No. 784,225. PATENTED MAR. 7, 1905.

O. S. PIKE.

PNEUMATIC DESPATCH APPARATUS.

APPLICATION FILED AUG. 6, 1903.

5 SHEETS—SHEET 1.

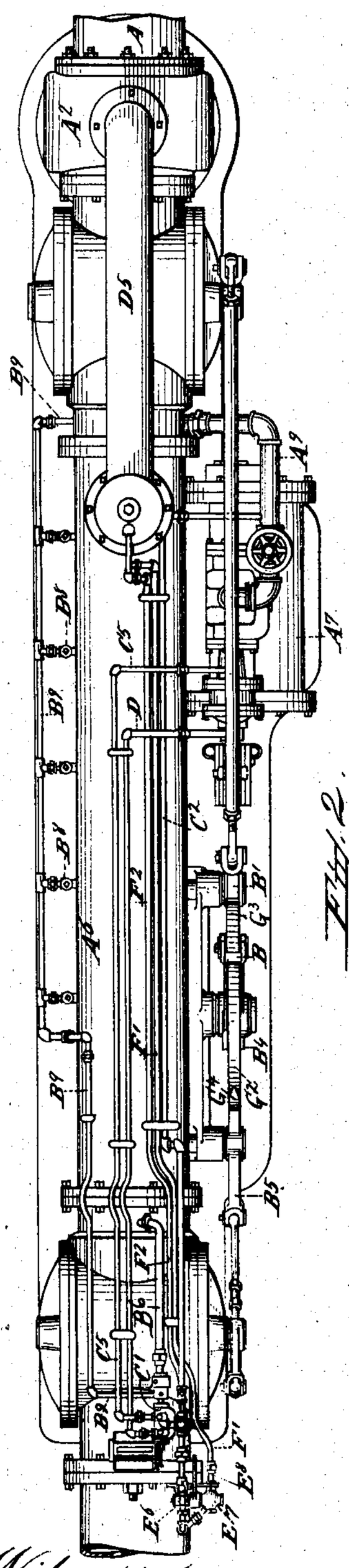

FIG. 2.

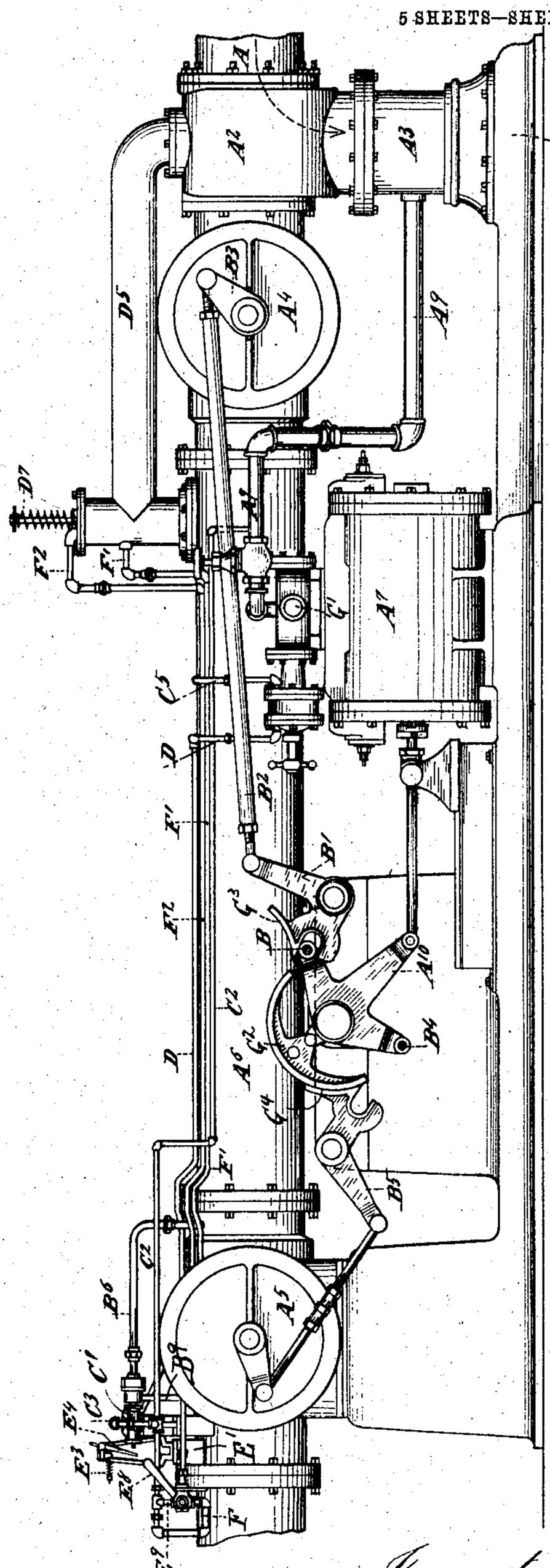

FIG. 1.

Witnesses:
A. R. Lonabee
Burt Kemp.

Inventor:
Otto S. Pike.
By E. C. Dillman
& J. L. Rusk Atty.

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5 SHEETS—SHEET 2.

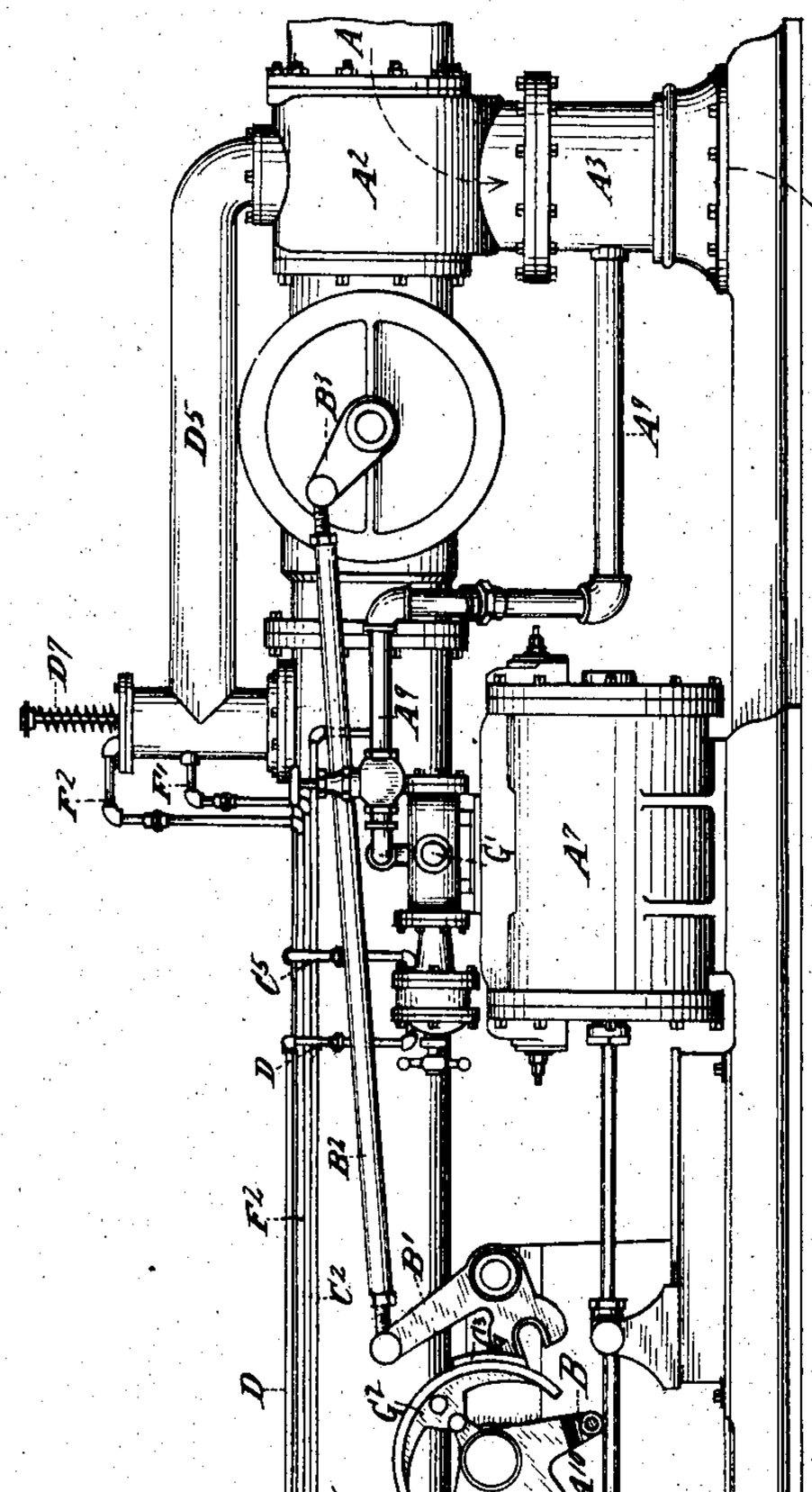

Fig. 3.

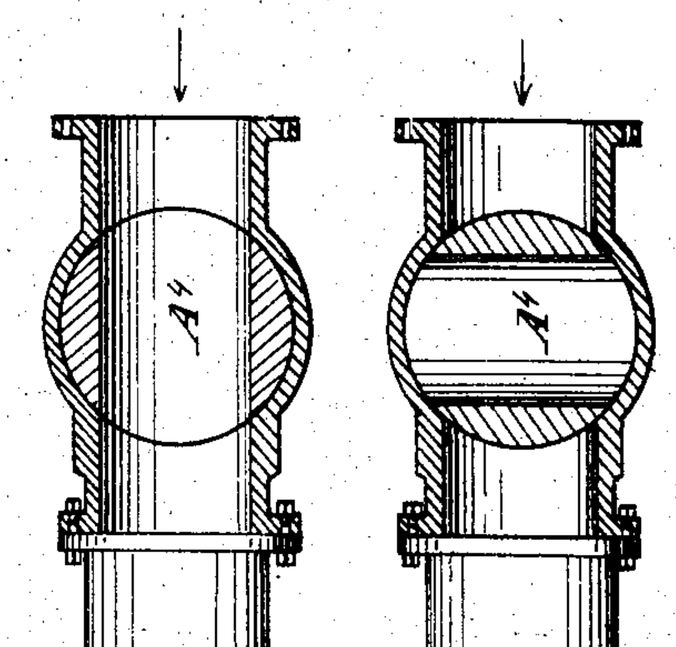

Fig. 4.

Fig. 5.

Witnesses:
Bert Kemp
A. L. Mason

Inventor:
Otto S. Pike
By E. G. Siggers
& J. Kunz
Atty.

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5 SHEETS—SHEET 3.

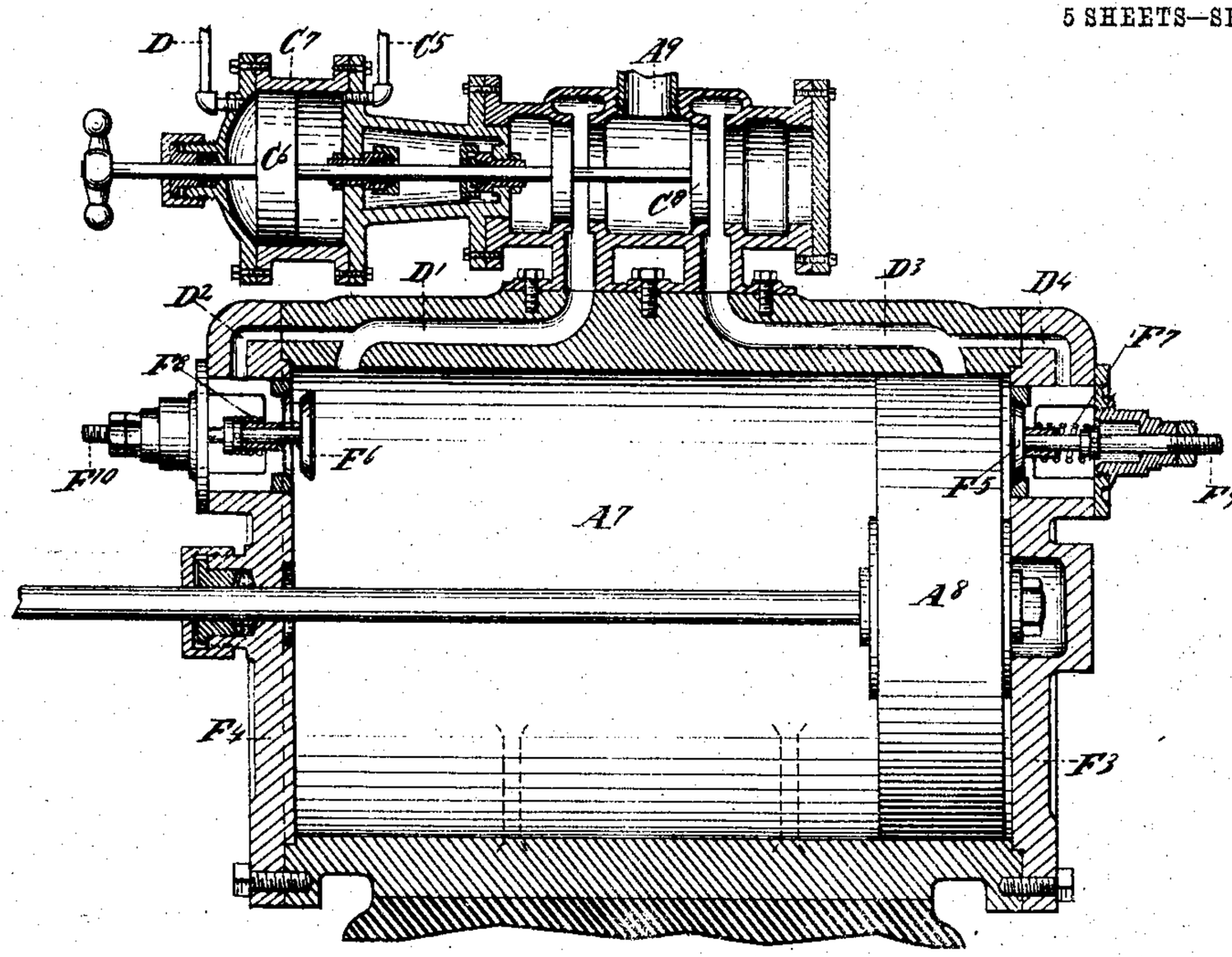

Fig. 6.

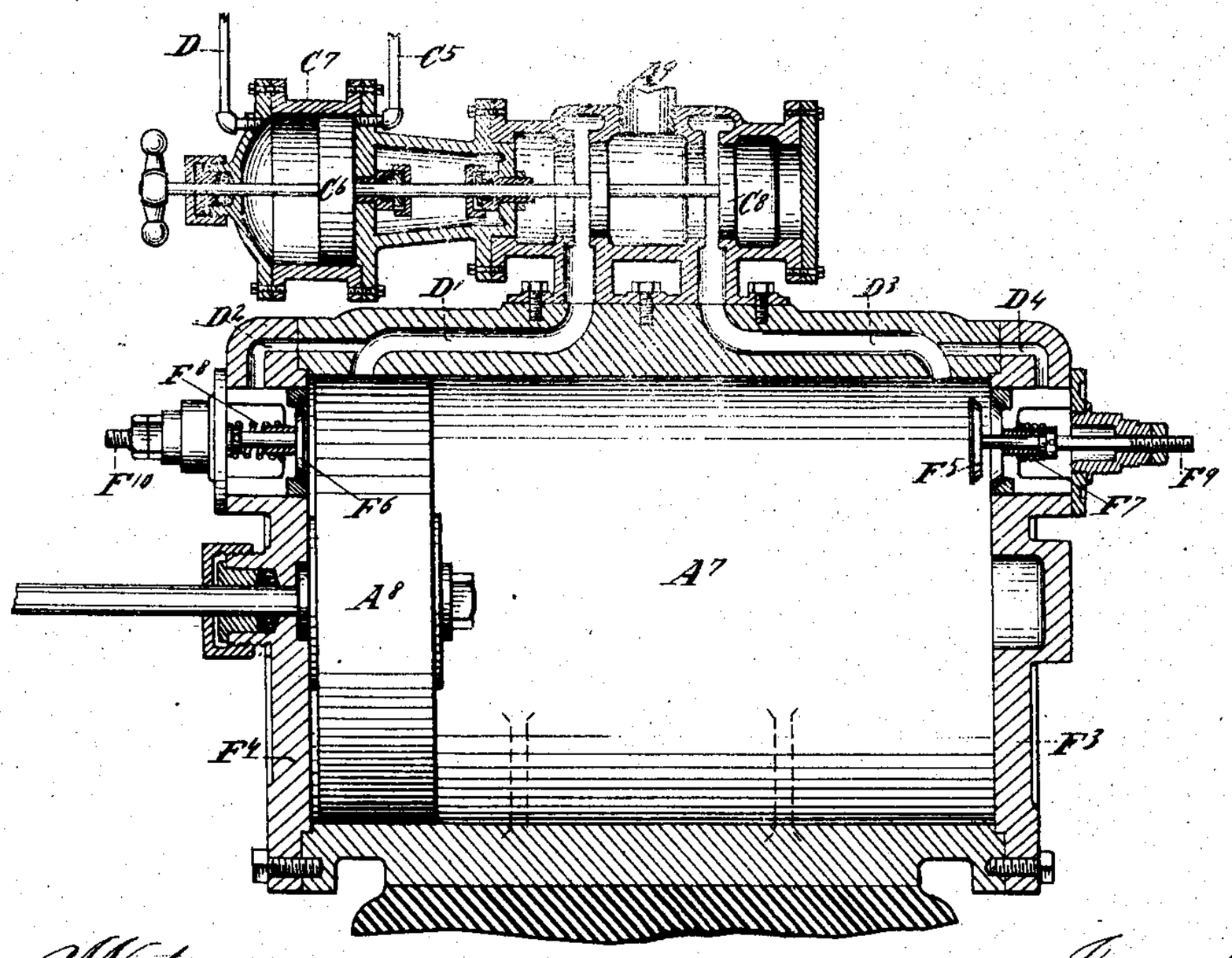

Fig. 7.

Witnesses:
Ben Etemp.
A. L. Musser

Inventor:
Otto S. Pike
By E. C. Gilman
Atty

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O. S. PIKE.

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5 SHEETS—SHEET 4.

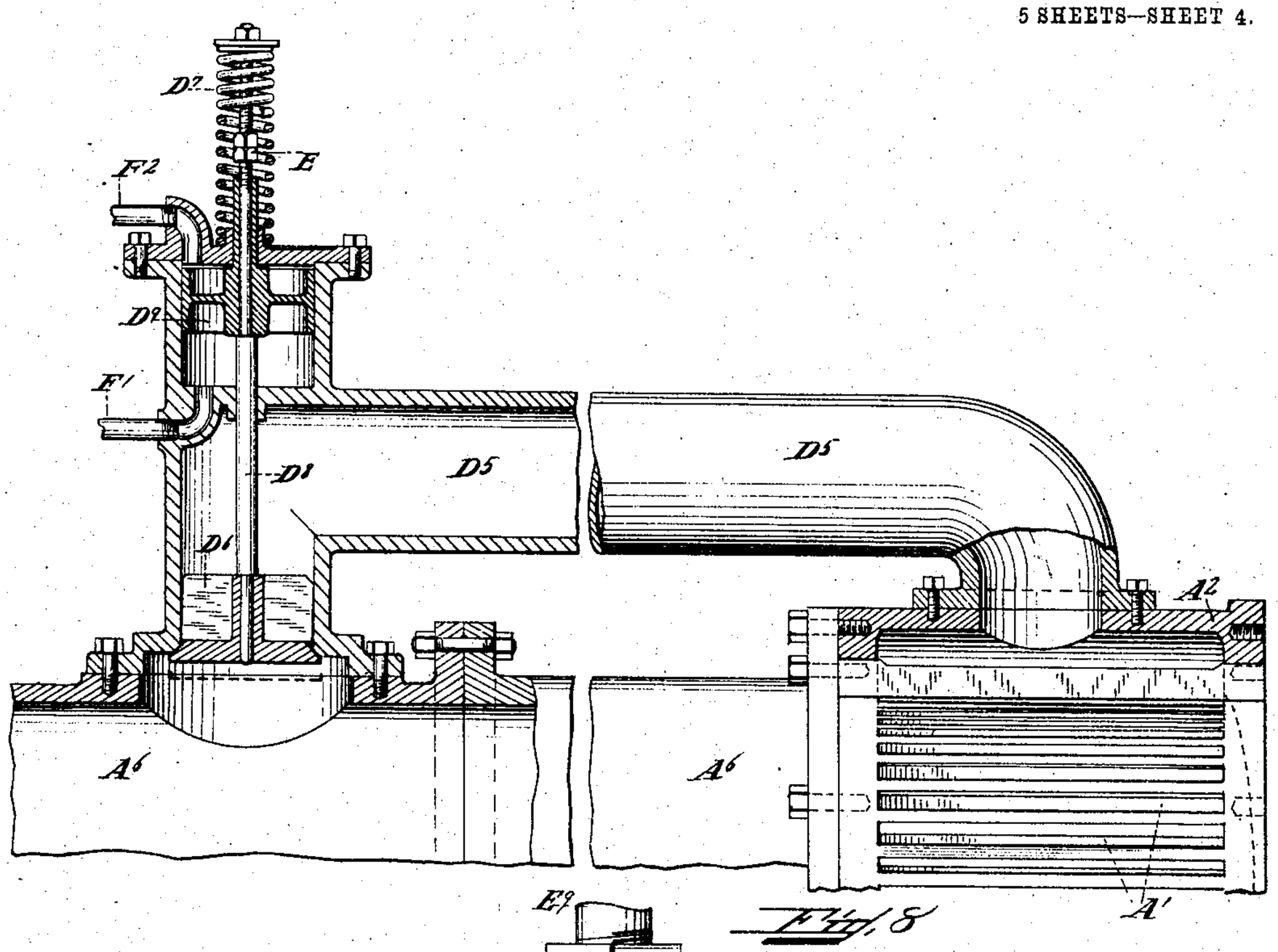

Fig. 8

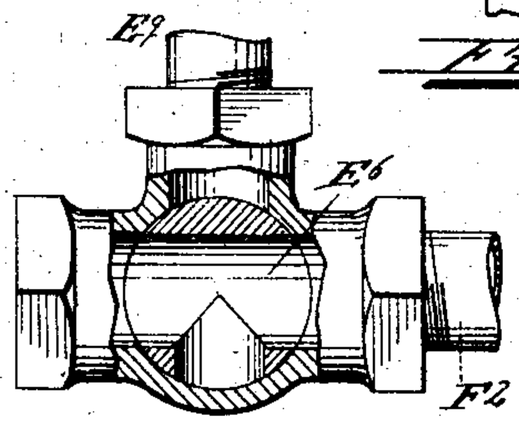

Fig. 10.

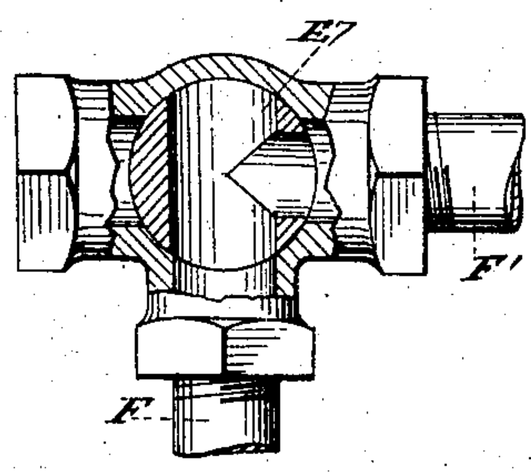

Fig. 12

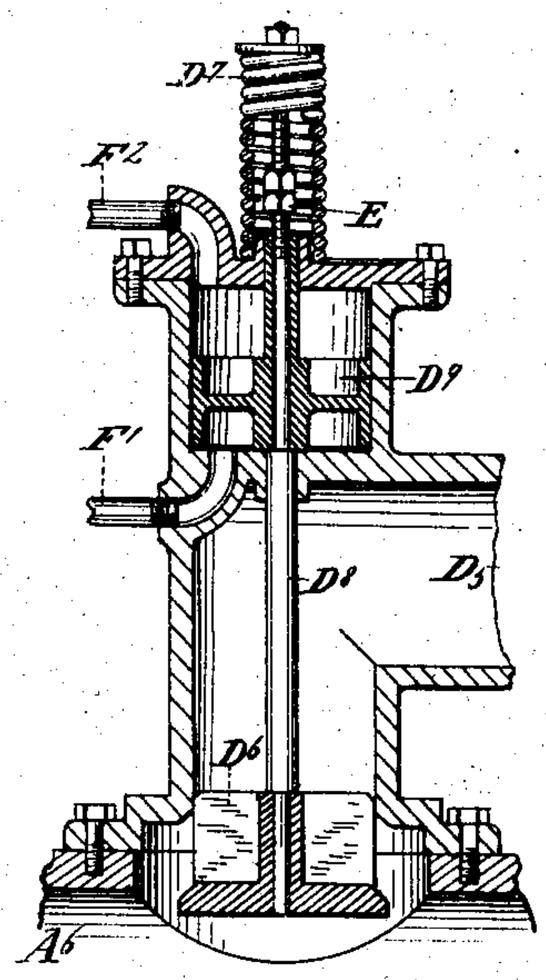

Fig. 9.

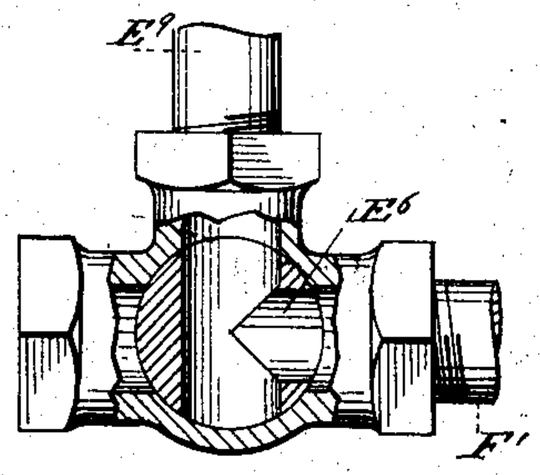

Fig. 11.

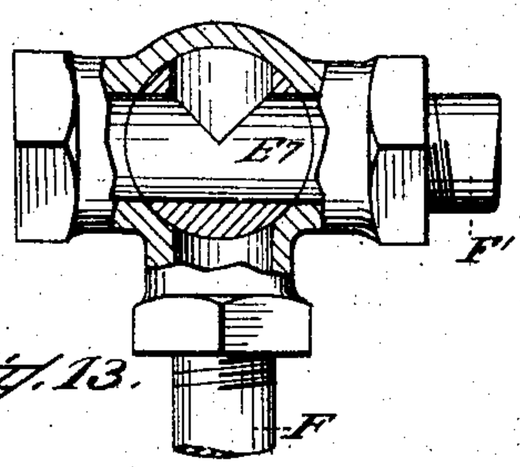

Fig. 13.

Witnesses:
Bert Kemp
A. L. Merrick

Inventor:
Otto S. Pike
By E. C. Gilman
& J. P. Rupp
Attys

No. 784,225. PATENTED MAR. 7, 1905.

O. S. PIKE.

PNEUMATIC DESPATCH APPARATUS.

APPLICATION FILED AUG. 6, 1903.

5 SHEETS--SHEET 5.

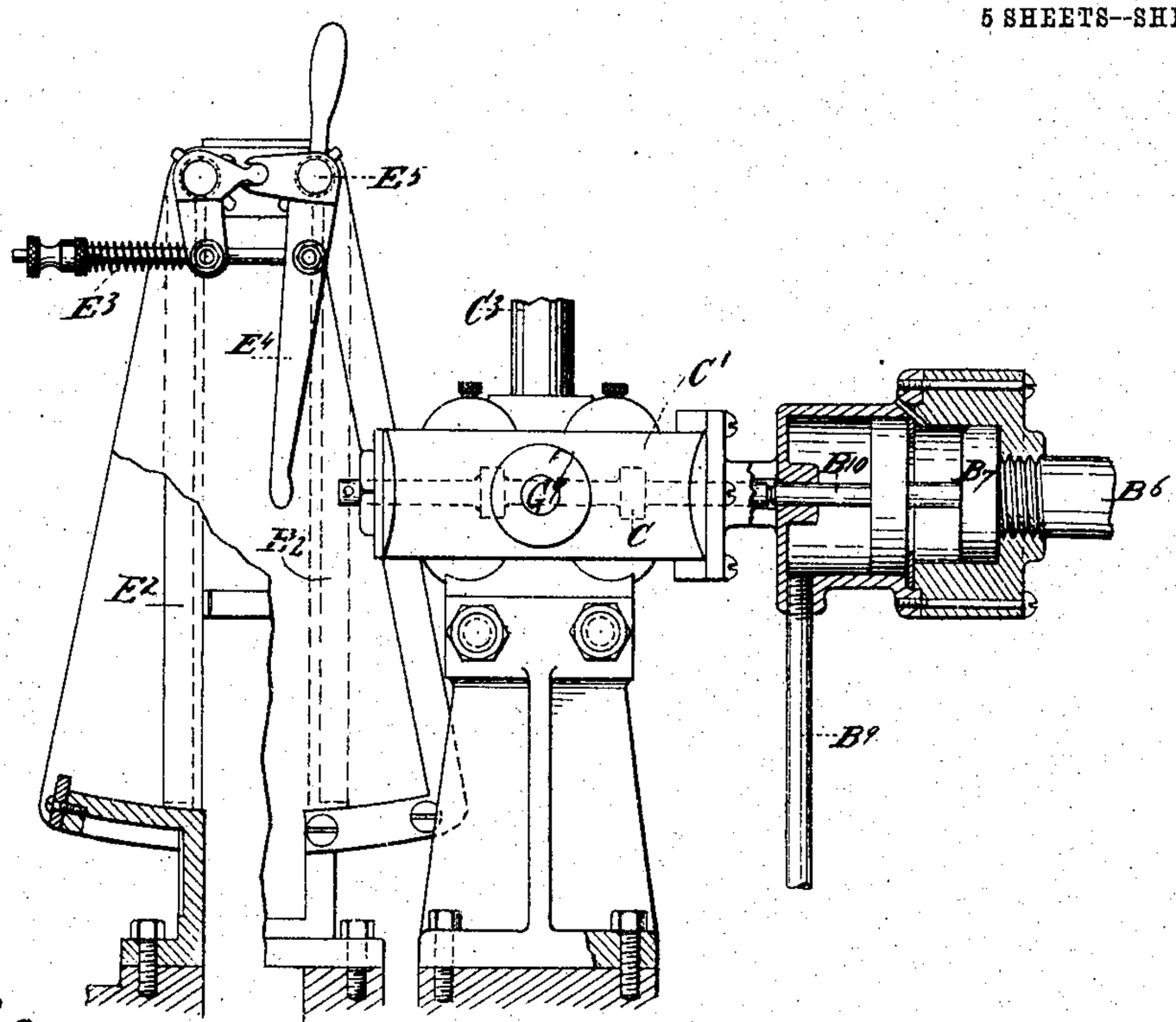

Fig. 14.

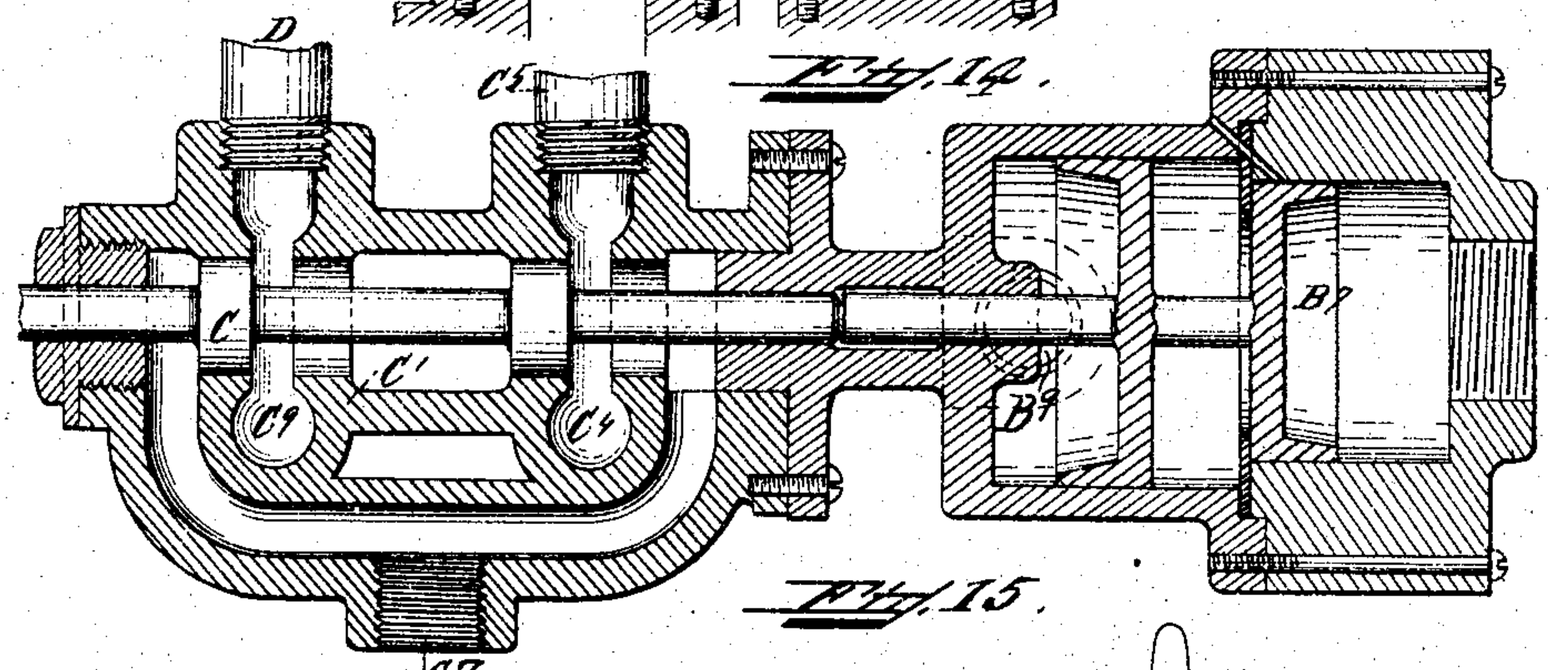

Fig. 15.

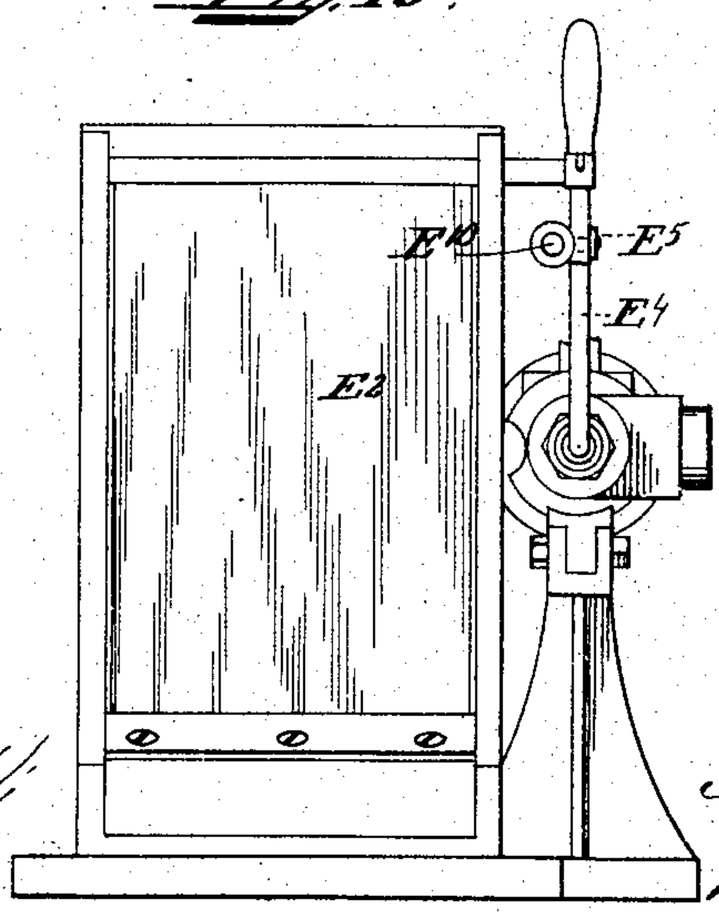

Fig. 16.

Witnesses:
Ben Ekemp.
R. L. Wesson

Inventor:
Otto S. Pike
by E. C. Gilman
& J. T. Russell
Atts

No. 784,225. Patented March 7, 1905.

UNITED STATES PATENT OFFICE.

OTTO S. PIKE, OF MALDEN, MASSACHUSETTS, ASSIGNOR TO AMERICAN PNEUMATIC SERVICE COMPANY, OF DOVER, DELAWARE, A CORPORATION OF DELAWARE.

PNEUMATIC-DESPATCH APPARATUS.

SPECIFICATION forming part of Letters Patent No. 784,225, dated March 7, 1905.

Application filed August 6, 1903. Serial No. 168,468.

To all whom it may concern:

Be it known that I, OTTO S. PIKE, of Malden, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Pneumatic-Despatch Apparatus, of which the following is a specification.

My invention relates to new and useful improvements in closed receivers for pneumatic terminals.

The object of the invention is to remove carriers from a pneumatic-despatch tube while the tube is under pressure without causing a blast of air to flow from the tube into the atmosphere.

My invention consists, essentially, of a chamber to receive the carriers, a valve interposed between the chamber and the tube-line, the air from the tube-line being deflected before reaching said valve, another valve closing the above-mentioned chamber to the atmosphere. In action the carrier enters the chamber and the valve between the chamber and the tube-line closes. The valve between the chamber and the atmosphere opens, allowing the carrier to pass out onto a suitable table. Various auxiliary devices hereinafter described insure the prompt and correct working of the valves and the expulsion of the carrier from the terminal.

My invention consists of certain novel features hereinafter described, and particularly pointed out in the claims.

In the accompanying drawings, which illustrate a construction embodying my invention, Figure 1 shows an elevation of the terminal in its normal or closed position. Fig. 2 is a plan view of the same. Fig. 3 is an elevation of the terminal in its open position ready for a carrier to pass from the chamber onto the table. Fig. 4 is a section of the terminal through the valves, showing their position when the machine is closed. Fig. 5 is a similar section showing the position of the valves when the machine is open. Figs. 6 and 7 show a cylinder and piston with their attachments for operating the main valves in normal and open positions, respectively. Fig. 8 shows a by-pass pipe and valve in its normal position, the dotted lines showing the valve in open position. Fig. 9 shows in section the by-pass valve and its piston in position for blowing out a carrier under certain circumstances, as hereinafter described. Figs. 10 to 16, inclusive, show various auxiliary portions of the machine hereinafter described.

Like letters of reference refer to like parts throughout the several views.

Referring to Figs. 1, 2, and 3, a portion of the tube-line is shown at A. The air travels through this tube in the direction indicated by the arrow and flows outward through the ports A', Fig. 8, into the T A^2 and away through the pipe A^3. The valve A^4 is now open and the valve A^5 closed, as shown in Fig. 4. The carrier enters the T A^2, passing over the ports A', and travels through the valve A^4 and into the receiving-chamber A^6.

A^7 is a cylinder in which is a piston A^8, detail Figs. 6 and 7. A supply of compressed air from the pipe A^3 or from any independent source is supplied to the cylinder A^7 through the pipe A^9. When air is admitted to the right of the piston A^8, the piston is forced to the left and carries with it the wrist-plate A^{10}. The roller B, mounted on the wrist-plate A^{10} and inclosed between the jaws of the bell-crank B', forces the bell-crank into position shown in Fig. 3. By means of the connecting-rod B^2 and crank B^3 the valve A^4 is rotated through a quarter-circle into the position shown in Fig. 5. When the valve A^4 reaches this position, the roller B slips from the jaws of the bell-crank B', and the locking-arc G^2 engages with the curved portion G^3 of the bell-crank B', thus holding the valve A^4 securely in position. At about the same time the locking-arc G^2 disengages from the curved portion G^4 of the bell-crank B^5, and the roller B^4, mounted on the wrist-plate A^{10}, engages the jaws of the bell-crank B^5, which operates the valve A^5 and revolves the same into the position shown in Fig. 5.

The operation of the piston A^8 is secured as follows: When a carrier enters the receiving-chamber A^6, the air imprisoned in front of the carrier is compressed, thus bringing the carrier gradually to rest. The pipe B^6

leads from the front end of the receiving-chamber to the right of the double piston B^7. (Shown in detail in Figs. 14 and 15.) Fig. 14 shows the normal position of this piston. At various points along the receiving-chamber A^6 are tapped in small pipes B^8. These pipes are supplied with stop-cocks, with the exception of the pipe nearest the valve A^4. These pipes all connect to the pipe B^9, which leads to the left-hand side of the piston B^7. The left-hand disk of the piston B^7 is made larger than the right-hand disk, so as to offset the loss of area due to the piston-rod B^{10} and also insure the piston staying securely in its normal position when no carrier is in the terminal. Any one or all of the stop-cocks in the pipes B^8 may be left open. As a carrier enters the receiving-chamber A^6 it passes by the pipes B^8. When a carrier passes by the nearest open pipe B^8 to the valve A^5, the excess of pressure in front of the carrier, due to cushioning of the carrier, acts only on the right hand of the piston B^7, thus forcing said piston to the left, as shown in Fig. 15. When the piston B^7 moves to the left, it carries with it the piston-valve C in the valve-chest C'. A supply of compressed air passes from the pipe C^2 to pipe C^3. Normally the air from the pipe C^3 passes through the port C^4 into the pipe C^5, thence to the left of the piston C^6, which is in the cylinder C^7, as shown in detail in Figs. 6 and 7. The piston C^6 is attached to the piston slide-valve C^8, the slide C^8 controlling the supply of compressed air for the piston A^8 in the cylinder A^7. When the valve C moves to the left, as noted above, the compressed air in the pipe C^3 is led through the port C^9 into the pipe D, thence to the left of the piston C^6, forcing it and the piston slide-valve C^8 to the right. The air on the right of the piston C^6 exhausts through the pipe C^5 and port C^4 through the opening G^7 into the atmosphere. Normally the compressed air in the pipe A^9 is led through the ports D' and D^2 to the left of piston A^8. When the piston-valve C^8 is forced to the right, air is led to the right of the piston A^8 through the ports D^3 and D^4, forcing the piston A^8 to the left and rotating the valves A^4 A^5 successively, as above noted, from the positions shown in Fig. 4 to those shown in Fig. 5, the air on the left of the piston A^8 exhausting through the ports D' D^2 to the opening G' into the atmosphere. This cuts off the supply of air from behind the carrier and opens the terminal in front of the carrier, the carrier being stationary, or nearly so, in the chamber A^6. The by-pass pipe D^5 (shown in detail in Fig. 8) leads from the T A^2 to the receiving-chamber A^6 at a point just in front of the valve A^4. In the pipe D^5 is a valve D^6, which is held normally closed by the spring D^7 and by the excess air-pressure on the bottom of the valve D^6, the pressure on the bottom being somewhat greater than that on top, owing to the conical form of the valve. The valve-spindle D^8 slides freely in the piston D^9. When the valves A^4 and A^5 move into the positions shown in Fig. 5 after the arrival of a carrier in the chamber A^6, the air-pressure underneath the valve D^6 is dissipated into the atmosphere, leaking by the carrier or pushing the carrier outward. This allows the air-pressure on top of the valve D^6 to force said valve open against the spring D^7 into the position shown in broken lines in Fig. 8, the amount of opening being regulated by the nut E on the valve-spindle D^8. The opening of the valve D^6 allows sufficient compressed air from the main tube-line to pass through the pipe D^5 into the chamber A^6 behind the carrier, and thus force the carrier out onto the table promptly. When the valve D^6 moves downward, the piston D^9 remains stationary. The use of this piston will be described later. As the carrier passes from the receiving-chamber A^6 onto the receiving-table part of the air behind it is deflected upward through the port E', Figs. 4 and 5, which is just in front of the valve A^5. The air then passes between the vanes E^2. (Shown in detail in Figs. 14 and 16.) These vanes are normally held in the position shown in Fig. 14 by the spring E^3. The air-pressure between these vanes forces them outward, and by means of the lever E^4, which is rigidly attached to the spindle E^5 of one of the vanes, the valve C is forced to the right, carrying with it the piston B^7. When the valve C moves to the right, air from the pipe C^3 passes through the port C^4 into the pipe C^5, thence to the right of the piston C^6, forcing this piston and the piston-valve C^8 into the position shown in Fig. 6, thus admitting air to the left of the piston A^8 and bringing the valves A^5 A^4 successively into their normal positions, as shown in Fig. 4. When the carrier has passed out of the terminal, the pressure behind the vanes E^2 dissipates and allows the vanes to assume their normal position. When the valve A^4 opens the main tube-line to the chamber A^6, the pressure in the receiving-chamber A^6 becomes the same as that in the pipe D^5, so that the spring D^7 may close the valve D^6. This restores the terminal to its normal condition.

In Figs. 10 and 11 are shown sections of a three-way cock E^6, Fig. 10 showing the normal position. Figs. 12 and 13 show similar sections of another three-way cock, E^7, Fig. 12 showing the normal position. These cocks E^6 E^7 are manually operated simultaneously by the lever E^8. Compressed air is supplied through the pipe E^9 to the cock E^6 and through the pipe F to the cock E^7. The pipes E^9 and F lead from the pipe C^2. Normally the pipe E^9 is closed by the cock E^6 while air from the pipe F passes through the cock E^7 and the pipe F' to the bottom of the piston D^9 above the by-pass pipe D^5, holding the piston in its upper position, as shown in Fig. 8, the air

above the piston being exhausted through the pipe F^2 and valve E^6 into the atmosphere. In case a carrier sticks so hard in the receiving-chamber A^6 (owing to excessive friction, dirt, or other causes) that the air which passes by the valve D^6 is insufficient to force the carrier out, the attendant throws the lever E^8 to the left, thus rotating the cocks E^6 and E^7 into the positions shown in Figs. 11 and 13, respectively. This exhausts the air beneath the piston D^9 into the atmosphere through the pipe F' and the cock E^7 and admits the compressed air through the pipe E^9 and valve E^6 to the top of the piston D^9, thus forcing the piston D^9, and with it the valve D^6, to its extreme downward position, as shown in Fig. 9, and admitting a larger supply of air through the by-pass pipe D^5 into the receiving-chamber A^6 behind the carrier and forcing the carrier out through the valve A^5 onto the receiving-table. After the carrier has passed out of the machine, the lever E^8 may be turned to its normal position, as shown in Fig. 1, thus restoring the piston D^9 to its normal position, the spring D^7 drawing the valve D^6 upward.

Referring to Figs. 6 and 7, in the cylinder-heads F^3 F^4 are the check-valves F^5 F^6. These valves open inwardly, and the springs F^7 and F^8 tend to hold them in the closed position. Normally both valves F^5 F^6 would be closed on their seats unless prevented by the adjusting-screws F^9 F^{10}, hereinafter described. In Fig. 6, however, the valve F^6 is shown in the position it would take when the piston A^8 is moving to the right. The purpose of this valve is to secure an air-cushion on the end of the cylinder to prevent the piston A^8, and consequently the valves A^4 A^5, coming home with a shock. As the piston A^8 moves to the right it overlaps the opening of the port D^3, and the pressure generated in the closed space, combined with the spring F^7, tends to keep the valve tightly closed. The valve F^5, however, may be kept from entirely closing by the adjusting-screw F^9, so that the air may escape by the valve F^5 slowly and allow the piston A^8 to come home slowly. When air is admitted to the port D^3, so as to force the piston A^8 to the left, some of the air can pass through the port D^4 to the right of the valve F^5 and by forcing the valve F^5 open can pass into the cylinder to the right of the piston A^8. After the piston A^8 has moved a short distance the opening of the port D^3 is uncovered, thus allowing the full volume of air to enter the cylinder. The action of the valve F^6 is entirely similar to the valve F^5, previously described.

Having thus described the nature of my invention and set forth a construction embodying the same, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In an apparatus of the character described, a terminal, a transmission-tube, a valve for closing said terminal to the atmosphere and normally closed, a valve for closing communication between said terminal and the transmission-tube and normally open, mechanism common to said valves for operating the same, a cylinder, a piston in said cylinder connected to said mechanism, an air-supply for operating said piston to move said valves, a valve operated by compressed air for controlling the flow of air from said air-supply to said cylinder for operating said piston, an air-supply for operating said cylinder-controlling valve, and a valve controlling the air-supply which operates said cylinder-controlling valve and operated by the pressure in the terminal for moving the piston in one direction and actuated by air compressed by the traveling carrier for moving said piston in the opposite direction.

2. In an apparatus of the character described, a terminal, a transmission-tube, a valve for closing said terminal to the atmosphere and normally closed, a valve for closing communication between said terminal and the transmission-tube and normally open, mechanism common to said valves for operating the same, a cylinder, a piston in said cylinder connected to said mechanism, a locking device for holding said valves in the position to which they are moved by the operation of the piston, an air-supply for operating said piston to move said valves, a valve operated by compressed air for controlling the flow of air from said air-supply to said cylinder for operating said piston, an air-supply for operating said cylinder-controlling valve, and a valve controlling the air-supply which operates said cylinder-controlling valve and operated by the pressure in the terminal for moving the piston in one direction and actuated by air compressed by the traveling carrier for moving said piston in the opposite direction.

3. In an apparatus of the character described, a terminal, a transmission-tube, a valve for closing said terminal to the atmosphere and normally closed, a valve for closing communication between said terminal and the transmission-tube and normally open, mechanism common to said valves for operating the same, a cylinder, a piston in said cylinder connected to said mechanism, a locking device for holding said valves in the position to which they are moved by the operation of the piston, an air-supply for operating said piston to move said valves, a valve operated by compressed air for controlling the flow of air from said air-supply to said cylinder for operating said piston, an air-supply for operating said cylinder-controlling valve, a valve controlling the air-supply which operates said cylinder-controlling valve and operated by the pressure in the terminal for moving the piston in one direction and actuated by air compressed by the traveling carrier for moving said piston in the opposite direction, and

mechanism operated by the pressure at the rear of the traveling carrier for operating said valve-operating mechanism to return said valves to their normal positions.

4. In an apparatus of the character described, a terminal, a transmission-tube, a valve for closing said terminal to the atmosphere and normally closed, a valve for closing communication between said terminal and the transmission-tube and normally open, mechanism common to said valves for operating the same, a cylinder, a piston in said cylinder connected to said mechanism, a locking device for holding said valves in the position to which they are moved by the operation of the piston, an air-supply for operating said piston to move said valves, a valve operated by compressed air for controlling the flow of air from said air-supply for operating said cylinder-controlling valve, a valve controlling the air-supply which operates said cylinder-controlling valve and operated by the pressure in the terminal for moving the piston in one direction and actuated by air compressed by the traveling carrier for moving said piston in the opposite direction, and mechanism consisting of two vanes and operated by the pressure at the rear of the traveling carrier to operate said valve-operating mechanism to return said valves to their normal positions.

5. In an apparatus of the character described, a terminal, a transmission-tube, a valve for closing said terminal to the atmosphere and normally closed, a valve for closing communication between said terminal and the transmission-tube and normally open, mechanism common to said valves for operating the same, a cylinder, a piston in said cylinder connected to said mechanism, an air-supply for operating said piston to move said valves, a valve operated by compressed air for controlling the flow of air from said air-supply to said cylinder for operating said piston, an air-supply for operating said cylinder-controlling valve, and a valve controlling the air-supply which operates said cylinder-controlling valve and operated by the pressure in the terminal for moving the piston in one direction and actuated by air compressed by the traveling carrier for moving said piston in the opposite direction, and mechanism operated by the pressure at the rear of the traveling carrier for operating said valve-operating mechanism to return said valves to their normal positions.

6. In an apparatus of the character described, a terminal, a transmission-tube, a valve for closing said terminal to the atmosphere and normally closed, a valve for closing communication between said terminal and the transmission-tube and normally open, mechanism common to said valves for operating the same, a cylinder, a piston in said cylinder connected to said mechanism, a locking device for holding said valves in the position to which they are moved by the operation of the piston, an air-supply for operating said piston to move said valves, a valve operated by compressed air for controlling the flow of air from said air-supply for operating said cylinder-controlling valve, a valve controlling the air-supply which operates said cylinder-controlling valve and operated by the pressure in the terminal for moving the piston in one direction and actuated by air compressed by the traveling carrier for moving said piston in the opposite direction, mechanism consisting of two vanes and operated by the pressure at the rear of the traveling carrier to operate said valve-operated mechanism to return said valves to their normal positions, and means for normally holding said vanes against movement.

7. In an apparatus of the character described, a terminal, a transmission-tube, a valve for closing said terminal to the atmosphere and normally closed, a valve for closing communication between said terminal and the transmission-tube and normally open, mechanism common to said valves for operating the same, a cylinder, a piston in said cylinder connected to said mechanism, a locking device for holding said valves in the position to which they are moved by the operation of the piston, an air-supply for operating said piston to move said valves, a valve operated by compressed air for controlling the flow of air from said air-supply for operating said cylinder-controlling valve, a valve controlling the air-supply which operates said cylinder-controlling valve and operated by the pressure in the terminal for moving the piston in one direction and actuated by air compressed by the traveling carrier for moving said piston in the opposite direction, mechanism consisting of two vanes and operated by the pressure at the rear of the traveling carrier to operate said valve-operating mechanism to return said valves to their normal positions, and yielding means for normally holding said vanes against movement.

8. In an apparatus of the character described, a terminal, a transmission-tube, a valve for closing communication between said terminal and the transmission-tube, a by-pass from said transmission-tube to said terminal, a valve normally closing said by-pass, means for holding said valve closed, a cylinder, a piston in said cylinder for operating said valve, a supply of compressed air for operating said piston, and means for controlling said air-supply to move said piston in opposite directions.

9. In an apparatus of the character described, a terminal, a transmission-tube, a valve for closing communication between said terminal and the transmission-tube, a by-pass from said transmission-tube to said terminal, a valve normally closing said by-pass, means for holding said valve closed, a cylinder, a piston in said cylinder for operating said

valve, a supply of compressed air for operating said piston, pipes for the compressed air leading to opposite sides of said piston, and means for controlling the supply of compressed air through said pipes to move the piston in opposite directions.

10. In an apparatus of the character described, a terminal, a transmission-tube, a valve for closing communication between said terminal and the transmission-tube, a by-pass from said transmission-tube to said terminal, a valve normally closing said by-pass, means for holding said valve closed, a cylinder, a piston in said cylinder for operating said valve, a supply of compressed air for operating said piston, pipes for the compressed air leading to opposite sides of said piston, and manually-operated valves for controlling the flow of compressed air through said pipes to move the piston in opposite directions.

11. In an apparatus of the character described, a terminal, a transmission-tube, a valve for closing communication between said terminal and the atmosphere and normally closed, a valve for closing communication between said terminal and the transmission-tube and normally open, mechanism common to said valves for operating the same, a by-pass from said transmission-tube to said terminal, a valve normally closing said by-pass, and means for holding said by-pass valve normally closed, the said by-pass valve being opened by the pressure in the transmission-tube through said by-pass when the valve between the terminal and the transmission-tube is closed and the valve between the terminal and the atmosphere is opened.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 30th day of July, A. D. 1903.

OTTO S. PIKE.

Witnesses:
A. L. MESSER,
E. L. HARLOW.