Jan. 30, 1968 E. ARONSSON ETAL 3,366,070

GEAR PUMP

Filed Jan. 27, 1967

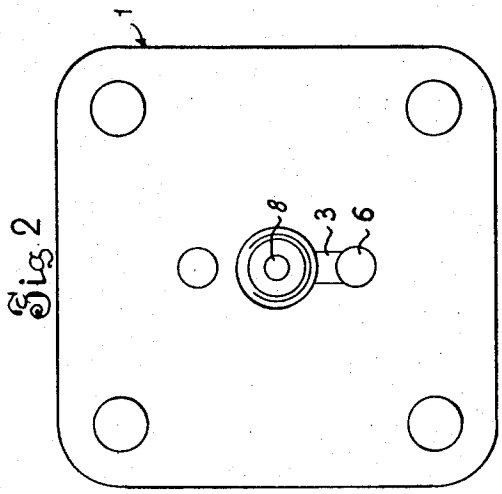

Fig. 2

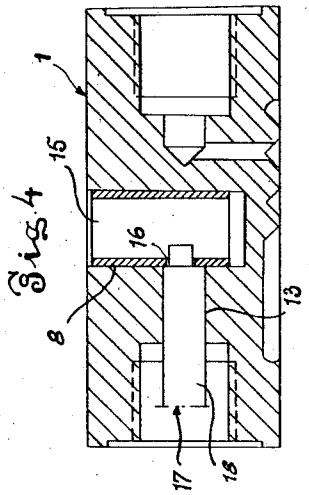

Fig. 4

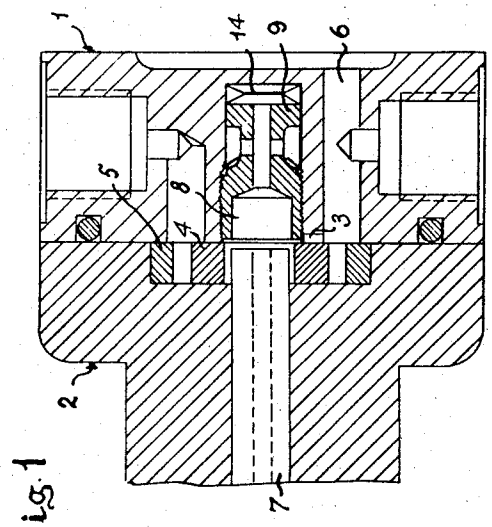

Fig. 1

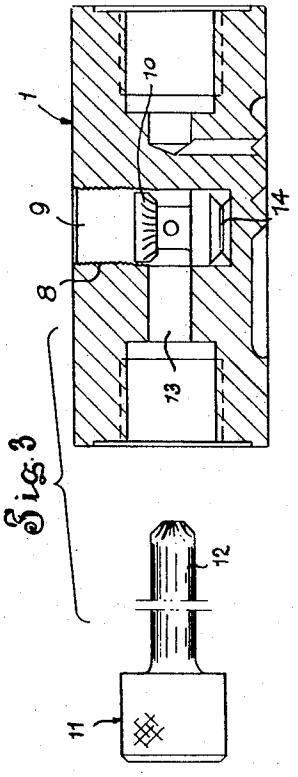

Fig. 3

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GEAR PUMP

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5 Claims. (Cl. 103—126)

ABSTRACT OF THE DISCLOSURE

A constant pressure gear type pump having a by-pass and valve mechanism for controlling the discharge pressure of the pump, and adjustable throttling means for regulating the sensitivity of the constant pressure valve mechanism. The throttling means includes a bleed path between the pump discharge and inlet, with adjustable means for varying the rate of flow through the bleed path.

A gear pump having a valve mechanism which keeps constant the pressure of the liquid delivered by the gear pump to a place of consumption, said valve mechanism being opened only when the pressure of the liquid delivered by the gear pump has reached a predetermined value. The gear pump has a throttled passage for the liquid between the pressure side and the suction side of the pump, which passage is a groove in one of the sides of the pump housing against which the gears bear with their flat side faces, said groove running from the outlet of the pump to a return conduit preferably situated opposite the pump shaft, and said groove including a portion which is adjustable relative to the remaining groove and which serves to control the throttling action provided by the groove.

The primary object of the invention is to provide a gear pump having a valve mechanism in which the throttling action can be set individually for the associated pump, which has proved to be of great advantage. Also, the throttling action is settable during operation of the pump to allow an easy check to be made whether the correct throttling action has been set.

For better elucidation, the invention will be described more in detail in the following with reference to the accompanying drawing which illustrates two embodiments, chosen by way of example, of the gear pump.

In the drawing:

FIG. 1 is a longitudinal section of one embodiment of the gear pump and an adjoining body having conduits extending therethrough;

FIG. 2 is a side view of said body;

FIG. 3 is a longitudinal section of the body at right angles to that in FIG. 1 and a setting means as viewed from the side;

FIG. 4 is a longitudinal section of the other embodiment of said body and the associated setting means.

Disposed on one side of the body **1** having conduits extending therethrough, is the gear pump **2**, while the valve mechanism is to be mounted on the other side of the body. The valve mechanism comprises on one hand a main valve inserted in the conduit leading from the pump pressure side to the place of consumption, preferably the oil atomizing nozzle of an oil burner, and on the other hand a pressure control valve inserted in a by-pass line leading from the pump pressure side back to the suction side of the pump. The valve mechanism may be for instance of the type described in Swedish Patents Nos. 178,010 and 181,675.

The valve mechanism is adapted to keep constant the pressure of the liquid delivered by the gear pump **2** to

the place of consumption. Besides the valve mechanism is adapted to be opened only when the pressure of the liquid delivered by the gear pump **2** has reached a predetermined value. To this end, the gear pump **2** has a throttled passage **3** for the liquid between the pump pressure side and the pump suction side, said passage **3** being a groove provided in one of the sides of the pump housing against which the gear wheels **4** and **5** bear with their flat side faces. More precisely, the groove **3** is provided in the side of the body **1** facing the pump **2**. The groove **3** extends from the outlet **6** of the pump on the pressure side thereof to a return conduit **8** opposite the pump shaft **7**.

According to the invention, the groove **3** has a portion which is adjustable in relation to the remaining groove and serves to control the throttling action realized by the groove **3**. The adjustable portion preferably is a portion that can be raised and lowered in relation to the bottom of the groove **3**. The portion or portions, however, could also be laterally shiftable towards and away from the groove **3**.

Although the adjustable portion or portions could be arranged between the ends of the groove **3** it is suitable from the structural point of view to provide but one adjustable portion at one of the groove ends. In the two preferred embodiments illustrated the adjustable portion thus is disposed at that end of the groove **3** which is situated at the return conduit **8** opposite the pump shaft **7**. The portion more precisely is a sleeve or like element which can be raised and lowered in the return conduit **8** and the upper preferably rounded edge of which produces the throttling action.

In the embodiment shown in FIGS. 1–3 the sleeve **9** is screwed into the return conduit **8** so that a rotation of the sleeve will result in a raising or lowering thereof. The sleeve **9** is formed with a gear rim **10** to permit rotation of the sleeve with the aid of a gear element **11**. The gear rim **10** is of such a shape relative to the return conduit **8** that it can be actuated by means of the gear element **11** during operation of the pump **2**.

The gear element **11** is constituted by a pin **12** which at its front end has the gear teeth which are to engage the gear rim **10**. The pin **12** is adapted substantially to fill out the bore **13** in the body **1**, which leads to the return conduit **8**. As a consequence, and owing to the pin **12** being hollow and connected to a return conduit, the sleeve **9** can be actuated during operation of the pump without any leakage of liquid from the pump **2**.

In order not to be subjected to unintentional rotation due to, for example, vibrations the sleeve **9** cooperates with a spring device **14** clamped between the sleeve **9** and the bottom of the bore in which the sleeve **9** is inserted.

In the embodiment shown in FIG. 4 the sleeve **15** is a tension pin which bears resiliently against the walls of the return conduit **8**. The tension pin **15** has a recess **16** with which an eccentric **17** is to engage for raising and lowering the pin **15**. Same as in the first embodiment, the arrangement is such that the sleeve **15** can be actuated by means of the eccentric **17** during operation of the pump **2**.

Like the gear element **11**, the eccentric **17** incorporates a pin **18** which is adapted to fill out the bore **13** leading to the return conduit **8**. The pin **18** being hollow and connected to a return conduit, the sleeve **15** also can be actuated during operation of the pump **2**, without any leakage of liquid.

It will be obvious to those skilled in the art that various changes may be made without departing from the scope of the invention, and therefore the invention is not limited to the embodiments described in the specification and shown in the drawings, but only as indicated in the appended claims.

What we claim and desire to secure by Letters Patent is:

1. In a gear pump including a pump housing having a pump cavity therein, a pair of gears rotatably mounted in said cavity in engagement with one another, shaft means for driving said gears, a valve body mounted on said housing, said valve body having a bearing surface in engagement with one radial side face of said gears and defining one wall of the pump cavity, a pump inlet passage and a pump dicsharge passage formed in said valve body, and pressure control valve means for maintaining a constant pump discharge pressure, the improvement wherein said pressure control valve means comprises, throttling means including a groove formed in said bearing surface extending from said pump discharge passage and communicating with said pump inlet passage, a bore formed in said valve body from said bearing surface, said groove extending through the side wall of said bore to define an opening therein, a sleeve member mounted for axial movement in said bore, said sleeve including means engaging the inner surface of said bore to frictionally resist axial movement therein, and adjustable means for moving said sleeve axially within said bore to cover any desired portion of said opening in the wall of said bore to control the flow of fluid therethrough from said pump discharge passage to said pump inlet passage to vary the throttling action on the pump.

2. The gear pump defined in claim 1 wherein said adjustable means for moving said sleeve axially within said bore comprises mating thread means on said sleeve member and said bore, and means for rotating said sleeve.

3. The gear pump defined in claim 1 wherein the inner surface of said bore is smooth and said sleeve member comprises resilient means engaging the smooth inner surface of said bore wall.

4. The gear pump defined in claim 1 wherein said adjustable means for moving said sleeve includes a recess formed in said sleeve, and eccentric means rotatably mounted in said valve body and engaging said recess.

5. The gear pump defined in claim 4 wherein said eccentric means includes drain means operatively connected to the pump inlet to prevent fluid leakage during adjustment thereof whereby the eccentric means may be adjusted during operation of the pump.

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WILBUR J. GOODLIN, *Examiner.*

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,366,070 January 30, 1968

Erik Aronsson et al.

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

In the heading to the printed specification, lines 4 and 5, for "System Apulin Aktiebolag" read -- System Paulin Aktiebolag --.

Signed and sealed this 8th day of April 1969.

(SEAL)
Attest:

Edward M. Fletcher, Jr.
Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents