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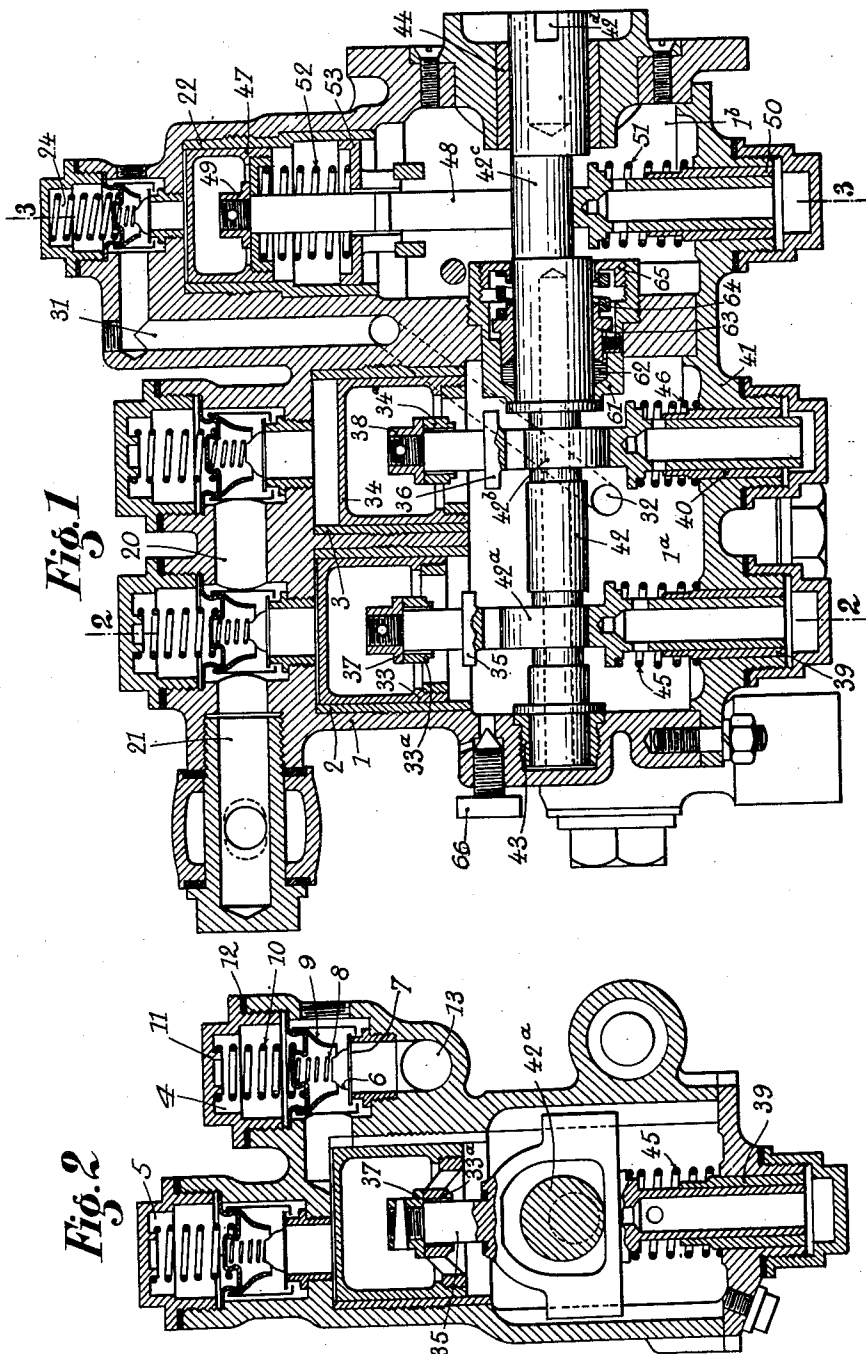
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PUMP

Filed April 13, 1934

2 Sheets-Sheet 1



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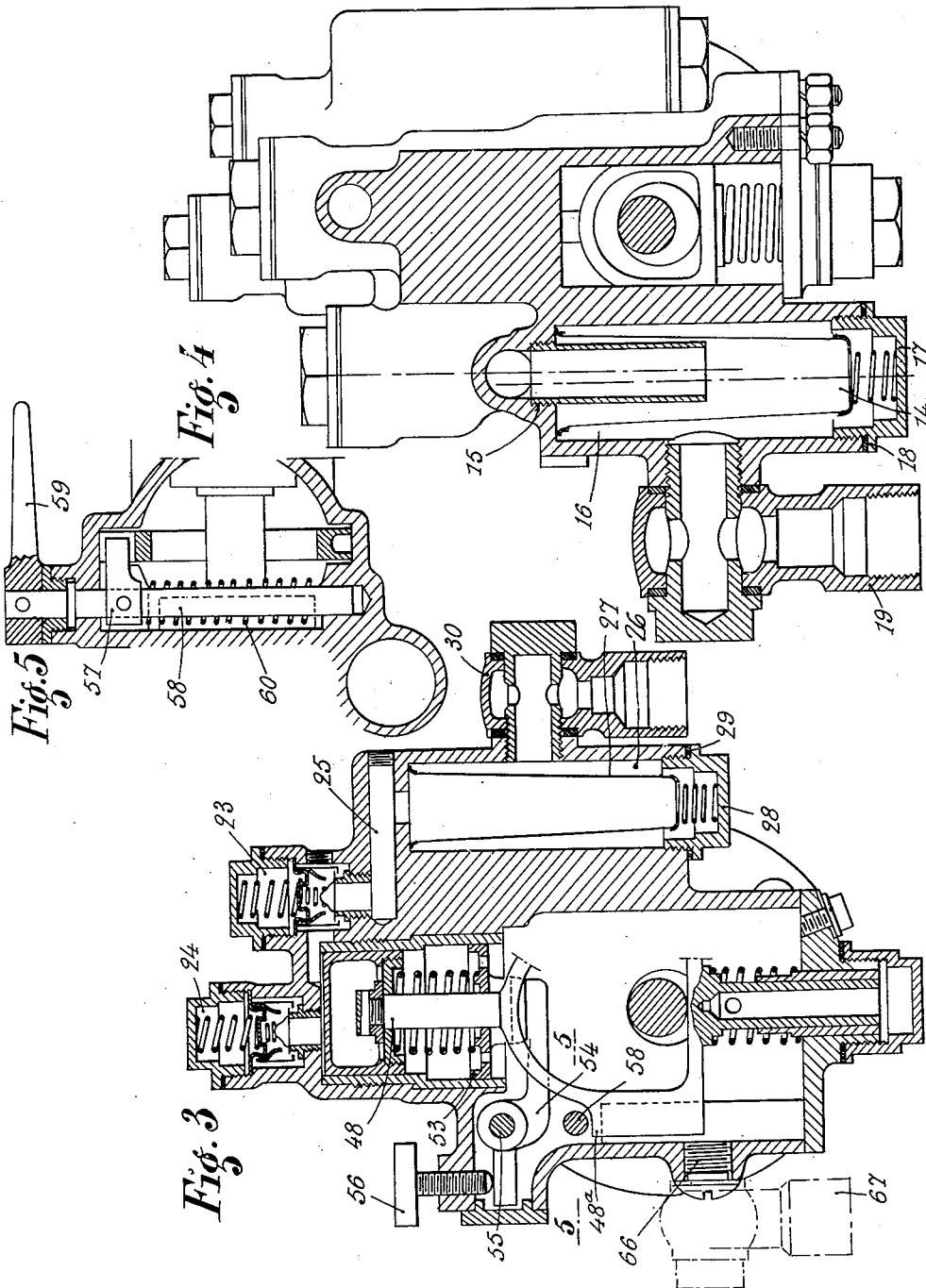
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PUMP

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It is a known fact that the usual piston pumps are not adapted to operate upon liquids dissolving the lubricants; this is particularly the case of gasoline which dissolves the lubricating oil and causes thus a rapid wear of the moving parts and a gripping.

It is thus necessary to provide the piston pumps with a suitable lubricating arrangement, should it be desired to employ these pumps for operating upon gasoline or the like. It is indispensable to introduce the lubricant between the pistons and the cylinders at a pressure which, on the one hand, is sufficient to prevent any gripping, but on the other hand, should not much exceed the pressure of the liquid operated upon in order to avoid any considerable flow of lubricating oil towards this pumped liquid, such a flow constituting a loss of lubricant which would be useless or even harmful.

Moreover, if these pumps are intended to supply gasoline to carburetors of explosion engines, or to the injection systems of internal combustion engines, they have preferably to be self-regulating; in other words, their pressure and their output must be limited according to the requirement of the engine to be supplied with gasoline or the like.

The present invention has for its object a pump constructed in accordance with the conditions set forth hereabove; this pump is characterized chiefly in that it comprises in combination a casing containing a lubricating liquid, at least one cylinder situated in said casing, delivery and suction valve means provided in said cylinders, pistons movable in said cylinders, and operative means positively actuating said pistons during their suction stroke, the delivery stroke thereof being effected under the action of the pressure of the lubricating liquid inside of said casing.

An example of such a pump is described in the following description; the means utilized to establish and to maintain the pressure of the oil in the pump casing consist of a self-regulating oil piston pump, wherein the piston is positively driven by a mechanical means (a cam, for example) during the suction stroke of the pump, and effects its delivery stroke under the influence of an adjustable elastic means. But it is to be readily understood that the same result may also be obtained by the use of any other suitable arrangement, such as a self-regulating pump of another type, a reservoir under air pressure, etc., and this without departing from the spirit of the invention.

Other characteristics of the invention will be besides set forth in the following description.

In the accompanying drawings, given solely by way of example:

Fig. 1 is a longitudinal section of an improved pump according to the invention.

Fig. 2 is a transverse section on the axis of a cylinder of a pump operating upon gasoline, on the line 2—2 of Fig. 1.

Fig. 3 is a transverse section, on the axis of the cylinder of the oil pump, on the line 3—3 of Fig. 1.

Fig. 4 is a transverse section on the axis of the gasoline filter.

Fig. 5 is a partial section on the line 5—5 of Fig. 3.

According to the represented example, the pump essentially comprises (Figure 1) a casing 1, wherein are disposed all of the gasoline cylinders. These latter comprise sleeves 2 and 3 secured in casing 1. Each one of these cylinders is provided with a box 4 containing the suction valve and with a delivery valve box 5 (Figures 1 and 2). These boxes comprise a disc 6 resting upon a seat 7, a spring 8, a valve stop 9, a spring 10 for the valve stop, and a plug 11 for the valve box, with a packing 12.

The two suction valve boxes communicate through a tube 13 (Figure 2) which also connects them with the suction well 14 (Figure 4) by an immersed tube 15. This suction well 14 may contain a filter 16; it is closed by a plug 17 provided with a joint 18, and carries the suction nozzle 19, which is provided with a suitable coupling for its non-leaking connection with a piping.

The delivery valve boxes are also connected by conduit 20 (Figure 1) which in turn is connected with the delivery nozzle 21, and also provided with a suitable coupling for its connection with a piping.

Casing 1 also contains the cylinder of an oil pump. This cylinder consists of a sleeve 22 (Fig. 1), and is provided with a suction valve box 23 (Fig. 3) and with a delivery valve box 24. The elements of these boxes are identical with those used for the gasoline cylinders. The suction valve box 23 (Fig. 3) is connected by a conduit 25 with a cavity 26 which contains a filter 27. This cavity is closed by a plug 28 with a joint 29. The boss containing the filter also carries a nozzle 30 for the suction of oil provided with a suitable coupling for the non-leaking mounting of a piping.

The valve box 24 for the delivery of oil (Fig. 1) is

communicates by conduits 31 and 32 with the interior 1a of casing 1.

Pistons 33 and 34 are movable in the cylinders of the gasoline pumps 2 and 3. These pistons are of a hollow form. Their downward stroke takes place under the action of links 35 and 36, the ends of which bear upon rings 33a and 34a through the intermediary of nuts 37 and 38. These rings 33a and 34a are secured to the pistons by means of suitable arms or of a piece pierced with holes. These rings 33a and 34a, as shown in the drawings (Figs. 1 and 2), are freely slidable on the links 35 and 36. Thus the pistons may freely slide upon links 35 and 36 between the shoulders of said links and nuts 37 and 38. Links 36 and 35 are, at their ends, guided by sockets 39 and 40, secured to the cover of casing 41. On the other hand, each one of these links has a central part having the form of a cage containing an operating cam. Cams 42a and 42b corresponding to each of the cylinders for gasoline are mounted on a shaft 42 which rotates in bearing rings 43 and 44 secured to casing 1 (Fig. 1). At one of its ends, this shaft 42 has a screw like slot 42d for its driving. Spiral springs 45 and 46 inserted between the cover of casing 41 and suitable shoulders provided on the links maintain these latter in such manner that the lower part of the cage always remains in contact with the cam. When the action of the cam ceases, links 35 and 36 are pushed in an upward direction. But during this stroke the pistons are not driven, this being due to the play between rings 37 and 38, and links 35 and 36. The delivery stroke of the pistons takes place under the sole action of the lubricating fluid in casing 41.

Cylinder 22 of the oil pump also comprises a piston 47, actuated, for its downward stroke, by a link 48 carrying a nut 49. This link is guided at its lower part in a socket 50 secured to the cover of the casing. It is subjected to the action of a cam 42c, carried by shaft 42, said cam acting upon the horizontal branch of the central part of link 48. A spiral spring 51 is inserted between the cover of casing 41 and a shoulder of the link and constantly maintains the contact between link 48 and cam 42c.

Due to the respective dimensions of cam 42c and of the opening in link 48, and also due to the method of connection of link 48 and of piston 47, the cam only acts on the piston for the downward stroke, corresponding to the suction. The delivery stroke is thus effected under the action of a spiral spring 52 compressed between piston 47 and a socket 53 slidably mounted in the cylinder. This socket bears in turn upon a lever 54 (Fig. 3) pivoted to a spindle 55. The position of the other arm of this lever is adjusted by means of a screw 56. Thus by screwing or unscrewing this screw 56, the amount of compression of spring 52 may be easily varied and hence the amount of the pressure of the delivery of oil.

Finally (Fig. 3) link 48 is provided with a part 48a forming a heel and which can be acted upon by a lever 57 (Fig. 5) pinned to a spindle 58 turning in the casing. A lever 59 also secured to spindle 58, is provided to actuate said spindle from the outside, whereas lever 57 is constantly urged back by spring 60. Thus by acting upon lever 59, link 48 and the piston 47 may be displaced by hand without setting the driving shaft 42 in movement.

Both of the chambers 1a and 1b of casing 1 are traversed by shaft 42 and between these chambers a stuffing-box is mounted, comprising

a socket 61 serving as a lodging for a plastic packing member 62, pressed by a stuffing-box bearing 63 constantly urged by a spiral spring 64 held by a nut 65. This stuffing box assures the non-leaking of chamber 1a.

A boss pierced with a threaded hole closed by a plug 66 (Fig. 3) is provided on part 1b of the casing corresponding to the oil pump. This plug may be replaced by a coupling 67 shown in dotted lines, and permitting the mounting of a pipe.

The oil suction nozzle 30 is obviously connected with an oil containing tank of any type. Oil is also supplied to the interior 1a of casing 1; this operation may be performed by actuating by hand lever 59. A plug 66 is provided in the casing for the evacuation of air. (Fig. 1.) It should be noted, however, that the interior of pistons 2 and 3 remains full of air.

The operation of the pump is as follows: shaft 42 being driven at a suitable speed, for instance from the engine cam 42c of the oil piston positively causes the suction of the oil through nozzle 30. The delivery stroke of this piston takes place only under the effect of spring 52. The oil delivered by this pump flows into chamber 1a through conduits 31 and 32. Thus, a determined and constant pressure is established in this chamber. This pressure obviously depends only upon the tension of spring 52, this tension being adjustable by means of screw 56 as above described.

When a suitable pressure is established in casing 1a, the oil pump, continuing to operate, maintains it at the desired rate and automatically compensates for all the leaks which may occur.

The gasoline pistons 33 and 34 are on the other hand adapted to be positively acted upon by cams 42a and 42b for the suction strokes. During the suction stroke of one of these pistons, the other will practically effect its delivery stroke. But this sequence of the two strokes may be somewhat irregular, due to the fact that the hollow back portion of the pistons always contains a little amount of air which may be compressed and may thus balance the effects of the unsymmetrical movements of the pistons. When one of the pistons is freed from the action of the corresponding cam, it is subjected on its back side to the action of the lubricating liquid which is maintained under a constant pressure, and on its front side to the action of the gasoline pressure. But the gasoline filling the cylinder may now flow out through the delivery valve, and this flow as soon as it begins creates a certain very little difference of pressure on the front and back sides of the piston. Thus due to the fact that the oil pressure is always constant, the piston is forcibly displaced and causes the outflow of the gasoline. The output of the pump is thus automatically adjusted according to needs, and the pump is self regulating.

The described arrangement for the suction of gasoline (wells with immersed tube) also serves to damp the successive strokes, due to the fact that the liquid column in these wells may oscillate and cause an efficient damping. Such an arrangement is of course desirable for an operation at high speed, when the number of the successive strokes is very high.

On the other hand, the oil pressure at 1a will only slightly exceed the gasoline pressure above the pistons, this small difference of pressure being sufficient to ensure the lubrication of the pistons without causing a great oil consumption.

Finally, it is known that in engines provided

with compressors delivering air into the carburetor, the feeding pressure of gasoline must be automatically increased by an amount always equal to the variable pressure produced by the compressor in the air conduits of the engine. The pump according to the invention is remarkably well adapted for this particular use. It suffices in fact to cause the pressure produced by the compressor to act in the interior 1b of the oil pump casing. For this purpose, plug 66 is removed and replaced by coupling 67 receiving a pipe connecting it with the air conduits of the engine or with any other point at which the pressure of the compressor prevails. This pressure is thus constantly added to the actual pressure of the pump due to spring 52 and the pump is thus automatically compensated.

The various results sought for are thus obtained without the use of any diaphragm or deformable wall and the pump is capable, due to this fact, of being used to obtain high delivery pressures.

Obviously the invention is by no means limited to the method of execution which has been represented and described only by way of example.

Having now described my invention what I claim as new and desire to secure by Letters Patent is:

1. A pump for feeding combustion fluid to a motor comprising a casing containing a lubricating liquid under pressure, means for always maintaining said pressure at an amount which is substantially equal to the pressure of the combustion fluid feeding the motor, at least two cylinders situated in said casing, delivery and suction valve means provided in said cylinders and adapted to operate upon the combustion fluid feeding the motor, pistons slidably located in said cylinders, and operative means for positively and successively actuating said pistons for their suction stroke which causes the filling of the corresponding cylinder with the combustion fluid, whereas, for their delivery stroke, said pistons are freed from the action of said operative means, this latter stroke being effected under the sole action upon the back side of said pistons of the pressure of the lubricating fluid in said casing, as the opening of the delivery valve means, which occurs during this stroke, produces a flow of the combustion fluid.

2. A pump according to claim 1 wherein chamber means are provided through which the feeding of the pump takes place, said chamber forming a damper permitting the operation of said pump at high speeds.

3. A pump for feeding combustion fluid to a motor comprising a casing containing a lubricating liquid under pressure, a preferably self regulating pump for always maintaining said pressure at an amount which is substantially equal to the pressure of the combustion fluid feeding the motor, at least two cylinders situated in said casing, delivery and suction valve means provided in said cylinders and adapted to operate upon the combustion fluid feeding the motor, pistons slidably located in said cylinders, and operative means for positively and successively actuating said pistons for their suction stroke which causes the filling of the corresponding cylinder with the combustion fluid, whereas for their delivery stroke, said pistons are freed from the action of said operative means, this latter stroke being effected under the sole action upon the back side of said pistons of the pressure of the lubricating fluid in said casing, as the opening of the deliv-

ery valve means, which occurs during this stroke, produces a flow of the combustion fluid.

4. A pump according to claim 3 wherein said preferably self regulating pump is located in said casing of the main pump.

5. A pump according to claim 3 and provided with driving means simultaneously actuating said operative means.

6. A pump according to claim 3 provided with a driving shaft simultaneously actuating said operative means, located in and emerging out of said casing, and being provided with suitable packing means.

7. A pump for feeding combustion fluid to a motor comprising a casing containing a lubricating liquid under pressure, means for always maintaining said pressure at an amount which is substantially equal to the pressure of the combustion fluid feeding the motor, at least two cylinders situated in said casing, delivery and suction valve means provided in said cylinders and adapted to operate upon the combustion fluid feeding the motor, pistons slidably located in said cylinders, and operative means for positively and successively actuating said pistons for their suction stroke which causes the filling of the corresponding cylinder with the combustion fluid whereas for their delivery stroke, said pistons are freed from the action of said operative means, this latter stroke being effected under the sole action upon the back side of said pistons of the pressure of the lubricating fluid in said casing, as the opening of the delivery valve means, which occurs during this stroke, produces a flow of the combustion fluid, said pressure maintaining means for the lubricating liquid comprising a preferably reciprocating pump for maintaining the pressure in the casing at a desired amount, said pump being provided with further operative means positively actuating it during its suction stroke and with adjustable preferably elastic means actuating it during its delivery stroke.

8. A pump according to claim 7 wherein said preferably reciprocating pump is provided with preferably hand operable adjusting means.

9. A pump of the kind described, comprising a main preferably tight casing containing lubricating oil, at least two cylinders provided in said casing, suction and delivery valve means provided in said cylinders, pistons slidably located in said cylinders, a driving shaft located in said casing, cam means carried by said shaft, connection means between said cams and said pistons positively and successively actuating said pistons for the suction stroke of the pump, and freeing said pistons for the delivery stroke of the pump which is effected under the sole action of the lubricant contained in said casing, a secondary pump supplying oil in said casing and maintaining the pressure thereof at a desired amount, said pump in turn comprising at least one cylinder, a piston located in said cylinder, a driving shaft, cam means secured on said shaft for positively actuating said piston for the suction stroke of said oil pump and elastic means preferably of an adjustable type actuating said piston for the delivery stroke of said oil pump.

10. A pump of the kind described, comprising a main preferably tight casing containing lubricating oil, at least two cylinders provided in said casing, suction and delivery valve means provided in said cylinders, pistons slidably located in said cylinders, a driving shaft located in said casing, cam means carried by said shaft, connecting means between said cams and said pistons for

- positively and successively actuating said pistons for the suction stroke of the pump, and freeing said pistons for the delivery stroke of the pump which is effected under the sole action of the
- 5 lubricant contained in said casing, a secondary pump supplying oil in said casing and maintaining the pressure thereof at a desired amount, said pump being located in said casing and in turn comprising at least one cylinder, a piston
- 10 located in said cylinder, cam means located on said driving shaft and positively actuating said piston for the suction stroke of said oil pump, elastic reaction means actuating said second piston for the delivery stroke of said oil pump and preferably hand operable means for adjusting the compression of said elastic means and thereby the amount of pressure in said casing.

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