2 Sheets—Sheet 1.

D. E. SOMES.

AIR PUMP.

No. 95,613. Patented Oct. 5, 1869.

Fig. 1.

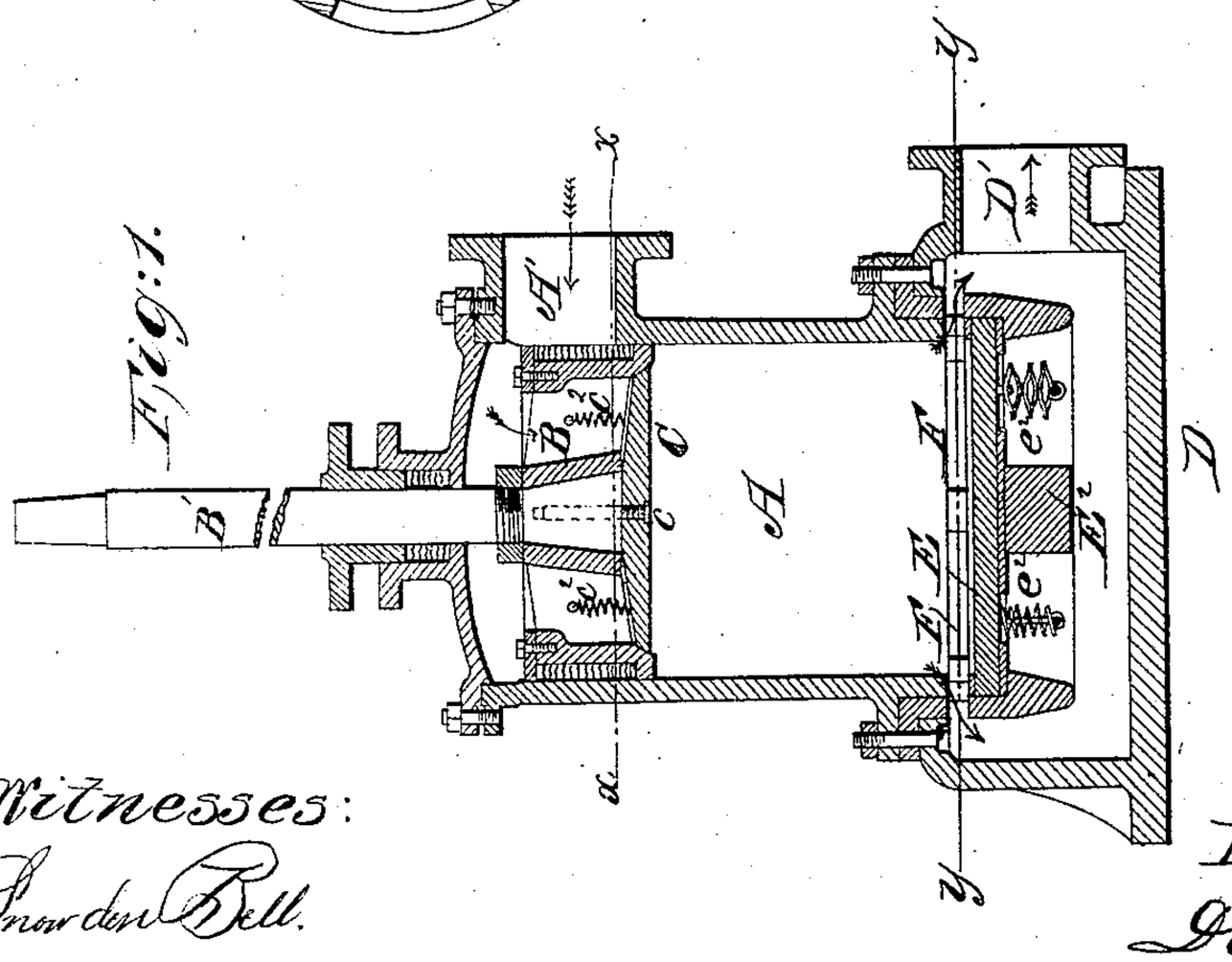


Fig. 2.

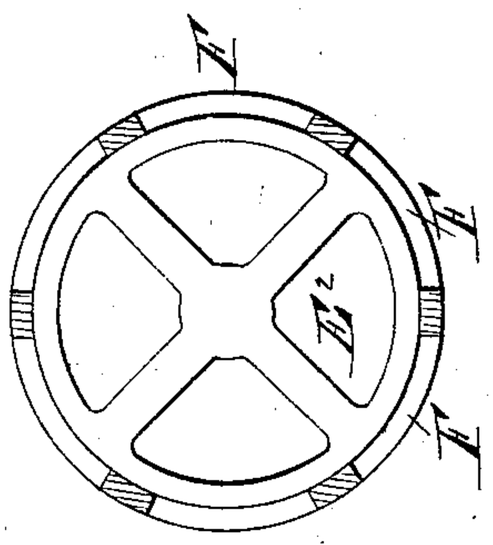


Fig. 3.

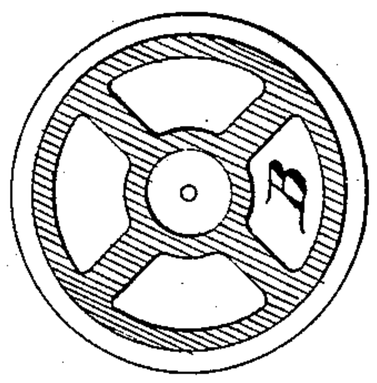
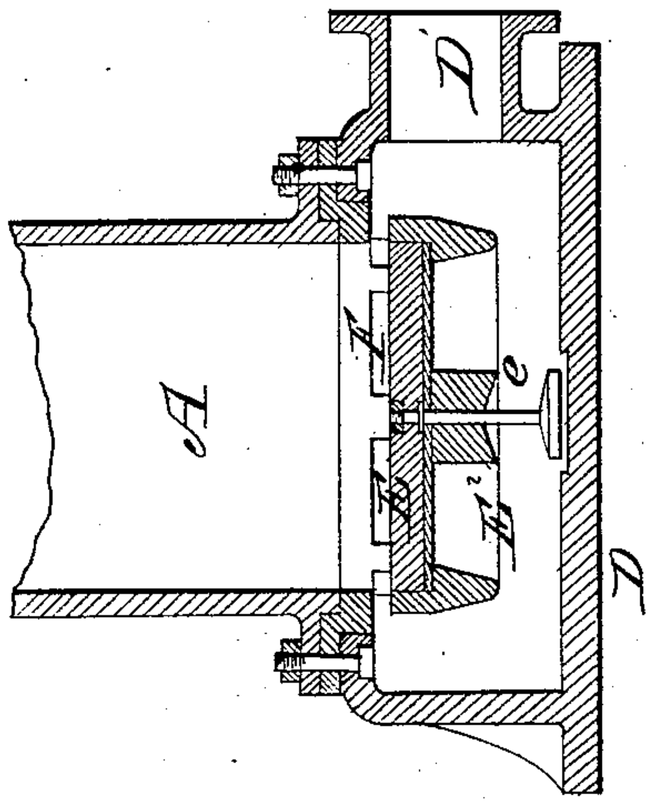


Fig. 4.



Witnesses:

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Charles Kerron.

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2 Sheets—Sheet 2.

D. E. SOMES.

AIR PUMP.

No. 95,613. Patented Oct. 5, 1869.

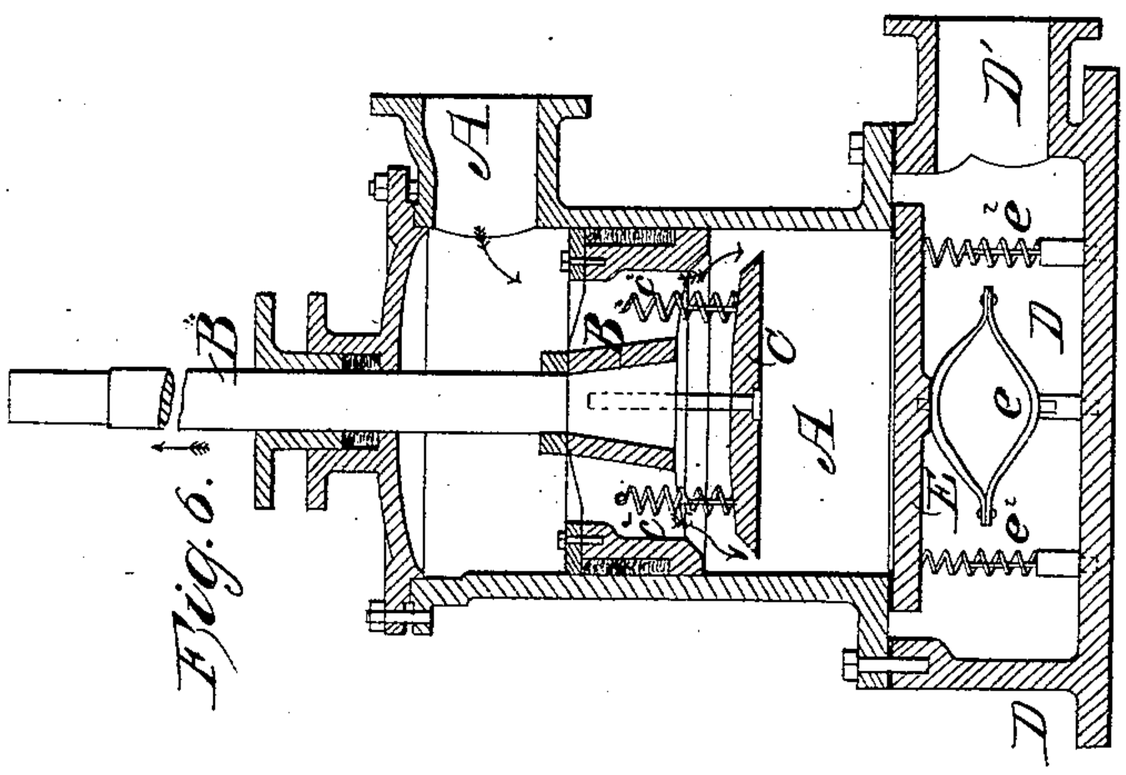

Fig. 6.

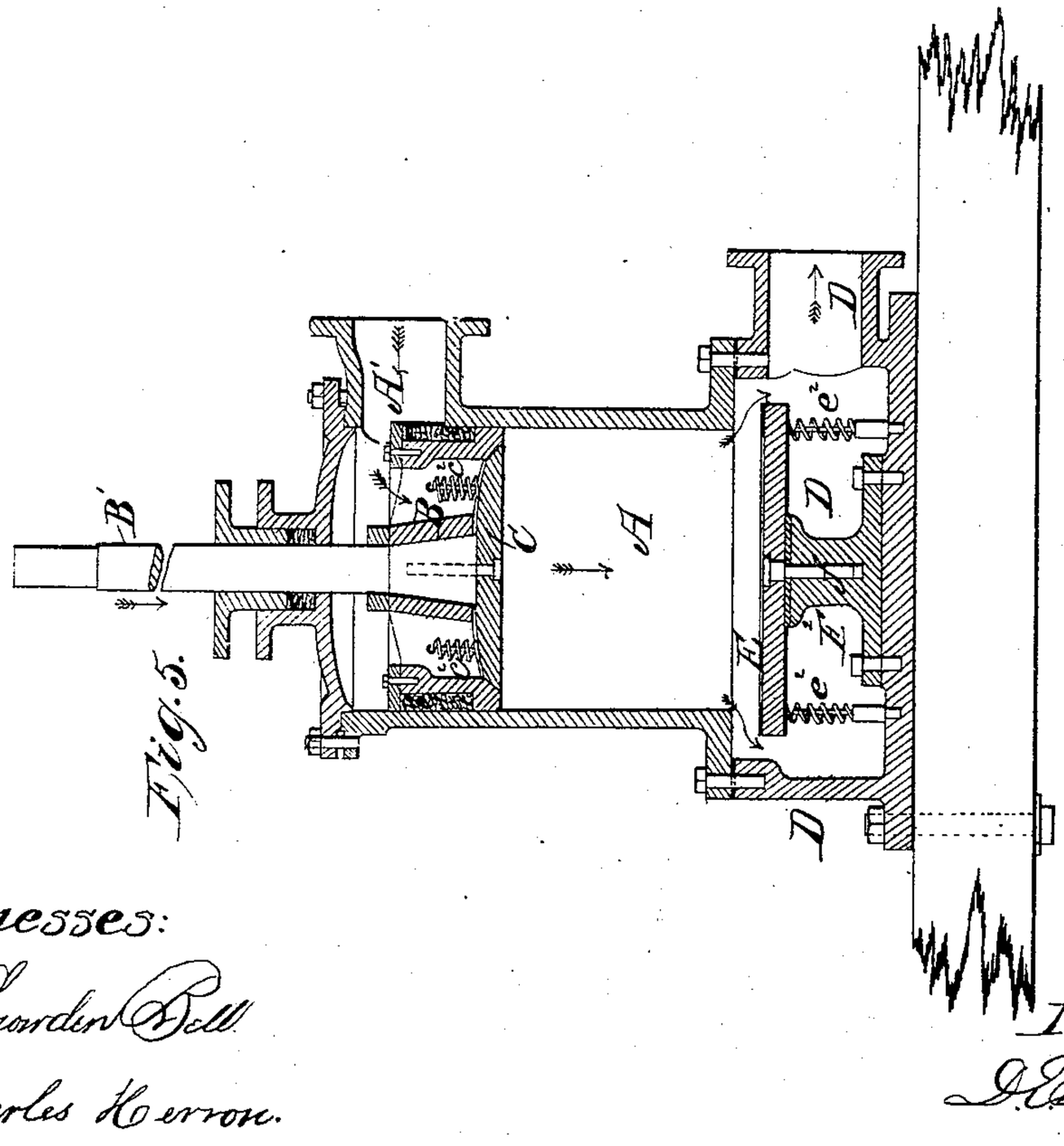

Fig. 5.

Witnesses:

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Charles Herron.

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DANIEL E. SOMES, OF WASHINGTON, DISTRICT OF COLUMBIA.

Letters Patent No. 95,613, *dated October* 5, 1869.

IMPROVEMENT IN AIR-PUMPS.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, DANIEL E. SOMES, of Washington, in the county of Washington, and District of Columbia, have invented a new and useful Improvement in Air-Pumps; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which make part of this specification, and in which—

Figure 1 represents a vertical section of an air-pump embracing my improvements;

Figure 2, a section through the cage of the delivery-valve, taken at the line *y y* of fig. 1;

Figure 3, a section through the piston, taken at the line *x x* of fig. 1;

Figure 4, a vertical section of an air-pump, showing a modification of the delivery-valve seat;

Figure 5, a similar section, in which a rest for the delivery-valve is substituted for the cage; and

Figure 6, a similar section, in which both cage and seat are dispensed with.

The object of my invention is to provide a force-pump, for compressing air or other fluids, which shall be free from the injurious effects arising from having a large amount of clearance or space between the piston and valves, as is found in most air-pumps of the ordinary construction, which causes a certain amount of air to be rarefied and compressed at every stroke without useful effect; and to this end,

My improvements consist in so constructing and arranging the receiving and delivery-valves of an air-pump as to leave no space where this injurious action can take place.

In the accompanying drawings—

A represents the cylinder or barrel of the air-pump, having a receiving-nozzle, A′, cast upon it, for attaching the pipe which conveys the air or other fluid to be forced to the pump.

The piston B is secured upon its rod by a screw and nut, or in any other suitable manner. The arrangement shown in the drawings is a simple and convenient one.

The piston-rod B′ passes out through a stuffing-box, of the ordinary construction, in the air-pump cover, and is to be provided with a cross-head and guides, for proper connection to the driving-power.

The space between the centre or eye of the piston and the outer space, which contains the packing, is cored hollow, except where interrupted by the ribs or arms which unite the two portions, thus forming a passage for the air from the nozzle A′ to the receiving-valve C. This valve opens downward, and seats in the bottom of the piston, as shown in figs. 1 and 5. It is guided by a spindle, *c*, screwed into it, and moving in a hole drilled in the end of the piston-rod.

Springs c^2 may be made use of, if desired, to hold the valve firmly to its seat when closed. They are represented as spiral in the drawings, but elliptic, volute, or any other form may be adopted, according to convenience.

Gum or leather may be placed upon the bottoms of the piston and receiving-valve, to prevent the noise caused by their striking against the delivery-valve when the pump is in operation.

The delivery-valve E is circular, and closes the bottom of the barrel, against which it seats. It is of equal or greater diameter than the piston B, so that the latter can strike and rest upon it when at the bottom of its stroke.

In the arrangement shown by figs. 1 and 4, the valve E works in a cage, E^2, within the delivery-chamber D. This cage is cylindrical in form, bored out on its inside, to fit the valve E, and turned on its outside, to make a tight joint with the chamber D.

When the valve is of greater diameter than the barrel of the pump, which is preferable to having it of the same diameter, it seats against the bottom thereof, which is faced accurately, so as to make a perfectly tight joint with it when closed. The air compressed by the piston passes, through the openings F F of the cage, into the delivery-chamber D. Springs e^2 can be added, for the purpose of keeping the valve closed tightly against its seat.

Fig. 4 shows a modification of the pump, in which the delivery-valve is of the same diameter as the cylinder. In this case, the valve is provided with a guard, *e*, to prevent it from lifting too far. The delivery-chamber and cage are connected to the barrel by suitable ground or packed joints, as may be deemed preferable; and the bottom of the chamber may form the bed-plate, for fastening the pump in position, as exemplified in fig. 5. One or more nozzles, D′, are cast upon the chamber D, to which pipes can be attached, to convey the compressed air to any desired point.

Fig. 5 shows a form of the pump in which a rest, F^2, is substituted for the cage E^2. This rest may be either cast in a piece with the chamber D, or bolted to it, as is preferred. The valve rests upon it when down, and its top should have a facing of some elastic material, to ease the shock of the valve in striking it, or the valve may rest upon the springs alone. The top of the valve should have a similar facing, either around its edge, or over its whole surface, to serve both as packing, and to prevent the piston from striking it with noise.

A hole is drilled in the rest, in which a stem, *f*, screwed into the valve, slides, to guide the valve in its movement.

Springs e^2, fastened to stems tapped into the bottom of the chamber, may be employed for the purpose of

keeping the valve to its seat, which, as in the case of the receiving-valve, may be of any suitable form; and, if it is desired, for reducing friction, the stem *f* may be dispensed with, and the springs will regulate the course of the valve with sufficient accuracy.

When the piston is at the bottom of its stroke, it rests upon the delivery-valve E, and communication between the barrel A and chamber D is closed. When it commences to be raised, the pressure in the chamber D, together with the force of the springs, causes the valve E to rise with it until it strikes its seat. (From an inspection of the parts, it will be readily seen that it is impossible for any air to find its way back between the valve and piston, or into the barrel A.) The valve E then being closed, and the piston continuing to rise, there is a tendency to form a vacuum between it and the valve E, which is counteracted by the atmospheric pressure above the piston, which forces down the valve C, and rushes in to fill the space between the piston and delivery-valve, and continues to do so until the piston has reached the top of its stroke. As soon as the piston begins its downward stroke, the pressure of the air beneath it, together with the springs c^2, closes the valve C, and the air in the barrel, being compressed, forces down the valve E, and rushes into the chamber D. This continues until the piston strikes the valve E, when another upward stroke is commenced, and the operation before described is repeated.

Having thus fully described my improved air-pump,

What I claim therein as new, and desire to secure by Letters Patent, is—

The delivery-valve E, eduction-valve C, nozzle A′, stuffing-box, and piston-rod B′, in combination with the cylinder A and piston B, substantially as described.

D. E. SOMES.

Witnesses:

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WILLIAM HUFF.