Aug. 22, 1961 C. H. BOUVY 2,997,230

CENTRIFUGAL OIL CLEANERS FOR INTERNAL COMBUSTION ENGINES

Filed Feb. 25, 1959 2 Sheets-Sheet 1

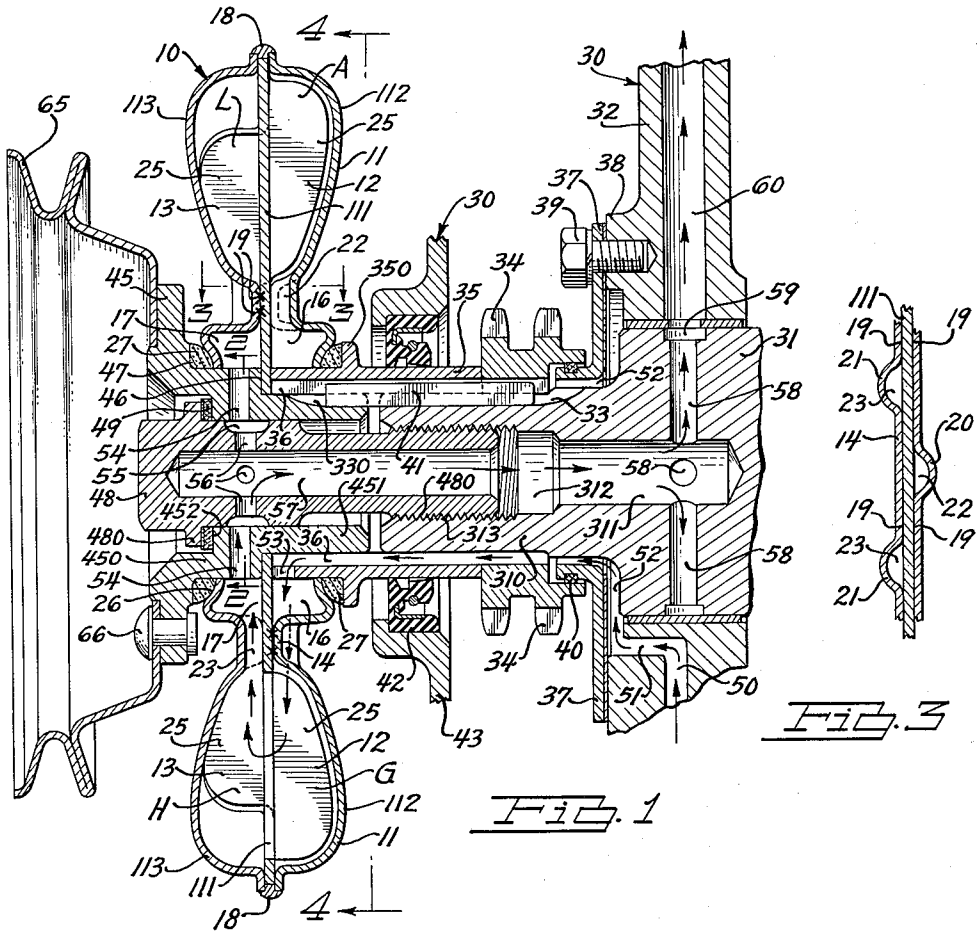


Fig. 1

Fig. 3

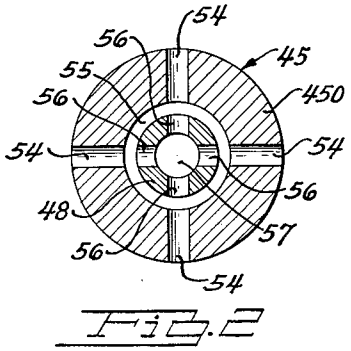


Fig. 2

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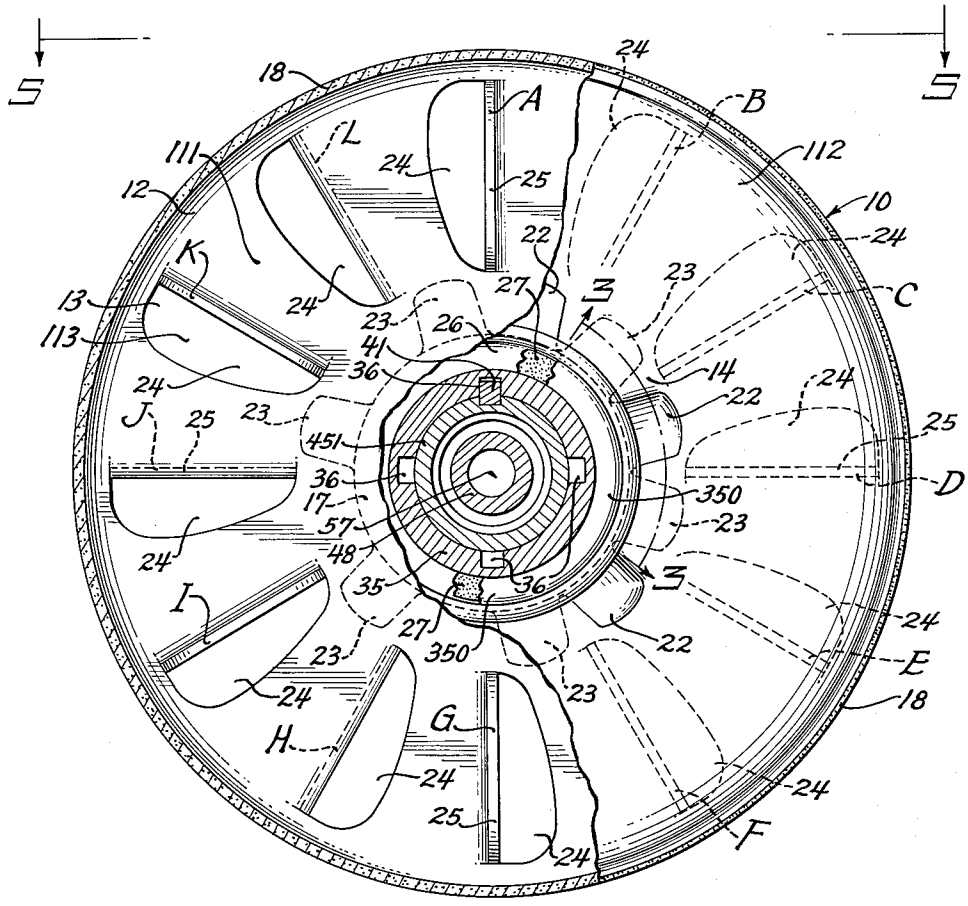


Fig. 4

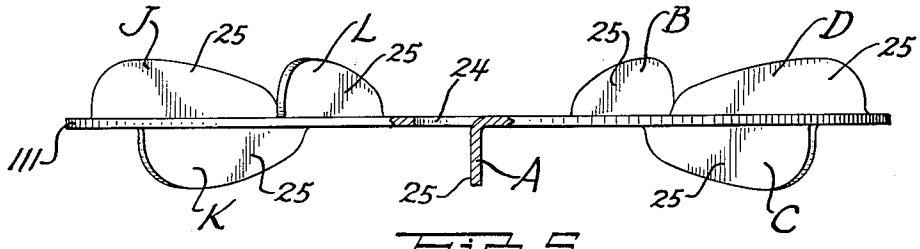


Fig. 5

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CENTRIFUGAL OIL CLEANERS FOR INTERNAL COMBUSTION ENGINES

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4 Claims. (Cl. 233—32)

This invention relates to improvements in centrifugal oil cleaners for internal combustion engines which may be readily mounted on an engine or an engine accessory shaft for rotation therewith.

The primary object of the invention is to provide an inexpensive centrifugal oil cleaner for internal combustion engines usable as a long lasting highly efficient oil cleaner to replace conventional expendible cartridge type oil cleaners generally in use.

Another object of the invention is to provide an improved centrifugal oil cleaner and simplified leak-proof means for mounting the same on an engine or engine accessory shaft for rotation therewith simultaneously connecting the said centrifugal oil cleaner in the pressure oil lubricating system of the engine.

Another object of the invention is to provide a simply constructed mass produceable centrifugal oil cleaner which will function perfectly during from 25,000 to upwards of 50,000 of automotive vehicle mileage, at the end of which time the said oil cleaner can either be removed and cleaned or replaced at a relatively minor expense to the vehicle owner.

Other objects of the invention will become apparent by reference to the following detailed description taken in connection with the accompanying drawings, in which:

FIG. 1 is a longitudinal sectional view showing an improved centrifugal oil cleaner embodying the invention mounted on an extended end of an engine crankshaft in accordance with the invention.

FIG. 2 is a cross sectional view taken on the line 2—2 of FIG. 1.

FIG. 3 is a fragmentary sectional view taken on the line 3—3 of FIGS. 1 and 4.

FIG. 4 is a cross sectional view taken on the line 4—4 of FIG. 1 with a portion of one cover element broken away to show the interior of the centrifugal oil cleaner.

FIG. 5 is a top plan view taken on the line 5—5 of FIG. 4 showing only the central divider plate of the centrifugal oil cleaner indicating the direction to which the several baffles extend therefrom.

Referring now to the drawings wherein like numerals refer to like and corresponding parts throughout the several views, the illustrative embodiment of an improved centrifugal oil cleaner 10 embodying the invention shown in the drawings consists of an annular three-part housing 11 formed into two radially outer axially adjacent annular cavities 12 and 13, an annular waist portion 14 and inner annular oil inlet and outlet channels 16 and 17 respectively. The said housing 11 is preferably constructed of a central annular disc or partition 111 having oppositely outwardly dished annular cover elements 112 and 113 welded thereto on opposite sides thereof preferably by a continuous peripheral weld 18 and a plurality of spot welds 19 at the annular waist portion 14 thereof. Each cover element 112 and 113 is preferably deformed at the waist portion 14 thereof at 20 and 21 to provide radially disposed oil inlet passages 22 and oil outlet passages 23 between the annular oil inlet and outlet channels 16 and 17 and the said outer axially adjacent annular cavities 12 and 13, all respectively.

The central annular disc or partition 111 is provided with a plurality of circumferentially spaced preferably elongated apertures 24 establishing communication between the axially adjacent radially outer annular cavities 12 and 13 of the housing 11. Between each of said apertures 24 is a baffle 25, alternate baffles 25 extending alternately into one of the said annular cavities 12 and 13. It is preferable that the size and shape of the apertures 24 are such that the baffles 25 may be punched out of the central annular disc or partition 111 and bent alternately to extend axially into and substantially block the annular cavities 12 and 13 at staggered intervals therearound. By reference to FIG. 4, wherein the baffles 25 are marked A to L inclusive, alternate baffles A, C, E, G, I and K extend into the annular cavity 12 on the oil inlet side of the partition 111 while alternate baffles B, C, F, H, J and L extend into the annular cavity 13 on the oil outlet side of the partition 111.

As best shown in FIG. 1, the inner peripheral portion of the central annular disc or partition 111 of the housing 11 preferably extends radially inwardly of the inner peripheral portion of the annular cover elements 112 and 113 thereof to aid in mounting the centrifugal oil cleaner 10 on a rotating shaft. The inner periphery of each of the annular cover elements 112 and 113 of the oil cleaner housing 11 is preferably formed at 26 to provide annular axial recesses to accommodate annular resilient seals 27 as hereinafter described in detail to prevent leakage of oil from between the centrifugal oil cleaner 10 and the rotating shaft 31 of an internal combustion engine 30 or the like upon which the said oil cleaner 10 is mounted either directly or by use of intermediate mounting means such as hereinafter described in detail.

Referring now to the particular means shown in the drawings to mount a centrifugal oil cleaner 10 embodying the invention on the extended end 310 of the crankshaft 31 of an internal combustion engine 30, the said crankshaft 31 which is rotatably mounted in the engine block 32 has its extended end 310 preferably reduced in diameter and provided with a longitudinal keyway 33. An accessory drive gear 34 and a mounting sleeve 35, both provided with a plurality of interior female splines 36, are telescoped onto the said reduced extended end 310 of the crankshaft 31 with a seal carrier 37 interposed between the accessory drive gear and an annular boss 38 formed on the outer end of the engine block 32.

The said seal carrier 37 is preferably secured to the engine block 32 by studs 39, and a suitable oil seal 40 is provided between the seal carrier 37 and the accessory drive gear 34. A key 41 is disposed in the keyway 33 of the reduced extended end 310 of the crankshaft 31 and in aligned splines 36 in the accessory drive gear 34 and mounting sleeve 35 keying the said accessory drive gear 34 and the mounting sleeve 35 to the said crankshaft 31 for rotation therewith. A crankcase seal 42 is provided between the forward end of the engine crankcase 43 and the outer periphery of the mounting sleeve 35 as best shown in FIG. 1. The said mounting sleeve 35 is preferably provided with a seal abutment 350 for one of the oil cleaner seals 27, which abutment 350 is disposed around the outer periphery of the said mounting sleeve 35 and inwardly of the outer end thereof.

A centrifugal oil cleaner 10 is telescoped over the outer end of the said mounting sleeve 35 with a neoprene or other annular resilient seal 27 disposed between the said seal abutment 350 of the said mounting sleeve 35 and the annular cover element 112 of the oil cleaner housing 11 at the seal recess 26 therein. An annular mounting cap 45 shouldered at 46 and 47 includes an annular mounting sleeve 450 which has a reduced portion 451 telescoped within the annulus of the central annular disc 111 of the housing 11 as best shown in FIG. 1 and within the inner annulus of the mounting sleeve 35. The reduced portion 451 of the mounting cap 45 has a keyway 330

therein which aligns with the keyway 33 in the reduced end portion 310 of the engine shaft 31 to which it is keyed by the key 41.

The annular shoulder 46 of the mounting cap 45 clamps the central annular disc 111 of the oil cleaner housing 11 axially against the outer end of the mounting sleeve 35, and the annular shoulder 47 of the mounting cap 45 compresses the annular seal 27 against the cover element 113 of the oil cleaner housing 11 at the seal recess 26 therein, all under clamping pressure exerted by an elongated lock nut 48 having an integral thrust ring 480 bearing against an annular seal 49 which is compressed against an annular shoulder 452 formed in the recessed outer end of the annular mounting cap 45. The said elongated lock nut 48 has its inner end threaded at 480 into the crankshaft 31 which is axially bored at 311, counterbored at 312, and threaded at 313 at the reduced extended end 310 thereof.

With the foregoing construction, the centrifugal oil cleaner 10 is mounted on an engine or other rotating shaft 31 for rotation therewith. Oil under pressure from the engine lubrication system is forced through right angle bores 50 and 51 in the engine block 32, through an annular passage 52 between the engine block 32 and the seal carrier 37, through the female splines 36 in the accessory drive gear 34, and the mounting sleeve 35 not occupied by the key 41, through suitable peripheral notches 53 in the outer end of the mounting sleeve 35 at the said female splines not occupied by the key 41, and into the oil inlet channel 16 of the said centrifugal oil cleaner 10.

Oil under pressure entering the oil inlet channel 16 of the centrifugal oil cleaner 10 passes therefrom through the oil inlet passages 22 at the waist portion 14 thereof and into the radially outer annular cavity 12 of the said centrifugal oil cleaner 10 between baffles A, C, E, G, I and K thereof. Oil under pressure entering the said radially outer annular cavity 12 of the oil cleaner 10 passes through the circumferentially spaced elongated apertures 24 in the central annular disc 111 thereof into the adjacent radially outer annular cavity 13 of the said oil cleaner 10 from whence the said oil under pressure passes through the oil outlet passages 23 in the waist portion 14 of the oil cleaner 10 and into the oil outlet channel 17 thereof.

The annular mounting cap 45 is provided with a plurality of radially disposed bores 54 so that oil under pressure from the oil outlet channel 17 of the centrifugal oil cleaner 10 may pass into an oil groove 55 suitably located in the outer periphery of the elongated lock nut 48 adjacent the annular mounting sleeve 450 of the mounting cap 45. The said elongated lock nut 48 is radially bored at the base of the said oil groove 55 to provide passages 56 for oil under pressure from the said oil groove 55 therein to an axial bore 57 in the inner end of the said elongated lock nut 48 and communicating with the axial bore 311 of the rotating shaft or crankshaft 31. The rotating shaft 31 is provided with a plurality of radially disposed oil passages 58 communicating between the axial bore 311 thereof and an oil groove 59 in the outer periphery of the rotating shaft 31 which in turn communicates with an oil bore 60 in the engine block 32 for return of oil under pressure from the axial bore 57 of the elongated lock nut 48 to the engine pressure oil lubricating system.

Thus, oil in the pressure oil lubricating system of an internal combustion engine or the like is forced while the engine is running through the centrifugal oil cleaner 10 as hereinbefore described and as indicated by the arrows in FIG. 1. Rotation of the centrifugal oil cleaner 10 causes sludge and relatively heavy foreign particles in the lubricating oil to separate from oil passing through the centrifugal oil cleaner 10 and to collect in the outer peripheral portion of the outer annular axially adjacent cavities 12 and 13 of the housing 11 of the said centrifugal oil cleaner 10. The said oil cleaner 10 is highly efficient, only needs cleaning out or replacement at long intervals of time, for example, every 25,000 to 50,000 miles of automotive vehicle driving, is inexpensive to manufacture, and may be readily serviced by mechanics of ordinary skill.

If desired, a fan belt pulley 65 may be secured to the outer end face of the annular mounting cap 45 by such means as rivets 66 as best shown in FIG. 1. Although not shown in the drawings, the fan belt pulley 65 may be formed or assembled as an element of the housing 11 of the centrifugal oil cleaner 10.

Although but a single embodiment of the invention has been disclosed and described in detail herein, it is obvious that many changes may be made in the size, shape, arrangement and details of the various elements thereof, all without departing from the spirit and scope of the invention as defined by the appended claims.

I claim:

1. A centrifugal oil cleaner comprising an annular housing including an axially central annular disc and a pair of annular cover elements secured axially together forming two radially outer axially adjacent annular cavities in said housing, an annular waist portion, and a pair of axially adjacent inner annular oil inlet and outlet channels, said annular waist portion being disposed radially between said annular cavities and said annular oil inlet and outlet channels, said central annular disc and said annular cover elements being secured together in sealed relationship at the outer periphery thereof and at said annular waist portion, said central annular disc having a plurality of radially disposed circumferentially spaced elongated apertures therethrough extending from adjacent said waist portion of said housing to adjacent the outer periphery thereof, a baffle adjacent each said elongated aperture formed integral with said central annular disc, alternate baffles extending from opposite sides of said central annular disc into the axially adjacent annular cavities, the said waist portion of said housing having circumferentially spaced radial oil inlet passages therein on one side of said central disc communicating between said oil inlet channel and one said annular cavity, and said waist portion of said housing having radial oil outlet passages therein on the other side of said central disc communicating between the other said annular cavity and said oil outlet channel.

2. In combination with a rotating shaft having axially spaced oil circulating passages therein, a centrifugal oil cleaner comprising an annular housing including an annular axially central partition and a pair of cover elements secured axially thereto formed to provide a pair of axially adjacent annular cavities at the periphery thereof, axially and radially disposed baffles in each said axially adjacent annular cavity located in staggered relationship on opposite sides of said central partition, said partition having a plurality of equally spaced elongated apertures formed radially therein, said baffles being formed integral with said partition extending normal thereto adjacent said elongated apertures provided therein, the said centrifugal oil cleaner having inlet and outlet passages therein on opposite sides of said partition leading to and from said axially adjacent annular cavities in said housing, said inlet and outlet passages of said oil cleaner communicating with said oil circulating passages in said rotating shaft, and means securing said centrifugal oil cleaner in removably fixed sealed relationship on said rotating shaft.

3. In combination with a rotating shaft having axially spaced oil circulating passages therein, a centrifugal oil cleaner comprising an annular housing including an axially central partition and a pair of cover elements secured thereto formed to provide a pair of axially adjacent annular cavities at the periphery thereof, the said partition having a plurality of circumferentially spaced apertures therein, axially and radially disposed baffles

formed integral with said partition adjacent said apertures therein, alternate baffles extending from opposite sides of said partition into said axially adjacent cavities, the said oil cleaner having a plurality of radially disposed inlet passages therein on one side of said partition leading to one annular cavity, the said oil cleaner having a plurality of radially disposed outlet passages therein on the other side of said partition leading from the other annular cavity, the said annular housing having an annular inlet and an annular outlet oil channel formed at the inner periphery thereof one on each side of said partition communicating respectively with said radially disposed inlet and outlet passages, and means removably securing and sealing said centrifugal oil cleaner on said rotating shaft for rotation therewith with each said annular inlet and outlet oil channels of said oil cleaner in communication with one of said spaced circulating oil passages of said rotating shaft.

4. In combination with a rotating shaft having axially spaced oil circulating passages therein, a centrifugal oil cleaner comprising an annular housing including an axially central annular disc and an annular cover element secured axially on each side of said annular disc formed to provide with said annular disc two radially outer axially adjacent annular cavities, an annular waist portion radially inwardly of said outer annular cavities, and inner annular oil inlet and outlet channels disposed axially inwardly of said annular waist portion at least one on each side of said central annular disc, said central annular disc having a plurality of radially disposed circumferentially spaced elongated apertures therethrough extending from adjacent said waist portion of said housing to adjacent the outer periphery thereof, a baffle formed integral with said central annular disc adjacent each said elongated aperture, alternate baffles extending axially across each of said axially adjacent radially outer annular cavities, the said waist portion of said housing having radial oil inlet passages therein communicating with said inlet channel and one said annular cavity, and said waist portion of said housing having a radial oil outlet passage therein communicating from the other said annular cavity to said oil outlet channel, the said inlet and outlet channels of said centrifugal oil cleaner communicating with said axially spaced oil circulating passages in said rotating shaft, and means removably securing said centrifugal oil cleaner on said rotating shaft for rotation therewith, said securing means including sealing ring means axially engaging the inner peripheral portion of said central annular disc and said cover elements sealing each of said annular inlet and outlet oil channels of said oil cleaner in communication with one of said spaced circulating oil passages of said rotating shaft.

References Cited in the file of this patent

UNITED STATES PATENTS

1,386,154	Brush	Aug. 2, 1921
2,416,193	Meyers	Feb. 18, 1947
2,898,037	Dega	Aug. 4, 1959
2,908,352	Giacosa	Oct. 13, 1959

FOREIGN PATENTS

607,994	France	Apr. 10, 1926
630,986	France	Sept. 3, 1927