CUTTER FOR OIL FILTER AND LIKE CASINGS

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ABSTRACT
A cutter particularly adapted for opening oil filter and like casings having an elongated base member with a roller support platform at one end and a thrust block at the other end. A cutter block, the position of which is controlled by a threaded rod, is slidably positioned at the base member. The cutter block carries a cutter blade engageable with the filter casing to cut the same when it is rotated relative to the cutter.

7 Claims, 4 Drawing Figures
CUTTER FOR OIL FILTER AND LIKE CASINGS

BACKGROUND OF THE INVENTION

This invention relates to cutters and, more particularly, to a cutter particularly adapted for the opening of oil filter and like casings.

It has become desirable to periodically open oil filters which have been in operation on internal combustion and like engines for periodic inspection. The filter media, typically, is removed from the filter after opening and subjected to analysis by an atomic spectrograph. This procedure enables the condition of the oil which has been running in the engine to be checked and, additionally, permits the isolation of metal filings, particles and the like to determine whether particular engine components are deteriorating or unworkable.

Great difficulty has been experienced in opening the oil filter cartridges for spectrograph analysis. This difficulty has been prompted, primarily, by the manufacturing methods which the filter makers utilize, it being customary to crimp or roll the oil filter hood onto the base member prohibiting easy removal of the same. It is impractical to attempt to cut the hood loose with conventional cutting tools since the same will introduce metal filings into the filter media and make it impossible, during subsequent analysis, to determine whether the particles came from the engine or filter casing. It is difficult, additionally, to cut the hood at any location except adjacent the base since the hood will tend to slide out of round if pressure is exerted on it at other locations.

OBJECTS AND SUMMARY OF THE INVENTION

It is an object of this invention, therefore, to provide a cutter particularly adapted to open oil filter and like casings.

It is an object of this invention, more particularly, to provide such a cutter which will easily and quickly separate the casing from the base without producing metal chips or filings which might interfere with accurate testing of the contents of the filter media.

It is an object of this invention, further, to provide such a cutter which may be economically fabricated rendering the same economically accessible throughout service organizations of the type under discussion.

Briefly, the objects of this invention are accomplished by a cutter comprising an elongated member having a casing-receiving bed along the length thereof, the bed being adapted to support the base of filter or like casings when the same are opened. A roller support platform is affixed to one extremity of the member, the roller support having at least two spaced rollers rotatably mounted thereon for rotation about axes generally perpendicular to the bed, at least portions of the periphery of the said rollers overhanging and being spaced from the plane of the bed. A thrust block is affixed to the other extremity of the member, a cutter block being slidably interspersed between it and the roller support platform. A rotatable cutting member is supported by the cutting block and slideable therewith, the cutting member also being rotatable about an axis generally perpendicular to the bed and having at least a portion of its periphery overhanging and spaced from the bed. Means are provided interconnecting the cutter block and the thrust block for controlling the sliding movement of the cutter block.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a plan view of the cutter which is the subject of this invention;
FIG. 2 is a side-elevational view thereof, partially in cross section, illustrating in phantom a typical oil filter in cutting position;
FIG. 3 is a cross-sectional view taken along plane III—III of FIG. 1, and
FIG. 4 is a cross-sectional view taken along plane IV—IV of FIG. 1.

DETAILED DESCRIPTION OF THE INVENTION

Referring now to the figures, the cutter 10 includes an elongated base member 12 which may be fabricated out of conventional base stock. Base member 12, preferably, has a substantial width since the forward portion thereof provides a bed for the filter to rest upon while it is being cut. A width of 1½ inches has been found satisfactory for cutters adapted to accept filters up to six inches in diameter.

Member 12 has two rectangular guideways 14 machined in its sides along the length thereof. Guideways 14, as will be readily apparent to those skilled in the art, should extend forwardly a sufficient distance to permit the cutting block 50, to be discussed hereinafter, to be brought into sufficiently close proximity with the roller-supporting platform to permit the minimum size filter to be opened. They may, as illustrated, extend the entire length of the member 12.

Affixed to base member 12 at the forward extremity thereof is roller support platform 20. Platform 20, which is affixed to base member 12 by suitable bolts or other fasteners, includes a base member 22, a central spacer 24 and an upper member 26. The base and upper members 22 and 26, respectively, overlap one another and provide a space therebetween on either side of the platform for receipt of rollers 28. Rollers 28 are rotatably sandwiched between members 22 and 26 by any suitable means such as pins 32 suitably force fitted in the platform as illustrated. The bore of rollers 28, of course, is of a sufficient diameter to permit the rollers to rotate freely about the pins 32.

A thrust block 40 is mounted by means of suitable bolts or other fasteners at the opposite extremity of member 12 from roller support platform 20. Thrust block 40 has a tapped aperture 42 therethrough adapted to threadably receive rod 72 to be discussed hereinafter. The axis of aperture 42 is parallel to the length of base member 12.

The cutter block 50 is slidably mounted upon member 12 between roller support platform 20 and thrust block 40. The block 50, which has a width exceeding that of member 12, is machined so as to have depending arms 52 on either side thereof which arms carry elongated guideway engaging members 54. The cutter block 50, thus, is slidably received by guideways 14 and may be placed in operative position prior to affixing the thrust block 40 to the base member 12.

Cutter block 50 has a centrally located recess formed therein, the recess opening forwardly toward roller support platform 20. Rotatably positioned within recess 56 is a cutter member which, conveniently, can be rotatably borne by a pin 52. A portion of the periphery of cutter 58, as well as that of rollers 28, overhang and are spaced from the plane of the filter supporting bed surface of member 12. A vertical spacing of approximately
three-eighths of an inch has been found satisfactory for typical oil filters. The rotational axis of the three components, for maximum cutting efficiency, should form an isosceles triangle (the base of which is formed by the axes of rollers 28) with the cutting edge of blade 58 contained in a plane bisecting each of rollers 28.

Cutter blade 50 is fabricated from 41L50 steel and has a diameter, preferably, of between one-half and 1 inch. It converges in the form shown to a peripheral, sharpened cutting edge with an included angle of approximately 20°. Smaller included angles have also proved acceptable.

The proximity of blade 58 with respect to roller supporting platform 20 is controlled by assembly 70. This assembly includes a threaded rod 72 having an annular groove 74 formed about the forward extremity thereof. This extremity is received in a suitably sized "blind" bore in cutter block 50 and rod 72 rotatably secured thereto by means of a pin 76 engaging groove 74. The relative dimensions of the bore, groove 74 and pin 76 are preferably such that rod 72 bears directly against block 50 during movement of the block toward roller platform 20.

Rod 72 threadingly mates with the tapped bore 42 and thrust block 40. By rotating rod 72 at knob 78, thus, the longitudinal position of the cutting block and, thus, cutter 58, can be varied.

The cutter which is the subject of this invention is utilized by retracting the cutter block 50 through rotation of knob 78 to a position where the filter 80 to be cut can be placed on the bed of member 12 in the general position shown in FIG. 2. Knob 78 is then rotated in the opposite position, until the sidewalls of the filter hood are firmly engaged by rollers 28 and cutter blade 58.

Care should be taken during this initial tightening to avoid flattening of the filter hood.

At this point either the filter may be rotated while the cutter remains stationary or, alternatively, the cutter can be rotated and the filter held stationary. Best results have been obtained when the filter is rotated and, to this end, the entire cutter assembly may be bolted to a workbench or the like with the under surface 16 of member 12 in abutment with the bench.

The filter is rotated and the knob 78 intermittently rotated to slightly decrease the distance between cutter block 50 and roller support platform 20 until the cut has been completed. At this point, of course, the hood may be removed and access gained to the filter media. If, as is the case in some filters, the media is enclosed in a separate, perforate metal container, the second container can also be cut in the aforementioned manner.

It is important that the cutter be designed so that the cut is made on the filter hood in relatively close proximity to base member 81. The base, which usually contains a threaded fitting or similar structure, will discourage disfigurement of the filter hood from its circular configuration and, thus, insure that a uniform cut will be made along all areas of the hood periphery.

Cutter blade 58, of course, leaves no metal chips or other debris which may interfere with analysis of the filter medium. It works, rather, by flowing the metal to either side of the cut.

While a preferred embodiment of this invention has been described in detail, it will be apparent to those skilled in the art that other embodiments may be conceived and fabricated without departing from the spirit and scope of this invention. Such other embodiments are to be deemed as included within the scope of the appended claims unless these claims, by their language, expressly state otherwise.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A cutter particularly adapted for opening oil filter and like casings, said cutter comprising:
   an elongated member having a casing-receiving bed along the entire thereof and two sides, said bed being adapted to support the base of filter or like casings when the same are opened;
   a guideway extending along either side of said member;
   a roller support platform affixed to one extremity of said member, said roller support platform having at least two spaced rollers rotatably mounted thereon for rotation about axes generally perpendicular to said bed, at least portions of the periphery of said rollers overhanging and being spaced from the plane of said bed;
   a thrust block affixed to the other extremity of said member;
   a cutter block slideably mounted on said member between said roller support platform and said thrust block, said cutter block having a width exceeding the width of said member and including a depending arm on either side thereof, said depending arms including means for slideably engaging said guideways whereby said cutter block is slideable toward and away from said roller support platform along at least portions of said bed;
   a rotatable cutting member supported by said cutting block and slideable therewith, said cutting member being rotatable about an axis generally perpendicular to said bed such that one of said depending arms, engaging means and guideways is positioned to either side of said cutting member axis, said cutting member having at least a portion of its periphery overhanging and spaced from said bed, and means interconnecting said cutter block and thrust block for controlling the sliding movement of said cutter block;

2. The cutter as set forth in claim 1 wherein said controlling means includes a threaded rod; a threaded bore in said thrust block receiving said rod such that said rod extends to either end of said thrust block, one end of said rod being rotatably affixed to said cutting block and the other end of said rod having graspable means thereon for turning said rod to adjust the position of said cutting block along said member.

3. The cutter as set forth in claim 2 wherein said guideways are recessed along either side of said member and wherein said depending arms support inwardly converging guideway engaging members slideable in said recessed guideways.

4. The cutter as set forth in claim 3 wherein said guideways extend to at least one end of said member to facilitate assembly of said cutter.

5. The cutter as set forth in claim 4 wherein said cutter block includes a recess therein, said cutter blade being mounted in said recess.

6. The cutter as set forth in claim 1 wherein a line connecting the axes of rotation of said rollers forms the base of an isosceles triangle and wherein the cutting edge of said cutting member lies in a plane parallel to said bed and bisecting said rollers.

7. The cutter as set forth in claim 1 wherein said cutting blade is circular and includes a converging peripheral cutting edge.