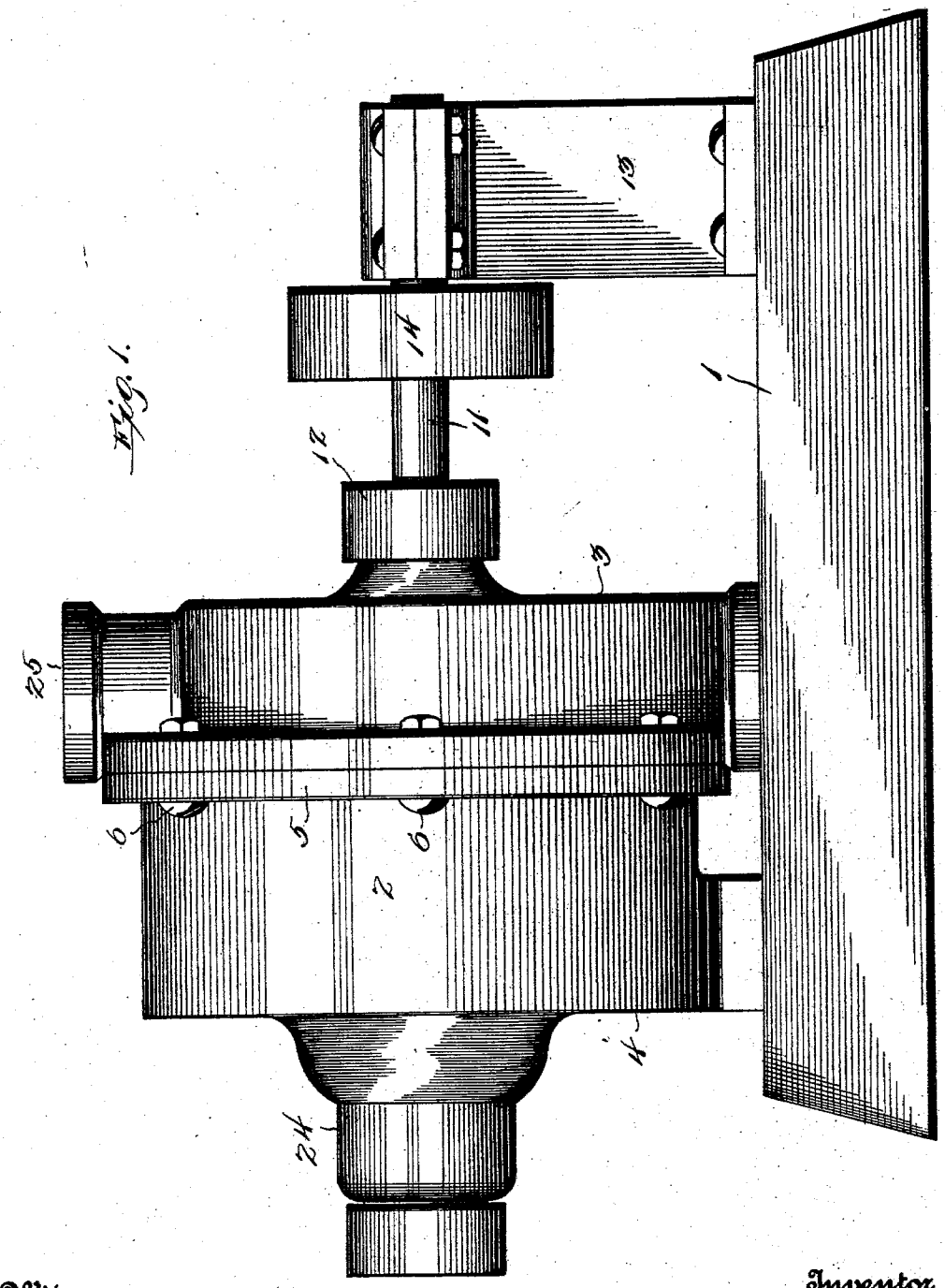
No. 758,214. PATENTED APR. 26, 1904.

J. NIELSEN.

ROTARY MOTOR.

APPLICATION FILED APR. 9, 1902.

NO MODEL. 5 SHEETS—SHEET 1.



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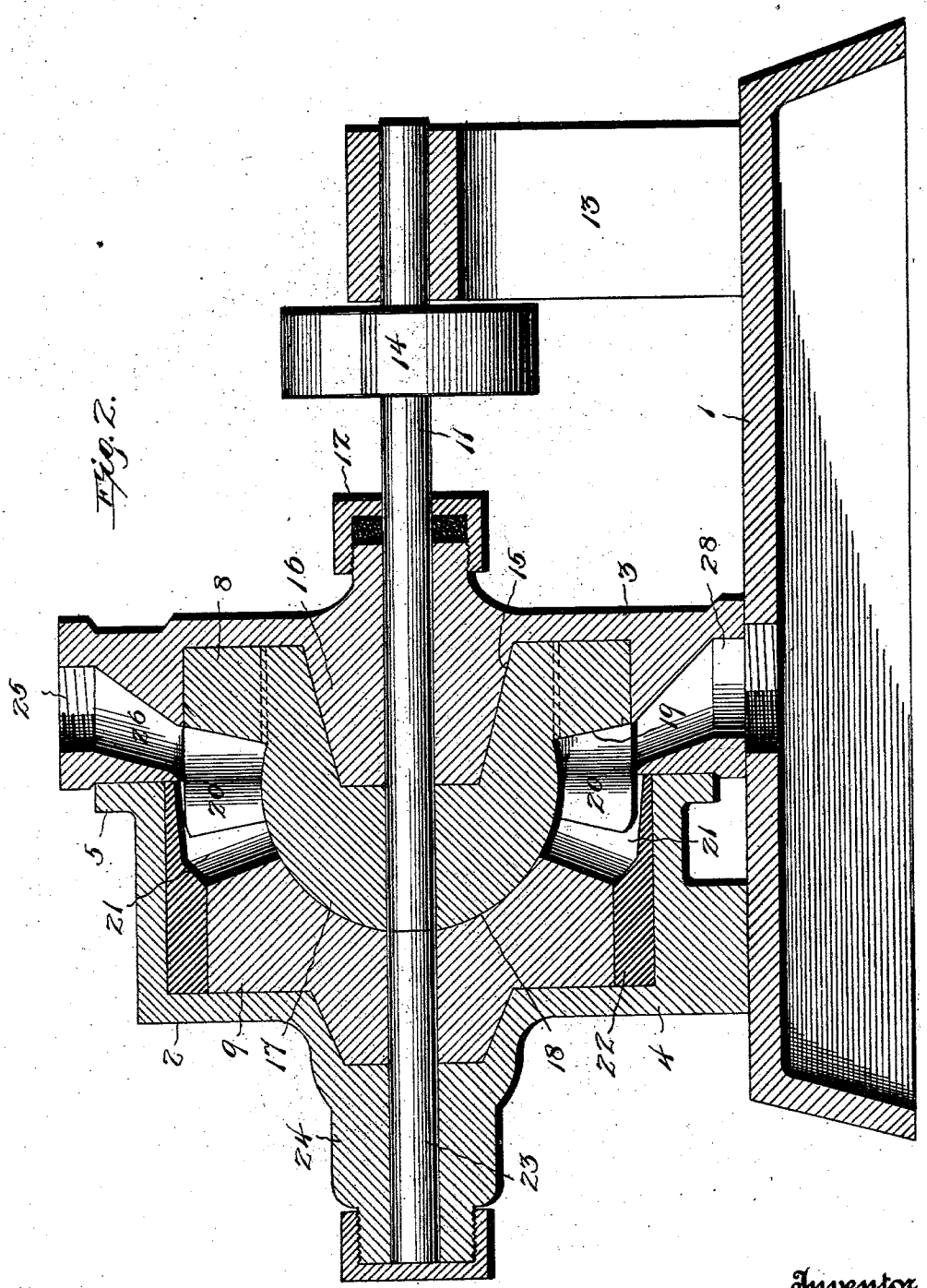
NO MODEL. 5 SHEETS—SHEET 2.

Fig. 2.



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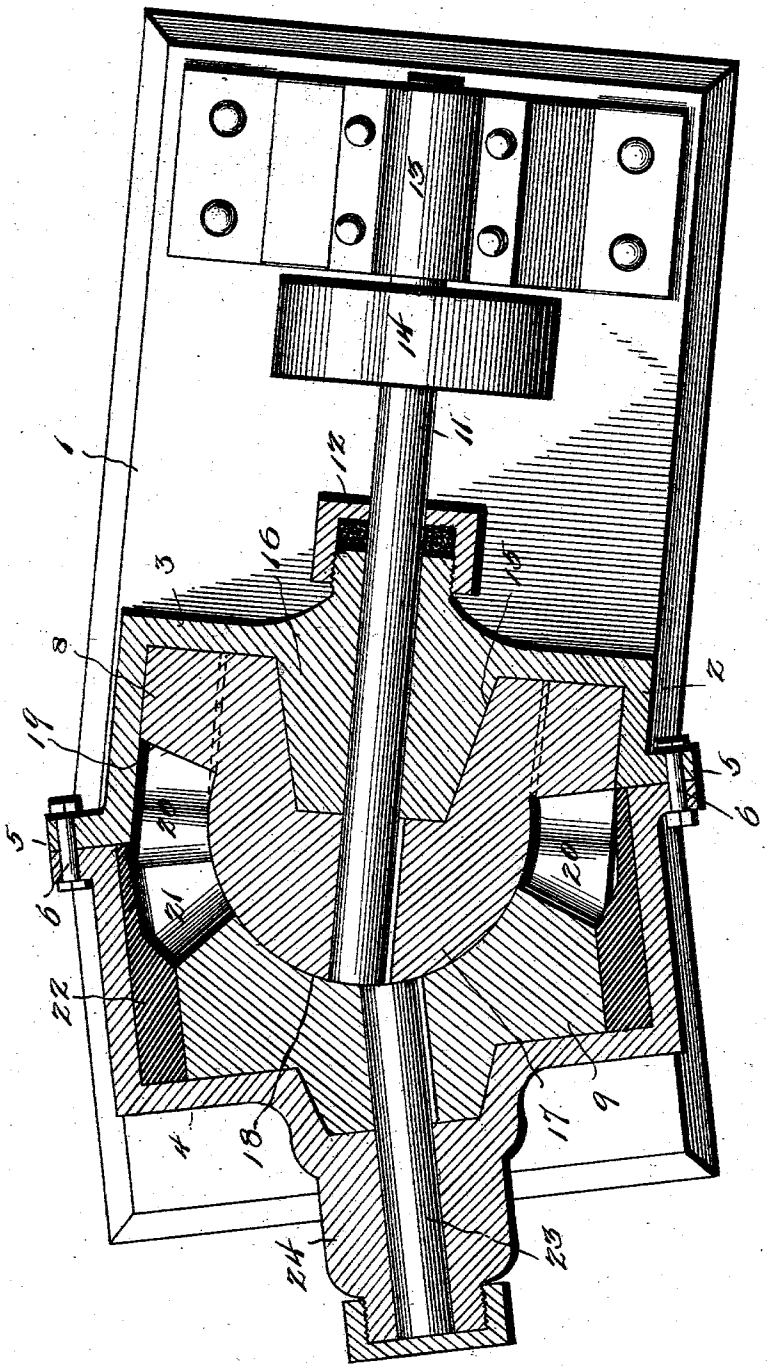
NO MODEL. 5 SHEETS—SHEET 3.

Fig. 3.



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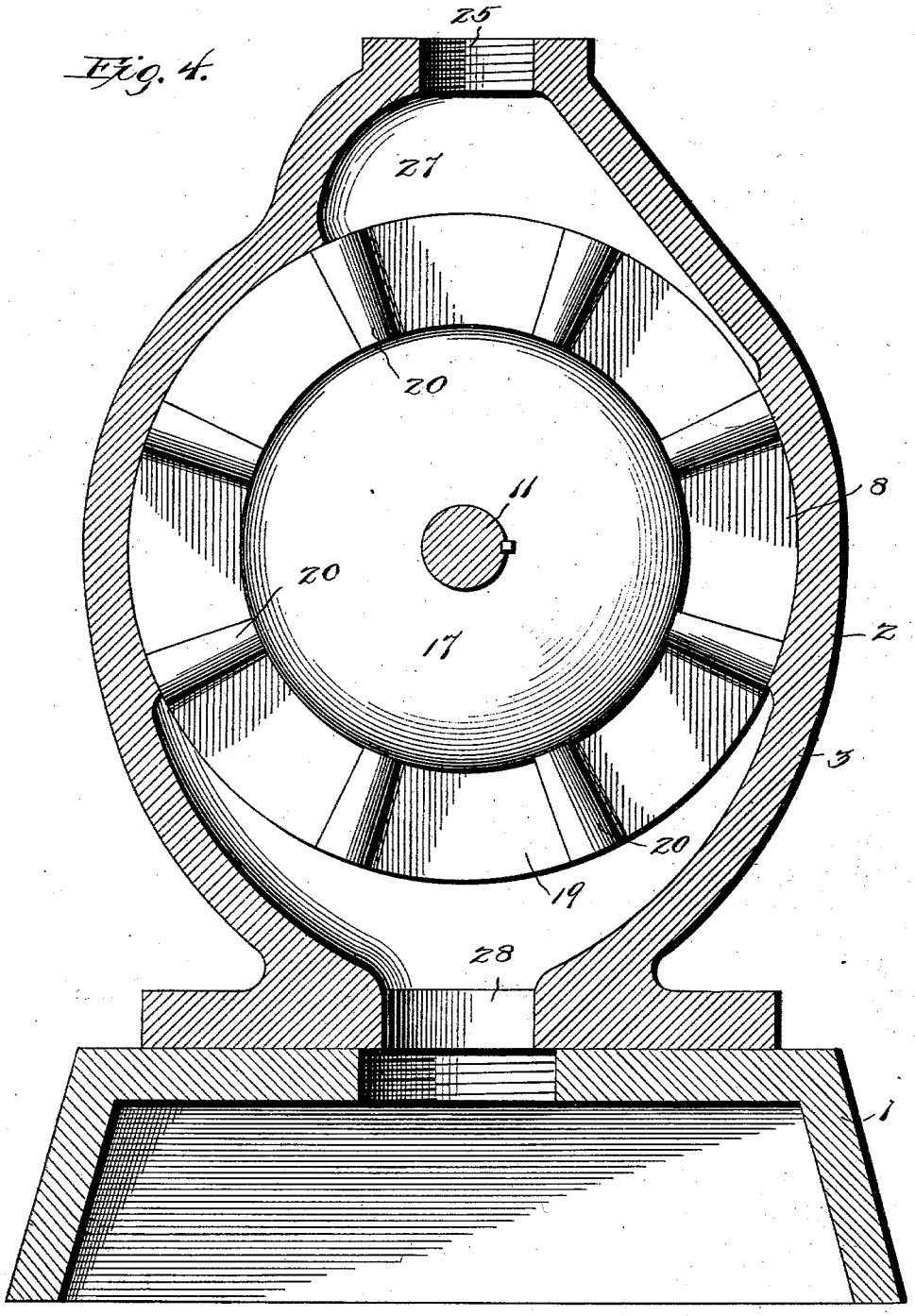
NO MODEL. 5 SHEETS—SHEET 4.

Fig. 4.



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No. 758,214. PATENTED APR. 26, 1904.

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ROTARY MOTOR.

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NO MODEL. 5 SHEETS—SHEET 5.

Fig. 6.

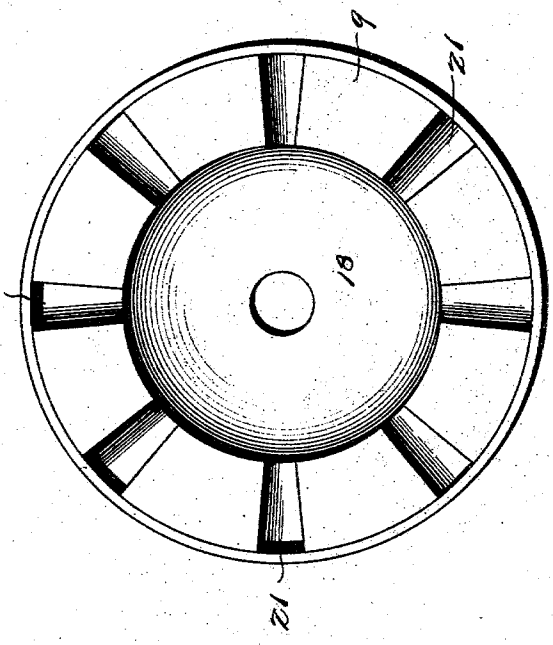
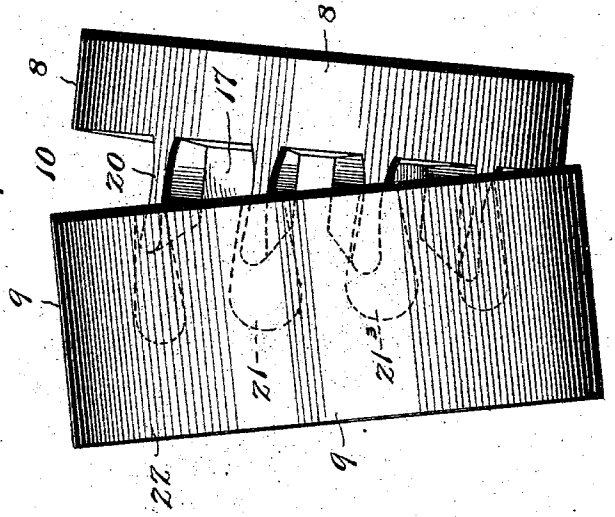


Fig. 5.



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No. 758,214. Patented April 26, 1904.

UNITED STATES PATENT OFFICE.

JENS NIELSEN, OF CEDARFALLS, IOWA.

ROTARY MOTOR.

SPECIFICATION forming part of Letters Patent No. 758,214, dated April 26, 1904.

Application filed April 9, 1902. Serial No. 102,033. (No model.)

To all whom it may concern:

Be it known that I, JENS NIELSEN, a citizen of the United States, residing at Cedarfalls, in the county of Blackhawk and State of Iowa, have invented certain new and useful Improvements in Rotary Motors, of which the following is a specification.

This invention relates to motors of the rotary type, and has in view the provision of a motor of this type comprising means for utilizing the motive agent to the greatest possible advantage and with a minimum loss of power.

As a general object the invention provides a novel construction of motor in which the rotary movement of the piston provides for steady, speedy, and powerful motion of the machinery to be operated.

While the improved construction contemplated by the present invention possesses special utility as a water-motor, it will of course be understood that the invention can be employed as a rotary pump or blower and also can be operated in conjunction with any suitable motive agent.

With these and many other objects in view, which will more readily appear as the nature of the invention is better understood, the same consists in the novel construction, combination, and arrangement of parts to be hereinafter more fully described, illustrated, and claimed.

The essential feature of the invention involved in the peculiar formation and action of the rotating piston is necessarily susceptible to a great variety of modifications without departing from the spirit of the invention; but a preferred embodiment of the latter is shown in the accompanying drawings, in which—

Figure 1 is a side elevation of a rotary motor constructed in accordance with the present invention. Fig. 2 is a longitudinal sectional view thereof. Fig. 3 is a horizontal sectional view showing the angular disposition or relation which is maintained between the separate members of the rotating piston. Fig. 4 is a transverse vertical sectional view showing the cogged face of the driving-wheel member of the piston in elevation. Fig. 5 is a detail view of the piston, showing the peculiar angular relation of the separate members thereof. Fig. 6 is a detail face view or elevation of the follower-wheel member of the piston.

Like reference-numerals designate corresponding parts throughout the several figures of the drawings.

In carrying out the invention the motor may be mounted in connection with any suitable form of supporting base or bed, as well as associating with any suitable type of casing and having any kind of gearing connected with the shafts of the separate members of the rotating piston. These details of course do not affect the fundamental feature of the invention involved in the peculiar construction of the rotating piston. However, for illustrative purposes a preferred embodiment of the invention is shown in the accompanying drawings, and particular reference thereto will now be made.

Referring to the drawings, the numeral 1 designates the main supporting-base of the motor, which may be hollow or otherwise and supports thereon a main motor-casing 2. This main motor-casing 2 is preferably formed of separate circular sections 3 and 4, which are respectively of different diameters and provided at their meeting edges with the outturned abutting flanges 5, united by the fastening-bolts 6, thus detachably coupling together the separate sections of the casing, while at the same time providing a perfectly-tight joint between the meeting edges thereof. As plainly shown in Fig. 3 of the drawings, the separate circular sections 3 and 4 of the casing are set at an angle to each other—that is, the central lines, or what might be properly termed the "axes" of the casing, are disposed at an obtuse angle to provide for properly receiving and housing the separate members of the rotating piston, as presently described. The section 3 of the circular casing is of a less diameter than the other and complemental section 4 to permit of the proper play of the separate members of the rotating piston, and referring particularly to this piston the reference-numeral 7 designates the piston as an entirety, said piston being illustrated in detail in Fig. 5 of the drawings

The rotating piston 7, which is housed entirely within the casing 2, is of a peculiar formation and action. Essentially speaking, it comprehends two members 8 and 9, respectively, having a loosely-interlocked connection, so as to be compelled to rotate in unison, and disposed at an angle to each other to leave therebetween an intervening angular working space 10 for the motive agent which may be employed to drive or operate the piston or for the fluid which may be circulated by the apparatus when the same is used as a rotary pump or blower. Irrespective of the use of the rotating piston 7 the peculiar relation of the separate members 8 and 9 is always preserved, and for convenience in understanding the action of the piston the member 8 thereof will be referred to as the "driving-wheel" member and the other member, 9, as the "follower-wheel" member.

The driving-wheel member 8 of the rotating piston is concentrically mounted within the smaller casing-section 3 and is fitted to the inner end of a shaft-section 11, extending through a stuffing-box 12 at the outer side of the casing-section 3 and journaled in an exterior bearing 13. At a point intermediate the bearing 13 and the casing of the motor the shaft-section 11 may have mounted thereon a pulley or gear wheel 14, according to the use of the motor. In order to bring the bearing for the driving-wheel member 8 as close as possible to the force applied to the said wheel, the latter is provided in the outer side thereof with a reëntrant conical bearing-seat 15, which receives a similarly-shaped inwardly-projecting bearing-boss 16, formed integrally and projecting inwardly from the inner side of the smaller casing-section 3.

The driving-wheel member 8 of the rotating piston has a central ball-and-socket-joint connection with the adjacent face of the follower-wheel member 9, said ball-and-socket-joint connection consisting of a globular or ball portion 17, projected centrally from one side of the driving-wheel member and snugly but loosely registering within a concave bearing socket or seat 18, formed centrally in one side of the follower-wheel member. In addition to the globular or ball section 17 the driving-wheel member 8 is further provided at one side with an annular active beveled face 19, from which is laterally projected a plurality of offstanding impact-cogs 20. These impact-cogs are of duplicate formation and are preferably of an inwardly-tapering form from their outer ends, as plainly shown in detail Fig. 5 of the drawings. The said inwardly-tapering impact-cogs 20 are designed to loosely interlock with and play within inwardly-flared cog sockets or recesses 21, formed in a circular series within one face of the follower-wheel member 9.

In the construction of the follower-wheel member 9 the same may be constructed in one piece or, as shown in the drawings, namely, of a solid body portion and an outer rim portion 22, which overhangs and covers the sockets or recesses 21 to provide a completely-inclosed basket for receiving the impact-cogs 20 during the rotation of the piston. It will be observed that the said outer rim portion 22 overhangs and incloses the outer sides of the sockets or recesses 21 and combines with the central ball 17 of the driving-wheel member to produce a closed chamber for the cogs. In this connection it will also be noted that the follower-wheel and its casing are of larger diameter than the driving-wheel and its casing for the purpose of providing a perfectly free play for the cogs to insure an easy and positive running of the motor. The follower-wheel member 9 is also mounted upon one end of a shaft-section 23, extending through a bearing or box 24 at the outer side of the casing-section 4.

The shaft-sections 11 and 23, respectively supporting the driving-wheel and follower-wheel members of the rotating piston, are maintained in fixed angular relation to each other, thus maintaining the angular relation of the separate members of the rotating piston. This angular relation of the separate members of the rotating piston brings said members in contact at one side of the axes of the rotation, and consequently during the rotation of the piston each individual impact-cog partly retreats out of the socket coöperating therewith and then reënters such socket as the rotation continues. It will thus be seen that there is always a completely housed or closed interval between the two members of the rotating piston, and in the use of the apparatus as a motor said interval is designed to receive the motive agent supply through an inlet-opening 25, formed in one side, preferably at the top of the smaller casing-section 3. This inlet-opening 25 is downwardly tapered, as indicated at 26 in Fig. 2 of the drawings, and circumferentially flared over the top portion of the driving-wheel member, as indicated by the reference-number 27 in Fig. 4 of the drawings. This particular formation of the motive-agent inlet provides for a distribution of the motive agent into the tapered working space 10 between the angularly-related members of the piston. The outlet-opening 28 at an opposite point in the casing-section 3 is correspondingly shaped to the inlet-opening 26 in order that the exhaust or discharge will be perfectly free, so as to obviate any back pressure. When the motive agent is introduced into the inclined working space or interval between the separate members of the piston, the pressure exerts itself in a direction tending to force the two members of the piston apart, and as this pressure is not exerted in a line with the shafts of the said pis-

ton members the tendency referred to necessarily assists in a rotation of the piston as an entirety. Such friction as may be exerted endwise of the follower-wheel member will serve to hold such follower-wheel back against the cogs of the driving-wheel member, and thus make the joint between the cogs and their sockets close, thus insuring a better response of the wheel to the pressure of the motive agent.

In further explanation of the action of the motor it should be stated that by reason of the angular relation of the driving-wheel and follower-wheel members of the rotating piston the latter is necessarily larger or of greater width at one side of the shafts than at the opposite side. While this is true, the opposite sides of the piston, respectively at opposite sides of the shaft, are of equal weight, and there is an open working space 10, which always occupies a fixed plane with reference to the axis of rotation of the separate members of the piston such working space 10 being plainly shown in detail Fig. 5 of the drawings. The impact-cogs move through this working space when the wheel is in motion, and assuming the said working space to be filled with water in the use of the machine as a water-motor it will be obvious that there is more space for water at one side of the axis of the piston than at the other. Therefore, inasmuch as the piston proper is of equal weight on both sides of its axis, the addition of a considerable quantity of fluid upon one side will necessarily make that side of the wheel the heavier and cause the same to have an overbalancing action. The lateral or spreading pressure referred to is only a mere incident to the operation of the piston, as the overbalancing action is the primary cause of rotation, and said action is maintained continuously to provide for the continuous rotation of the piston by reason of the constant circulation of the fluid through the inlet, through the working space 10, and out through the outlet of the casing. If there were no impact-cogs in the working space 10, the fluid would obviously pass through the casing without turning the piston; but the said cogs divide the working space into a number of independent chambers, each filling from the inlet, and after having exerted its weight or overbalancing influence at one side of the axis of the piston discharges through the outlet. Water or other fluid under head or pressure will proportionately increase the overbalancing weight, and therefore the power to turn the piston.

The use of the machine as a pump involves simply a reversal of the operation described with power applied to a shaft or shafts, as will be well understood.

It will be obvious to those familiar with the art that the motor may be used in various ways other than thus described, and it will also be understood that various changes in the form, proportion, and minor details of construction may be made within the scope of the invention without departing from the spirit or sacrificing any of the advantages thereof.

Having thus described the invention, what is claimed, and desired to be secured by Letters Patent, is—

1. In a machine of the class described, the combination with the casing, of a rotating piston consisting of separate driving and follower wheel members respectively, the driving-wheel member having at one side a beveled face, a central ball portion, and a series of impact-cogs projected laterally from said beveled face, and the follower-wheel member having a central concaved bearing-socket, a circular series of sockets or recesses receiving the cogs of the other wheel member, and an outer imperforate rim portion overhanging and covering the said sockets or recesses, said rim portion combining with the central ball portion of the driving-wheel member to completely close in both the outer and inner sides of the sockets or recesses receiving the cogs, substantially as set forth.

2. In a machine of the class described, the combination of the casing consisting of separate sections set at an angle to each other and respectively of different diameters, inlet and outlet connections with the casing-section of smaller diameter, and a rotating piston consisting of angularly-related driving and follower wheel members respectively mounted in the smaller and larger casing-sections and having cogged connection, the cogs being of an inwardly-tapering form from their outer ends and said follower-wheel member being provided with an outer rim portion overhanging the cogs when engaged therewith.

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

JENS NIELSEN.

Witnesses:
CARL BRANDT,
J. P. LARSEN.