

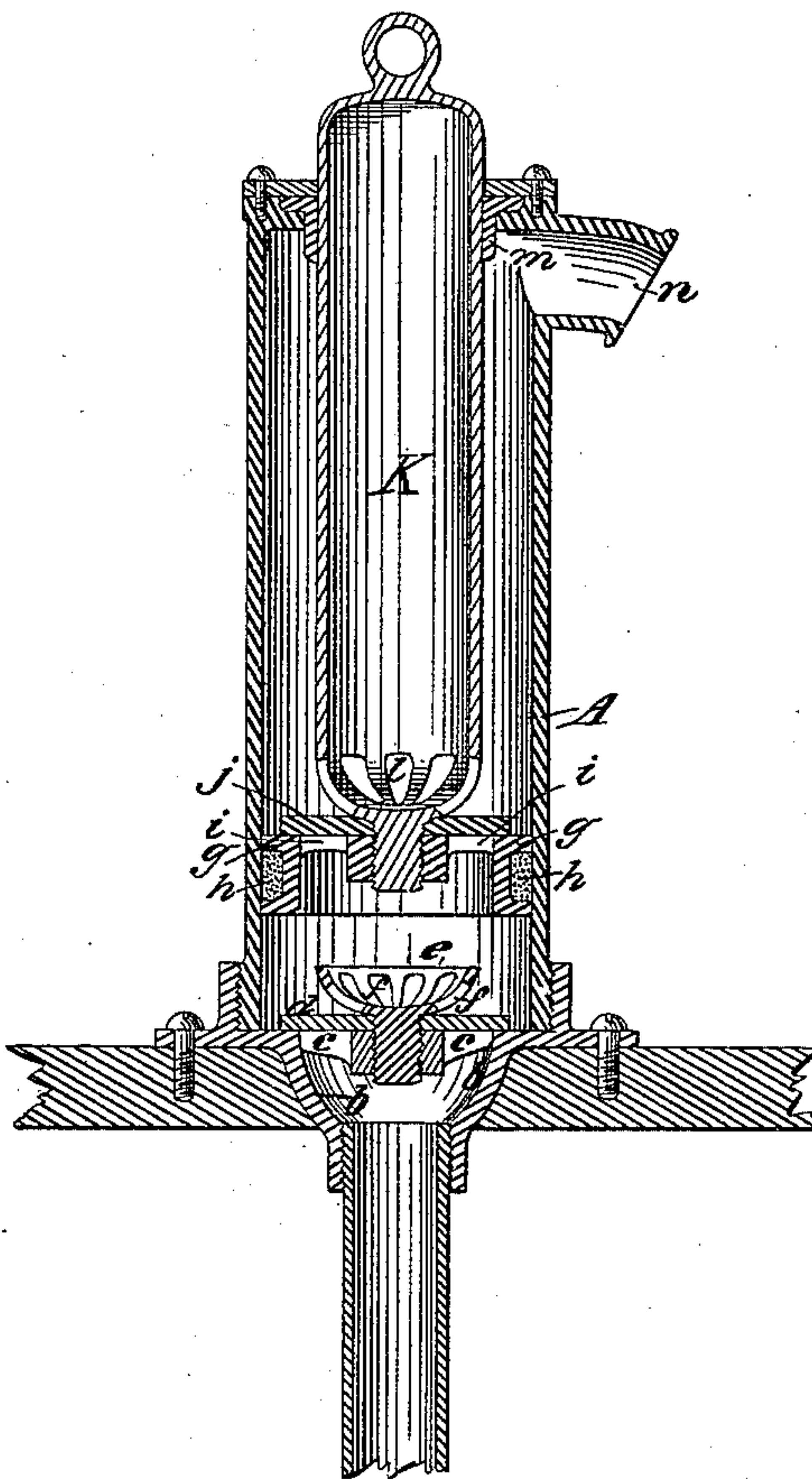
(No Model.)

R. HARDIE.

PUMP.

No. 297,076.

Patented Apr. 15, 1884.



Witnesses:
Ed. L. Moran
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UNITED STATES PATENT OFFICE.

ROBERT HARDIE, OF HOBOKEN, NEW JERSEY, ASSIGNOR OF ONE-HALF TO
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PUMP.

SPECIFICATION forming part of Letters Patent No. 297,076, dated April 15, 1884.

Application filed April 16, 1883. (No model.)

To all whom it may concern:

Be it known that I, ROBERT HARDIE, of Hoboken, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Pumps, of which the following is a specification.

My invention is more especially adapted for pumps for ships and other vessels.

The invention relates to pumps having but two valves, and in which the plunger or rod to which the piston or bucket is attached is made hollow, and provided with openings in its lower end, so as to serve as an air-chamber, whereby the pump is made to have a double delivery—that is to say, to deliver water during the stroke of the pump in both directions—and the delivery is made as nearly as possible continuous.

The invention consists in novel details of construction and combinations of parts hereinafter described, and pointed out in the claim.

The accompanying drawing represents a vertical section of an apparatus embodying my improvement.

A is the cylinder or barrel of the pump. *b* is the seat for the foot-valve, which extends across the bottom of the cylinder or barrel, and which may be formed of the same casting as the cylinder-bottom of the casing A. This valve-seat *b* is provided with a circular series of holes or openings, *c*, to allow the water to pass through.

d is the foot-valve, which is a disk of leather or soft rubber; and *e* is a valve-guard which passes through the valve *d*, and, screwing into the valve-seat *b*, serves to keep the said valve in place and to protect the same. This guard is also furnished with water-openings *f*.

g is the piston or bucket, which may be packed in any suitable manner with any packing material, as *h*. The piston or bucket *g* has in it a circular series of holes or openings, *i*, similar to those in the valve-seat *b*, for the passage of the water.

j is the delivery-valve, of leather or soft rubber, which is held in place on the piston *g* and over the openings *i* by the lower end of the plunger or piston rod *K*, which is secured

to the piston in any appropriate manner—as, for instance, by screwing into the same. The lower end of the rod or plunger *K* is rounded or hemispherical in shape, so as to form a guard for the flexible delivery-valve *j*. As here shown, the rod or plunger *K* has at its lower end an integral stud or projection, which is screw-threaded, and on which the piston or bucket *g* is screwed, the delivery-valve *j* being clamped between said bucket or piston and the end of the rod or plunger. This plunger or piston rod is made in the form of a hollow cylinder, closed at its top, and having its bottom provided with openings *l* for the admission of air and water, thus forming an air-chamber.

The casing or pump-cylinder A has an ordinary discharge-spout, *n*, closed at its top, except where the hollow piston-rod *K* passes through it, and where it is fitted with a neck-leather, *m*, or other packing. The area of the transverse section of the plunger *K* should be about one-half of the area of the transverse section of the pump-cylinder A, in order that the pump may deliver equal quantities of water during the up and down strokes. In the upward stroke of the piston the water fills the lower part of the cylinder below the piston or bucket above the foot-valve *d*. In the downward stroke of the piston the water is forced up through the bucket-valve or delivery-valve into the annular space between the cylinder A and the hollow plunger *K*; and as the area of the transverse section of the plunger is so proportioned that the plunger will displace about half the contents of the cylinder, only half of the water in the cylinder is expelled during the upward stroke, the other half being expelled during the downward stroke. The pump thus, though taking in all the water in the upward stroke, discharges half of it during each stroke in either direction.

The hollow plunger *K* may be worked by any suitable means.

I do not claim, broadly, a pump having a hollow rod or plunger to which the piston or bucket is attached, and which serves as an air-chamber.

Having now described my invention, what I

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

The combination, with the cylinder A, provided with a foot-valve, of the hollow rod or plunger having a rounded lower end formed integral with it, and provided with openings 7, so that the rod or plunger may serve as an air-chamber, and also provided with an integral screw-threaded stud or projection, the
10 piston or bucket *g*, screwed upon said stud or

projection, and the flexible delivery-valve *j*, clamped between the piston or bucket and the integral end of said rod or plunger the end of said rod or plunger forming a guard for said delivery-valve, substantially as described. 15

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