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OIL PUMP AND FILTER

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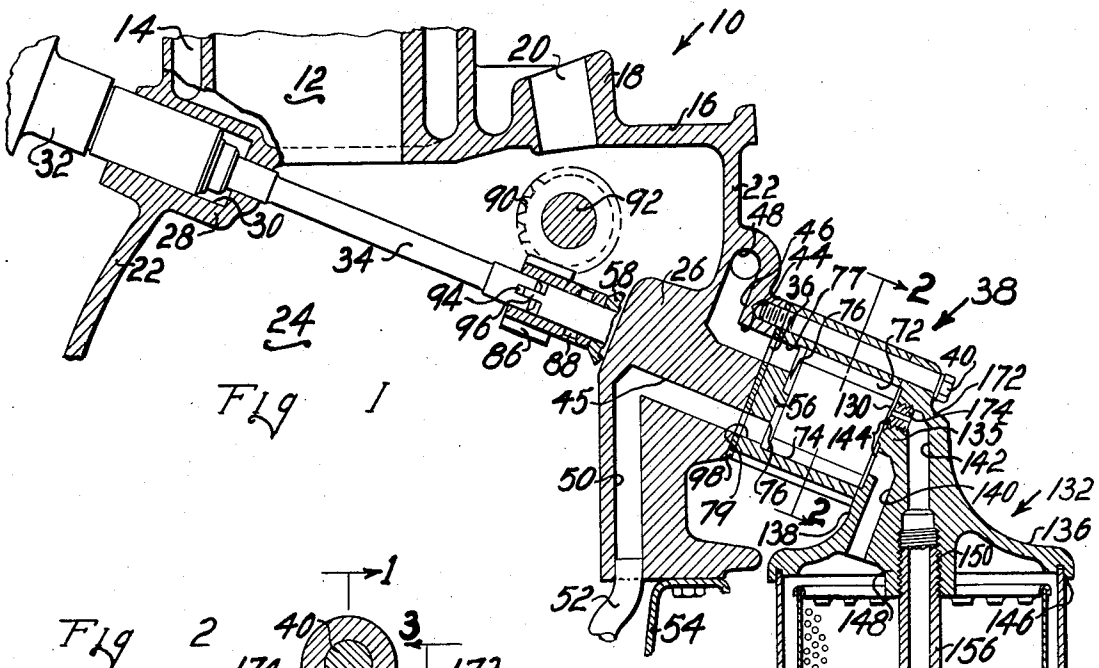


Fig 1

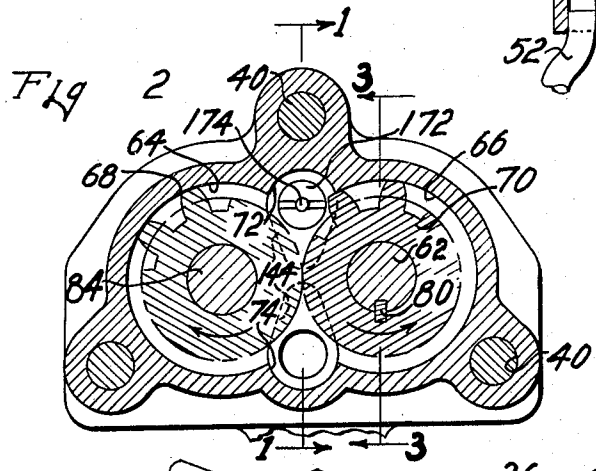


Fig 2

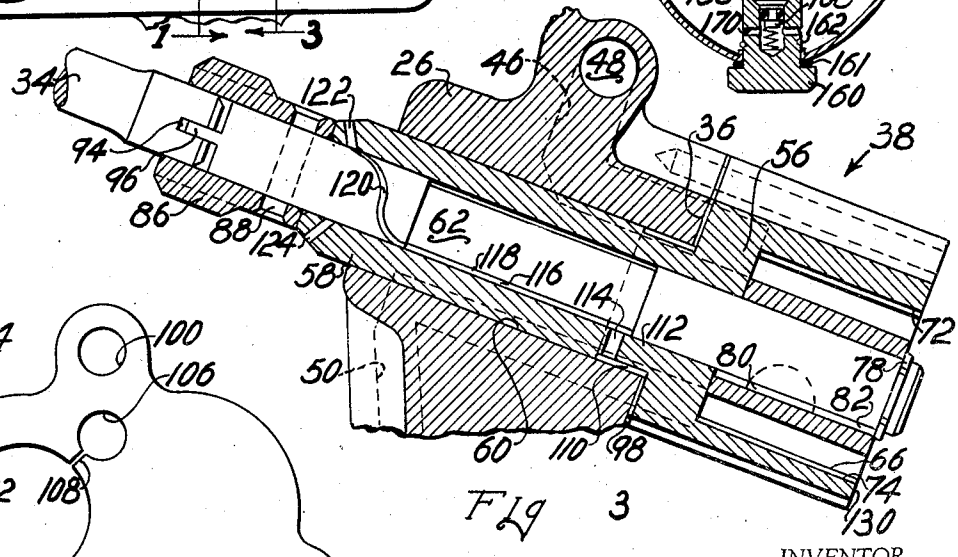


Fig 3

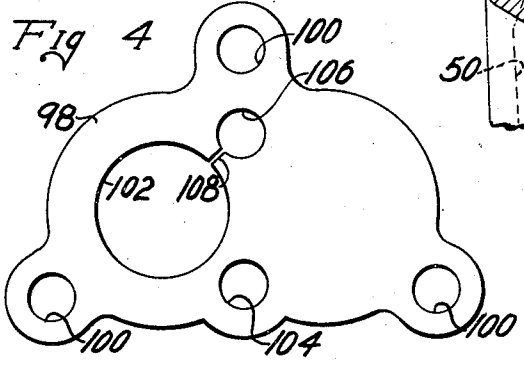


Fig 4

INVENTOR.
FLOYD F. KISHLINE
BY Carl J. Barbee
his ATTORNEY.

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OIL PUMP AND FILTER

Floyd F. Kishline, Kenosha, Wis., assignor to Nash-Kelvinator Corporation, Kenosha, Wis., a corporation of Maryland

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15 Claims. (Cl. 184—6)

This invention relates to oil filters and has particular reference to a filter arranged to be attached directly to the oil pump of an internal combustion engine.

It is an object of this invention to provide a filter for an internal combustion engine which may be attached without tubing and extra fittings.

It is another object of this invention to provide an oil pump which is designed to receive an oil filter thereon, which is accessible from below the pump.

It is another object of this invention to provide means for bleeding a portion of the output of an oil pump directly from the pump to a filter and returning the filtered oil to the intake side of said pump.

Other objects and advantages of the invention will be apparent from a consideration of the following description and claims and the attached drawing of which there is one sheet and in which

Figure 1 represents a vertical transverse section, partially broken away, through an internal combustion engine;

Figure 2 represents a section taken along a plane indicated by the line 2—2 in Figure 1 and looking in the direction of the arrows;

Figure 3 represents a section taken along a plane indicated by the line 3—3 in Figure 2 and looking in the direction of the arrows;

Figure 4 represents a bottom plan view of the gasket which fits between the engine and oil pump.

Attention is called to the fact that the plane of the section of Figure 1 is indicated by the line 1—1 in Figure 2.

Shown in Figure 1 is a portion of an internal combustion engine indicated generally at 10 and having a cylinder 12 surrounded by a cooling water jacket 14. Extending from one side of the cylinder 12 is a generally horizontal wall 16 in which are formed bosses 18 which are apertured at 20 to form guides for valve push rods (not shown). Below the cylinders 12 and horizontal wall 16 are formed the walls 22 of the crank case 24 of the engine which are cast along with the block. One of the walls 22 is thickened as at 26 for a purpose which will be described later. The other wall 22 (the left wall as viewed in Figure 1) is provided with a boss 28 apertured at 30 to receive the end of a distributor 32 and pass the distributor shaft 34. The boss 28 and shaft 34 are located forwardly of the section line at which Figure 1 is taken.

The thickened portion of the right wall 22 (see Figures 1 and 3) is machined into a sloping surface 36 to which the oil pump, generally indicated at 38, is secured by means of screws 40. The sloping surface 36 is normal to the distributor shaft 34 and is provided with two holes 44 and 45 which extend upwardly and parallel to the distributor shaft 34. The upper hole 44 connects with a hole 46 leading to an oil manifold or header 48 for delivering oil to the various parts of the engine. The lower hole 45 connects with a downwardly opening hole 50 which forms the suction line of the pump 38. Secured in the lower end of hole 50 is a tube 52 which extends downwardly to a screened intake (not shown) in the oil pan 54.

The oil pump 38 consists of a casting having a base 56 from which extends the cylindrical boss 58 (see Figure 3). The boss 58 fits into a hole 60 formed in the thickened portion 26 of the crank case wall 22, forwardly of the holes 44 and 45. The boss 58 is bored to receive the shaft 62 which drives the pump 38. Below the base 56 the casting is bored in two parallel intersecting cylinders 64 and 66 within which fit the mating gears 68 and 70. The casting is cut away at 72 where the two cylindrical spaces intersect to form a discharge chamber and at 74 to form an intake chamber. The base 56 is cut away at 76 at the ends of the discharge and intake chambers to form pockets which are uncovered by each tooth of the gears 68 and 70 as the gears revolve. The upper hole 44 in the thickened portion 26 of the engine connects with a hole 77 in the base 56 which opens into the pocket 76 at the end of discharge chamber 72 and the lower hole 45 connects with a hole 79 in the base 56 which opens into the pocket 76 in the end of the intake chamber 74.

The gear 70 is retained on the lower end of shaft 62 by means of a snap ring 78 fitted in a groove in the end of the shaft 62 (see Figure 3) and is fixed to rotate with the shaft by a key 80 engaged in the keyway 82 cut in the gear 70. The gear 68 is driven by the gear 70 and turns on an idler shaft 84 (see Figure 2) fixed in the base 56 of the pump casting.

The upper end of the shaft 62 carries the gear 86 which is fixed on the shaft by means of the pin 88. The hub of gear 86 bears on the upper surface of the cylindrical boss 58 and keeps the shaft 62 from sliding lengthwise of the bore 60. The gear 86 mates with a spiral gear 90 cut in the cam shaft 92 so that the oil pump is driven by the cam shaft.

The distributor shaft 34 is slotted at its lower

end at 94 and fits within the gear 86 where the upper end of the pump shaft 62 is provided with a tongue 96 which fits into the slot 94 and drives the distributor shaft 34.

A gasket 98 is positioned between the sloping surface 36 on the engine and the base 56 of the pump 38. Gasket 98 (see Figure 4) has formed therein holes 100 which pass the screws 40 and the hole 102 which passes the cylindrical boss 58 of the pump 38. Hole 104 permits oil flow between the intake chamber 74 and the lower passage 45 in the engine block, and hole 106 allows communication between the discharge chamber 72 and the upper passage 44 in the engine block. It will be noted that a small slot 108 is cut in the gasket 98 between the holes 106 and 102. When the gasket is in place between the pump and motor block, the slot 108 forms a metering passage through which oil is bled from the discharge passage 44 to the annular space 110 formed by reducing the diameter of the cylindrical boss 58 at 112. From the annular space 110 oil flows through a hole 114 in the boss 58 to a second annular space 116 formed by reducing the diameter of the shaft 62 at 118. Oil from the annular space 116 creeps along the shaft 62 to lubricate the shaft and also passes up the spiral groove 120 cut in the shaft 62.

As the shaft 62 revolves, the spiral groove 120 uncovers or communicates with the holes 122 and 124 drilled in the upper end of the cylindrical boss 58. Hole 122 directs a jet of oil upwardly against the cam shaft gear 90, and hole 124 acts as a relief hole to return a portion of the oil in the annular space 116 to the oil pan 54. Gears 86 and 90 are thus positively lubricated at every revolution of the shaft 62.

The lower face of the pump 38 is machined flat at 130 and is closed by the head 132 of an oil filter 134 which is secured to the pump 38 by the screws 40. Head 132 has a raised portion 135 formed on a circular cap 136.

Raised portion 135 is machined flat to form the inclined face 138 which fits against the lower face 130 of the pump 38 and is provided with the passages 140 and 142. Passage 142 opens at its upper end into the discharge chamber 72 of the pump, and passage 140 opens into the intake chamber 74. The face 138 is cut away around each passage 140 and 142 to form pockets 144 similar to pockets 76 at the upper ends of the discharge and intake chambers 72 and 74 of the pump. The face 138 may also be recessed to accommodate the lower end of the shaft 62.

Formed on the bottom of cap 136 is an annular groove 146 and a hollow boss 148 in the center thereof. Hollow boss 148 is internally threaded at 150 and communicates with the passage 142 from the discharge chamber 72 of the pump 38. Groove 146 is arranged to receive the upper edge of a container 152. The passage 140 opens in the lower face of cap 136 at a point between the groove 146 and the boss 148.

The filter 134 consists of an annular cartridge 154 of oil filtering material supported within the container 152 and around a feed pipe 156 which is threaded into the hollow boss 148 at its upper end. The lower end of the feed pipe 156 is threaded into a hollow plug 158 and soldered thereto so that the plug and pipe will turn together. The plug 158 is provided with a head 160 outside of the container 152 which seals the lower end of the container by drawing up on a gasket 161 when the plug 158 and pipe 156 are turned into the hollow boss 148. Turning up the plug 158 and pipe 156 also tightens the container 152 into the annular groove 146 sealing the top of the container. Plug 158 is retained in the container 152 by a snap ring 162.

Cartridge 154 is smaller than the container 152 so that oil entering pipe 156 will pass through holes 164 in the center of the pipe, through the filtering material of the cartridge and up the annular space 166 between the cartridge and container to the passage 140 which is connected to the intake or suction side of the pump 38.

The hollow plug 158 is provided, below the pipe 156, with a spring-pressed relief valve 168 which is arranged to open and vent oil from the pipe 156 to the space 166 through holes 170 should the cartridge 154 become clogged. By turning the head 160 of plug 158 the pipe 156 may be dropped from boss 148 and the container 152 may be removed to change the cartridge 154.

It will be noted that the upper end of passage 142 is threaded to receive the plug 172 which is drilled at 174 to permit oil to flow from the discharge chamber 72 of the pump 38 to the passage 142. Hole 174 acts as a metering device so that only part of the oil discharged by the pump passes through the filter.

By use of this invention the raised portion 135 of the filter cap 132 takes the place of the oil pump cover. No extra tubing is necessary over that required by an engine without a filter, and the labor of drilling holes for the tubing is dispensed with. There are less connections which might rattle loose and leak. The filter may be assembled on new cars or added to cars already in use with a minimum of labor. The filter may also be serviced while the car is raised on a grease rack without lowering the car or opening the hood.

While I have described my invention in some detail, I intend this description to be an example only and not limiting of my invention to which I make the following claims.

I claim:

1. In combination with an oil pump having intake and discharge chambers, intake and discharge passageways communicating with said chambers, a cover for said pump defining ports communicating with said chambers, filter means secured to said cover and communicating with said ports.

2. In combination with an oil pump having intake and discharge chambers, intake and discharge passageways communicating with said chambers, a cover for said pump defining ports communicating with said chambers, filter means secured to said cover and communicating with said ports, and metering means positioned in one of said ports.

3. In combination with a rotary oil pump having intake and discharge chambers, said pump defining intake and discharge passages, a cover for said pump defining other passages communicating with said chambers, and filter means secured to said cover and communicating with said other passages, said pump and said filter means being separably removable from said cover.

4. In combination with a motor having a rotary oil pump secured on the outside thereof and having intake and discharge chambers, intake and discharge passageways communicating with said chambers, a cover for said pump defining ports communicating with said chambers, and

filter means secured to said cover and communicating with said ports.

5. An oil filter comprising a head having a cap portion and a surface forming a portion of a pumping chamber, said head defining two passages between said surface and said cap portion, a container secured to said cap portion, a filter element positioned within said container, means for directing a flow of oil from one of said passages through said filter element, said other passage returning filtered oil to said surface, and means for securing said filter to an oil pump with said passages communicating with the pumping chamber.

6. An oil filter comprising a head having an inclined surface forming a part of a pumping chamber and a cap portion, said head defining two passages between said surface and said cap portion, a container secured to said cap portion, a filter element positioned with said container, means for directing a flow of oil from one of said passages through said filter element, said other passages returning filtered oil to said surface, and means for securing said surface to an oil pump with said passages communicating with the pumping chamber.

7. In combination with an oil pump, an oil filter comprising a head having a surface forming a portion of a pumping chamber and a cap portion, said head defining two passages between said surface and said cap portion, a container secured to said cap portion, a filter element positioned within said container, means for directing a flow of oil from one of said passages through said filter element, said other passage serving as a return for the filtered oil to said pump, and means for securing said filter to said oil pump, said first passage having metering means therein.

8. An oil filter comprising a head having a surface forming a portion of a pumping chamber and a cap portion, said head defining two passages between said surface and said cap portion, a container secured to said cap portion, a filter element positioned within said container, means for directing a flow of oil from one of said passages through said filter element to the other of said passages, and means for securing said filter to an oil pump.

9. An oil filter comprising a head having a surface forming a portion of a pumping chamber and a cap portion, said head defining two passages between said surface and said cap portion, a container secured to said cap portion, a filter element positioned within said container, means for directing a flow of oil from one of said passages through said filter element to the other of said passages, and means for securing said filter to an oil pump with said surface forming a part of the pumping chamber, said first passage having metering means therein.

10. In combination with an oil circulating system including a pressure pump, a container, a head for said container secured directly to said pump, a filter element in said container, said head defining passageways communicating with said container and with the high and low pressure sides of said pump, a pipe connected to one of said passageways and extending through said filter element, and means threaded on the end of said pipe arranged to secure said container to said head, said pipe being perforated within said filter element.

11. In combination with a pump having intake and discharge chambers with passages communicating therewith, a cover for said pump defining other passages communicating with said chambers, a container secured to said cover, a filter element in said container, a pipe secured to said cover and communicating with one of said other passages, said pipe extending through said filter element and defining apertures opening into said filter element, a plug extending through a wall of said container and threaded on the end of said pipe, said plug being arranged to secure said container to said cover, and a pressure relief valve positioned in said plug and arranged to discharge into said container and outside of said filter element.

12. In combination with a lubricant circulating pump having intake and discharge connections and a filter for lubricant acted upon by said pump, a cover for said pump having a surface constituting a part of the pumping chamber, and apertures through said cover upon the intake and discharge sides of the pump, said filter being secured against said cover in a position to receive lubricant from the aperture connecting with said discharge side and to return the lubricant to the aperture connecting with said intake side of said pump.

13. A lubricant pump comprising pumping instrumentalities, a pumping chamber having an intake and a discharge side and formed by two parallel flat surfaces and a body portion, discharge apertures through each of said parallel flat surfaces, and inlet apertures through each of said flat surfaces, one set of inlet and discharge apertures serving to connect said pump to a machine to be lubricated and the other set of inlet and discharge apertures serving to connect said pump to a lubricant filter.

14. A lubricant pump comprising a pumping chamber, gears within said chamber arranged to be driven from outside said chamber to constitute the impelling elements of said pump, an intake port for said chamber, an outlet port for said chamber, a filter including a portion forming a part of said pumping chamber, and passages extending through said filter portion and forming additional intake and discharge ports for said pump for circulating lubricant through said filter.

15. A lubricating system including a lubricant pump having intake and discharge sides with ports communicating therewith to supply lubricant under pressure to said system, additional intake and discharge ports for the pump directly communicating with the intake and discharge sides of the pump, and a lubricant filter operatively connected to said additional ports for circulation of lubricant through said filter.

FLOYD F. KISHLINE.