Oct. 15, 1968 R. T. J. SKINNER 3,405,644
LIQUID DISPLACEMENT PUMPS
Filed June 8, 1966

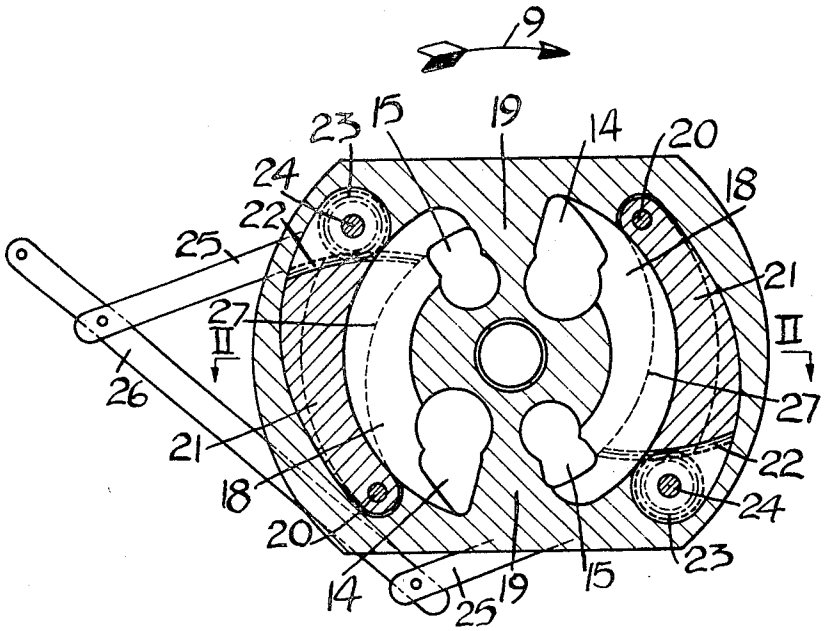

FIG. 1

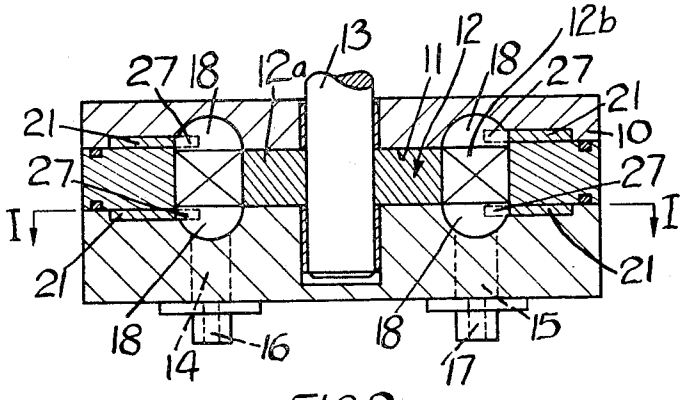

FIG. 2

United States Patent Office 3,405,644 Patented Oct. 15, 1968

3,405,644

LIQUID DISPLACEMENT PUMPS

Robert Thomas John Skinner, Kenilworth, England, assignor to Joseph Lucas (Industries) Limited, Birmingham, England, a British company

Filed June 8, 1966, Ser. No. 556,235
4 Claims. (Cl. 103—97)

ABSTRACT OF THE DISCLOSURE

A liquid displacement pump in which a bladed rotor is mounted within a cavity in a pump body having an inlet and outlet at angularly spaced positions around the rotor periphery. The body has a part-annular recess in the cavity wall extending around the periphery at least between the position of the inlet and that of the outlet. A spoiler is mounted within the body and is capable of movement into the cavity for preventing or reducing continuity of liquid flow between the inlet and outlet through the recess and the spaces between adjacent rotor blades.

This invention relates to liquid displacement pumps of the kind having a body, a bladed rotor within a cavity in the body, the body having an inlet and an outlet at angularly spaced positions around the periphery of the rotor, and a part-annular recess defined within the body in the wall of the cavity extending around the periphery of the rotor at least between the position of the inlet and that of the outlet.

The object of this invention is to provide a pump of the kind specified in a convenient form.

In accordance with the present invention, a liquid displacement pump of the kind specified includes spoiler means capable of being introduced into the recess for preventing or reducing the continuity of flow of liquid between the inlet and the outlet through the part-annular recess and through the spaces between adjacent blades of the rotor.

The invention will now be described by way of example with reference to the accompanying drawings in which:

FIGURE 1 is a cross-sectional view taken along the line I—I in FIGURE 2 of a pump constructed in accordance with this invention and

FIGURE 2 is a cross-sectional view taken along the line II—II in FIGURE 1.

In the example shown, there is provided a pump which is particularly suitable for supplying liquid fuel to a gas turbine engine. The pump comprises a body **10** defining a cylindrical cavity **11** within which is mounted a rotor denoted generally **12**. The rotor **12** is connected to a shaft **13** which can be driven by the engine to which the pump is intended to supply fuel, in the direction indicated by the arrow **9**.

The rotor **12** includes a hub **12***a* and flat radial blades **12***b* and is of a size to sweep the whole of the cylindrical cavity **11** and one side wall has a pair of diametrically opposite inlets **14** and a similarly disposed pair of outlets **15**, the inlets **14** and outlets **15** being angularly spaced and being in communication with respective adaptors **16**, **17** on the body **10**. The inlets **14** and outlets **15** are disposed adjacent to the rotor periphery.

In the side walls of the cavity **11** are formed respective pairs of semi-circular recesses **18** divided by a pair of fixed abutments **19**, the ends of the recesses being respectively adjacent to the positions of the inlets **14** and the outlets **15**.

The recesses **18** are of U-shape in cross-section and their outside peripheral edges are approximately coincident with the cylindrical wall of the cavity **11**, the widths

of the recesses **18** in the radial direction being approximately one third of the radius of the rotor **12**.

Mounted within the body **10** on spindles **20** are respective pairs of spoilers **21**. Each spoiler is housed in a slot in the body **10** and has teeth **22** engaging with a gear **23** mounted upon a spindle **24**. The spoilers are mounted in pairs upon the spindles **20** and the gears **23** are also mounted in pairs upon the spindles **24**. The spindles **24** are interconnected by external links **25**, **26**, the latter link being connected to an appropriate operating mechanism (not shown). The spoilers **21** can be moved in unison by the link **26** from the positions shown in which they are completely housed in their respective slots, to the positions indicated in dotted lines **27** in which they partially impede entry of liquid being pumped, into the recesses **18**.

In use, when the pump is as illustrated with the spoilers retracted into their slots, the rotation of the rotor **12** causes liquid to flow through the inlets **14**, between the rotor blades **12***b* and into the recesses **18** and to the outlets **15**. It is believed that there is a tendency for the liquid flowing between the inlets **14** and outlets **15** to follow a generally part-toroidal path through the spaces between the rotor blades **12***b* and the recesses **18**. The insertion of the spoilers into the recesses **18** tends to prevent or reduce the continuity of the flow and thus has the effect of reducing the outlet pressure and also the rate of flow through the pump.

In a modification, a single recess and a single inlet and an outlet are provided. With the arrangement described however, a pair of inlets **14** and a pair of outlets **15** tends to balance the loads exerted on the pump.

The invention is not to be confined to any strict conformity to the showings in the drawings but changes or modifications may be made thereto so long as such changes or modification mark no material departure from the spirit and scope of the appended claims.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. A liquid displacement pump including a body having a cavity therein, a bladed rotor within the cavity, said body having an inlet and an outlet at angularly spaced positions around the periphery of the bladed rotor, said body being provided with a part-annular recess in the wall of the cavity extending around the periphery of the bladed rotor at least between the position of the inlet and that of the outlet, and spoiler means movably mounted within said body and capable of being introduced into the cavity for preventing or reducing the continuity of flow of liquid between the inlet and the outlet through the part-annular recess and through the spaces between adjacent blades of the rotor.

2. The liquid displacement pump as claimed in claim 1 in which the spoiler means comprises a spoiler arranged to be movable from a position wholly disposed within a slot provided in the body and a position in which the entry of liquid to the recess is restricted.

3. The liquid displacement pump as claimed in claim 1 in which there are two pairs of recesses at the sides of the rotor respectively with individual spoiler means being provided for the recesses respectively.

4. The liquid displacement pump as claimed in claim 3 in which the individual spoiler means are coupled together so as to be movable in unison.

References Cited

UNITED STATES PATENTS

3,257,955	6/1966	Worst	103—97
3,259,072	7/1966	Carpenter	103—97 XR

ROBERT M. WALKER, *Primary Examiner.*