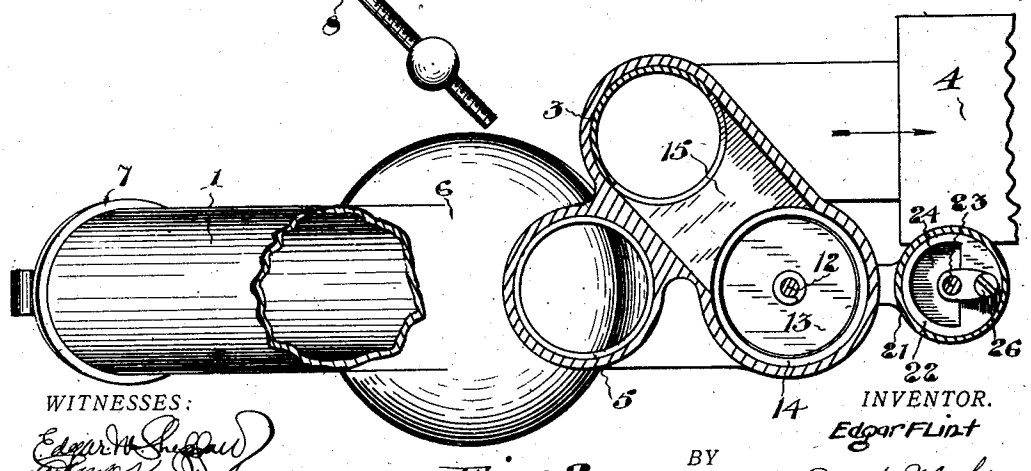

Fig. 2.

WITNESSES:

Edgar H. Sheffield

F. W. Kendrick

INVENTOR.

Edgar Flint

BY

Ridout & Maybee

ATTORNEYS

UNITED STATES PATENT OFFICE.

EDGAR FLINT, OF TORONTO, ONTARIO, CANADA.

VACUO DESPATCH SYSTEM.

973,931. Specification of Letters Patent. Patented Oct. 25, 1910.

Application filed November 27, 1908. Serial No. 464,645.

To all whom it may concern:

Be it known that I, EDGAR FLINT, of the city of Toronto, in the Province of Ontario, Canada, have invented certain new and useful Improvements in Vacuo 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 needed for the transit of the carrier actually in use and to maintain a slight vacuum in the lines not in use. Automatic closures for this purpose have been devised which move toward the closing position under the influence of the vacuum in the system. With such closures it is necessary for the opening or feed inlet to be of smaller area than the line into which it opens, to create a partial vacuum to close opening therefor reducing the atmospheric pressure behind carrier, but such closures naturally vary in their rate of closing with variations in the vacuum in the system, and I aim to make the closure move toward the closed position independently of the vacuum and against a resistance variable to adapt the rate of closing to the length of the line through which the carriers must pass. The opening of the closure is effected by bringing it under the influence of the vacuum in the exhausting apparatus immediately a trap is opened at any point of the line to admit a carrier. The controlling means for the closure is so arranged that it is unaffected by any fluctuations of vacuum in the system and will only operate by a rise to atmospheric pressure within the system at the inlet traps. The closing movement is regulated by an oil dash pot with an adjustable by-pass.

Figure 1 is a vertical section of parts of a vacuo-despatch system, constructed in accordance with my invention. Fig. 2 is a sectional plan view of the same.

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

1 is an up or despatch tube of a pneumatic despatch system.

2 is the down or receiving tube. This tube is connected by the tube 3 with an exhauster. A part of the exhaust drum 4 is shown in Fig. 2. The exhaust pumps being of ordinary construction are not illustrated.

The terminal air inlet is at the upper end of the tube 5 connected with the chamber 6, which is in communication with the up tube 1 close to the inlet trap 7. Any form of trap may be employed. I show it, however, as secured to the end of the weighted lever 8 pivoted at 9 close to the end of the tube 1.

10 is the closure for the air inlet. This opens upwardly and therefore, under the action of gravity, always tends to close. It is guided in its movements by being connected by means of the arm 11 with the upper end of the piston rod 12 secured to the piston 13 vertically movable in the closed cylinder 14. A restricted movement of air is permitted past the piston 13, preferably by making the piston a loose fit in the cylinder. When the pressure is the same on each side of the piston, the piston will fall and move the closure 10 toward its closed position. The device is arranged so that the opening of an inlet trap in the system will effect the opening of the closure. I accomplish this by forming a connection 15 between the tube 3 and the upper end of the cylinder 14 thus bringing the cylinder into direct connection with the exhauster. An air inlet 16 is provided in the bottom of the cylinder 14 which opening is controlled by the valve 17. It is evident that by opening this valve air at atmospheric pressure would be introduced below the piston, while above the piston the cylinder is subjected to the vacuum in the exhauster. The piston 13 would then promptly rise, carrying the closure with it, as the leakage past the piston is small compared with the area of the air inlet 16. The valve 17 is secured to a stem carried by the lever 18 pivoted at one end to a stationary part and at the other connected by means of the arm 19 with a flexible diaphragm 20. This diaphragm closes an opening in the under side of the chamber 16. One side of the diaphragm is thus exposed to the atmosphere and the other to the pressure within the system. If at any time the system is opened, the pressure therein promptly rises to that of the atmosphere. The pressure then being equal on opposite sides of the diaphragm 20 the weight of the parts connected thereto will

open the valve 17 and the closure 10 will be opened as hereinbefore described. As soon as the system is again closed the valve 17 is again closed as shown in the drawings. The piston 13 then drops and carries the closure 10 with it toward the closed position. As, however, carriers may take a longer or shorter time to travel through the system, due to differences of length of the line, or to other causes, it is necessary to provide means for regulating the rate of the closing movement of the closure 10. While this might possibly be accomplished by making the piston 13 a tighter or looser fit in the cylinder, yet I prefer to provide a separate regulator which is more reliable and permit a finer adjustment. For this purpose I provide a cylinder 21 filled with fluid preferably oil. In this cylinder is located a piston 22 connected by means of a piston rod 23 with the arm 11. In the piston is a spring actuated downwardly opening check valve 24, which will permit of a free and unobstructed rising of the piston through the fluid. The downward movement of the piston is provided for by forming a by pass 25 through the valve, which by pass is controlled by a screw 26 forming a needle valve. In this arrangement practically no resistance is offered to the rapid opening of the closure 10, while the rate of the closing movement depends on the adjustment of the needle valve 26.

It will be seen that the arrangement I have above described is very simple. The closing of the air inlet is certain under all conditions and is quite independent of any slight variations in the vacuum in the system, as is also the rate of its closing movement. At the same time, the opening of the air inlet when the system is open is assured under all conditions as the full pressure in the exhauster is available for opening the closure.

As the closure of the air inlet is independent of the vacuum in the system, the air inlet will remain closed when the apparatus is not in use and the exhauster pumps not running. Consequently when the pumps are started all the systems are closed and the pumps have a minimum duty thrown upon them until such times as the systems are actually put into use by the insertion of carriers.

What I claim as my invention is:—

1. In a vacuo-despatch system the combination of a line of tubing provided at one end with a manually operable trap; a diaphragm chamber in communication with said line adjacent to said trap and provided at the upper side with an air inlet; a gravity actuated closure normally closing said inlet; pneumatic means for opening the closure normally exposed to the pressure in the system and closed to the atmosphere; a movable diaphragm in the diaphragm chamber exposed at one side to the pressure in the system and at the other to the atmosphere; and means operable by the diaphragm for conditioning the operation of the closure opening means by admitting atmospheric pressure thereto.

2. In a vacuo-despatch system the combination of a line of tubing normally closed and provided with a terminal air inlet; a gravity actuated closure normally closing said inlet; an exhauster connected with the line; a closed cylinder at one end in communication with the exhauster and having an air inlet at the other end; a piston in said cylinder adapted to permit a restricted leakage of air from one side to the other; operating connections between said piston and the closure; a valve closing the air inlet of the cylinder; and means controlled by the vacuum in the system whereby said valve is held closed except at such times as the system is opened.

3. In a vacuo-despatch system the combination of a line of tubing normally closed and provided with a terminal air inlet; a gravity actuated closure normally closing said inlet; an exhauster connected with the lineo a closed cylinder at one end in communication with the exhauster and having an air inlet at the other end; a piston in said cylinder adapted to permit a restricted leakage of air from one side to the other; operating connections between said piston and the closure; a valve closing the air inlet of the cylinder; a flexible diaphragm exposed at one side to the pressure in the system and at the other to the atmosphere, and connections between the diaphragm and the valve for operating the latter.

4. In a vacuo despatch system the combination of a line of tubing normally closed and provided with a terminal air inlet; a gravity actuated closure normally closing said inlet; an exhauster connected with the line; a closed cylinder at one end in communication with the exhauster and having an air inlet at the other end; a piston in said cylinder adapted to permit a restricted leakage of air from one side to the other; operating connections between said piston and the closure; a valve closing the air inlet of the cylinder; a flexible diaphragm exposed at one end to the pressure in the system and at the other to the atmosphere; connections between the diaphragm and the valve for operating the latter, and means for regulating the closing movement of the closure.

5. In a vacuo-despatch system the combination of a line of tubing normally closed and provided with a terminal air inlet; a gravity actuated closure normally closing said inlet; an exhauster connected with the line; a closed cylinder at one end in communication with the exhauster and having

an air inlet at the other end; a piston in said cylinder adapted to permit a restricted leakage of air from one side to the other; operating connections between said piston and the closure; a valve closing the air inlet of the cylinder; a flexible diaphragm exposed at one side to the pressure of the system and at the other to the atmosphere; connections between the diaphragm and the valve for operating the latter; a cylinder filled with fluid; a piston in said cylinder connected with the closure; a check valve in the piston opening downwardly; and a by pass past said piston.

6. In a vacuo-despatch system the combination of a line of tubing normally closed and provided with a terminal air inlet; a closure for the air inlet; an exhauster; pneumatic means in connection with the exhauster for opening the closure; a flexible diaphragm exposed at one side to the pressure in the system and at the other to the atmosphere; means normally operable by the diaphragm for causing the operation of the closure opening means; and means for retarding the closing movement of the closure comprising a cylinder filled with fluid, a piston in said cylinder and connected with the closure, a check valve in the piston opening downwardly, and a by-pass past said piston.

Toronto this 23rd day of November, 1908.

EDGAR FLINT.

Signed in the presence of—

J. EDW. MAYBEE,

F. W. MCKENDRICK.