No. 751,196. PATENTED FEB. 2, 1904.

J. NIELSEN.

ROTARY PUMP.

APPLICATION FILED MAY 2, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

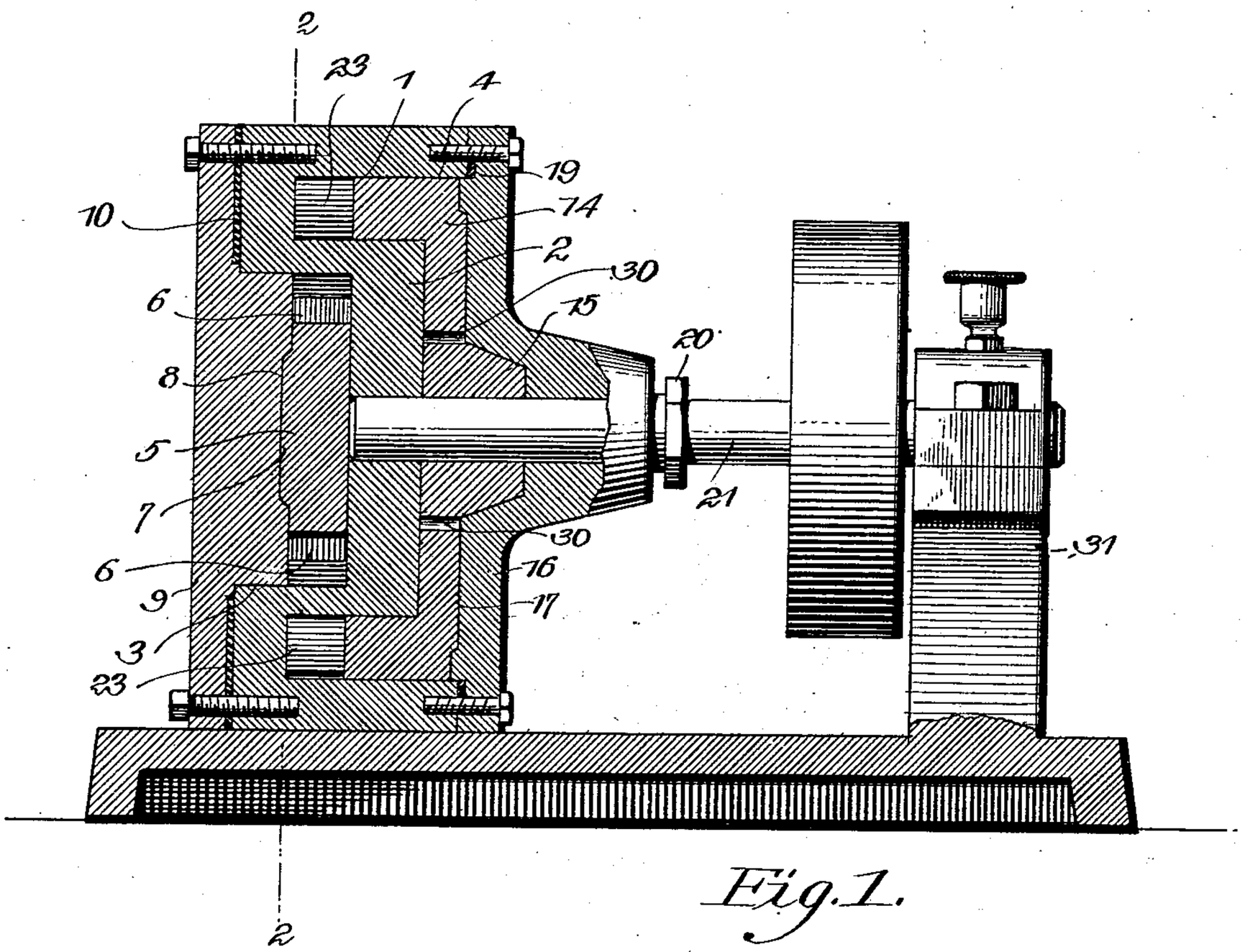


Fig. 1.

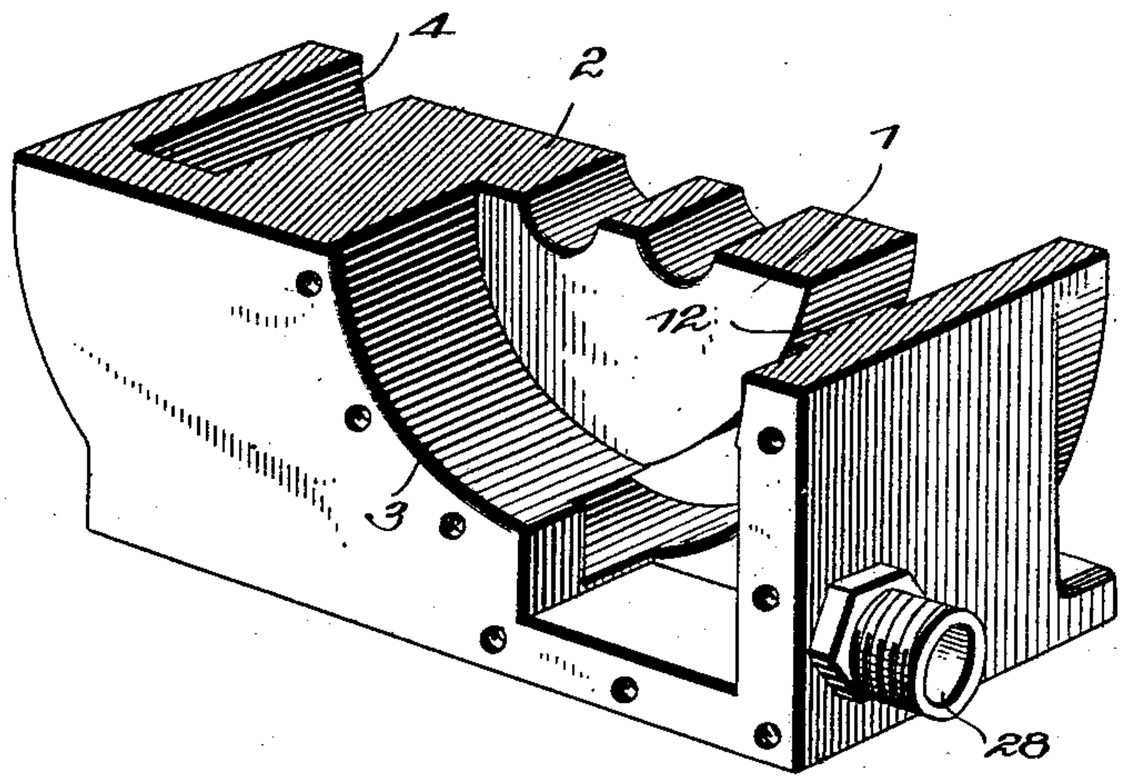


Fig. 3.

Witnesses
E. P. Stewart
Jno. E. Parker

Jens Nielsen, Inventor:
by C. A. Snow & Co.
Attorneys

No. 751,196. PATENTED FEB. 2, 1904.

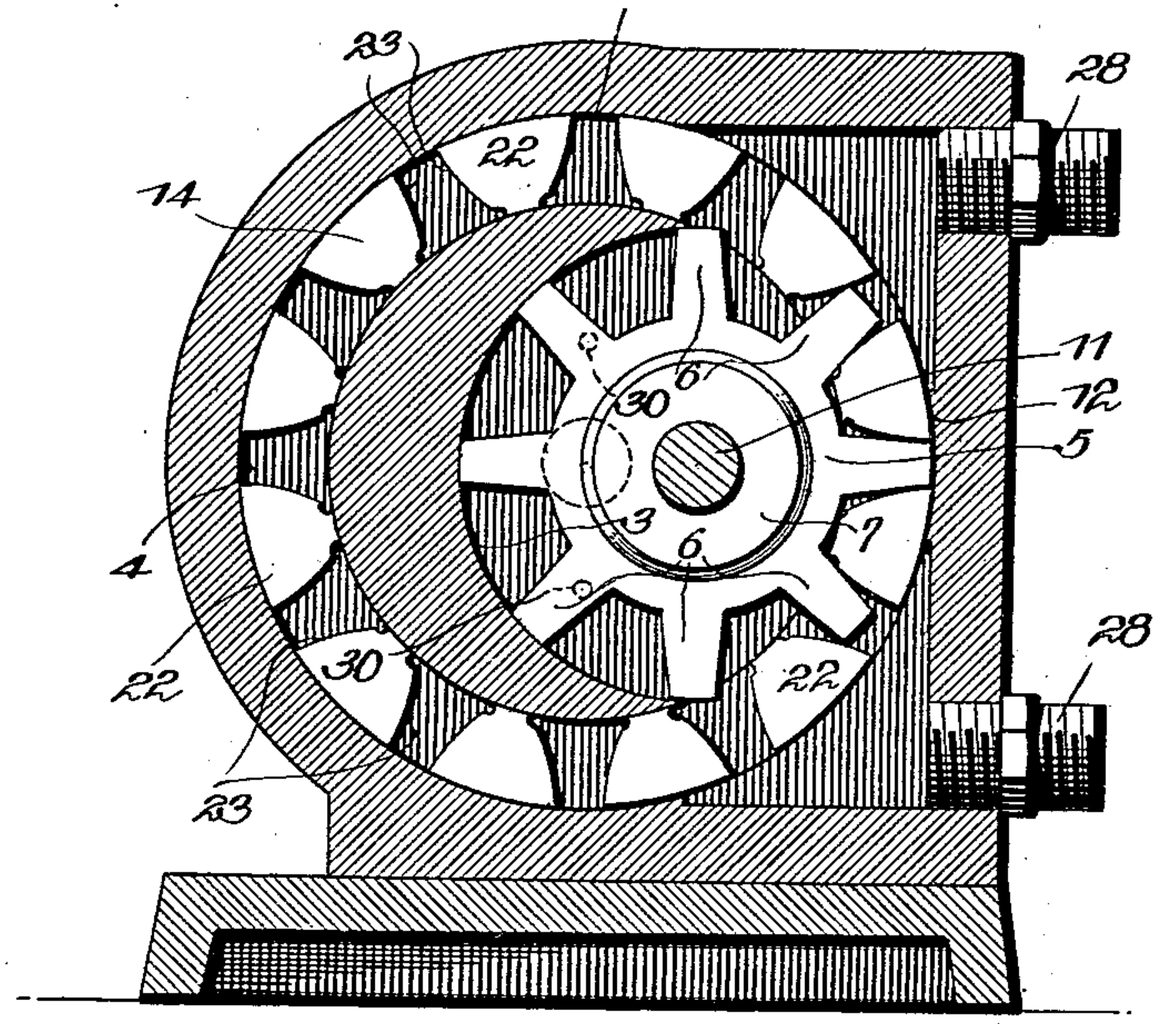
J. NIELSEN.

ROTARY PUMP.

APPLICATION FILED MAY 2, 1903.

NO MODEL. 2 SHEETS—SHEET 2.

Fig. 2.



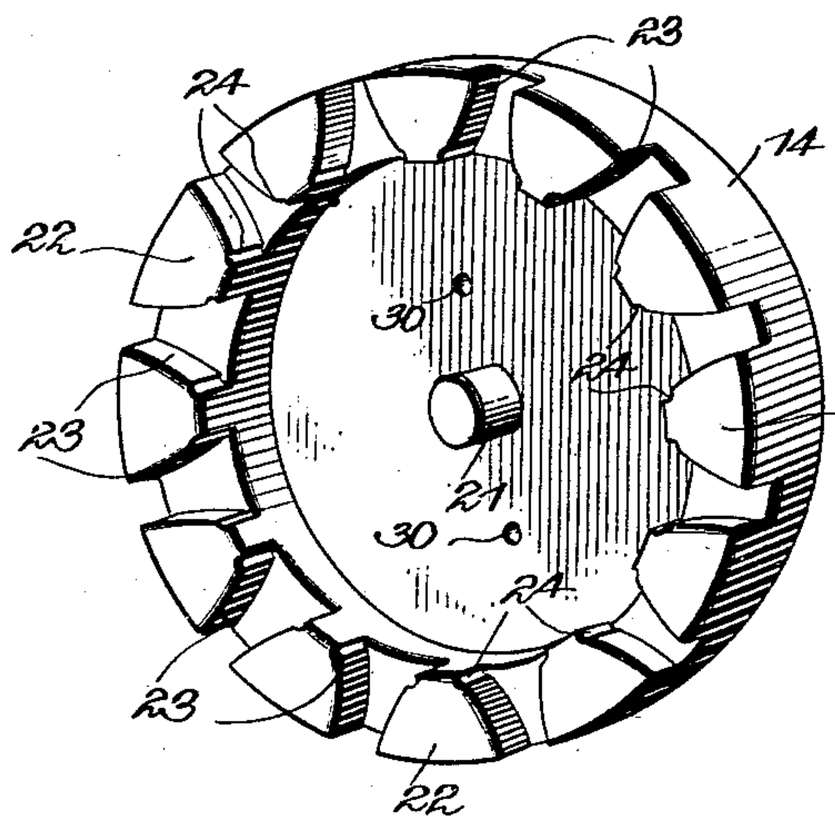


Fig. 4.

Witnesses
E. F. Stewart
Jno. E. Parker

Inventor:
Jens Nielsen,
by Church & Co.
Attorneys

No. 751,196. Patented February 2, 1904.

UNITED STATES PATENT OFFICE.

JENS NIELSEN, OF CEDARFALLS, IOWA.

ROTARY PUMP.

SPECIFICATION forming part of Letters Patent No. 751,196, dated February 2, 1904.

Application filed May 2, 1903. Serial No. 155,405. (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 a new and useful Rotary Pump, of which the following is a specification.

This invention relates to certain improvements in rotary pumps or motors, and has for its principal object to provide a rotary pump having a constant and uniform discharge and in which the operative parts may be moved with less friction than in similar pumps of the same general character now in use.

With these and other objects in view the invention consists in the novel construction and arrangement of parts hereinafter described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in the form, proportions, size, and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of the invention.

In the accompanying drawings, Figure 1 is a sectional elevation of a rotary pump constructed in accordance with the invention. Fig. 2 is a transverse sectional elevation of the same on the line 2 2 of Fig. 1. Fig. 3 is a sectional perspective view of the cylinder or main casing and intermediate partition. Fig. 4 is a detail perspective view of the main piston member detached.

Similar numerals of reference are employed to indicate corresponding parts throughout the several figures of the drawings.

The pump forming the subject of the present invention is one of that type in which a cog-wheel or annular rack is employed in connection with a rotary-pump element resembling in general contour an ordinary spur-gear and traveling inside of and intermeshing with the rack and the intermeshing point forming the divisional line between the entrance and exit ports of the pump-cylinder.

In the drawings, 1 indicates the cylinder proper, having an intermediate partition 2, which divides the main casing into two main chambers 3 and 4, each of which contains one of the revoluble pumping members. The chamber 3 is circular in form and serves to receive a revoluble pumping member in the form of a toothed follower-wheel 5, the teeth 6 of which extend in radial lines from the periphery of the wheels, said teeth being preferably formed on slightly-tapering straight lines, so that the root of the tooth shall be of somewhat greater width than the apex. This pump-wheel fits snugly in its chamber and at one side is provided with an offset portion 7, fitting snugly within a recess 8, formed in the inner wall of a removable cylinder-plate 9, a suitable packing material 10 being preferably introduced between the cylinder and plate in order to prevent leakage. The pump-wheel 5 is mounted on or is secured to a short shaft 11, adapted at one end to a bearing-opening in the intermediate partition 2 and at the opposite end fitting in a similar bearing-opening in the removable cylinder-head 9.

In that side of the casing opposite the chamber 3 is the annular chamber 4, and a portion of the wall which divides the two chambers from each other is cut away, so that the chambers intersect tangentially, as indicated in Fig. 2. At the point of intersection of the chambers is an abutmeut 12, which, in connection with the revoluble pumping members, divides the upper from the lower portion of the chambers.

In the chamber 4 is placed a cup-shaped piston 14, the disk portion of which is provided with an enlarged and tapering hub 15, fitting within a correspondingly-shaped recess in a removable cylinder-head 16, and the outer face of the disk is further provided with a projecting portion 17, fitting within a correspondingly-shaped recess formed in the inner wall of the removable head. To positively prevent the escape of the fluid, a packing ring or gasket 19 is introduced between the removable head and the outer wall of the main casing, and said removable head is further provided with a stuffing-box having a gland-nut 20 of the usual construction, through which passes a piston-supporting shaft 21. The piston is keyed to the shaft, and the inner end of said shaft is adapted to a suitable bearing-opening formed in the intermediate partition

at a point adjacent to and parallel with the corresponding bearing-opening for the similar shaft 11.

The flange, which forms a part of the piston, fits snugly within the annular chamber 4, and said flange is provided with a plurality of recesses forming teeth 22, the inner and outer faces of which are concentric with the axis of rotation of the piston. The other sides of the teeth are convex, as illustrated at 23, being arranged on a substantially cycloidal curve in order to more closely interfit with the substantially straight tapering lines of the teeth 6, while the width of the spaces between the adjacent teeth at the periphery of the piston is but a trifle greater than the width of the apex of said teeth, so that when the parts come into mesh the peripheral line of the piston will be to all intents and purposes continuous and in connection with the abutment 12 will prevent the passage of fluid from one side of the chamber to the other.

At the juncture of the inner and curved walls of each of the teeth 23 is a groove 24, forming abrupt sharp edges, which serve to prevent clogging when pumping water containing sand, mud, or other impurities.

In the upper and lower portions of the main casing are ports 28, extending on tangential lines from the annular chamber 4, and either of these may form the inlet and the other the outlet portion. Such ports may be arranged at the top or bottom of the casing or otherwise so disposed as to permit the entrance and discharge of the material to be pumped or the actuating fluid for the motor, allowance in all cases being made for the abutment and the intermeshing points of the pump elements between such points.

In order to provide for the proper balancing of the piston, especially when the device is used as a motor, the disk portion of the piston is provided with a number of openings 30, through which the fluid may freely pass to the outer face of the disk, and thus balance the pressure on both sides of said piston.

The pump-cylinder is mounted on a suitable base which also carries a standard 31, having a bearing for the end portion of the piston-supporting shaft 21, and on said shaft is also mounted a belt-wheel or gear-wheel for the transmission of power to or from said shaft 21.

When the device is used as a pump, the shaft 21 is rotated from any suitable source of power and the fluid is led through one of the ports—for instance, the upper port—will enter between the teeth 22, and be carried around through the annular chamber 4 in the direction of the opposite port. A portion of the water will enter the circular chamber 3 between the teeth and be carried around by the teeth 6 until the latter are about to intermesh with the teeth 22, at which time the water in the spaces between said teeth 6 will be forced downwardly through the spaces between the teeth 22, and as the parts more fully intermesh the teeth 6 will almost completely fill the spaces between the teeth 22 and form at one point a practically continuous peripheral line for the piston, so that there will be no chance of the water going backward toward the inlet-port.

Where the device is employed as a motor, the operation is substantially the same, the fluid under pressure acting on the teeth of both the piston member and the wheel 5 and freely escaping at the outlet-port.

It will be observed that the piston member 14 actuates the wheel 5; but this construction need not be rigidly followed in all cases, as in some instances the two shafts may be connected by gears in order to permit driving of the two elements at proper speed, and thus in a measure prevent or lessen the wear on the contacting parts of the two revoluble members.

It will be observed that both the revoluble members have supports on each side, the intermediate partition forming both a divisional wall between the two chambers and also serving as a support for the shafts on which the two members are mounted.

Having thus described the invention, what is claimed is—

1. In a device of the class specified, a casing having an intermediate partition dividing the interior of the casing into a pair of circular intersecting chambers, a pair of revoluble intermeshing pumping members disposed one in each of said chambers, and supporting-shafts for said members, each of the shafts having a bearing in the partition.

2. In a device of the class described, a casing having an intermediate partition separating said casing into a circular chamber and an annular chamber, a revoluble piston having a toothed flange arranged in the annular chamber and the web or disk portion of said piston being provided with openings to permit equalization of the pressure on opposite sides of the piston, a toothed wheel forming the opposite piston member, said toothed wheel intermeshing with the teeth of the piston and being disposed within said circular chamber, and shafts for said members, each of said shafts having a bearing in the partition.

3. In a device of the class specified, a casing having an intermediate partition forming intersecting annular and circular chambers, a cup-shaped piston arranged on one side of the partition and having its flange portion toothed and fitting within the annular chamber, a toothed wheel forming a secondary piston member and intermeshing with the teeth of the piston, and carrying shafts for both piston members, there being bearing-openings formed in the partition for the support of said shafts.

4. In a device of the class specified, a casing having in one side a recess forming a circular chamber and in the opposite side a recess forming an annular piston-chamber, said chambers intersecting tangentially, there being between said chambers a dividing-partition, a flanged piston member fitting in one side of the casing and having its toothed flange portion disposed in the annular chamber, a toothed wheel forming a secondary piston member and fitting within the circular chamber, means for supporting the pistons, removable cylinder-heads at the opposite sides of the casing, and supporting-shafts for said piston members, each of the shafts having a bearing in the dividing-partition as well as in the removable cylinder-head into which it extends.

5. In a device of the class specified, the combination with a casing having a partition dividing said casing into a circular chamber and an annular chamber, a piston member having a toothed flange fitting within the annular chamber, the opposite sides of the teeth of said flange being arranged on convex lines and grooves being formed at the intersection of the convex sides and the inner surfaces of the teeth, and a wheel forming a secondary piston member and disposed within the circular chamber, said wheel having radiating teeth tapering from root to apex and the side walls of such teeth being arranged on straight lines.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

JENS NIELSEN.

Witnesses:
CARL BRANDT,
J. P. LARSEN.