April 28, 1931. R. C. STOLTE 1,802,847

CRANK CASE OIL PAN

Filed Dec. 15, 1928

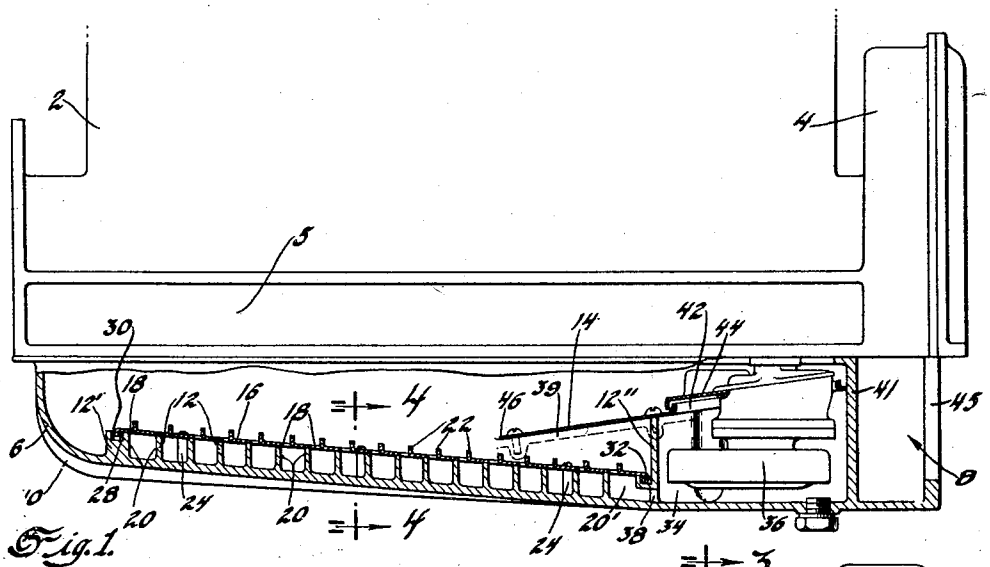


Fig. 1.

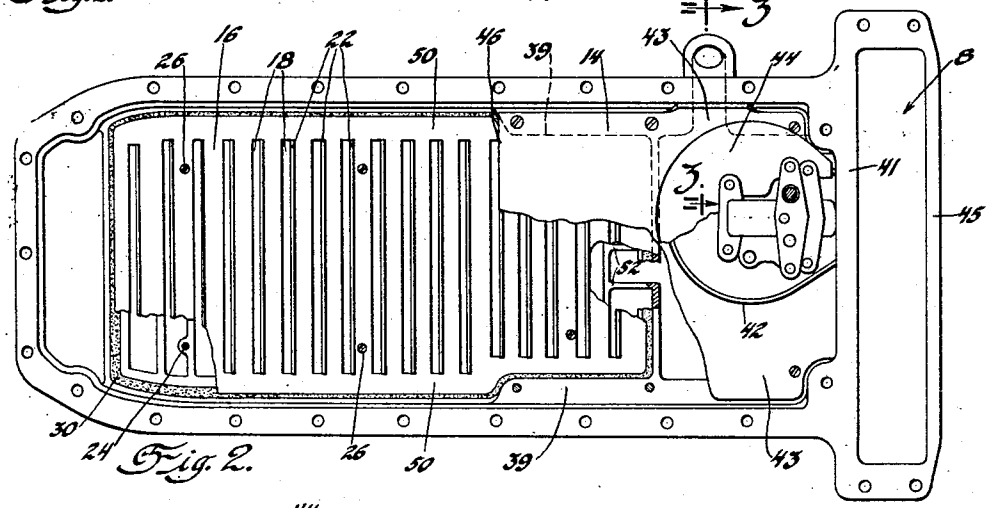


Fig. 2.

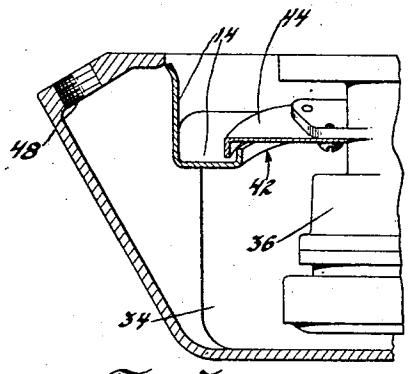


Fig. 3.

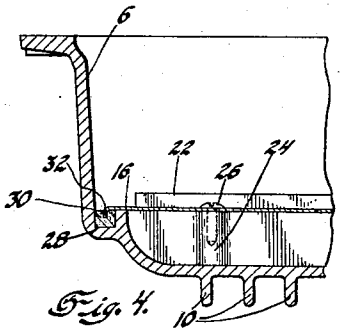


Fig. 4.

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UNITED STATES PATENT OFFICE

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CRANK-CASE OIL PAN

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This invention relates to lubricant purifiers or oil filters, and has particular reference to purifiers as applied to internal combustion engines used on automotive vehicles.

Oil filters now used on automotive vehicles are usually of the spiral bag type to which a portion of the oil of the lubricating system is forced by the oil pump. After passing through the filter this oil is returned to the oil pan or to the bearing parts of the engine. This construction has been somewhat objectionable because of the piping and connections involved which are subject to breakage and leakage which interferes with the proper functioning of the lubricating system. It is also necessary to replace the filter when it becomes clogged, and it is accordingly an object of the present invention to entirely eliminate the usual bag filter and its piping and to incorporate the lubricant purifier as a part of the oil pan of the engine and cause it to operate without any direct connection with the pump, although the pump receives the lubricant from the oil pan purifier in substantially the usual way.

The object of the invention is accomplished by casting integral with the oil pan on its inner side a plurality of ribs which extend upwardly from the bottom and have their upper edges in an inclined plane. The bottom of the oil pan preferably slopes conformably to the incline so that the ribs are of substantially the same width. The ribs define a plurality of spaces and over the ribs and spaces there is positioned a relatively flat plate provided with a plurality of perforations or openings in the form of transverse slots. A slot or opening preferably conforms to each space between the ribs so as to allow for the entry of lubricant or impurities into the spaces between the ribs. The openings in the plate are preferably formed by pressing upwardly a portion of the plate to form a rib or projection which extends upwardly away from the spaces at one edge of the opening. The opening or slot is preferably considerably smaller in width as compared to the width of the space between the ribs. The ribs formed on the plate preferably form impediments or hinder the flow of oil and thereby cause the deposit of any sediment or impurities in the lubricant. These impurities will fall in the spaces between the ribs where they will be caught and removed from the circulating system. The edge of the oil pan is preferably provided with a groove in which there is seated a piece of fabric, and a flange on the pan edge fits over the fabric to form a sediment-tight joint.

The lubricant pump is preferably placed at one end of the oil pan or at the lowest point of the incline. The rib adjacent the pump is considerably higher than the remainder of the ribs and has an opening at its lower portion to allow the oil to flow to the pump.

A shelf is placed over the pump and is supported on ribs at the side of the crankcase and extends well over the plate on the rib edges in order to direct or deflect any oil which may drop thereon over into the purifying device.

The oil pan is preferably provided with an opening at its side adjacent the pump in order to accommodate a depth gauge rod.

The oil in the pan is normally of a depth to entirely cover or submerge the purified or sediment remover.

In the drawing:

Figure 1 is a side view of an internal combustion engine with the oil pan shown in section to illustrate the invention.

Figure 2 is a plan view of the oil pan or lubricant purifier of the invention.

Figure 3 is a section taken on the line 3—3 of Figure 2.

Figure 4 is a section on the line 4—4 of Figure 1.

Referring to the drawing, the numeral 2 indicates an internal combustion engine provided with a flywheel housing 4, crankcase 5, and an oil pan 6. The oil pan is of a special construction and forms the lubricant purifier of the present invention. The oil pan is attached to the crankcase in the usual manner and the rear end 8 thereof forms the lower portion of the flywheel housing.

By referring particularly to Figure 1, it will be noted that the oil pan 6 is provided with a plurality of integral cooling ribs 10 on its bottom, while the interior has cast inte-

gral therewith the plurality of upwardly extending ribs 12. The ribs 12 extend entirely across the crankcase and are preferably equally spaced, although this equal spacing is not necessary and the spaces may be narrower or wider as desired. The oil pan is preferably inclined from front to rear as shown in Figure 1, and as the ribs 12 are of the same height, the upper edges thereof will be in an inclined plane which conforms substantially to the inclined bottom of the oil pan. The ribs 12 are shown as extending transversely of the pan, but they may be at an angle to the pan side if desired.

The forwardmost rib 12′ is somewhat thicker as is seen in Figure 1, while the rearmost rib 12″ is considerably higher for the purpose of supporting a shelf 14 and damming up the lubricant.

Supported on and secured to the upper edges of the ribs 12 is a relatively flat plate or pan 16 provided with a plurality of openings 18, one opening conforming to each space 20 between the ribs 12. The openings 18 are preferably formed by pressing upwardly a tongue or projection 22 from the metal of the pan 16. These upwardly projecting tongues 22 are positioned at the edge of the opening 20, and are arranged preferably somewhat to one side of the center of each space 20. As shown in Figure 1 one edge of each opening 18 preferably conforms to the rearmost edge of a rib 12.

Some of the ribs 12, as shown at 24, are preferably provided with thickened portions which are tapped and adapted to receive the screws 26, which pass through openings in the plate or pan 16 to hold it onto the ribs 12.

The arrangement of the tongues or projections 22 as described and shown in Figure 1 is to form an impediment or to hinder the flow of oil from the highest to the lowest part of the oil pan or purifier. The object of this construction is to retain the lubricant over the openings in order that any sediment contained therein may settle out and fall to the bottom of the spaces 20 where it is trapped and removed from circulation. The sediment or sludge which collects in the spaces 20 will not again return to the lubricating system for the reason that both ends of the greater portion of the top are closed forming a substantially closed chamber.

Around the edge of the oil pan there is constructed a groove 28 in which there is received a fabric packing 30, preferably a strip of felt, and into the felt there is sunk the flanged edge 32 of the pan or tray 16. The purpose of this construction is to secure a sediment-tight connection and to prevent the oozing out of any impurity from the spaces 20 between the ribs.

At the lowermost end 34 of the purifier or pan 6 there is positioned the oil pump 36 which receives the oil from the purifier through the opening 38 in the rib 12″ as shown in Figure 1. The pump is of the usual type and after receiving the lubricant forces it to the engine bearings and to the working parts. A rib 41 separates the lubricant chamber of the oil pan from and also forms one wall of the fly wheel housing portion 8. A flange 45 at the rear of the housing 8 serves as an attaching means for the clutch or transmission housing.

The side of the oil pan or purifier at the deepest end 34 is provided with a pair of integrally extending flanges or shoulders 39, and on these shoulders and on the upper edge of the rib 12″ there is mounted the shelf 14. The shelf 14 is provided with an opening 42 for the introduction of the oil pump 36 and over this opening after the oil pump is in position there is positioned the pan or deflector 44, preferably secured to the pump housing. The shelf 14 is further provided with lateral lips 43 to prevent contaminated oil from reaching the pump through the gauge opening 48.

As is best shown in Figure 1 the end 46 of the shelf 14 extends well over onto the tray or pan 16 of the oil purifier. The purpose of this construction as well as of the deflector 44 is to cause any oil which drips onto the deflector 44 and shelf 14 to flow to the end 46, where it will drip onto the purifier and must pass over a portion of the purifier in order to again reach the pump 36.

The side of the oil pan or lubricant purifier is provided at its deepest part or lowermost end 34 with an oil-depth gauge-rod opening or connection 48.

Flat portions 50 are shown at the sides of the ribs 22 in the plate or tray 16. The purpose of these portions is to enable the ribs and tray to be made integral. If desired, the flat portions may be omitted and individual ribs used extending entirely across the oil pan or purifier. The tray 16 should have as much inherent stiffness as possible to cause it to lie quite flat and close to the upper edges of the ribs 12, and the use of the flat portions 50 is therefore to be preferred. The tray 16 is also much cheaper when made in one piece.

The operation of the purifier is as follows:

When the engine is working and the pump 36 is forcing the oil to the bearing parts, the lubricant will spill or drop from the various bearings of the crankshaft, etc. toward the oil pan where it will drip or fall onto the oil covering the pan or tray 16. Due to the incline of the tray 16 the oil will tend to flow toward the lowest point 34, but in so doing must first pass over the spaces 20 between the ribs 12′ and over the ribs 22. These spaces 20 are filled with lubricant and the oil therein will remain in a substantially undisturbed or stationary condition and any inmpurity

therein will settle to the bottom. The entire body of oil in the pan is moving only slowly when the pump is working, and is of course entirely stationary when the pump stops. This allows the impurities, such as particles of dirt, metal, etc., to settle toward the bottom, and once they get behind a rib 22, where the oil is dammed up or prevented from flowing, they will settle to the bottom of the spaces 20. This damming up or retention of the oil will give ample opportunity for the impurities to settle or collect in the spaces 20, and a thorough removal of impurities is accomplished each time the oil is allowed to remain undisturbed for any length of time. The lubricant will gradually work its way over the ribs 22 of the oil pan toward the deepest end 34 from where it will flow into the pump chamber through the opening 38, and will be taken up by the pump and again forced to the bearing parts of the engine.

A pair of short transverse ribs 52 are preferably provided in the end space 20′ at each side of the openings 38 to form two small sediment traps.

As a result of the invention it will be seen that the usual bag or other type of oil filter has been eliminated, and the oil purifier has been incorporated into the oil pan. The purifier is of very large capacity and need be cleaned only after many years of use, or after a given mileage of say 40,000 to 60,000 miles.

In order to clean the purifier it is necessary to remove the oil pan and then remove the pan or tray 16. The spaces 20 may then be readily cleaned by the use of a steam jet or otherwise. The purifier may then be replaced.

The oil pan or purifier, in addition to purifying the oil, serves as an oil cooler, the ribs 10 and 12 performing the oil cooling function. Ribs 12 remove heat from the oil, this heat then being radiated to the outside atmosphere by ribs 10. By the use of the proper number and size and length of ribs, the amount of desired cooling is obtained. The degree of cooling may be varied over a considerable range by changing the number, size and length of ribs, the cooling being of course accomplished by radiation from the metallic ribs and the flow of air when the vehicle is in motion.

I claim:

1. In a lubricant purifying device, a receptacle for the lubricant, a plurality of spaced ribs in said receptacle, a plate over said ribs, said plate having a plurality of openings conforming to the spaces between the ribs and said spaces forming sediment or impurity traps, and a sediment tight connection between the edges of the plate and the receptacle.

2. In a lubricant purifying device, a lubricant receptacle, a plurality of spaced ribs in said receptacle, a plate over said ribs, said plate having a plurality of openings conforming to the rib spaces and said spaces forming sediment or impurity traps, a groove at the edge of said receptacle, a fabric in said groove, and a flange at the edge of said plate fitting over said fabric to form a sediment tight connection.

3. In a lubricant purifier, a lubricant receptacle, means at one end of the receptacle for moving the lubricant, a shelf secured to said receptacle over said means to prevent the flow of lubricant directly to the said means, a plurality of ribs in said receptacle the upper edges of said ribs inclined upwardly away from said means, a plate over said ribs said plate having a plurality of openings conforming to the spaces between the ribs, said spaces forming sediment or impurity traps, said plate extending partially under said shelf so as to cause the lubricant falling on the shelf to be delivered to the purifying device, and a gauge rod connection for said receptacle positioned at its lowermost point.

4. In a lubricant purifier, a lubricant receptacle, means at one end of the receptacle for moving the lubricant, a shelf secured to said receptacle over said means to prevent the flow of lubricant directly to the said means, a plurality of ribs in said receptacle the upper edges of said ribs inclined upwardly away from said means, and a plate over said ribs said plate having a plurality of openings conforming to the spaces between the ribs, said spaces forming sediment or impurity traps, said plate extending partially under said shelf so as to cause the lubricant falling on the shelf to be delivered to the purifying device.

In testimony whereof I affix my signature.

R. C. STOLTE.