April 18, 1939. F. S. BARKS 2,155,250

INJECTOR

Filed Jan. 17, 1938

FIG. 1.

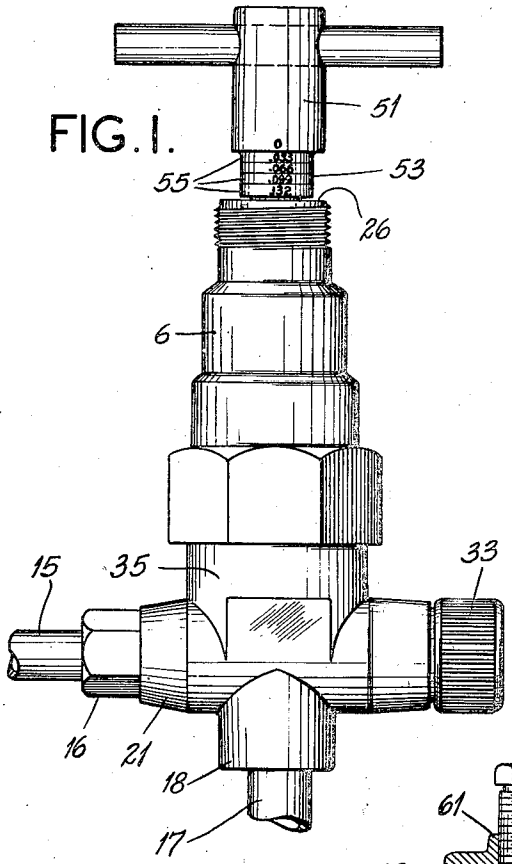


FIG. 2.

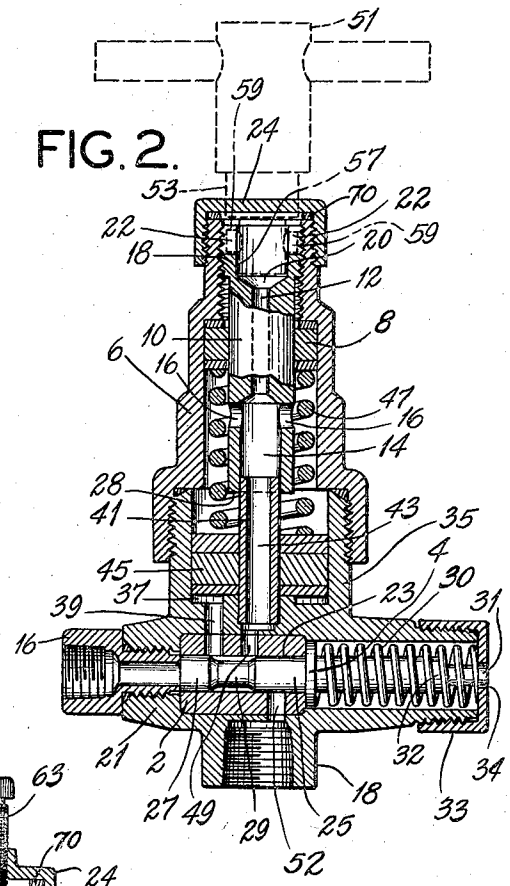
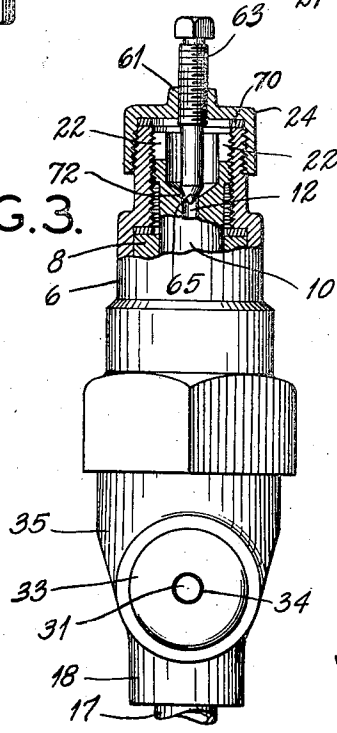


FIG. 3.



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2,155,250

INJECTOR

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11 Claims. (Cl. 184—7)

This invention relates to injectors, and with regard to certain more specific features, to injectors for pressure lubricating apparatus and the like.

Among the several objects of the invention may be noted the provision of an injector for use in systems such as described in United States Patent Number 2,141,022 of Lutwin C. Rotter, dated Dec. 20, 1938, for Lubricating apparatus; and which is an improvement upon the injector shown in United States Patent Number 2,122,177, issued to Victor G. Klein, on June 28, 1933, for Injector; the provision of an injector of the class described in which the delivered charge may be varied and accurately adjusted to predetermined amounts; the provision of an injector of this class which may be adjusted while loaded; and the provision of apparatus of this class in which the degree of adjustment is exteriorly visible. Other objects will be in part obvious and in part pointed out hereinafter.

The invention accordingly comprises the elements and combinations of elements, features of construction, and arrangements of parts which will be exemplified in the structures hereinafter described, and the scope of the application of which will be indicated in the following claims.

In the accompanying drawing in which are shown several of various possible embodiments of the invention,

Fig. 1 is a side elevation of the injector with its cap removed and an adjusting wrench in place;

Fig. 2 is a vertical section showing the injector with the cap in place, the dotted lines indicating the position of the wrench as it would be if it were in adjusting position; and,

Fig. 3 is an end view of an alternative form of closure, parts being broken away to show a section.

Similar reference characters indicate corresponding parts throughout the several views of the drawing.

Referring now more particularly to Fig. 1, there is shown at numeral 15 an inlet line supplying lubricant to the injector, and at 17 an outlet line. The inlet comes from a suitable pump, and the outlet line 17 is associated with a suitable bearing or bearings which are to be lubricated, as described in said Patents 2,122,177 and 2,141,022.

The object of the injector is to permit of forcing measured charges of lubricant from the line 15 to the line 17 simply by operating a pump. The object of this invention is to permit of accurately predetermining these charges and of adjusting them.

The line 15 is threaded into a nipple 16 which in turn is threaded into a die-cast body portion 21. The body portion 21 has an outlet 18 into which the outlet pipe 17 is threaded. Within the body portion 21 is a hardened steel liner 2 around which the body portion 21 is die-cast. Although this method of providing a hard sleeve 2 in a body portion 21 is structurally advantageous in a valve of this class, the sleeve 2 and the body 21 may be treated functionally as one part. Hereinafter, this will be done wherever desirable.

In the sleeve 2 is a valve passage 23 in which is a valve 25. The valve 25 has a head 27 which is exposed to the pressure entering the line 15. The valve also has a peripheral recess 29.

A spring 30 normally presses the valve 25 (at shoulder 4) to what will be called a re-charging position (shown in Fig. 2). Motion is limited inwardly by shoulder 4. The valve carries an indicator stem 31 adjacent which is a shoulder 32 limiting the outward movement of the stem. The stem moves through an opening 34 in a cap 33, the latter also serving to hold in place the spring 30. The shoulder 4 also serves as a reaction point for the spring 30 so that the spring may normally move the valve 25 to the left (Fig. 2).

Forwardly of the valve, the body 21 carries a cylindric chamber 35 which has a clearance 37 communicating with the valve cylinder by means of a port or passage 39. Centrally and axially of the cylinder 35 is held a stationary cylinder or pipe 41 which forms a communicating passage 43.

In cylinder 35 and slidably mounted upon the pipe 41 is a piston 45. The piston 45 is sealed both inwardly with respect to the pipe 41 and outwardly with respect to the cylinder 35. A spring 47 normally forces the piston 45 toward the clearance space 37.

The spring 47 is located within a cylindric extension 6 which is threaded to the cylinder 35. The spring reacts against radially expansive packing 8 which seals outwardly against the cylinder 6 and seals inwardly against a hollow tube 10. The seal is such as to permit longitudinal and rotary movement of the tube 10 without destroying the seal.

The tube 10 comprises a main body portion having a relief port or passage 12 therethrough and a lower sleeve portion in which is a counterbore 14. The counterbore 14 has a close sliding fit with the outside of the pipe 41 and is always in communication with the region above the piston 45 by means of port 16.

At its upper end the tube 10 is formed as a shoulder 18 which is threaded into the threaded upper end of the cylinder 6. Within this shoulder is a counterbore 20. The shoulder is slotted at opposite points, the purpose of which is to receive wrench lugs. Over the end of the cylinder 6 is a removable, threaded enclosing cap 24, sealed as at 70.

At numeral 51 is indicated a wrench having a reduced portion 53 upon which are index lines

55 adjacent which are numerals indicating, for example, ounces of lubricant. The lines 55 are visually indexed by their adjacency to the top 26 of the cylinder 6, when the cap 24 has been removed.

The lower end of the wrench 51 comprises a portion 57, which is receivable in the counterbore 20, and lateral lugs 59 which may enter the slots 22. Thus, by removing the cap 24, the wrench may be applied to the upper end of the adjusting member 10 and said member screwed up or down. The effect of this is to move up or down the lower end 28 of the sleeve member 10 and the lower end 28 functions as an abutment to upward travel of the piston 45. Variation in travel of the piston 45 varies the delivered charge. With suitable accuracy in the related positions of shoulder 28, end 26, lugs 22 and indices 55, the adjustment of the charge is visibly predetermined.

The purpose of the pipe 41 is to provide a connection between (*a*) the passage 49 and (*b*) the spring-side of the piston 45, the communication being completed through the passages 14 and 16 of telescoping tube 10. A port 52 connects the cylinder 23 with the outlet 17.

Operation is as follows:

Starting with the parts in the re-charging position, such as shown in Fig. 2, (cap 24 closed) it may be assumed that there is no pressure in the line 15. Lubricant has been forced from the lower side of the piston 45 to its upper side by reason of the pressure of spring 47. Movement of lubricant is through passages 39, 29, 49, 43, 14 and 16.

Upon a rise of pressure in the line 15, pressure is exerted upon the valve head 27 to force the valve 25 against spring 30 until the shoulder 32 contacts the head 33. This places the head 27 in a position to uncover the port 39 to incoming pressure, and at the same time causes the recess 29 to connect ports 49 and 52. The charge of lubricant which theretofore has become located on the upper side of the piston 45 is now forced through passages 16, 14, 43, 49, 29 and 52 to the pipe 17. This is due to piston rise induced by fluid pressure on the bottom side of the piston 45. Pressure enters by way of the open passage 39. The valve head 27 prevents pressure from by-passing directly from the inlet 15 to the outlet 17.

When the piston 45 engages the abutment 28, the charge has been emptied, and inasmuch as the space on the lower side of the piston 45 no longer expands, the pressure increases (due to continued pump operation) until pressure relieving apparatus (not shown) becomes operative to relieve the pressure in the line 15. The character of this apparatus can be determined from said Patent 2,141,022. Also, as shown in said Patent 2,141,022, the relief of pressure results in stopping the pump.

Hence, whenever the pressure in the inlet 15 drops to a point where the valve 25 is moved back by the spring 30 to the position of Fig. 2, the port 49 is cut off from the port 52.

This causes the under side of the piston again to be connected with the upper side thereof by way of passages 39, 29, 49, 43, 14 and 16. Hence, under action of spring 47, the piston 45 will be driven down to transfer lubricant from the contracting volume below the piston to the expanding volume on the top side. Thus, it will be seen that when the charging ceases, the device is ready for another delivery when the pressure in line 15 again rises.

The travel of the piston 45 determines the measure of the charge delivered to the line 17. By threading down the member 10, the size of the charge may be reduced, and hence the index numbers on the wrench, as shown in Fig. 1, successively become smaller as they indicate lowering of the member 10.

The purpose of the passage 12 is, in view of the loose fit between the wrench and the member 10, to permit exudation or bleeding of lubricant from above the piston 45 (through passages 16 and 12) when the member 10 is forced down by the wrench. It will be seen that if such an exudation were not permitted the member 10 could not be adjusted downwardly when a charge is above the piston. By the provision of bleeder port 12 the device may be adjusted while loaded.

In Fig. 3 is shown an alternative form of the invention in which like numerals designate like parts. The difference in this form is that the cap 24 is provided with a boss 61 through which is threaded an indicator and valve screw 63 having a pointed lower end 65 for cooperation with a seat 72 at the end of the passage 12.

Thus, after an adjustment has been made upon the adjusting member 10 by the wrench 51, the cap 24 is replaced and the screw 63 is screwed down to position to shut off the port 12. It will be seen that the elevation of the head of the screw above the boss 61 is determined by the adjusted position of the member 10, so that a user has a visible indication of about what charge is being delivered, without taking the device apart to investigate. The purpose of the seal between the lower end 65 of the screw and the passage 12 is to eliminate the necessity for a seal at the threads of the screw 63.

It is to be understood that the piston 45 is one example of means for separating or dividing the chamber 35 into two chambers, the sizes of which are varied by operation of the apparatus. For example, a movable diaphragm may be used in lieu of the piston 45.

In view of the above it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As many changes could be made in carrying out the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. An injector comprising a cylinder, a movable dividing means therein, said cylinder having an inlet on one side of the dividing means, outlet means leading from the other side of the dividing means, said outlet means comprising a stationary tube through the dividing means, a second tube telescoping the stationary tube and forming an abutment for limiting the movement of the dividing means.

2. An injector comprising a cylinder, a movable piston therein, said cylinder having an inlet on one side of the piston, outlet means leading from the other side of the piston, said outlet means comprising a stationary tube through the piston, a second tube telescoped to the stationary tube and forming an abutment for limiting piston movement.

3. An injector comprising a cylinder, a movable piston therein, said cylinder having an inlet on one side of the piston, outlet means leading from the other side of the piston, said outlet

means comprising a stationary tube through the piston, a second tube telescoped to the stationary tube and forming an abutment for limiting piston movement, said telescoping tube being adjustable in position and having communicating means between the cylinder and said stationary tube.

4. An injector comprising a cylinder, a movable piston therein, said cylinder having an inlet on one side of the piston, outlet means leading from the other side of the piston, said outlet means comprising a stationary tube through the piston, a second tube telescoped with respect to the stationary tube and forming an abutment for limiting piston movement, said telescoping tube being adjustable and having communicating means between the cylinder and said stationary tube and also having communicating means between said cylinder and the exterior of the apparatus.

5. An injector comprising a cylinder, a movable piston therein, said cylinder having an inlet on one side of the piston, outlet means leading from the other side of the piston, said outlet means comprising a stationary tube through the piston, a second tube telescoped with respect to the stationary tube and forming an abutment for limiting piston movement, said telescoping tube being adjustable and having communicating means between the cylinder and said stationary tube and also having communicating means between said cylinder and the exterior of the apparatus and means for opening said last-named communication during periods of adjustment and for closing it during other periods.

6. An injector comprising a cylinder, a piston in the cylinder, said cylinder having an inlet on one side of the piston, outlet means communicating from the other side of the piston, said outlet means comprising a stationary tube passing through the piston, a telescoping tube related to said stationary tube and forming a stop for the piston, said telescoping tube including a communication from the cylinder to said stationary tube and including a communication from said cylinder to the exterior, means for adjusting the position of said telescoping tube, and means for closing said exterior communication when the adjusting means is not in position.

7. An injector comprising a cylinder, a piston in the cylinder, said cylinder having an inlet on one side of the piston, outlet means communicating from the other side of the piston, said outlet means comprising a stationary tube passing through the piston, a telescoping tube related to said stationary tube and forming a stop for the piston, said telescoping tube including a communication from the cylinder to said stationary tube and including a communication from said cylinder to the exterior, means for adjusting the position of said telescoping tube, and means for closing said exterior communication when the adjusting means is not in position, said last-named means comprising a screw threaded valve member forming a closure over said exterior communication and extending exteriorly to form an indicator of the adjusted position of said telescoping tube.

8. An injector comprising a body having an inlet and a chamber, movable dividing means in the chamber having areas presented to pressure on opposite sides thereof, means normally biased to one position in which opposite sides of the dividing means are placed in communication with one another, said means being adapted upon increase in pressure in the inlet to assume a position to place one side of the diaphragm in communication with the inlet and the other side thereof with the outlet, the communication with the outlet comprising a stationary tube through the dividing means, and an adjustable tube telescoping said stationary tube, said telescoping tube with the stationary tube forming a communication from one side of the movable dividing means to the outlet.

9. An injector comprising a body having an inlet for receiving a fluid under pressure and having an outlet for delivering fluid under pressure, a chamber, a movable dividing means in the chamber having areas presented to pressure on opposite sides thereof, said body including a port between said inlet and one side of the dividing means and a port communicating between the outlet and the other side of the dividing means, valve means traversing said ports normally biased to one position in which both of said ports are cut off from the inlet and the outlet, said valve means presenting an area to pressure of the inlet whereby when said pressure rises the valve means is moved to a position to connect said ports respectively to the inlet and outlet, and an adjustable stop means adapted variably to limit the motion of said dividing means.

10. An injector comprising a body having an inlet and a chamber, movable dividing means in the chamber having areas presented to pressure on opposite sides thereof, means normally biased to one position in which opposite sides of the diaphragm are placed in communication with one another, said means being adapted upon increase in pressure in the inlet to assume a position to place one side of the diaphragm in communication with the inlet and the other side thereof with the outlet, the communication with the outlet including a stationary tube through the dividing means, and a second tube telescoping said stationary tube, said telescoping tube being adjustable and with the stationary tube forming a communication from one side of the movable dividing means to the outlet, said adjustable means having a bleeder port for use during adjustment, and means preventing bleeding under conditions of non-adjustment.

11. An injector comprising a body having an inlet and a chamber, movable dividing means in the chamber having areas presented to pressure on opposite sides thereof, means normally biased to one position in which opposite sides of the diaphragm are placed in communication with one another, said means being adapted upon increase in pressure in the inlet to assume a position to place one side of the diaphragm in communication with the inlet and the other side thereof with the outlet, the communication with the outlet including a stationary tube through the dividing means, and a second adjustable tube telescoping said stationary tube, said telescoping tube forming a communication from one side of the movable dividing means to the outlet, said adjustable means having also a bleeder port for use during adjustment, and means preventing bleeding under conditions of non-adjustment, said last-named means comprising exterior indicating means.

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