Oct. 7, 1930. H. L. HORNING 1,777,311

FILTERING MEANS

Original Filed Oct. 22, 1924

Fig. 1.

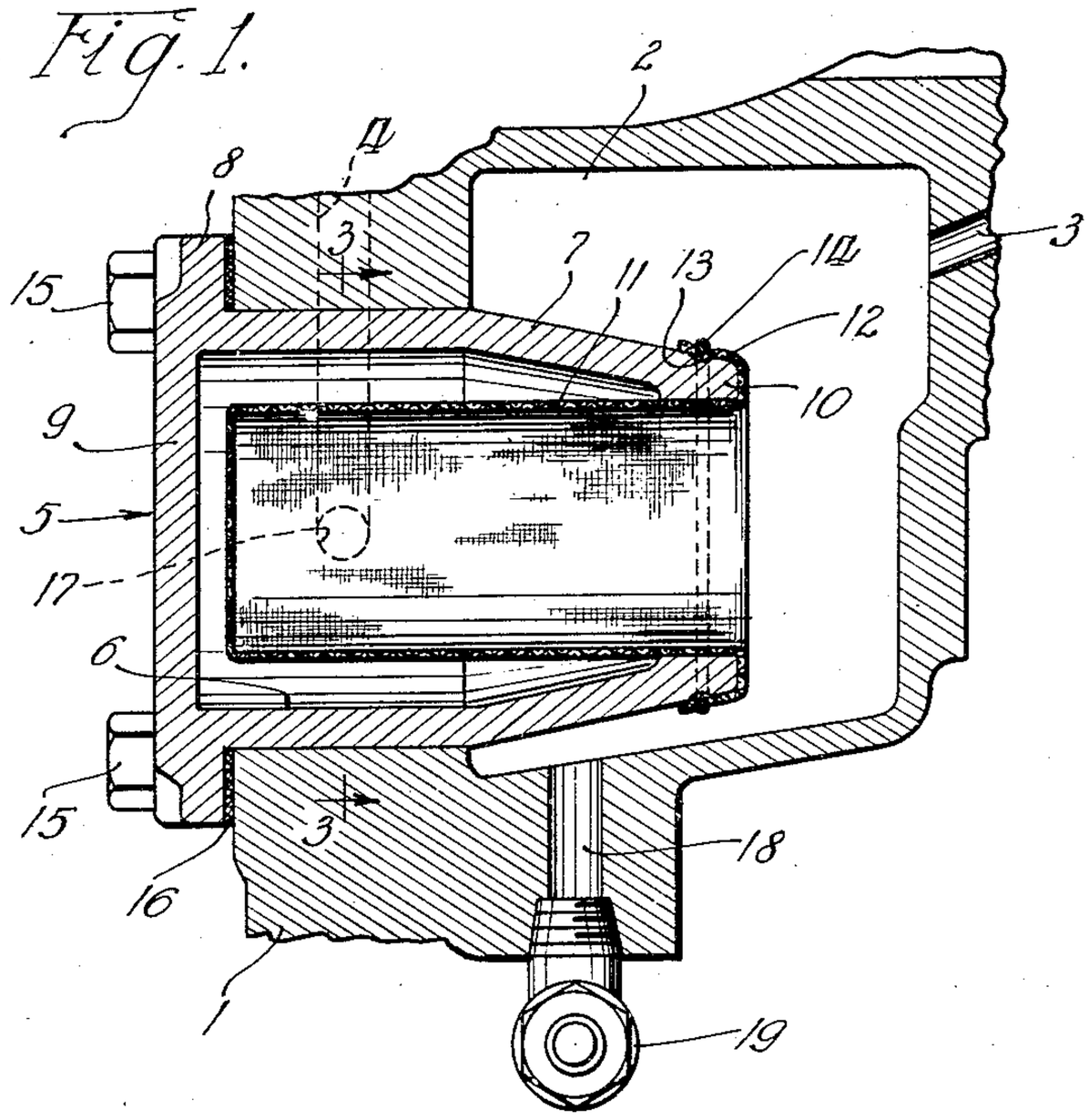


Fig. 2.

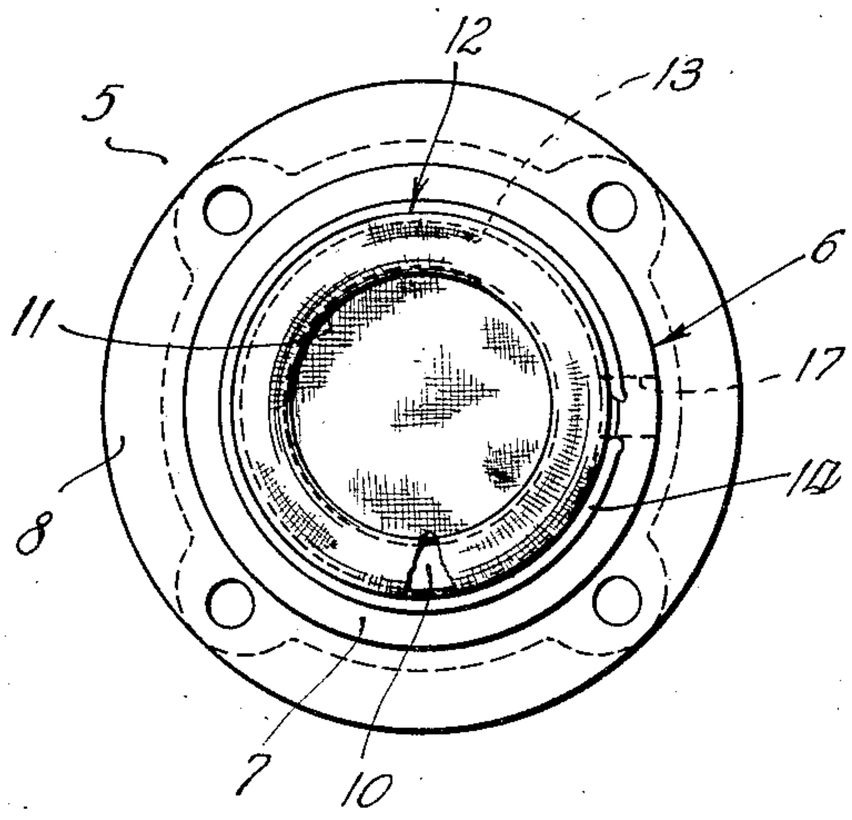
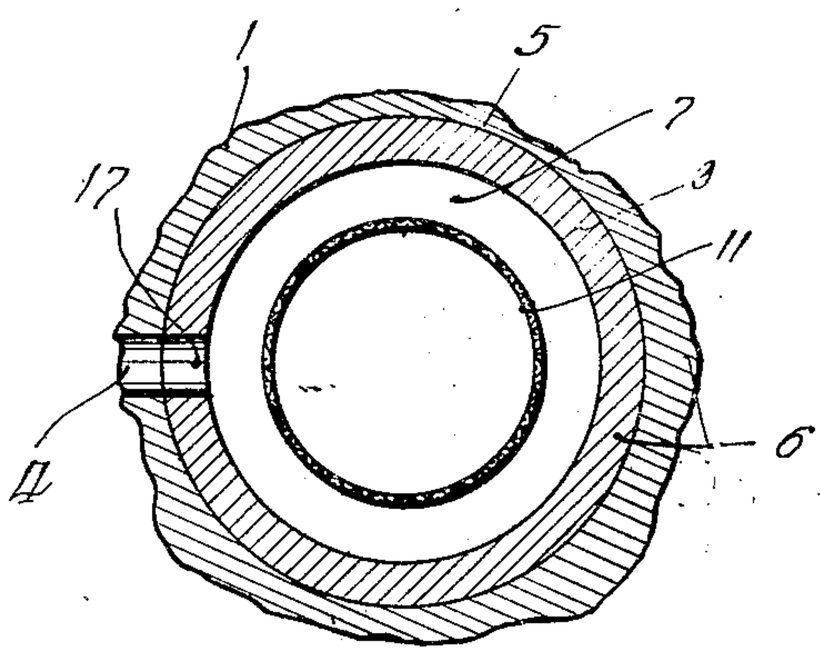


Fig. 3.



Inventor:
Harry L. Horning.

By Brown, Jackson, Boettcher & Dinnen,

Attys.

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1,777,311

UNITED STATES PATENT OFFICE

HARRY L. HORNING, OF WAUKESHA, WISCONSIN, ASSIGNOR TO WAUKESHA MOTOR COMPANY, OF WAUKESHA, WISCONSIN, A CORPORATION OF WISCONSIN

FILTERING MEANS

Original application filed October 22, 1924, Serial No. 745,188. Divided and this application filed May 8, 1929. Serial No. 361,359.

My invention relates to filtering means, and more particularly to a device adapted to be introduced into the lubricating system of an internal combustion engine.

One of the main objects of my invention is to provide a device of simple construction which can be readily introduced into the lubricating system of an internal combustion engine and, when so applied, is effective in removing from the oil fine particles of carbon, steel, and other gritty substances such as would be injurious to the bearings and working parts of the engine. A further object is to provide a device of the character stated which can be removed and cleaned, and replaced with facility. It is also an object of my invention to provide a device embodying a fine mesh screen or equivalent means associated with a cup or casing for receiving the oil to be filtered, the screen and the cup being so related that deleterious materials separated out of the oil and collected in the cup will be directed away from the screen in such manner as to prevent clogging thereof.

Further objects and advantages of my invention will appear from the detailed description.

In the drawings:

Fig. 1 is a fragmentary sectional view through an engine casing and a filtering device constructed in accordance with my invention and as applied;

Fig. 2 is an inner end view of the filtering device;

Fig. 3 is a vertical sectional view through the filtering device taken substantially on line 3—3 of Fig. 1, the engine casing being shown fragmentarily.

In order that the use of my filtering device, and the advantages thereof may be more clearly understood, I have illustrated this device in Fig. 1 as applied to the casing 1 of an internal combustion engine which employs a forced feed lubricating system such as that disclosed in my copending application for oiling system, Serial Number 745,188, filed October 22, 1924, of which this application is a division.

Casing 1 is provided with a lubricant or oil receiving chamber 2 having an outlet duct 3 through which the filtered oil is supplied to the bearing surfaces and working parts of the engine in a known manner. The casing is further provided with an oil duct 4 which leads from the discharge of a suitable oil pump by means of which the oil is fed under pressure to the bearings. This pump is illustrated and described in detail in my above identified copending application and need not be illustrated nor described here, it being sufficient to note that the used oil is discharged from a suitable pump under pressure and through the duct 4.

The casing is provided, through its outer wall, with an opening alined with the outer end of chamber 2. This opening accommodates a filtering device constructed in accordance with my invention. This filtering device comprises a cup 5 having an outer cylindrical body portion 6 and an inwardly tapering mouth portion 7 which extends inwardly from the inner end of the body portion. The cup is inserted horizontally into casing 1, through the opening thereof above referred to, inward movement of this cup being limited by an outer angular flange 8 which is preferably formed integrally with a head 9 which closes the outer end of the cup. At its inner end the cup is provided with a mouth 10 which is open to permit of flow of filtered oil therethrough into the chamber 2. As will be noted more clearly from Fig. 1, the inner face of the surrounding wall of mouth 10 is parallel to the axis of the cup and provides a bearing of appreciable area for a cylindrical screen 11 which extends into the cup from the inner end thereof. This screen is provided, at its inner end, with an element 12 in the nature of a flange, which fits about mouth 10 of the cup and extends over the outer radial face thereof.

The mouth of the cup is provided, in its outer radial face, with a circumferentially extending groove 13 over which element 12 of screen 11 extends. This element of the screen is clamped to the mouth of the cup by a resilient clamping ring 14, of known type, which serves to press element 12 of the screen into the groove. This provides simple and highly efficient means for securing

the screen to the cup while permitting the screen to be quickly detached from the cup and removed therefrom for the purpose of removing sediment from the cup and flushing out the same and the screen.

Flange 8, in addition to limiting movement of the cup inwardly of casing 1 also provides convenient means for securing the cup to the casing in a suitable manner, as by means of cap screws 15. Obviously, the flange 8 need not be continuous, two or more ears or lugs being the equivalent of the flange for securing the cup in position and limiting inward movement thereof. It will also be understood that other suitable means may be employed for securing the cup in position. Preferably, however, I employ a continuous flange 8 and provide a packing gasket 16 between this flange and the engine casing to assure an oil-tight closure about the outer end of the cup.

Cup 5 is provided, in body portion 6 thereof, with an oil inlet opening 17 which, when the cup is properly positioned, is in register with the outlet end of oil duct 4. Any suitable or known means may be employed to assure proper positioning of the cup, relative to duct 4, when it is secured in the position of Figure 1.

In the operation of the engine, the oil is discharged under pressure from duct 4 into the space between screen 11 and the surrounding wall of cup 5. The screen is of sufficiently fine mesh to prevent passage therethrough of fine particles of carbon, metal, gritty substances, and other materials of like nature which would be injurious to the bearings and moving parts of the engine. The oil in passing through the screen is thus filtered and flows through the mouth of the cup into chamber 2, from which escapes through the outlet duct 3, and is supplied to the bearings and moving parts of the engine in a known manner. Referring more particularly to Figure 1, it will be noted that the lower portion of the mouth portion 7 of the cup is inclined downwardly and outwardly away from screen 11 which, being cylindrical, is spaced away from both the mouth portion and the body portion of the cup. This inclination of the mouth portion of the cup below the screen is of importance as directing away from the screen the various materials which have been filtered out of the oil, thus preventing clogging of the screen by such materials. The space below the outer portion of the screen and the body portion of the cup is sufficient to accommodate the sediment which collects in the cup during a considerable period of time. As the filtering device, comprising the cup and the screen, can be readily removed as a unit from the engine casing, it is a simple matter to remove such device and to remove the screen from the cup, in the manner previously described, after which all sediment can be easily emptied out of the cup and the screen and cup flushed so as to thoroughly cleanse the same, after which the screen is again secured in the cup and the device as a unit is inserted into the casing and secured in position.

This is advantageous as encouraging periodic removal and flushing out of the filtering unit thus greatly reducing likelihood of clogging of the screen due to inattention.

The inlet opening 17 of the cup is preferably disposed well above the lower portion thereof, as illustrated. This is advantageous as permitting the sediment which collects in the cup to remain quiescent thus eliminating possibility of clogging of the screen such as might occur if this sediment were agitated by the oil flowing into the cup.

I preferably provide chamber 2 with a pressure release duct 18 disposed at the bottom thereof and communicating with a pressure release valve 19 of known type which acts, when the oil in chamber 2 attains a predetermined maximum pressure, to discharge oil from this chamber into the crank case of the engine, in a known manner, this valve closing when the proper operating pressure in chamber 2 has been restored.

What I claim is:—

1. In filtering means for use in a lubricating system of an internal combustion engine, a cup adapted for insertion horizontally into the engine casing through a suitable opening therethrough, said cup being closed at its outer end and open at its inner end for flow of filtered lubricant therefrom, and a screen secured to the mouth of the cup and extending into the same, the lower portion of the cup having its inner face inclined downward toward the outer end of the cup and away from the lower portion of the screen, said cup having an inlet opening above the lower portion thereof.

2. In filtering means for use in a lubricating system of an internal combustion engine, a cup adapted for insertion horizontally into the engine casing through a suitable opening therethrough, said cup being closed at its outer end and open at its inner end for flow of filtered lubricant therefrom, and a screen secured to the mouth of the cup and extending into the same, the inner face of the cup flaring outwardly from the mouth thereof and the screen conforming in cross-area to said mouth, said cup having an inlet opening above the lower portion thereof.

3. In filtering means for use in a lubricating system of an internal combustion engine, a cup adapted for insertion horizontally into the engine casing through a suitable opening therethrough, said cup being closed at its outer end and open at its inner end for flow of filtered lubricant therefrom, and a screen secured to the mouth of the

cup and extending into the same, the cup comprising an outer cylindrical body portion and an inwardly tapering mouth portion extending from the inner end of said body portion, said screen being cylindrical, the cup being provided with an inlet opening disposed above the lower portion thereof.

4. In filtering means for use in a lubricating system of an internal combustion engine, a cup adapted for insertion horizontally into the engine casing through a suitable opening therethrough, said cup being closed at its outer end and open at its inner end for flow of filtered lubricant therefrom and the mouth portion of the cup tapering inwardly, and a screen releasably secured to the mouth of the cup and extending into the same and in spaced relation to the surrounding wall of the cup.

5. In filtering means for use in a lubricating system of an internal combustion engine, a cup adapted for insertion horizontally into the engine casing through a suitable opening therethrough, said cup being closed at its outer end and open at its inner end for flow of filtered lubricant therefrom, the cup comprising a cylindrical body portion and an inwardly tapering mouth portion extending from the inner end of the body portion, a cylindrical screen fitting into the mouth of the cup and extending into said cup, and means releasably securing the screen to the mouth of the cup.

6. In filtering means for use in a lubricating system of an internal combustion engine, a cup adapted for insertion horizontally into the engine casing through a suitable opening therethrough, said cup being closed at its outer end and open at its inner end for flow of filtered lubricant therefrom and comprising an outer cylindrical body portion and an inwardly tapering mouth portion extending from the inner end of the body portion, the surrounding wall of the mouth of the cup at the inner end thereof being parallel to the axis of the cup, a cylindrical screen fitting through the mouth of the cup in contact with the wall of said mouth and extending into the cup, said screen being provided at its inner end with an element extending about the mouth of the cup, and clamping means releasably securing said element to the cup mouth.

7. In a filtering unit for use in a lubricating system of an internal combustion engine, a cup closed at its outer end by a head provided with an element projecting beyond the body of the cup for securing it to the engine casing, said cup being open at its inner end and adapted for insertion horizontally into the engine casing through a suitable opening therein, and a screen secured about the inner end of the cup and extending into the cup, said screen being spaced above the lower portion of the cup body and the cup having an opening for admitting lubricant between the body of the cup and the screen.

8. In a filtering unit for use in a lubricating system of an internal combustion engine, a cup closed at its outer end and open at its inner end, said cup being adapted for insertion horizontally into the engine casing through a suitable opening therein, and a screen secured about the inner end of and extending into the cup for the greater portion of the length thereof, said screen being spaced above the lower portion of the cup body and the cup having an opening for admission of lubricant thereto.

9. In a lubricating system, a chamber having an oil outlet passageway and a relatively large opening with a flange seat thereabout, a flanged cup closed at its outer end and open at its inner end projecting into said chamber and seated in said opening with its flange seating on the flange seat, and a cup-shaped screen within said cup and having its mouth releasably secured to the mouth of the cup, the cup being provided with an inlet opening through its wall and registering with said passageway, and the screen being spaced away from the circumferential wall of the cup, said cup being disposed substantially horizontally whereby sediment will collect on the wall of the cup away from the screen.

10. In a lubricating system for an internal combustion engine, a bodily removable cup extending through the wall of the engine casing, said cup being disposed substantially horizontally and having an inlet opening for lubricant, the cup being closed at its outer end and opening at its inner end, means for supplying lubricant to the cup through said inlet opening, and a screen disposed within the cup and having its mouth releasably secured about the mouth of the cup, said screen being spaced away from the surrounding wall of the cup.

11. In a lubricating system for an internal combustion engine, a bodily removable cup extending through the wall of the engine casing, said cup being disposed substantially horizontally and having an inlet opening for lubricant, the cup being closed at its outer end and open at its inner end, means for supplying lubricant to the cup through said inlet opening, and a screen disposed within the cup and having its mouth releasably secured about the mouth of the cup, the mouth of the cup comprising an inwardly extending wall whereby the screen is spaced away from the surrounding wall of the cup and sediment collecting within the cup is deflected away from the screen.

In witness whereof, I hereunto subscribe my name this 6th day of May, 1929.

HARRY L. HORNING.