No. 630,932. Patented Aug. 15, 1899.

A. ROCK.

ROTARY PUMP.

(Application filed Apr. 27, 1899.)

(No Model.)

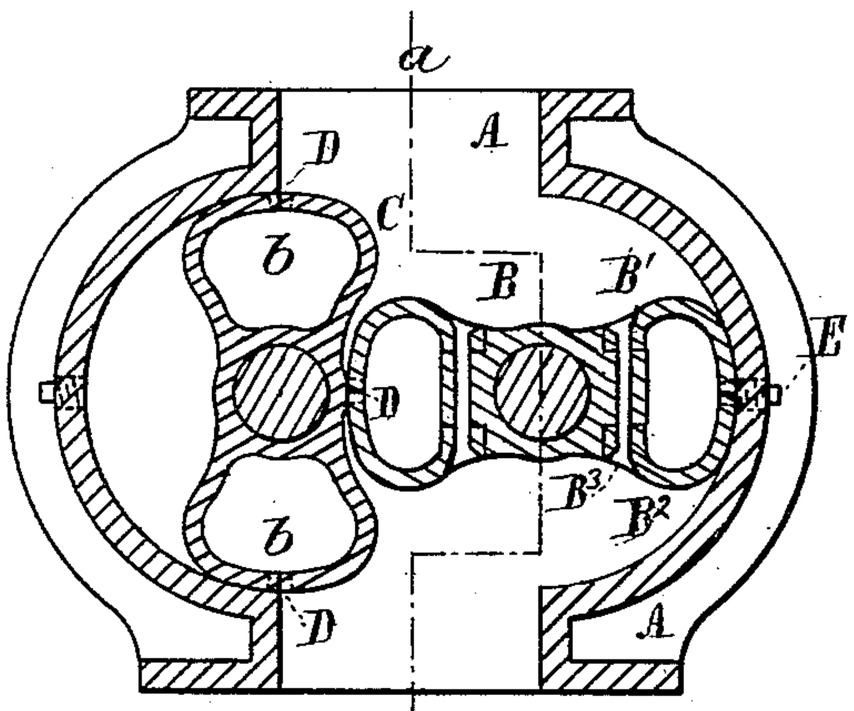

Fig. 1.

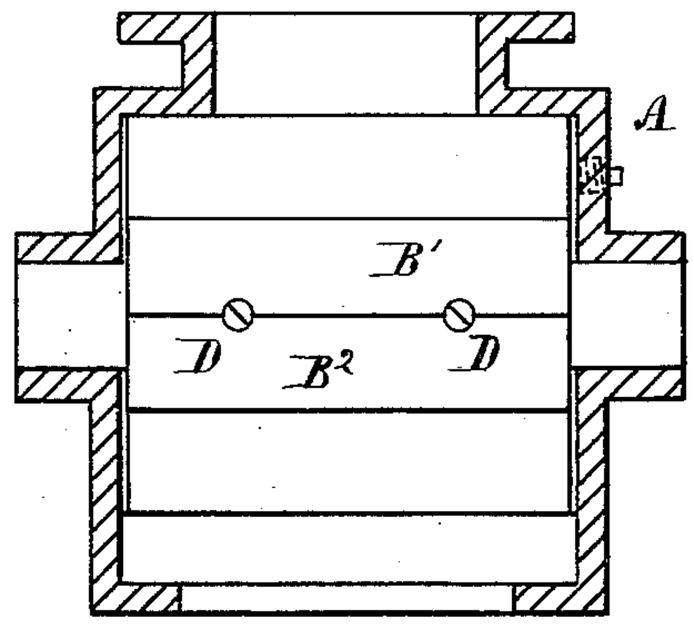

Fig. 1a.

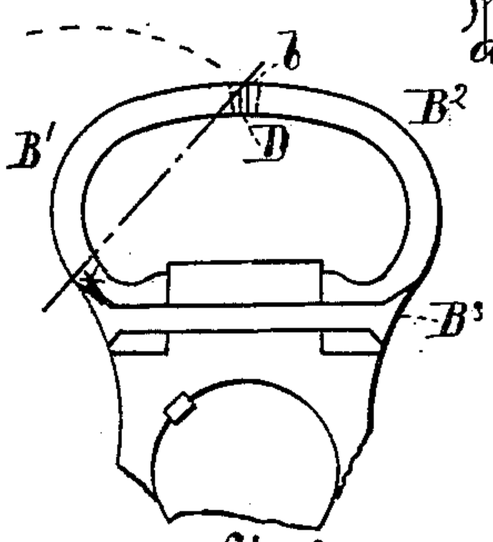

Fig. 2

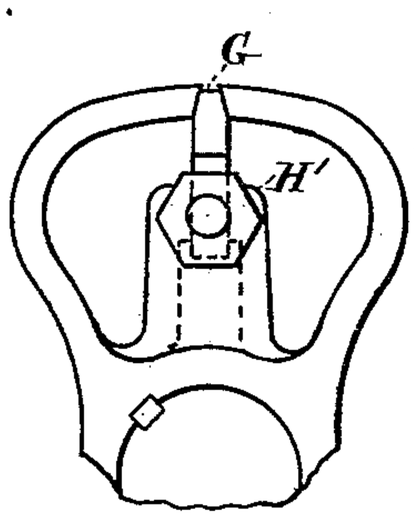

Fig. 3a

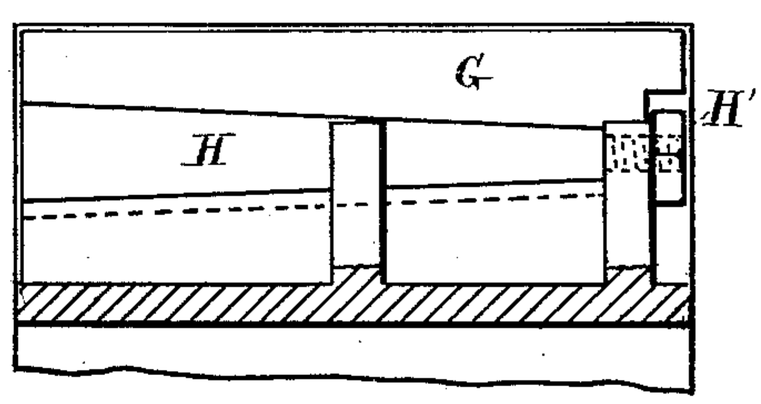

Fig 3

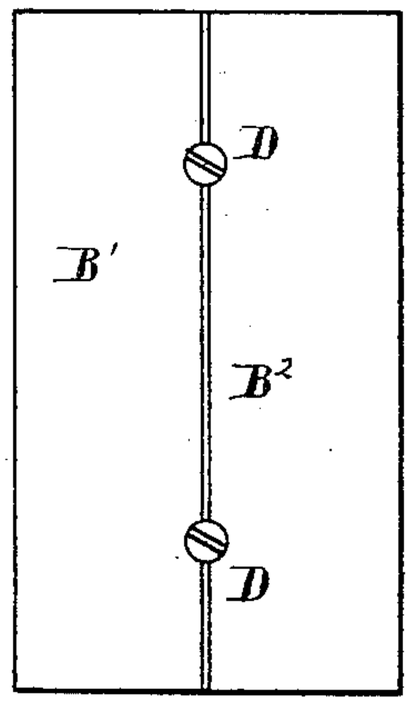

Fig 2a

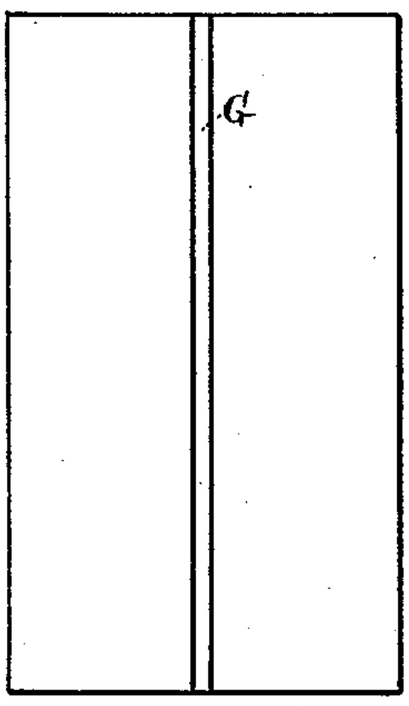

Fig. 3b

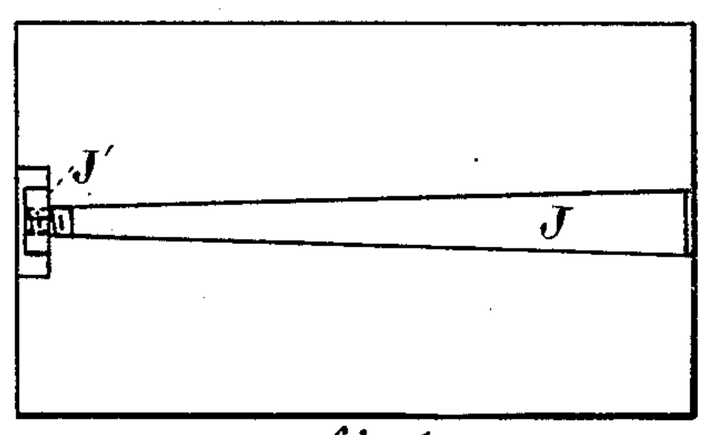

Fig. 4

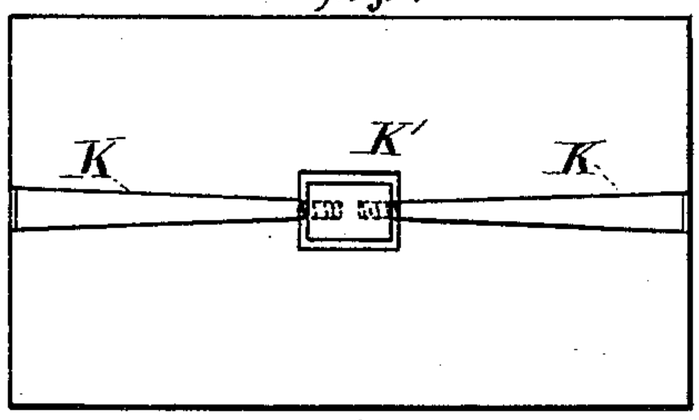

Fig. 5.

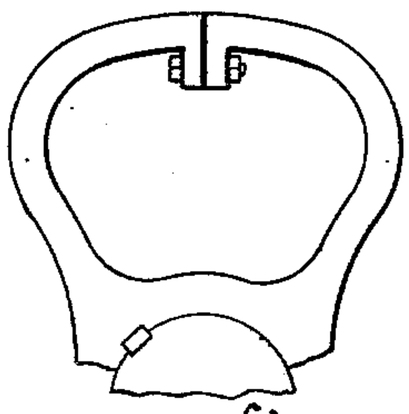

Fig. 6.

WITNESSES:

William Paxton

J. B. Blantier.

INVENTOR

Adolphe Rock

BY

Thomas Drew Stetson

ATTORNEYS.

UNITED STATES PATENT OFFICE.

ADOLPHE ROCK, OF SAN FRANCISCO, CALIFORNIA.

ROTARY PUMP.

SPECIFICATION forming part of Letters Patent No. 630,932, dated August 15, 1899.

Application filed April 27, 1899. Serial No. 714,647. (No model.)

To all whom it may concern:

Be it known that I, ADOLPHE ROCK, a citizen of the United States, residing in San Francisco, in the county of San Francisco, in the State of California, have invented a certain new and useful Improvement in Rotary Pumps, of which the following is a specification.

My improved pump may be used for pumping oil and other liquids, as also for pumping air, ammonia, or other gaseous fluids; but I will describe it as applied for pumping water. The pump is of the class in which valves and packings are dispensed with, and the pumping is effected by revolving two parallel shafts with peculiarly-shaped impellers, keyed or otherwise firmly fixed thereon, matching closely together and to the interior of a suitably-hollowed casing, to which latter the induction and eduction pipes are bolted. The continued use of the pump, especially in pumping gritty water, has a tendency to wear the surfaces, and thereby impair the efficiency of the machine. Hence it is very desirable that the closeness of fit should be maintained. I have invented a practicable mode of effecting this by making the wings of the impellers hollow, split, and therefore elastic, and providing for expanding the joint to the required extents as the wear proceeds. I make the split wings separately and attach them firmly to the hubs of the respective impellers. This facilitates the construction.

The accompanying drawings form a part of this specification and represent what I consider the best means of carrying out the invention.

Figure 1 is a central vertical section of the entire pump. Fig. 1ª is a longitudinal section of the casing on the line *a a* in Fig. 1, with the inclosed parts in side elevation. Fig. 2 is an end view, on a larger scale, showing the upper side or upper wing of the impeller, which is in an upright position. Fig. 2ª is a corresponding plan view. Figs. 3, 3ª, and 3ᵇ represent a modification. They show one of the impelling-wings in the upright position, with a single adjusting-wedge extending the whole length, with means for effecting the adjustment. Fig. 3 is a side elevation, partly in section. Fig. 3ª is a corresponding end view, being a view from the right in Fig. 3; and Fig. 3ᵇ is a corresponding plan view. Fig. 4 shows another modification. It is a plan view of one of the wings in an upright position. Fig. 5 is a similar view of another modification. Fig. 6 is an end view showing still another modification.

In Figs. 3, 3ª, and 6 the wings are shown as integral with the hub; but it will be understood that they may in practice, like the wings in the form of the invention first shown, be formed separately and afterward firmly affixed. On the other hand, the form first shown may be made with the wings integral with the hub, if preferred. One wing is so shown in Fig. 1. It may facilitate description to first consider these hollow split wings as so made, the hub and the two wings being all in a single nicely-finished casting.

Similar letters of reference indicate corresponding parts in all the figures where they appear.

Referring to Figs. 1, 1ª, 2, and 2ª, the casing A forms a chamber, within which the accurately-shaped impellers B C revolve in opposite directions in unison, being geared at their ends in the obvious manner. (Not shown.) These impellers are so formed as to gently touch each other at every point of the revolution, and as they thus revolve they also maintain gentle contact with the interior of the casing. This general style of pump has been long known and is much approved. The two impellers may be exactly alike, and the two ends or wings of each may also coincide. A description of one wing of one impeller will suffice for all, describing it as integral with the hub.

I cast or otherwise form the wing hollow, with a sufficient thickness to give the required strength and elasticity, and produce by any suitable means, as sawing, a narrow slit extending longitudinally along the center line of the periphery of the wing, as indicated by *b*. At a point near each end of the slit I insert tapering screw-plugs D radially in correspondingly-tapering screw-threaded holes. The outer end or head of each of these tapering screws is cross-grooved to allow it to be operated by an ordinary screw-driver.

At corresponding points in the casing A, I produce somewhat larger holes with tight-fitting removable plugs E. These should be

screw-threaded, but it is not necessary that they should taper.

Before applying the parts together the tapering screw-plugs D are inserted, springing the slit open to what is judged a little less than the proper slight extent. After all else is adjusted the pump may be tried various ways, during which the screw-plugs E are removed, and the impellers being turned and arrested in the right position a screw-driver is inserted successively in the holes presented by the removal of the several screw-plugs E and the plugs D turned inward to spread the slit *b* open wider and increase the tightness of the fit of the impeller within the casing or outward to relax the distention of the slit *b* and allow the impellers to be turned more easily. This being properly done for each of the several wings and by means of the two screws for each, the adjustment being made right at each end of each wing, those important portions of the pump may be pronounced accurately adjusted, and the screw-plugs E being tightly inserted the machine is ready to serve. If the pump is severely used, occasion should be taken at intervals to again remove the plugs E and through the apertures thus opened to again adjust the plugs D.

The metal should be so conditioned that its elasticity will tend to close the slit *b*. This may be effected at the time of casting by skilfully removing the molding material from the inside or outside, as is found expedient, to induce this condition. The effect may be heightened by peening the exterior with a hammer.

The slit *b* may be formed by casting the hollow wing continuous and properly sawing a slit with a thin metal-saw after it is cold. Another and perhaps preferable mode in the large way would be to insert a piece of thin sheet metal of the same or a different kind and preventing the joint from being permanently closed by clay-washing or other approved means.

In what I esteem the most complete development of the invention the wings are cast or otherwise formed separately from the hub. One mode of manufacture of such detachable wings is to cast them, another is to press them from properly-heated steel, in each case making them a little large, and finishing when cold by operating with tools to attain the required perfection of form and surface. Figs. 1 and 2 show one successful form of these parts. Each hollow and elastically-yielding wing is composed of two separately-formed parts $B' B^2$, fitted firmly in rabbets formed in the hub and stiffly secured by stout rivets B^3.

Modifications may be made without departing from the principle or sacrificing the advantages of the invention. The thickness of different portions of the wings of the impellers may be varied. My experiments indicate that the form shown induces a just sufficient increase of the diameter, as well as the breadth, of each wing when the tapering plugs D are screwed in. I conceive the slight elastic yielding of the two sides of each wing as they move apart to be performed approximately in arcs of circles around an axis at about the point marked ※. (See Fig. 2.) It is important that the increase of the width and the increase of the radial dimensions of the wing shall be about equal. The thickness may be varied, as experience with different irons or hard-brass castings may indicate, to most perfectly attain this end.

Instead of the tapering plugs D and the mode of adjusting them by removing the plugs E, which I prefer, there may be a great variety of other means for attaining the adjustment. Referring to the mode shown in Figs. 3, 3^a, and 3^b, the slit is made wider and beveled and the wedge-shaped piece G is inserted. Radially within this is a slightly-tapered adjusting-piece H, resting in a corresponding groove in a stout longitudinal ridge in the casting and guided by fingers at various points. I have shown two; but the number of these fingers may be increased. The adjustment may be effected with great nicety by turning a nut H′, applied on the screw-threaded end of the adjusting-piece H. There may be a suitable hole with a removable covering in the casing (not shown) to allow access from time to time to turn this nut. In the form shown in Fig. 4 the slit is tapered in width and receives a correspondingly-tapered piece J, adjusted by means of a nut J′, applied on its screw-threaded end. In the form shown in Fig. 5 the slit is tapered from both ends toward the middle with a wider opening for a short distance at the mid-length. There are two adjusting-pieces K, properly tapered, having right and left screw-threaded ends received in a single correspondingly-tapped cylindrical nut K′. The nut having small radial holes may be turned, as required, by inserting a steel wire. There may be a single provision at the mid-length of the pump, corresponding to one of the two screw-plugs E, before described, for allowing access for this purpose. In the form shown in Fig. 6 the slit is narrow, but of sufficient width to receive a shim, as indicated by a strong black line. A bolt is inserted through an internal flange at each side of the slit, and it is drawn together by a nut. With this form the strong but slightly-yielding parts of the impeller-wing should of themselves spring apart, while in the other forms they should spring together. In order to take up wear and tighten the fit of the revolving parts against each other and against the interior of the casing, with this form of the invention the bolts should be slackened or removed and a thicker shim or two thin shims inserted in place of a previous thin shim and the nuts again tightened.

I claim as my invention—

1. In a rotary pump, engine or blower, an impeller split lengthwise, and provided with

means for expanding the two halves of same along the split, for the purpose of taking up wear, substantially as herein specified.

2. In a rotary pump, the combination with a suitable casing, of impellers each having peripheral portions removably secured thereto and split lengthwise, and means for expanding said peripheral portions to take up wear, substantially as herein specified.

3. In a rotary engine or pump, the matched impellers B, C, having their wings slitted longitudinally and elastically expansible, in combination with means for effecting such expansion to various degrees at either end at will, substantially as herein specified.

In testimony that I claim the invention above set forth I affix my signature in presence of two witnesses.

ADOLPHE ROCK.

Witnesses:
M. F. BOYLE,
J. B. CLAUTICE.