Nov. 7, 1933. G. HEGWEIN 1,934,669

LUBRICATING PUMP

Filed Dec. 4, 1930

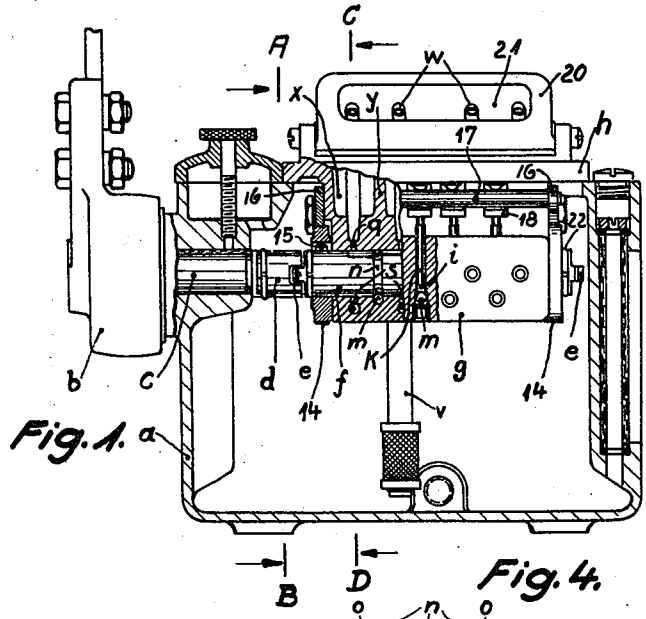


Fig. 1.

Fig. 4.

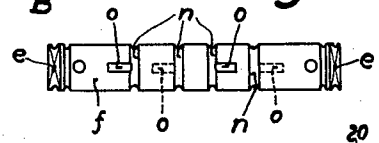


Fig. 3.

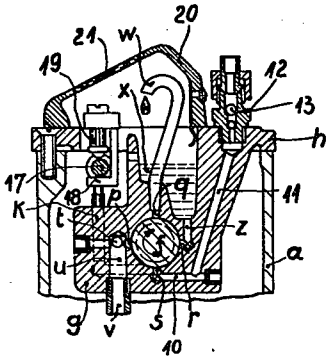


Fig 2.

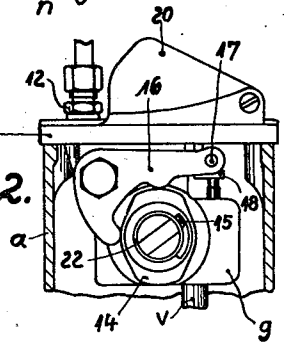
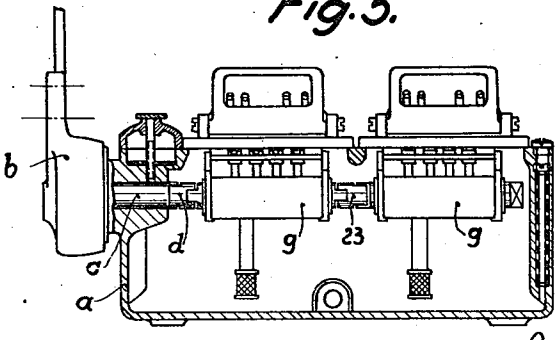


Fig. 5.



Inventor
Georg Hegwein
by Stenfield & McKay
his attorneys

Patented Nov. 7, 1933 1,934,669

UNITED STATES PATENT OFFICE

1,934,669

LUBRICATING PUMP

Georg Hegwein, Stuttgart, Germany, assignor to Robert Bosch Aktiengesellschaft, Stuttgart, Germany

Application December 4, 1930, Serial No. 500,085, and in Germany December 18, 1929

8 Claims. (Cl. 184—27)

The present invention relates to lubricating pumps and more particularly to lubricating pumps of the type embodying several piston pumps which project into a casing containing the drive and are arranged in series on a cover, the inlets and outlets of these pumps being controlled by a common rotating shaft and the pistons of the same being actuated by a drive derived from this controlling shaft.

According to the present invention, the controlling shaft, both ends of which are constructed as socket or clutch coupling halves is disposed in the vertical middle plane to be considered as vertical to the supporting edge of the cover, so that the pump system suspended from the cover can be inserted in the casing in one of two positions rotated for 180° as desired without removing the drive located in the casing.

In this way, all the possible methods of installation can be covered without it being necessary to make constructional alterations or to provide these from the front.

One form of construction of the invention of a lubricating pump in which the piston alternately supplies oil to the lubricating positions during a compression stroke, and through a visible drop indicator during the following compression stroke, is illustrated in the accompanying drawing in which:—

Figure 1 shows the pump block partly in elevation and partly in section.

Figure 2 is a section on A—B of Fig. 1.

Figure 3 is a section on C—D of Fig. 1.

Figure 4 is a view of the controlling shaft.

Figure 5 shows on a reduced scale two similar pump blocks disposed in one casing.

An oscillating lever drive *b* through which the drive is transmitted to a shaft *c* is mounted on an oil reservoir *a*. The shaft *c* is connected, through a clutch coupling member *d* with a controlling shaft *f* provided at both ends with similar and similarly directed clutches *e*, and mounted in a boring of a cast block *g*. This block *g* projects downwards into the oil reservoir, and is mounted on the upper edge of the same, having a flange-like upper edge *h* constructed at the same time as a cover for the reservoir. The cast block has four pump pistons with drop indicator device together with the spaces and channels necessary therefor. The four vertical cylinder borings or piston guides *i* with their pistons *k* are arranged in series adjacent each other and extend in a direction laterally to the boring for the controlling shaft.

A duct *m* leads from the lower end of each piston guide to the bore of the controlling shaft. An annular groove *n* is provided in the controlling shaft at the place where the ducts *m* discharge into the bore of the controlling shaft. A controlling groove *o*, longitudinally cut in the upper surface of the controlling shaft *f* branches from each of the annular grooves *n* and during one rotation of the shaft successively connects channels *p*, *q*, *r*, *s*, lying in a plane vertically inclined to the axis of the shaft, to the annular groove *n* and by this also to the duct *m* and the respective piston guide *i*. The channels are displaced from each other by 90° and two of them, *p* and *r* discharge into the horizontal middle plane of the bore of the controlling shaft and the other two into the vertical middle plane of the same.

The channels *p* lead to a common longitudinal bore *t* provided in the pump block and closed at both sides. A suction tube *v* which projects downwardly almost as far as the base of the reservoir and is provided at its lower end with a filter basket is screwed into a boring *u* communicating with the longitudinal boring *t*.

Each of the channels *q* issuing from the highest position of the bore of the controlling shaft leads to a small drop tube *w*, the free end of which is bent down at right-angles so that the drops of oil issuing from this fall into a container *x* formed in the cast block and disposed above the controlling shaft. The individual containers *x* are separated from each other by partitions *y*. A bore *z* leads to each duct *r* from the lowest point of the corresponding container.

The channels *s* branching from the lowest position of the bore of the controlling shaft are connected through bore 10, 11 with outlet nipples 12 which are laterally arranged in series above the cast block and in which are provided non-return valves 13.

It is seen from Fig. 4 that the controlling grooves *o* branching from the annular grooves *n* are alternately disposed on diametrically opposite sides of the axis of the shaft i. e., are separated from each other by 180°. The purpose of this displacement will be described in more detail when the piston drive has been described.

One of a pair of similar lifting cams 14 is placed on each of the ends of the controlling shaft projecting from the ends of the pump body *g*. A pin 15 jutting from the controlling shaft projects into a groove of the cam bore and when the shaft is rotated, it carries the cams with it, these latter being secured against longitudinal displacement by a spring ring 22 partly lying in a

channel of the controlling shaft. Both cams have two noses disposed on opposite sides of their axis i. e. at 180° from each other.

A two-armed lever 16 is hinged to each end of the pump body above each of the cams in such a way that the noses of the cam act on both arms of each lever when rotating and thereby give this latter a vertically reciprocating motion. The relatively short arms of the levers project downwardly whilst the relatively long arms lie somewhat horizontal under the edge of the cover and are connected together when disposed at as great a distance as possible from the point of rotation by a cross piece 17.

Yokes 18 of the pistons *k* engage with this cross piece or lifting rod 17, the width and the jaws of the yokes being adjusted by screws 19.

When the lever is given an angular reciprocating motion, the lifting rod 17 is given a substantially vertically reciprocating motion and thereby carries all the four pistons *k* with it. The two noses of the cam act so that the pistons are raised and lowered twice during one revolution of the controlling shaft. Each stroke follows the preceding one after the controlling shaft has turned through an angle of 90°.

The operation of the pump is as follows:—

So long as the controlling grooves *o* run past the duct *p* the pistons *k* are raised and suck oil out of the reservoir *a* into the pump cylinders *i* through the suction tube *v*, the bores *u* and *t*, channels *p*, controlling grooves *o*, annular grooves *n*, and the channels *m*. The oil sucked up is forced out of the cylinders *i* into the dropping tubes *w* through channels *m*, annular grooves *n*, controlling grooves *o* and the channels *q* during the following downward movement of the pistons above which the controlling grooves *o* are rotated past the channels *q*. The oil then drops visibly from the discharge openings of the drop tubes *w* into the bowls *x*. If the controlling grooves *o* have been rotated up to the channels *r*, the next piston stroke begins. The pistons are then raised and suck oil out of bowls *x* into the cylinder *i* through bores *z*, *r*, grooves *o*, *n* and channels *m*, finally during the next stroke, i. e. the work stroke, the oil previously sucked up passes through the channels *m* and grooves *n* and *o* to the channels *s* and from there through the bores 10 and 11 to the outlets 12 where the guides leading to the elements or parts to be lubricated are connected.

As the controlling grooves are alternately displaced on the shaft *f* by 180° as mentioned above, only two of the four pistons feed to the outlet during one compression stroke of the working operation for example the first and third, the other two pistons feeding to the drop indicator. These other two pistons then (for example the second and fourth) only feed to the lubricating place during the next compression stroke and the first-mentioned two pistons to the drop place. Although therefore all the pistons exert pressure at the same time only half of the oil is forced away into the pipes and to the elements or parts to be lubricated against resistance whilst the other half of the pistons feed to the drop place which does not exert any counter-pressure. The driving arrangement and the cross member is not so heavily loaded by this distribution of the working and controlling strokes as they would be if all the working strokes are to be effected simultaneously.

The channels *q* leading to the drop indicator branch off as was shown from the highest position of the controlling shaft bore. When therefore any air passes into the cylinder, it can easily be forced out during the controlling stroke through the drop control in the part having no resistance.

A protecting cap 20 covering the drop indicating tube and the piston heads is hinged to the window 21 and at the top to the cast block.

The controlling shaft is disposed in the middle plane vertically arranged on the supporting edge *h*. This and the clutches *e* provided on both ends of the controlling shaft allow the pump block supporting the controlling shaft and the parts making the stroke to be inserted in two positions in the casing which are displaced 180° from each other and actually in such a way that the series of outlets 12 lie at the front—when the casing and the drive *c* are in the same position—and the other time at the rear. This feature of the pump block being adapted to be fixed makes it possible to fulfill several requirements with one and the same type of construction.

It is shown in Fig. 5 how two or more of the pump blocks described can be inserted in one single casing. The controlling shafts of the blocks are thereby connected together by an intermediate clutch coupling member 23.

I claim:

1. A lubricating pump comprising a casing containing lubricant, a driving shaft rotatably supported by said casing, a cover for said casing, a plurality of pump elements carried by said cover, and driving means for said pump elements, said driving means being secured to said cover on an axis extending in the median plane perpendicular to the plane of said cover and being provided with coupling means at each end arranged so that either end of said driving means can engage and be driven by said driving shaft.

2. A lubricating pump comprising a casing containing lubricant, a driving shaft rotatably supported by the wall of said casing, a unit comprising a cover for said casing, pump elements in said cover and a shaft rotatable in said cover for operating said pump elements and clutch couplings on both ends of said shaft of said cover for the engagement of either end of said shaft with said driving shaft in the wall of said casing.

3. A lubricating pump comprising a casing, a cover for said casing having chambers and oil inlet and exhaust conduits formed therein together with a central longitudinal bore, pump elements including pistons reciprocating in the chambers formed in said cover, a driving shaft for said pistons rotatable within said central longitudinal bore and having grooves formed therein to interconnect appropriate conduits formed in the cover on rotation of the shaft and reciprocation of the pistons, a shaft rotatably mounted in the wall of said casing, a drive for said shaft and clutch coupling members on both ends of the shaft rotatable in the bore of said cover whereby on placing of the cover together with its pump elements in position on the casing, the shaft within the bore of the cover is adapted to engage with the shaft of the casing in either of two positions of the cover displaceable by 180° without affecting the operation of the pump.

4. A lubricating pump comprising a casing, a driving shaft rotatably mounted on said casing, a cover for said casing, pump elements on said cover, a controlling shaft rotatably mounted within said cover and clutch means on both ends of said controlling shaft for the interconnection of either end of said controlling shaft with

the driving shaft rotatable in the wall of said casing.

5. A lubricating pump comprising a casing, a driving shaft rotatably mounted on said casing, a cover for said casing, pump elements on said cover, a controlling shaft rotatably mounted with said cover, clutch means on both ends of said controlling shaft for the interconnection of either end of said controlling shaft with the driving shaft rotatable in the wall of said casing, cam members on both ends of said controlling shaft, bell crank levers pivotally supported on said cover, a longitudinal rod extending longitudinally of said cover for interconnecting one arm of each bell crank lever and means for interconnecting said rod with the reciprocal members of said pump elements.

6. A lubricating pump according to claim 4 whereby the pump pistons suck oil out of the casing at every separate revolution of the controlling shaft, the oil being then fed into a dropping receptacle disposed above the bore of the controlling shaft where it is again sucked up and finally forced to the lubricating position and wherein the feed to the drop indicator receptacle branches off at the highest position of the control shaft bore but the pressure channel leading to the lubricating position branches off at the lowest position of the controlling shaft bore.

7. A lubricating pump according to claim 4 in which the pistons of the pump elements arranged in series are given a reciprocating motion by a longitudinal rod and only one portion of the pump elements feeds oil to the parts to be lubricated at each common compression stroke, the other portion being supplied to the drop indicator.

8. A lubricating pump according to claim 4 wherein several of the pump elements feed to the lubricating position and the others to the drop indicator alternately during every compression stroke.

GEORG HEGWEIN.