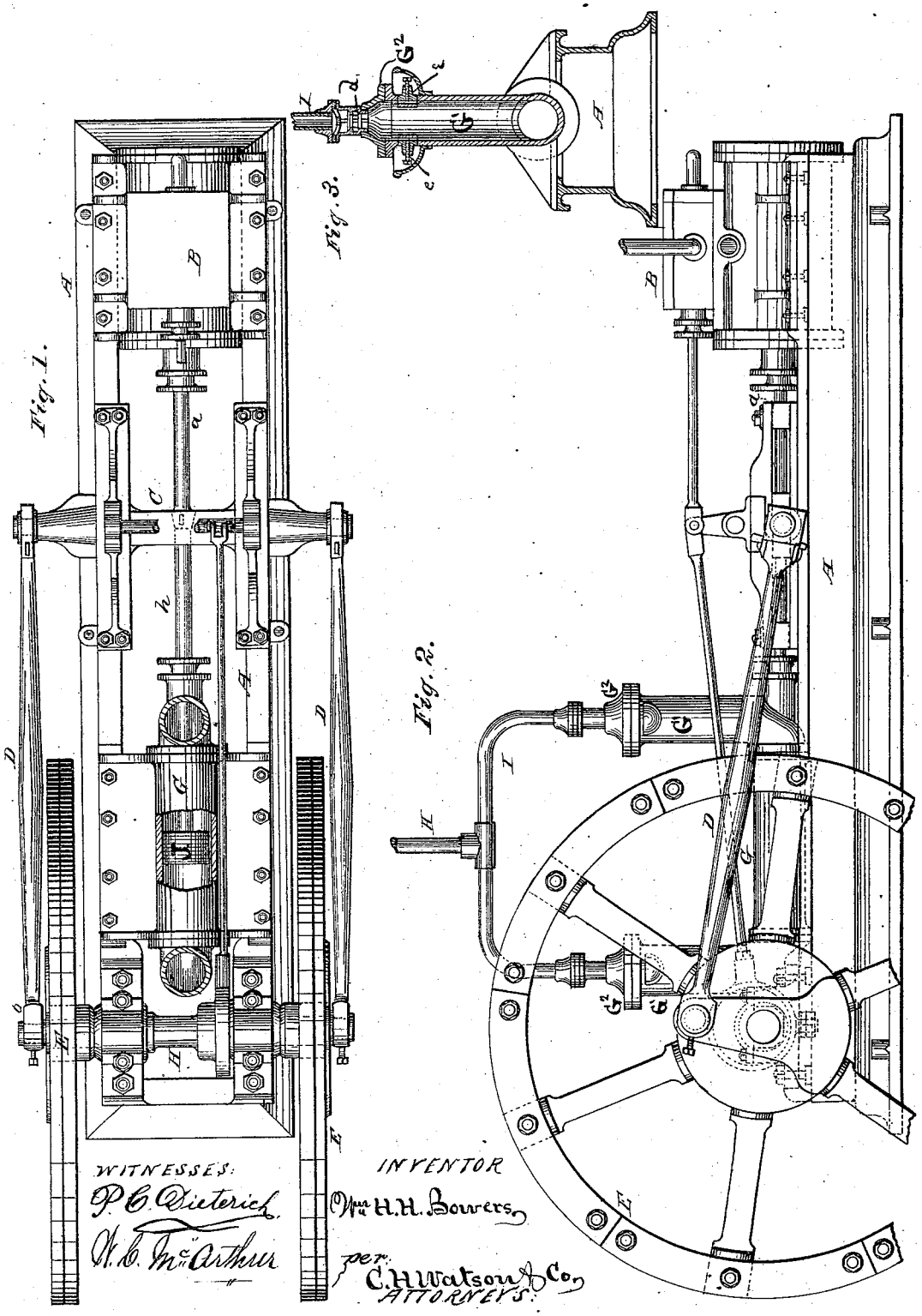
W. H. H. BOWERS.

Air-Pump.

No. 162,021. Patented April 13, 1875.



UNITED STATES PATENT OFFICE.

WILLIAM H. H. BOWERS, OF FRANKLIN, KENTUCKY.

IMPROVEMENT IN AIR-PUMPS.

Specification forming part of Letters Patent No. **162,021**, dated April 13, 1875; application filed March 4, 1875.

To all whom it may concern:

Be it known that I, WM. H. H. BOWERS, of Franklin, in the county of Simpson and State of Kentucky, have invented certain new and useful Improvements in Air-Pumps; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

The nature of my invention consists in the construction and arrangement of a direct-acting steam air-pump, as will be hereinafter more fully set forth.

In the annexed drawing, Figure 1 is a plan view of my air-pump. Fig. 2 is a side elevation of the same, and Fig. 3 is a transverse vertical section through one end of the pump-cylinder.

A represents the frame of my air-pump, at one end of which is an ordinary steam-cylinder, B, with an interior piston and piston-rod, *a*, connected to the cross-head C. From the ends of the cross-head C pitmen D D connect with crank-pins *b b* on the fly-wheels E E, which are fastened on the shafts. These parts may all be constructed in any of the known and usual ways. The air-pumping cylinder is made in three parts, the center part being a straight open-ended cylinder, G. To each end of this cylinder is attached a vertical cylinder, G^1, having its lower end formed in the shape of a curved elbow, the curve being on a true circle. The cylinders are fastened together by bolts passing through flanges formed around their ends. The upper end of each vertical cylinder G^1 is provided with a cone-shaped cap, G^2, from the top of which a pipe, I, communicates with the outlet-pipe H. In the cap G^2 is a check-valve, *d*, and in the sides of the upper end of the cylinder G^1 are suction-valves *e e*. J is the piston, operating in the cylinder G by means of the piston-rod *h*, connected to the cross-head C.

A quantity of water or other suitable fluid is poured into each cylinder G^1, sufficient to fill the same from the check-valve *d* to the connection with the main cylinder G. As the piston J moves away from the cylinder G^1, (at either stroke,) the water in said vertical cylinder follows the piston—the curvature of the elbow or goose-neck causing the water to move freely—and the valves *e e* open, filling the vacuum with air. As the piston returns, the water ahead of the piston causes pressure of the air to close the valves *e e* and open the check-valve *d*, for the air to pass into the receiver or other place where wanted through the pipes I H. If any of the fluid should pass with the air through the check-valve *d*, it is to pass into a suitable trap and be blown out when necessary, leaving the air to pass perfectly dry into the receiver.

The suction-valves are placed on the sides of the goose-neck, and near the upper end of the same, in such position that the water covers the suction-valve before the immense heat is generated sufficiently to burn or destroy the valves. Forming the top of the goose-neck in cone form prevents the force of the water on the upstroke striking or pressing the top, and more effectually enabling the air to be more completely expelled at each stroke, which would not be the case were the top of the goose-neck straight on a horizontal line, instead of being cone-shaped.

By this construction of the air-pumping cylinder several important advantages are secured.

The great obstacle to the success of air-pumps is the great heat generated by the compression of the air, and this has been attempted to be remedied by surrounding the cylinder with a water-jacket. This has proven objectionable, because it did not only not remedy the evil for which it was designed, but created another. The center of the cylinder would be comparatively cool, and metal hence contracted, and the ends would be hot and the metal expanded, so that where the piston ought to fit the closest there would be a leak, and the air would rush past the piston. The great heat generated in the cylinder would meet the piston and valves.

These difficulties are all obviated by my invention, as I remove the heat from the piston to the ends of the vertical cylinders, leaving the main cylinder perfectly cool without any exterior water-jacket. The liquid used in the

vertical cylinders remains cool, as the heat it acquires by the compression of the air at one stroke of the piston is immediately reduced by the cold air drawn in at the next stroke. By forming the upright portions of the cylinder on a circle there is no resistance to the fluid against the ends of the lower cylinder, said ends being in circular form, and thereby the pounding—as the piston is at work—at the ends of the cylinders is overcome.

I am aware that a main cylinder with vertical cylinders at each end is not new, and I do not, therefore, broadly claim such device; but

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

The main cylinder G, provided at each end with cylinders G^1, curved or turned upward on a true circle, and having cone-shaped top G^2, in combination with valves *e* and *d*, pipes I H, and plunger J, all constructed as and for the purpose set forth.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

WILLIAM H. H. BOWERS.

Witnesses:
C. H. WATSON,
H. C. SCOTT.