Nov. 14, 1933. A. P. FOX ET AL 1,935,150

LUBRICATING APPARATUS

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FIG. 1.

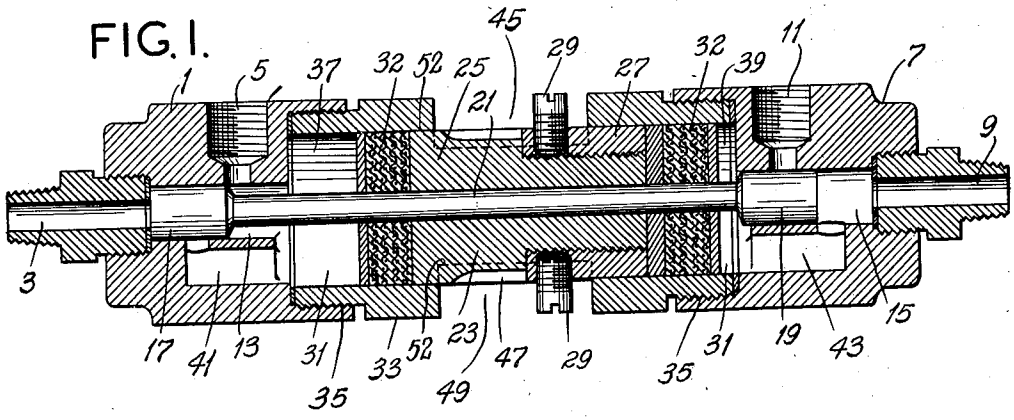


FIG. 2.

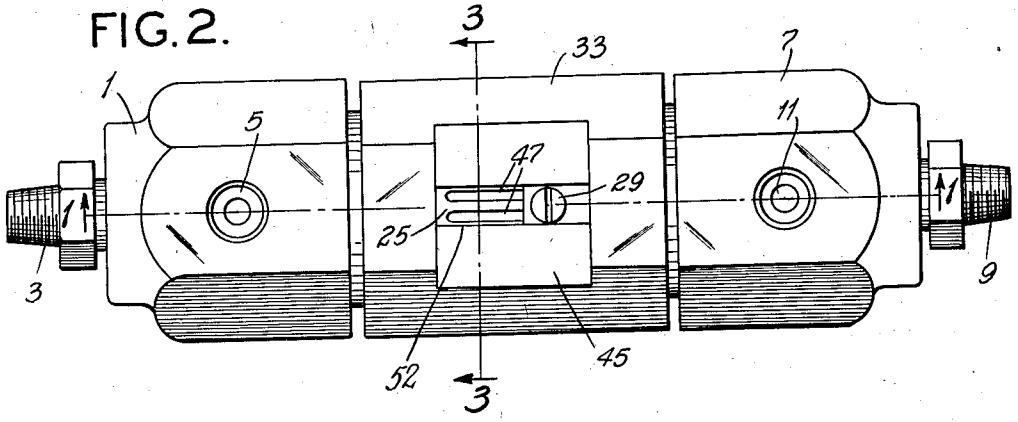
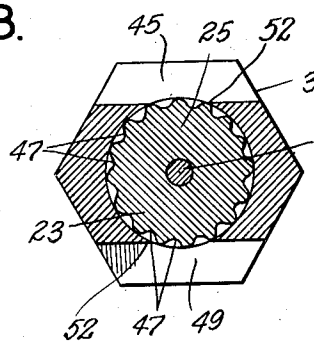


FIG. 3.



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FIG. 4.

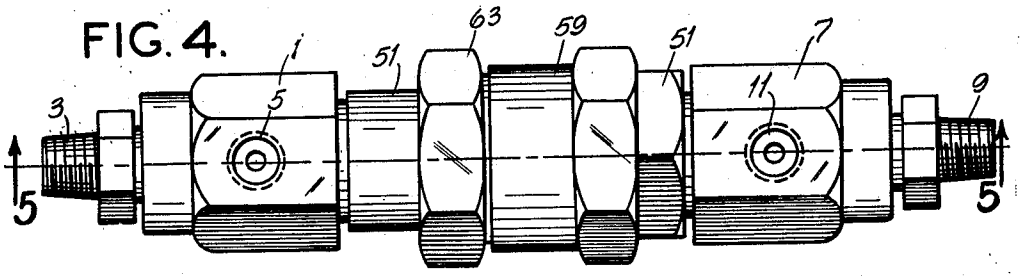


FIG. 5.

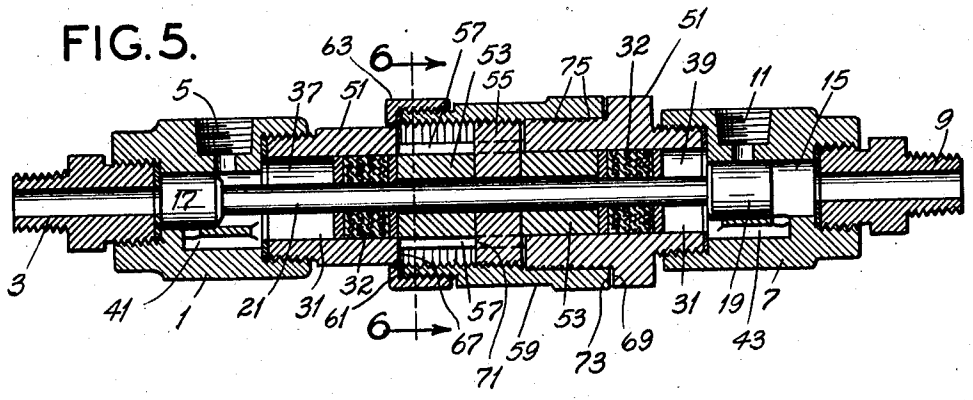


FIG. 7.

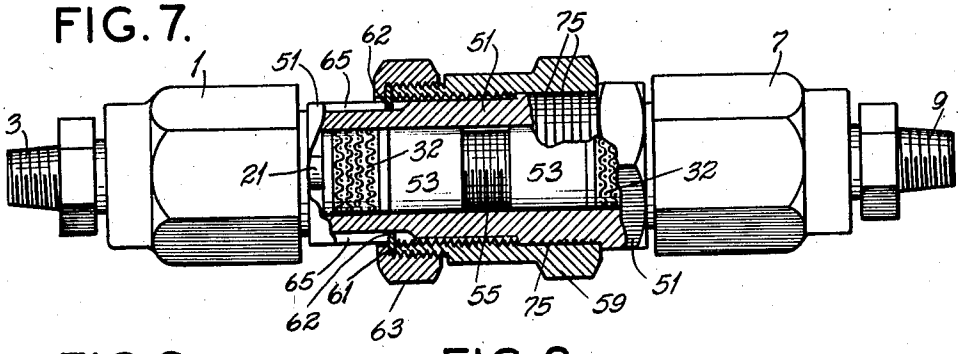


FIG. 6.

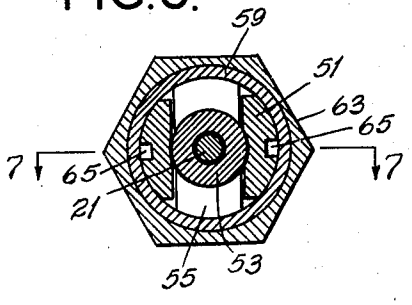
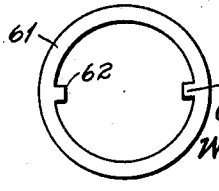


FIG. 8.



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UNITED STATES PATENT OFFICE

1,935,150

LUBRICATING APPARATUS

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Application June 27, 1931. Serial No. 547,316

10 Claims. (Cl. 184—7)

This invention relates to lubricating apparatus, and with regard to certain more specific features, to adjustable injectors for lubricating systems.

Among the several objects of the invention may be noted the provision of an improvement upon the class of injectors shown in the patent of Frank S. Barks, No. 1,805,303, dated May 12, 1931 (see particularly Figs. 1 to 3); the provision of an improved injector of this class which shall have means for manually adjusting the charge delivered without disassembling the device to make the adjustment; the provision of apparatus of this class of which the adjustment shall be visible; the provision of apparatus of the class described which permits a manufacturer and a user to carry in stock a minimum number of parts to supply a maximum number of needs; and the provision of apparatus of this class which is simple in construction, rugged and long lived. 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 drawings, in which are illustrated several of various possible embodiments of the invention,

Fig. 1 is a longitudinal section of preferred form of the device;

Fig. 2 is a top plan view of Fig. 1;

Fig. 3 is a cross section taken on line 3—3 of Fig. 2;

Fig. 4 is a plan view of an alternative form of the invention;

Fig. 5 is a longitudinal section taken on line 5—5 of Fig. 4;

Fig. 6 is a cross section taken on line 6—6 of Fig. 5;

Fig. 7 is a view similar to Fig. 4, certain portions being broken away along line 7—7 of Fig. 6 to show certain features of the interior of the device; and,

Fig. 8 is a detail plan view of a locking washer of the alternative form.

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

Referring now more particularly to Fig. 1, there is illustrated at numeral 1 a body member having an inlet 3 and an outlet 5. At numeral 7 is shown a similar body member having also an inlet 9 and an outlet 11. As will be shown, the outlet 11 receives material from the inlet 9 and the outlet 5 receives material from the inlet 3. However, pressure from the inlet 3 forces material out of the outlet 11 and pressure from the inlet 9 forces material out of the outlet 5. A device of this nature is adapted to cooperate with alternating pressure means for supplying pressure first at the inlet 3 and then at the inlet 9. The inlet not receiving pressure is used to deliver returns or exhaust material. Apparatus adapted to effect the alternation of pressure between the inlets 3 and 9 is shown in said Barks patent.

The body portions 1 and 7 are provided with bores 13 and 15 respectively, and carrying heads 17 and 19 respectively, said heads 17 and 19 being connected by a spacing rod or pillar 21.

The rod 21 extends loosely through a piston 23 comprising a head 25 and a head 27, the latter being threaded to the former and held in predetermined position by set screws 29 which function also as indicated thus for a purpose later to be made clear.

Packing members 32 at each end of the piston 23 serve to seal the piston about the rod 21 and in the bores 31 of a connector member 33 joining said body members 1 and 7 by threaded couplings 35.

The bore 31 of the member 33 forms cylinders 37 and 39 adjacent to the body members 1 and 7, respectively. By-passages 41 and 43 join the inlets 3 and 9 with the cylinders 37 and 39 respectively and are adapted to be covered and uncovered by the heads 17 and 19 respectively. When the heads 17, 19 uncover their respective by-passages, they cover their respective outlet passages. Thus each passage 3 and 9 is put into communication with its respective cylinders 37 or 39 whenever the adjacent outlet passage 5 or 11 is covered and vice versa.

Operation takes place when one of the inlets, for instance inlet 9, receives pressure. This causes the head 19 to receive pressure (continuing the example), thus throwing what may be called the valve member 17, 21, 19 into the position shown in Fig. 1. The incoming fluid (grease in the present example) is by-passed behind the piston 23 and into the cylinder 39, thereby forcing the piston to the left and thereby forcing prior-placed fluid in the cylinder 37 out through the outlet 5. Upon decrease of the pressure in the outlet 9 and increase of the pressure in the inlet 3, the valve 17, 21, 19 moves to the right under the incoming pressure and by-passage is effected around the head 17 which at this time covers the outlet 5. The by-passed fluid pushes the piston 23 to the right and forces the previously

entered grease in the cylinder 39 out to the outlet 11. The outlets are connected to suitable points of delivery of the fluid.

From the above it will be seen that measured charges are delivered from the outlets 5 and 11, depending upon the volume of the respective cylinders 37 and 39. The purpose of threading together the members 25 and 27 is to provide a means for adjusting the length of the piston 23 so that the volume of the cylinders 37 and 39 may be changed for the purpose of effecting changes in the amounts of fluid delivered per stroke. In other words, the stroke is changed by lengthening the piston and consequently the weight and/or volume of materials delivered is changed.

In order that the piston 23 may be reached for turning the head 25 relatively to the head 27 on the thread therebetween, the member 33 is milled as shown at numeral 45, the milled portion intersected the bore 31 and thereby exposing (when assembled) a portion of the head 25 and a portion of the head 27 of the piston 23. The head 25 is provided with flutings 47 in the region of the milling 45 so that a grip may be obtained by a hand or tool used externally. A corresponding milled portion 49 is used opposite to the milled portion 45 so that adjustment may be made from both sides at the same time or alternatively.

To make an adjustment, the set screws 29 are loosened and the fingers or tool applied to the fluting 47 on opposite sides in order to effect relative turning of the parts 25 and 27. The part 27 is kept from turning by the keying action of the then loose set screws 29 in the slot 52, which slot is the intersection between the cylinder 31 and the milled portion 45 and/or 49. The set screws 29 also function to show the amount of travel of the piston as determined by the adjustment.

In Figs. 4 to 6 is shown an alternative form of the invention. Like numerals designate like parts in the preferred and alternative form.

The difference in structure consists in changing the form of the structure which join the members 1 and 7. This structure still provides the bore 31 for effecting the cylindrical charge and delivering portions 37 and 39. The new form of said member is indicated broadly by numeral 51, the same being bored as indicated at numeral 31 to provide said cylinders 37 and 39. In the bore 31 is located a piston comprising packed sealing members 32 for sealing around the end 21 and in the bore 31. Behind the sealing members 32 are located spacers 53. Between the spacers is an adjusting block 55 having the form shown in Figs. 5 and 6. The block 55 is slidable in flats 57 of said joining member 51. The block 55 is externally threaded with an adjusting sleeve 59, the latter having a bearing on the member 51, thus permitting rotation.

From the above it will be seen that if the sleeve 59 is not locked, it may rotate and be adjusted in respect to the adjusting block 55. In order to provide a locking effect after an adjustment has been made, the sleeve 59 is provided with a locking washer 61 held in place by a threaded and movable cap 63 (Fig. 5). The washer 61 has tongues 62 reaching into grooves 65 externally positioned on the joining member 51. Thus the washer 61, being clamped to the sleeve 59, prevents the latter from normally turning. However, when the clamping nut 63 is loosened, the sleeve 59 may be turned with respect to the washer and on the member 51, thus effecting a relative adjustment between the sleeve 59 and the adjusting block 55. After an adjustment has been made, the nut 63 may be again tightened with the result that the predetermined adjustment is maintained.

The operation of the alternative form is as follows:

Pressure brought into the inlet results in pushing over the head 19, thereby by-passing fluid through the by-pass 43 and into the cylinder 31. The outlet 11 is at this time cut off. The pressure in the cylinder 31 results in the piston comprising members 32, 53 and 55 being forced to the left, whereupon the charge in the cylinder 37 is exhausted from the outlet 5, the by-pass being at this time cut off by the head 17. The stroke is limited by contact of the adjusting block 55 with the face 67 of the member 51. Upon reversing the pressure so that pressure is exerted at the inlet 3 and substantially no pressure at the inlet 9, the heads 17 and 19 pass to the other extremes of their positions, thus closing the outlet 5, opening the by-pass 41, closing the by-pass 43, and opening the outlet 11. Thus fluid under pressure flows from the inlet and into the cylinder 37 to reverse the stroke of the piston. Fluid is thus caused to push out of the cylinder 31 and to the outlet 11. The stroke to the right is limited by a contact between the end of the sleeve 59 and the surface 69 on the member 51. Thus the amount of charge delivered from the cylinder 31 is determined.

From the above it will be seen that on the device the slidable members comprise those numbered as follows: 32, 53, 55, 59, 61 and 63. This slidable, normally non-rotatable assembly has two faces which limit motion, namely, face 71 on the adjusted block 55 which limits the left hand stroke and face 73 on the sleeve 59 which limits the right-hand stroke. By loosening the nut 63 and making an adjustment between the sleeve 59 and the block 55 there is effected a difference in the distance between the faces 71 and 73. If there is a wide adjustment between the faces 71 and 73, the stroke of the slidable parts is decreased; whereas if there is a narrow adjustment, as shown in Fig. 4, the stroke is increased. In Fig. 4 the device is shown in adjustment for delivering a maximum charge, as is the case with the preferred form shown in Fig. 1.

In order that an indication may be had of the amount of fluid being delivered, the surface of the member 51 beneath the sleeve 59 is provided with indicia 75 in the forms of circular marks or grooves. The number of indicating marks uncovered during a stroke by the edge or face 73 is a measure of the charge delivered. For instance, in Fig. 4 when a left-hand stroke is taken, substantially all of the marks will be uncovered, indicating that a full charge is being delivered. When the adjustment is made such that the adjusting block is near the ends of the threads in the member 59, then only a few of the marks 75 will be uncovered indicating that the stroke has been materially reduced and that the charge being delivered is much less.

One of the advantages of the alternative form is that there are no openings connecting the interior and exterior of the device at the adjusting portion. Furthermore, a ready indication is given. Also, there is less likelihood of the hands of an operator being pinched in making an adjustment. The adjustment can be made while the device is in operation.

It will be clear that in both forms of the invention, a single adjustment is effective for determining the amount delivered on each stroke.

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 drawings shall be interpreted as illustrative and not in a limiting sense.

We claim:

1. Apparatus for distributing quantities of material under pressure from two sources, comprising a body connected with said sources and having inlets and outlets, movable means preventing communication between said sources, means for simultaneously cutting off one inlet and one outlet, and conducting fluid pressure from the other inlet to said movable means, and opening the other outlet to permit said movable means under said fluid pressure to make a delivery thereto, and means for adjusting the movable means to effect a change in the quantity delivered, said adjusting means being operable from the exterior of the assembled apparatus.

2. In apparatus of the class described, a body portion having inlets and outlets, bores in said portion, an annular piston in at least one of said bores, valve heads in said other bores and a stem joining said heads and passing through said annular piston, said piston comprising two members arranged for longitudinal adjustments for changing the length of said piston.

3. In apparatus of the class described, a body portion having inlets and outlets, bores in said portion, an annular piston in at least one of said bores, valve heads in said other bores and a stem joining said heads and passing through said annular piston, said piston comprising two members arranged for longitudinal adjustments for changing the length of said piston, and means for adjusting the relative position of the two parts of the piston from the exterior of the assembled apparatus.

4. In apparatus of the class described, a body portion having inlets and outlets, bores in said portion, an annular piston in at least one of said bores, valve heads in said other bores and a stem joining said heads and passing through said annular piston, said piston comprising two members arranged for longitudinal adjustments for changing the length of said piston, and means of adjusting the relative position of the two parts of the piston from the exterior of the assembled apparatus, said body portion having at least one opening adapted to permit access to said adjustable parts.

5. In apparatus of the class described, a body portion having inlets and outlets, bores in said portion, an annular piston in at least one of said bores, valve heads in said other bores and a stem joining said heads and passing through said annular piston, said piston comprising two longitudinally threaded members whereby the length of the piston may be adjusted, said body having an opening whereby the piston may be reached for adjusting purposes and locking means on the piston and extending through said opening to also provide a signal.

6. In apparatus of the class described, a body portion having inlets and outlets, bores in said portion, an annular piston in at least one of said bores, valve heads in said other bores and a stem joining said heads and passing through said annular piston, said piston comprising two longitudinally threaded members whereby the length of the piston may be adjusted, said body having an opening whereby the piston may be reached for adjusting purposes and locking means on the piston and extending through said opening to also provide a signal, and roughened means on said piston adapted to be exposed at said opening to facilitate said adjustment.

7. In apparatus of the class described, a body portion having inlets and outlets, bores in said portion, an annular piston in at least one of said bores, valve heads in said other bores and a stem joining said heads and passing through said annular piston, said body having at least one opening therein, means associated with the piston extending through said opening, a sleeve located exteriorly of said body and threaded through said means extending from the piston, said sleeve having a stop associated with the body and said extension having a stop associated with the body, said stops being adjustable by adjusting the sleeve with respect to the extension.

8. In apparatus of the class described, a body portion having inlets and outlets, bores in said portion, an annular piston in at least one of said bores, valve heads in said other bores and a stem joining said heads and passing through said annular piston, said body having at least one opening therein, means associated with the piston extending through said opening, a sleeve located exteriorly of said body and threaded through said means extending from the piston, said sleeve having a stop associated with the body and said extension having a stop associated with the body, said stop being adjustable by adjusting the sleeve with respect to the extension, and means for locking and unlocking the sleeve to and from said body to hold an adjustment or to effect a release for purposes of adjustment.

9. In apparatus of the class described, a body portion having inlets and outlets, bores in said portion, an annular piston in at least one of said bores, valve heads in said other bores and a stem joining said heads and passing through said annular piston, said body having at least one opening therein, means associated with the piston extending through said opening, a sleeve located exteriorly of said body and threaded through said means extending from the piston, said sleeve having a stop associated with the body and said extension having a stop associated with the body, said stop being adjustable by adjusting the sleeve with respect to the extension, and means for locking and unlocking the sleeve to said body to hold an adjustment or to effect a release for purposes of adjustment, and indicia on the body adapted to be covered and uncovered by said sleeve, whereby the degree of the amount delivered may be determined.

10. Apparatus for distributing quantities of material under pressure comprising a body having spaced inlets and spaced outlets, movable means in a bore in said body between the spaced inlets and the spaced outlets adapted to receive pressure from an inlet and press fluid through an outlet, on the other side thereof, valve means operable by fluid admitted alternately to said inlets to establish communication between the respective inlet and bore at the adjacent side of the movable means, and between the bore at the opposite side of said movable means and the op-

posite outlet, and simultaneously cutting off the communication between the bore and the adjacent outlet and between the bore and the opposite inlet, said movable means separating incoming material on one side thereof from outgoing material, and a single means for adjusting the length of the movable means to effect a simultaneous and equal change in the quantities delivered from the outlets, said adjusting means being operable from the exterior of the assembled apparatus.

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