(No Model.) 2 Sheets—Sheet 1.

H. A. DANIELS.

AUTOMATIC AIR COMPRESSOR FOR PUMPS.

No. 410,075. Patented Aug. 27, 1889.

Fig. 1.

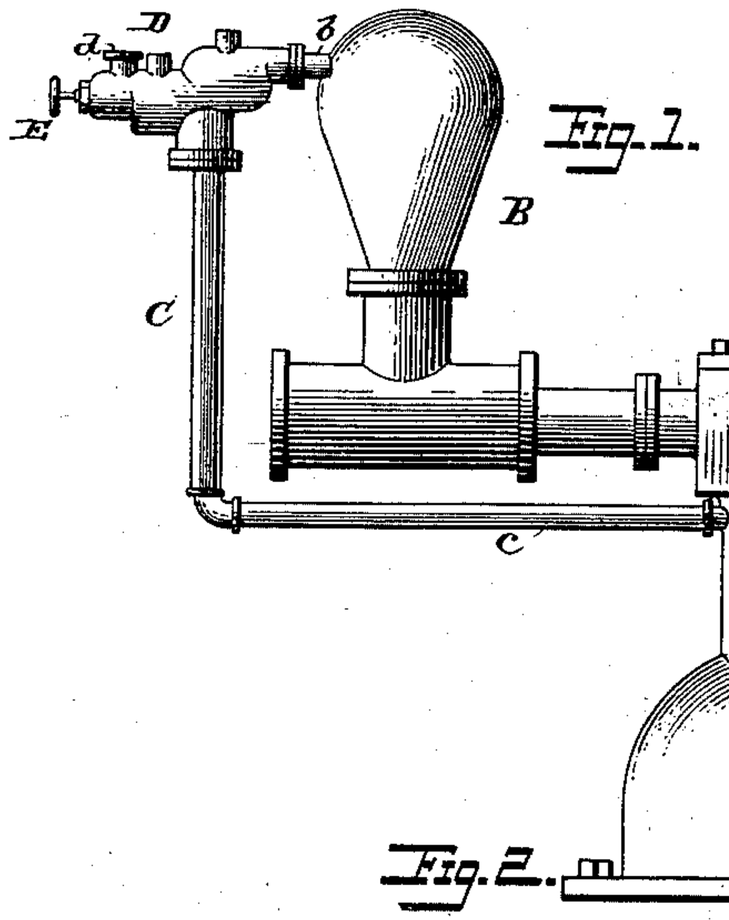


Fig. 2.

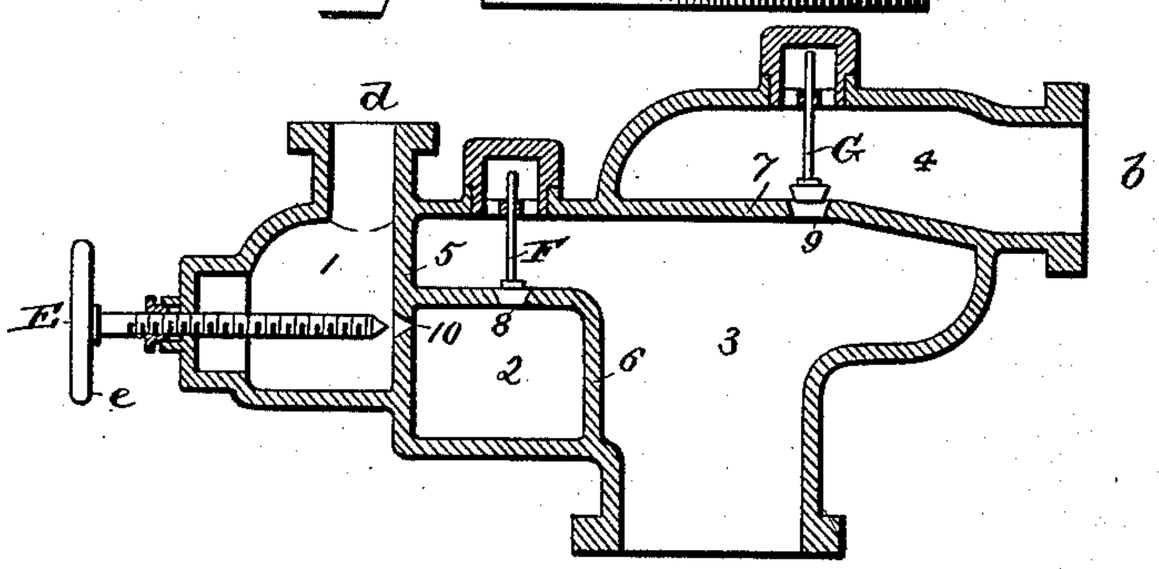
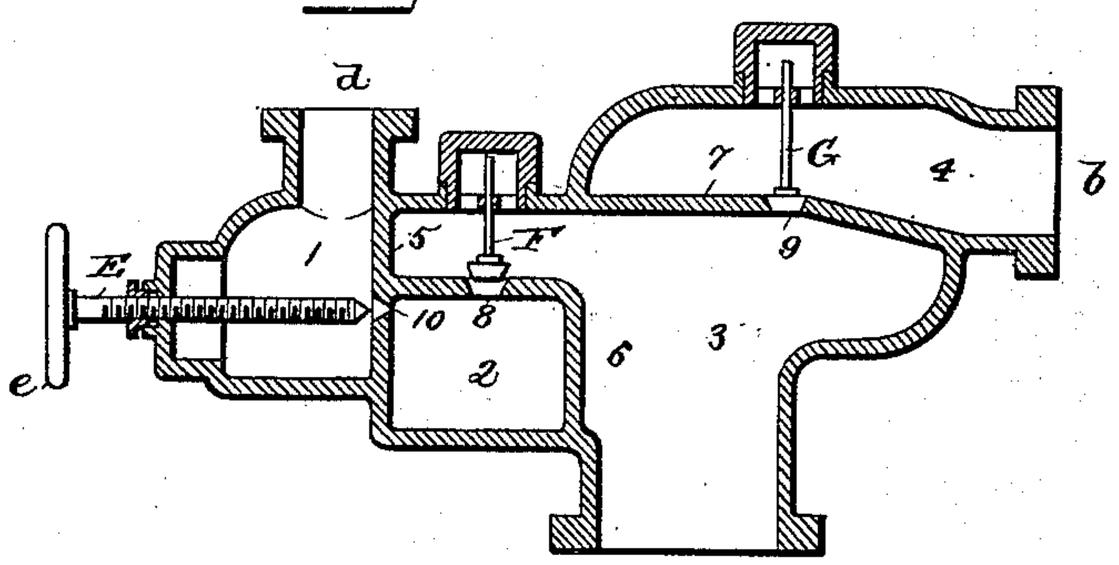


Fig. 3.



Witnesses
Jno. J. Hinkel Jr.
J. S. Barker.

Henry A. Daniels,
Inventor
By Foster & Freeman
Attorneys

(No Model.) 2 Sheets—Sheet 2.

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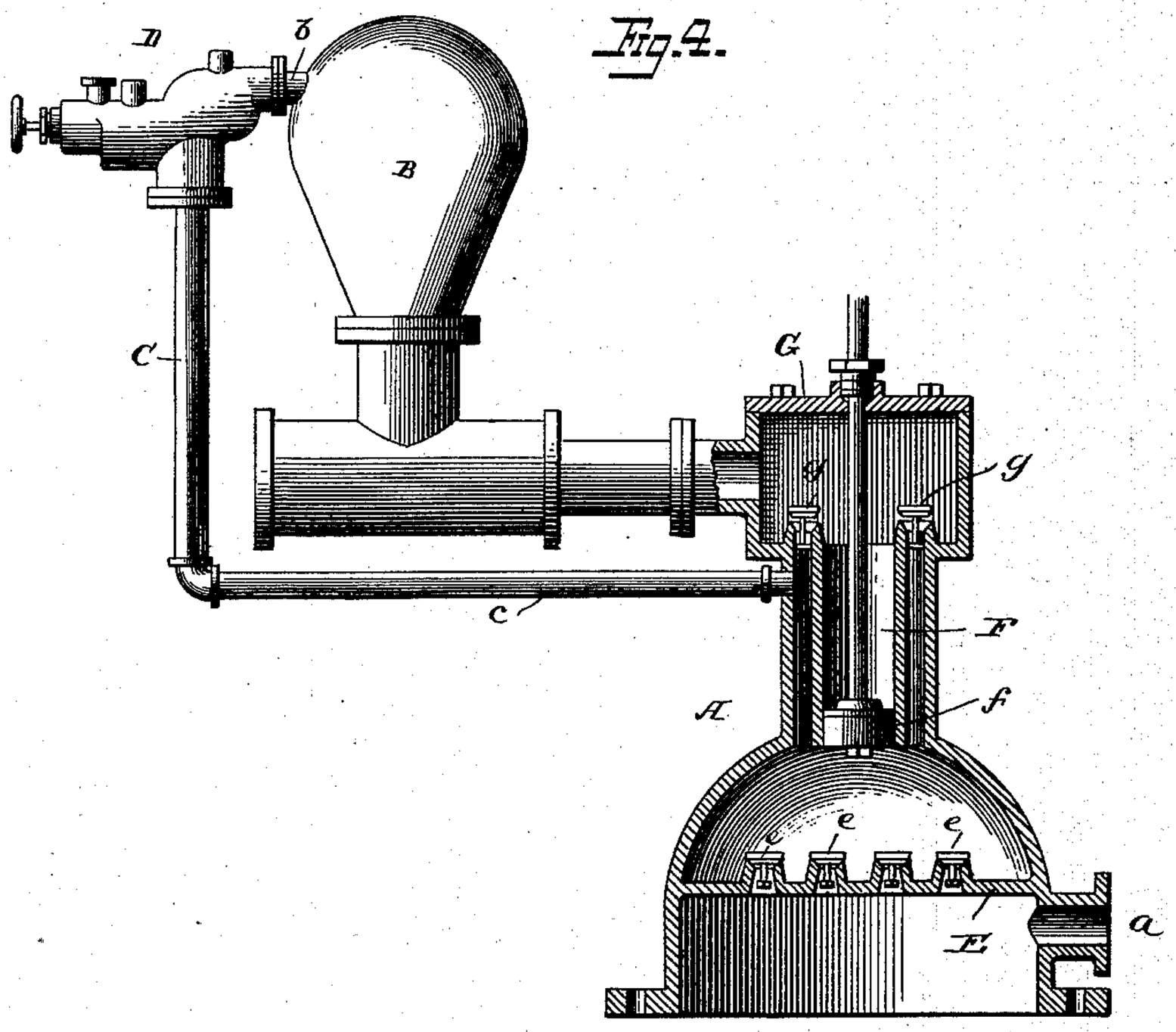
Fig. 4.



Witnesses
Jno. J. Hinkel Jr.
J. S. Barker.

Henry A. Daniels.
Inventor

By his Attorneys
Foster Freeman

UNITED STATES PATENT OFFICE.

HENRY A. DANIELS, OF YONKERS, NEW YORK.

AUTOMATIC AIR-COMPRESSOR FOR PUMPS.

SPECIFICATION forming part of Letters Patent No. 410,075, dated August 27, 1889.

Application filed October 15, 1888. Serial No. 288,129. (No model.)

To all whom it may concern:

Be it known that I, HENRY A. DANIELS, a citizen of the United States, residing at Yonkers, county of Westchester, State of New York, have invented certain new and useful Improvements in Automatic Air-Compressors for Pumps, of which the following is a full, clear, and exact specification.

It is well known that it is necessary to constantly charge the air-chambers of pumps with fresh air, owing to the fact that the water absorbs more or less rapidly the air in the said chambers, and unless the amount absorbed is replaced the working of the pump soon becomes defective.

My invention relates to a device for automatically maintaining the requisite supply of air within the air-chamber; and it consists of a casing in which are arranged certain valves, connected both with the pump and with the air-chamber, as will be hereinafter explained.

In the drawings, Figure 1 is a side view of a pump having my invention connected therewith. Figs. 2 and 3 are sectional views of my invention, showing the valves in different positions. Fig. 4 is a sectional view of the pump, showing the arrangement of its valves and its connection with the casing D.

A designates the pump, which may be of any suitable construction, and B the air-chamber, into which the water is forced by the pump.

Referring to Fig. 4, which shows the interior construction of the pump, E designates a diaphragm or partition dividing that part of the pump-chamber containing the working-barrel F from the portion into which the inlet-pipe *a* enters. This partition is perforated and provided in any well-known manner with one or more check-valves *e*, which allow the water to pass them freely when the pump-piston *f* is elevated, but which automatically close on the reverse movement of the piston.

g are the usual check-valves between the pump-chamber and the box G, which communicates with the air-chamber, which valves prevent the water from being forced back into the pump.

Connected with the upper part of the air-chamber by a pipe *b* is a casing D, in which are mounted three valves, which casing and valves form the essential features of my invention. This casing is also connected by a pipe or pipes C *c* with the pump between the valves *g* and *e* in such manner that the effect of the movements of the piston is communicated to the interior of the casing. The casing is preferably of a single piece, interiorly divided into the chambers 1, 2, 3, and 4, separated from each other by partitions 5, 6, and 7, except at the places 8, 9, and 10, where the partitions are perforated. The chamber 1 has an opening or pipe *d*, through which it has free communication with the open air. The pipe C from the pump communicates with the chamber 3, and the pipe *b*, leading to the air-chamber, opens into the chamber 4. The opening 10 in the partition 5 between the chambers 1 and 2 has mounted opposite to it a stop or regulating valve E, the stem of which extends through the outer wall of the casing and is provided with a hand-wheel *e*. The opening 8 in the partition 6 between the chambers 2 and 3 is covered by a check-valve F, and the opening 9 in the partition 7 between the chambers 3 and 4 is covered by another check-valve G.

The operation of the device may now be understood. When the pump is at rest, the valves F and G are closed; but as soon as it is put into motion the equilibrium of pressure within the chambers of the casing D is disturbed and the check-valves are moved. Upon the downward movement of the pump-piston, which forces water into the air-chamber, more or less water is forced into the pipe C, causing the air in the chamber 3 to be compressed, whereupon the valve F will be forcibly held closed and the valve G opened, permitting the air under pressure to pass thereby, and thence through the chamber 4 and pipe *b* into the air-chamber B. (See Fig. 2.) On the reverse movement of the pump the water in the pipe C falls, the pressure in the pump-chamber being reduced, and the air in the chamber 3 is rarefied, which immediately causes the valve G to close, while the valve F is raised by the air entering through the parts *d*, 10, and 2 from the outside. (See Fig. 3.) This continues so long as the pump operates, and by properly regulating the size of the opening 10 by the valve E sufficient air will be forced into the air-chamber B at each reciprocation of the

piston to maintain a sufficient quantity of air therein, thus automatically supplying the amount lost through the absorption by the water. I prefer that the casing D should be a single-piece casting, and the valve F a straight check-valve, and the one G an angle check-valve. The pipe C is of larger size than is the pipe *c*, and the column of fluid therein acts as a liquid-plunger, the momentum whereof produces an additional compression upon the air in the chamber 3 beyond what would ordinarily be produced by the pump-piston alone, and thus insures that the valve G shall be raised against the pressure thereon from the compressed air within the chamber B. After the valve E has been once properly regulated it will not need attention for a long time, and it will be understood that the device would be operative were this valve omitted entirely, the aperture 10 being of proper size for the capacity of the devices used.

What I claim is—

1. The combination, with a pump and a compressed-air chamber, of a single-piece casing D, interiorly divided by the partitions 6 and 7 into the chambers 2, 3, and 4, the chamber 3 communicating with the pump between its inlet and discharge valves, the chamber 4 communicating with the compressed-air chamber, and the chamber 2 communicating with the external air, a check-valve G, adapted to close an opening in the partition 7, and a check-valve F, adapted to close an opening in the partition 6, substantially as set forth.

2. The combination, with a pump and a compressed-air chamber, of a pipe communicating with the pump between its inlet and discharge valves, a casing communicating with the pipe and also with the compressed-air chamber, provided with an air-inlet, check-valves in the casing between the said pipe and the compressed-air chamber and the said pipe and the air-inlet, and a regulating-valve for the air-inlet, substantially as set forth.

3. The combination, with a pump and an air-chamber, of a casing having separate chambers, one connected with the pump between its inlet and discharge valves, another with the air-chamber, and the third having an air-inlet, check-valves between the said chambers, and a regulating or stop valve for the air-inlet, substantially as described.

4. The combination, with a pump and an air-chamber, of a casing D, having the chambers 2, 3, and 4, communicating with each other through the openings 8 and 9, the air-inlet opening into chamber 2, the pipe connecting the chamber 3 with the pump between its inlet and discharge valves, the connecting-pipe between the chamber 4 and the air-chamber, the regulating-valve opposite the air-inlet, and the check-valves which close the openings 8 and 9, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HENRY A. DANIELS.

Witnesses:

MATT. H. ELLIS,

WM. HARRIGAN.