J. A. & F. L. DREEHOUSE.

AIR PUMP.

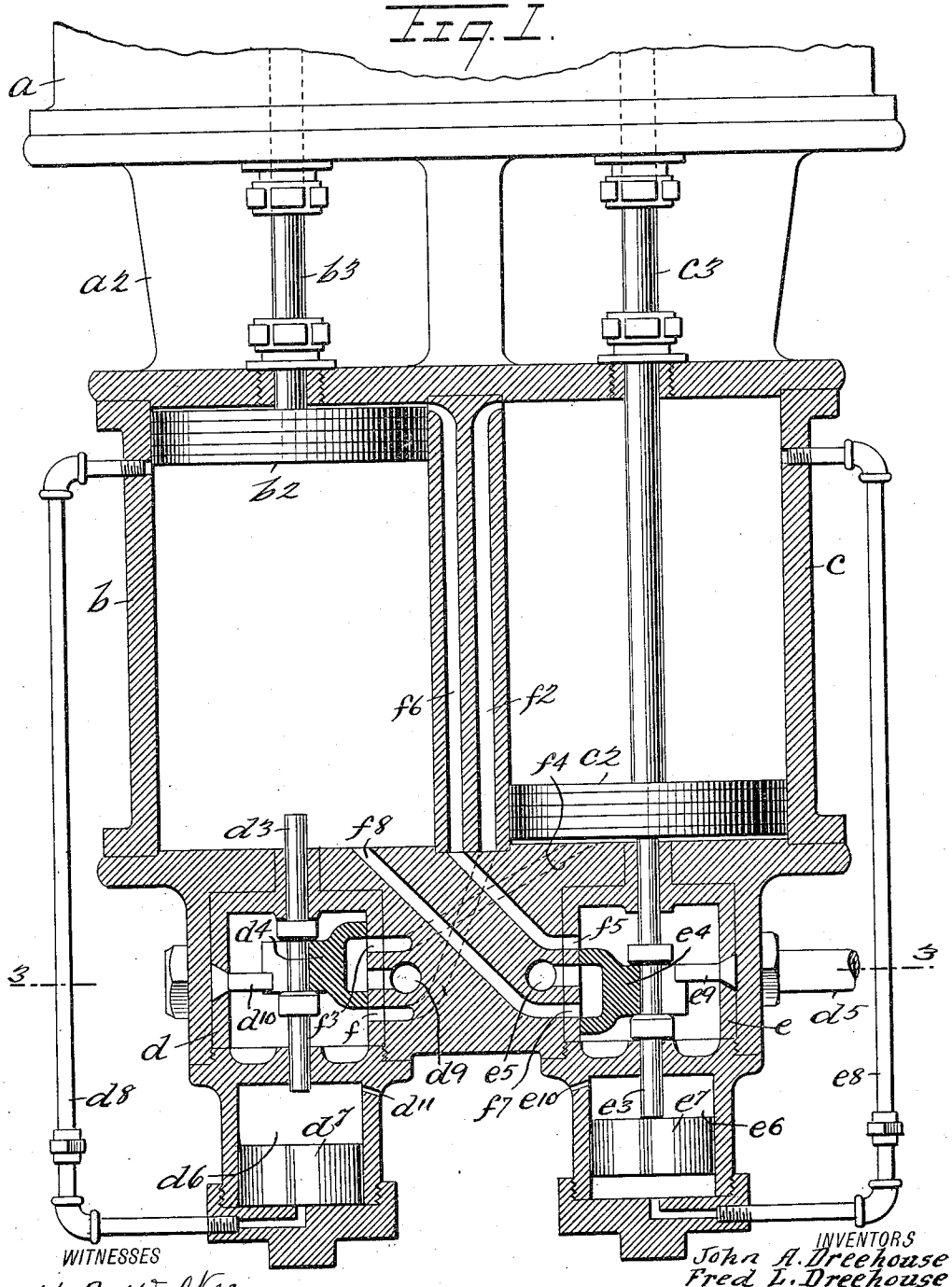
APPLICATION FILED MAY 23, 1914. RENEWED JUNE 22, 1915.

1,165,157.

Patented Dec. 21, 1915.

2 SHEETS—SHEET 1.

Fig. 1.



WITNESSES

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2 SHEETS—SHEET 2.

Fig. 2.

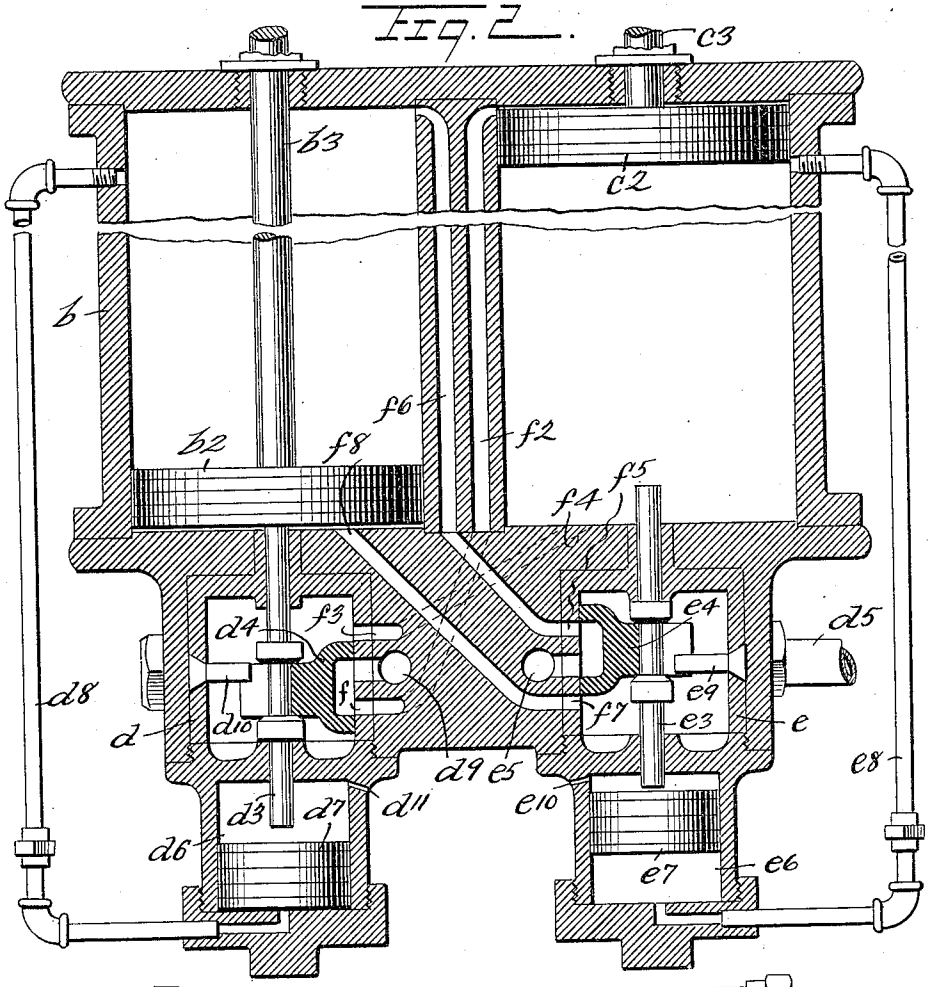
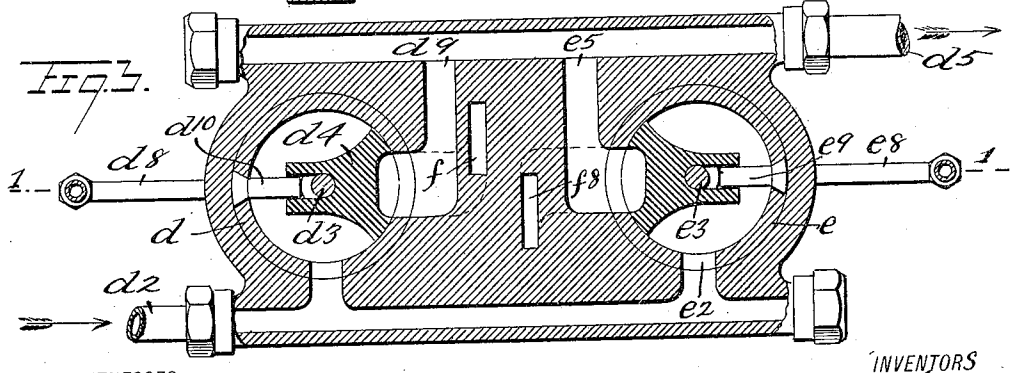


Fig. 3.



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AIR-PUMP.

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To all whom it may concern:

Be it known that we, JOHN A. DREEHOUSE and FRED L. DREEHOUSE, citizens of the United States, and residents of Laramie, in the county of Albany and State of Wyoming, have invented certain new and useful Improvements in Air-Pumps, of which the following is a specification.

Our invention relates to pumps, in the present case to air pumps, and the main object thereof is to provide reversing means for the steam pistons of such pumps, our invention being particularly designed for use in connection with conventional pumps, as the Westinghouse or New York pumps, to dispense with the usual reversing rod and with the tappet plate which cause so much trouble at present.

A further object is to accomplish this result by means of reversing cylinders, one for each of the main pistons, and each of which contains a reversing valve and suitably directed steam passages, for both live steam and for the exhaust.

A further object is to so construct the reversing mechanism as to be readily connected with either of the pumps mentioned without any alteration thereof, other than the removal of certain caps now used.

Our invention is fully set forth in the following specification, of which the accompanying drawings form a part, in which the same reference characters are used to designate the same parts in each of the views, and in which:—

Figure 1 is a central, vertical, section taken through the main cylinders of the steam pump actuating mechanism, and showing its connection with the air pump, and also our invention, with the parts in one position; Fig. 2 is a similar view, with the parts in alternate position; and Fig. 3 is a plan section taken on the line 3—3 of Fig. 1.

In the drawings forming a part of this application we have shown at a the conventional air-pump and with which the steam cylinders b and c are connected, as shown at a^2, said cylinders having pistons b^2 and c^2 in operative connection with piston rods b^3 and c^3, respectively.

Arranged beneath the cylinder b is a valve chamber d, communicating with a steam pipe d^2 leading to the boiler, and having a vertically movable, centrally arranged, rod d^3 therein which carries a slide-valve d^4 in constant communication with an exhaust pipe d^5, as clearly shown in Fig. 3, and the rod d^3 extends into the cylinder b and downwardly into a reversing cylinder d^6 having a free piston d^7 therein, and a steam pipe d^8 connects the lower part of the cylinder d^6 with the upper part of the cylinder b, but beneath the uppermost position of the piston b^2, for a reason later explained.

The valve d^4 is in constant communication with the exhaust port and passage d^9 leading to the exhaust pipe d^5, and said valve is guided by a projection d^{10} within the chamber d and, in order not to retard the action of the piston d^7 in the cylinder d^6, a vent d^{11} is provided at the upper end of said cylinder.

Arranged beneath the cylinder c is a valve chamber e communicating with the steam-pipe d^2 by means of a port e^2 and having a vertically movable, centrally arranged, rod e^3 therein which carries a slide-valve e^4 in constant communication with the exhaust pipe d^5 by means of a port e^5, as clearly shown in Fig. 3, and the rod e^3 extends into the cylinder c and downwardly into a reversing cylinder e^6 having a free piston e^7 therein, and a steam-pipe e^8 connects the lower part of the cylinder e^6 with the upper part of the cylinder c, but beneath the uppermost position of the piston c^2, as clearly shown in Fig. 2, and said valve e^4 is guided by a projection e^9 in the cylinder e, and a vent e^{10} is provided at the top of the cylinder e^6.

In the position of the parts shown in Fig. 1 the valve d^4 places the exhaust port d^9 in communication with a port f^3 communicating with a passage f^4 leading to the cylinder c, beneath the piston c^2, whereas in Fig. 2 the said valve communicates the said exhaust port with a port f leading to the upper part of the cylinder c, above the uppermost position of the piston c^2, by means of a passage f^2. In the first position referred to the valve e^4 places the exhaust port e^5 in

communication with a port f^7 leading to the bottom of the cylinder b through a passage f^8 whereas, in the alternate position of said valve e^4, communication is opened between said exhaust port e^5 and a port f^5 leading by means of a passage f^6 to the upper part of the cylinder b and above the uppermost position of the piston b^2, these alternate positions of the parts being clearly illustrated in Figs. 1 and 2.

With the parts in the state of rest shown in Fig. 1, steam admitted through the pipe d^2 passes into the valve chamber e through the port f^5 and passage f^6 to the upper side of the piston b^2 and forces the same downwardly, the dead steam being exhausted through the passage f^8, valve e^4, and port e^5; when the piston b^2 strikes the rod d^3 the valve d^4 is forced into the alternate position shown in Fig. 2, thereby admitting steam beneath the piston c^2 and opening the exhaust thereof through the passage f^2, valve d^4, and port d^9, and the piston c^2 is forced upwardly; when in uppermost position, the piston c^2 uncovers the entrance to the pipe e^8 through which the live steam passes to the reversing cylinder e^6, thereby forcing the piston e^7 against the rod e^3 and thus moves the valve e^4 into the alternate position shown in Fig. 2. The steam now passes through the valve chamber e and the port f^7 to the under side of the piston b^2 which is thus forced into uppermost position, the exhaust being made through the passage f^6, port f^5, valve e^4, and port e^5; when in uppermost position, the piston b^2 has cleared the entrance to the pipe d^8 and the steam passes therethrough, and forces the piston d^7 upwardly against the rod d^3 and thus moves the valve d^4 into the position shown in Fig. 1; the steam now enters the passage f and f^2 and passes to the upper part of the piston c^2 which is thus forced downwardly, the exhaust being made through the passage f^4, port f^3, valve d^4, and port d^9; when the piston c^2 has reached its lowermost position, the valve e^4 has been again forced into the position shown in Fig. 1, and the operation just described is repeated as long as steam is admitted, and it will thus be seen that the two main pistons b^2 and c^2 are actuated alternately in reverse directions, the reversing of the valves for the inlet and exhaust ports being automatic.

The cylinders b and c, pistons b^2 and c^2, valve chambers d and e, and valves d^4 and e^4 are all of conventional form, no change being made therein, but we do remove the conventional cap which is screw-threaded into the bottom of each of the valve chambers, and substituting the reversing cylinders d^6 and e^6 therfor, also threaded into the corresponding valve chambers, having, each, a detachable cap permitting the insertion of the floating valves d^7 and e^7, and we also provide the pipes d^8 and e^8, and the valve rods d^3 and e^3, all of these parts, as stated, being added to the conventional structure without any alteration in the latter.

It will thus be seen that we provide an automatic reversing mechanism for the two steam cylinders of a pump or the like, comprising a valve for connecting each side of each of the main pistons with the steam supply and the exhaust alternately, and means operable by one of said main pistons for accomplishing this result on the other main piston, each piston in the main cylinders actuating the other piston through the medium of the corresponding valve.

Our invention is simple though fully efficient and is adapted for connection with certain conventional air-pumps by merely substituting the parts shown and described for certain caps now employed, no change in the pumps themselves being needed and, while we have shown a present preferred form of construction, it will be obvious that we are not limited thereto, but may make changes in and modifications thereover, within the scope of the following claims, without departing from the spirit of the invention or sacrificing its advantages.

Having fully described the invention, what we claim as new, and desire to secure by Letters Patent, is:—

1. The combination with a pump provided with two main steam cylinders, a piston in each cylinder, a rod on each piston, a valve chamber casing beneath each cylinder in communication with the opposite cylinder, above and below the piston therein, a valve in each chamber controlling such communication, a steam inlet pipe and a steam exhaust pipe in constant communication with said chambers; of a reversing cylinder screw-threaded into each valve chamber, a cap detachably secured thereto, a piston in each reversing cylinder, a rod connected with each valve and projecting into corresponding main and reversing cylinders, and a pipe connecting the lower portion of each reversing cylinder with the corresponding main cylinder.

2. The combination with a pump provided with two main steam cylinders, a piston in each cylinder, a rod on each piston, a valve chamber casing beneath each cylinder in communication with the opposite cylinder, above and below the piston therein, a valve in each chamber controlling such communication, a steam inlet pipe and a steam exhaust pipe in constant communication with said chambers; of a reversing cylinder screw-threaded into each valve chamber, a cap detachably secured thereto, a floating piston

in each reversing cylinder, a rod connected with each valve and projecting into corresponding main and reversing cylinders, and a pipe connecting the lower portion of each reversing cylinder with the corresponding main cylinder.

In testimony that we claim the foregoing as our invention we have signed our names in presence of the subscribing witnesses.

JOHN A. DREEHOUSE.
FRED L. DREEHOUSE.

Witnesses:
HERBERT W. CAREY,
GEORGE W. PATTERSON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."