Dec. 24, 1940. H. GARTHE 2,225,908

ROTARY PUMP

Filed March 9, 1938

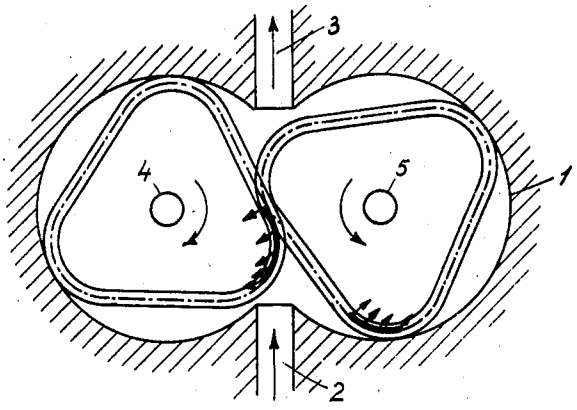


Fig. 1

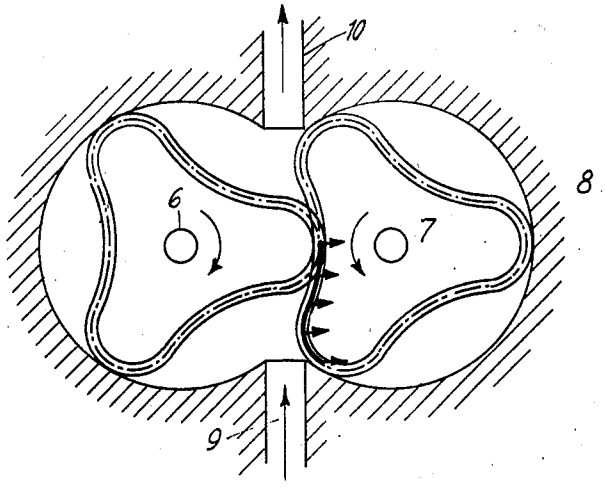


Fig. 2

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ROTARY PUMP

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1 Claim. (Cl. 103—126)

This invention relates to rotary fluidic devices, such as pumps, compressors, motors or similar mechanisms, which are arranged in a conduit system in order to act on or to be acted upon by the fluid. The invention, more particularly, relates to devices of the aforementioned kind, which are provided with two rotary pistons consisting of gear wheels which coact with each other and with a housing enclosing the wheels in producing variable fluid chambers to be charged and discharged continually.

Rotary pumps are known in which two untoothed rotary pistons cooperate with each other to circulate fluid, the pistons being maintained in proper relative position by means of additional gear wheels. To attain a better sealing, it is further known to provide rotary pistons of elliptical shape with a great number of teeth of the same pitch in order to dispense with additional gear wheels. In this case the rotary pistons must be so shaped that the pitch lines are in rolling contact with each other.

In the known type of rotary pumps, the pistons are so designed as to have a convex shape over their whole periphery. Consequently, always two curve portions with opposite curvature come into engagement so that the engaging surface is small in the positions in which the vertices of the ellipse-shaped curves come into contact with one another, which is unfavorable for the sealing.

A relatively good sealing and a greater volume of fluid delivered is attained with lemniscate-shaped pistons. They are often employed in connection with gear wheels, but cannot be toothed, since they do not permit the curves to roll on each other.

An object of the invention is to improve the sealing between the rotary pistons of a fluidic device of the aforementioned type while maintaining a favorable volumetric efficiency without necessitating additional gear wheels.

According to the invention, the rotary pistons of a fluidic device have a peripheral shape composed of alternating concave, and rectilinear or convex portions. In particular, the pistons are polygon-shaped, the corners of the polygon being rounded off and the sides being rectilinear or, preferably, concave.

The invention will be understood from the drawing in which Figs. 1 and 2 illustrate two different embodiments in diagrammatic cross sections.

Fig. 1 shows a rotary pump provided with two triangle-shaped pistons. These pistons are enclosed by a housing 1 which is provided with an inlet conduit 2 and an outlet conduit 3 and are mounted on shafts 4 and 5 passing through the centers of gravity of the pistons. Each piston consists of a gear wheel which is toothed over its whole periphery, the teeth having the same pitch. The corners of the triangular wheels are rounded off, whereas the sides are substantially straight lines.

Fig. 2 shows an arrangement of similar pistons in which, however, the sides of the triangles are bent concavely. The two pistons which rotate about the shafts 6 and 7, passing through the centers of gravity, are arranged in a housing 8 provided with an inlet and an outlet conduit 9 and 10 respectively. The convex-curved portions of one piston come into engagement with the concave-curved portions of the other, whereby a large surface of engagement and therefore a good sealing is obtained as well as a favorable volumetric efficiency. By volumetric efficiency is understood the ratio of half the volume of liquid delivered upon each rotation of a piston to the capacity of the cylinder surrounding this piston. In the arrangement according to Fig. 1, the conditions are not quite as favorable as in the second embodiment, since the convex-curved portions come into engagement with a rectilinear portion. Nevertheless, the surface of engagement and therefore the sealing is considerably more favorable than in the known devices with elliptical pistons.

The invention also improves the sealing between the pistons and the housing, since for instance, in the embodiments shown, the sealing with respect to the wall of the housing is effected in practically all positions by two corners of the piston, whereas in the case of elliptical pistons the sealing is effected only by one end of the piston. It is preferable to shape the fluid chamber of the housing in such a way that the two circular portions of the chamber, which open into each other, form a constricted transition, the inlet and outlet conduits being arranged at opposite sides of this constructed transition as illustrated in Figs. 1 and 2. This construction has the following function: While, for instance in Fig. 1, the upper corner of the left piston is moving out of contact with the wall of the housing, the lower right-hand corner of the same piston already engages the wall so that a double sealing between each piston and the housing is obtained in all positions of the piston.

Furthermore, when employing polygonal pistons according to the invention, the periodical fluctuations of the volume of liquid delivered are smaller, since, for instance, in the case of triangle-shaped pistons six part-chamber fillings

are supplied upon every rotation, in contrast to only four in the case of elliptical pistons.

Instead of the pistons shown, also such having more than three corners may be employed. What has been said in connection with the triangle-shaped pistons applies also to such other pistons as far as the sealing is concerned. However, the volumetric efficiency is smaller in the case of more than three corners.

The rotary pumps shown may also be employed in a simple manner for measuring quantities of liquid. The pistons in this case are rotated by the fluid to be measured. Effective rotary forces occur at those sides of the pistons the entire length of which is not under the same liquid pressure, that is to say, at the sides at which the pistons come into contact. The arrows in both Figs. 1 and 2 indicate the effective rotary forces.

The invention is not limited to the forms of the invention shown in the drawing, since, as above described, the pistons may be provided with more than three corners.

What is claimed is:

A rotary fluidic device of the kind described, comprising a housing having an inlet and an outlet for the fluid to pass through the device, and two rotary pistons disposed in said housing on parallel axes and coacting with each other and said housing in continually producing variable fluid chambers, each of said rotary pistons having a triangular periphery composed of three convex lobes and concave portions joining said lobes and with uniform gear teeth along the whole of said periphery, said gear teeth on one of said pistons being in constant engagement with the gear teeth on the periphery of the other piston.

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