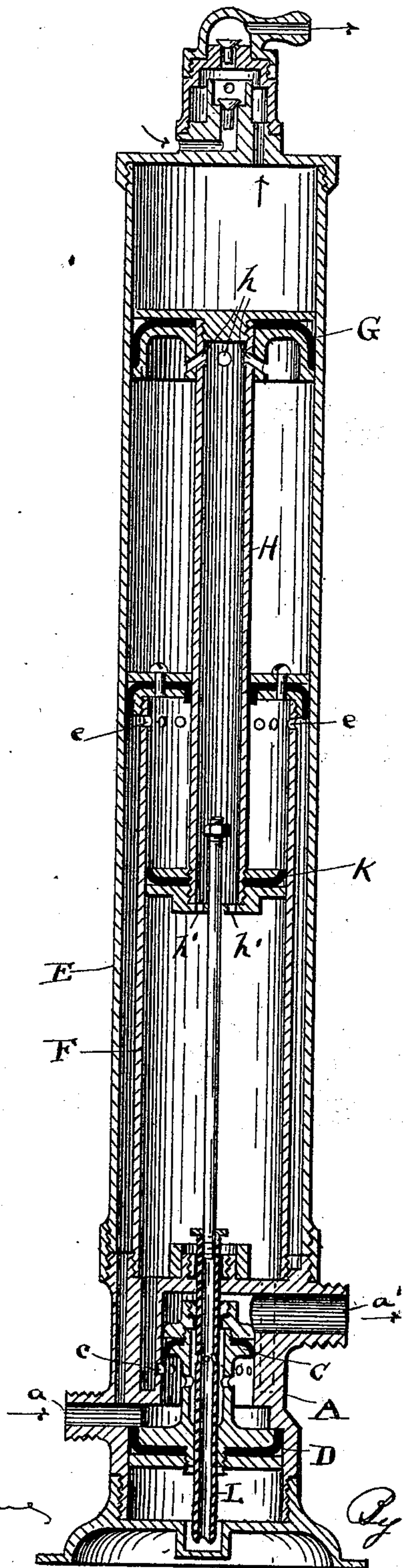


(No Model.)

E. H. WEATHERHEAD.
HYDRAULIC AIR PUMP.

No. 512,776

Patented Jan. 16, 1894.



ATTEST

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EDWARD H. WEATHERHEAD, OF CLEVELAND, OHIO, ASSIGNOR TO THE
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HYDRAULIC AIR-PUMP.

SPECIFICATION forming part of Letters Patent No. 512,776, dated January 16, 1894.

Application filed June 17, 1892. Serial No. 437,059. (No model.)

To all whom it may concern:

Be it known that I, EDWARD H. WEATHERHEAD, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Hydraulic Air-Pumps; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to hydraulic air pumps, and is an improvement in the style or variety of pump shown and claimed in my applications for Letters-Patent, filed, respectively, July 23, 1890, Serial No. 359,667, and October 22, 1890, Serial No. 368,938.

The invention consists in the construction and combination of parts substantially as shown and described and particularly pointed out in the claims.

The accompanying drawing shows a central vertical sectional elevation of my improved form of pump.

A represents the base of the pump, provided with the usual water passages, and water inlet *a*, and outlet or exhaust, *a'*, and a main reciprocating valve, C, and a controlling piston D therefor.

Secured to the base A is the main or outer cylinder E, and the inner cylinder F, having about half the length of the main cylinder, and closed at its top against the passages of water by suitably packing the said top against the inside of the outer cylinder. These two cylinders are so arranged with respect to one another that a water space is formed between them, and the inner cylinder is provided with a series of perforations *e* at its top through which water enters into or passes from the said inner cylinder. The water space between these cylinders is in open communication with the source of supply, so that a constant head of water is maintained in this water space, and in the space above the returning piston within said inner cylinder.

G represents the main piston in the upper portion of the outer or main cylinder, and divides the said cylinder into air and water chambers, respectively, on its opposite sides. The upper portion of said cylinder or the

head thereof, has suitable valved air passages, so that air is admitted into the said air chamber through one passage, and expelled through another, as is now well known in this art. 55

The main piston G has rigidly affixed to it a tubular or hollow piston rod H, which has the returning cylinder K, affixed to its lower end. The two pistons reciprocate together, and the connecting tube or pipe H passes through the top of the inner cylinder and is packed to prevent the flow of water about the same. Inlet and outlet openings, *h*, are provided at the top of the said tube or pipe H beneath the main piston G, and other openings, *h'*, are formed in the bottom of the said tube or pipe H communicating with the space beneath the returning piston. By this construction a passage-way for the water is formed from the water space in the inner cylinder beneath the piston K to the water chamber beneath the main piston G. 60 65 70

As before stated, the pressure is constant above the piston K in the returning cylinder, and is on or off in the main water chamber and the chamber beneath the returning piston in the inner cylinder, according to the position of the main valve C, and according as the pump is receiving or discharging water. If the parts be positioned as shown in the drawing, the pump is receiving water, and pressure is exerted against the bottom of the piston K and in the main water chamber upward against the piston G. In all such cases the pressure above and below on the piston K is balanced, so that the full area of the piston G is utilized to force the said piston up and compress the air in the air chamber above it. When the main valve C is reversed so that the discharge passages *c* are open from within the inner cylinder beneath piston K and from the main water chamber through the piston rod H the upward pressure upon the said pistons of course is withdrawn, and the downward pressure of the water on the piston K forces said pistons down, and the dead water in the pump is expelled. This action continues until the position of the main valve is reversed, when live water again is admitted into the pump and the former action is repeated. In this case I employ a continuous cylinder E within which are comprised all the several 75 80 85 90 95 100

chambers hereinbefore referred to. This cylinder may of course be made of one or more sections, but there is no reason why it should not be made of a single piece, and this is the better construction. The main valve C is actuated by means of the piston D when it is in the position shown in the drawing, the greater area of said piston offsetting the area of the said valve and the fluid pressure driving the said parts down together, as is now well-known in this art, and when this occurs the water discharges through the auxiliary valve from beneath said piston. To drive the said piston and valve up, water enters through the said auxiliary valve through the holes in the main casing and the holes in the neck of the valve and piston and, passing beneath the piston D, raises it. This operation is old in the art.

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

1. In a hydraulic air pump, the base provided with valve mechanism to control the inlet and the exhaust of the pressure fluid and a pair of concentric cylinders fixed to said base and the outer cylinder extending above the inner cylinder, and the inner cylinder water tight about its top against the outer

cylinder, in combination with a main piston in the upper portion of the outer cylinder and dividing the same into air and water chambers, and a returning piston in the inner cylinder and a hollow tube or pipe connecting said pistons through the top of the inner cylinder and having water passages beneath each of the said pistons, substantially as described. 30 35

2. In a hydraulic air pump, a base provided with inlet and outlet passages and a controlling valve between said passages, an outer cylinder and an inner cylinder extending above said base and having a water space between them open to the source of supply, and open into the top of the inner cylinder, in combination with a piston chamber and a piston in said chamber dividing said chamber into air and water chambers, a returning piston in the inner cylinder and a piston rod having a water passage longitudinally through it connecting said pistons and moving in unison therewith, substantially as described. 40 45 50

Witness my hand to the following specification.

EDWARD H. WEATHERHEAD.

Witnesses:

H. T. FISHER,

NELLIE L. McLANE.