Aug. 9, 1949. D. FIORETTI 2,478,260

MEASURING AND DISTRIBUTING DEVICE FOR FLUIDS, PARTICULARLY LUBRICANTS

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Fig. 1.

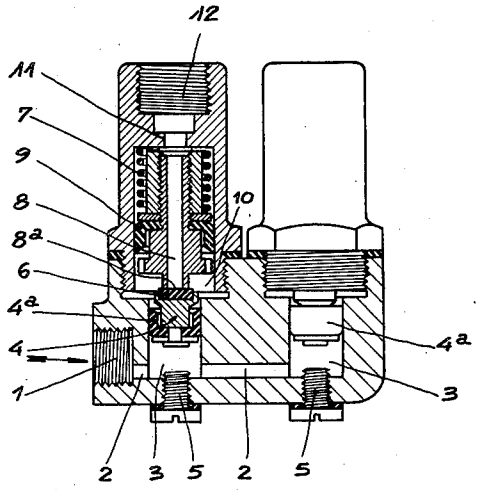


Fig. 3.

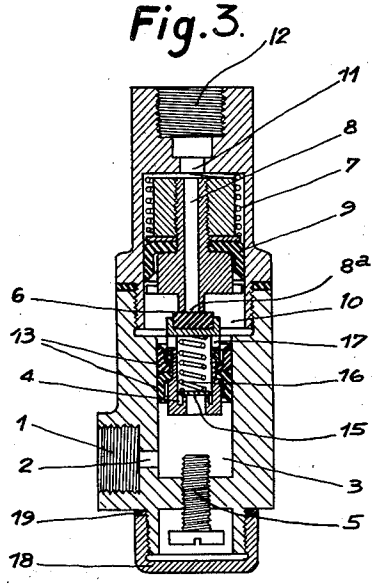


Fig. 2.

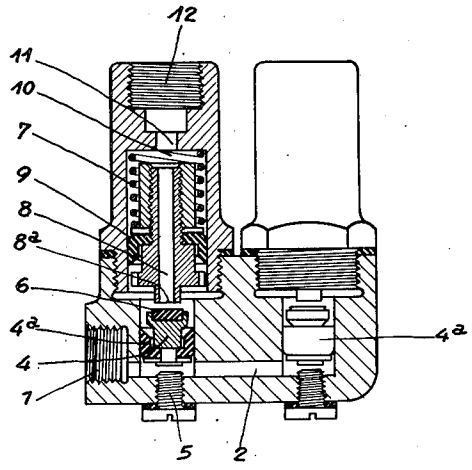
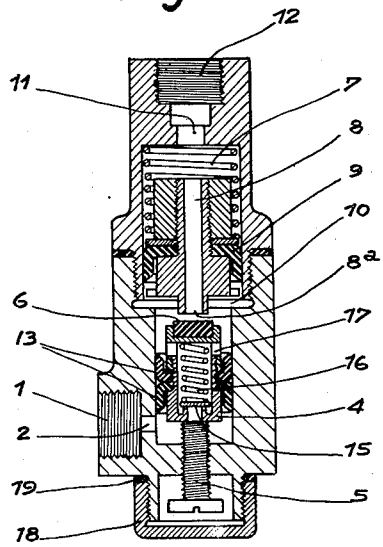


Fig. 4.



INVENTOR:
Dario Fioretti
BY
ATTORNEYS

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Fig. 5.

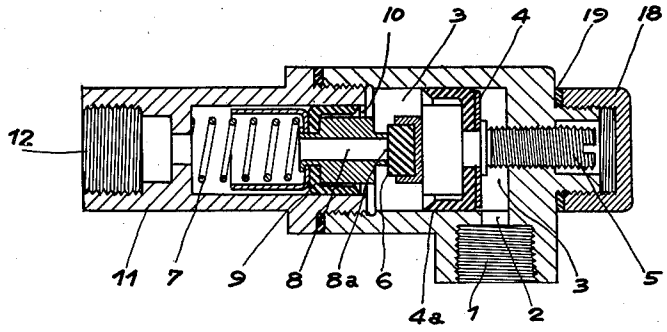


Fig. 6.

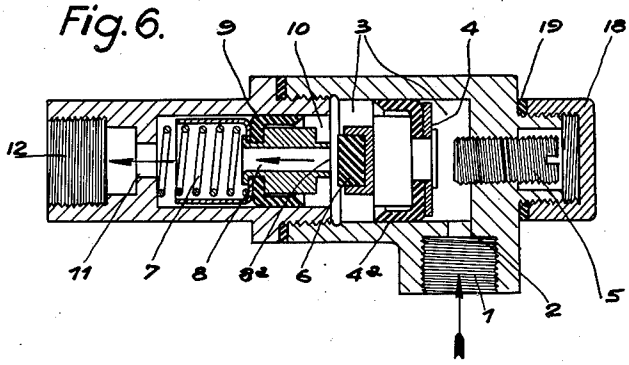
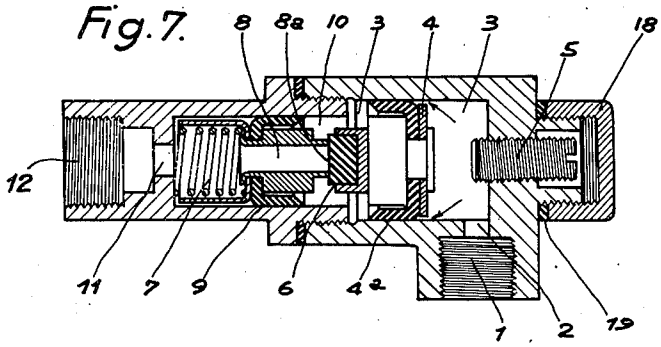


Fig. 7.



INVENTOR:
Dario Fioretti
BY
Richards & Geier
ATTORNEYS

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UNITED STATES PATENT OFFICE

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MEASURING AND DISTRIBUTING DEVICE FOR FLUIDS, PARTICULARLY LUBRICANTS

Dario Fioretti, Suresnes, France

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Section 1, Public Law 690, August 8, 1946
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3 Claims. (Cl. 184—7)

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The present invention relates to a measuring and distributing device for fluids, more particularly to central lubricating apparatus of the kind in which the two steps of admittance and expulsion of a measured volume of fluid are ensured by a movable system moving in one direction, the first step, under the action of the high pressure in the main supply piping and in the opposite direction, the second step, under the action of a spring, after relief of pressure in said piping.

An object of this invention is the provision of a device which will work safely and precisely without requiring adjustment.

One embodiment according to this invention essentially comprises a spring loaded distributing piston the exterior face of which communicates with the point to be lubricated, said piston having a duct connecting its two faces, the inner end of said duct being adapted to be closed, in the position of rest at the end of the second step ensured by said spring in absence of pressure in the main piping, by a valve pad, said valve pad being carried by a valve piston having an area different than that of said distributing piston and carrying valve means allowing the fluid to pass toward the distributing piston, said valve piston being movable in a separate cylinder and having its exterior face connected with said main piping, so that either during the step where the movable system moves under the action of the high pressure, or during its return movement under the action of the said spring, the two pistons separate to allow fluid to pass from the space between them through said duct towards the exterior face of said distributing piston, the volume of the dose expelled being the difference between the two volumes of this inter-piston space in the two extreme positions of said movable system.

When the valve piston has a smaller area than the distributing piston, the separation of the two pistons occurs during the return stroke—the second step—the dose of lubricant admitted between the two pistons during the first stroke flowing behind said distributing piston through said duct.

When the valve piston has a larger area than the distributing piston, the separation of the two pistons occurs during the first stroke and the dose is directly expelled towards the point to be lubricated through said duct, a new dose being admitted during the following return stroke.

In one embodiment, the valve piston comprises a packing sleeve, turned towards the distributing piston, the support of which carries a valve pad controlling the flow of fluid in said duct in said distributing piston.

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In another embodiment, the valve piston comprises an ordinary hollow piston, with two opposed packing sleeves, and carries in its interior, on the side adjacent to the main piping, a valve loaded by a spring having an appropriate force and, on the other side, the above mentioned valve pad.

The annexed drawings show, by way of illustration, two embodiments of the measuring and distributing device forming the object of the invention in which the valve piston has a smaller area than the distributing piston, and an embodiment in which the area of the valve piston is larger than that of the distributing piston.

Fig. 1 is a diametral sectional view of one embodiment, the parts being in the position of the end of the first working step; a twin device is shown in an external view.

Fig. 2 is a similar sectional view showing the parts during the second working step.

Fig. 3 is a diametral sectional view of another embodiment, the parts being in the position at the end of the first step.

Fig. 4 is a similar sectional view, the parts being shown in their position a little before the end of the second step.

Figs. 5 to 7 show still another embodiment where the area of the valve piston is larger than that of the distributing piston.

Fig. 5 is a diametral section showing the parts in the position of rest at the end of the second step.

Fig. 6 is a similar section where the two pistons are shown in the course of displacement during the first working step.

Fig. 7 shows the elements just when the first step is ended and when the second will begin.

Figs. 1 and 2 show two coupled similar or twin devices which are supplied by the same branch from the main piping.

The main piping communicates by means of a connection (not shown) with an inlet branch 1 from which starts a passage 2 feeding two small cylinders 3, one for each device.

In each cylinder 3 is placed a small piston 4 carrying a packing sleeve 4a and resting, in the absence of high fluid pressure in the main piping, on a stop 5 which is preferably adjustable. This piston 4 carries the valve pad 6 on which is adapted to rest, under the action of the spring 7, the projecting end 8a of a duct 8 connecting the two faces of the distributing piston 9. The area of piston 9 is larger than that of piston 4 and is movable in cylinder 10 next to cylinder 3.

In the embodiment shown, this piston 9 com-

prises a packing sleeve, mounted so as not to allow the lubricant to pass.

The cylinder 10 is provided with an outlet port 11 which opens into a branch 12 connected in a suitable way to the point to be supplied.

In the position of rest, the port 8a of the duct 8 is pressed against the valve pad 6 connected with piston 4 which abuts, against the stop screw 5.

This device operates as follows:

When the pressure rises in the main piping, the lubricant passes around the packing sleeve 4a and enters the space between the two pistons 4 and 9. When the pressure under the piston 9 is sufficient to move it against the action of the spring 7, this piston moves and the parts 4 and 6 follow it, the piston 4 being pushed by the friction of the lubricant on the circumference of the packing sleeve 4a and due to the absence of counter-pressure on the surface of the pad 6 facing the duct 8. The volume of the space between the two pistons increases, because of the movement of the large piston 9 in cylinder 10, but is filled progressively by the lubricant entering under pressure past the sleeve 4a.

Simultaneously, the distributing piston 9 expels with its exterior face the lubricant from in front of this face, through the port 11.

When the piston 9 abuts against the upper end of its cylinder 10, the first step is ended. The second step beings when, by any suitable means which does not form part of this invention, the pressure in the main piping has been relieved.

Thereupon, the spring 7 pushes the entire movable system back and, as the volume swept by the movement of the large piston 9 in cylinder 10 is greater than the volume swept by the piston 4 in the cylinder 3, the two pistons are separated (Fig. 2) so that the port 8a opens and a portion of the lubricant between the two pistons, which portion is equal to the difference of the said swept volumes, flows in front of piston 9 where it fills a part of the empty space produced by the retreat of this piston, the other part being filled by a part of the lubricant expelled beyond the outlet port 11 during the first step being drawn back.

It follows that with this device the dose of lubricant which is supplied to the point to be lubricated is the difference between the volume expelled during the first step and the volume drawn back during the second step, this difference being equal to the difference between the volumes swept by the movements of the two pistons in their respective cylinders or, in other words, to the difference between the volumes of the space comprised between the two pistons at the end of the first step and in the position of rest at the end of the second step which is expressed by: $(S-s)\times c$, wherein c designates the stroke and S, s the areas of the two pistons.

In another embodiment, shown on Figs. 3 and 4, where the same reference numerals designate the same parts, the small piston 4 comprises an ordinary hollow piston carrying two opposed packing sleeves 13, and this piston is provided at its center with a valve 15 loaded by a spring 16, the space above this valve being connected with the inter-piston space by ports 17.

In the position of rest, this device abuts on the stop screw 5 which, being adjustable, permits precise setting of this position, thereby permitting selection of the dose of lubricant to be delivered. A seal is provided by a screw threaded hood 18 enclosing the screw 5 and pressing on a joint 19. This device may also be used with the embodiment shown in Figs. 1 and 2.

The operation is the same as in the case of the foregoing embodiment shown in Figs. 1 and 2, with the exception that instead of packing sleeve 4a valve 15 acts as an intake valve.

In the embodiment shown in Figs. 5 to 7, the valve piston, as shown in Figs. 1 and 2, comprises a packing sleeve 4a, but has here a larger area than the distributing piston 9. The other reference numerals designate the same parts as above.

The operation, beginning from the position of Fig. 5, is the following:

The lubricant under pressure in the main piping pushes the valve piston 4, which, in turn, pushes the piston 9. But immediately, as the volume of the space comprised between the two pistons decreases, the smaller piston 9 is separated from the larger piston 4 and moves faster than the latter (see Fig. 6).

Consequently, in the first step, which is ended when the piston 9 reaches the end of its stroke and the valve pad 6 is applied again to the port 8a, the quantity of lubricant expelled towards the point to be lubricated is equal to the volume swept by the piston 9 in the cylinder 10, plus the difference between the volumes swept by the two pistons in their respective cylinders.

In the second step, as soon as the pressure in the main piping is relieved, the parts 9 and 4 move back under the action of the spring 7, and the piston 9 draws back a quantity of lubricant which is equal to the volume swept by the return movement of the said piston.

On the other hand, as the volume of the space comprised between the two pistons now increases, lubricant from the main piping is drawn into this space, in a quantity equal to the difference between the volumes swept by the two pistons during the stroke. This quantity of lubricant, which will be expelled through the duct 8 in the first step of the following operation, represents as in the preceding embodiments the dose which is supplied to the point to be lubricated by the device.

This invention is of course not limited to the described and represented embodiments and it is evident that the same may be varied by the replacement of certain parts by their equivalent.

What I claim is:

1. A measuring and distributing device for fluids, especially lubricants, of the kind in which an arrival of fluid under high pressure supplied by a main piping causes the storage of a dose of this fluid, which dose is subsequently expelled towards the point to be lubricated, comprising a first cylinder having its outer end connected with the point to be lubricated, a first piston movable in said first cylinder, said first piston comprising an inner face and an outer face, said first piston having a duct formed therein connecting said outer face to said inner face, a second cylinder having an area different from that of said first cylinder and communicating at one end with said first cylinder and communicating at the other end with said main piping, a valve piston movable in said second cylinder, valve means on said valve piston allowing the fluid to pass towards said first cylinder, a valve member carried by said valve piston and adapted to close said duct of said first piston, and resilient means urging said first piston into sealing contact against said valve member in the absence of pressure in said main piping, whereby said duct is sealed by said

valve member, said valve member and said duct being adapted when in contact to space apart said valve piston and said first piston.

2. A measuring and distributing device for fluids, especially lubricants, of the kind in which an arrival of fluid under high pressure supplied by a main piping causes the storage of a dose of this fluid, which dose is subsequently expelled towards the point to be lubricated, comprising a first cylinder having its outer end connected with the point to be lubricated, a first piston movable in said first cylinder, said first piston comprising an inner face and an outer face, said first piston having a duct formed therein connecting said outer face to said inner face, a second cylinder having a smaller area than said first cylinder and communicating at one end with said first cylinder and at the other end with said main piping, a valve piston movable in said second cylinder, valve means on said valve piston allowing the fluid to pass towards said first cylinder, a valve member carried by said valve piston and adapted to close said duct of said first piston, and resilient means urging said first piston into sealing contact against said valve member in the absence of pressure in said main piping, whereby said duct is sealed by said valve member, said valve member and said duct being adapted when in contact to space apart said valve piston and said first piston.

3. A measuring and distributing device for fluids, especially lubricants, of the kind in which an arrival of fluid under high pressure supplied by a main piping causes the storage of a dose of this fluid, which dose is subsequently expelled towards the point to be lubricated, comprising a first cylinder having its outer end connected with the point to be lubricated, a first piston movable in said first cylinder, said first piston comprising an inner face and an outer face, said first piston having a duct formed therein connecting said outer face to said inner face, a second cylinder having a larger area than said first cylinder and communicating at one end with said first cylinder and communicating at the other end with said main piping, a valve piston movable in said second cylinder, valve means on said valve piston allowing the fluid to pass towards said first cylinder, a valve member carried by said valve piston and adapted to close said duct of said first piston, and resilient means urging said first piston into sealing contact against said valve member in the absence of pressure in said main piping, whereby said duct is sealed by said valve member, said valve member and said duct being adapted when in contact to space apart said valve piston and said first piston.

DARIO FIORETTI.

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