No. 640,093. Patented Dec. 26, 1899.

A. W. & L. W. CASE.

ROTARY PUMP.

(Application filed Nov. 26, 1898.)

(No Model.)

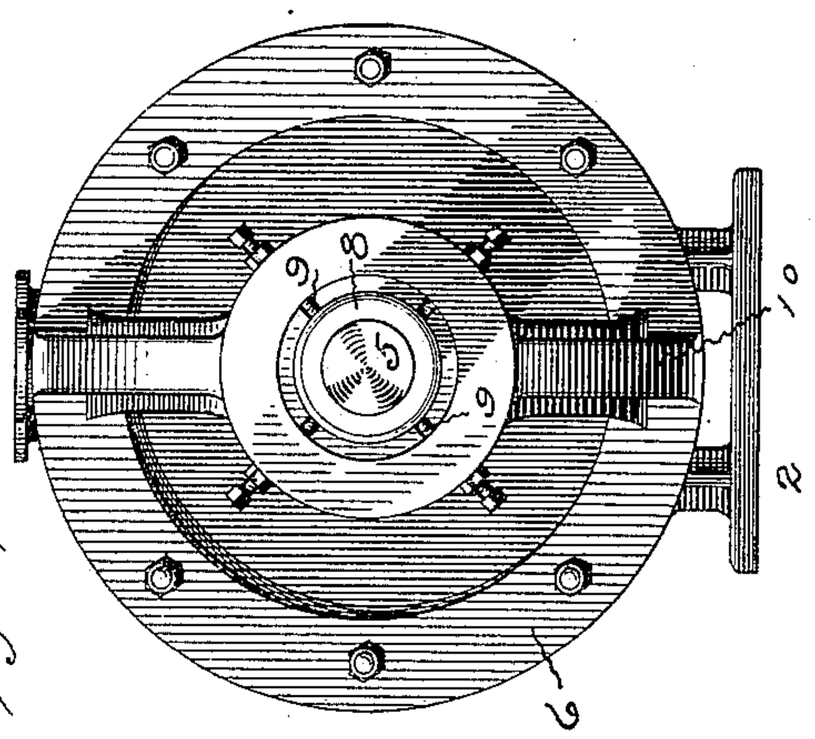

Fig. 2.

Fig. 1.

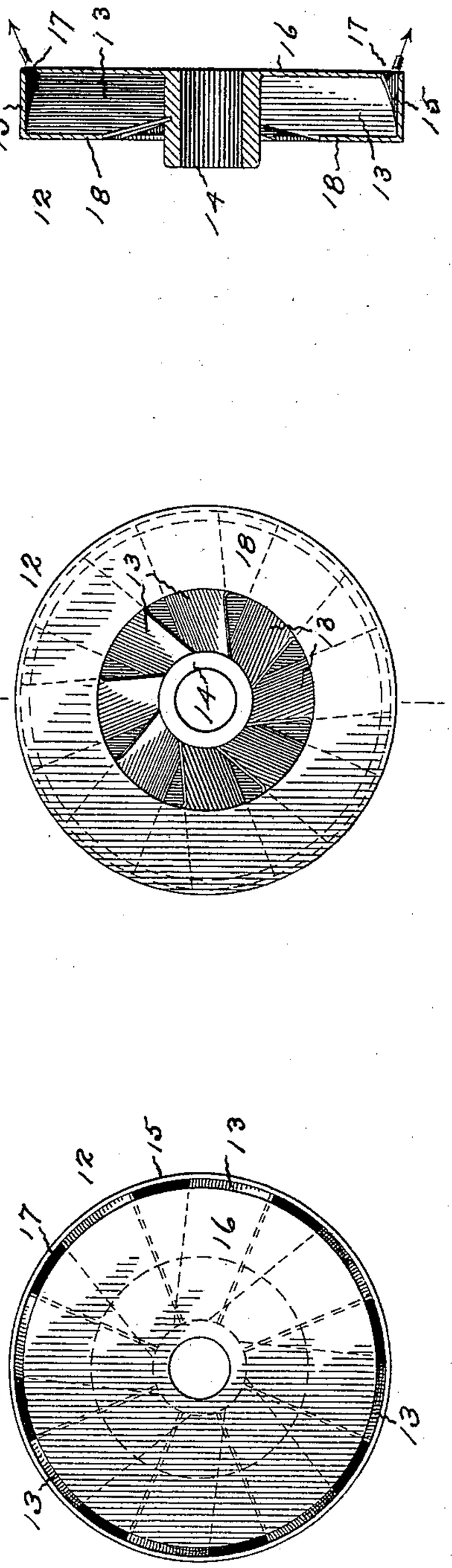

Fig. 5.

Fig. 4.

Fig. 3.

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UNITED STATES PATENT OFFICE.

ALFRED WELLS CASE AND LAWRENCE WELLS CASE, OF HIGHLAND PARK, CONNECTICUT.

ROTARY PUMP.

SPECIFICATION forming part of Letters Patent No. 640,093, dated December 26, 1899.

Application filed November 26, 1898. Serial No. 697,494. (No model.)

To all whom it may concern:

Be it known that we, ALFRED WELLS CASE and LAWRENCE WELLS CASE, citizens of the United States, residing at Highland Park, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Rotary Pumps, of which the following is a specification.

This invention relates to the class of pumps which have fan-blades so arranged that they will cause a flow of fluid under considerable pressure.

The object of the invention is the production of a simple pump of this nature which is particularly adapted for forcing water or similar liquids under pressure, but which may be utilized for driving air or other gases against pressure and which is capable of generating considerable pressure whatever the medium required to move with a small expenditure of power.

The pump illustrated in the accompanying drawings as embodying the invention has a tight cylindrical shell, with suitable inlets and outlet for the ingress and egress of fluid, a rotary shaft, with the necessary driving-pulley, supported by approved bearing-boxes, and fans carried by the shaft, with the spaces between the angularly-arranged radiating fan-blades entirely closed around the outer ends of the blades, inclosed in front near the outer ends of the blades, and inclosed at the back from the hub outward nearly to the outer ends of the blades, where a narrow opening is left around the back face.

Figure 1 of the drawings shows a side elevation of this pump with the shell cut in central longitudinal section, so as to show the interior. Fig. 2 shows an end view of this pump. Fig. 3 shows a view of the back or pressure side of a fan used in this pump. Fig. 4 shows a view of the front or suction side of this fan, and Fig. 5 shows a diametrical section of the fan.

The cylindrical shell 1 of this pump, which is formed of any suitably strong material, is mounted upon legs 2 and provided with inlets 3, for the attachment of pipes leading from the source of fluid-supply, and an outlet 4. arranged for the attachment of the pipes that conduct the fluid under pressure to a reservoir or the locality where it is to be utilized. A shaft 5 extends through the center of the cylinder, and after passing through the heads 6 and stuffing-boxes 7, arranged to prevent the leakage of fluid through the heads around the shaft, it is supported by bearing-boxes 8. These boxes are adjustably supported by bolts 9, turning in the annular ends of the brackets 10, that are bolted to the heads. A pulley 11 is mounted upon the shaft in position to be belted to the driving means.

In the form of pump illustrated two fans 12 are mounted upon the shaft. These fans are arranged to force fluid that enters through the inlets near the ends toward the walls of the shell at the middle, so that it will collect under pressure between the fans and pass away through the outlet. Each of the fans has angularly-arranged blades 13, of which there may be any desired number, radiating from the hub 14. The outer ends of these blades are joined by an encircling band 15, and the back edges are joined by a disk 16, that extends from the hub nearly to the encircling band, leaving only a narrow space 17 between the outer edge of the disk and the band, while the front edges are joined by an annular plate 18, that extends from the outer band some distance inwardly toward the hub. The blades, the encircling band, the back disk, and the front annular plate may, if desired, be cast in a single piece, or they may be built up of separate pieces and secured together. By this means the spaces between the blades are entirely closed at the outer ends of the blades, all closed at the back except for the narrow annular opening near the outer ends of the blades, and closed in front for some distance from the outer ends of the blades toward the hub. When these fans are rotated, fluid is drawn inwardly and after being caught by the blades and becoming subject to the resulting action of the angles of pitch and inclination of the blades and centrifugal force is driven toward the backs of the fans and at the same time toward the outer edges of the fans in such manner as to become packed into the spaces between the outer ends of the blades, from which the only escape is through the narrow discharge-outlet around the outer edges of the backs. The

effect of this is to drive the fluid violently through the narrow discharges in a direction that will cause it to impinge against the walls of the shells just back of the fans. This flow of fluid forms a barrier around the walls of the shell near the peripheries of the fans which precludes fluid from returning around the peripheries of the fans, so that the only avenue of escape for fluid forced between the fans is through the outlets.

In the form of pump shown two fans are arranged oppositely upon the shaft, and the end pressure of one balances that of the other. Any number of fans may be located upon the shaft to accumulate pressure, and these fans may be placed facing toward the middle or all facing toward an end, in which latter case, however, the outlet would have to be near one end of the shell. If the shaft should be set vertically, the fans could be arranged so that the end pressure might be utilized to overcome the effect of gravity and relieve the step-bearing.

The pump shown and described is arranged for forcing water or similar liquids, and consequently the ends of the shell are made tight. This pump, however, may be arranged for forcing air or other gases, in which case the ends of the shell may be left open for the free entrance of the gas. This pump is simple to build and does not occupy a large amount of space. It is effective in operation, durable in use, and requires but a small amount of power for obtaining satisfactory pressures with the fluids it is called upon to set in motion.

We claim as our invention—

1. A rotary pump consisting of a shell having an outlet and an inlet, a shaft passing through the center of the shell and extending through the heads, angularly-arranged blades radiating from the shaft, a band closely fitting the interior of the shell and secured to the outer ends of the blades, a disk extending in a plane at right angles with the shaft secured to the back edges of the blades except for a small space near the band, and an annular plate extending in a plane at right angles with the shaft and secured to the front edges of the blades except for a small space near the shaft, substantially as specified.

2. A rotary pump having a shell with tight ends with an inlet and outlet, a shaft passing through the center of the shell and extending through the ends, and a fan having angularly-arranged radiating blades, said blades having their inner ends secured to a hub on the shaft, their outer ends secured to a band, their back edges, except near the periphery, secured to a disk, and their front edges from the periphery some distance inward secured to an annular plate, substantially as specified.

3. A rotary pump having a shell with tight ends and an inlet and outlet, a shaft passing through the center of the shell and extending through the ends, adjustable bearing-blocks supported by the ends and supporting the shaft, and a fan having angularly-arranged radiating blades, said blades having their inner ends secured to a hub on the shaft, their outer ends secured to a band, their back edges, except near the periphery, secured to a disk and their front edges from the periphery some distance inward secured to an annular plate, substantially as specified.

4. A fan for a rotary pump having angularly-arranged radiating blades that have their inner ends attached to a hub, their outer ends extending to and joined by a band, their back edges, except near the periphery, connected with a disk that rotates in a plane perpendicular with the axis of the hub, and their front edges from the periphery some distance inward joined by an annular plate that rotates in a plane parallel with the disk, substantially as specified.

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