A. E. LOLE.

ROTARY PUMP AND THE LIKE.

APPLICATION FILED DEC. 18, 1917.

1,291,037.

Patented Jan. 14, 1919.

2 SHEETS—SHEET 1.

Fig. 1.

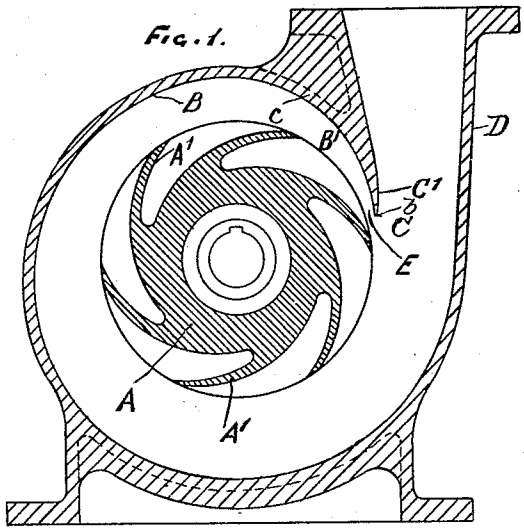


Fig. 2.

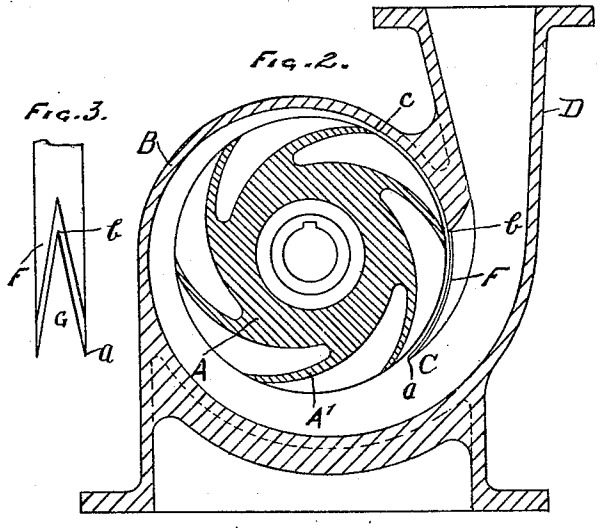


Fig. 3.

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2 SHEETS—SHEET 2.

Fig. 4.

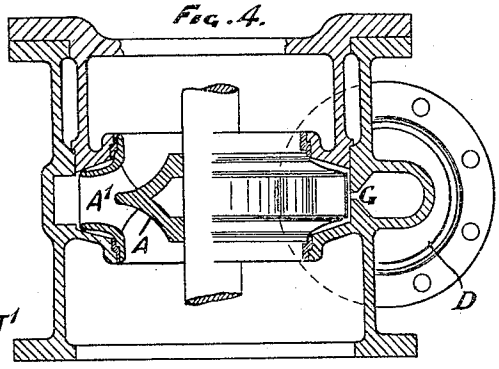


Fig. 7.

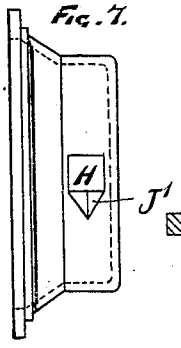


Fig. 6.

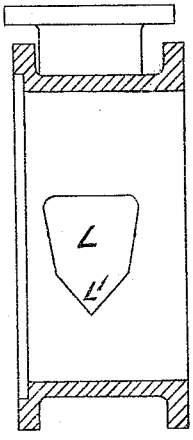
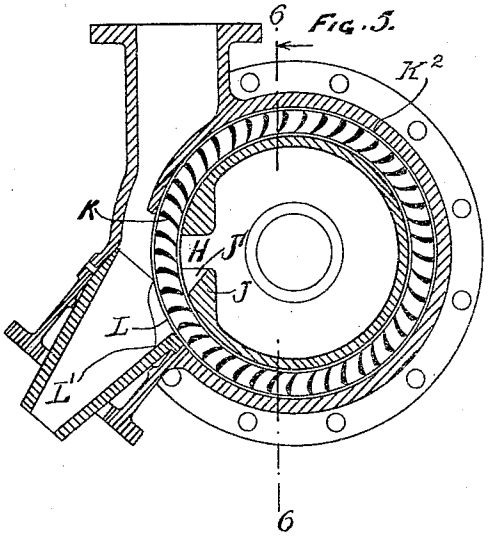


Fig. 5.



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UNITED STATES PATENT OFFICE.

ALFRED ERNEST LOLE, OF JACKSDALE, ENGLAND.

ROTARY PUMP AND THE LIKE.

1,291,037. Specification of Letters Patent. Patented Jan. 14, 1919.

Application filed December 18, 1917. Serial No. 207,777.

To all whom it may concern:

Be it known that I, ALFRED ERNEST LOLE, a subject of the King of the United Kingdom of Great Britain and Ireland, and residing at Jacksdale, in the county of Nottingham, England, have invented a certain new and useful Improvement in Rotary Pumps and the like, of which the following is a specification.

This invention relates to improvements in rotary fluid pumps of the centrifugal type, and its object is to increase their efficiency, and more particularly to obviate the destructive action of the fluid on the impeller and the interior of the casing.

Referring to the accompanying drawings, Figure 1 is a sectional side view of a centrifugal pump as ordinarily constructed. Fig. 2 is a sectional side view of a rotary pump of the same type constructed according to the invention. Fig. 3 is a detail view of a web or extension showing the triangular discharge outlet. Fig. 4 is a sectional elevation of the improved pump. Fig. 5 is a sectional side view, showing the invention applied to the fluid pump of an air extractor of the "Leblanc" type. Fig. 6 is a sectional view on line 6—6, Fig. 5, of the outer casing, looking toward the discharge opening in said casing, and Fig. 7 is a detail view of the inner casing showing the shape of the water inlet.

In centrifugal fluid pumps of modern construction of which the impeller is fitted with tangentially disposed blades and is mounted for rotation in a volute shaped casing, as shown in Fig. 1, serious destructive action is set up when a certain pressure or head of water is exceeded, and the height to which water can be raised by such pumps with economy is therefore restricted.

The destructive action referred to takes the form of pitting, perforating and bulging of the blades A′ of the impeller A, and pitting of the interior of the casing B, from *b* to *c*, leading ultimately to complete perforation. This action is believed to be partly due to the instantaneous cut-off of the delivery of the fluid from each of the impeller blades A′, owing to the disposition and form of the inner side C′ of the discharge opening C, and the form of the interior of the casing from *b* to *c* resulting in vibration and unequal velocity in the volume of fluid discharged into the delivery pipe D, which causes a proportion of that fluid to return to the casing B again through the gap E into the space B′, where it forms eddies which meet the impeller blades A′ again, and set up water-hammer action.

According to this invention the main discharge opening C (Fig. 2) into the tangential delivery pipe D is situated at *a* instead of at the usual point *b*, the space between *a* and *b* is occupied by an abutment or wall or web F extending from the casing B, the interior face of which wall or web is preferably concentric with the impeller A, said wall or web being provided with an inverted V-shaped opening G forming a continuation or extension of the discharge opening C. This opening G is continued with a gradually decreasing width in the direction of rotation of the impeller or rotor A from *a* to the point *b* where it terminates. The opening G is approximately in the form of an isosceles triangle, as shown more clearly in Fig. 3 the base of which is at *a* and the apex at *b*, so that the impeller blades A′, when passing said opening G, move from the wider end to the narrower end, and the delivery from each impeller blade A′ is thus cut off gradually, instead of instantaneously as in existing fluid pumps such as shown in Fig. 1.

The interior face of the casing B is also preferably concentric with the impeller from the point *b*, where the opening G terminates, up to the point *c*, or about one sixth of its circumference, in order to prevent the possibility of water returning from the delivery pipe D to the casing B.

The construction permits reduction of the area of the discharge opening C approximately to the capacity of each impeller blade A′, without affecting the efficiency of the pump or volume of fluid the pump will raise, and it helps to give the ideal conditions of working, that is, the maintenance of a uniform velocity of the fluid at the discharge opening.

With the arrangement shown in Figs. 2 to 4 the fluid maintains a constant velocity until it has passed the end of the opening G, and it has been proved in practice that the destructive action, whether due to the particular cause previously stated or not, is entirely obviated by the construction described and shown.

The result is that not only can fluid be raised to greater heights or against higher pressures with such pumps without the rapid deterioration described, but also the same

quantity can be raised with the expenditure of less power.

In Figs. 5 to 7 the invention is shown as applied to the fluid pump of an air extractor of the well known "Leblanc" type, in which air is extracted by the injector action of water.

In this construction the outer casing K^2 inclosing the impeller or rotor K is provided with a discharge opening L having a V-shaped extension L′, the inner face of said casing being concentric with said impeller or rotor K, said discharge opening L, L′ diminishing gradually in the direction of rotation of the impeller or rotor K, so as gradually to cut off the delivery from each impeller blade. In this construction the action of the arrangement described may be assisted by having the discharge opening H to the impeller or rotor K communicate with an extension J′ which is formed in the interior wall J and is V-shaped in similarity to the V-shaped extension L′, and which extension J′ also diminishes gradually in the direction of rotation of the impeller or rotor K.

What I claim is:—

1. In a centrifugal fluid pump, in combination, a rotary impeller, a casing inclosing said impeller and having at its delivery side a wall or web concentric with said impeller, said wall or web being formed with an opening of gradually reduced width in the direction of rotation of said impeller.

2. In a centrifugal fluid pump, in combination, a rotary impeller, a casing inclosing said impeller, and an adjoining delivery pipe, said casing having a wall or web concentric with said impeller and formed with an opening extending from its free extremity and gradually reduced in the direction of rotation of said impeller.

3. In a centrifugal fluid pump, in combination, a rotary impeller, a casing inclosing said impeller, and an adjoining delivery pipe, said casing having a wall or web concentric with said impeller, said wall or web being formed with an opening of the form of an isosceles triangle, the base of the triangular opening being at the free extremity of said wall or web and the apex thereof at the junction of said casing and said delivery pipe.

4. In a centrifugal pump, in combination, a rotary impeller, a casing for said impeller, and an adjoining delivery pipe, said casing being provided with an extension or web concentric with said impeller, said extension or web being formed with a discharge opening extending from its free end to the junction of said casing and said delivery pipe and of gradually reduced width in the direction of rotation of said impeller, said casing having an inner wall continuous with said extension or web and concentric with said impeller for a distance at least equal to about one sixth of its circumference.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ALFRED ERNEST LOLE.

Witnesses:
HENRY MASON,
FLORENCE HOUSTON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."