March 6, 1956 G. BADALINI 2,737,121

ROTARY PUMP

Filed April 20, 1954

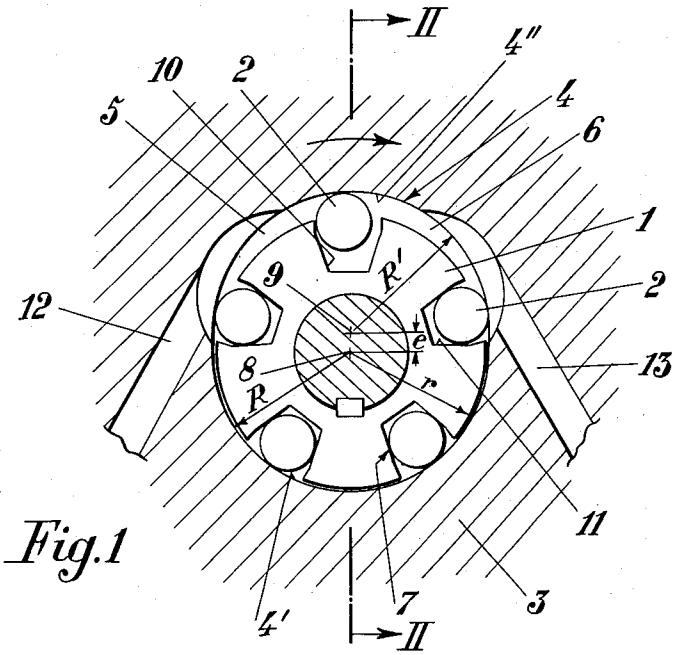

Fig.1

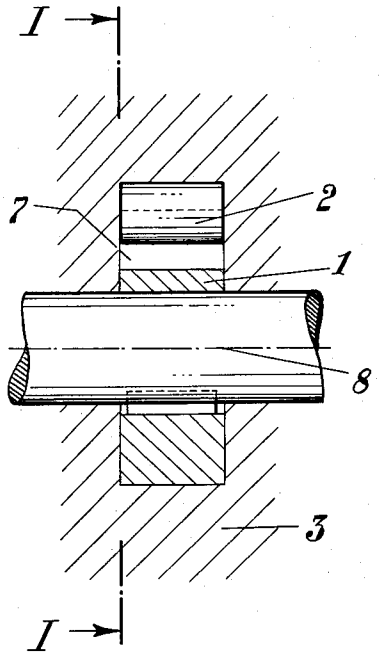

Fig.2

INVENTOR.

GIOVANNI BADALINI

BY

Hendrath, Lind & Ponack

Attorneys

United States Patent Office

2,737,121
Patented Mar. 6, 1956

2,737,121

ROTARY PUMP

Giovanni Badalini, Rome, Italy, assignor to Cambi Idraulici Badalini S. p. A., Rome, Italy, an Italian company

Application April 20, 1954, Serial No. 424,485

Claims priority, application Italy March 8, 1954

1 Claim. (Cl. 103—136)

The present invention relates to an improvement in or relating to the rotary pumps provided with roller shaped elements settling into recesses provided within the body of the rotor.

The purpose of this invention is that of embodying a volumetric pump apt to ensure a continuous flow for the delivery of the liquid with a great output in respect to the dimensions of the pump.

Another purpose of this invention is that of obtaining a good noiseless operation of the pump.

Said purposes are embodied, according to the present invention, by means of a rotary pump comprising a rotor housed in a two-centered bore generated by two circular arcs connected between themselves each whereof, has a radius equal to the radius of the rotor which is concentrical to one of said circular arcs, on the outer surface of the rotor being provided an odd number of recesses containing an equal number of rollers having a diameter lesser than the maximum width of the recesses, said rollers when the rotor is revolving being brought to adhere to the inner surface of the bore, creating thus, when passing along the circular arc eccentric in respect to the rotor, two chambers the volume whereof varies continuously with the revolving of said rotor, in order to cause a suction from the admission duct for the liquid and a compression in the delivery duct. The seal is effected by the rollers projecting from the recesses in the eccentric circular arc and by the periphery of the rotor in the circular arc concentrical with the rotor, where the rollers are completely settled into the respective recesses. Said arrangement allows the roller to be pressed against the side opposite to the revolving direction of the rotor and prevents the hammering against the opposite side of the recess which, after the mouth of the delivery duct has been overpassed, would cause a consequent leakage of output, irregularities of said output, wear and noise. Said arrangement of the rotor and of the rollers is also assisted by the width of the recess which diminishes towards the bottom.

One preferred form of embodiment is shown in the attached drawings wherein:

Fig. 1 is a cross-section of the volumetric pump and of its pump body;

Fig. 2 is a cross-sectional view of said pump, taken along the line II—II of Fig. 1.

With reference to Figs. 1 and 2, in a rotor **1** is provided a certain odd number of lengthwise arranged recesses **7**, pierced in its outer surface and having a trapezoidal cross-section for housing a corresponding number of rollers **2**, the length whereof is equal to the length of the recesses and of the rotor. The diameter of said rollers is lesser than the maximum width of the recesses.

The rotor revolves around its center **8** into a two-centered bore **4** provided in the body of the pump **3**. The contour of the bore **4** is formed by two circular arcs joined between themselves 4′ and 4″ having radius R and R′, R being equal to R′, and the center of the radius R of the arc 4′ being in the point **8**, while the center of the radius R′ of the arc 4″ is at the point **9** displaced of an eccentricity *e*, lesser than the radius of the roller, in respect of the point **8**.

When the rotor **1** revolves in the direction shown by the arrow, the rollers due to the centrifugal force are continuously outwardly pushed against the inner surface of the chamber **4**, creating thus, when passing in correspondence with the arc 4″ the radius whereof is R′, two chambers **5** and **6** the volume whereof varies with the revolution, in order to cause the suction from the admission duct **12** and the compression into the delivery duct **13**, in the piping wherein the pump is inserted. The radius R of the arc 4′, the center whereof is at **8** is greater of some hundredths of millimeter than the radius *r* of the rotor **1** and therefore throughout the length of the arc 4′, the radius whereof is R, there is a seal embodied by the periphery of the rotor **1** against the inner surface of the arc 4′; to the rollers which are running along the arc 4′, the radius whereof is R, is not committed the task of said seal which is embodied by means of the periphery of the rotor, while to said rollers is committed the task of the seal when running along the arc 4″, the radius whereof is R′. Said arrangement, according to the direction of rotation shown by the arrow, causes the roller drawn by the rotor to adhere against one of the sides of their recesses (for instance **10**); when running along the arc 4″, the radius whereof is R′, each roller **2** is further and more pressed against the side **10** of the recess **7**, by the greater pressure existing in the chamber **6** in respect to the chamber **5**, and it is to be noted that if to the rollers is committed the seal also throughout the arc 4′ and if the recess has a rectangular cross-section, as in the known systems, the reversal of the action direction of the thrust due to the pressure, after the delivery duct **13** has been overpassed, would cause a sudden hammering of the roller **2** against the opposite side **11** of the recess **7**, with a wear of the contact surfaces of the roller and of the recess, with the possibility of leakages for the passage of the liquid when the roller is moved, with following cyclic oscillations of the delivery flow at high speeds and a noiseful operation of the pump. In order to assist said arrangement the sides **10** and **11** of the recesses **7** are converging towards the center of the rotor, so that the roller resting on the sides of the recess has a minimum clearance in respect to said recess, diminishing thus the possibility of wide displacements for the roller from one side of the recess to the other, after the delivery duct **13** has been overpassed, and diminishing also the possibility for the passage and leakage of the liquid flow under the roller.

I claim:

A rotary pump comprising a rotor, a housing containing said rotor, a shaft protruding from the side walls of said housing on which said rotor is keyed, said housing being formed with two sections of a radius substantially equal to the radius of the rotor but having different centers of curvature, the center of curvature of one section of the housing being coincident with the axis of the rotor and the center of curvature of the other section being eccentric with respect to said axis, an inlet duct for a fluid and a discharge duct for said fluid, said ducts extending through a side wall of said housing and being located facing each other in the section of said housing whose center of curvature is eccentric with respect to the axis of said rotor, said rotor being provided on its periphery with a plurality of recesses having a substantially trapezoidal cross-section, the side walls of said recesses being equally inclined and converging toward the axis of the rotor, a roller in each of said recesses, the length of the roller being substantially equal to the length of the recess and of the rotor and the diameter of the roller being less than the maximum width and greater than the minimum width of the recess, said rollers sealing during the revolution of said rotor against the inner surface of the section

of the housing having the center of curvature eccentric with respect to the axis of the rotor and being wholly contained in the recesses and abutting against the inclined side walls thereof when the rollers traverse the section of the housing whose center of curvature coincides with the axis of said rotor.

References Cited in the file of this patent

UNITED STATES PATENTS

232,017 Espent ---------- Sept. 7, 1880
2,520,724 Jessop ---------- Aug. 29, 1950
2,551,623 More ---------- May 8, 1951
2,631,544 Wilcox ---------- Mar. 17, 1953

FOREIGN PATENTS

243,388 Great Britain ---------- 1927
844,907 France ---------- May 1, 1939