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RECEIVING APPARATUS FOR PNEUMATIC DESPATCH SYSTEMS.

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974,617.

Patented Nov. 1, 1910.

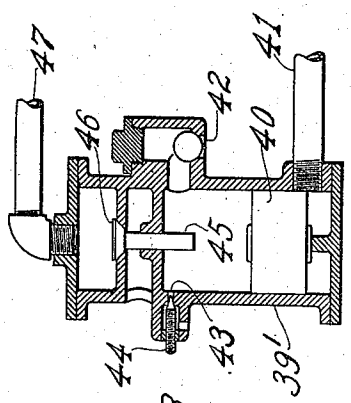

FIG. 3

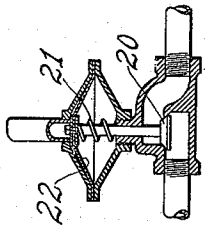

FIG. 2

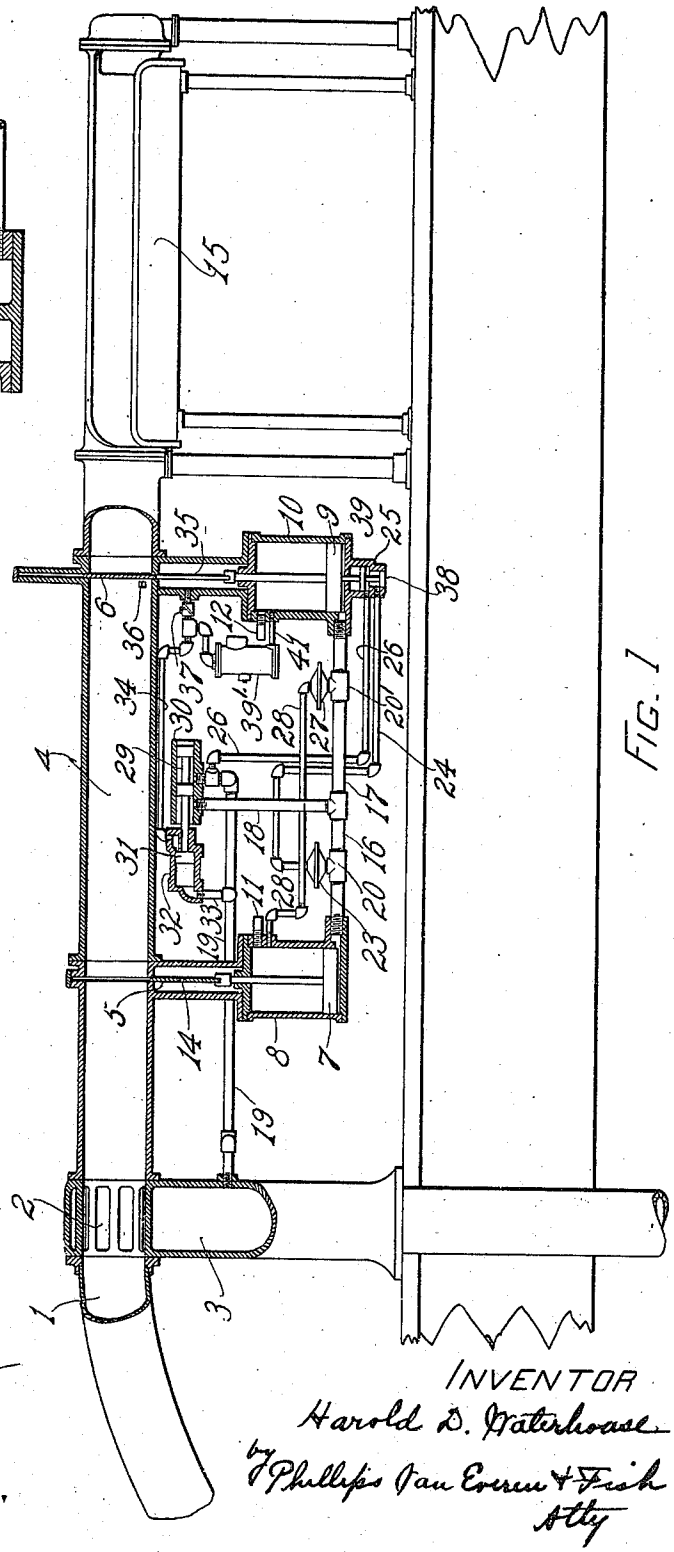

FIG. 1

WITNESSES

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RECEIVING APPARATUS FOR PNEUMATIC-DESPATCH SYSTEMS.

974,617. Specification of Letters Patent. Patented Nov. 1, 1910.

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To all whom it may concern:

Be it known that I, HAROLD D. WATERHOUSE, a citizen of the United States, residing at Norfolk Downs, Quincy, in the county of Norfolk and State of Massachusetts, have invented certain new and useful Improvements in Receiving Apparatus for Pneumatic-Despatch Systems; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The invention relates to receiving apparatus for pneumatic despatch systems, and more especially to receiving mechanism adapted for use in receiving comparatively large and heavy carriers such as are employed for carrying mail and other heavy matter.

An apparatus embodying all the various features of the invention comprises a cushioning chamber arranged in line with or adapted to be brought into alinement with a transmitting tube and provided with two valves or gates, the inner gate being normally open and the outer gate normally closed. When the carrier enters the cushioning chamber the air between the carrier and outer gate is compressed and forms an air cushion for stopping the carrier. The entrance of the carrier into the cushioning chamber sets into operation mechanism which causes the inner gate to close and then the outer gate to open so that the carrier may pass out of the cushioning chamber on to the receiving table or pan. The gates and the operating and controlling mechanism therefor then return to normal position ready for the reception of another carrier.

Certain features of the invention contemplate the employment of a pneumatically operated piston for each valve, and relate to improved devices for controlling the supply of air to and the exhaust of air from the cylinders within which these pistons operate, so that the accurate timing of the operation of the gates is insured.

Other features of the invention relate to the means for controlling the return of the parts to normal position, and these features in their broader aspects may be embodied in constructions in which the inner and outer valves are operated by a single piston, the form of the gates or the connections between the gates and the piston being so constructed and arranged that the gates open and close in proper succession. These features may also be embodied in constructions in which a single valve is employed at the exit end of the cushioning chamber as well as in constructions in which two valves are employed, to form an air trap for preventing the escape of air from the transmission tube during the delivery of the carrier. In accordance with these features of the invention the opening of the gate against which the air is compressed by the carrier sets into operation a timing mechanism which acts after a certain interval to cause the return of the gate to closed position. In case the timing mechanism is embodied in a construction in which the receiving chamber is provided with inner and outer gates, the timing mechanism acts to cause a return of the gates and of the operating and controlling devices to their normal positions.

The various features of the invention will be understood from an inspection of the accompanying drawings, in which—

Figure 1 is a vertical sectional view of an apparatus embodying the various features of the invention in the forms in which I prefer to use them, and Figs. 2 and 3 are details of certain valves and parts to be described.

In the apparatus illustrated the transmission tube 1 is connected through a by-pass 2 with a tube 3 through which the compressed air back of the carrier flows after the carrier has passed beyond the by-pass. The cushioning chamber 4 is arranged in line with the transmission tube and is provided with an inner gate 5 and an outer gate 6. The inner gate is connected to a piston 7 mounted within a cylinder 8, and the outer gate is connected to a piston 9 mounted within a cylinder 10. The upper ends of the cylinders 8 and 10 are in free communication with the atmosphere through the pipes 11 and 12, and the pistons normally rest at the lower ends of the cylinder. With the pistons in these positions, the inner gate 5 is opened and the outer gate 6 is closed.

When a carrier enters the cushioning chamber the air between the carrier and the valve 6 is compressed, forming an air cushion which brings the carrier to rest within

the cushioning chamber. The air compressed in front of the carrier sets into operation the devices which control the supply of compressed air to the lower ends of the cylinders 8 and 10 so that the piston 7 is first raised to close the gate 5 and then the piston 9 is raised to open the gate 6. The gate 5 is provided with a small port 14 through which compressed air enters the cushioning chamber back of the carrier and forces the carrier out of the cushioning chamber on to the receiving pan 15.

The lower ends of the cylinders 8 and 10 are connected by means of pipes 16 and 17 with a pipe which is normally in communication with the atmosphere and is brought into communication with an air supply pipe 19 when compressed air is to be supplied to the lower ends of the gate cylinders for closing the inner gate and opening the outer gate. The flow of air to and from the lower end of the cylinder 8 through the pipe 16 is controlled by a valve 20 arranged within said pipe and forced yieldingly toward its seat by a spring 21. The stem of the valve 20 is connected with a diaphragm 22 arranged in a casing 23. The chamber above the diaphragm is connected through a pipe 24 with a valve chamber 25 which is also in communication through a pipe 26 with the air supply pipe 19 when the parts are in normal position. The valve 20 is therefore normally held away from its seat by the pressure on the upper side of the diaphragm 22, and the lower end of the cylinder 8 is normally open to the atmosphere through the pipe 16 and pipe 18.

The flow of air to and from the lower end of the cylinder 10 is controlled by a valve 20′ similar to the valve 20 and connected to a diaphragm within a diaphragm casing 27. The chamber above the diaphragm on the casing 27 is connected through a pipe 28 with the cylinder 8 near its upper end, and when the parts are in their normal position this chamber is therefore open to the atmosphere. The valve which controls the flow of air to and from the lower end of the cylinder 10 is therefore normally closed.

The pipe 18 which communicates with the pipes leading to the lower ends of the gate cylinders is brought into communication with the air supply pipe 19 by means of a piston valve 29 which is mounted within a valve casing 30 and is provided with pistons arranged to coöperate with the ports in the valve casing with which the pipes 18 and 19 communicate. The piston valve 29 is connected to a piston 31 mounted within a cylinder 32, one end of which is connected by means of a pipe 33 with the air supply pipe 19, and the other end of which is in communication with a pressure supply pipe 34. When the parts are in normal position the pressure supplied to the cylinder 32 through the pipe 33 holds the piston 31 at the right-hand end of the cylinder 32, and with the piston in this position the valve 29 is in position to cut off communication between the supply pipe 19 and the pipe 18, and to open the pipe 18 to the atmosphere. The pressure pipe 34 communicates with the cushioning chamber near the outer gate 6 through a chamber 35 and port 36. A check valve 37 is arranged in the pressure pipe 34 to prevent back flow of air through the pipe.

When the carrier enters the cushioning chamber and compresses the air in front of it, a portion of this air flows through the port 36, chamber 35 and pipe 34 to the cylinder 32 and forces the piston therein toward the left, and this air is entrapped within the cylinder and pressure pipe by reason of the check valve 37 which prevents back flow of the air, so that the piston 31 is held at the left-hand end of the cylinder 32. This movement of the piston 31 moves the valve 29 into position to bring the pipe 18 into communication with the supply pipe 19. Compressed air now flows through the pipe 18, pipe 16 and valve 20 to the lower end of the cylinder 8, flow of air through the pipe 17 being prevented by the valve 20′. The air entering the lower end of cylinder 8 forces the piston 7 upward, thus closing the inner gate 14. When the piston 7 reaches the upper end of the cylinder 8 it passes the end of the pipe 28 so that this pipe is brought into communication with the air supply. Compressed air now flows through the pipe 28 and acting on the diaphragm within the casing 27 opens the valve 20′ so that air flows through the pipe 17 to the lower end of the cylinder 10. This air entering the cylinder 10 forces the piston 9 upward, thus opening the valve 6 and allowing the carrier to be discharged from the cushioning chamber.

When the piston 9 moves upward in the cylinder 10 it releases a piston valve 38 which is mounted within the valve chamber 25 before referred to. The valve 38 is provided with two pistons, the upper one of which is slightly larger in diameter than the lower one, and these pistons are so arranged that when the parts are in normal position indicated in Fig. 1, the two pipes 24 and 26 enter the valve chamber 25 between the pistons. The pistons are therefore subjected to the pressure transmitted through the pipe 26, and since the upper piston is larger than the lower piston this pressure tends to force the valve upward. Upward movement of the piston valve 38 is prevented, however, when the parts are in normal position, by the engagement of the piston rod 39 with the gate operating piston 9. When the piston 9 moves upward and the piston valve 38 is released the pressure transmitted through the pipe 26 moves the valve upward, carry-

ing the lower piston above the end of the pipe 24, thus opening said pipe to the atmosphere. The pressure on the upper side of the diaphragm 22 is thus released and the spring 21 acts to close the valve 20, thus entrapping the air within the lower end of the cylinder 8.

As the gate operating piston 9 reaches the upper end of its stroke, it sets into operation a timing mechanism through which, after a certain interval, the pressure pipe 34 is opened to the atmosphere and vented. This venting of the pipe 34 allows the air within the cylinder 32 at the right of the piston 31 to escape so that the piston 31 is returned to normal position by the pressure transmitted through the pipe 33. This movement of the piston returns the valve 29 to normal position and thus opens the pipe 18 to the atmosphere. At this time the piston 7 is still held at the upper end of the cylinder 8 by the air entrapped within the cylinder by reason of the closing of the valve 20 and the valve 20′ is still held from its seat by the pressure on the diaphragm within the casing 27. The lower end of the gate cylinder 10 is therefore open to the atmosphere through the pipe 17 and pipe 18 and the air escapes from this cylinder, allowing the piston 9 to fall, thus closing the outer gate 6. As the piston 9 reaches the lower end of the cylinder 10 it operates the piston valve 38, thus bringing the pipe 24 into communication with the pipe 26 so that pressure is transmitted to the diaphragm 22. The valve 20 is opened by this pressure, thus opening the lower end of the cylinder 8 to the atmosphere and allowing the piston 7 to fall. This movement of the piston opens the inner gate 14 and also opens the pipe 28 to the atmosphere, so that the pressure on the diaphragm in the casing 27 is relieved and the valve 20 returns to its seat. The parts are now in normal position ready for the reception of another carrier.

Any suitable timing mechanism for venting the pressure pipe 34 may be employed, but I prefer to employ the form of mechanism shown in Figs. 1 and 3, as this mechanism is simple in construction and reliable in operation. As shown in these views, the timing mechanism comprises a cylinder 39′ in which is mounted a weighted piston 40. The lower end of the cylinder 39′ is connected through a pipe 41 with the gate cylinder 10 near its upper end. The upper end of the cylinder 39′ is connected with the atmosphere through a port 42 in which a check valve is mounted which prevents flow of air from the cylinder while allowing a free flow of air into the cylinder. The upper end of the cylinder 39′ also communicates with the atmosphere through a restricted vent 43 which may be controlled by a needle valve 44.

When the piston 9 reaches the upper end of its stroke and thus opens the outer gate 6, it passes the end of the pipe 41 so that pressure is supplied through this pipe to the lower end of the timing cylinder 39′. This pressure tends to force the piston 40 upward. When this pressure is applied to the lower side of the piston 40 the air above the piston gradually escapes through the vent 43 allowing the piston to rise in the cylinder. When the piston reaches the upper end of the cylinder it strikes and lifts a rod 45, the upper end of which carries a valve 46. This valve controls a communication between the atmosphere and the pipe 47 which leads from the pressure pipe 34 between the check valve 37 and the cylinder 32. The opening of this valve vents the pressure pipe 34 and causes a return of the parts to their normal position in the manner above described. When the gate piston 9 moves downward to close the outer gate 6, the pipe 41 is opened to the atmosphere through the cylinder 10 and the piston 40 quickly drops to the lower end of the cylinder 39, the check valve 42 acting to allow free ingress of air to the upper end of the cylinder.

While I prefer to employ the construction and arrangement of devices shown and described, and to operate and control the various mechanisms pneumatically, it will be understood that the specific construction and arrangement of the parts may be modified and varied without departing from the broader features of the invention.

Having explained the nature and object of the invention and specifically described one form of mechanism in which it may be embodied, what I claim is:—

1. A pneumatic despatch apparatus, having, in combination, a transmission tube, a gate therefor, mechanism actuated by the air compressed by the carrier for causing the opening of the gate, and a timing mechanism for causing the gate to be closed after a predetermined interval, substantially as described.

2. A pneumatic despatch apparatus, having, in combination, a transmission tube, a gate therefor, means for supplying air for operating the gate mechanism actuated by the air compressed by the carrier for controlling said air supply to operate the gate in one direction, and a timing mechanism for causing the gate to be operated in the other direction after a predetermined interval, substantially as described.

3. A pneumatic despatch apparatus, having, in combination, a transmission tube, a gate therefor, a cylinder, a piston therein connected with the gate, an air supplying means, a valve controlling communication between the cylinder and air supply, means for operating the valve in one direction by the carrier, and a timing mechanism for

causing the valve to be operated in the opposite direction after a predetermined interval, substantially as described.

4. A pneumatic despatch apparatus, having, in combination, a transmission tube, a gate therefor, a cylinder, a piston therein connected with the gate, an air supplying means, means operated by air compressed by the carrier for controlling said air supply to open the gate, and a timing mechanism for causing the air supply to close the gate after a predetermined interval, substantially as described.

5. A pneumatic despatch apparatus, having, in combination, a transmission tube, a gate therefor, a cylinder, a piston therein connected with the gate, means controlled by the carrier for supplying air to the cylinder to operate the gate in one direction, and a timing mechanism rendered active by the operation of the gate for causing the gate to be returned after a predetermined interval, substantially as described.

6. A pneumatic despatch apparatus, having, in combination, a transmission tube, a gate therefor, mechanism controlled by the carrier for operating the gate in one direction, and a timing mechanism rendered active by the operation of the gate for causing the gate to be returned to normal position after a predetermined interval, substantially as described.

7. A pneumatic despatch apparatus, having, in combination, a transmission tube, a gate normally closing the same, means operated by the approach of a carrier for opening said gate, and a timing mechanism rendered active by the opening of the gate for causing the gate to be closed after a predetermined interval, substantially as described.

8. A pneumatic despatch apparatus, having, in combination, a cushioning chamber, inner and outer gates for the chamber, mechanism for operating said gates to first close the opened gate and then open the closed gate, means controlled by the carrier for causing said mechanism to operate the gates in discharging a carrier, and a timing mechanism for causing said operating mechanism to return the gates to normal position after a predetermined interval.

9. A pneumatic despatch apparatus, having, in combination, a cushioning chamber, inner and outer gates for the chamber, mechanism for operating said gates to first close the opened gate and then open the closed gate, means controlled by the carrier for causing said mechanism to operate the gates in discharging a carrier, and mechanism rendered active by the opening of the outer gate for causing the gates to be returned to normal position after a predetermined interval, substantially as described.

10. A pneumatic despatch apparatus, having, in combination, a cushioning chamber, a normally opened inner and a normally closed outer gate for the chamber, means operated by the entrance of a carrier for closing the inner gate, means operated by the closing of the inner gate for opening the outer gate, a timing mechanism for causing the outer gate to be closed after a predetermined interval, and means operated by the closing of the outer gate to open the inner gate, substantially as described.

11. A pneumatic despatch apparatus, having, in combination, a cushioning chamber, a normally opened inner and a normally closed outer gate for the chamber, an air supply for operating the gates, means operated by the entrance of the carrier for connecting the air supply with the inner gate to close the same, means operated by the closing of the inner gate to connect the air supply with the outer gate to open the same, and a timing mechanism rendered active by the opening of the outer gate for causing the gate to be returned to normal position after a predetermined interval, substantially as described.

12. A pneumatic despatch apparatus, having, in combination, a cushioning chamber, a normally opened inner and a normally closed outer gate for the chamber, pistons connected with the gates, cylinders within which the pistons are mounted open to the atmosphere at their upper ends, an air supplying means, means operated by the entrance of a carrier to connect the lower end of the inner cylinder with the air supply, means operated by the closing of the inner gate to connect the outer cylinder with the air supply, a timing mechanism rendered active by the opening of the outer gate for causing the disconnection of the cylinders from the air supply and the venting of the outer cylinder after a predetermined interval, and means operated by the closing of the outer gate for venting the inner cylinder, substantially as described.

13. A pneumatic despatch apparatus, having, in combination, a cushioning chamber, a normally opened inner and a normally closed outer gate for the chamber, means for supplying air for operating the gates, a valve for controlling the air supply, means for operating said valve in one direction by air compressed between the carrier and the outer gate and entrapping said air to hold the valve, and a timing mechanism for venting said entrapped air after a predetermined interval, substantially as described.

14. A pneumatic despatch apparatus, having, in combination, a cushioning chamber, a normally opened inner and a normally closed outer valve for the chamber, a piston connected to the inner valve, a cylinder in which the piston is mounted having one end open to the atmosphere, a valve through which air flows to and from the cylinder,

means for holding said valve open by air pressure, and means for controlling said air pressure by the opening and closing of the outer gate, substantially as described.

15. A pneumatic despatch apparatus, having, in combination, a cushioning chamber, a normally opened and a normally closed gate for the chamber, a piston connected to the inner gate, a cylinder in which the piston is mounted having one end open to the atmosphere, a valve through which air flows to and from the cylinder, means for holding said valve open by air pressure, a valve controlled by the movements of the outer gate to relieve said pressure when the outer gate opens and apply said pressure when the outer gate closes, substantially as described.

16. A pneumatic despatch apparatus, having, in combination, a cushioning chamber, normally opened inner and a normally closed outer gate for the chamber, a piston connected to the inner gate, a cylinder in which the piston is mounted having one end open to the atmosphere, a piston connected to the outer gate, a cylinder in which the piston is mounted having one end open to the atmosphere, a valve through which air flows to and from the end of the inner cylinder, a diaphragm connected to said valve, a pressure pipe for supplying air under the pressure to the diaphragm for holding the valve open, a valve for opening said pressure pipe to an air supply or to the atmosphere, and means for operating said latter valve to vent the pressure pipe upon the opening of the outer gate and to connect said pipe with an air supply upon the closing of the outer gate, substantially as described.

17. A pneumatic despatch apparatus, having, in combination, a cushioning chamber, a valve normally closing the same, means for supplying air for operating the valve, a valve for controlling the air supply, means for operating the controlling valve by air compressed by the carrier and entrapping said air to hold the valve, and a timing mechanism for venting said entrapped air after a predetermined period upon the opening of the outer valve, substantially as described.

In testimony whereof I affix my signature, in presence of two witnesses.

HAROLD D. WATERHOUSE.

Witnesses:

IRA L. FISH,

ANNIE C. RICHARDSON.