F. J. CURTIS.

ROTARY PUMP.

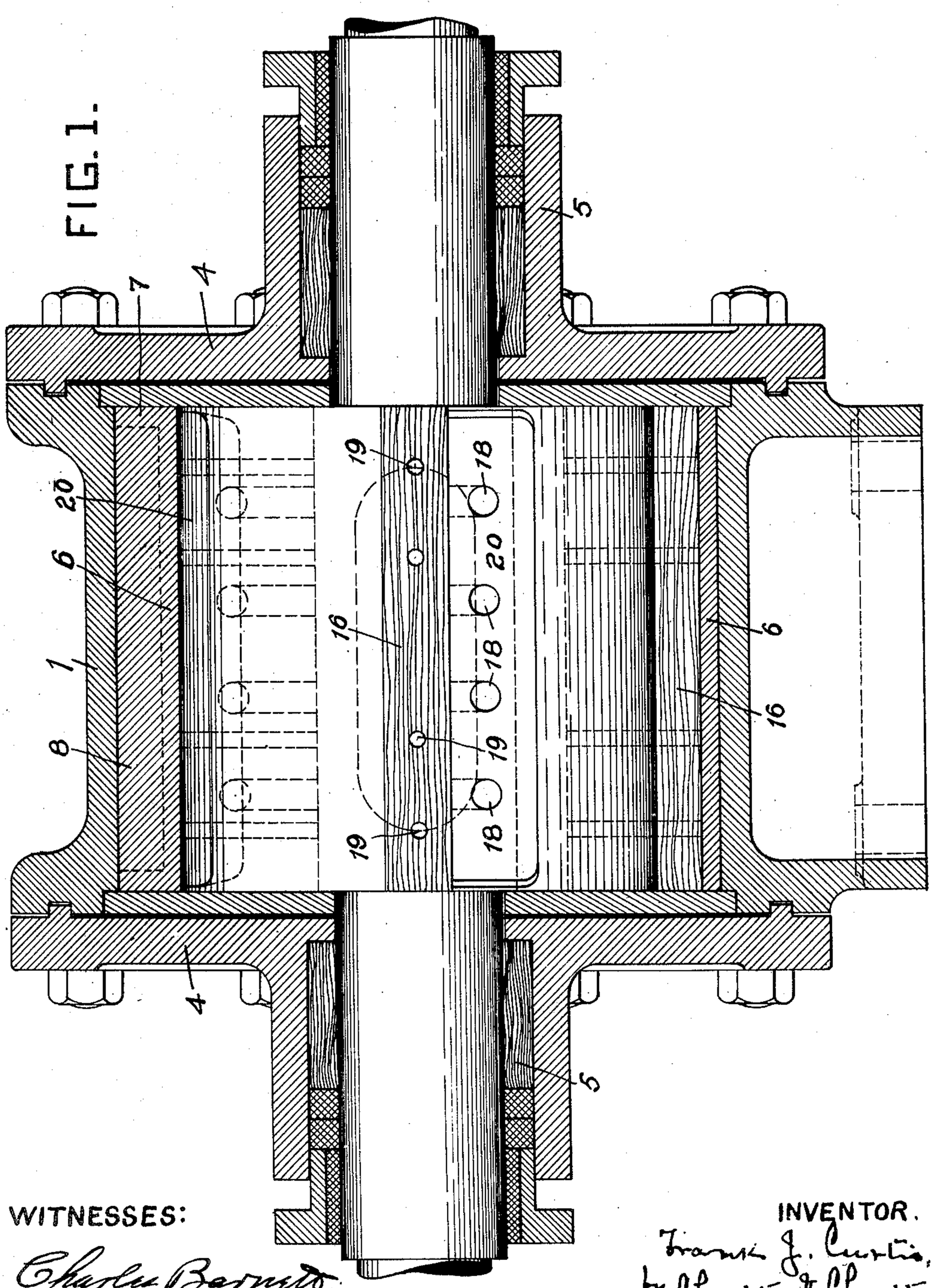
APPLICATION FILED NOV. 12, 1908.

963,690.

Patented July 5, 1910.

3 SHEETS—SHEET 1.

FIG. 1.



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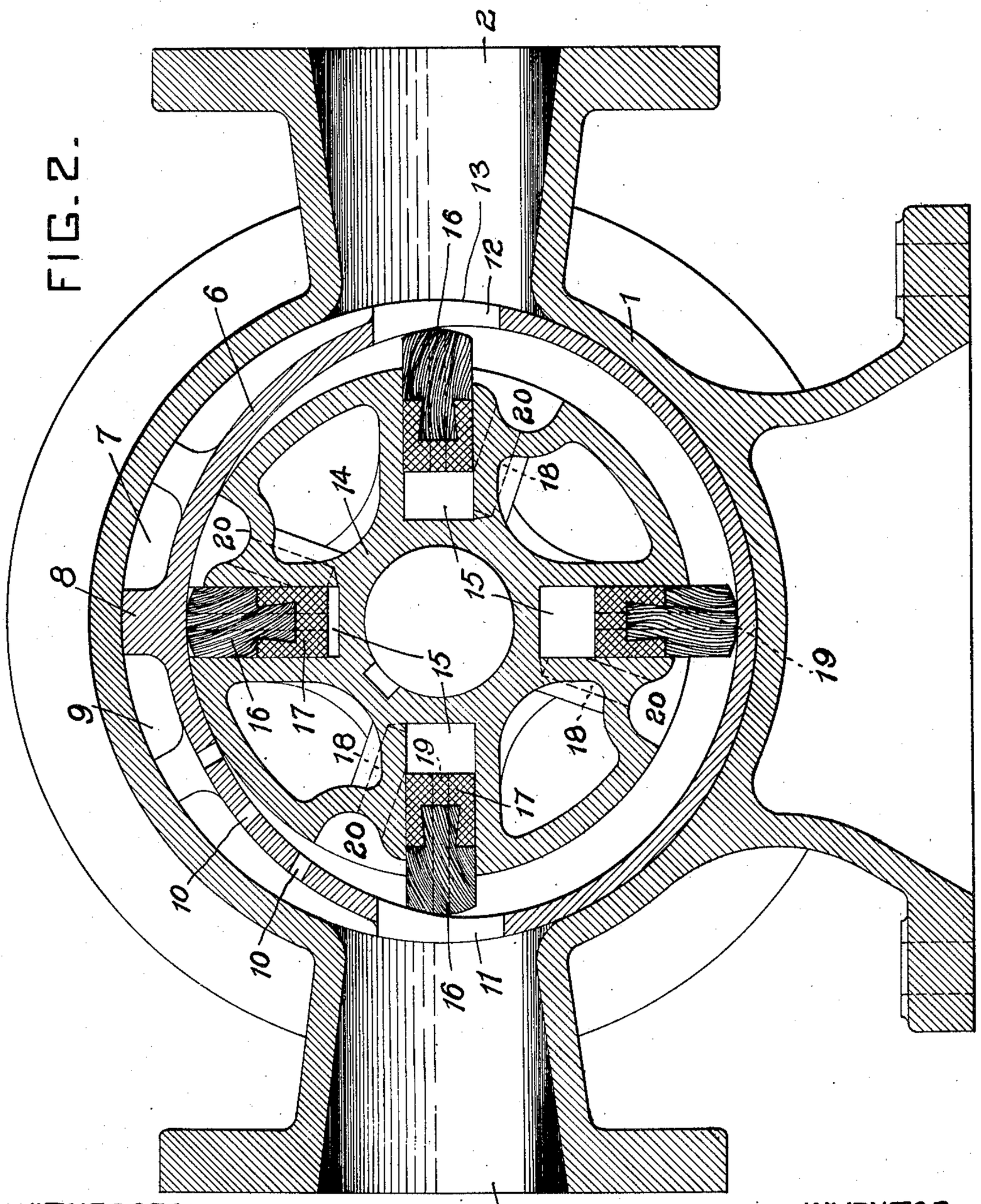
3 SHEETS—SHEET 2.

FIG. 2.



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3 SHEETS—SHEET 3.

FIG. 4.

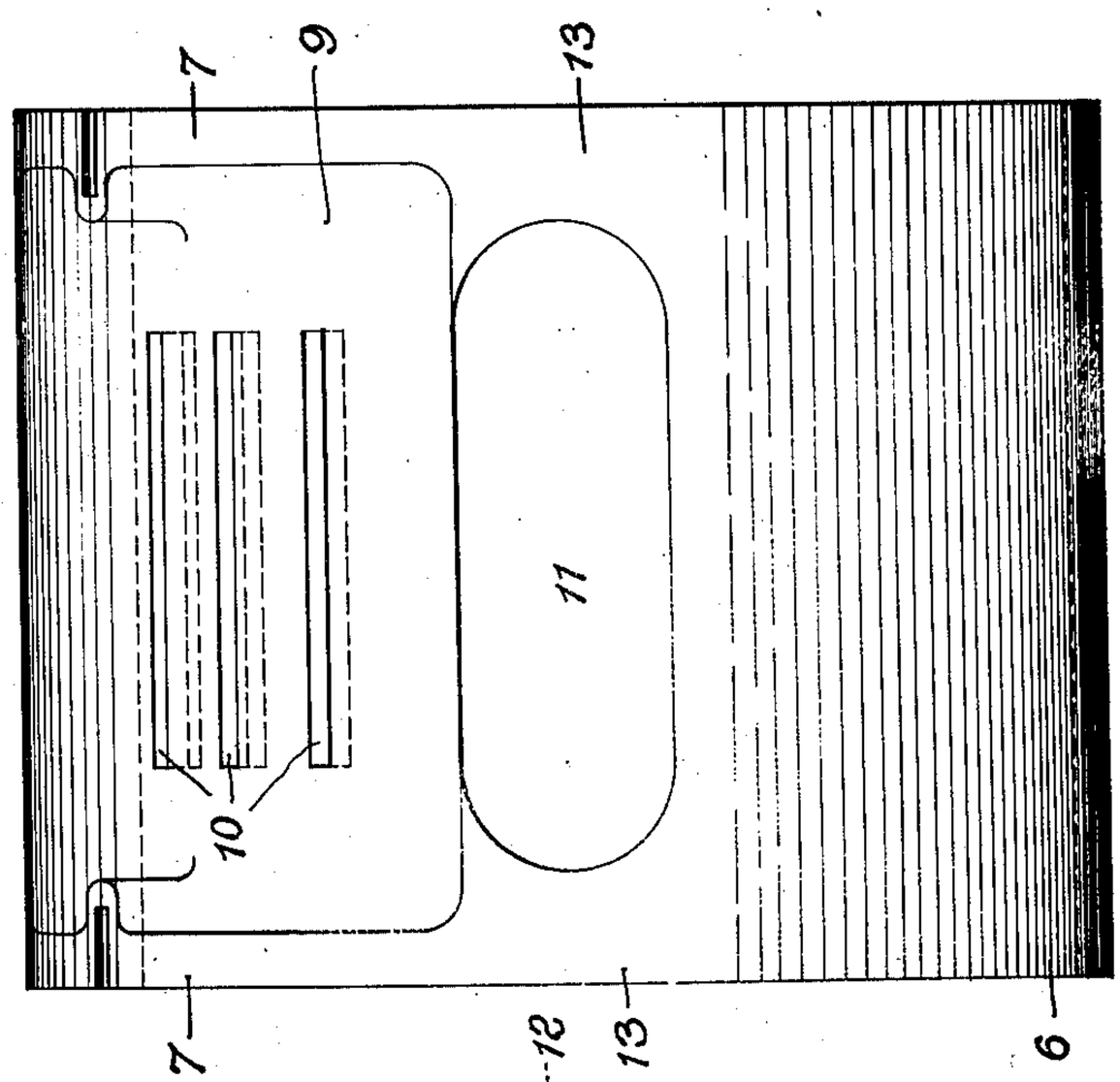


FIG. 6.

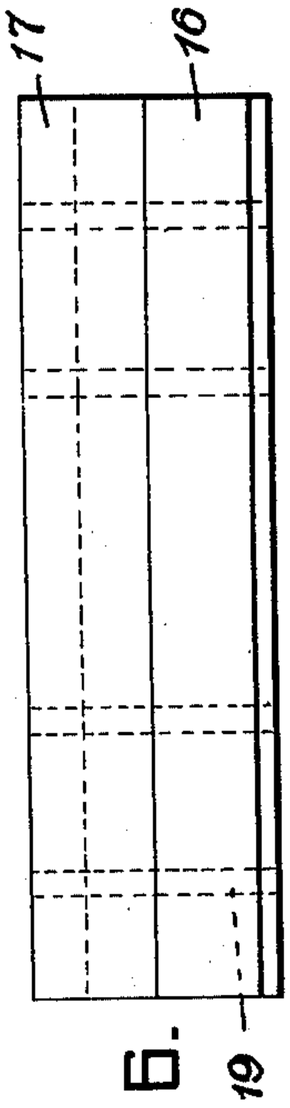


FIG. 3.

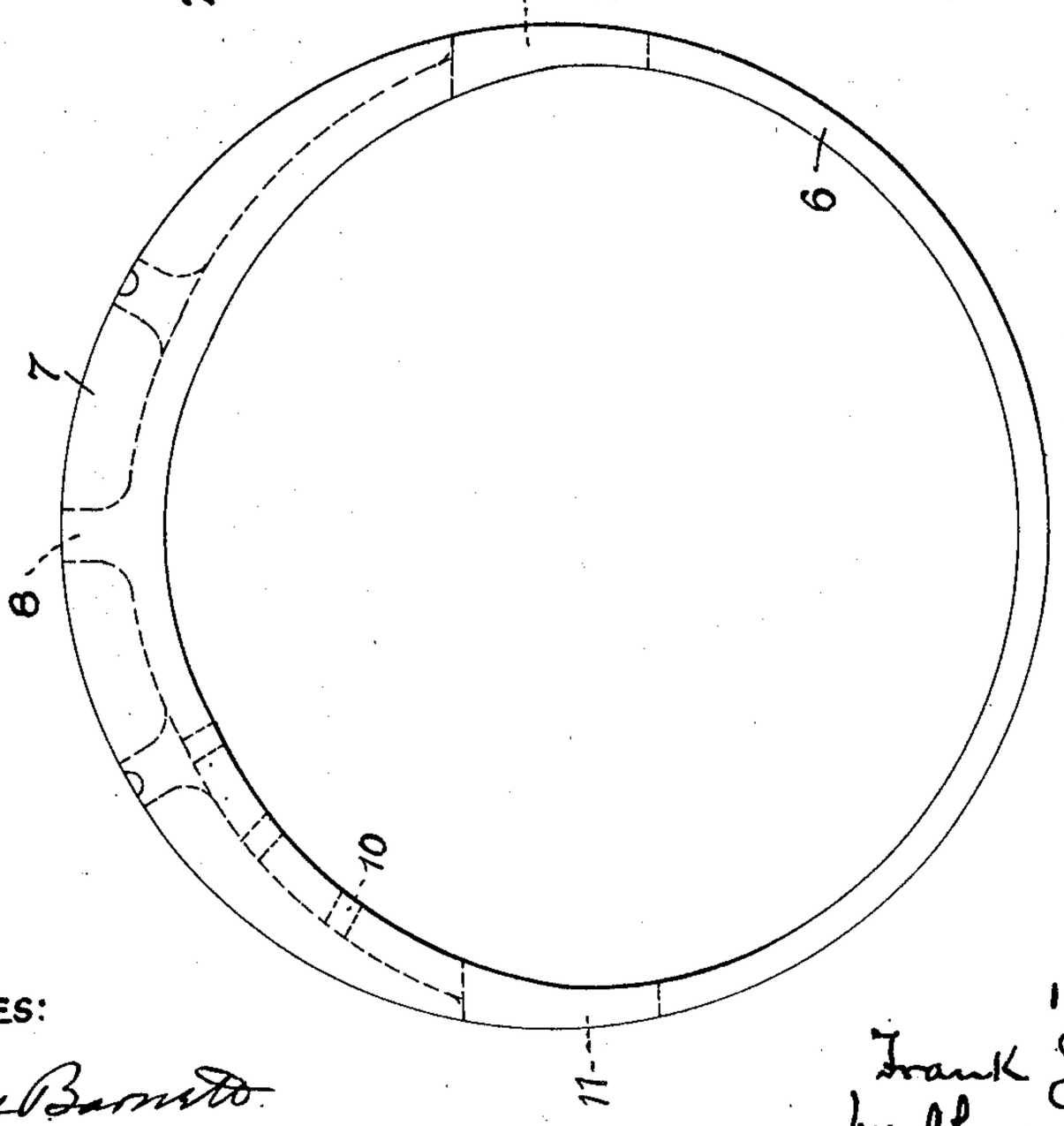
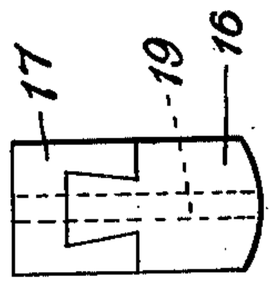


FIG. 5.



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UNITED STATES PATENT OFFICE.

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ROTARY PUMP.

963,690. Specification of Letters Patent. Patented July 5, 1910.

Application filed November 12, 1908. Serial No. 462,304.

To all whom it may concern:

Be it known that I, FRANK J. CURTIS, residing at Ben Avon, in the county of Allegheny and State of Pennsylvania, a citizen of the United States, have invented or discovered certain new and useful Improvements in Rotary Pumps, of which improvements the following is a specification.

The invention described herein relates to certain improvements in rotary pumps, and has for its object a construction in which the blades or vanes are held with increased pressure in operative position, during such times as the water pocket in front of the vane is subjected to discharge pressure, and at other times the outward movement is due practically entirely to centrifugal force.

It is a further object of the invention to provide for the practically entire discharge through the outlet opening of all the water contained in the successive pockets as formed.

It is a further object of the invention to provide for the cushioning of the blades or vanes while subjected to the higher pressure.

The invention is hereinafter more fully described and claimed.

In the accompanying drawings forming a part of this specification, Figure 1 is a view partly in section and partly in side elevation of my improved pump; Fig. 2 is a transverse section of the same; Figs. 3 and 4 are end and side elevations respectively of the lining or cylinder proper; Figs. 5 and 6 are end and side elevations of one of the blades or vanes.

In the practice of my invention the pump consists of drum 1 provided on its side with inlet and discharge nozzles 2 and 3 and having removable heads 4 closing the ends of the drum and provided with bearings 5 for the shaft of the rotary member, said bearings being eccentric to the drum. Within this drum is placed a lining 6 forming the cylinder of the pump. This lining is arranged eccentrically to the drum thus providing a space between the lining and drum. The lining is provided along the edges eccentric to the drum with flanges 7 which will bear against the inner wall of the drum and hold the lining firmly in place. The space between the drum and lining which extends from the inlet to the outlet of the pump is divided into two compartments by an abutment 8 on the lining and the portion or compartment 9 of such space connecting with the discharge port of the pump is utilized as an auxiliary discharge passage being connected with the interior of the lining or cylinder by ports 10.

The inner ends of the discharge and inlet ports of rotary pumps have heretofore been made of a width considerably greater than the least width of the ports themselves but of a length less than the cylinder so as to provide shoulders which will prevent such outward movement of the blades or vanes as will cause it to catch in the ports. On account of the length of travel of the blades along these shoulders, the ends of the blades are worn away quite rapidly and the blades become inoperative.

In my improved pump the discharge and inlet ports 11 and 12 through the lining are made narrow in the direction of movement of the blades or vanes and of a length a little less than the length of the cylinder, so as to provide holding shoulders 13 for the vanes or blades. In order to compensate for such reduction in the discharge port, the auxiliary ports 10 are provided, so that the total discharge through the main port 11 and through the auxiliary ports 10 and passage 9, will be equal to the capacity of the space or opening between adjacent vanes.

The rotary member 14 is provided with radial sockets 15 for the reception of the blades or vanes, which consist preferably of outer portions 16 formed of a hard wood and inner portions or shoes 17 formed of metal, which when the pumps are employed in mines should be of a character capable of resisting the action of acid contained in such water. It has been found that when the outer portions which are subject to the greatest wear, are formed of wood, the water will form an efficient lubricant, and the acid in the water will not have an injurious effect. If the blades or vanes were formed wholly of wood they would be too light to respond quickly and efficiently to centrifugal action and the action of gravity to move out radially when the blades are moving down past the inlet port. Such retarded action will be prevented by the weight of the metal shoes which are so located as to be subject to a minimum wear.

When passing across the outlet port the blades or vanes are subjected to a pressure tending to force them inwardly. Such inward movement is prevented by forming ports or passages 18 extending from points

on the periphery of the rotary member in front of the blades or vanes to the inner ends of the sockets 15 so that the outer and inner ends of the blades are subjected to the same pressure, but as the area of the inner ends subjected to such pressure is greater by the width of the shoulders 13 at the ends of the main discharge port 11, the blades or vanes will be held at the outer limits of their movements and in operative positions. Small ports 19 are formed through the blades so as to provide jets of water under the pressure of the discharge head, and impinging on the wall of the cylinder and forming water cushions between the ends of the blades or vanes and the cylinder. These cushions materially reduce the internal resistance of the pump.

Catch basins 20 are formed in the periphery of the rotary member in front of the blades or vanes for the reception of sand, etc. which will be washed back into these basins and will not be carried in between the walls of the rotary member and the cylinder. As the blades or vanes move from the main outlet port, they are gradually forced inwardly and the water behind the blades is forced out through the passages 18, thus washing out the sand, etc. in the basins into the contracting pockets formed by the lining, the periphery of the rotary member and the blades. As the auxiliary ports are so arranged that the last port is adjacent to the point where the water pocket disappears it follows that practically all water moved forward by the blades is forced into the discharge and none will flow back into the next pocket.

I claim herein as my invention:

1. In a rotary pump the combination of a rotary member provided with radially movable blades, each blade being movable in and out independent of the others, means for applying an increased outwardly acting pressure independently to each blade while the pocket in front of the blade is subjected to discharge pressure, a cylinder inclosing such member and provided with a main discharge port and having an auxiliary discharge port in the rear of the main discharge port.

2. In a rotary pump the combination of a rotary member provided with radially movable blades, each blade being movable in and out independent of the others, means for applying an increased outwardly acting pressure independently to each blade while the pocket in front of said blade is subjected to discharge pressure, a cylinder inclosing such member and provided with a main discharge port restricted in the direction of rotation of such member and having auxiliary discharge ports in the rear of the main discharge port.

3. In a rotary pump the combination of a cylinder provided with inlet and outlet ports, a rotary member eccentrically mounted in the cylinder and provided with non-communicating radial sockets and having passages extending from points on the periphery of the rotary member in front of the sockets to the inner ends of the latter, blades or vanes mounted in said sockets, the cylinder being provided with an auxiliary outlet arranged to permit of the escape of water from the sockets after the blades forming the rear walls thereof have passed beyond the main outlet port.

4. In a rotary pump the combination of a single cylinder having inlet and outlet ports, a rotary member eccentrically mounted in said cylinder, radially movable blades or vanes carried by the cylinder, whereby radially contracted water pockets are formed in front of the blades or vanes, each blade being movable in and out independently of the other blades, means for applying an increased outwardly acting pressure independently to each blade while the pocket in front of such blade is subject to discharge pressure and means permitting a reduction of such outwardly acting pressure after the blade forming the rear wall of the pocket has passed the discharge outlet.

5. In a rotary pump the combination of a cylinder provided with inlet and outlet ports, a rotary member eccentrically mounted in the cylinder and provided with radial sockets and having passages extending from points in front of the sockets to the inner ends of the latter, blades or vanes movably mounted in said sockets and having openings therethrough.

6. In a rotary pump the combination of a cylinder provided with inlet and outlet ports, a rotary member eccentrically mounted in the cylinder and having non-communicating radial sockets and provided with catch basins in front of the sockets and with passages extending from the sockets to the catch basins, and blades or vanes radially mounted in said sockets.

7. In a rotary pump the combination of a cylinder provided with inlet and outlet openings and having auxiliary outlets in the rear of the main outlet, a rotary member having radial non-communicating sockets and eccentrically mounted in the cylinder and having catch basins in advance of the radial sockets and provided with passages extending from the basins to the inner ends of the sockets and blades or vanes arranged in said sockets and each blade or vane being movable in and out independent of the others.

In testimony whereof, I have hereunto set my hand.

F. J. CURTIS.

Witnesses:
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