

July 16, 1935.

O. JACOBSEN

2,008,308

CENTRIFUGAL PUMP

Filed Oct. 3, 1934

2 Sheets-Sheet 1

Fig. 1.

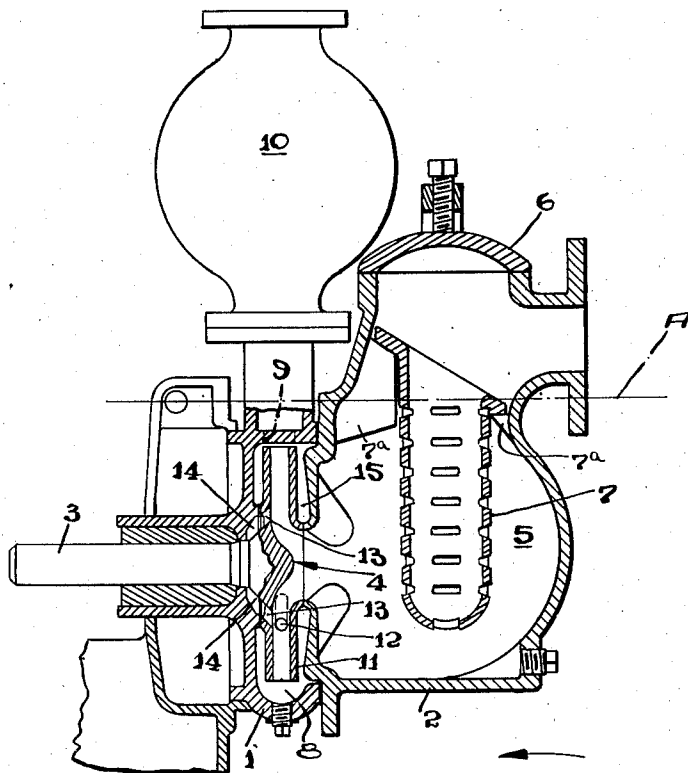


Fig. 2.

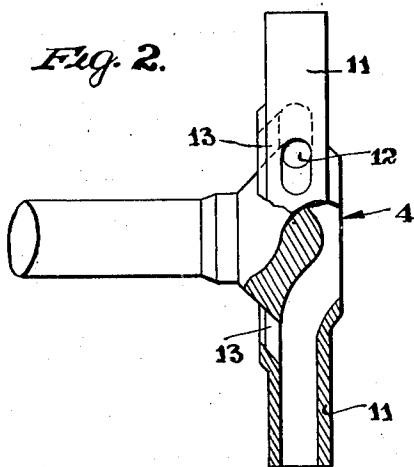


Fig. 3.

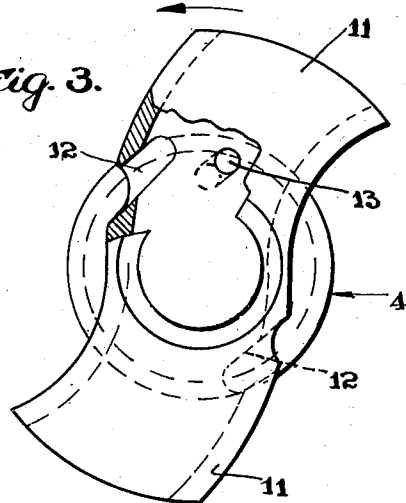
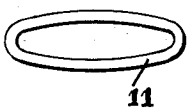


Fig. 4.



INVENTOR.
OYSTEIN JACOBSEN

BY *James C. Bradley*
ATTORNEY.

July 16, 1935.

O. JACOBSEN

2,008,308

CENTRIFUGAL PUMP

Filed Oct. 3, 1934

2 Sheets-Sheet 2

Fig. 5.

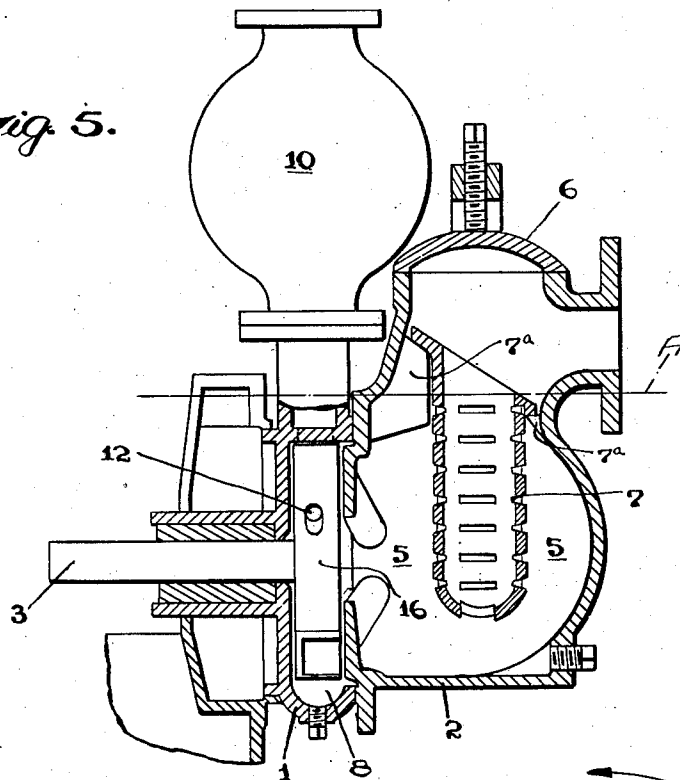


Fig. 6.

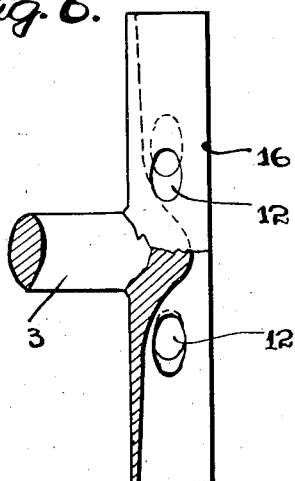
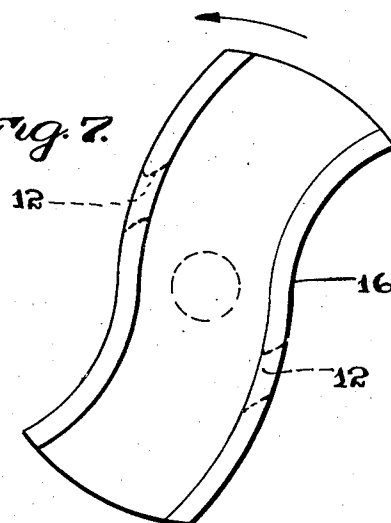


Fig. 7.



INVENTOR.
OYSTEIN JACOBSEN

BY *James C. Bradley*
ATTORNEY.

UNITED STATES PATENT OFFICE

2,008,308

CENTRIFUGAL PUMP

Oystein Jacobsen, Dayton, Ohio, assignor to The
Duriron Company, Inc., a corporation of New
York

Application October 3, 1934, Serial No. 746,692

2 Claims. (Cl. 103—113)

The invention relates to self priming pumps and involves an improvement over the construction of my Patent No. 1,946,212, dated February 6, 1932. The object is to provide an improved and simplified construction which will give a self priming action that is very effective, and which does not detract from the efficiency of the pump after the completion of the priming operation. Two embodiments of the invention are illustrated in the accompanying drawings, wherein:

Figure 1 is a vertical section through a pump of the closed runner or impeller type with my improvement applied thereto. Fig. 2 is a detail of the runner in partial section. Fig. 3 is a side elevation of the runner. Fig. 4 is an end view of the runner tube. Fig. 5 is a vertical section through a pump of the open runner type with the improvement applied thereto. And Figs. 6 and 7 are detail views of the runner of the Fig. 5 construction, Fig. 6 being a partial section and partial elevation and Fig. 7 being a side elevation.

Referring to the construction of Figs. 1 to 4, which show the invention as used with the closed type of runner, 1 and 2 are parts of the pump casing which are clamped or bolted together; 3 is the drive shaft provided at one end with the impeller or runner 4 and at the other end having a suitable driving means (not shown) such as a pulley; 5 is the suction elbow arranged to discharge to the eye of the pump and having at its upper end a priming opening provided with a cover 6 suitably secured in position; and 7 is a screen removably supported in position upon the lugs 7a.

Extending around the periphery of the casing part 1 is the volute 8 which discharges at 9 into the lower end of the separation chamber 10, such chamber being connected at its upper end with the usual discharge pipe (not shown).

The runner 4 which is preferably integral with the drive shaft comprises a pair of arms 11, 11, which taken together are of the approximate S-shape shown in Fig. 3 and preferably have an oval cross section, as indicated in Fig. 4. Each arm is provided on its front side (as defined by the direction of rotation of the runner, as indicated by the arrow in Fig. 3) with a circulation port 12 preferably inclined, as shown, so that its discharge end lies closer to the end of the arm than its inlet end, such ports serving to promote the priming action of the pump, as later explained.

Each of the runner arms is also provided with a relief port 13 extending transversely of the direction of rotation of the runner and communi-

cating with a chamber 14 lying between the hub of the runner and the wall of the casing 1. The purpose of these relief ports and chamber 14 is to secure an equalization of pressure on the two sides of the runner and thus eliminate end thrust to the right which would be present if the relief ports were not provided.

When the pump is primed, the liquid lies at about the level A, filling the elbow 5 and the volute. The pump is then started and the action of the runner withdraws the liquid in the elbow and forces it up into the separation chamber 10, such movement of the liquid carrying with it some of the air in the elbow. The head pressure built up in the chamber 10, due to the rise of the level therein, now causes a gravity flow down into the volute and into the space 15 in the casing at the sides of the runner arms and between such arms. The ports 12, 12 cutting through the body of water in this space conduct it into the arms and it is then forced up into the separation chamber. Provision is thus made for a repeated circulation of the priming liquid and this movement carries with it more and more air from the elbow, so that all the air in the elbow is soon exhausted causing it to fill with water from the inlet, thus completing the priming operation. After the priming action is completed, there is little back-flow into the space 15 as the liquid now flowing through the volute at considerable velocity causes a drag which counteracts the gravity flow that would otherwise occur. There is thus substantially no decrease in the efficiency of the pump incident to the use of the circulation ports 12 which give the pump its self priming function. The inclining of the ports 12, as shown, materially increases the priming circulation as compared with ports which extend through the walls of the runner arms at right angles thereto.

In the construction of Figs. 5, 6 and 7, the runner 16 is of the open type. It is of S-shape and provided with circulating ports 12, 12 as in the construction of Figs. 1 to 4, but is of rectangular instead of oval cross section, as indicated in Fig. 5. The priming operation is the same as in the construction of Figs. 1 to 4 and the numerals used on the various parts are the same as those employed in connection with the closed runner pump.

What I claim is:

1. In combination in a centrifugal pump, a casing having an inlet eye at its center and a volute around its periphery, a suction elbow leading to the eye, a separation chamber above the volute to which the volute discharges, a runner having radial curved arms mounted for rotation in the

- casing and arranged to receive the liquid supplied through the eye, the front interior wall of each arm presenting a smooth uninterrupted curved surface, and a perforation extending through such wall at the inner end of the arm and constituting a circulation passage, such passage having its inlet end nearer the axis of rotation of the runner than its other end.
- 5 2. In combination in a centrifugal pump, a casing having an inlet eye at its center and a volute around its periphery, a suction elbow leading to the eye, a separation chamber above the volute to which the volute discharges, a runner having radial curved arms mounted for rotation in the casing and arranged to receive the liquid supplied through the eye, the front interior and exterior walls of each arm presenting smooth uninterrupted curved surfaces, and a perforation extending through such wall at the inner end of the arm and constituting a circulation passage, such passage having its inlet end nearer the axis of rotation of the runner than its other end.
- 10

O. JACOBSEN.