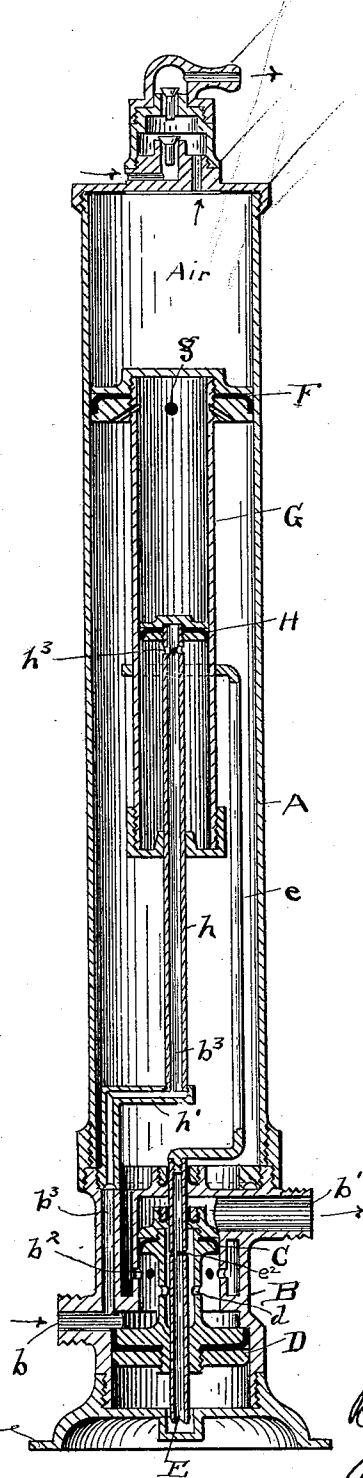


(No Model.)

E. H. WEATHERHEAD.
HYDRAULIC AIR PUMP.

No. 512,419.

Patented Jan. 9, 1894.



ATTEST.

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HYDRAULIC AIR-PUMP. -

SPECIFICATION forming part of Letters Patent No. 512,419, dated January 9, 1894.

Application filed June 17, 1892. Serial No. 437,057. (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, of the type or variety described and claimed in my application for Letters Patent, filed July 23, 1890, Serial No. 359,667.

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

The single figure in the drawing represents a central vertical sectional elevation of my improved pump.

A is the main casing or cylinder, and B is a base for said cylinder, and provided with a water inlet passage *b* and a water outlet passage *b'*. In this base is the main valve C, located between the water inlet and the water outlet, and adapted to control the flow of water into the main cylinder through the said base, and out of the main cylinder into the outlet, according as the said valve occupies one position or another with respect to the lateral holes or openings *b*².

D is a valve controlling piston rigid with said valve, and E is an auxiliary tubular valve which extends through the main valve and the controlling piston thereof.

The main cylinder is divided into water and air chambers respectively by the main piston or diaphragm F, adapted to reciprocate within said cylinder subject to the pressure of the water therein, as hereinafter fully described. The said piston has secured rigidly thereto a cylinder G, suspended from said piston in the said cylinder, and closed against the passage of fluid throughout its entire length except at its top, where there is a water passage or passages *g*, through which water enters the said inner cylinder from the main cylinder and escapes therefrom. The said inner cylinder is rigid with the main piston, and therefore trav-

els up and down with it. Operating in this inner cylinder is the hydraulic returning piston H, supported upon a tubular rod or pipe *h*, extending centrally through the bottom of the said inner returning cylinder near to the bottom of the outer cylinder, where an elbow connection *h'* is provided and which is rigidly fixed to the base B at one side thereof. A fluid channel or passage-way *b*³, opens into the main inlet *b* of the pump, and leads through the elbow *h'* and the piston rod or tube *h* into the returning cylinder G, where connection is made with the returning piston H, as hereinbefore described. Small openings or holes *h*³ are formed in the said pipe or rod *h* just beneath the piston H, and through the passage-way thus provided, from the main inlet by way of the elbow *h'* and the tube *h*, a constant head of water is maintained in the returning cylinder beneath the piston H. The pressure into said returning cylinder beneath piston H therein is always equal to the pressure in the source of supply, whatever that may be. Above the piston H in the returning cylinder the pressure will at all times be equal to the pressure in the main cylinder, and when the valve E is reversed and the water in the main cylinder is discharged, so that the main piston and the returning cylinder can be carried down, the water above the returning piston is discharged through the passage *g* and the said main piston and its returning cylinder are carried down by reason of the pressure in the lower portion of the returning cylinder against the piston H.

In case the flow of water is on within the main cylinder so as to raise the main piston F, the pressure upon the piston H is balanced, and the main piston therefore is free to be carried up under the pressure of the fluid beneath, and the air in the upper portion thereof is compressed and forced out under pressure. The auxiliary valve E is operated by means of the stem *e* connected therewith, and looped around the returning cylinder. When the said cylinder rises a sufficient distance it carries the said valve stem and valve up until the openings *e*² in the auxiliary valve are carried above the main valve C, when immediately the water beneath the controlling piston D is discharged and the main valve is

carried down beneath the openings b^2 , when the inflow of water is cut off and the exhaust is established. Then the exhaust from the main cylinder continues until the main piston and the returning cylinder come down so that the main piston strikes the loop or top of the valve stem e , reverses the position of the auxiliary valve, and in consequence the position of the main valve C, so that water pressure is again restored to the main cylinder beneath the main piston and all parts assume the same relative position as shown in the drawing. In all this operation the valve stem h and the returning piston H of course are stationary, and the returning cylinder moves up and down in respect to the said piston H. Valved air inlets and outlets are provided in the upper end of the main cylinder. The auxiliary valve E has small holes e^2 about midway between its ends through which the water flows into the exhaust passage from beneath the piston D when the said auxiliary valve is raised so that said holes come above the main valve C. When the parts are in the relation shown in the drawing, the passage way is open for water to enter beneath the piston D, the water coming in through the holes— b^2 —and the holes d in the neck which connect the piston D and the valve C.

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

1. In a hydraulic air pump of the kind described, the main cylinder, the main piston therein having a returning cylinder rigidly affixed thereto, a stationary hydraulic returning piston in said returning cylinder and the means for applying the motive fluid, substantially as described.

2. The main cylinder and valved water passages leading into and out of the same, the main piston and the hydraulic returning cylinder affixed to said piston, the returning piston and a stationary support therefor provided with a fluid passage from the source of water supply, and openings to admit water into the returning cylinder above and below the piston therein substantially as described.

3. The main cylinder and the valved inlet and outlet passages at its bottom, and valved air inlets and outlets at its top, in combination with a main piston in said cylinder and the returning cylinder suspended therefrom, a piston in said returning cylinder supported on a fixed tube or pipe open to the main source of water supply, and an auxiliary valve arranged to be operated by the said returning cylinder, substantially as described.

EDWARD H. WEATHERHEAD.

Witnesses:

H. T. FISHER,
NELLIE L. McLANE.