May 6, 1958 J. W. WILKINSON 2,833,416

FILTER

Filed Nov. 30, 1956

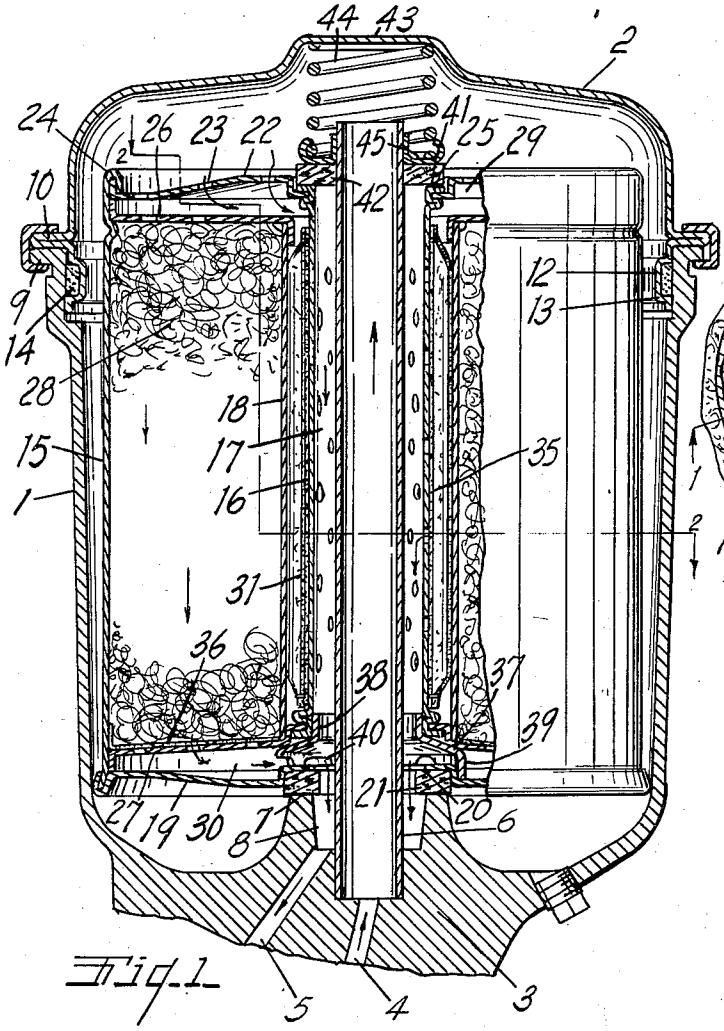

Fig. 1

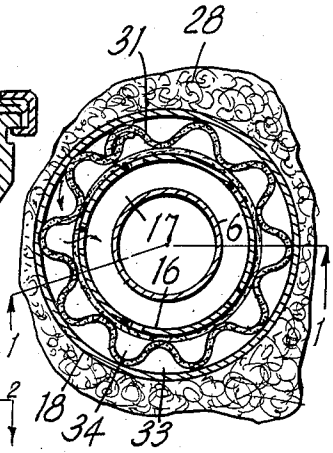

Fig. 3

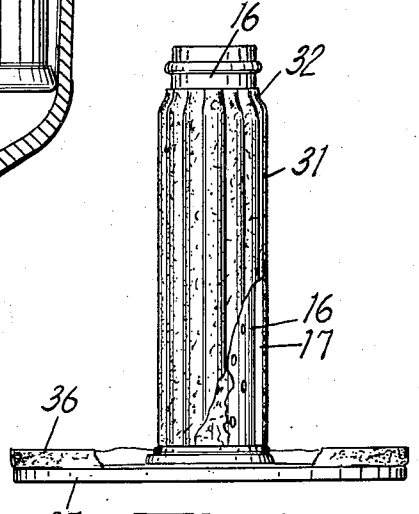

Fig. 4

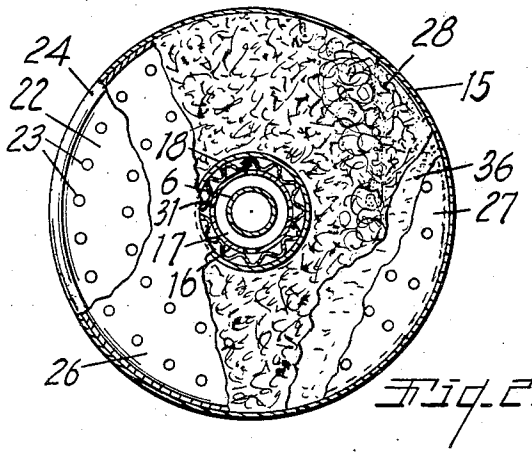

Fig. 2

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FILTER

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14 Claims. (Cl. 210—130)

This invention relates to filters adapted for filtering the lubricant of internal combustion engines forcibly circulated therethrough.

The main objects of this invention are:

First, to provide a filter which provides for relatively free passage of lubricant therethrough and at the same time is highly efficient.

Second, to provide a filter comprising a cartridge flow case and a renewable or replaceable cartridge which may be quickly removed and replaced as occasion may require and by a relatively unskilled person.

Third, to provide a filter having these advantages which under ordinary use conditions cannot become clogged so as to prevent flow of lubricant.

Objects relating to details and economies of the invention will appear from the description to follow. The invention is defined and pointed out in the claims.

A preferred embodiment of the invention is illustrated in the accompanying drawing, in which:

Fig. 1 is a fragmentary view in vertical section on a line corresponding to line 1—1 of Fig. 3.

Fig. 2 is a fragmentary view partially in horizontal section on a line corresponding to broken line 2—2 of Fig. 1.

Fig. 3 is an enlarged fragmentary horizontal section.

Fig. 4 is a fragmentary side elevational view of certain of the parts.

In the accompanying drawing the closed housing or casing comprises the body member 1 and top member 2, the body member being desirably formed as a casting and the top member as a sheet metal stamping.

The side walls of the body member are generally cylindrical. The bottom 3 is provided with an inlet passage 4 and an outlet passage 5. The inlet passage 4 opens to the inlet tube 6 which projects upwardly to deliver at the top of the casing. The tube is surrounded by the upwardly facing gasket seat 7 spaced therefrom to provide an annular discharge 8 opening to the outlet 5.

The body member has an outwardly projecting flange 9 at its upper end while the top member is provided with an outwardly projecting flange 10 seated upon the flange 9 and secured thereto by the locking member 11, the details of which are not illustrated as they form no part in my present invention. The top member is provided with a downwardly projecting skirt portion 12 telescoping within the body member and provided with an outwardly facing gasket seat 13 for the gasket 14. The filter cartridge surrounds and is removably associated with the inlet tube.

The filter cartridge comprises the outer cylindrical imperforate wall 15, the foraminate inner wall 16 which is radially spaced from the inlet tube to provide a discharge passage 17 and an intermediate imperforate wall 18 which is spaced from but adjacent to the inner wall. The walls are concentric.

The outer bottom wall 19 is seamed to the lower edge of the outer wall 15 and is provided with an upward

offset at its inner end constituting a gasket seat 20 for the gasket 21 which seats upon and coacts with the gasket seat 7 on the casing bottom wall.

The outer top wall 22 is provided with an annular series of openings 23 and its outer edge is connected to the upper edge of the outer wall 21 by a seam indicated at 24 and at its inner edge to the upper end of the inner wall by a seam indicated at 25.

The foraminate inner top and bottom walls 26 and 27 respectively coact with the outer and intermediate upright walls in defining a chamber for the filtering medium 28 which is desirably of uniformity compacted cotton linters having their full natural wax content. The outer and inner top walls coact to define an inlet header 29 while the outer and inner bottom walls coact to provide a discharge header 30. The foraminate inner wall 16 and imperforate intermediate wall 17 are spaced to receive the corrugated member 31 which is desirably of fiberboard stock of a character permitting relatively free passage of lubricant or other liquid filtered material therethrough. The upper end of this filter element 31 is conformed at 32 to closely embrace the inner wall 16.

The corrugated filter element 31 coacts with the imperforate wall 18 and the foraminate wall 16 to provide an annular series of outer channels 33 and an annular series of inner channels 34, the outer channels opening to the inlet header as is clearly shown in Fig. 1. The outer channels serve to uniformly distribute the liquid to be filtered around the filtering element 31. The corrugations provide a relatively large filtering area.

The inner channels distribute the liquid for further filtering through the filtering sheet 35 wrapped around the inner wall. While the filtering member 31 and the filtering sheet 35 provide effective filtering means the material filtered is delivered the full length of the cartridge and flows quite freely through these media. A bottom filtering sheet 36 is provided for the inner bottom member.

The cartridge is further provided with an annular support member 37 having an upstanding collar 38 fitting within the inner wall 16 and a downwardly projecting flange 39 which embraces the upstanding gasket seat portion of the outer bottom member. Holes 40 in the flange provide discharge for the discharge header. The inner wall 16 is provided with a gasket seat 41 at its upper end for the gasket 42 which fittingly embraces the inlet tube providing a seal for the upper end of the discharge passage 17.

To hold the gaskets 21 and 42 upon their respective seats and to retain the cartridge in operating relation to other parts the top member 2 is provided with a boss 43 providing a seat for a coil spring 44 which is seated in the thrust collar 45 seated upon the gasket 42.

Filters embodying my invention are highly efficient and at the same time permit what is commonly designated as free flow, that is, a substantial flow of lubricant or other filtering material is assured.

I have not illustrated or described other embodiments or adaptations of my invention as it is believed that this disclosure will enable those skilled in the art to embody or adapt the invention as may be desired.

Having thus described the invention, what is claimed as new and is desired to be secured by Letters Patent is:

1. In a filter, the combination with a closed casing including a bottom having inlet and discharge openings, an inlet tube mounted on the bottom of the casing in communication with the inlet opening thereof and discharging at the upper end of the casing, a filter cartridge surrounding and removably associated with said inlet tube and comprising concentric radially spaced outer, inner and intermediate upright walls, the outer and intermediate walls being imperforate, the inner wall being

foraminate and spaced from the inlet tube to define a discharge passage opening to said discharge opening, the intermediate wall being adjacent to but spaced from the inner wall, a foraminate outer top wall connected to said outer and inner upright walls, an imperforate outer bottom wall connected to said outer and inner walls, foraminate inner top and bottom walls extending between said outer and intermediate upright walls, said inner top wall coacting with said outer top wall to define an inlet header opening to the space between said inner and intermediate upright walls, said inner bottom wall coacting with said outer bottom wall to form an outlet header in communication with said discharge opening, a sheet of filtering fabric disposed on said inner bottom wall, said outer, and intermediate upright walls and inner top and bottom walls defining a filtering medium chamber having a fibrous filtering medium therein, a sheet of filtering fabric surrounding said inner wall, a vertically corrugated sleeve of filtering material disposed between said inner and intermediate upright walls and coacting therewith to provide a plurality of vertical passages in communication with said inlet header.

2. In a filter, the combination with a closed casing including a bottom having inlet and discharge openings, an inlet tube mounted on the bottom of the casing in communication with the inlet opening thereof and discharging at the upper end of the casing, a filter cartridge surrounding and removably associated with said inlet tube and comprising concentric radially spaced outer, inner and intermediate upright walls, the outer and intermediate walls being imperforate, the inner wall being foraminate and spaced from the inlet tube to define a discharge passage opening to said discharge opening, the intermediate wall being adjacent to but spaced from the inner wall, a foraminate outer top wall connected to said outer and inner upright walls, an imperforate outer bottom wall connected to said outer and inner walls, foraminate inner top and bottom walls extending between said outer and intermediate upright walls, said inner top wall coacting with said outer top wall to define an inlet header opening to the space between said inner and intermediate upright walls, said inner bottom wall coacting with said outer bottom wall to form an outlet header in communication with said discharge opening, said outer, and intermediate upright walls and inner top and bottom walls defining a filtering medium chamber having a fibrous filtering medium therein, a vertically corrugated sleeve of filtering material disposed between said inner and intermediate upright walls and coacting therewith to provide a plurality of vertical passages in communication with said inlet header.

3. In a filter, the combination with a closed casing including a bottom having inlet and discharge openings and having an upwardly facing gasket seat surrounding the discharge opening thereof, an inlet tube mounted on the bottom of the casing in communication with the inlet opening thereof and discharging at the upper end of the casing, a filter cartridge surrounding and removably associated with said inlet tube and comprising concentric radially spaced outer, inner and intermediate upright walls, the outer and intermediate walls being imperforate, the inner wall being foraminate and spaced from the inlet tube to define a discharge passage opening to said discharge opening, the intermediate wall being adjacent to but spaced from the inner wall, a foraminate outer top wall connected to said outer and inner upright walls, an imperforate outer bottom wall connected to said outer and inner walls, foraminate inner top and bottom walls extending between said outer and intermediate upright walls, said inner top wall coacting with said outer top wall to define an inlet header opening to the space between said inner and intermediate upright walls, said inner bottom wall coacting with said outer bottom wall to form an outlet header in communication with said discharge opening, said outer, and intermediate upright walls and inner top and bottom walls defining a filtering medium chamber having a fibrous filtering medium therein, a vertically corrugated sleeve of filtering material disposed between said inner and intermediate upright walls and coacting therewith to provide a plurality of vertical passages in communication with said inlet header opening, a sheet of filtering material disposed between said inner and intermediate upright walls and inner top and bottom walls defining a filtering medium chamber having a fibrous filtering medium therein, a vertically corrugated sleeve of filtering material disposed between said inner and intermediate upright walls and coacting therewith to provide a plurality of vertical passages in communication with said inlet header, said top and bottom outer walls having outwardly facing gasket seats, and gaskets disposed in said seats, the top gasket being in sealing relation to said inlet tube, the bottom gasket being in supported sealing relation to said gasket seat at the bottom of the casing and in spaced relation to said tube, and spring means supported by said casing and in thrust engagement with the top gasket acting to urge said gaskets upon their said seats.

4. In a filter, the combination with a closed casing, of an inlet tube discharging at the upper end of the casing, a filter cartridge comprising concentric radially spaced outer, inner and intermediate upright walls, the outer and intermediate walls being imperforate, the inner wall being foraminate and spaced from the inlet tube and coacting therewith to define a discharge passage, an outer top wall connected to said outer and inner upright walls and having an inlet opening therein, an imperforate outer bottom wall connected to said outer and inner walls, foraminate inner top and bottom walls extending between said outer and intermediate upright walls, said inner top wall coacting with said outer top wall to define an inlet header opening to the space between said inner and intermediate upright walls, said inner bottom wall coacting with said outer bottom wall to form an outlet header, a sheet of filtering fabric disposed on said inner bottom wall, said outer, and intermediate upright walls and inner top and bottom walls defining a filtering medium chamber, a filtering medium in said chamber, a sheet of filtering fabric surrounding said inner wall, a vertically corrugated sleeve of filtering material disposed between said inner and intermediate upright walls and coacting therewith to provide a plurality of vertical passages in communication with said inlet header.

5. In a filter, the combination with a closed casing, of an inlet tube discharging at the upper end of the casing, a filter cartridge comprising concentric radially spaced outer, inner and intermediate upright walls, the outer and intermediate walls being imperforate, the inner wall being foraminate and spaced from the inlet tube and coacting therewith to define a discharge passage, an outer top wall connected to said outer and inner upright walls and having an inlet opening therein, an imperforate outer bottom wall connected to said outer and inner walls, foraminate inner top and bottom walls extending between said outer and intermediate upright walls, said inner top wall coacting with said outer top wall to define an inlet header opening to the space between said inner and intermediate upright walls, said inner bottom wall coacting with said outer bottom wall to form an outlet header, said outer, and intermediate upright walls and inner top and bottom walls defining a filtering medium chamber, a filtering medium in said chamber, a vertically corrugated sleeve of filtering material disposed between said inner and intermediate upright walls and coacting therewith to provide a plurality of vertical passages in communication with said inlet header.

6. In a filter, the combination with a closed casing, of an inlet tube discharging at the upper end of the casing, a filter cartridge comprising concentric radially spaced outer, inner and intermediate upright walls, the outer and intermediate walls being imperforate, the inner wall being foraminate and spaced from the inlet tube and coacting therewith to define a discharge passage, an outer top wall connected to said outer and inner upright walls and having an inlet opening therein, an imperforate outer bottom wall connected to said outer and inner walls, foraminate inner top and bottom walls extending between said outer and intermediate upright walls, said inner top wall coacting with said outer top wall to define an inlet header

opening to the space between said inner and intermediate upright walls, said inner bottom wall coacting with said outer bottom wall to form an outlet header, said outer, and intermediate upright walls and inner top and bottom walls defining a filtering medium chamber, a filtering medium in said chamber, a vertically corrugated sleeve of filtering material disposed between said inner and intermediate upright walls and coacting therewith to provide a plurality of vertical passages in communication with said inlet header, a gasket mounted on the top of said cartridge when the cartridge is in operative relation thereto.

7. A filter cartridge comprising concentric radially spaced outer, inner and intermediate upright walls, the outer and intermediate walls being imperforate, the inner wall being foraminate, the intermediate wall being adjacent to but spaced from the inner wall, a foraminate outer top wall connected to said outer and inner upright walls, an imperforate outer bottom wall connected to said outer and inner walls, foraminate inner top and bottom walls extending between said outer and intermediate upright walls, said inner top wall coacting with said outer top wall to define an inlet header opening to the space between said inner and intermediate upright walls, said inner bottom wall coacting with said outer bottom wall to form an outlet header, a sheet of filtering fabric disposed on said inner bottom wall, said outer, and intermediate upright walls and inner top and bottom walls defining a filtering medium chamber having a fibrous filtering medium therein, a sheet of filtering fabric surrounding said inner wall, and a vertically corrugated sleeve of filtering material disposed between said inner and intermediate upright walls and coacting therewith to provide a plurality of vertical passages in communication with said inlet header.

8. A filter cartridge comprising concentric radially spaced outer, inner and intermediate upright walls, the outer and intermediate walls being imperforate, the inner wall being foraminate, the intermediate wall being adjacent to but spaced from the inner wall, a foraminate outer top wall connected to said outer and inner upright walls, an imperforate outer bottom wall connected to said outer and inner walls, foraminate inner top and bottom walls extending between said outer and intermediate upright walls, said inner top wall coacting with said outer top wall to define an inlet header opening to the space between said inner and intermediate upright walls, said inner bottom wall coacting with said outer bottom wall to form an outlet header, said outer, and intermediate upright walls and inner top and bottom walls defining a filtering medium chamber having a fibrous filtering medium therein, and a vertically corrugated sleeve of filtering material disposed between said inner and intermediate upright walls and coacting therewith to provide a plurality of vertical passages in communication with said inlet header.

9. A filter cartridge comprising concentric radially spaced outer, inner and intermediate upright walls, the outer and intermediate walls being imperforate, the inner wall being foraminate and spaced from the intermediate wall, an outer top wall connected to said outer and inner upright walls and having an inlet opening therein, an imperforate outer bottom wall connected to said outer and inner walls, foraminate inner top and bottom walls extending between said outer and intermediate upright walls, said inner top wall coacting with said outer top wall to define an inlet header opening to the space between said inner and intermediate upright walls, said inner bottom wall coacting with said outer bottom wall to form an outlet header, a sheet of filtering fabric disposed on said inner bottom wall, said outer, and intermediate upright walls and inner top and bottom walls defining a filtering medium chamber, a filtering medium in said chamber, a sheet of filtering fabric surrounding said inner wall, and a vertically corrugated sleeve of filtering material disposed between said inner and intermediate upright walls and coacting therewith to provide a plurality of vertical passages in communication with said inlet header, a gasket mounted on the top of said cartridge when the cartridge is in operative relation thereto.

10. A filter cartridge comprising concentric radially spaced outer, inner and intermediate upright walls, the outer and intermediate walls being imperforate, the inner wall being foraminate and spaced from the intermediate wall, an outer top wall connected to said outer and inner upright walls and having an inlet opening therein, an imperforate outer bottom wall connected to said outer and inner walls, foraminate inner top and bottom walls extending between said outer and intermediate upright walls, said inner top wall coacting with said outer top wall to define an inlet header opening to the space between said inner and intermediate upright walls, said inner bottom wall coacting with said outer bottom wall to form an outlet header, said outer, and intermediate upright walls and inner top and bottom walls defining a filtering medium chamber, a filtering medium in said chamber, and a vertically corrugated sleeve of filtering material disposed between said inner and intermediate upright walls and coacting therewith to provide a plurality of vertical passages in communication with said inlet header, and a gasket mounted on the top of said cartridge when the cartridge is in operative relation thereto.

11. A filter cartridge comprising concentric radially spaced outer, inner and intermediate upright walls, the outer and intermediate walls being imperforate, the inner wall being foraminate, an outer top wall connected to said outer and inner upright walls and having an inlet opening therein, an imperforate outer bottom wall connected to said outer and inner walls, foraminate inner top and bottom walls extending between said outer and intermediate upright walls, said inner top wall coacting with said outer top wall to define an inlet header opening to the space between said inner and intermediate upright walls, said outer, and intermediate upright walls and inner top and bottom walls defining a filtering medium chamber, a filtering medium in said chamber, a sheet of filtering fabric surrounding said inner wall, and a vertically corrugated sleeve of filtering material disposed between said inner and intermediate upright walls and coacting therewith to provide a plurality of outer and inner vertical passages, the outer vertical passages openings to said inlet header in communication with said inlet header.

12. A filter cartridge comprising concentric radially spaced outer, inner and intermediate upright walls, the outer and intermediate walls being imperforate, the inner wall being foraminate, an outer top wall connected to said outer and inner upright walls and having an inlet opening therein, an imperforate outer bottom wall connected to said outer and inner walls, foraminate inner top and bottom walls extending between said outer and intermediate upright walls, said inner top wall coacting with said outer top wall to define an inlet header opening to the space between said inner and intermediate upright walls, said outer, and intermediate upright walls and inner top and bottom walls defining a filtering medium chamber, a filtering medium in said chamber, and a vertically corrugated sleeve of filtering material disposed between said inner and intermediate upright walls and coacting therewith to provide a plurality of outer and inner vertical passages, the outer vertical passages openings to said inlet header in communication with said inlet header.

13. A filter cartridge comprising concentric radially spaced outer, inner and intermediate upright walls, the outer and intermediate walls being imperforate, the inner wall being foraminate and spaced from the intermediate wall, a foraminate outer top wall extending between said outer and inner upright walls, a foraminate inner

top wall extending betweeen said outer and intermediate upright walls, said outer and intermediate upright walls and said inner top wall coacting to define a filter medium chamber, a fibrous filtering material in said chamber, said outer and inner top walls coacting to define an inlet header opening to the space between the said inner and intermediate upright walls, and a vertically corrugated sleeve of filtering material disposed between said inner and intermediate upright walls, the upper end of said sleeve being in fitting embracing relation to said inner wall, said sleeve coacting with said intermediate wall to provide an annular series of inlet vertical channels and coacting with said inner wall to provide an annular series of vertical outlet channels.

14. A filter cartridge comprising concentric radially spaced outer, inner and intermediate upright walls, the outer and intermediate walls being imperforate, the inner wall being foraminate and spaced from the intermediate wall, a foraminate outer top wall extending between said outer and inner upright walls, a foraminate inner top wall extending between said outer and intermediate upright walls, said outer and intermediate upright walls and said inner top wall coacting to define a filter medium chamber, a fibrous filtering material in said chamber, said outer and inner top walls coacting to define an inlet header opening to the space between the said inner and intermediate upright walls, and a vertically corrugated sleeve of filtering material disposed between said inner and intermediate upright walls, said sleeve coacting with said intermediate wall to provide an annular series of inlet vertical channels and coacting with said inner wall to provide an annular series of vertical outlet channels.

References Cited in the file of this patent

UNITED STATES PATENTS

2,750,042 Wilkinson ---------- June 12, 1956