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⑤④ **Valve gear lubrication for an internal combustion engine.**

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Description

This invention relates to an internal combustion engine having an overhead camshaft to parts of which lubrication is applied by spraying.

Lubrication of the interface between each cam of an overhead camshaft and the component against which the cam operates e.g. valve stem, tappet, rocker, ultimately controlling the aspiration valves of an internal combustion engine, is often effected by spraying.

The primary objective of such lubrication is to direct a spray of oil on to an intended area of the cam and/or the component against which the cam directly operates. Effective lubrication of the said interface is mainly dependent on maintaining a sufficient oil spray onto the intended area.

The spray is usually emitted from a small hole or jet in a conduit situated conveniently near the said area and fed from the engine oil pump by pipes and/or oilways in the cylinder block and head.

An average engine oil filter is effective in preventing the flow, in the general oil circuits, of particles which would be injurious to sleeve and rolling bearings. However, it does allow to pass minute particles which in time, become coagulated on the walls of pipes or oilways to form areas of "crust".

Any pieces of this "crust" subsequently dislodged are able to circulate the oilways or pipes and may reach lubrication areas without being influenced by the filter.

While such pieces are usually too soft by their nature to injure sleeve or rolling bearings, they have enough size and tenacity to block the spray holes of the spray lubrication system, thereby starving the cams of their lubrication.

The said pieces may become dislodged purely by the flow of oil in the pipes or oilways, but their incidence is enhanced by the addition of or change to a higher detergent oil than normally used. This is particularly noticeable after the engine has been "flushed out".

An object of the present invention is to provide an O.H.C. internal combustion engine wherein this problem is obviated or minimised.

Accordingly the invention provides an internal combustion engine having an overhead camshaft and a lubrication system including an oil reservoir, a pump and a filter for supplying filtered lubricating oil to desired parts of the engine, the lubrication system including a plurality of apertures whence oil is pumped to lubricate cam surface of the camshaft, characterised in that additional filter means is provided in the oil flow to the apertures to discourage or prevent solid particles or matter from reaching the apertures and causing total or partial blockage thereof.

Because the chance of such a blockage increases with the length of conduit such as piping and/or oilways leading to the spray holes the additional filter means should be positioned as far downstream in the oil stream flow as

conditions allow; preferably in the final stage, just before the spray holes, in order to minimise the likelihood of blockage.

The invention will be described further, by way of example, with reference to the accompanying drawings wherein:

Fig. 1 is a perspective view of an engine modified in accordance with the present invention;

Fig. 2 and 2a are fragmentary views, respectively a perspective view of a spray conduit and a part-sectional view showing the conduit connected to a cylinder head in a conventional internal combustion engine;

Fig. 3 is a view similar to that of Fig. 2 but showing the conduit modified and connected to a filter illustrated in exploded form, and

Fig. 4 is a view similar to that of Fig. 2(a) but showing the filter in position connecting the conduit to a camshaft bearing pedestal of an engine.

The chosen example of engine of the invention is the British Ford Petrol engine 1600 OHC or 2000 OHC currently in production.

In this style of engine, camshaft lubrication oil ascends from the engine oil pump and filter, both situated low near the sump, through an oilway in the cylinder block, through a perforation in the cylinder head gasket, through an oilway in the cylinder head into the camshaft centre bearing pedestal from which it passes through a horizontally drilled oilway into the spray pipe assembly (Fig. 2).

Fig. 2 is a pictorial view of an assembly consisting of a spray pipe 10, nipple 11 and bracket 12. The assembly is that Ford Part which in U.K. is given No. 1490126 and which in Europe and U.S.A. is marked 70 HM 6578AE and DIFZ-6578A respectively. The assembly is secured by a bolt 13 to the side of the camshaft centre bearing pedestal 14 (Fig. 2a) while the nipple 11 enters a horizontally drilled oilway 15, to receive and transmit oil to the pipe 10. From this point oil flows into the fore and aft halves of the pipe 10a 10b finally to emerge as a spray 16 from each of eight spray holes 17, one spray lubricating each of each cams (not illustrated).

The ends 18 of the pipe are sealed, and secured by one bolt each (not shown) to the camshaft force and aft bearing pedestals (also not shown).

It is this existing system which is vulnerable to blocking of the spray holes 17.

Another hazardous feature of this particular engine lies in the fact that the oil passes from an oilway in the cylinder block to an oilway in the cylinder head via the cylinder head gasket. Therefore, very special care must be taken, when changing the cylinder head gasket for maintenance purposes, that foreign matter, such as scrapings does not enter the oilway in either the cylinder block or the cylinder head, for on re-starting the engine, such matter could be carried along by the oil and block one or more of the spray holes.

Referring simultaneously to Figs. 3 and 4, in an

engine in accordance with the invention the innermost ends of pipe halves 20a, 20b are removed by cutting and the two ends resulting are secured by brazing into two holes, one in each side of a filter case 21 in such a manner that the said ends do not protrude into the inside of the case 21 but the bores of the pipes 20a, 20b connect with the inside of the case 21. When the case 21 is being made, holes for the ends of pipes 20a, 20b are punched out to form a short tubular spigot 32 which facilitates brazing of the pipe ends to the case 21 and increases the tolerance in the length to which the pipe halves 20a, 20b have to be cut.

Filter components are assembled in the case (1) in the following order:

'O' ring	22
Screen	23
Plate	24
Spacer	25
Plate	26
'O' ring	27
Lid	28
Yoke	29

This assembly is then secured to the camshaft centre bearing pedestal by a bolt 30 which may be tightened solidly and yet apply a dimensionally controlled compression to the two 'O' ring seals 22, 27 because of the limit to its movement imposed by the solid centre parts of the various components forming a stack around it.

At the same time a nipple 31 on the case 21 enters the horizontally drilled hole 15 (Fig. 4) in the camshaft centre bearing pedestal 33 to admit oil to the filter case 21. The ends of the pipes 20a, 20b are secured as before to the camshaft fore and aft bearing pedestals (not shown).

Now referring to Fig. 4. On starting the engine, oil passes from the drilled hole 15 in the camshaft centre bearing pedestal 33 through the nipple 31 into chamber 34 from where any subsequent flow must be through filter screens 23 the whole area of which is available to pass oil but to stop particles greater than a given size and to collect such particles in chamber 34.

The now filtered oil flow through holes 35 in plate 24 into annulus 36 into the bores of pipe 20 and is finally emitted from the spray holes onto the intended area of the cam.

Claims

1. An internal combustion engine having an overhead camshaft and a lubrication system including an oil reservoir, a pump and a filter for supplying filtered lubricating oil to desired parts

of the engine, the lubrication system including a plurality of apertures whence oil is sprayed to lubricate cam surfaces of the camshaft, characterised in that additional filter means is provided in the oil flow to said apertures to discourage or prevent solid particles or matter from reaching the apertures and causing total or partial blockage thereof.

2. An engine as claimed in Claim 1, characterised in that the additional filter means communicates immediately with oil supply pipes in which the spray apertures are provided.

3. An engine as claimed in Claim 2, characterised in that two pipes connect with the additional filter means on a downstream side of the screen thereof and a chamber on an upstream side of the screen has a nipple communicating therewith and dimensioned to engage an oil supply cavity in structure of the engine.

4. An engine as claimed in claim 3, characterised in that the additional filter means comprises a case and, which in the case, components for defining a chamber one on each side of the screen and sealing with the screen to enforce flow through the screen.

5. An engine as claimed in claim 4, characterised in that said components are secured in the case and the case is secured to the engine by a single fastener passing through the centre of all the components which are shaped to define a stack around the bolt.

6. A camshaft lubricating oil supply assembly comprising an additional filter means having an inlet adapted to connect with an oil supply conduit of an engine and an outlet to a conduit supplying oil to spray apertures for cam lubrication.

7. An assembly as claimed in claim 6 characterised in that the additional filter means has a case which is central and supplies filtered oil to two pipes each of which has spray apertures therein.

8. An assembly as claimed in claim 7, characterised in that components of the additional filter means can be secured in the case and the case can be secured to an engine by a single central bolt.

Patentansprüche

1. Brennkraftmaschine mit oberliegender Nockenwelle und einem einen Vorratsbehälter, eine Pumpe und einen Filter aufweisenden Schmiersystem, um gefiltertes Schmieröl zu gewünschten Teilen des Motors zu fördern, wobei das Schmiersystem eine Mehrzahl von Öffnungen aufweist, durch die Öl zur Schmierung von Nockenoberflächen der Nockenwelle gesprüht wird, dadurch gekennzeichnet, daß eine zusätzliche Filtervorrichtung in dem zu den Öffnungen führenden Ölstrom vorgesehen ist, um feste Teilchen oder Stoffe davon abzuhalten oder zu hindern, die Öffnungen zu erreichen und diese vollständig oder teilweise zu verstopfen.

2. Brennkraftmaschine nach Anspruch 1,

dadurch gekennzeichnet, daß die zusätzliche Filtervorrichtung mit den Ölversorgungsleitungen, in denen die Sprühhöffnungen vorgesehen sind, unmittelbar verbunden ist.

3. Brennkraftmaschine nach Anspruch 2, dadurch gekennzeichnet, daß die zusätzliche Filtervorrichtung stromab von deren Filter mit zwei Ölversorgungsleitungen verbunden ist und daß eine stromauf des Filters gelegene Kammer einen Nipell aufweist, der so angeordnet und dimensioniert ist, daß eine Verbindung zu einem im Motorgehäuse vorhandenen Ölversorgungsraum besteht.

4. Brennkraftmaschine nach Anspruch 3, dadurch gekennzeichnet, daß die zusätzliche Filtervorrichtung ein Gehäuse und innerhalb des Gehäuses Teile zur Bildung je einer Kammer auf jeder Seite des Filters aufweist, die durch das Filter derart geschlossen ist, daß der Ölfluß durch den Filter gehen muß.

5. Brennkraftmaschine nach Anspruch 4, dadurch gekennzeichnet, daß diese Teile im Gehäuse befestigt sind und daß das Gehäuse am Motor durch eine einzige, durch die Mitte aller Teile gehende Halterung befestigt ist, wobei die Teile als um den Bolzen angeordneter Stapel ausgebildet sind.

6. Ölversorgungseinrichtung für eine Nockenwellenschmierung mit einer zusätzlichen Filtervorrichtung, die einen mit einer Ölversorgungsleitung eines Motors verbindbaren Einlaß und einen mit einer Leitung zur Versorgung von der Nockenschmierung dienenden Sprühhöffnungen mit Öl verbindbaren Auslaß aufweist.

7. Einrichtung nach Anspruch 6, dadurch gekennzeichnet, daß die zusätzliche Filtervorrichtung ein in der Mitte gelegenes Gehäuse aufweist und zwei mit Sprühhöffnungen versehene Leitungen mit gefiltertem Öl versorgt.

8. Einrichtung nach Anspruch 7, dadurch gekennzeichnet, daß die Einzelteile der zusätzlichen Filtervorrichtung in dem Gehäuse befestigbar sind und daß das Gehäuse durch einen einzigen, mittig angeordneten Bolzen am Motor befestigbar ist.

Revendications

1. Moteur à combustion interne à arbre à cames en tête et système de lubrification comportant un réservoir d'huile, une pompe et un filtre pour fournir de l'huile de lubrification filtrée aux parties

voulues du moteur, le système de lubrification incluant une pluralité d'orifices par lesquels l'huile est pulvérisée pour lubrifier les surfaces de cames de l'arbre à cames, caractérisé par le fait qu'un moyen de filtrage additionnel est prévu dans le courant d'huile allant auxdits orifices pour décourager ou empêcher des particules ou de la matière solide d'atteindre les orifices et en causer le blocage total ou partiel.

2. Moteur selon la revendication 1, caractérisé par le fait que le moyen de filtrage additionnel communique directement avec des conduits d'alimentation d'huile dans lesquels sont prévus les orifices de pulvérisation.

3. Moteur selon la revendication 2, caractérisé par le fait que deux conduits communiquent avec le moyen de filtrage additionnel d'un côté aval de son tamis et une chambre d'un côté amont du tamis comporte un raccord communiquant avec elle et dimensionnée pour s'engager dans une cavité d'alimentation d'huile ménagée dans la structure du moteur.

4. Moteur selon la revendication 3, caractérisé par le fait que le moyen de filtrage additionnel comprend un boîtier et, dans ce boîtier, des composants pour définir une chambre de chaque côté du tamis, et assurer l'étanchéité du tamis de façon à obliger l'huile à le traverser.

5. Moteur selon la revendication 4, caractérisé par le fait que lesdits composants sont fixés au boîtier et le boîtier est fixé au moteur par un unique organe de fixation traversant le centre de tous les composants qui sont de forme telle qu'ils délimitent un bloc autour du boulon de fixation.

6. Ensemble d'alimentation en huile de lubrification d'un arbre à cames comprenant un moyen de filtrage additionnel possédant un orifice d'entrée agencé pour communiquer avec un conduit d'alimentation d'huile d'un moteur et un orifice de sortie sur un conduit fournissant de l'huile à des orifices de pulvérisation pour lubrification des cames.

7. Ensemble selon la revendication 6, caractérisé par le fait que le moyen de filtrage additionnel comporte un boîtier central et fournit de l'huile filtrée à deux conduits munis d'orifices de pulvérisation.

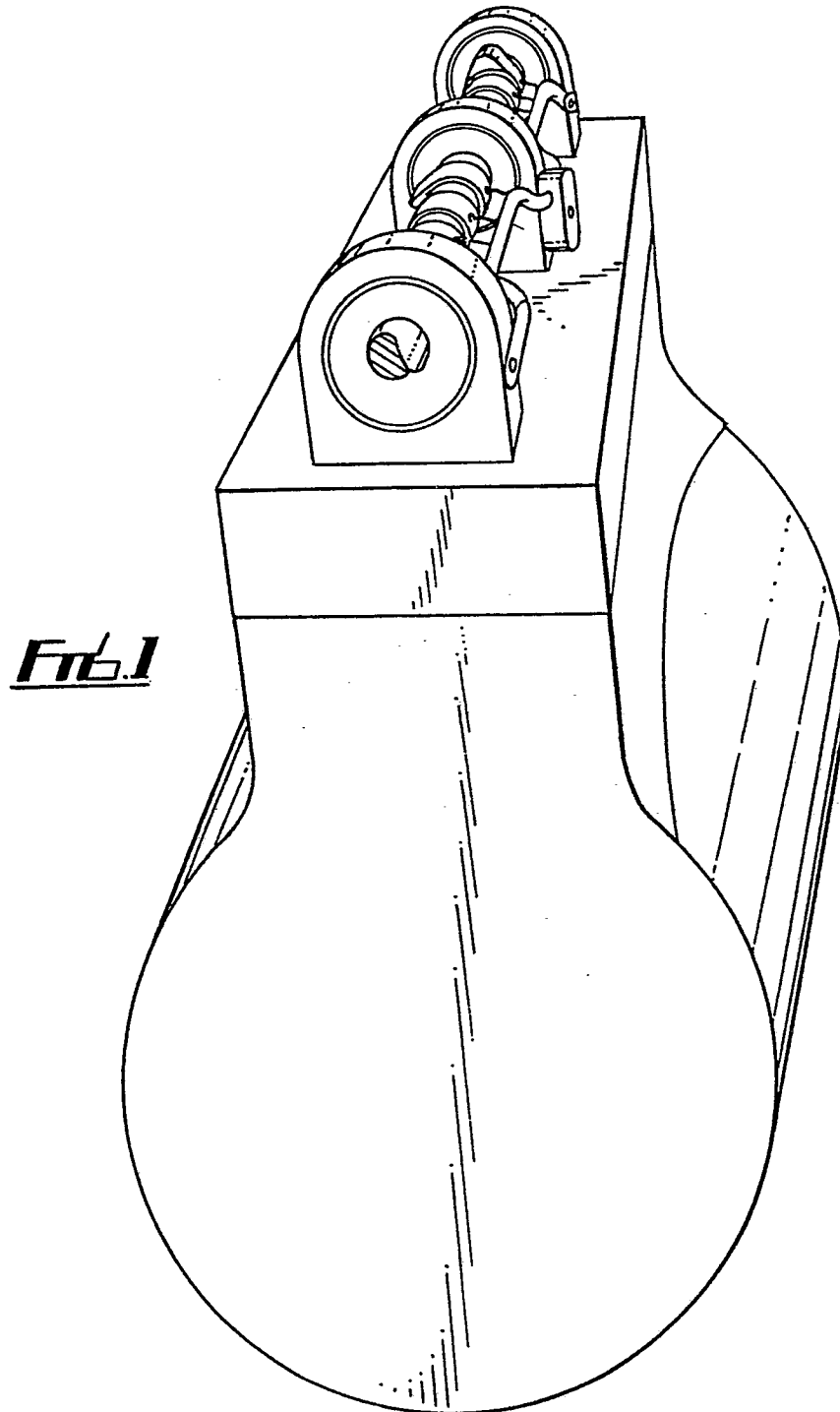
8. Ensemble selon la revendication 7, caractérisé par le fait que des composants du moyen de filtrage additionnel peuvent être fixés dans le boîtier et le boîtier fixé sur un moteur par un unique boulon central.

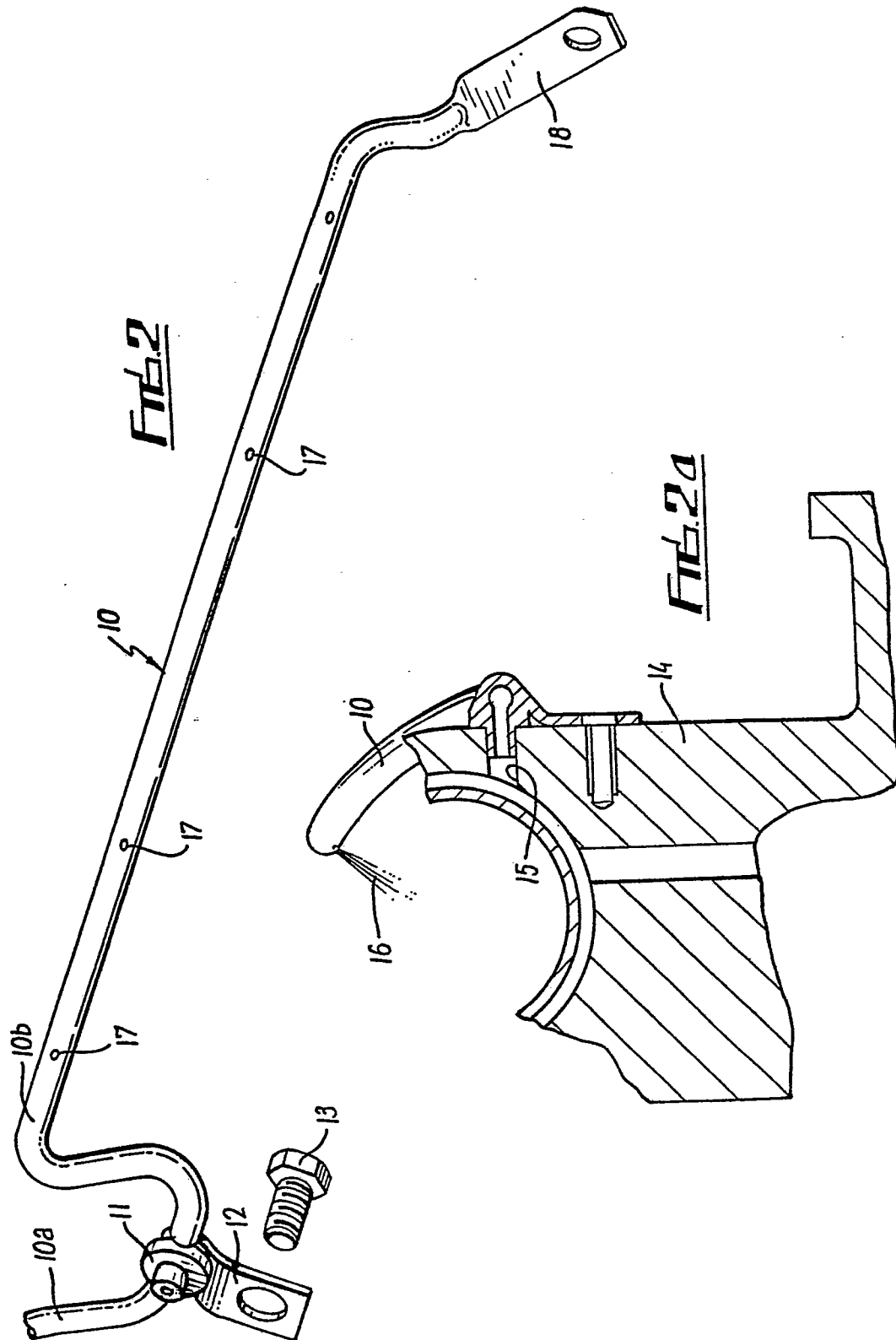
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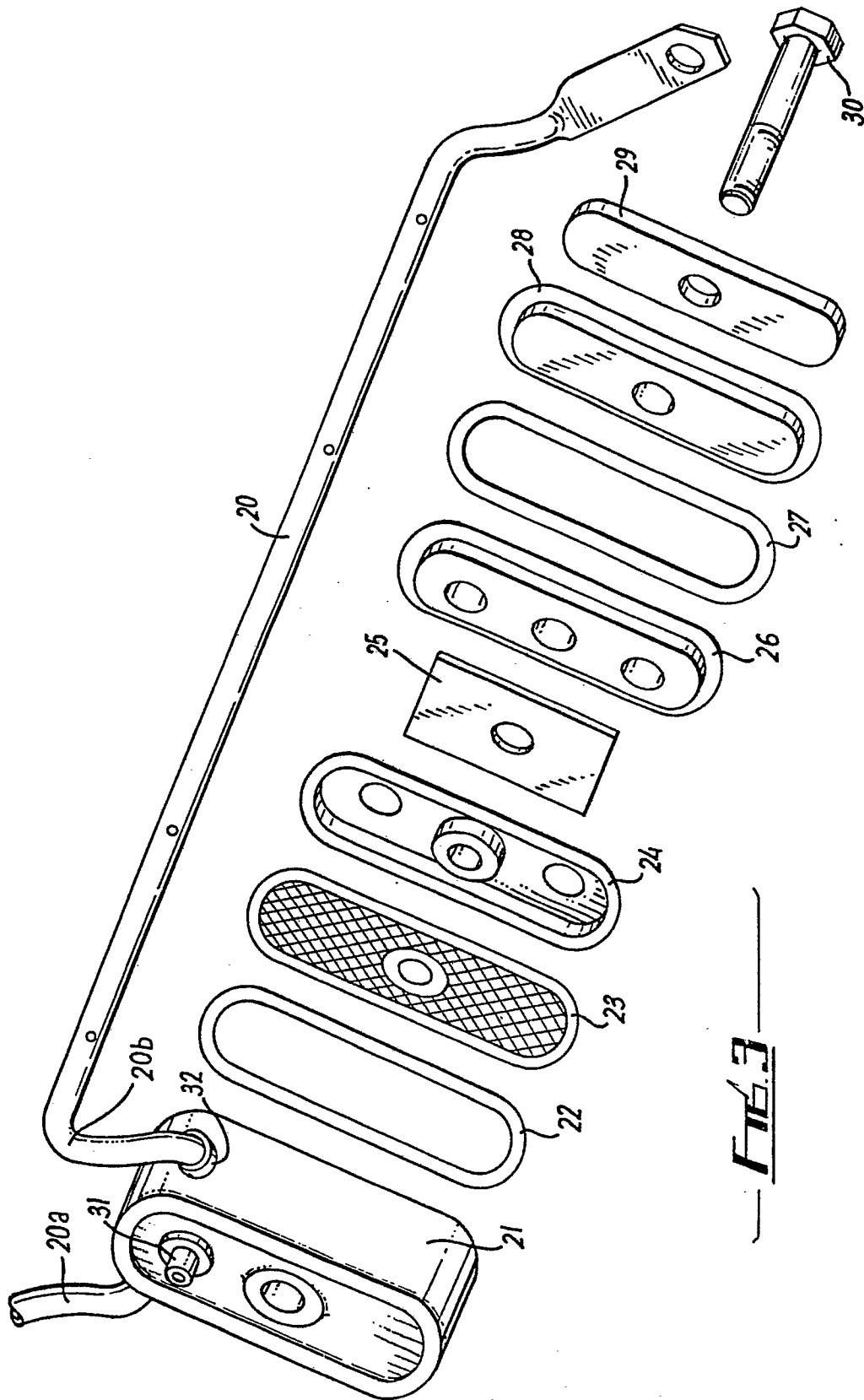


FIG. 3

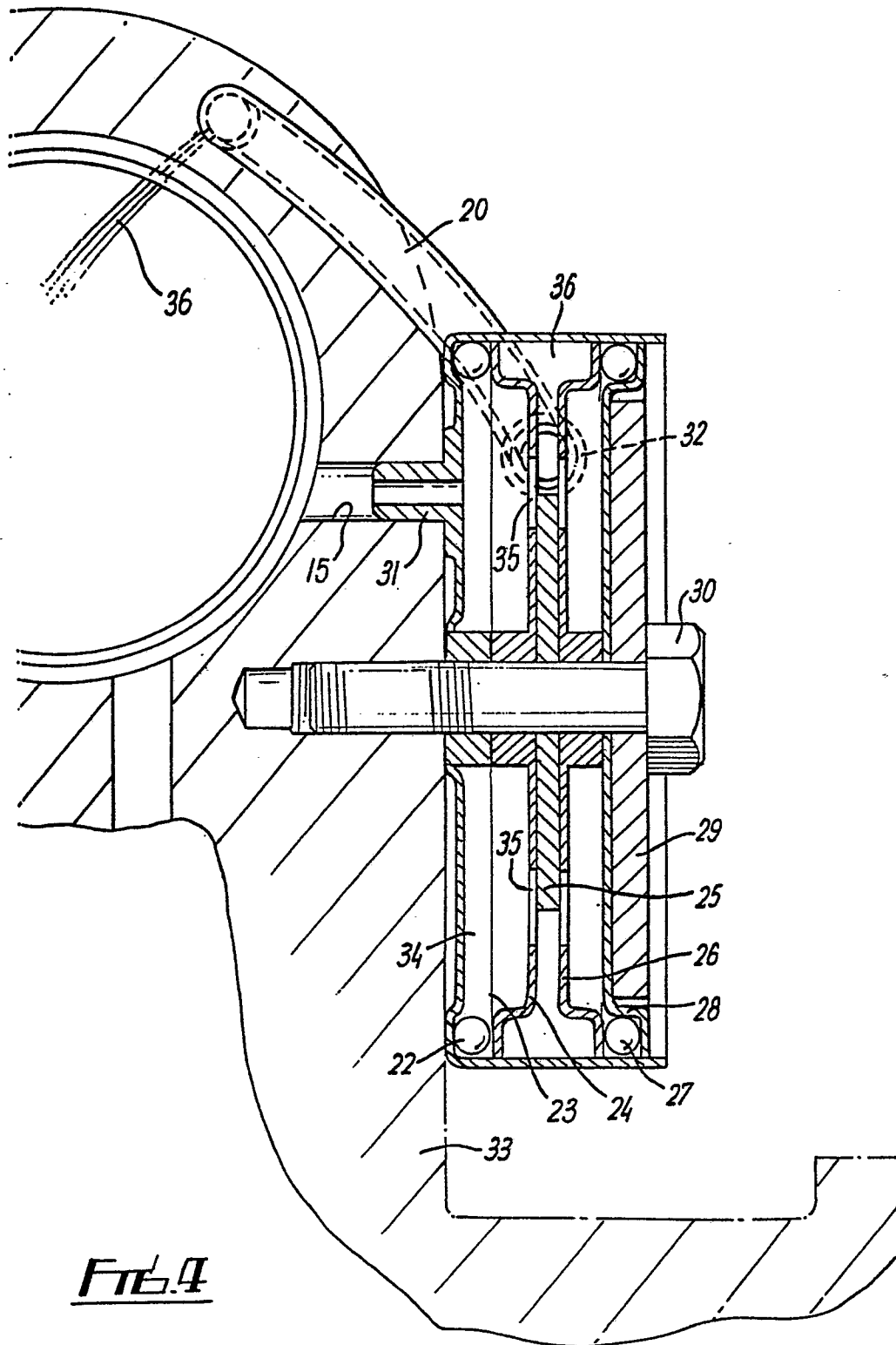


Fig. 4