

Sept. 15, 1953

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2,651,999

ROTARY PUMP

Filed Nov. 13, 1950

3 Sheets-Sheet 1

FIG. 1.

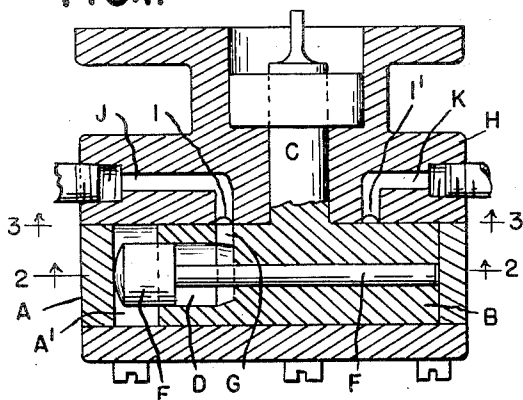


FIG. 2.

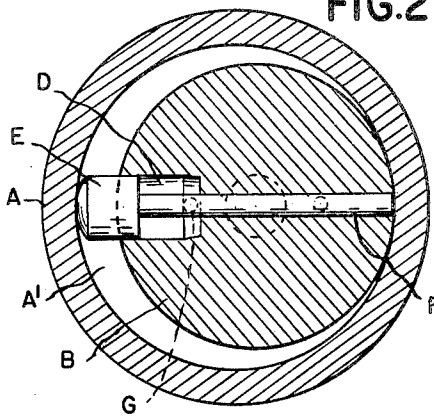


FIG. 5.

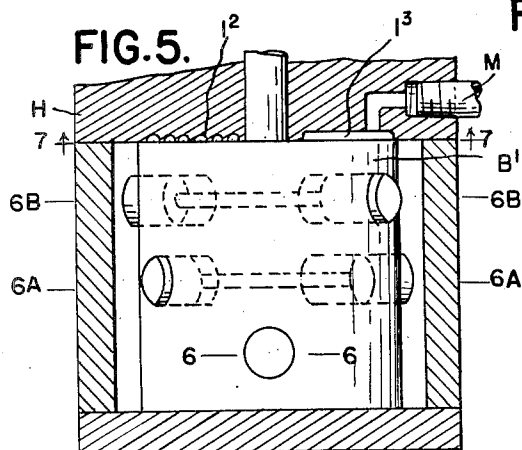


FIG. 4.

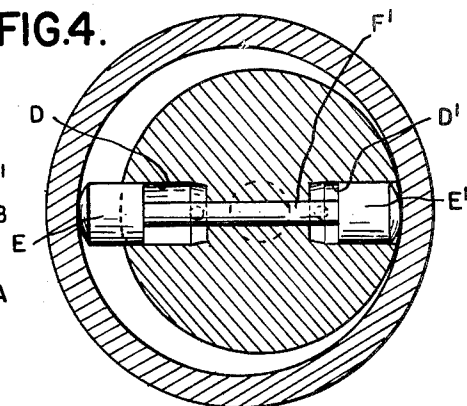


FIG. 3.

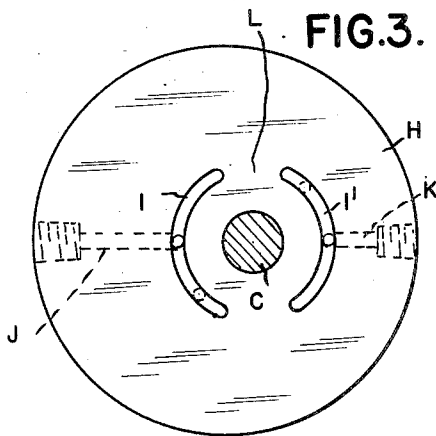
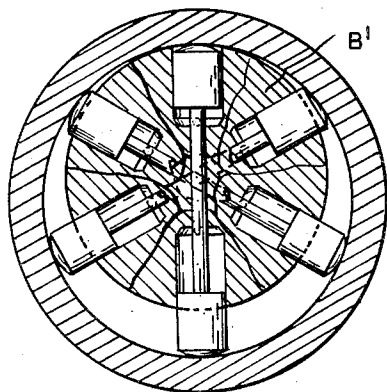


FIG. 6.



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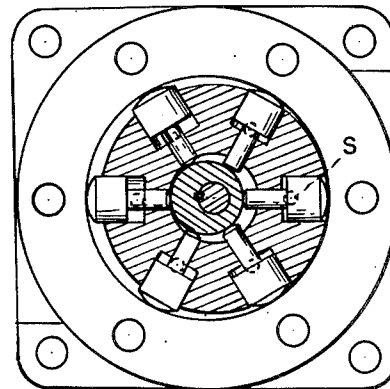
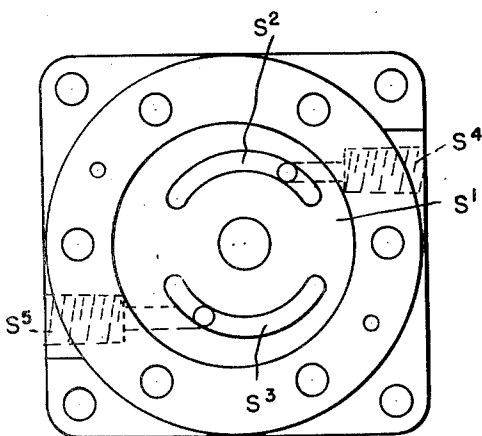
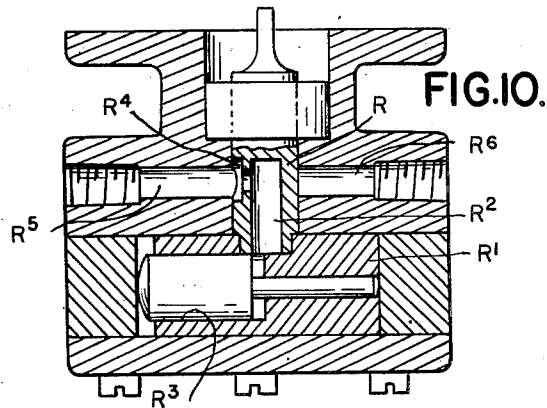
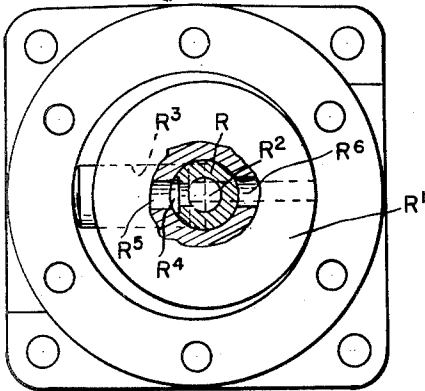
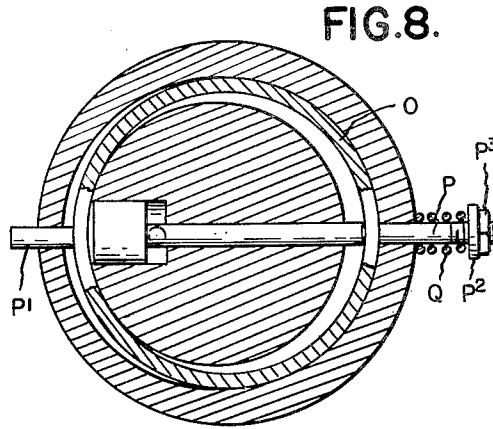
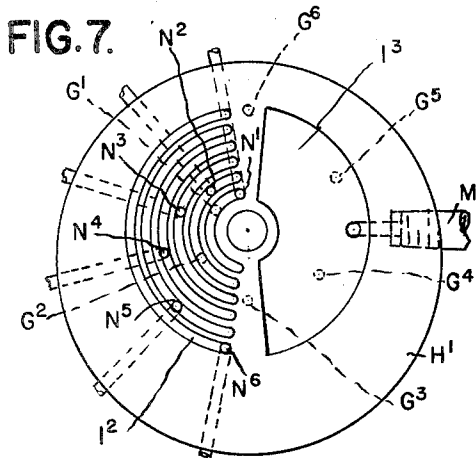


**FIG. 11.**

**FIG. 12.**

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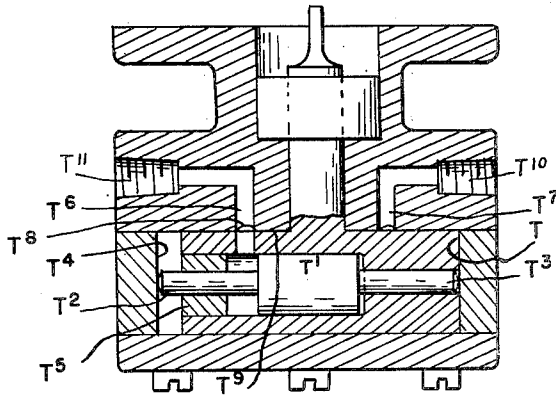


FIG. 13.

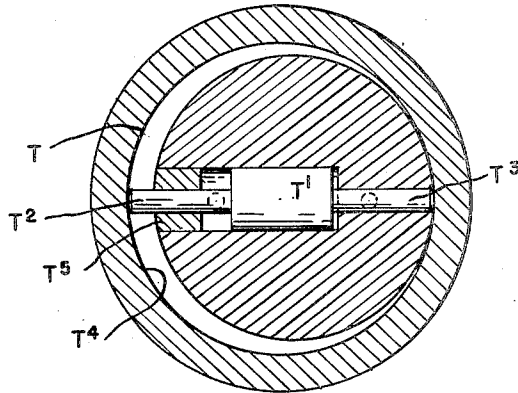


FIG. 14.

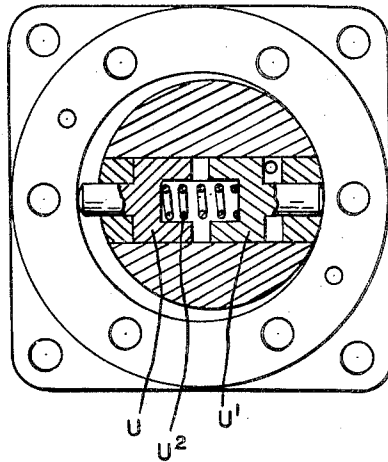


FIG. 15.

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## UNITED STATES PATENT OFFICE

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## ROTARY PUMP

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Application November 13, 1950, Serial No. 195,424

3 Claims. (Cl. 103-161)

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The invention relates to pumps and is more particularly designed for use in the delivery of measured quantities of fluid such, for instance, as fuel oil to internal combustion engines.

It is the object of the invention to obtain an exceedingly simple construction of rotary pump which can be manufactured at small cost and is adapted to be operated by an electric or other small powered motor.

It is a further object to obtain a multiple unit in which measured quantities of fluid are delivered to different points either simultaneously or successively as conditions may require.

With these objects in view the invention consists in the construction as hereinafter set forth.

In the drawings:

Fig. 1 is a central longitudinal section through my improved rotary pump having a single delivery in each cycle;

Fig. 2 is a section on line 2-2, Fig. 1;

Fig. 3 is a section on line 3-3, Fig. 1, illustrating the controlling valve mechanism;

Fig. 4 is a view similar to Fig. 2, showing a double acting pump;

Fig. 5 is a view similar to Fig. 1 of a multiple delivery pump;

Fig. 6 is a cross section having portions thereof in planes respectively corresponding to lines 6-6, 6<sup>a</sup>-6<sup>a</sup> and 6<sup>b</sup>-6<sup>b</sup> in Fig. 5;

Fig. 7 is an elevation of the controlling valve as viewed in the plane of line 7-7, Fig. 5;

Fig. 8 is a view similar to Fig. 2 showing a modified construction;

Figs. 9 and 10 are, respectively, an end elevation with the cover removed and a central longitudinal section through another modified construction;

Figs. 11 and 12 show another modification and are, respectively, an end elevation of the casing with the cover and the rotor removed and a similar view with the rotor in position and in transverse section;

Figs. 13 and 14 show another modification, respectively, in longitudinal transverse section; and

Fig. 15 is a view similar to Fig. 14 of still another modification.

As illustrated in Figs. 1 to 3, A is a casing having cylindrical chamber A' therein, within which is placed a cylindrical member B of smaller diameter having its axis eccentric to the axis of the casing and mounted upon a shaft C journaled in bearings in said casing. The member B is formed with a cylindrical recess D extending radially inward from the periphery and E is a piston within said recess. F is an actuating rod for the piston which is of smaller diameter and extends through a bore diametrically across the member B to engage the opposite peripheral wall of the chamber A'. Thus if the members A and B

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are relatively rotated, the piston E will be reciprocated in the cylindrical recess D by traveling contact of its outer end and also the opposite end of the rod F with the peripheral wall of the recess A'.

The inner end portion of the cylindrical recess D has a port G extending out through an end face of the member B. This face is in contact with a head H of the casing having formed in its contacting face segmental channels I and I' concentric with the axis of rotation. The channel I is connected to a radially extending passage J which is connected to the course of the fluid to be pumped. The other channel I' is connected to a radially extending passage K through which the fluid is to be discharged. These segmental channels are so located that the port G will register with the channel I during rotation through something less than 180° and will register with the channel I' during something less than 180° on the opposite side of the axis. At the opposite ends of these channels and between the same are portions L in the face of the head B which close the port G while passing thereover. As these portions are at right angles to the axis of the piston, there will be negligible movement of the latter while the port G is closed and, consequently, the channel I will be in communication with the cylinder D during substantially all of the outward movement of the piston, and the channel I' will communicate with said cylinder during substantially all of the inward movement of the piston. This will deliver during each cycle a quantity of fluid corresponding to the displacement of the piston.

The construction illustrated in Fig. 4 is similar to that above described with the exception that it is provided with two cylindrical recesses D and D' extending radially inward from diametrically opposite sides of the member B and having pistons E and E' therein with an actuating rod F' between said pistons. Thus in operation a quantity of fluid corresponding to the piston displacement is delivered each half cycle of rotation.

With the construction illustrated in Figs. 5 and 6, cylindrical recesses are formed in a plurality of transverse planes of the member B', each having a pair of said recesses extending inward from diametrically opposite sides of the periphery with a connecting bore therebetween similar to the construction in Fig. 4. Each of these cylindrical recesses is connected by a channel extending axially of the member B' to a port in one end face of said member and these ports G', G<sup>2</sup>, G<sup>3</sup>, G<sup>4</sup>, G<sup>5</sup> and G<sup>6</sup> are different radial lengths from the axis of rotation so as to be arranged in a substantially spiral path. The contacting face of the head H' has a series of concentric segmental channels I<sup>2</sup> therein for

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registration respectively with the ports G'—G<sup>6</sup>. All of these channels are, however, limited in length to less than 180° about the axis of rotation. On the opposite side of said axis is a segmental recess I<sup>3</sup> of a radius sufficient for registration with all of said ports and extended through something less than 180°. This recess is connected by a conduit M with a source of fluid and a series of discharge conduits N', N<sup>2</sup>, N<sup>3</sup>, N<sup>4</sup>, N<sup>5</sup>, and N<sup>6</sup> are connected by intersecting axial and radial bores with respective channels G'—G<sup>6</sup>. Thus in operation measured volumes of fluid will be successively ejected through these discharge conduits.

The construction illustrated in Fig. 8 is similar to that of Fig. 2 but instead of contacting the piston and its operating rod with diametrically opposite portions of the peripheral wall of the recess A', a separate annular track member O is employed for this purpose. The member O is located in a recess in the casing of sufficient size to permit of movement from its normal position eccentric to the axis of rotation to a position concentric to said axis. A resilient member resists such movement but when the pump is sufficiently loaded it will overcome the resistance and move the track towards its concentric position. As illustrated the member O has radially extending guide rods P and P' attached thereto at diametrically opposite sides which slidably engage radial bores in the wall of the casing. A helical spring Q surrounding the rod P outside the casing is between the latter and a collar P<sup>2</sup> on said rod, so that movement of said member is resisted by the resiliency of said spring. The spring may be loaded to the desired degree by a nut P<sup>3</sup> engaging a threaded portion of the stem and bearing against the collar P<sup>2</sup>. With this construction the pressure of the pistons on the fluid within the cylinders is limited to correspondingly limit the pressure of the discharge fluid and if the resistance to discharge is sufficiently great flow may be entirely stopped by movement of the track O into position concentric with the axis of rotation.

In the modified construction as shown in Figs. 9 and 10, the shaft R for driving the rotor R' has a central passage R<sup>2</sup> extending axially thereof and in communication with the cylinder recess R<sup>3</sup>. The shaft also has a radial port R<sup>4</sup> connecting with the passage R<sup>2</sup> which is adapted to alternately register with diametrically opposite inlet and outlet passages R<sup>5</sup> and R<sup>6</sup> in the casing and the cylindrical bearing portion thereof surrounding said shaft.

In the modified construction shown in Figs. 11 and 12, each of the angularly spaced cylinder recesses connects with a passage S extending axially of the rotor to a port in the end face thereof, which face is in contact with an end face S' in the casing. The latter has segmental grooves or channels S<sup>2</sup> and S<sup>3</sup> therein concentric with the axis of rotation and respectively connected with an inlet passage S<sup>4</sup> and an outlet passage S<sup>5</sup>. With this construction the displacement of all of the pistons in the cylinders is greater than could be obtained by a single cylinder and piston within a rotor of the same dimensions.

With the modified construction shown in Figs. 13 and 14, the rotor has a bore extending diametrically across the same to form a central cylinder recess T with a single piston T' therein. This piston has actuating rods T<sup>2</sup> and T<sup>3</sup>

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extending from opposite ends thereof into traveling engagement with an eccentric track T<sup>4</sup> and the opposite ends of the cylinder are closed by apertured heads or bushings T<sup>5</sup> through which the rods pass outward. The chambers in said cylinder on opposite ends of said piston are connected with passages T<sup>6</sup> and T<sup>7</sup> extending axially of the rotor to an end face thereof in contact with a grooved end face T<sup>8</sup> of the rotor, which is in contact with the end face T<sup>9</sup> of the casing, having segmental grooves or channels therein similar to those in Fig. 11. These channels are respectively connected with an inlet passage T<sup>10</sup> and an outlet passage T<sup>11</sup>.

The modified construction in Fig. 15 is similar to that in Fig. 14 but instead of having a single piston therein, a pair of pistons U and U' are resiliently pressed towards opposite ends of the cylinder by an intermediate spring U<sup>2</sup>. Otherwise the construction is the same as in Figs. 13 and 14. This spring will actuate the pistons outwardly with a predetermined limited pressure and thus will limit the pressure of the fluid propelled by the pump. The operation therefore is similar to that of the construction of Fig. 3 and the pump will automatically cut out when the pressure limit is obtained.

With all the various modifications above described there is a cylindrical rotor and a cylindrical casing surrounding the same with its axis eccentric to that of the rotor. The inner face of this casing forms the track for engaging the pistons and actuating rods. Also the controlling valve is formed by contacting faces of the rotor and casing suitably ported or channeled.

What I claim as my invention is:

1. A pump comprising a casing, an annular cylindrical rotor journaled in said casing and having a series of radially extending angularly spaced cylindrical recesses therein closed at one end, each recess having a passage extending from near the closed end thereof axially of said rotor to a port at one end of the latter, a piston in each cylinder, an actuating rod extending from each piston through a bearing in the closed end of the cylinder, circular tracks respectively inside and outside said annular rotor concentric with each other and eccentric to the axis of rotation, one track having traveling engagement with an end of each piston and the other with each of said rods, and a valve member contacting with the ported end of said rotor for connecting said cylindrical recesses alternately with fluid inlet and fluid outlet passages in said casing during each cycle of rotation of said rotor.

2. The construction as in claim 1 in which the radially inner end of each cylindrical recess is closed.

3. The construction as in claim 1 in which said tracks are rings.

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#### References Cited in the file of this patent

##### UNITED STATES PATENTS

| Number    | Name          | Date          |
|-----------|---------------|---------------|
| 2,397,314 | Grosser       | Mar. 26, 1946 |
| 2,458,985 | Ferris et al. | Jan. 11, 1949 |
| 2,525,498 | Naylor et al. | Oct. 10, 1950 |
| 2,557,508 | Leibing       | June 19, 1951 |

##### FOREIGN PATENTS

| Number  | Country       | Date |
|---------|---------------|------|
| 493,577 | Great Britain | 1938 |