Oct. 26, 1948. J. P. JOHNSON 2,452,468

RECIPROCATING ABUTMENT FLUID PUMP

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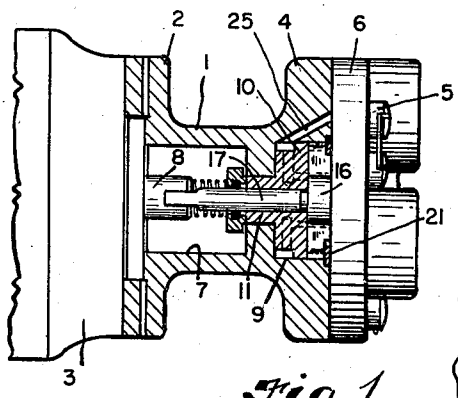


Fig. 1

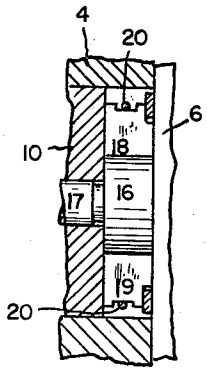


Fig. 5

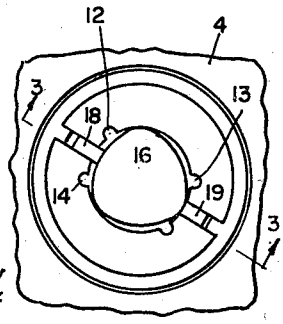


Fig. 4

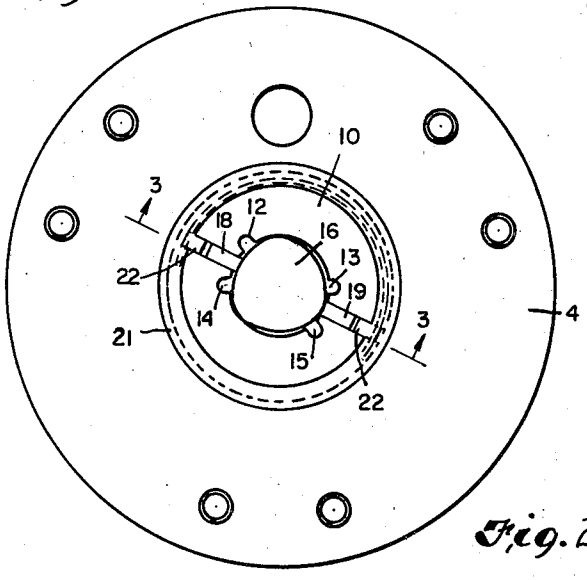


Fig. 2

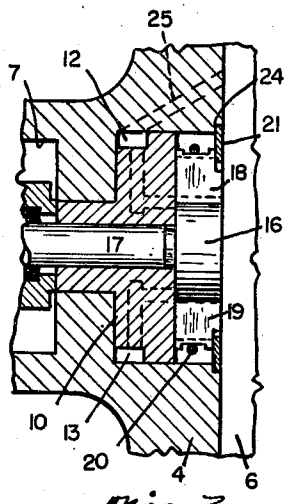


Fig. 3

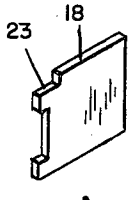


Fig. 6

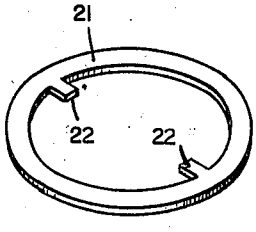


Fig. 7

INVENTOR.
JAMES P. JOHNSON

BY

Oberlin, Limbach & Day.
ATTORNEYS

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RECIPROCATING ABUTMENT FLUID PUMP

James P. Johnson, Shaker Heights, Ohio

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7 Claims. (Cl. 103—123)

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This invention relates as indicated to fluid pumps and more especially to the type of fluid pump disclosed and claimed in my copending application, Serial No. 467,510, filed December 1, 1942.

Pumps of this character are characterized in that a lobed rotor is rotated within a stator member, the latter provided with radially reciprocable blades which, at their inner ends, bear on the rotor. Suitable inlet and discharge ports are provided for the passage of fluid through the pump.

In pumps of this character, it is generally necessary to form the stator portion from two elements, an inner stator element, and an outer housing element, in order to provide the necessary passages and the like which it would be impossible to form from a one piece construction. The said inner stator member in a local area has an outside diameter less than the inside diameter of its supporting housing.

In such local area, the inner stator member is provided with radially extending slots in its wall in which the blades of the pump are slidably mounted.

This provision of slots for reception of the blades weakens the inner stator member in said local area so that it is subject to undesirable deflections especially at high speeds of operation of the rotor.

It is a principal object of this invention to provide a construction of the character described characterized by the provision of means for reinforcing and supporting the said inner stator member in said local area and to thus eliminate all of the deflections which have occurred in the prior structure of this character.

Other objects of the invention will appear as the description proceeds.

To the accomplishment of the foregoing and related ends, said invention then comprises the features hereinafter fully described and particularly pointed out in the claims, the following description and the annexed drawing setting forth in detail certain illustrative embodiments of the invention, these being indicative, however, of but a few of the various ways in which the principle of the invention may be employed.

In said annexed drawing—

Fig. 1 is a side elevation partially in section of a pump embodying my invention;

Fig. 2 is an end elevation drawn to an enlarged scale of a portion of the structure illustrated in Fig. 1;

Fig. 3 is a transverse sectional view of the structure illustrated in Fig. 2 taken on a plane substantially indicated by the line 3—3;

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Figs. 4 and 5 are similar to Figs. 2 and 3 respectively but show an alternative form of construction;

Fig. 6 is a perspective view of one of the blades of the previously illustrated constructions;

Fig. 7 is a perspective of the locking ring which is one of the elements of the previously illustrated construction.

Referring now more specifically to the drawing and more especially to Fig. 1, the pump here illustrated embodying my invention comprises a housing generally indicated at 1 which is provided with a mounting flange 2 by which the pump assembly may be secured to a suitable driving means such as an electric motor, a portion of which is diagrammatically illustrated at 3. The opposite end of the housing 1 is provided with a head flange 4 to which is secured, by means of suitable bolts such as 5, a head 6.

The housing 1 is provided with a central substantially cylindrical bore 7 into which projects the drive shaft 8 of the motor. A second cylindrical bore 9 is provided in the end of the housing 1, and non-rotatably secured therein is a stator member 10 having an annular extension 11 projecting to the bore 7.

The stator 10 is provided with a plurality of circumferentially spaced local relieved areas, two of which are shown at 12 and 13 in Fig. 3. Actually there are four such relieved areas, the other two lying behind the relieved portions 14 and 15 shown in Fig. 2. These relieved areas communicate with the recess between the head 16 of the rotor 17 and the inner periphery of the stator 10, which space is subdivided by the blades 18 and 19 carried in diametrical slots formed in the stator 10.

So much of the construction as has been described thus far is also illustrated and described in and forms the subject matter of my aforesaid copending application, Serial No. 467,510.

The blades 18 and 19 are urged inwardly into engagement with the head 16 of the rotor by means of a semi-circular spring 20 which lies in the space between the outer periphery of the stator 10 and the inner periphery of the casing 4 where it surrounds the stator.

The slots necessary to accommodate the blades 18 and 19 divide the end of the stator 10 into two parts. This area of the stator is subjected to the greatest stress because in this area the head 16, during its rotation at normal high operating speeds, causes a radial reciprocation of the blades

with a certain amount of tangential thrust on the inner ends of the blades, due to the camming action of the lobed shape of the head 16.

At high speeds, this force on the blades has a tendency to cause the split end of the stator 10 to separate resulting not only in a spreading apart of the slots which accommodate the blades but also an actual separation of the two portions of the stator bore which closely embraces the head 10 of the rotor. When it is remembered that the lobes on the head 10 must have a running fit with the inner periphery of the stator 10 for proper pumping action, the importance of preventing separation of the split end of the stator becomes evident.

A further condition responsible for the deformation of the split end of the stator 10 is the pressure of the fluid within the pump. The pressure generated by the rotor 16 on the fluid between the rotor and the stator 10 will cause the split ends of the stator to separate. On the other hand, there may be pressure on the fluid surrounding the stator which will cause the split ends of the stator to move together and bind upon the blades 18 and 19.

I provide a ring 21, the form of which is most clearly illustrated in Fig. 7 and which has an inside diameter such as to snugly engage the outside diameter of the split end of the stator 10. At diametrically opposite points, the ring 21 is provided with radially inwardly directed lugs 22 which are adapted to extend into the slots in which the blades are positioned. The width in a circumferential direction of the projections 22 is such as to have a snug fit with the slot. When the ring 21 is positioned on the end of the stator it, therefore, holds the stator end portions against relative radial movement and insures that there will be no deflection of this split end of the stator.

As most clearly illustrated in Fig. 6, the blades such as 18 are provided with a relieved area such as 23 whereby the blades may extend radially outwardly past the ring 21 and reciprocate radially in their respective slots.

In the form of the invention illustrated in Figs. 1 to 3, the outside diameter of the ring is slightly greater than the inside diameter of the bore 9, the latter having an enlarged area 24 adjacent its outer end to receive and snugly engage the ring 21.

In the modification illustrated in Figs. 4 and 5, the parts are similar to those which have just been described, excepting that the ring 21 has an outside diameter which is slightly less than the diameter of the bore 9, thus providing a slight clearance between the ring and the bore 9.

The head 6 has a flat face which abuts the flat face of the housing flange 4 and the remaining parts included in such casing which, it will be observed, are all positioned so as to present a flat face to the cover 6.

The housing 1 is provided with a plurality of ducts such as 25 which lead to registering passages in the cover 6 and by which connection may be made from suitable conduits to the spaces within the pump. The details of such construction are fully illustrated and described in my aforesaid copending application and will not be elaborated upon at this point.

In the light of the foregoing, it will be observed that I have provided a construction of the character described which is reinforced and so secured against deflection even under the loads encountered at high speeds so that there is always maintained between the several parts of the assembly the necessary and desired clearance for the proper operation of the pump.

Other modes of applying the principle of the invention may be employed, change being made as regards the details described, provided the features stated in any of the following claims or the equivalent of such be employed.

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

1. In a pump of the character described, the combination of a housing member having a bore therein, a substantially annular stator member in said bore and having radial slots in a local area, a rotor within said stator member, radially reciprocable blades adapted to bear at their center-wise inner ends on said rotor and being mounted in said stator slots, and an annular member bearing by one of its faces against said blades and snugly embracing the periphery of said stator in said area.

2. In a pump of the character described, the combination of a housing member having a bore therein, a substantially annular stator member in said bore and having radial slots cut in one of its ends only, a rotor within said stator member, radially reciprocable blades adapted to bear at their center-wise inner ends on said rotor and being mounted in said stator slots, a head for covering against the slotted end of the stator, and means snugly embracing said stator about said end having the radial slots.

3. In a pump of the character described, the combination of a housing member having a bore therein, a substantially annular stator member in said bore and having radial slots in a local area, a rotor within said stator member, radially reciprocable blades adapted to bear at their center-wise inner ends on said rotor and being mounted in said stator slots, and an annulus snugly embracing said stator about said slotted end and having radially inwardly extending projections lying in said stator slots.

4. In a pump of the character described, the combination of a housing member having a bore therein, a substantially annular stator member in said bore and having radial slots in a local area, a rotor within said stator member, radially reciprocable blades adapted to bear at their center-wise inner ends on said rotor and being mounted in said stator slots, means adapted to engage the outer ends of said blades and urge the same inwardly against said rotor, and an annulus snugly embracing said stator in said slotted area, and having radially inwardly extending projections lying in said stator slots.

5. In a pump of the character described, the combination of a housing member having a bore therein, a substantially annular stator member in said bore and provided in a local area with an outside diameter less than the inside diameter of said bore and having radial slots, a rotor within said stator member, radially reciprocable blades adapted to bear at their center-wise inner ends on said rotor and being mounted in said stator slots, means in said area between said housing and stator adapted to engage the outer ends of said blades and urge the same inwardly against said rotor, and an annular ring snugly embracing said stator in said area, bridging the space between said stator and housing and having radially inwardly extending projections lying in said stator slots.

6. In a pump of the character described, the combination of a housing member having a bore therein, a substantially annular stator member

in said bore and provided at one end with radial slots and an outside diameter less than the inside diameter of said bore, a rotor within said stator member, radially reciprocable blades adapted to bear at their center-wise inner ends on said rotor and being mounted in said stator slots, means adapted to engage the outer ends of said blades and urge the same inwardly against said rotor, and an annular ring snugly embracing the slotted end of said stator, and having radially inwardly extending projections lying in said stator slots.

7. In a pump of the character described, the combination of a housing member having a bore therein, a substantially annular stator member in said bore and having radial slots exposed in one of its ends only, a rotor within said stator member, radially reciprocable blades adapted to

bear at their center-wise inner ends on said rotor and being mounted in said stator slots, and an annulus with outstide diameter slightly less than the diameter of the aforesaid bore and surrounding said stator about said end with the radial slots and having radially inwardly extending projections lying in said stator slots.

JAMES P. JOHNSON.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
762,126	Bond	June 7, 1904
2,015,307	Hand	Sept. 24, 1935
2,017,107	Schley	Oct. 15, 1935