United States Patent [19]

Sjotun

[11] **3,865,518**

[45] **Feb. 11, 1975**

[54] **FUEL-OIL PUMP FOR ONE AND TWO LINE OPERATION**

[75] Inventor: **Kyrre G. Sjotun**, Kongsberg, Norway

[73] Assignee: **Danfoss A/S**, Nordborg, Denmark

[22] Filed: **Feb. 26, 1971**

[21] Appl. No.: **119,144**

[30] **Foreign Application Priority Data**

Feb. 24, 1970 Germany 2008510

[52] **U.S. Cl.** **417/440**

[51] **Int. Cl.** **F04b 23/00**, F04b 39/00

[58] **Field of Search** 417/440, 304, 310; 418/15, 418/16, 171

[56] **References Cited**

UNITED STATES PATENTS

2,209,856	7/1940	Smith	417/304
2,918,009	12/1959	Crevoisier	418/15
3,162,129	12/1964	Erikson	418/15

FOREIGN PATENTS OR APPLICATIONS

843,766	7/1952	Germany	91/6.5

Primary Examiner—William L. Freeh

[57] **ABSTRACT**

The invention relates to a fuel oil pump which is adaptable for single or double line operation. The exhaust from the conventional pressure regulating valve is optionally directed to the pump intake for single line operation or back to the sump for two line operation. The pump casing is provided with a planar surface having ports which have respective fluid communication with the exhaust from the pressure regulating valve, the pump intake passage, and the exhaust passage which leads to the sump. A rotatable valve is mounted on the planar surface and a sealing washer forming a part of the valve has an arcuately shaped recess whereby selective fluid communication may be provided between selected ports in the planar surface to provide single or double line operation.

3 Claims, 4 Drawing Figures

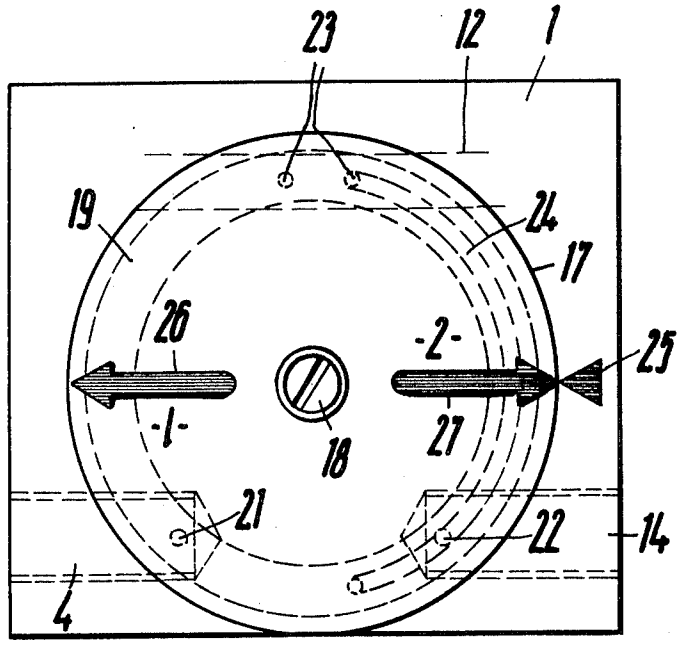


Fig.2

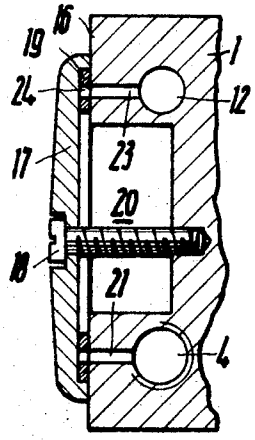


Fig.3

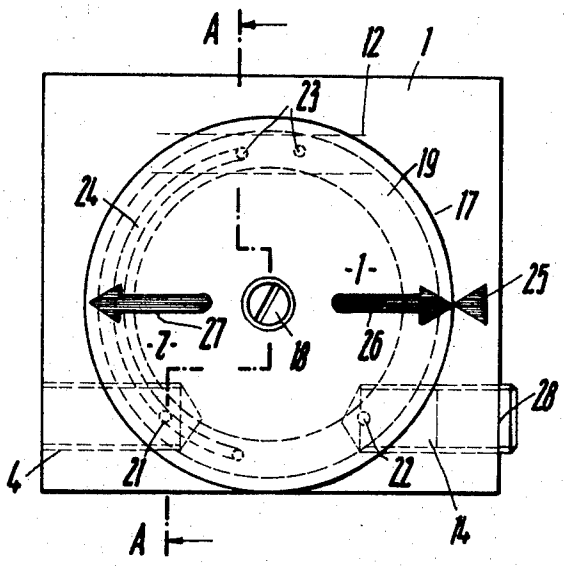


Fig.1

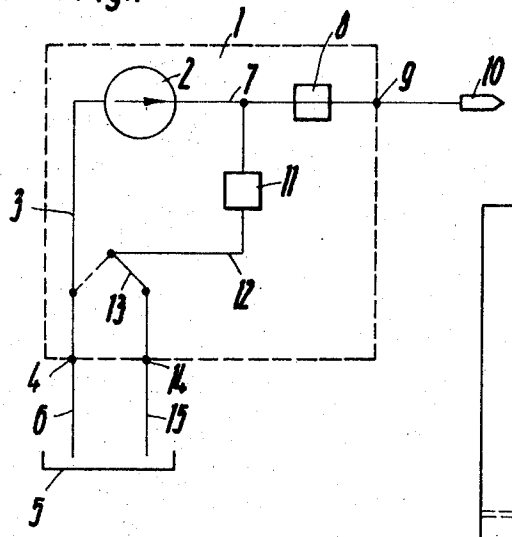
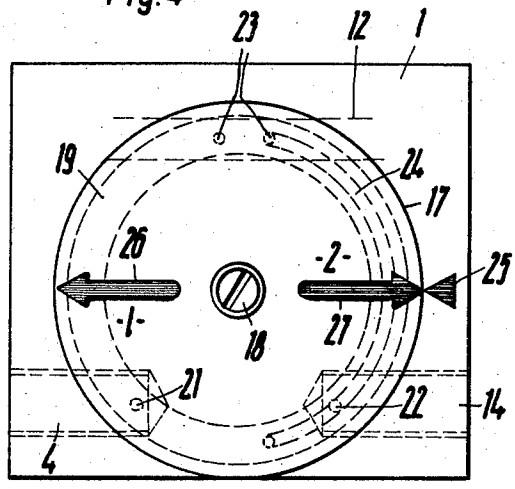


Fig.4



FUEL-OIL PUMP FOR ONE AND TWO LINE OPERATION

The invention relates to a fuel-oil pump for one and two line operation and in which the returned oil is passed from a return chamber optionally to the intake side (single-line operation) or to the discharge port (two-line operation) of the pump.

Fuel-oil pumps must discharge the delivered oil at a certain pressure. Ths is done by delivering an excess amount of oil and by a pressure-regulating valve returning part of the oil directly to the pump or by way of the stuffing box. In single-line operation when an oil tank that is generally located above the pump is used, there is only one pipe between the tank and the suction side connecting port of the pump; here, the returned oil must be passed directly to the intake side of the pump. In two-line operation in which the tank is generally located below the pump, there are two pipes between the tank and the pump, namely one pipe leading to the intake side port and one leading to a discharge port; the returned oil is passed to the tank by way of the discharge port.

It is known to design fuel-oil pumps of this kind in such a way that they are suitable both for single-line operation and for two-line operation. For this purpose, the return chamber directly adjoins the discharge port, and an additional passage extends in the interior of the housing from the return chamber to the intake side. In single-line operation the discharge port is closed by a screw, and in two-line operation, the additional passage is closed by a screw. If, in single-line operation, the screw remains in the connecting passage or if, in two-line operation, it is not present in the connecting passage, the pump either functins incorrectly or not at all. Since, after the pump has been connected, the screw is no longer visible in the additional passage, there is no simple way of checking. Furthermore, it is not particularly simple to switch over from the one type of operation to the other with the help of the screws.

The object of the invention is to provide a fuel oil pump of the initially described kind in which the change over from single-line to two-line operation and vice versa is very simple, and in which it is possible to know at any time what type of operation it is to which the pump has been set.

According to the invention, this object is achieved by means of passages which communicate with the return chamber, the intake side and the discharge port and which terminate at a common outer face of the pump housing, and by covering this face with a displaceable plate containing at least one connecting passage, in such manner that in a first position of the plate the intake side passage is connected to a return passage, and in a second position the discharge passage is connected with a return passage. The pump is thus changed over from one type of operation to the other by displacing the plate. The plate covers the mouths of the various passages; two selected mouths can only be interconnected with the help of the connecting passage. The position of the plate is a ready indication of the kind of operation to which the pump has been set.

It is particularly advantageous if the plate is mounted to rotate and is provided with an arcuate connecting passage, and if the mouths of the passages are disposed along an arc. The oil pump can then be changed over from one type of operation to another by a simple rotary movement. A single screw at the center of the plate suffices to secure it.

Furthermore, the plate and the housing can carry markings on the exterior that indicate the kind of operation to which the pump has been set. The plate then also acts as an indicating scale.

In a preferred arrangement, the plate is provided with a disc seal, and the connecting passage is formed in this seal. This results in a very inexpensive arrangement, since the plate itself requires no special machining and the disc seal is in any case required for sealing off the plate.

If in addition a component present for other reasons, for example a cover-plate sealing off the intake chamber of the pump, is used as the plate, the change-over device of the invention involves virtually no extra cost.

The invention will now be described in more detail by reference to an embodiment illustrated in the drawing, in which:

FIG. 1 shows the circuit diagram of a fuel-oil pump which can be switched from single-line to two-line operation,

FIG. 2 is a schematic section on the line A—A of FIG. 3 through those parts of a fuel-oil pump of importance to the invention,

FIG. 3 is a plan view of the pump of FIG. 2 in the position for single-line operation, and

FIG. 4 is a plan view of the pump of FIG. 2 in the position for two-line operation.

A pump housing 1 accommodates a geared pump 2. The intake side 3 of the pump communicates with a connecting port 4 to which an intake pipe 6 running from the tank 5 is connected. The pressure side 7 of the pump leads by way of a cut-off valve 8 to a port 9 to which can be connected a nozzle 10. Also connected to the pressure side 7 is a pressure-regulating valve 11 which keeps the pressure constant and returns surplus oil by way of a return chamber 12. In the diagram shown in FIG. 1 the oil is passed by way of a connecting passage 13 to a discharge port 14 which communicates with the tank by way of a discharge pipe 15. When the same pump is to be used for single-line operation, the discharge port 14 is closed and a connecting passage along the broken line between the return chamber 12 and the intake side 3 is established. In the embodiments shown in FIGS. 2 to 4, the housing 1 has an end face 16 against which a plate is pressed with the help of a central screw-bolt 18, a sealing washer 19 being fitted between said end face and the plate. The plate 17 seals off an intake chamber 20 which together with the intake-side connecting port 4 constitutes the intake side 3. To the end face 16 an intake side passage 21 runs from the port 4, a discharge passage 22 from the discharge port 14 and two return passages 23 from the return chamber 12 which is constituted by a bored hole. The mouths of these passages are disposed along an arc. A connecting passage 24, which extends over not quite 180°, is provided in the sealing washer 19. On the housing there is a mark 24, and on the plate 17 there are two arrows 26 and 27 which are respectively marked with the numerals 1 and 2.

For single-line operation, the plate 17 must be turned so that the arrow 26 points to the mark 25. The passage 24 in the seal 19 then connects a return passage 23 with the intake side passage 21. The returned oil contained in the chamber 12 therefore passes to the intake side 3 of the pump. The discharge port 14 can here be

closed by means of a screw **28.** It is however also sufficient for the seal to close the associated mouth **22** of the discharge passage.

For two-line operation, the plate **17** is turned to cause the arrow **27** to point to the mark **25.** The connection between the return chamber **12** and the intake side is then interrupted, and the connecting passage **24** establishes connection between the return chamber **23** and the discharge passage **22.** Returning oil can therefore travel back to the tank by way of the discharge port **14** to which is fitted the discharge pipe **15.**

I claim:

1. A fuel oil pump for single and double line operation comprising a casing, said casing defining a return passage, said casing defining intake and discharge passages, said casing having a planar external surface, first port means in said surface having fluid communication with said return passage, second and third port means

in said surface having respective fluid communication with said intake and discharge passages, valve means cooperable with said port means, said valve means having a first position providing fluid communication between said first and second port means and a second position providing fluid communication between said first and third port means.

2. A fuel oil pump according to claim **1** wherein said port means are on a circumferentially extending locus, said valve means is mounted for pivotal movement relative to said planar surface, said valve means having an arcuately shaped recess for providing selective fluid communication between said port means.

3. A fuel oil pump according to claim **2** wherein said valve means includes a sealing washer, said recess being in said washer.

* * * * *