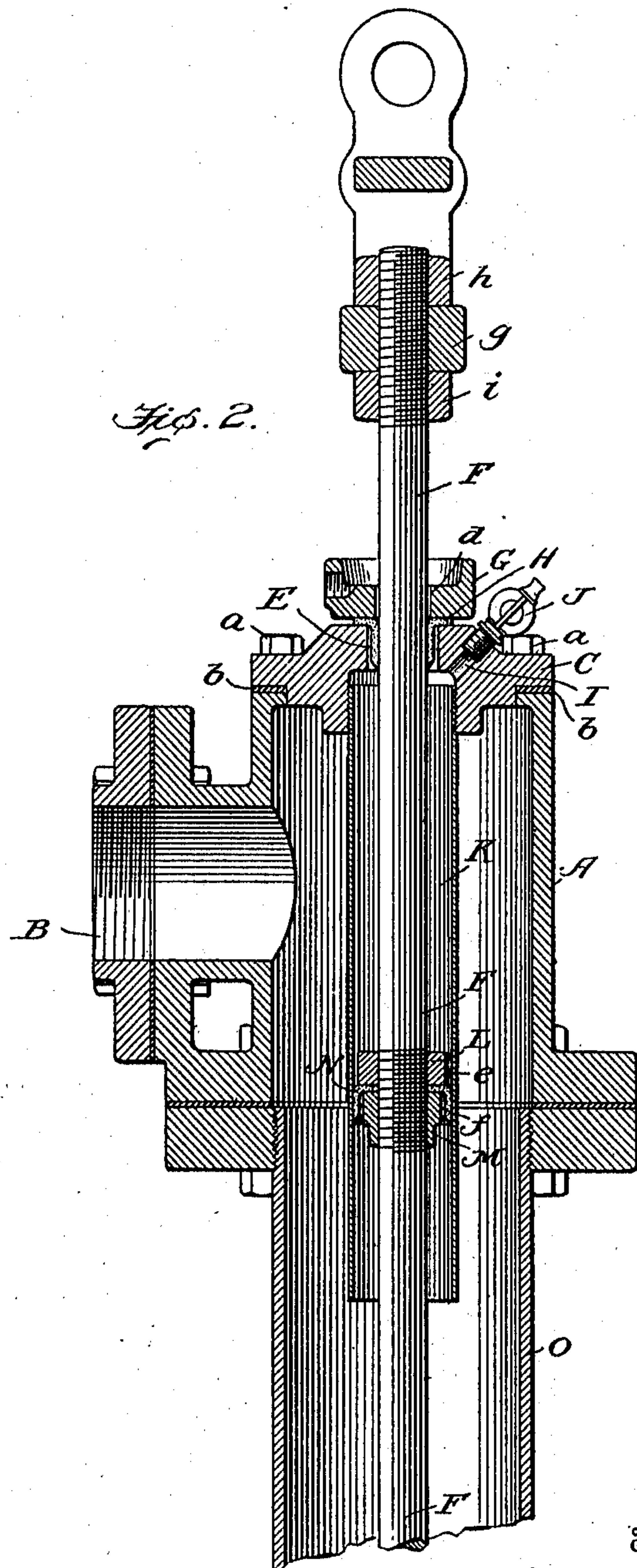
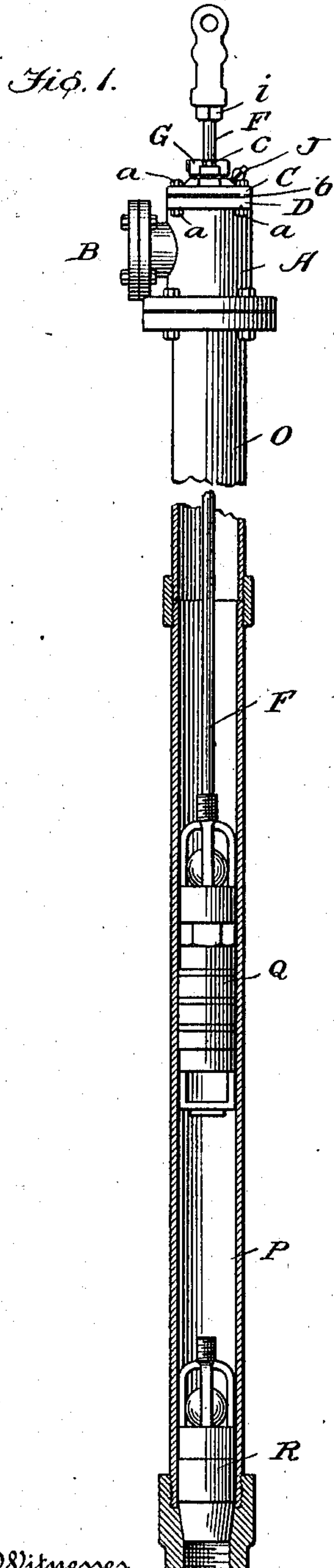


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HYDROPNEUMATIC PUMP.
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HYDROPNEUMATIC PUMP.

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To all whom it may concern:

Be it known that I, JESSE B. GARBER, a citizen of the United States, residing at Salem, in the county of Columbiana and State of Ohio, have invented certain new and useful Improvements in Hydropneumatic Pumps; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My present invention relates to pumps, but more particularly to hydropneumatic pumps, and to certain characteristic features contained within and forming part of the pump-head or working-head, which in the present illustrations is represented as of the deep well type.

The invention has for an object structural simplification and a corresponding reduction in cost of manufacture; also an increase in general efficiency including means for regulating to a nicety the proportion of air and water pumped under varying conditions and requirements.

The invention will be hereinafter particularly described and pointed out in the claims following.

In the accompanying drawings, which form part of this application and whereon corresponding reference letters indicate like parts in both views: Figure 1, is a side elevation of the improved pump head and discharge connection, together with a pumping cylinder, and its equipment, also a fragment of an intervening riser pipe, said cylinder appearing in longitudinal section, and, Fig. 2, is a longitudinal central section through the pump head and its discharge connection.

Reference being had to the drawings and letters thereon A indicates the pump head proper, preferably of cylindrical form, B its discharge connection, and C a flanged top cover therefor. This top C is fastened to a flange D upon the upper end of head A by means of bolts *a*, there being a suitable packing *b* interposed between said flanges. Opening through the said top C is a central passage E for a plunger rod F which enters through a stuffing box gland G, secured in position by screws *c*, and is provided with a liberal clearance on all sides as at *d*. Clamped between the under surface of gland G and the upper surface of top C is the annular flange of a flexible hat-shaped packing

H, serving also as a check-valve and having a diameter slightly less than that of the said passage E into which it projects as shown by Fig. 2.

To one side of the passage E, top cover C is perforated by an air vent or outlet I guarded by an air discharge cock J for purposes that will later appear; while into the under side of said top cover is tightly screwed an air cylinder K, preferably of brass, open at its lower end and projecting through the longitudinal center of the pump head A.

At a suitable position upon the combined plunger and pump rod F is threaded a piston L and a follower M, between which and the inner walls of cylinder K there is provided liberal clearance spaces as shown at *e*, *f*, respectively, and between the abutting surfaces of which there is firmly secured a flexible crimp leather plunger packing N as clearly shown by Fig. 2. Continuing downward through a connecting pipe O of suitable length, the said rod F projects into a pumping cylinder P, and is provided with any approved form of valved piston such as Q, the cylinder P being also equipped with a suitable foot valve R as shown by Fig. 1. The upper end of rod F is fitted with any approved form of coupling for connection with a cross-head (not shown), or any other power transmitting or actuating means; the present illustrations showing a bifurcated structure having a horizontal base *g* through which the said rod is threaded, and upon opposite sides whereof are employed a nut *h* and jam nut *i* as an adjustable fastening means.

This being a description of my invention in its preferred form of construction, it will be presumed that the pump stands primed, or full of water, to the level of the discharge connection B, with the air cylinder K partially submerged. A downstroke of rod F now causes the crimp-leather plunger-packing N to expand circumferentially into close engagement with the inner walls of the air cylinder K, aided by the water pressure in pump head A. The natural tendency of such downstroke is to produce a partial vacuum in cylinder K, which is instantly counteracted by an inrush of air through clearance space *d*, of gland G, past the annular packing H which is consequently expanded or flexed outwardly for the time

being. During the reverse or upward movement of rod F the action of packings H and N is reversed, that lettered H automatically contracting or closing to trap the air previously drawn into cylinder K and that lettered N also contracting to permit passage of the air thus trapped into the lower end of said cylinder K from whence it is expelled by the succeeding downstroke to mingle and be discharged with water simultaneously pumped into a suitable air tight pressure and supply reservoir (not shown) from whence the water is delivered to various points of utilization by the air pressure thus supplied and augmented by each stroke of the pump. Under varying conditions and requirements of the system it frequently becomes necessary to vary the proportion of air and water thus pumped, in which event recourse is had to the air discharge cock J which may be readily opened more or less to permit the escape of more or less air from cylinder K during each upstroke; or if it be desired to pump water only this cock can be opened fully, in which event free communication is established between the interior of cylinder K and the outside atmosphere.

Having thus described my invention, what I now claim and desire to secure by Letters Patent is:

1. A hydropneumatic pump head having a discharge passage therethrough, in combination with an air pumping cylinder within said head depending from the cover thereof, a plunger in said cylinder, a plunger packing adapted to expand and contract alternately with each stroke of the plunger, a

check valve for admitting air to said cylinder above the plunger, and a discharge cock also above said plunger for opening said cylinder to the atmosphere.

2. A hydropneumatic pump head having a discharge passage therethrough, in combination with an air pumping cylinder within said head depending from the cover thereof, a plunger in said cylinder, a plunger packing adapted to expand and contract alternately with each stroke of the plunger, an annular check valve adapted to expand circumferentially for admitting air to said cylinder above the plunger, and a discharge cock also above said plunger for opening said cylinder to the atmosphere.

3. A hydropneumatic pump head having a discharge passage therethrough, in combination with an air pumping cylinder located centrally within said head and depending from the cover thereof, a plunger rod entering said cylinder from above, a plunger packing within said cylinder adapted to expand and contract alternately with each stroke of the plunger rod, an annular packing for the entrance of said plunger rod serving also as a check valve, a stuffing-box gland for securing said annular packing in position, and a discharge cock at the upper end of the pump head for opening the air pumping cylinder to the atmosphere.

In testimony whereof I affix my signature, in presence of two subscribing witnesses.

JESSE B. GARBER.

Witnesses:

E. J. PEEK,
W. H. BUTLER.