

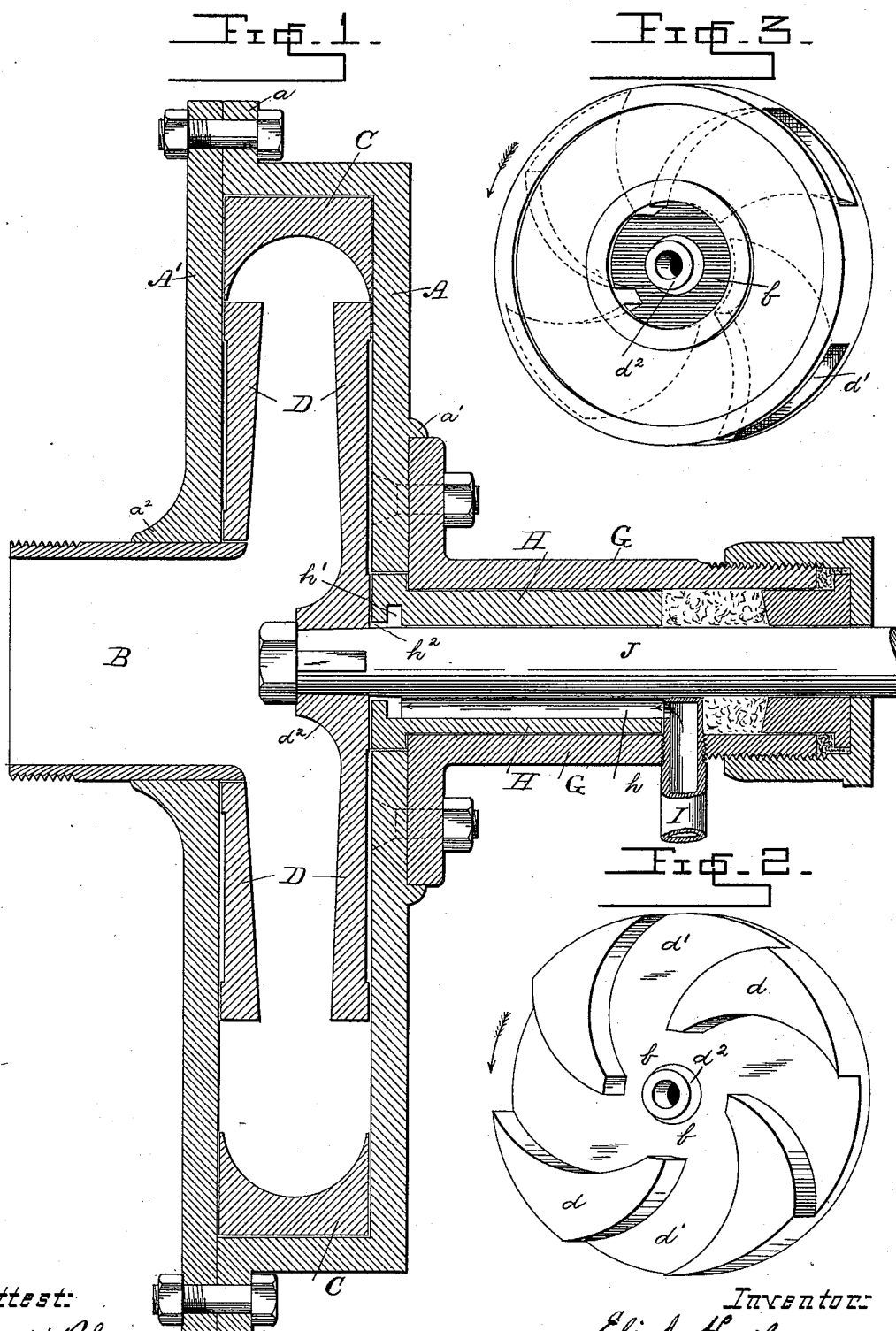
(No Model.)

2 Sheets—Sheet 1.

E. J. HAWLEY.
CENTRIFUGAL PUMP.

No. 350,362.

Patented Oct. 5, 1886.



Attest:

Josh Blackwood
R. & D. Boig

Inventor:

Eli J. Hawley
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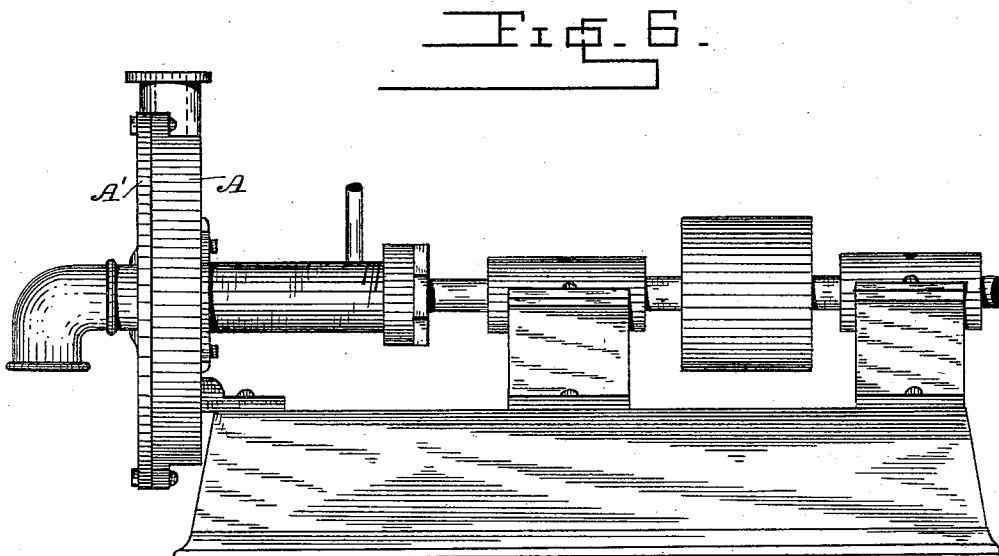
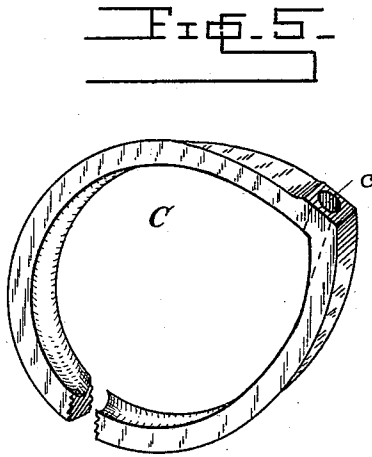
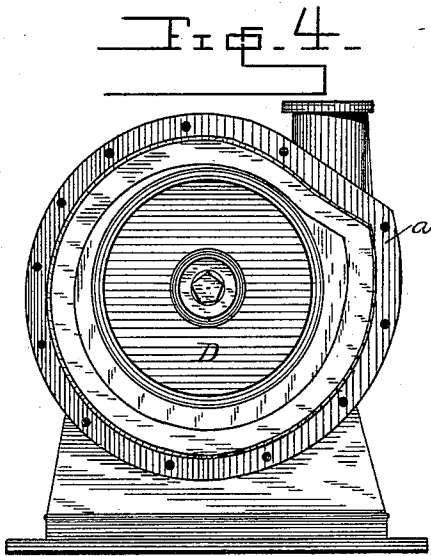
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WITNESSES;

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UNITED STATES PATENT OFFICE.

ELI J. HAWLEY, OF MANCHESTER, VERMONT.

CENTRIFUGAL PUMP.

SPECIFICATION forming part of Letters Patent No. 350,362, dated October 5, 1886.

Application filed April 17, 1886. Serial No. 199,248. (No model.)

To all whom it may concern:

Be it known that I, ELI J. HAWLEY, a citizen of the United States, residing at Manchester, in the county of Bennington and State of Vermont, have invented certain new and useful Improvements in Centrifugal 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 invention relates to certain improvements in centrifugal pumps adapted to pump fluids containing gritty substances, its object being the production of mechanism for this purpose which will stand wear better than any other pump with which I am acquainted, and in which the parts subjected to the destructive effects of sand and like gritty substances can be readily removed and replaced by new parts at a comparatively low cost.

The invention consists in certain novel features hereinafter described, and clearly pointed out in the claims.

In the accompanying drawings, Figure 1 is a central section of my improved pump. Fig. 2 is a view of the piston, one side being removed in order that the arms and water-ways may be clearly shown. Fig. 3 shows the piston complete. Fig. 4 is an end view of the pump, with the face-plate of the casing removed in order to show the removable lining and the piston in place. Fig. 5 is a perspective view of the removable lining, broken to show its concavity. Fig. 6 is an elevation of the pump arranged horizontally.

It is to be understood that the invention herein described contemplates both the horizontal and vertical forms of pumps, the novel feature being equally applicable to both, and therefore the substitution of one form for the other is entirely within the province of the mechanic.

Referring to the drawings, A A' represent the pump-casing, which should be of hard and durable cast metal. The part A, with its flange *a*, is cast in one piece, a circular opening being left in the side, of a suitable size to receive the inner end of the shaft and its surrounding composition bearing. The face-plate is preferably cast around a wrought-iron

inlet or suction pipe, B, whose inner end projects (when the face-plate is bolted to flange *a*) through the side of the piston, as shown in Fig. 1. Each part A and A' of the casing is provided with a raised annular projection, *a'* 55 *a''*, the former, *a'*, adapted to receive within it the flange on the journal of the shaft, and the latter, *a''*, serving as an additional bearing-surface for the end of the suction-pipe.

C represents a removable lining for the interior of the casing. This lining is of hard metal, cast in one piece, and, as shown in Figs. 1, 4, and 5, is square on the back and sides and concave on the inner side, and, as it entirely surrounds the periphery of the piston, 65 the concavity gradually deepens as it approaches the outlet *c*. It is designed that the lining shall fit in the casing without the employment of any fastening device.

D represents the piston, which is a single casting, also of hard metal. As seen in Fig. 2, in which one side of the piston is removed, the arms *d* are solid and increase in width from their inner ends outward, being curved backwardly with relation to the direction of 75 the line of motion indicated by the arrow. The spaces *d'* between the arms are the water-ways, through which the water is driven into the concavity of the lining and thence to the outlet, it being understood, on inspection of 80 Figs. 1 and 4 of the drawings, that the piston is located inside the lining. These water-ways are not so deep at their outer ends as at their inner ends, because as they gradually widen toward the periphery more space is afforded 85 laterally for the volumes of the water and sand, mud, &c., passing through them; and, besides, by this construction the substances being pumped are directed to the center of the concavity of the lining, thereby avoiding 90 wear on the edges. As before stated, and as shown in Fig. 1, the inlet or suction pipe B extends through the side of the piston and delivers the ingoing fluid to chamber *b*, which surrounds the hub.

d'' represents the hub of the piston, to which one end of shaft F is secured by a spline and nut, as shown.

G represents the journal for the shaft, its lower end flanged and fitting within the raised 100

annular projection a' , and secured to the casing by bolts and nuts, while its upper end is provided with a stuffing-box, as shown. Inside the journal, its lower end flanged and fitting the opening in the side of the casing, is a removable composition bearing, H, for shaft J to work in, along one side of which bearing there is a longitudinal groove, h , communicating at its upper end under the stuffing-box with a small pipe, I, tapped through the journal and bearing, and at its lower end with an annular chamber, h' , surmounting a contracted annular space, h'' , opening into the interior of the casing, as seen in Fig. 1, so that clear water admitted through said pipe will enter and flow through the groove, lubricating the shaft, until it reaches the annular chamber, whence it will be forced with great pressure through the contracted annular space onto the head of the piston, clearing it of any gritty substance likely to be forced up into the journal. This construction of the journal differs from that shown in my Patent No. 336,807, dated February 23, 1886, only in the provision of the composition bearing for the shaft.

The operation of the pump will be clearly understood from the drawings together with what has been stated above, and therefore further description is not deemed necessary.

Pumps used in raising water mixed with sand, mud, or other gritty substances are subject to great wear, and as a consequence are soon rendered unfit for use. As now constructed, when a pump is once disabled through wear, the expense of repairs, if it can be repaired at all, is generally very great in proportion to the original cost. Now, by my invention I can readily remove any part of my pump subject to wear and replace it by a new one

at small cost. By the removable lining all wear on the pump-casing is avoided, and, although the composition bearing for the shaft is intended to be hard, yet when it becomes worn it can be easily removed and another substituted. Should the piston itself become worn, it can be separated from its shaft and another put on.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a centrifugal pump, the combination, with the casing, of a removable annular metallic concave-faced lining surrounding the space in which the piston works, for the purpose set forth.

2. In a centrifugal pump, the combination, with the casing, of a removable annular lining surrounding the space in which the piston works, the inner face of the lining being concave, the concavity gradually deepening toward the outlet, as set forth.

3. The combination, with the casing and a removable annular lining concave on its inner face and surrounding the space in which the piston works, of a piston having solid arms and water-ways between the arms, the outer ends of the arms being farther apart than the inner ends, and the water-ways having a less depth at their outer ends than at their inner ends, substantially as described, and for the purpose stated.

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

ELI J. HAWLEY.

Witnesses:

G. W. BALLOCH,
N. E. ROBINSON.