PATENT SPECIFICATION

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PROVISIONAL SPECIFICATION

Improvements in or relating to Force Feed Lubricating Pumps

We, JOHN BLISS, a British Subject, and ARTHUR GOULD-SULLINGS, a British Subject, both of West Ridge, Knotty Green, Beaconsfield, Buckinghamshire, do hereby declare the nature of this invention to be as follows:—

This invention comprises improvements in or relating to force feed lubricators.

According to the present invention there is provided in a force feed lubricator the combination of a force feed pump, a rotary distributing valve associated therewith so as to receive the delivery from the pump and to distribute it in turn to a plurality of distributing ports, and a plurality of delivery pipes, one connected to each port, so that the single pump serves to supply oil in turn to each of the delivery pipes.

In one construction the pump is a plunger pump the barrel of which rotates with the rotary valve, the said pump having an operating member which is mounted on the rotary parts and is movable relatively thereto, and being provided with a plurality of stationary operating cams surrounding the path of the movable actuating member so that as the member comes into engagement with each cam the pump is operated to deliver lubricant to the outlet with which the valve is at that moment in connection.

The following is a description by way of example of one construction in accordance with the invention:—

The pump comprises a flanged disc which may be adapted to be secured to the side of an oil sump or to a supporting bracket or otherwise as desired. The disc has an upstanding spigot-like central portion which is screwthreaded round the outside and on this there is screwed a short cylindrical casing. The casing is machined internally to provide a flat valve face on its end wall and within the casing is a rotary disc valve having a central operating spindle which passes through the valve face and a stuffing gland outside the casing to a ratchet or other operating gear.

The body of the disc valve is bored diametrically to provide a pump barrel within which works a pump plunger. The disc is also bored transversely across the bore of the barrel from front to back near its periphery and the portion of the disc outside this transverse bore is slotted and receives a tappet. One end of the tappet bears on the end of the plunger and the other end projects beyond the rim of the disc. Within the cylinder bore is a return spring and the pump plunger is arranged to overrun an inlet aperture at the outer end of its stroke.

Around the valve disc are pivoted a plurality of cam-members which co-operate with the end of the pump plunger. The stroke which each one imparts to the pump plunger, as the latter rotates past it in the valve disc, can be varied and each cam-member can be independently adjusted by means of a setscrew and lock nut, the setscrew being secured in the outer wall of the cylindrical casing.

The delivery port of the pump barrel is led through the back of the valve disc to the valve face thereof and here it co-operates with a plurality of ports cut in the machined back face of the casting. Each of these ports leads by a radial passage in the casting to a delivery pipe.

Thus, as the disc valve is rotated, the pump plunger is operated by the cam-members, once for each member and the operation results in lubricant being delivered to the particular outlet which is in communication with the pump through the port and the disc valve at that time. The tappets which are interposed between the cams and the plunger serve to take any sidethrust and prevent this from coming upon the plunger, which would otherwise tend to wear the barrel oval.

The disc valve is held against its seating by means of a steel ball which bears on its centre and is held up to its work by an adjusting screw in the flanged casting first referred to hereinabove. In this casting is an inlet for oil and the inlet is located opposite to an annular groove in the adjacent face of the disc valve, within which groove the inlet port to the pump opens.

It will be seen that this construction is

[Price 1/-]

not only compact but it offers individual adjustment for the amount of oil delivered to each delivery pipe and it provides a good spacing between the various delivery pipes. If the number of pipes (which in the construction described may be as many as twelve or more) is insufficient for the total needs of the lubricator, it is possible to couple two such lubricators together with a single operating ratchet or pulley between them, or even to have several such pumps on the same shaft. In the latter case the thrust ball and its adjusting screw would be replaced by a ball race and a hollow screwed plug through which the shaft passes.

If the pump is required to work under a higher pressure than the disc valve will serve to control, it is possible to feed oil under pressure to the pump and use the pump and valve merely to add somewhat to this initial pressure and to act as a distributor.

Dated this 22nd day of January, 1940.
BOULT, WADE & TENNANT,
111 & 112, Hatton Garden, London, E.C.1,
Chartered Patent Agents.

COMPLETE SPECIFICATION

Improvements in or relating to Force Feed Lubricating Pumps

We, JOHN BLISS, a British Subject, and ARTHUR GOULD-SULLINGS, a British Subject, both of West Ridge, Knotty Green, Beaconsfield, Buckinghamshire, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention comprises improvements in or relating to force feed lubricating pumps.

The present invention relates to force feed lubricators of the type having a plunger pump mounted to rotate along with a rotary valve member for the pump, a movable actuating member mounted in the said rotating parts and connected to or forming part of the pump plunger, a plurality of operating members such as cams or tappets disposed around the pump so as to engage the actuating member and operate the pump successively at several points in its rotation, and a stationary valve-member having several distribution ports to co-operate with a delivery port in the rotary valve member, which ports are in communication with corresponding separate delivery pipes.

According to this invention a force feed lubricator of the type described is characterised by the fact that the stationary valve member has a disc-like valve face in which the distribution ports are located and the rotary valve carrying the delivery port bears endwise against said disc-like valve face.

The rotary valve member and pump barrel may be mounted for rotation within a casing, one face of the casing constituting the said disc-like valve face against which the rotary valve member is pressed, and the back of the rotary valve may be provided with an adjustable thrust bearing member (for example a ball thrust race) by which it may be kept in working contact with the valve face. The inlet to the pump may be open to an oil suction chamber in the said casing which is located concentrically within the said valve face and the casing may be provided with an oil suction pipe opening into the said oil suction chamber.

The actuating member of the pump plunger may take the form of a roller which is mounted for radial movement upon the pump barrel and bears at one side of its periphery on the head of the pump plunger and at the other side projects outward radially beyond the pump barrel, the stationary operating members consisting of tappets so located as to engage the rollers during its rotation. The employment of a roller has the benefit that the working surface automatically changes as the roller rotates and wear is therefore distributed, while at the same time friction is reduced.

The following is a description by way of example of one form of force feed lubricator in accordance with the invention, reference being made to the accompanying drawing in which:—

Figure 1 is a vertical section along the axis of the lubricator, and

Figure 2 is a section upon the line 2—2 of Figure 1 looking in the direction of the arrows.

The pump comprises a short cylindrical casing 11 the back of which is closed by an end-disc 12 and the front by a disc 13. The three parts of the casing are held together by means of bolts and nuts 14.

In the disc 12 is a central bearing 15 for an operating shaft 16 which is screwed and pinned to a rotary pump-and-valve element 17. The element 17 is bored through diametrically to provide a

working pump-bore 18 which is closed at one end by a screw 19 and in which works a pump plunger 20. The pump plunger is pressed normally outwards by means of a spring 21 which extends between the screw 19 and the end of the plunger inside the working bore 18.

The element 17 is cast with a lateral extension 22 which is slotted radially as indicated at 23 and in the slot 23 there works a spindle 24 of a large cam roller 25. The cam roller is therefore free to rotate and to move radially. It bears at its periphery on one side on the head of the pump plunger 20 and it rotates near to the outer wall of the casing 11 within a ring of tappets 26. The tappets 26 have screwed stems which are threaded in the outer wall of the casing 11 and can therefore be adjusted radially. They are provided with lock-nuts 27 to hold them in the adjusted position. On the opposite side of its diameter to that which engages the plunger 20 the roller 25 engages the tappets 26. During rotation of the element 17 therefore, the roller 25 will come in contact successively with each of the tappets 26 and will be forced inwardly to an extent which depends upon the position of adjustment of the tappets. This will cause it to force the pump plunger 20 inwardly at each tappet, thus operating the pump.

The pump is provided with an inlet port 28 which is uncovered by the plunger 20 in its outermost position of movement but is closed as soon as the plunger moves inward a little way. The pump furthermore has an outlet port 29 which communicates with a delivery passage 30 in the element 17. The delivery passage 30 terminates in a lateral valve face 31 on the element 17, the termination of the passage 30 constituting a port 32. The valve face 31 on the element 17 rotates in close contact with the co-operating valve face on the end-disc 13 of the pump casing and in this face there are a number of ports 33 which communicate by radial passages 34 with delivery pipes 35, connected to the casing by union fittings 36. In the union fittings 36 are non-return ball delivery valves 37.

The valve face 31 on the element 17 and the co-operating valve face on the end wall 13 of the casing are annular and within the valve face there is an oil suction chamber 38 with which the pump suction port 28 communicates. Oil is supplied to the oil suction chamber 38 by means of an oil suction pipe 39 which is coupled to the wall 13 of the casing by a union fitting 40.

The back of the element 17 is formed to accommodate a ball race 41 having a thrust washer 42 which is held up to its work by adjusting screws 43 provided with lock-nuts. By this means the valve face of the element 17 can be held in close contact with the co-operating valve face on the end wall 13 of the casing.

The shaft 16 is surrounded by a gland nut 44 where it enters its bearing 15.

In operation, upon rotation of the shaft 16 the pump plunger 20 is reciprocated every time that the roller 25 engages one of the tappets 26 and oil is delivered through the port 32 in the element 17 to one of the oil delivery pipes 35, one pipe being allocated to each position where a tappet engages the roller 25. Upon getting past the tappet, the roller 25 moves outwardly again under the impulse of the spring 21 and oil is drawn into the pump barrel from the port 28 and suction pipe 39.

Thus the plunger is reciprocated a number of times in each revolution and delivers lubricating oil under pressure successively to each of the pipes 35, the amount delivered to each pipe being determined by the position of the tappet which corresponds to it. As each of the tappets is separately adjustable, an independent adjustment is provided for each oil delivery pipe while using only a single pump plunger and barrel. The lubricator is therefore capable of serving a large number of pipes while occupying only a very small space.

If the number of pipes (which in the construction described may be as many as twelve or more) is insufficient for the total needs of the lubricator, it is possible to couple two such lubricators together with a single operating ratchet or pulley between them, or even to have several such pumps on the same shaft. In the latter case the suction pipe and its union would be located out of the way of the shaft which would pass through the element 17 and the disc 13 with a stuffing box in the latter.

If the pump is required to work under a higher pressure than the disc valve 31 will serve to control, it is possible to feed oil under pressure to the pump and use the pump and valve merely to add somewhat to this initial pressure and to act as a distributor.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A force feed lubricator of the type described, characterised by the fact that the stationary valve member has a disc-

working pump-bore 18 which is closed at one end by a screw 19 and in which works a pump plunger 20. The pump plunger is pressed normally outwards by means of a spring 21 which extends between the screw 19 and the end of the plunger inside the working bore 18.

The element 17 is cast with a lateral extension 22 which is slotted radially as indicated at 23 and in the slot 23 there works a spindle 24 of a large cam roller 25. The cam roller is therefore free to rotate and to move radially. It bears at its periphery on one side on the head of the pump plunger 20 and it rotates near to the outer wall of the casing 11 within a ring of tappets 26. The tappets 26 have screwed stems which are threaded in the outer wall of the casing 11 and can therefore be adjusted radially. They are provided with lock-nuts 27 to hold them in the adjusted position. On the opposite side of its diameter to that which engages the plunger 20 the roller 25 engages the tappets 26. During rotation of the element 17 therefore, the roller 25 will come in contact successively with each of the tappets 26 and will be forced inwardly to an extent which depends upon the position of adjustment of the tappets. This will cause it to force the pump plunger 20 inwardly at each tappet, thus operating the pump.

The pump is provided with an inlet port 28 which is uncovered by the plunger 20 in its outermost position of movement but is closed as soon as the plunger moves inward a little way. The pump furthermore has an outlet port 29 which communicates with a delivery passage 30 in the element 17. The delivery passage 30 terminates in a lateral valve face 31 on the element 17, the termination of the passage 30 constituting a port 32. The valve face 31 on the element 17 rotates in close contact with the co-operating valve face on the end-disc 13 of the pump casing and in this face there are a number of ports 33 which communicate by radial passages 34 with delivery pipes 35, connected to the casing by union fittings 36. In the union fittings 36 are non-return ball delivery valves 37.

The valve face 31 on the element 17 and the co-operating valve face on the end wall 13 of the casing are annular and within the valve face there is an oil suction chamber 38 with which the pump suction port 28 communicates. Oil is supplied to the oil suction chamber 38 by means of an oil suction pipe 39 which is coupled to the wall 13 of the casing by a union fitting 40.

The back of the element 17 is formed to accommodate a ball race 41 having a thrust washer 42 which is held up to its work by adjusting screws 43 provided with lock-nuts. By this means the valve face of the element 17 can be held in close contact with the co-operating valve face on the end wall 13 of the casing.

The shaft 16 is surrounded by a gland nut 44 where it enters its bearing 15.

In operation, upon rotation of the shaft 16 the pump plunger 20 is reciprocated every time that the roller 25 engages one of the tappets 26 and oil is delivered through the port 32 in the element 17 to one of the oil delivery pipes 35, one pipe being allocated to each position where a tappet engages the roller 25. Upon getting past the tappet, the roller 25 moves outwardly again under the impulse of the spring 21 and oil is drawn into the pump barrel from the port 28 and suction pipe 39.

Thus the plunger is reciprocated a number of times in each revolution and delivers lubricating oil under pressure successively to each of the pipes 35, the amount delivered to each pipe being determined by the position of the tappet which corresponds to it. As each of the tappets is separately adjustable, an independent adjustment is provided for each oil delivery pipe while using only a single pump plunger and barrel. The lubricator is therefore capable of serving a large number of pipes while occupying only a very small space.

If the number of pipes (which in the construction described may be as many as twelve or more) is insufficient for the total needs of the lubricator, it is possible to couple two such lubricators together with a single operating ratchet or pulley between them, or even to have several such pumps on the same shaft. In the latter case the suction pipe and its union would be located out of the way of the shaft which would pass through the element 17 and the disc 13 with a stuffing box in the latter.

If the pump is required to work under a higher pressure than the disc valve 31 will serve to control, it is possible to feed oil under pressure to the pump and use the pump and valve merely to add somewhat to this initial pressure and to act as a distributor.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A force feed lubricator of the type described, characterised by the fact that the stationary valve member has a disc-

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like valve face in which the distribution ports are located and the rotary valve carrying the delivery port bears endwise against said disc-like valve face.

2. A force feed lubricator as claimed in claim 1 wherein the rotary valve member and pump barrel is mounted for rotation within a casing, one face of the casing constitutes the said disc-like valve face against which the rotary valve member is pressed and the back of the rotary valve is provided with an adjustable thrust bearing member (for example a ball thrust race) by which it may be kept in working contact with the valve face.

3. A force feed lubricator as claimed in claim 2, wherein the inlet to the pump is open to an oil suction chamber in the casing located concentrically within the said valve face and the casing is provided with an oil suction pipe opening into the said oil suction chamber.

4. A force feed lubricator as claimed in any one of the preceding claims wherein the actuating member for the pump plunger takes the form of a roller which is mounted for radial movement upon the pump barrel and bears at one side of its periphery on the head of the pump plunger and at the other side projects outward radially beyond the pump barrel and wherein the stationary operating members consist of tappets so located as to engage the roller during its rotation.

5. A force feed lubricator substantially as described with reference to and shown in the accompanying drawing.

Dated this 19th day of August, 1940.

BOULT, WADE & TENNANT,
111 & 112, Hatton Garden, London, E.C.1,
Chartered Patent Agents.

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