No. 623,973. Patented May 2, 1899.

B. C. BATCHELLER.

CARRIER RECEIVING MECHANISM FOR PNEUMATIC TRANSIT TUBES.

(Application filed Apr. 9, 1898.)

(No Model.) 4 Sheets—Sheet 1.

FIG. 1.

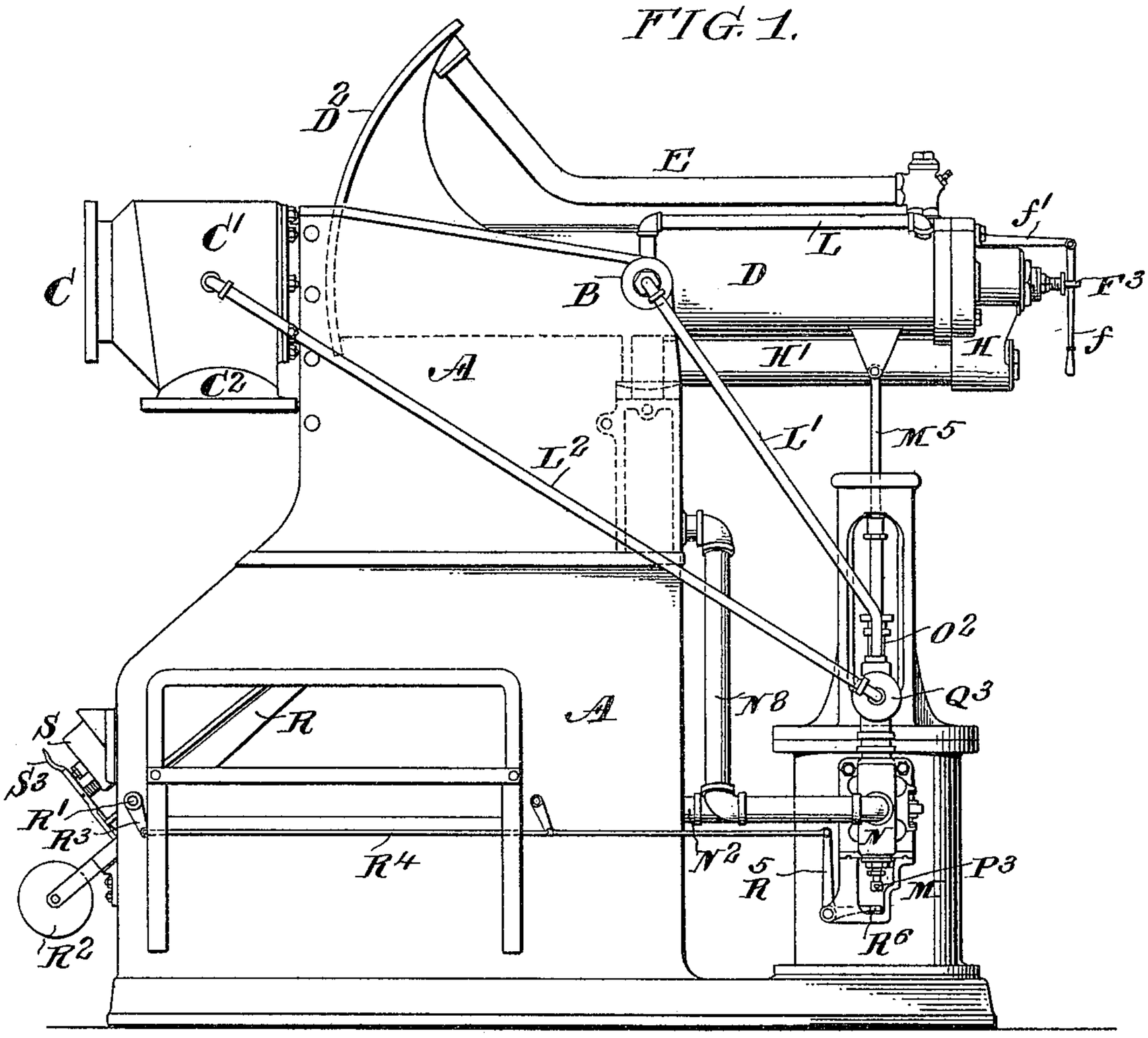
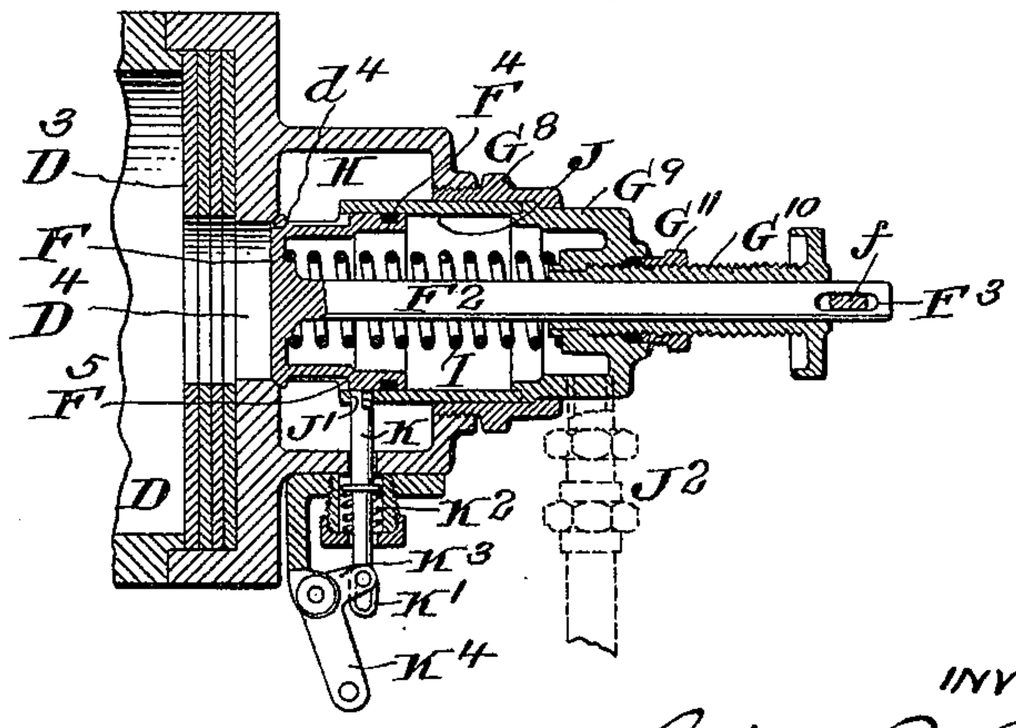


FIG. 6.



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(No Model.) 4 Sheets—Sheet 2.

FIG. 2.

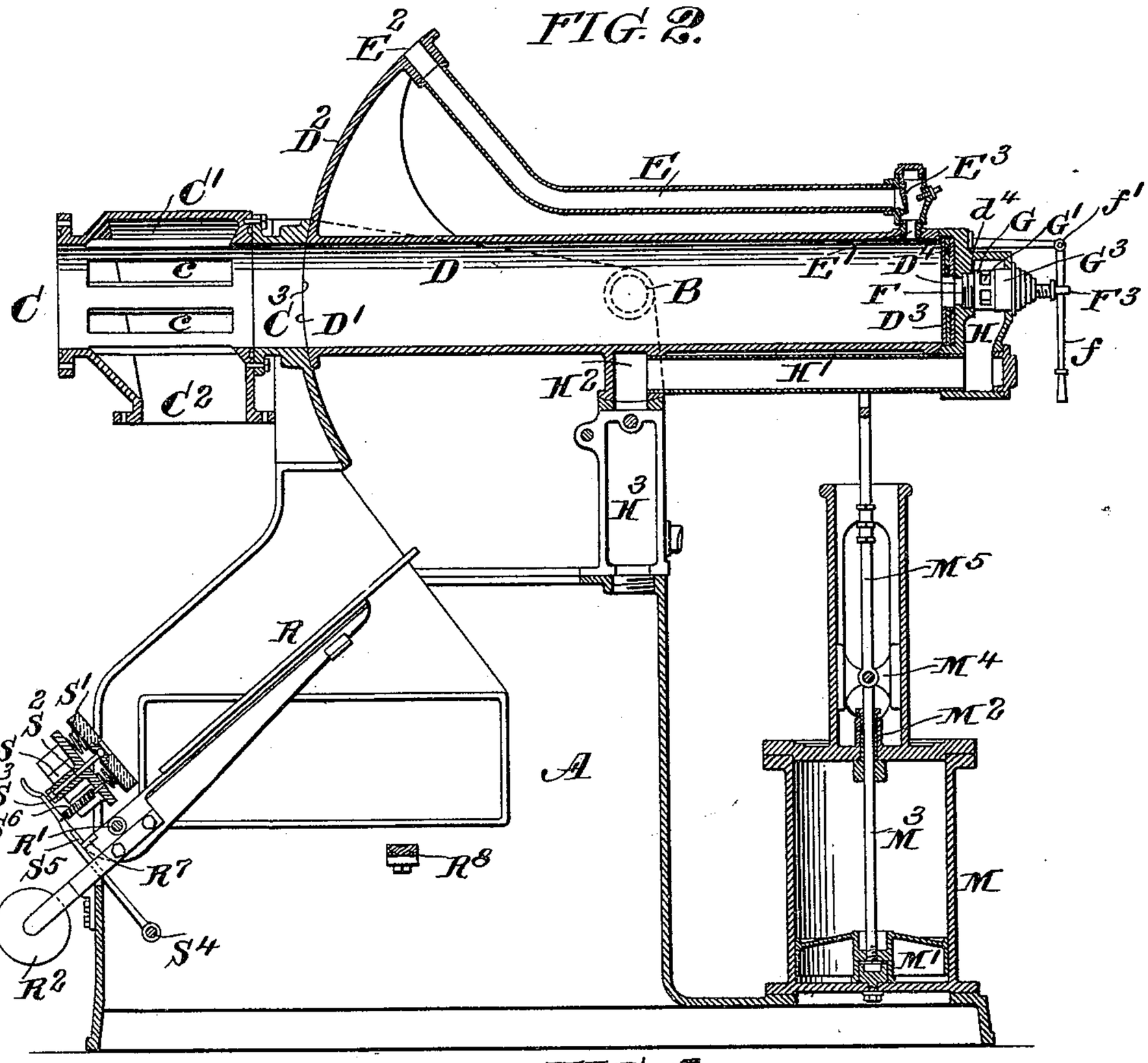
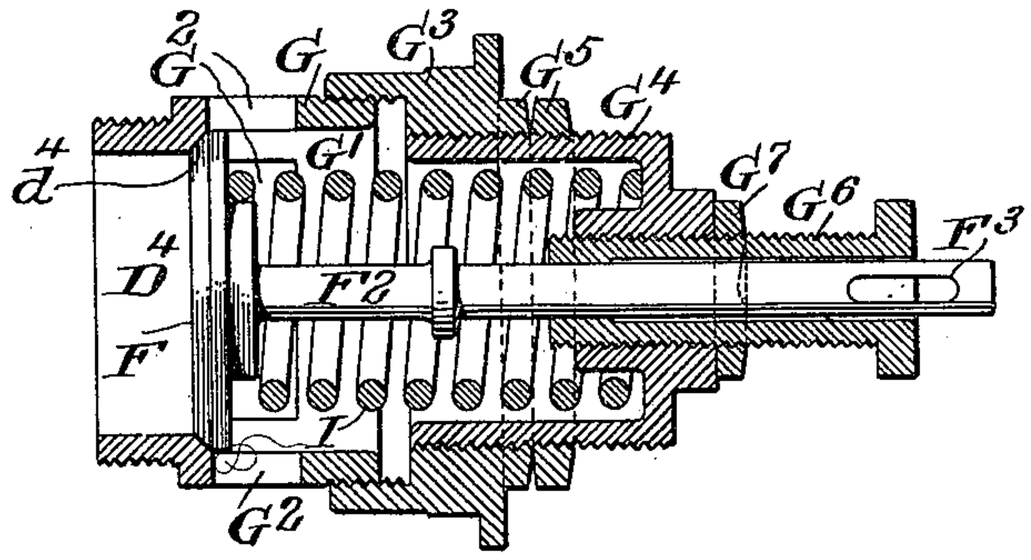


FIG. 5.



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(Application filed Apr. 9, 1898.)

(No Model.) 4 Sheets—Sheet 3.

FIG. 3.

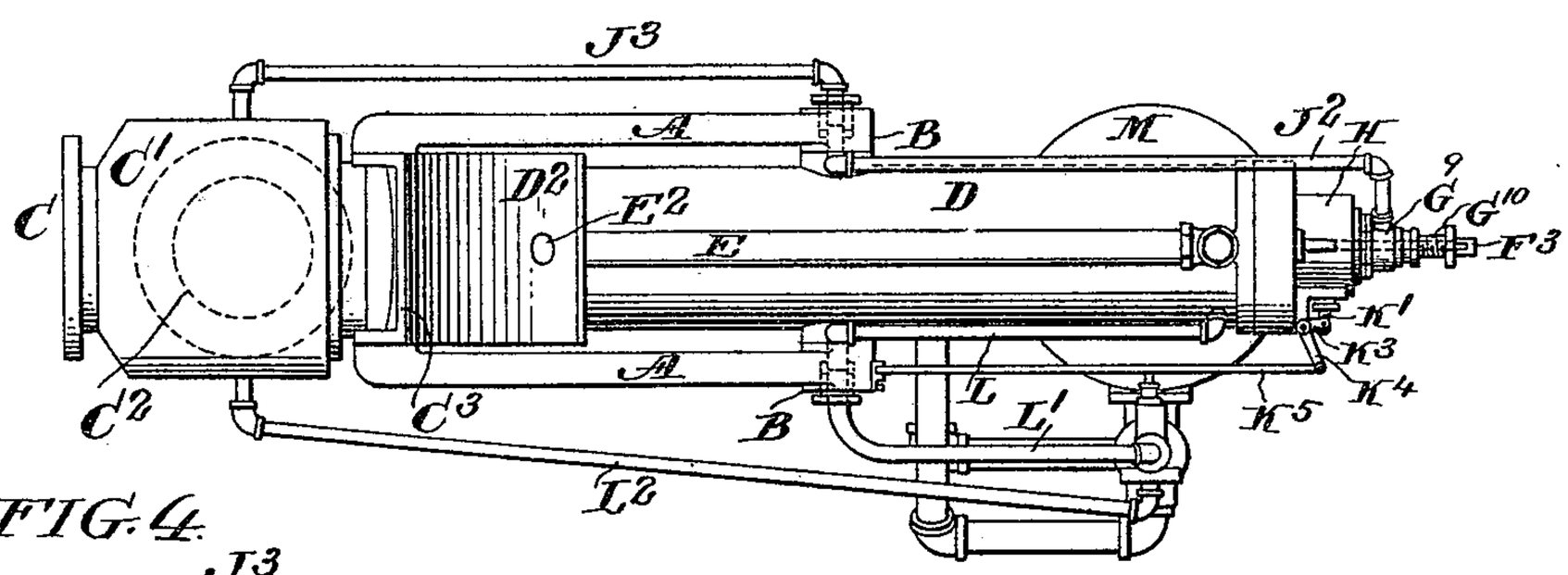


FIG. 4.

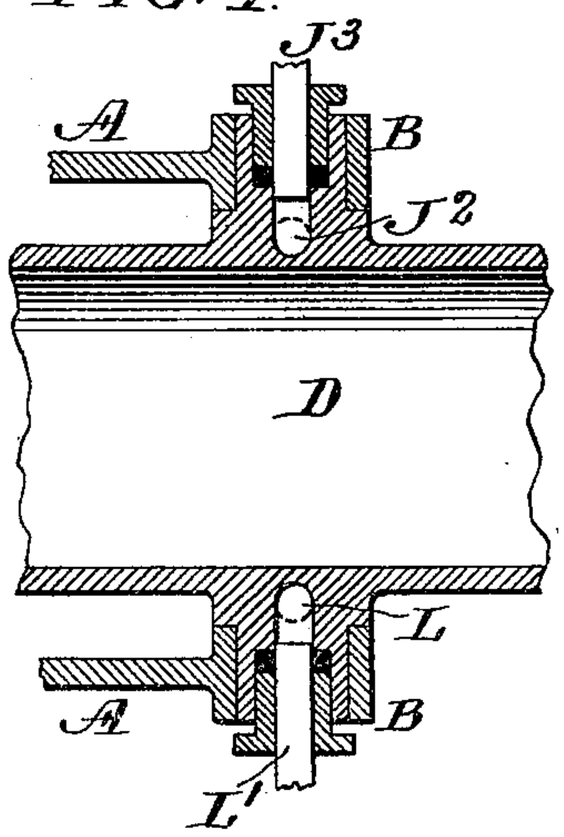


FIG. 7.

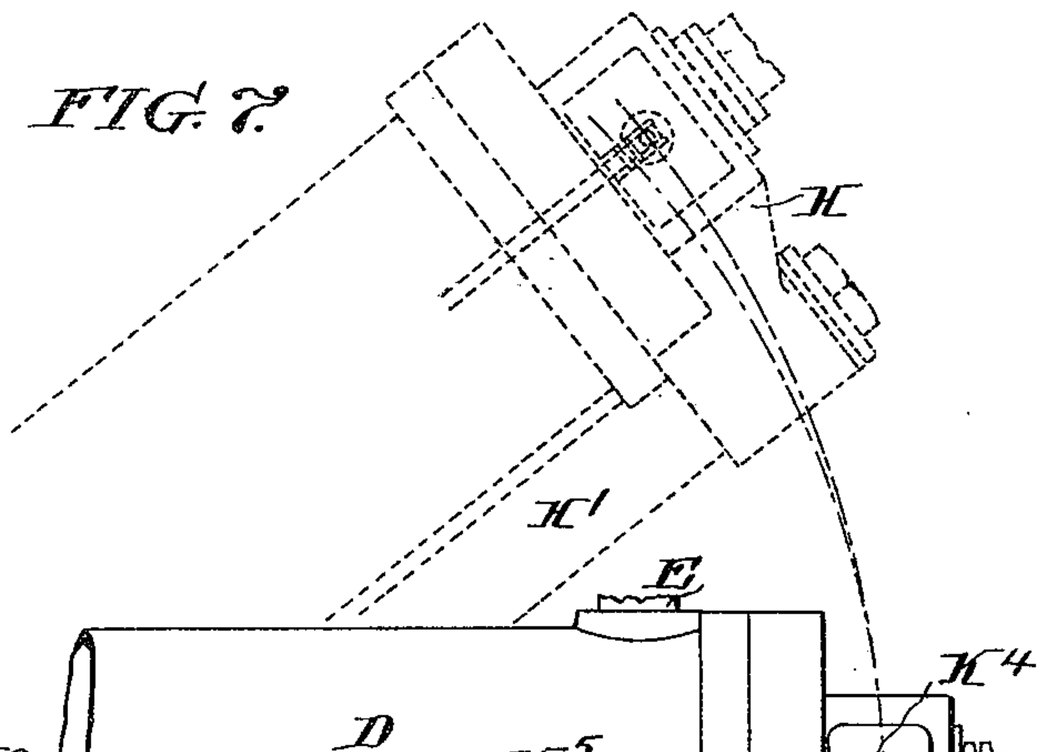
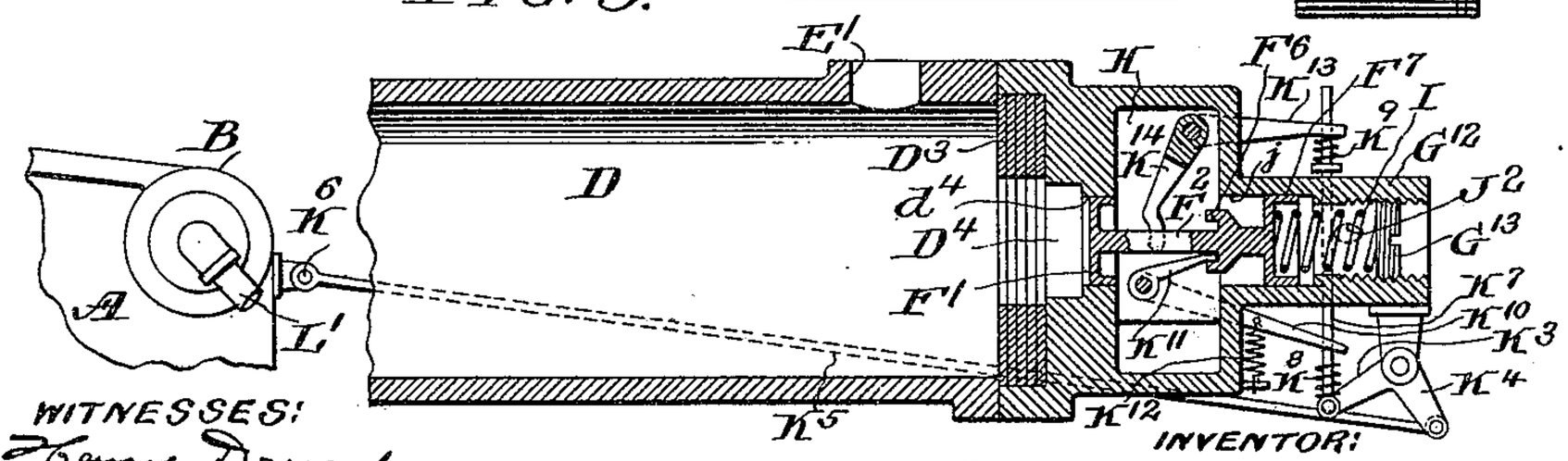


FIG. 8.



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No. 623,973. Patented May 2, 1899.

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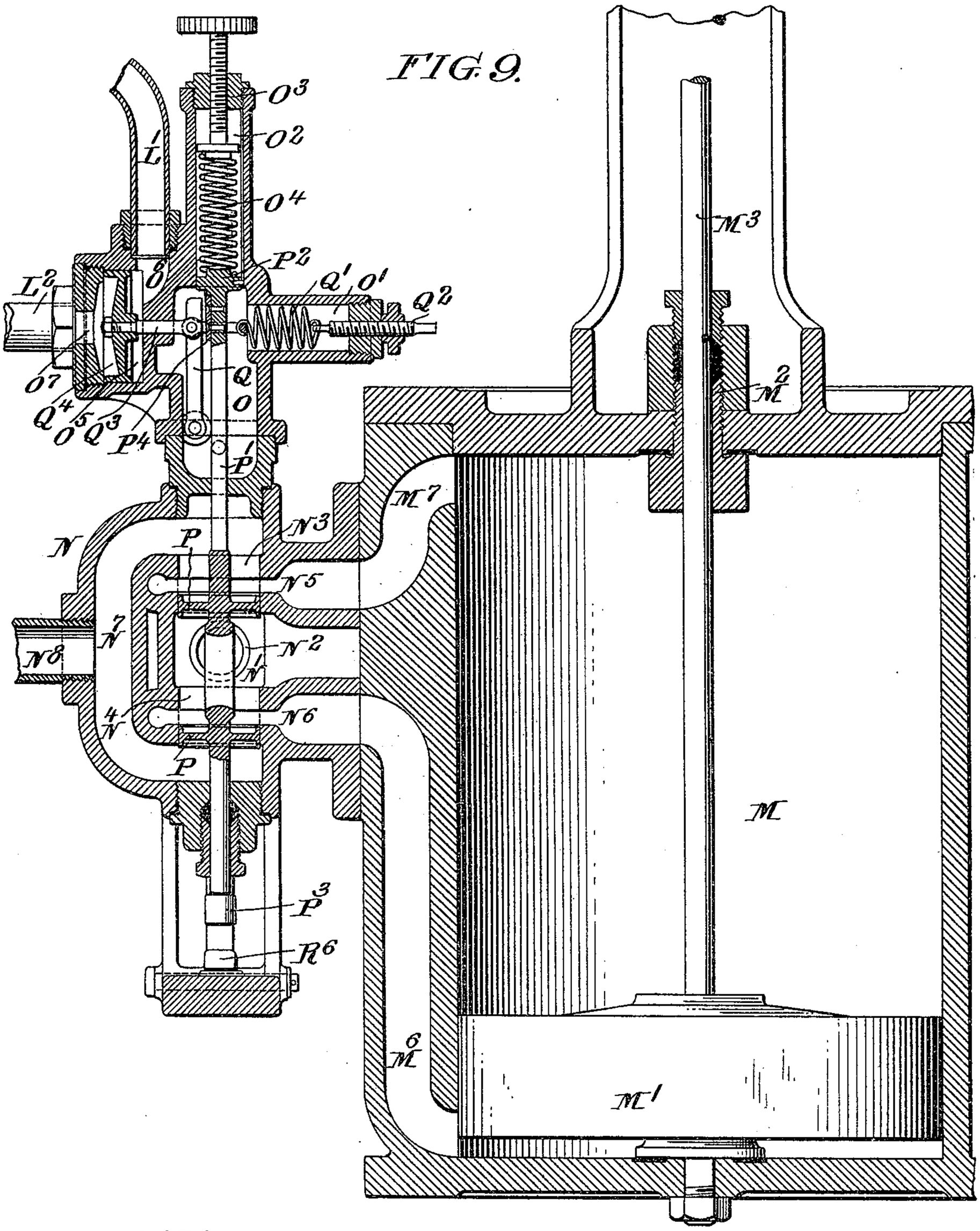
CARRIER RECEIVING MECHANISM FOR PNEUMATIC TRANSIT TUBES.

(Application filed Apr. 9, 1898.)

(No Model.) 4 Sheets—Sheet 4.

FIG. 9.



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UNITED STATES PATENT OFFICE.

BIRNEY C. BATCHELLER, OF PHILADELPHIA, PENNSYLVANIA.

CARRIER-RECEIVING MECHANISM FOR PNEUMATIC-TRANSIT TUBES.

SPECIFICATION forming part of Letters Patent No. 623,973, dated May 2, 1899.

Application filed April 9, 1898. Serial No. 676,977. (No model.)

To all whom it may concern:

Be it known that I, BIRNEY C. BATCHELLER, a citizen of the United States of America, residing in the city and county of Philadelphia, in the State of Pennsylvania, have invented a certain new and useful Improvement in Carrier-Receiving Mechanism for Pneumatic-Transit Tubes, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part thereof.

My invention relates to the construction and operation of the devices used to receive a carrier after its transmission through a pneumatic-transit tube, my object being to, in the first place, provide for the escape of the air in the receiver lying in front of a carrier as it enters such receiver, while at the same time utilizing it to cushion and check the impetus of the carrier. In the second place I desire to provide improved actuating mechanism for moving the receiver into and out of registry with the transmission-tube, and, lastly, I design to improve various details of the receiving mechanism.

The nature of my improvements will be best understood as described in connection with the drawings, in which they are illustrated, and in which—

Figure 1 is a side elevation of the receiving apparatus; Fig. 2, a central longitudinal section therethrough; Fig. 3, a plan view of the same device; Fig. 4, a longitudinal section taken at right angles to that of Fig. 2 through the trunnions of the receiver. Fig. 5 is a longitudinal section through the valve seated at the end of the receiver and regulating the escape of air therefrom. Fig. 6 is a similar view of a modified and preferred construction of this valve and its coöperative parts. Fig. 7 is a view illustrating the action of the mechanism for releasing the latch shown in Fig. 6. Fig. 8 is a sectional view of another modification of the air-releasing valve; and Fig. 9 is a sectional view, on an enlarged scale, of the motor and its coacting parts by which the receiver is shifted into and out of registry with the transmission-tube.

A indicates the frame of the apparatus, provided, as shown, with trunnion-bearings B B for the trunnions of the receiver and to which, in a position to register with the receiver, is secured the end C of a transmission-tube, the said end being surrounded by a box C′ in communication with a tube through slots *c c*, &c., and with an air-pipe C^2 through which the moving current of air passes from the transmission-tube.

C^3 indicates the face of the transmission-tube with which the end D′ of the receiver registers.

D indicates the receiver, pivoted on trunnions moving in the bearings B and adapted at its front end D′ to register with the transmission-tube, as shown, the face of the receiver being continued in the form of a shield, as indicated at D^2, so that when the receiver moves away from registry with the tube the said shield will close the end of the tube. At the rear end of the receiver it is advisable to provide cushioning-washers, as indicated at D^3, and preferably through the end of the receiver I from an opening D^4 for the escape of air, said opening serving also as a seat for a valve, as indicated at d^4 in Figs. 5, 6, and 8.

E is a tube or pipe opening into the rear end of the receiver, as indicated at E′, and through the face of the shield D^2, as indicated at E^2, the opening E^2 being in such position that it registers with the transmission-tube when the receiver has been moved to the position where it should deliver the carrier and so that air from the transmission-tube will then pass through the tube E and into the rear of the receiver, so as to force the carrier out of the same. In order to prevent the escape of air from the receiver through this pipe, I provide a non-return valve E^3.

At F, Figs. 5 and 6, I have shown a valve adapted to seat itself in and close the passage D^4, and at F′, Fig. 8, I have shown a valve serving the same purpose, but constructed as a piston-valve fitting and moving in the passage D^4.

F^2 in all the modifications illustrated indicates the valve-stem, and in Fig. 5 I have illustrated the simplest construction of the valve for regulating the escape of air from the receiver, the valve being held to its seat by the resilient force of a spring, which is preferably made regulable in tension, so that the valve will open whenever the air in the receiver exceeds a determined pressure, the increase of pressure relied upon to open the

valve being that due to the compression of air by the entrance of a carrier, and the purpose of the valve being to permit the escape of this air, so as to prevent it from forcing the carrier back into the transmission-tube. In the construction shown in Fig. 5 and indicated also on a smaller scale in Figs. 1 and 2 the opening D^4 is formed in a threaded annular casting G, which screws into the end of the receiver and forms on the outside of the valve-seat d^4 a chamber G', opening into an exhaust-passage II II' II^2 II^3 through ports G^2. Upon the outer end of this annular casting screws the nut G^3, into which in turn screws the nut G^4, G^5 indicating a binding-nut, while into the nut G^4 screws the threaded annulus G^6, G^7 again indicating a binding-nut. It will be obvious that with this construction the adjustment of the tension of the spring can be made to any desired degree. I have shown in Figs. 1, 2, 3, and 6 a slot F^3 in the end of the valve-stem F^2, and in Figs. 1 and 2 I have indicated a lever *f* as passing through this slot and pivoted to the top of a standard *f'*. It is obvious that by moving this lever the valve can be opened at any time.

In the exigencies of use it is found that the pressure in the transmission-tube and its connected parts will vary considerably, and owing to this fact the action of the valve-seating spring in the simple form illustrated in Fig. 5 cannot be relied upon to give the best result, because if the pressure is abnormally high in the line it might open the valve irrespective of the movement of a carrier, and it at any rate would be apt to result in the valve opening too soon after the entrance of a carrier into the receiver, while, on the other hand, if the pressure is abnormally low in the pipe the valve will not open promptly enough. Again, I have found it better to provide means for holding the valve to open the passage D^4 after it has been opened by the pressure of air in the front of the carrier, thus insuring the escape of all the air lying in front of the carrier and the movement of the carrier to the extreme back end of the receiver, and in Fig. 6 I have shown my preferred construction of providing both for the opening of the valve at the proper time and for holding it open. As shown in this figure, I form on or secure to the valve F a piston, (indicated at F^4,) working in a cylinder J which cylinder I connect conveniently by a pipe J^2 with the transmission-tube. Preferably the pipe J^2 passes to the trunnion on one side of the receiver, as indicated in Figs. 3 and 4, and then connects through the trunnion with a pipe J^3, which in turn is in connection with the transmission-tube. By this arrangement it will be obvious that the pressure in the cylinder J will be maintained at all times equal to that in the transmission-tube and acting on the piston F^4 will hold the valve to its seat with a resilient pressure equal to the normal pressure in the tube, the device being in fact a pneumatic spring. As shown, I secure the cylinder J in position by means of a screw-threaded clamping-ring G^8, which engages and holds the head G^9 of the cylinder in position, the end of the cylinder-head being internally threaded, as shown, to engage the threaded-rod-supporting bearing G^{10}.

G^{11} indicates a stuffing-box gland.

Preferably I employ a spring I to supplement the action of the pneumatic spring; but of course this spring may be light in comparison with the one used and relied upon to hold the valve seated, and it will be obvious that the action of the pneumatic spring is in effect a differential action, by means of which the opening of the valve is determined by the relative pressure in the transmission-tube and in the receiver.

In order to hold the valve F open, I provide it with a detent, as indicated at F^5, and to operate in connection with this detent I provide a latch K, which, as shown in Fig. 6, passes through a bearing J' in the edge of the cylinder J. The said latch-pin K is pressed upward by the spring K^2, and obviously whenever the valve F is moved backward to a sufficient degree the latch K will spring into the detent F^5 and hold the valve in its open position and so that all the air in front of the carrier can escape into the exhaust-passage H. The release of the latch is, as shown, effected by the movement of the receiver on its trunnions. The stem of the latch K is slotted, as indicated at K', a pin on the arm K^3 of a bell-crank lever K^3 K^4 fitting in this slot, and the arm K^4 of the lever being connected, as indicated in Figs. 3 and 7, by a rod K^5 with the point K^6 eccentric to the trunnions, so that as the receiver moves from the position shown in full lines in Fig. 7 to that shown in dotted lines in the same figure the latch will be retracted, permitting the valve to close.

In Fig. 8 I have illustrated another modification of the valve controlling and actuating device resembling that illustrated in Fig. 6 in the employment of the pneumatic spring and also in that it embodies a construction in which provision is made to hold the valve open after it is opened by the compression of air in front of the carrier.

In the construction of Fig. 8 the valve (here indicated by the symbol F') is, as before stated, a piston-valve, and it has secured to its rear a piston F^7, moving in a cylinder *j*, the said piston and cylinder differing in no material degree from that indicated at F^4 and J in Fig. 6. The end of the cylinder J, which is formed by a casting G^{12}, is closed by a screw-plug G^{13}, against which rests a spring I, and a pipe J^2 leads into the cylinder *j*, maintaining the air-pressure therein equal to that in the transmission-tube. It will be obvious from an inspection of the drawings that the action of the air-pressure, as well as of the spring I, is to force the piston-valve F' forward out of the cylindrical opening d^4,

which serves as its seat; but the valve is held in position to close the passage by a latch K^{11}, forming, as shown, one arm of a bell-crank lever, the other arm of which is indicated at K^{10}, K^{12} indicating a spring, the action of which is to draw down the latch-lever out of engagement with the detent-ring F^6, secured on the valve-stem F^2 and which, as shown, interlocks with the end of the lever K^{11} in normal position. On the entrance of a carrier into the receiver D the compression of the air in front of it, acting on the face of the piston-valve F′, will thrust it backward until the latch-lever K^{11} is released from its engagement with the detent F^6, whereupon the spring K^{12} will draw it down, so that the spring in the rear of the valve can force it forward out of its annular seat d^4, permitting the air to escape freely through the said seat. The return of the valve to position to close the end of the receiver and the reëngagement of the valve with the latch-lever K^{11} are effected by the movement of the receiver to deliver the carrier, and, as shown, through the somewhat eccentrically-secured rod K^5 and bell-crank lever K^4 K^3, which in this case, however, are connected to a rod K^7, having upon it, as shown, springs K^8 and K^9, the spring K^8 resting below and in position to engage and lift the arm K^{10} of the lever K^{10} K^{11}, while the spring K^9 is in position to engage and lift the arm K^{13} of a bell-crank lever K^{13} K^{14}, the arm K^{14} of which is moved in against the detent-ring F^6, so as to force the valve F′ backward until the detent-ring has passed and been engaged by the latch-lever arm K^{11}.

The receiver D, as in the case of the similar receiver shown and described in my former patent, No. 585,498, of June 29, 1897, is arranged to move after its reception of the carrier to deliver the carrier, and the motor which moves it is set in operation by the entrance of a carrier into the receiver, while the return of the receiver to registry with the transmission-tube is effected by the delivery of the carrier. In my present and improved construction, however, I provide a motor-controlling device having a resilient tendency to move to a position to actuate the motor in a direction to move the receiver out of registry with the transmission-tube, and I provide also a catch or latch arranged to engage the motor-controlling device when moved to a position to actuate the motor to return the receiver into registry with the tube, and I provide means whereby the entrance of a carrier into the receiver acts not directly upon the motor-controlling device, but upon the latch in a direction to release its hold upon the controlling device, which thereupon automatically moves to its normal position, causing the motor to shift the position of the receiver, a return of the motor-controlling device to engagement with the latch being preferably effected by the delivery of the carrier from the receiver. Preferably I utilize the compression of air in the receiver, due to the entrance of a carrier, for the purpose of acting upon the latch, and in the best form I connect the latch with the piston operating in the cylinder, which cylinder is connected on one side with the transmission-tube and on the other side with the receiver, so that the latch is not operated upon by any mere variation of pressure common to the receiver and tube, but only by an excess of pressure in the receiver over that in the tube.

While any convenient motor and motor-actuating device may be used, I prefer to use, as in my former construction, a pneumatic cylinder and the valve controlling the admission of compressed air to the two ends of the cylinder, and this construction I have illustrated in the drawings, in which M indicates the motor-cylinder, and M′ a piston working therein and connected through piston-rod M^3, cross-head M^4, and connecting-rod M^5 with the receiver.

N indicates the valve-chamber having an internal admission-chamber N′ connecting with a pipe N^2, leading from a source of air under pressure, the chamber N′ opening through the cylindrical ports N^3 and N^4 into the exhaust-passage N^7.

N^5 and N^6 indicate ports leading from the cylindrical valve-casing to the ports M^7 and M^6 of the motor-cylinder.

P indicates a double piston-valve working in the cylindrical valve-seat of the casing N and adapted to connect the ports M^6 and M^7 alternately with the pressure fluid and with the exhaust-ports.

P′ is the valve-stem, having a head P^2 at its upper end and a head P^3 at its lower end.

O indicates a chamber formed in or connected with the head of the valve-casing N and having connected therewith spring-chambers O^2 and O′. The head of the chamber O^2 is closed by a block through which screws the adjusting-screw O^3, between which and the head P^2 of the valve-rod is situated a spring O^4, the action of which is to press the valve-rod and valve backward into the position illustrated in Fig. 9.

O^5 is a cylinder formed, as shown, in the same casing as the chamber O and extending at right angles to said chamber. This cylinder connects through a port O^6 with a pipe L′, leading, as indicated in Figs. 1 and 4, through one of the trunnions of the receiver D and connecting with a pipe L, leading to the rear end of the receiver. The other end of the cylinder O^5 connects through a port O^7 with the pipe L^2, leading, as indicated in Fig. 1, to the transmission-tube.

Q is a latch situated in the chamber O and connected, as shown, with a spring Q′, situated in the chamber O′ and connected to the adjusting-screw Q^2, the operation of the spring being to draw the latch in toward the piston-rod P′ and so as to engage on the shoulder P^4, secured to said rod, when the rod is raised to a sufficient height.

Q^3 is a piston-rod attached to the latch on

the opposite side to the spring Q′ and connected with a piston Q^4, moving in the cylinder O^5.

The operation of the parts above described is readily followed. The normal position of rest of the valve P is its elevated position, in which it connects the chamber N′ with the upper end of the cylinder M and connects the lower end of this cylinder with the exhaust-port N^7. In this position it is held by the engagement of the latch Q with the shoulder P^4, the latch being held in position by the spring Q′. While the pressure at both ends of the cylinder O^5 is equal, being simply that of the transmission-tube, on the entrance of a carrier into the receiver, however, the pressure of the air introduced into the cylinder through the pipes L and L′ is materially increased over that introduced into the cylinder through the pipe L^2, and the piston O^4 moves outward, carrying with it the latch and releasing the shoulder P^4, whereupon the action of the spring O^4 at once moves the valve to the position shown in Fig. 9, whereupon the air is exhausted from the upper end of the cylinder M and admitted into the lower end of said cylinder, with the result of moving the receiver out of registry with the transmission-tube.

R indicates a platform arranged to receive a carrier when delivered out of the receiver, said platform being pivoted at R′ and counterweighted, so as to normally occupy the position shown in Fig. 2, as by a weight R^2. It is, as shown, however, held in its receiving position by the engagement with a shoulder R^7 on the platform of a shoulder S^5, secured on a lever S^3, pivoted at S^4.

S is a fixed abutment, upon the inclined face of which rests, through the medium of springs, as indicated, a yielding abutment S′, S^2 indicating a rod connected with the yielding abutment at one end and at the other end resting against or in close proximity with the lever S^3, while S^6 indicates a spring which holds the lever S^3 in contact or substantial contact with the rod S^2.

R^3 indicates a lever secured to the platform R at its pivotal point and connecting through a rod R^4 with a bell-crank lever R^5 R^6, the arm R^6 being arranged in such position with reference to the head P^3 of the valve-rod as when the platform R moves downward to thrust it up until the shoulder P^4 is engaged by the latch Q.

R^8 is a stop which limits the downward motion of the platform R.

The operation of the parts last described has been partially indicated and is clear. The receiver swinging down under the influence of the motor delivers the carrier onto the platform R and against the elastic abutment S′, which, acting through the rod S^2, pushes outward the lever S^3, releasing the engagement of the shoulders S^5 and R^7 and permitting the weight of the carrier to move the platform R down to a horizontal position, provision being made, as in my former patent, for the delivery of the carrier from the platform at the end of its movement, whereupon the counterweight R^2 will return the parts to the position shown in Fig. 2. The downward motion of the platform R, acting through the rod R^4, as described, changes the position of the valve, effecting a reverse motion of the piston in the cylinder and the return of the receiver to normal position, where it remains until another carrier enters it.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination with a pneumatic-transit tube and a tubular receiver adapted to receive a carrier transmitted through the tube and having a valve-seated opening, as D^4, at its rear end, of an exhaust-opening connected with said opening, a valve to close the opening, and a pneumatic spring connected with the transit-tube and with the valve aforesaid, all substantially as specified and so that the normal pressure in the tube is utilized to hold the valve closed while permitting it to move under the increased pressure in the receiver due to the entrance of a carrier.

2. The combination with a pneumatic-transit tube and a tubular receiver adapted to receive a carrier transmitted through the tube and having a valve-seated opening, as D^4, at its rear end, of an exhaust-opening connected with said opening, a valve to close the opening, a regulable spring, as I, and a pneumatic spring connected with the transit-tube, and with the valve aforesaid, all substantially as specified, and so that the normal pressure in the tube is utilized to hold the valve closed while permitting it to move under the increased pressure in the receiver due to the entrance of a carrier.

3. The combination with a pneumatic-transit tube and a tubular receiver adapted to receive a carrier transmitted through the tube and having a valve-seated opening, as D^4, at its rear end, of an exhaust-opening connected with said opening, a valve to close the opening, yielding means acting to normally hold the valve closed but adapted to permit its opening under the pressure produced by the entrance of a carrier into the receiver, means for holding the valve in open position after it is opened by the pressure of air in the receiver and means, operated by the movement of the receiver to deliver the carrier, operating to return the valve to its closed position.

4. The combination with a pneumatic-transit tube and a tubular receiver adapted to receive a carrier transmitted through the tube and having a valve-seated opening, as D^4, at its rear end, of an exhaust-opening connected with said opening, a valve to close the opening, yielding means acting to normally hold the valve closed but adapted to permit its opening under the pressure produced by the entrance of a carrier into the receiver, a latch as K arranged to engage the valve and

hold it open and latch-releasing mechanism operated by the movement of the receiver to deliver the carrier.

5. In combination with a pneumatic-transit tube, the pivoted receiver D adapted to move into registry with the tube to receive a carrier and out of such registry to deliver the same, a shield D^2 arranged to close the end of the tubes when the receiver moves away from it, a pipe E opening through shield D^2 in position to register with the tube when the receiver is in delivering position and leading to the rear end of the receiver and a non-return valve as E^3 situated in said pipe.

6. In combination with a pneumatic-transit tube and a movable receiver adapted to move into registry with the tube to receive a carrier and out of registry therewith to deliver the same, a motor arranged to move the receiver, a motor-controlling device, and means, as a spring, for moving and holding said device to a position for actuating the motor to shift the receiver out of registry with the tube, a catch for holding said device in position to actuate the motor so as to return the receiver into registry with the tube, and catch-releasing mechanism actuated by an increase of pressure in the receiver.

7. In combination with a pneumatic-transit tube and a movable receiver adapted to move into registry with the tube to receive a carrier and out of registry therewith to deliver the same, a motor arranged to move the receiver, a motor-controlling device, and means, as a spring, for moving and holding said device to a position for actuating the motor to shift the receiver out of registry with the tube, a catch for holding said device in position to actuate the motor so as to return the receiver into registry with the tube and catch-releasing mechanism actuated by an increase of pressure in the receiver over that in the transmission-tube.

8. In combination with a pneumatic-transit tube and a movable receiver adapted to move into registry with the tube to receive a carrier and out of registry therewith to deliver the same, a motor arranged to move the receiver, a motor-controlling device and means, as a spring, for moving and holding said device to a position for actuating the motor to shift the receiver out of registry with the tube, a catch for holding said device in position to actuate the motor so as to return the receiver into registry with the tube, catch-releasing mechanism actuated by an increase of pressure in the receiver, and means, actuated by the delivery of a carrier from the receiver, for returning the governing device to the catch.

9. In combination with a pneumatic-transit tube and a movable receiver adapted to move into registry with the tube to receive a carrier, and out of registry therewith to deliver the same, a cylinder and piston as M M′ for shifting the receiver, a valve arranged to govern the admission and exhaust of motive fluid to and from the cylinder, means, as a spring, for moving and holding said valve in position to effect the shifting of the receiver out of registry with the tube, a catch for holding said valve in its alternative position and means for releasing said catch actuated by an increase of pressure in the receiver.

10. In combination with a pneumatic-transit tube and a movable receiver adapted to move into registry with the tube to receive a carrier, and out of registry therewith to deliver the same, a cylinder and piston as M M′ for shifting the receiver, a valve arranged to govern the admission and exhaust of motive fluid to and from the cylinder, means, as a spring, for moving and holding said valve in position to effect the shifting of the receiver out of registry with the tube, a catch for holding said valve in its alternative position, a cylinder Q^5 connected at one end with the rear of the receiver and at the other end with the transmission-tube and a piston Q^4 working in said cylinder and connected with the catch as specified.

11. In combination with a pneumatic-transit tube and a receiver substantially as specified, a pivoted receiving-platform as R arranged to receive the carrier after it is discharged from the receiver, a catch acting to hold said platform in its receiving position and catch-releasing mechanism arranged to be actuated by the delivery of a carrier onto said platform.

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