H. B. Leach,

Rotary Pump.

No. 54,565. Patented May 8, 1866.

Fig. 1.

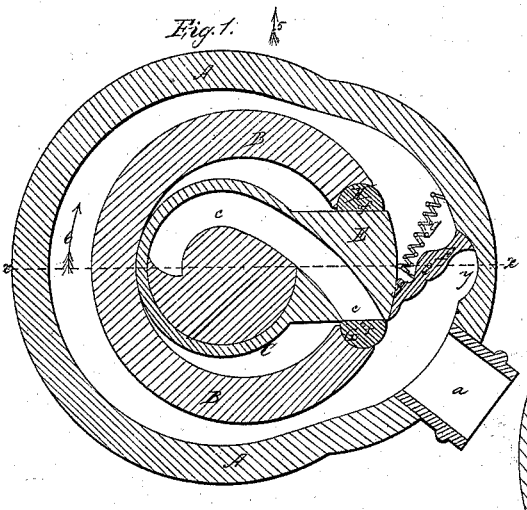


Fig. 2.

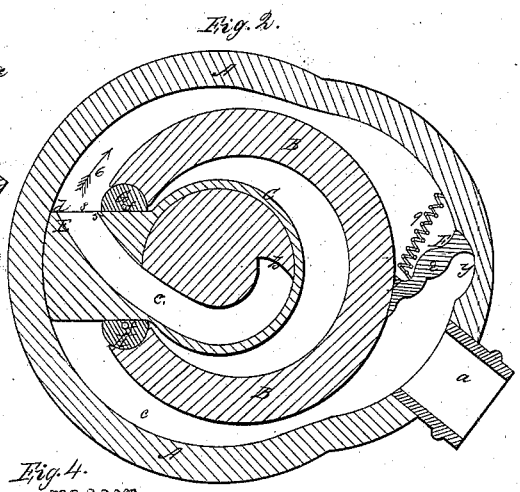


Fig. 3

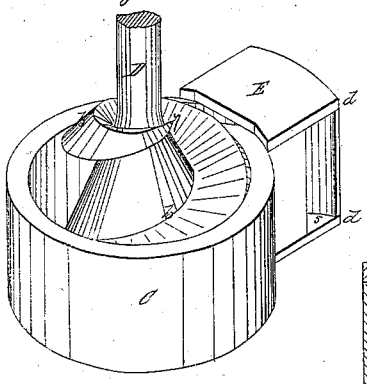
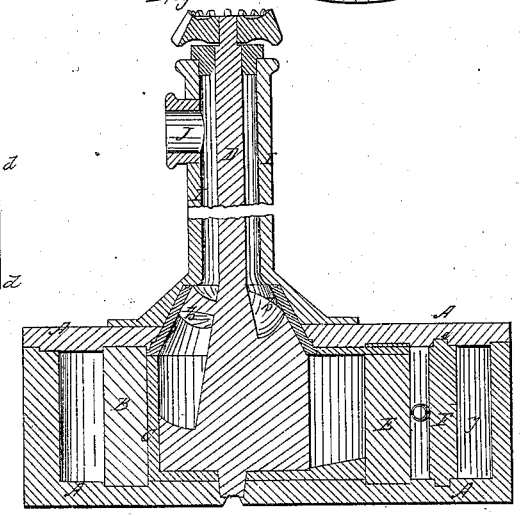


Fig. 4.



Witnesses.
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HENRY BEDELL LEACH, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN ROTARY PUMPS.

Specification forming part of Letters Patent No. **54,565**, dated May 8, 1866.

To all whom it may concern:

Be it known that I, HENRY BEDELL LEACH, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Rotary Pumps, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a horizontal section through my improved pump, with the parts represented in their respective positions when the orifice to the screw-cylinder is closed. Fig. 2 is a horizontal section of the same when the orifice to the screw-cylinder is open. Fig. 3 is a view of the screw-cylinder with its scoop, by which the water is elevated. Fig. 4 is a vertical section taken in the plane of the line *x x* of Fig. 1, and looking in the direction of the arrow 5.

In that class of rotary pumps where an eccentric drum is used and the outer surface of the drum comes in contact with the inner periphery of the cylinder to produce a partial vacuum, into which the water flows, the entrance of gravel or other foreign substances retards the action of the pump and frequently chokes it, while the surfaces in contact are rapidly worn away and require to be removed for repairs.

The object of my invention is to overcome the above-mentioned difficulties; and consists in a screw-cylinder terminating at its outer end in a scoop and revolving within a drum which is eccentric to and carried by it, the outer surface of the scoop coming in contact with the inner surface of the shell or casing, which is provided with a suitable abutment, snugly against which the drum revolves, by which construction the revolution of the scoop produces a partial vacuum behind it, into which the water from the inlet flows, while the water in front of the scoop is forced by it against the abutment and wedged up the screw-cylinder through the discharge-pipe to the outlet, whereby a large volume of water is gradually ejected with the expenditure of but little power.

To enable others skilled in the art to understand and use my invention, I will now proceed to describe the manner in which I have carried it out.

In the said drawings, A is a box or casing snugly inclosed on all sides excepting at the inlet *a*. Within the bottom of this casing A is formed a circular groove, eccentric to the larger portion of the inner periphery of the casing.

B is a circular drum, which is carried around in the groove (in the direction of the arrow 6) by the revolution of the cylinder C, which is eccentric to it, and which surrounds a screw or spiral incline, *b*, wound around the shaft D, which revolves in suitable bearings in the casing A.

Projecting outside the screw-cylinder C is a scoop, E, which together form a screw-passage, *c*, inclined from its inlet 5 to the top 7 of the screw, the height of the passage *c* at 5 being nearly equal to that of the drum B, while the width of the passage *c* at 5 is equal to that of the water-space between the drum B and the inner surface of the casing A at a point, 8, where the scoop E is open, (see Fig. 2,) and this passage is gradually reduced from its inlet 5 to its outlet 7, for the purpose of insuring the gradual delivery of the water, instead of the ordinary way of abruptly forcing it through an irregular narrow orifice. In the event of dirt, sand, or other foreign matter entering the casing A, it is taken up by the scoop E and discharged without the liability of obstructing the pump.

F is an abutment pivoted at *e*, and so balanced that while one of its sides presses constantly against a recess, *y*, in the interior of the casing its opposite side bears against the surface of the drum or scoop as they, while revolving, pass under or inside of it, the under or inside of the abutment being of the same curvature as that of the drum and scoop, so as to be self-compensating when worn, and thereby forming a water-tight joint at all times between the surfaces in contact. A spiral spring, 9, or weight may be used to keep the abutment F in place before the water is admitted, after which the position of the abutment does not depend upon the action of the spring or weight, but upon the action of the water, which keeps it perfectly balanced.

G H are segments nearly semicircular in section and pivoted at *f*, so as to allow of their vibrating freely and conforming to the sides of the scoop during its revolution, and preventing any water escaping between them. Immediately after the passage of the point *d* of the

scoop E beyond the point *g* of the abutment F the scoop revolves in the arc of a circle whose curvature coincides with that of the outer circumference of the drum, and the aperture *c* is closed by the segment G.

I is a pipe surrounding the shaft D, and through which the water is discharged at its outlet J.

A partial vacuum may also be produced within the drum B and used by conducting a pipe to the proper point. A circular groove may be formed in the inner surface of the drum, or in the outer surface of the screw-cylinder, to prevent the compression of air, which would otherwise take place between the drum and cylinder if no water occupied said space.

My improved pump is particularly adapted for ships, as it can be worked slowly by hand if desired, and it may be submerged or above the water, with a suction-hose attached when used as a bilge-pump. The resistance occasioned by centrifugal force is more than counterbalanced by the increased power derived from the screw, the greatest pressure being at the center, where the power is applied.

Instead of the shaft of the pump being placed upright, as herein shown and described, it may be placed horizontally and the power applied at either end of the shaft, suitable bearings being provided therefor, and it may rest in a step at the bottom or be supported by a suspension-box at the top, as the case may require.

Instead of the employment of but one spiral scoop E, I sometimes prefer to use two, in which case their lower or inner ends would be placed diametrically opposite, while their upper or outer ends would unite; and I do not confine myself to the particular abutment herein described, as it is evident that any other suitable abutment may be employed without departing from the spirit of my invention.

A pump constructed as above described is both simple and durable, and may be conveniently applied to various positions where other pumps cannot be used, and is capable of discharging a large volume of water by the application of comparatively little power.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. One or more inclined spiral scoops, E, revolving in a shell or casing, A, substantially in the manner and for the purpose set forth.

2. The self-compensating balanced abutment F, the curvature of one of its surfaces corresponding to and coming in contact with the outer surface of the scoop E and drum B, while the curvature of its opposite surface coincides and comes in contact with the surface of the recess *y*, provided for it in the casing A, for the purpose set forth.

3. The abutment F, or its equivalent, when used in combination with one or more inclined spiral scoops, E, for producing behind the scoop or scoops a vacuum or partial vacuum.

4. Gradually decreasing the size of the spiral waterway or ways, substantially as and for the purpose set forth.

5. Revolving the drum B by the revolution of the screw-cylinder C and scoop E, for the purpose set forth.

6. The segments G H, as arranged between the scoop E and drum B.

7. A rotary pump consisting, essentially, of one or more spiral inclined scoops, E, revolving drum B, segments G H, abutment F, and shell or casing A, substantially as described.

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Witnesses:
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