Dec. 17, 1957 G. P. NYLEN 2,816,662

OIL CLEANING DEVICE

Filed Dec. 27, 1955

FIG. 1

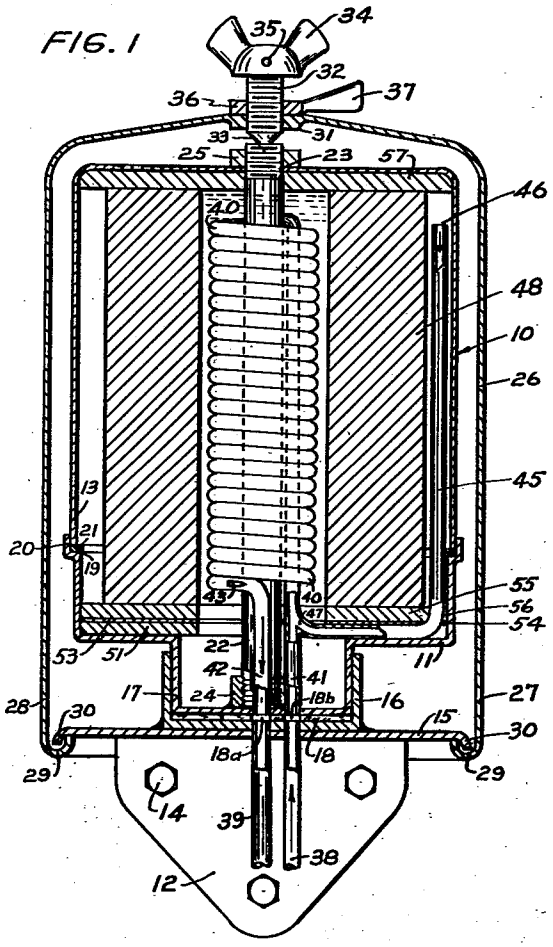
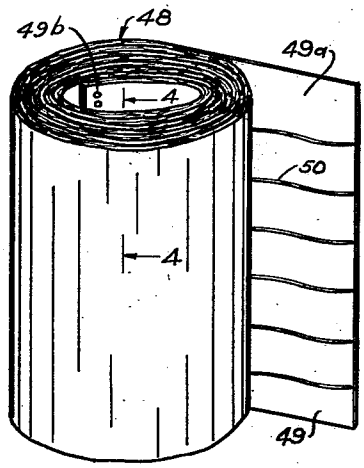


FIG. 2



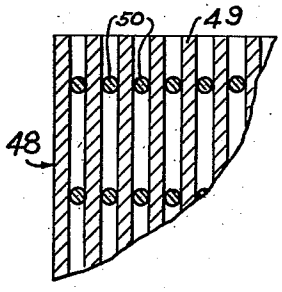


FIG. 4

FIG. 3



FIG. 5

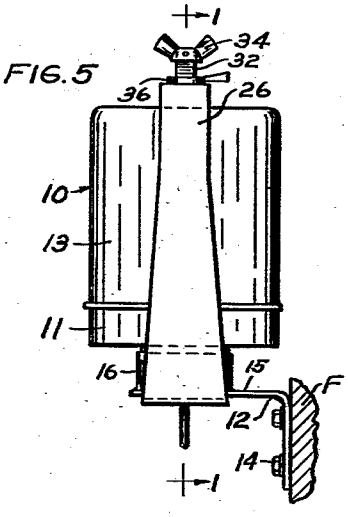
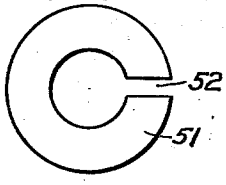


FIG. 6



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OIL CLEANING DEVICE

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9 Claims. (Cl. 210—196)

This invention relates to oil cleaners and more specifically relates to such cleaners of the type having a helically or spirally disposed chamber for centrifugally separating the lighter oil from the heavier foreign materials or dirt.

An object of my invention is to provide a new and improved oil cleaning device of simple and inexpensive construction and operation which is adapted for use in automotive type vehicles and other machinery wherein oil is positively circulated under pressure.

Another object of my invention is to provide a novel oil cleaner wherein the major portion of the oil circulated therethrough remains out of engagement with the foreign material or dirt previously collected in the cleaning device.

Still another object of my invention is the provision of an improved oil cleaner wherein the portions of the oil which carry foreign material and dirt are separated and then cleaned and recirculated back into the oil line for further cleaning and discharge back into the lubricating system.

A further object of my invention is the provision of a new oil cleaning device which is adapted to be readily and easily maintained and periodically cleaned for further use.

A still further object of my invention is the provision of an improved oil cleaner wherein the heavy foreign material and dirt is concentrated into a certain portion of the oil circulated therethrough, which portion is cleaned in a dirt-collecting media which may be quickly and conveniently changed and replaced.

These and other objects and advantages of my invention will more fully appear from the following description made in connection with the accompanying drawings wherein like reference characters refer to similar parts throughout the several views and in which:

Fig. 1 is an elevation sectional view of the invention and taken substantially on a vertical plane as indicated at 1—1 of Fig. 5;

Fig. 2 is a detail perspective view of the filtering media employed as a portion of the present invention;

Fig. 3 is a broken away detail view of a portion of the invention;

Fig. 4 is a detail section view taken on a substantially vertical plane as indicated at 4—4 of Fig. 2;

Fig. 5 is a side elevation view of the invention; and

Fig. 6 is a detail plane view of a supporting spacer shown in Fig. 1.

One form of the present invention is shown in the accompanying figures and is described herein.

The oil cleaning device comprising the invention includes a housing or container indicated in general by numeral **10**. Housing **10** includes a bottom portion **11** which comprises an open-topped receptacle attachable to a bracket **12**. Container **10** also includes a removable top **13**.

Bracket **12** is attachable as by bolts **14** to a suitable

frame portion F of an automotive vehicle or to the motor block or head. Bracket **12** has a horizontal supporting portion **15** upon which is fixedly secured as by welding, a mounting receptacle **16**. The lower portion **11** of container **10** is provided with a well or downwardly extending receptacle **17** which fits within the receptacle mounting **16** to be retained and held thereby. A suitable gasket **18** constructed of felt or other suitable material is interposed between the well **17** and mounting receptacle **16**. The lower receptacle portion **11** of container **10** is provided with a shoulder **19** and an upwardly extending flange **20** at the upper peripheral portion thereof. An annular gasket **21** is carried on shoulder **19** for sealingly seating the lower peripheral portion of top **13** thereon and thereby sealingly enclosing the interior of the container.

Top **13** is maintained in sealing and enclosing relation relative to the bottom portion **11** of container **10** by a rod **22** which extends through a suitable aperture **23** in the central portion of top **13** and which is threadably mounted in a boss **24** affixed on the interior of the dirt-collecting well **17**. A removable nut **25** is threadably mounted on the upper end of rod **23** and in engagement with the top **13** for urging and holding the same downwardly onto the lower portion **11** of container **10**.

Means are provided for securely but removably affixing the container **10** on the bracket **12**. In the form shown such means include a substantially U-shaped rigid strap **26** which is provided with a pair of depending connecting arms **27** and **28**, each of which has a hook portion **29** formed in the lower portion thereof which cooperatively engages a down-turned lip **30** at the edge of the horizontal support portion **15** of bracket **12**. Strap **26** is provided with a tapped boss **31** at the upper central portion thereof in which is threadably carried an adjustable clamping screw **32**, the inner end **33** of which engages the upper end portion of rod **22**. Screw **32** is provided with suitable means for manually turning the same and in the form shown a wing nut **34** is affixed as by pin **35** to the upper end of screw **32**. Locking nut **36** is carried on screw **32** for engaging the boss **31** and thereby locking the position of screw **32** with respect to the upper end of rod **22**. Locking nut **36** has a suitable gripping ear **37** to facilitate manual turning thereof.

An oil inlet conduit **38** and an oil outlet conduit **39** are mounted adjacent each other in mounting receptacle **16** and may be secured therein as by braising. Inlet conduit **38** may be connected in oil-communicating relation to a source of oil under pressure. Gasket **18** is provided with a pair of apertures **18***a* and **18***b* which are disposed respectively in communicating relation with the conduits **38** and **39**. A helically or spirally wound conduit **40** is mounted within container **10** and provides a helically or spirally disposed flow-confining channel therein. Conduit **40** has an inlet **41** which is mounted in the bottom of well **17** and is adapted for oil communication therethrough. Inlet **41** may be affixed in well **17** as by soldering or by braising. It should be noted that inlet **41** extends upwards through the spirally wound conduit **40** whereupon the oil flows through the helically disposed flow-confining channel from top to bottom. Conduit **40** is also provided with an outlet **42** which is also affixed in the bottom of well **17** as by braising. Inlets **41** and **42** are positioned for communication with the apertures **18***b* and **18***a* and with inlet conduit **38** and outlet conduit **39** respectively.

The spirally formed conduit **40** is provided with an aperture **43** adjacent the outlet end thereof and at the lower end of the winding of the conduit. As best seen in Fig. 3, the aperture **43** is formed in the radially outward side of the wound conduit **40**. Adjacent the aperture **43** and toward the outlet **42** therefrom, a deflector or

scoop 44 is formed in conduit 40. The aperture 43 and deflector 44 will be formed as by making a crimp in the conduit 40 in such a manner that the conduit 40 is opened to form the aperture.

Means are provided for recirculating a portion of the oil which is discharged through aperture 43 back into the inlet of the helically disposed conduit 40 for further cleaning and subsequent discharge through the outlet 42 and outlet conduit 39. In the form shown, such means include a vertically disposed return pipe 45 which is positioned adjacent the outer peripheral wall of container 10 and which is open at its upper end portion 46 for receiving oil to be recirculated therein. The lower end of return pipe 45 is connected in oil-communicating relation with the inlet 41 at 47. At 47, return pipe 45 is diminished in diameter to provide a jet connection to the inlet 41 so as to cause flowing upwardly through inlet 41 to draw oil from return pipe 45.

Means are provided for filtering the oil and collecting the dirt carried thereby which is expelled or discharged through the aperture 43 as the oil progresses toward the opening at the upper end portion 46 of return pipe 45. In the form shown, such dirt-collecting media comprises a filter 48, best shown in Figs. 2 and 4. Filter 48 is annular in shape and consists in a single elongated piece 49 of paper which is wound with a plurality of convolutions into a sleeve. In Fig. 2 the outer end portion 49*a* is slightly unrolled for the purpose of showing the construction thereof and would normally be in overlying relation, closely disposed to the next adjacent convolution. Means are provided for spacing the convolutions of the wound paper 49 from each other and in the form shown, a plurality of elongated spacer elements 50 are secured to paper 49 and may consist in small threads. Threads 50 are placed on the paper 49 in a wave pattern as best seen in Fig. 2 whereby to more efficiently collect foreign material and dirt thereon. The inner end of the wound paper may be perforated as at 49*b* for receiving oil therethrough to assure that oil may flow continuously through the wound paper filter.

Means are provided for supporting and sealing the ends of filter 48. In the form shown such means comprise a supporting or spacer disc 51 which is annular in shape as best seen in Fig. 6. Supporting disc 51 has a notch 52 formed therein for permitting the lower portion of return pipe 45 to extend therethrough. Overlying supporting disc 51 is an annular rigid metal plate 53 which has a notch 54 cut out of the outer periphery thereof to receive the return pipe 45 therethrough. Overlying metal disc 53 has a sealing gasket 55 having an annular shape with a notch 56 cut out of the periphery thereof to permit return pipe 45 to extend therethrough. At the top of the cover portion 13 of housing 10 another sealing gasket 57 is provided. Gaskets 55 and 57 sealingly close the ends of filter 48 and thereby preclude oil from flowing outwardly or inwardly through the ends of the filter. Oil must flow spirally between the convolutions of filter 48 from the inner portion thereof to the outer portion thereof to reach the return pipe 45.

Filter 48 is readily and easily removed when the cover portion 13 of housing 10 is removed. The filter may thereby be quickly and easily changed when the same has collected a substantial quantity of foreign material and dirt.

Operation

When the inlet conduit 38 is connected to a source of oil under pressure such as the oil line of an automotive vehicle, oil will be moved upwardly through the inlet 41 through the top of the helically wound conduit 40. The oil will then pass through the spirally disposed flow-channel within the conduit 40 and the heavier materials in the oil will be impelled by centrifugal force radially outwardly toward the radial outward side of the conduit. As the oil moves downwardly through the wound conduit 40 substantially all of the heavy foreign material will be collected on the radially outward side of the flow channel. As the heavy foreign material reaches the lower end of the spiral flow channel, it will engage the deflector or scoop 44 and be thrown outwardly through the aperture 43 into the area surrounding conduit 40. A portion of the heavy material will immediately settle into the well 17. Of course a portion of oil will also be discharged through aperture 43 with the heavy foreign material and dirt. This oil carrying the heavy foreign material will entirely fill the area within the interior of filter 48 and the oil will flow between the convolutions of wound paper thereof. Subsequently the oil will flow spirally between the convolutions of filter 48 progressively moving toward the outer portion thereof and toward the annular opening within housing 10 and disposed at the exterior of filter 48. As the oil flows spirally between the convolutions of filter 48 the heavy foreign material and dirt will be collected in the filter 48. Because the spacing threads 50 are disposed in a wavy manner on the paper 49, portions of foreign material and dirt will be collected in each of the troughs defined thereby. After the oil has been discharged to the exterior of filter 48, it will flow into the upper open end portion 46 of return pipe 45. It will be noted that because the open end 46 of pipe 45 is disposed at the top of housing, oil flowing therein will be substantially the cleanest of any oil within the housing 10. The oil which was discharged through aperture 43 of the spirally disposed conduit 40 eventually moves into the return pipe as described and then downwardly into the jet connection 47 and into the inlet 41 to be returned back into the spirally disposed flow channel. Because substantially all of the heavy foreign material is removed from this oil, this oil which has been returned will flow generally along the radially inward side of the spiral flow channel and will subsequently be discharged through the outlet conduit 39 for recirculation through the oil system.

After a period of time, the dirt collecting media or filter 48 may become clogged or saturated with dirt and foreign material and it may be desirable to change the filter. When this occurs, lock nut 36 is loosened from boss 31 and the clamping screw 32 is loosened away from rod 22 to permit the clamping strap 26 to be removed. The entire housing 10 may then be lifted out of mounting receptacle 15 if desired. Nut 25 will be removed from the top of rod 22 and the cover portion 13 of housing 10 may then be removed from the lower receptacle portion 11 thereof. Filter 48 may then be conveniently and easily removed and replaced with a clean filter. While filter 48 is removed from the oil cleaning device, the gasket disc 55, metal plate 54, and the spacer support 51 may all be removed to facilitate the ready and easy cleaning of the interior of the lower receptacle portion 11 of housing 10 and the well 17 thereof. When the housing has been thoroughly cleaned the parts may be readily reassembled for subsequent operation.

It will be seen that I have provided a new and improved oil cleaning device wherein the clean oil to be recirculated back into the oil system is physically separated from the dirtier oil and from the foreign material and dirt collected out of oil previously cleaned and wherein the dirt-laden oil is filtered of foreign material and then recirculated back into the system for further cleaning and then discharged from the oil cleaning device.

It will, of course, be understood that various changes may be made in the form, detail, arrangement and proportion of the parts without departing from the scope of my invention which consists of the matter described herein and set forth in the appended claims.

What I claim is:

1. An oil cleaning device comprising an enclosed housing, a flow confining channel within said housing and having an inlet adapted for connection with a source of oil under pressure and also having an outlet, said channel being helically disposed between said outlet and said inlet, said channel having a radially inward side and also having

a radially outward side with a discharge opening formed therein in spaced relation with said inlet in a direction along said channel, whereby to expel heavy foreign matter and a portion of the oil into the housing, a recirculating pipe mounted within said housing and having an oil-receiving opening disposed adjacent the top of said housing, said recirculating pipe having a connection with the inlet of said channel for supplying oil from the top of the housing therein whereby heavy foreign matter, and a portion of the oil will be expelled from said channel to allow the foreign matter to settle in the bottom of the housing and to recirculate the cleaner oil at the top of the housing back to the channel to be carried through the outlet.

2. An oil cleaning device for separating heavy foreign material from oil, comprising an enclosed housing having top and bottom portions, a spirally disposed conduit mounted within said housing and having an inlet adapted for connection to a source of oil under pressure, and also having an outlet adapted for connection to an oil supply, said spiral conduit having a radially inward side and also having a radially outward side with a heavy material-expelling aperture formed therein, and spaced along the length of the channel from said inlet, said aperture being disposed adjacent the bottom portion of said housing and being disposed along the length of said conduit, a recirculating pipe mounted within said housing and having an oil-receiving opening disposed adjacent the top portion of said housing, said recirculating pipe having a connection with said conduit adjacent the inlet thereof for supplying oil thereinto from the top of the housing, said connection being constructed and arranged to cause the flowing oil in the conduit to draw oil through the recirculating pipe, whereby the heavy foreign material in the oil is centrifugally separated through said expelling aperture along with a portion of the oil flowing through the conduit and the foreign material will be collected in the bottom portion of the housing permitting the oil expelled therewith to rise to the top portion of the housing for recirculation through said pipe.

3. An oil cleaning device for separating heavy foreign material from oil, comprising a housing having a top portion and a bottom portion, a flow-confining channel within said housing and having an inlet adapted for connection to a source of oil under pressure and also having an outlet adapted for connection with an oil supply system, said channel being helically disposed between said outlet and said inlet, said channel having a radially inward side and also having a radially outward side with a discharge opening formed therein and spaced along the length of the channel from said inlet, a recirculating pipe mounted within said housing and having an oil-receiving opening adjacent the top portion of said housing, said recirculating pipe being connected with said channel adjacent the inlet for supplying oil thereinto from the top portion of the housing, a dirt-collecting media mounted within said housing and disposed between the discharge opening in said channel and the oil-receiving opening in said recirculating pipe, whereby to expel the heavy foreign material along with a portion of the oil from said channel and to remove at least a portion of the foreign material from the discharged oil before the same is recirculated through said pipe into the channel for discharge through the outlet thereof.

4. An oil cleaning device for removing heavy foreign material and dirt from oil, comprising an enclosed housing having top and bottom portions, a spirally disposed conduit mounted within said housing and having an inlet adapted for connection to a source of oil under pressure and also having an outlet, said spiral conduit having a radially inward side and also having a radially outward side with a heavy material expelling aperture formed therein and spaced along the length of said spiral conduit from said inlet, a heavy material and dirt deflector carried by said conduit and extending inwardly adjacent

the aperture therein, said deflector being constructed and arranged for directing heavy foreign material traveling along the radial outward side of the conduit through said aperture, a recirculating pipe mounted within said housing and having an oil-receiving opening disposed adjacent the top portion of said housing, said recirculating pipe having a connection with said channel adjacent the inlet thereof for supplying oil thereinto from the top portion of the housing, said connection being constructed and arranged to cause the flowing oil in the channel to draw oil through the recirculating pipe, whereby to remove heavy foreign material from the oil flowing in the conduit along with a portion of the oil and to recirculate the expelled oil through said pipe and into the conduit for discharge through the outlet.

5. An oil cleaning device for separating heavy foreign material from oil, comprising an enclosed housing having top and bottom portions, a spirally disposed conduit mounted within said housing and having an inlet adapted for connection to a source of oil under pressure and also having an outlet, said spiral conduit having a generally annular shape and having a radially inward side and also having a radially outward side with a heavy material expelling aperture formed therein and spaced along the length of said conduit from said inlet, a recirculating pipe mounted within said housing and having an oil-receiving opening disposed adjacent the top portion of said housing, said recirculating pipe having a connection with the inlet of said conduit for supplying oil thereinto from the top of the housing, a substantially annular dirt-collecting media mounted between said recirculating pipe and said spiral conduit and in concentric relation with said spiralling conduit, said dirt-collecting media being constructed and arranged to permit oil passage therethrough from the expelling aperture in said conduit to the oil-receiving opening in said pipe.

6. An oil cleaning device for separating heavy foreign material and dirt from oil, comprising an enclosed housing having top and bottom portions and having a sidewall, a spirally disposed conduit mounted within said housing and having an inlet adapted for connection with a source of oil under pressure and also having an outlet, said spiral conduit having a generally annular shape and having a radially inward side and also having a radially outward side with a heavy material-expelling aperture formed therein and spaced along the length of said conduit from said inlet, a recirculating pipe mounted within said housing and adjacent said sidewall and having an oil-receiving opening disposed adjacent the top portion of said housing, said recirculating pipe having a connection with said conduit adjacent the inlet thereof for supplying oil thereinto from the top of the housing, a dirt-collecting media of substantially annular configuration and constructed and arranged to admit passage of oil therethrough, said dirt-collecting media being mounted between said recirculating pipe and said spiral conduit and in substantially concentric relation with said spiralling conduit, whereby heavy foreign material expelled with a portion of the oil flowing through the conduit will pass into said dirt-collecting media wherein the heavy foreign material and dirt will be collected and the oil will pass on therethrough to be recirculated through said pipe.

7. The structure recited in claim 6 wherein said annular dirt-collecting media is constructed of spirally wound sheet material formed into a sleeve having upper and lower ends and having spaced convolutions, a flow-restricting media interposed between the top and bottom portions of said housing and the corresponding top and bottom ends of said sleeve, whereby oil and heavy foreign material will move spirally into said dirt collecting media wherein the heavy foreign material will be collected and the oil will be recirculated into said pipe and back to the spiral conduit for discharge through the outlet.

8. The structure recited in claim 7 and including a plurality of spirally disposed thread-spacers disposed be-

tween the convolutions of said sheet material, whereby to facilitate spacing of the sheet material convolutions and the collecting of heavy foreign material therebetween.

9. An oil cleaning device for separating heavy foreign matter and dirt from oil, comprising an enclosed housing having top and bottom portions, a spirally disposed conduit mounted centrally within said housing and having an inlet adapted for connection to a source of oil under pressure and also having an outlet, said spiral conduit having a generally annular shape and having a radially inward side and also having a radially outward side with a heavy material-expelling aperture formed therein and spaced along the length of said conduit from said inlet, a circulating pipe mounted within said housing and having an oil-receiving opening disposed adjacent the top portion of the housing and in widely spaced relation with said spiral conduit, said recirculating pipe having a connection with said conduit adjacent the inlet thereof for supplying oil thereinto from the top of the housing, a

dirt-collecting media surrounding said spiral conduit and sealingly engaging the top and bottom portions of the housing, said dirt-collecting media being disposed between said spiralling conduit and the opening in said circulating pipe and being constructed and arranged to admit passage of oil therethrough, and a sediment collecting well formed in the bottom of said housing below said spiral conduit for collecting heavy foreign material expelled through the aperture in said conduit, whereby to increase the capacity and effective life of said device for cleaning oil passed therethrough.

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