No. 745,857. PATENTED DEC. 1, 1903.

R. D. O. JOHNSON & W. H. REEVES.

ROTARY PUMP.

APPLICATION FILED AUG. 23, 1902.

NO MODEL.

Fig. 1.

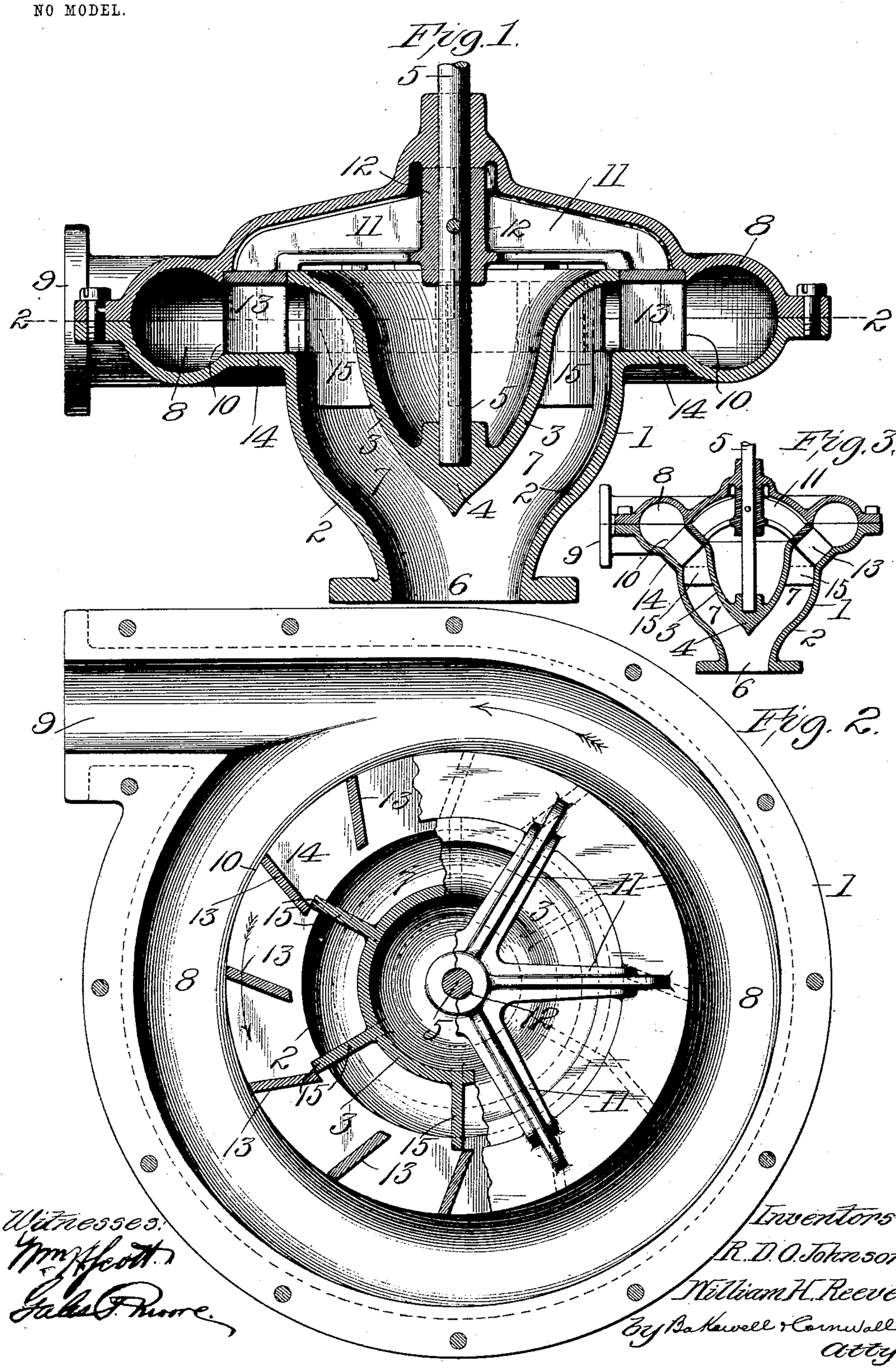

Fig. 3.

Fig. 2.

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UNITED STATES PATENT OFFICE.

RENO D. O. JOHNSON AND WILLIAM H. REEVES, OF ST. LOUIS, MISSOURI.

ROTARY PUMP.

SPECIFICATION forming part of Letters Patent No. 745,857, dated December 1, 1903.

Application filed August 23, 1902. Serial No. 120,741. (No model.)

To all whom it may concern:

Be it known that we, RENO D. O. JOHNSON and WILLIAM H. REEVES, citizens of the United States, residing at the city of St. Louis, State of Missouri, have invented a certain new and useful Improvement in Rotary Pumps, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a central vertical sectional elevation. Fig. 2 is a view on the line 2 2 of Fig. 1, and Fig. 3 is a view of the character of Fig. 1 and illustrating a modification.

Our invention relates to improvements in rotary pumps and the like, our object being to provide a simple structure having high capacity, the friction of the water against the parts of the device being greatly reduced.

To this end and also to improve generally upon devices of the character indicated our invention consists in the various matters hereinafter described and claimed.

In centrifugal pumps as heretofore constructed the blades have been relatively long and so related to each other that there is a greater space between the outer ends of adjacent blades than between their inner ends, and the water or other fluid has been supplied to the side face of a blade at or near its inner end. The outer portion of a blade rotates with greater linear velocity than does its inner portion and, taken in connection with the constantly-increasing area of the passage between the blades and the constantly-increasing velocity of the fluid, is capable of discharging from its periphery a much greater quantity of water than can be delivered to it by the inner blade portion, which runs at a lower linear velocity. The result of this faulty construction is that a large portion of the water between the blades is not delivered, but is carried around, producing eddy-currents and introducing friction, both of which reduce the efficiency and capacity of the pump. Furthermore, the pumps of usual construction have a heavy end thrust on the shaft due to the presence of the supported column of fluid. In the present construction the pump-blades or, as they may be termed, "impeller-blades," are relatively short in the direction of the travel of the water and are substantially straight, and the water is supplied in a ring to the inner edge of a blade and is forced by the blade across the same and into a discharge-passage.

Referring now more particularly to the drawings, 1 represents the casing of the present device, said casing having an outer annular wall 2 and an inner wall 3 parallel to said outer wall, the inner wall having a central portion 4, in which the operating-shaft 5 is seated. The inlet-opening 6 is in the central portion of the end of the casing and below or beyond the central portion 4 of the inner wall, whereby there is produced an annular water-passage 7. Extending about the casing is a wall, producing an annular discharge-passage 8, said passage being provided with a suitable outlet 9, and a slot 10 in the wall of said outlet-passage 8 connects the same with the interior of the casing, the said slot 10 being opposite the discharge end of the annular inlet-passage 7.

Spider-arms 11 extend radially from a hub 12, suitably fixed upon the operating-shaft 5, and upon the outer ends of these arms are pump-blades or impeller-blades 13, which extend laterally from the arms and lie between the slot 10 of the discharge-opening and the annular space 7, a portion 14 of the casing-wall housing the free ends of the said blades and connecting the wall 2 with the wall of the discharge-passage 8. These impeller-blades are preferably supported upon the arms 11 at an angle to a radius extending across the space in which the said blades travel, the inner edge of a blade—*i. e.*, the edge adjacent the discharge-opening of the water-passage 7—being in advance. When the shaft 5 is rotated, the blades are correspondingly rotated in the channel in which they travel and water is drawn into the annular inlet-passage 7, this water being supplied to the inner edges of the impeller-blades. These blades, because of their inclination, "shear" the water, so to speak, and force the same across the short blades and into the discharge-passage 8, the water flowing about said passage to the outlet-opening 9. Thus the water is fed directly from the inlet-passage to the outlet-passage across the short blades and is not swept across

the blade and held in contact therewith for any considerable length of time. All tendency of the water to form eddies is avoided and very little friction results, the pump being thus capable of being operated at high speed, and thus handling a large volume of water.

We preferably provide the annular inlet-passage 7 with a series of radial partitions 15, and these partitions serve to cause the water to pass in straight lines from the inlet-opening to the impeller-blades, any tendency of the water to rotate about the annular inlet-passage 7 being prevented.

By reason of the present construction we not only avoid friction due to the passage of the water over a considerable surface, but we also provide a substantially balanced shaft, all end thrust of the operating-shaft 5 being obviated.

In Fig. 1 we have shown the impeller-blades as extending in lines parallel to the longitudinal axis of the machine. Manifestly, however, the direction in which the blades extend can be varied, and in Fig. 3 we have shown a construction in which the blades extend from the arms at an angle to the longitudinal axis of the apparatus.

It will be apparent that by causing the discharge-passage of one pump to empty into the inlet-passage 7 of a second pump several pumps can be connected to operate in multiple.

We are aware that minor changes in the construction, arrangement, and combination of the several parts of our pump can be made and substituted for those herein shown and described without in the least departing from the nature and principle of our invention.

Having thus described our invention, what we claim, and desire to secure by Letters Patent, is—

1. In a pump, an inlet-passage having an annular outlet-opening, an outlet-passage having an annular inlet-opening opposite said annular outlet-opening of said inlet-passage, a rotatable carrier, and blades upon said carrier and in the space between said annular outlet and inlet openings, said blades having their inner edges sweeping said annular outlet-opening and their outer edges sweeping said annular inlet-opening, said blades being substantially straight and inclining outwardly and backwardly; substantially as described.

2. In a pump, an inner casing-wall, an outer casing-wall extending about said inner wall, whereby an inlet-passage is produced, an annular outlet-opening from said inlet-passage, a hollow ring about said outer casing-wall and forming an outlet-passage, an annular inlet-opening to said outlet-passage and opposite said annular outlet of said inlet-passage, a casing-wall portion, as 14, connecting said ring and said outer casing-wall, a rotatable carrier, and blades upon said carrier and sweeping over said connecting casing-wall portion, said blades having their opposite edges sweeping said respective annular openings and being substantially straight and outwardly and backwardly inclined; substantially as described.

3. In a pump, an inlet-passage having an annular outlet-opening, radially-disposed partitions in said inlet-passages, an outlet-passage having an annular inlet-opening opposite said annular outlet-opening of said inlet-passage, a rotatable carrier, and blades upon said carrier and in the space between said annular outlet and inlet openings, said blades having their inner edges sweeping said annular outlet-opening and their outer edges sweeping said annular inlet-opening, said blades being substantially straight and inclining outwardly and backwardly; substantially as described.

In testimony whereof we hereunto affix our signatures, in the presence of two witnesses, this 21st day of August, 1902.

RENO D. O. JOHNSON.
WILLIAM H. REEVES.

Witnesses:
GALES P. MOORE,
GEORGE BAKEWELL.