Jan. 10, 1933. G. L. FERGUSON 1,893,616

PUMPING APPARATUS

Filed June 9, 1930

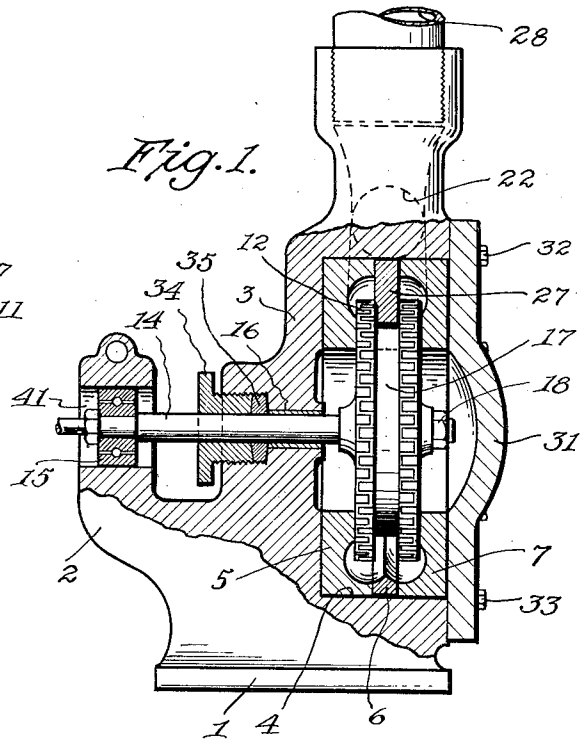


Fig. 1.

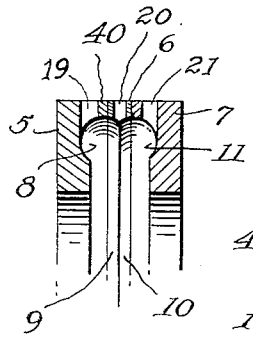


Fig. 2.

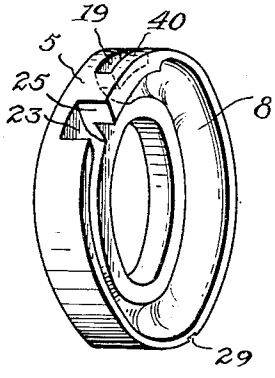


Fig. 3.

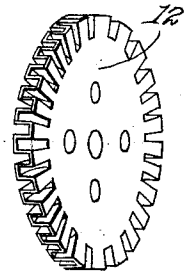


Fig. 4.

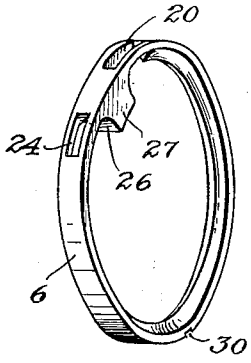


Fig. 5.

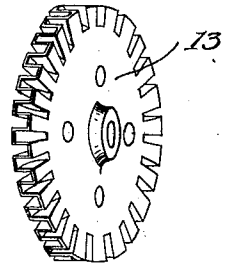


Fig. 6.

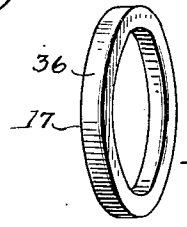


Fig. 7.

INVENTOR.

G. L. Ferguson

BY

Fay Oberlin & Fay

ATTORNEYS

Patented Jan. 10, 1933 1,893,616

UNITED STATES PATENT OFFICE

GALE L. FERGUSON, OF CLEVELAND, OHIO, ASSIGNOR, BY MESNE ASSIGNMENTS, TO WESTCO PUMP CORPORATION, OF DAVENPORT, IOWA, A CORPORATION OF DELAWARE

PUMPING APPARATUS

Application filed June 9, 1930. Serial No. 459,958.

The present invention, relating, as indicated, to pumping apparatus is more particularly directed to the provision of a pump which will require no more space than the present-day pumps but which will be capable of pumping liquid more easily and quickly.

Heretofore, pumps have been constructed for moving water by means of impellers, this being accomplished by means of buckets which engaged the water and forced it around a channel. In most instances, the water in such channel is in contact for the most part with a stationary surface and consequently this surface exerts a retarding action upon the water which is desired to be pumped. In the present instance I have aimed to overcome this difficulty and have provided a pump of such a construction that water, when admitted to the pump casing, falls upon a moving surface and is also engaged by two upstanding impellers so that as a result the major portion of the liquid admitted is in direct contact with a moving surface. This result is accomplished by means of forming a channel between two impellers so that the water is subjected to an unusual pull and is easily and quickly forced over.

To the accomplishment of the foregoing and related ends, said invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims; the annexed drawing and the following description setting forth in detail one method and one product exemplifying my invention, such disclosed procedure and product constituting, however, but one of various applications of the principle of my invention.

In said annexed drawing:—

Fig. 1 is an end elevation with parts in section of my improved pumping apparatus; Fig. 2 is a section through the inlet port of the impeller when in assembled relation; Fig. 3 is a perspective view of one of the impeller rings; Fig. 4 is a perspective view of one of the impellers; Fig. 5 is a perspective view of the central impeller ring; Fig. 6 is a perspective view of the other impeller; and Fig. 7 is a perspective view of the spacing ring.

Referring now to the drawing, a pump casing is shown having a base or pedestal 1, from which an upstanding portion 3 rises, said upstanding portion being recessed as shown at 4, for the reception of three impeller rings 5, 6 and 7. The rings 5 and 7 are allochiral and have corresponding channel surfaces 8 and 11. These channels are portions of an arc and the arcs merge with the surfaces 9 and 10 of the central ring 6 so that when the rings are assembled a double arced channel results, which is suitable for the reception of the impellers 12 and 13, said impellers being mounted in such a manner that each one rotates in the plane of its adjacent impeller ring.

The pump casing base 1 has another smaller arm 2 which projects upwardly so as to provide a journal 41 for a bearing 15, and this bearing, in conjunction with the casing bearing 16, affords a positive support for the shaft 14. This shaft has secured thereto at one end the impeller 12, the spacing ring 17, and another impeller 13, which are held in assembled relation by means of the nut 18.

It will be seen that the packing 35 and packing nut 34 prevent the exit of any water along the shaft, and that the recess 4 is sealed by means of a facing plate 31 which is held to the pump casing by means of headed bolts 32 and 33.

As a positive means of locking the three rings in place I have provided grooves in their periphery, as shown at 29 and 30, there being another groove in the ring 7 situated in the same manner. These grooves cooperate with a dowel pin (not shown) and are thus prevented from rotating, as such action would be likely to occur due to the force of the water when acted upon by the impellers.

The pump casing has an inlet port shown at 22, which communicates with three openings serially arranged in the three impeller rings. This is best shown in Fig. 2 where ring 5 will be seen to have an opening 19 therein, the inner surface of said ring being closed by the portion 40. In line with the opening 19, an opening 20 is shown in the ring 6, and similarly an opening 21 is illustrated, which in turn is in line with the other openings so that the inlet passage to the impeller channel comprises a series of three

openings. The outlet of the channel is quite the same and consists of an opening 23 in ring 5, opening 24 in the ring 6, and another opening similar to 23 located in the ring 7. The only difference between the outlet and inlet is that the outlet opening in the rings 5 and 7 extends to the inner face of these rings. Located between the inlet and outlet ports 6, a web 27 is shown, which has a curved surface 26 for the purpose of directing the liquid from the channel and upwardly out through the discharge port 28. Situated in the outlet ports of the rings 5 and 7 similar directed surfaces are provided, one of which is shown at 25, Fig. 3.

The spacing ring 17 is held clamped between the impeller rings and revolves therewith so that its outer circumference is always in contact with any water in the channel. In operation, water is admitted through the inlet 22 in the casing and then passes through the inlet in the impeller rings which last named inlet comprises the openings 19, 20 and 21. As the water falls into the channel it meets the rapidly revolving impellers and spacing ring so that the buckets and surface 36 of the spacing ring form a channel which exerts an unusual pull upon the water because no part of the water is in contact with a stationary surface. Even if the channel becomes totally full it will be seen that most of the water in said channel will be in contact with moving surfaces and will consequently be quickly and easily forced over. The water is discharged by means of the surfaces 25 and 26 and a surface similar to 25 on the ring 7, which force it upwardly and out through the discharge port 28.

From the foregoing description it will be seen that most of the water which is pumped is in contact with moving surfaces which exert an unusual pull and enable my improved pump to operate very efficiently. The pull of the stationary contacting surface is more than offset by the buckets, which project substantially into the channel and form a channel in themselves; so that most of the water lies between two moving bodies instead of contacting with one stationary surface and one moving surface, as is the case in most of the present-day pumps.

Other forms may be employed embodying the features of my invention instead of the one here explained, change being made in the form or construction, provided the elements stated by any of the following claims or the equivalent of such stated elements be employed, whether produced by my preferred method or by others embodying steps equivalent to those stated in the following claims.

I therefore particularly point out and distinctly claim as my invention:—

1. In a pumping apparatus, the combination of a casing having inlet and outlet ports a recess in said casing, rings mounted in said recess, said rings forming a double impeller channel, a pair of impellers rotatably mounted in said channel, a spacing ring between said impellers, said rings comprising two allochiral rings each having an arc-shaped channel formed therein, and a central ring having a projecting portion which forms a continuation of the arcs of said allochiral rings.

2. In a pumping apparatus, the combination of a casing having inlet and outlet ports, a recess in said casing, rings mounted in said recess, said rings forming a double impeller channel, a pair of impellers rotatably mounted in said channel, a spacing ring between said impellers, said rings comprising two allochiral rings each having an arc-shaped channel formed therein, and a central ring having a projecting portion which forms a continuation of the arcs of said allochiral rings, there being openings in said rings communicating with said inlet and outlet ports.

3. In a fluid pumping mechanism, a casing having inlet and outlet passages and a central recess, a pair of impellers, each having peripheral buckets opening laterally on each side, an annular spacing ring interposed between said impellers, said impellers very closely abutting said ring radially inwardly of said buckets, a pair of outer rings mounted in said recess and an inner ring interposed between said outer rings, each of said outer rings having an annular channel arcuate-shaped in cross section and said inner ring having opposed arcuate surfaces forming continuations of said annular channels, said outer rings having sealed running engagement with the outer lateral faces of said impellers radially inwardly of said buckets, said inner and outer rings having inlet and outlet ports placing said channels in communication with said inlet and outlet passages and also having stop means between said ports for directing fluid into said outlet port.

4. In a fluid pumping mechanism, a pair of spaced impellers, each having peripheral buckets opening laterally on each side thereof, and a casing enclosing said impellers and including an annular pressure-developing passageway surrounding said buckets, said impellers having sealed running engagement with said impellers radially inwardly of said buckets with the outer lateral faces of said casing, said casing having inlet and outlet passages and means for directing the fluid from said passageway into said outlet passage, said means including stops between said inlet and outlet passages and in sealed running engagement with the buckets at the inner lateral faces of said impellers and with the buckets at the outer lateral faces of said buckets.

5. In a fluid pumping mechanism, a pair of spaced impellers, each having peripheral buckets opening laterally on each side there-

of, and a casing enclosing said impellers and including a pair of annular channels, arcuate in cross-section and intersecting each other at a plane midway between said impellers to form an annular pressure-developing passageway surrounding said buckets, said impellers having sealed running engagement with said impellers radially inwardly of said buckets with the outer lateral faces of said casing, said casing having inlet and outlet passages and means for directing the fluid from said passageway into said outlet passage, said means including stops between said inlet and outlet passages and in sealed running engagement with the buckets at the inner lateral faces of said impellers and with the buckets at the outer lateral faces of said buckets.

Signed by me this 29th day of May 1930.

GALE L. FERGUSON.