June 3, 1969 L. A. MITTEN 3,447,578

CUTTER HEAD STRUCTURE

Filed Oct. 11, 1965 Sheet 1 of 2

FIG. 1

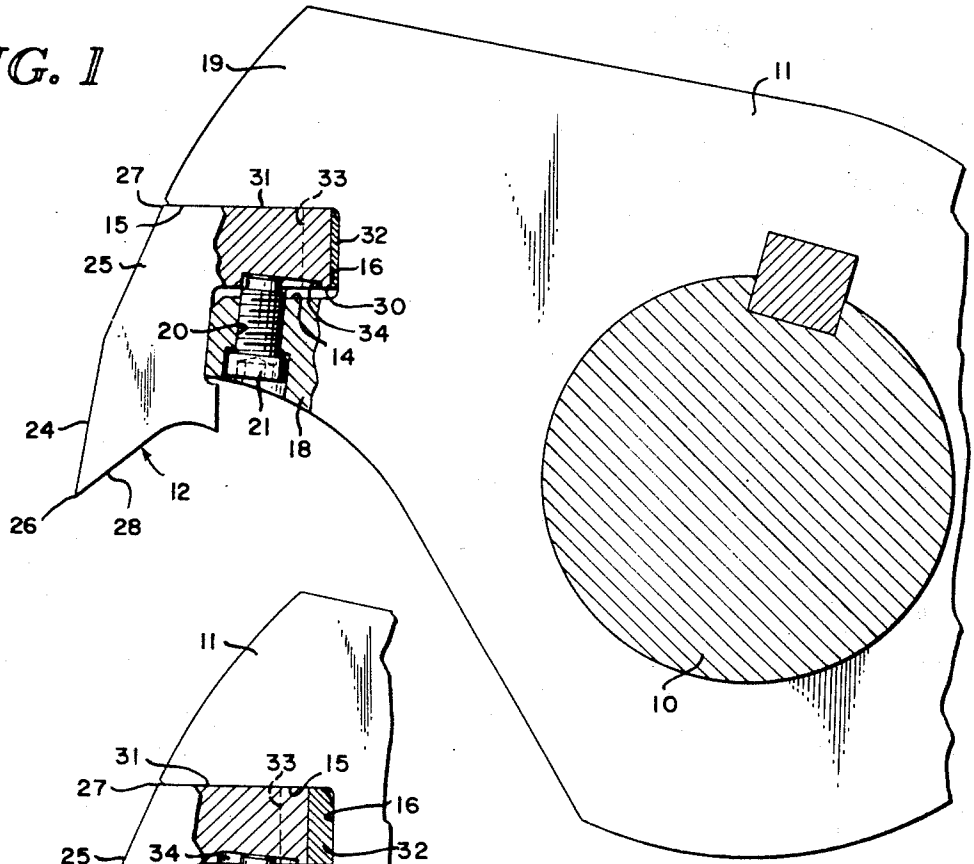
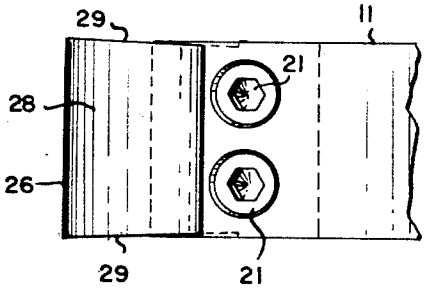


FIG. 2

FIG. 3



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FIG. 4

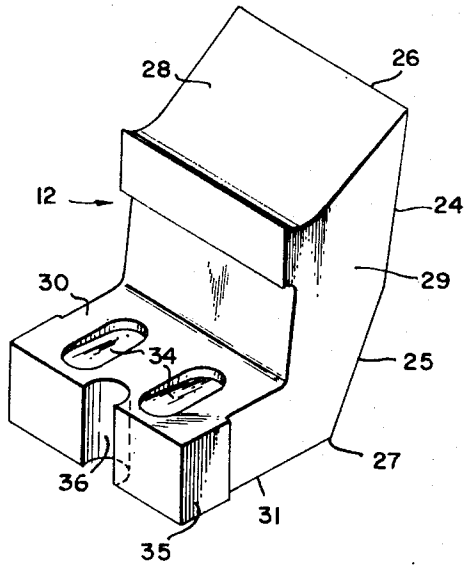
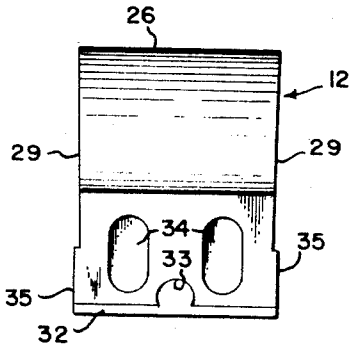


FIG. 5



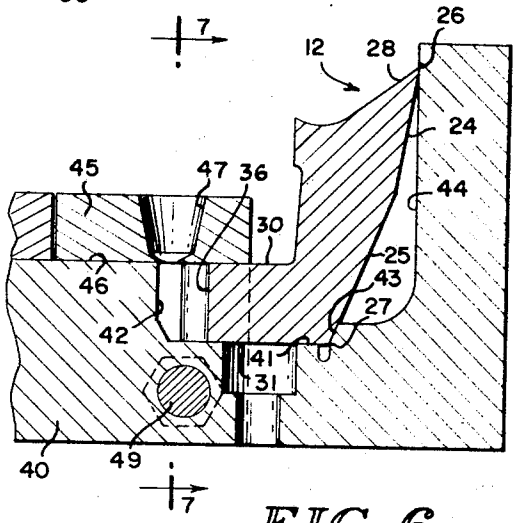


FIG. 6

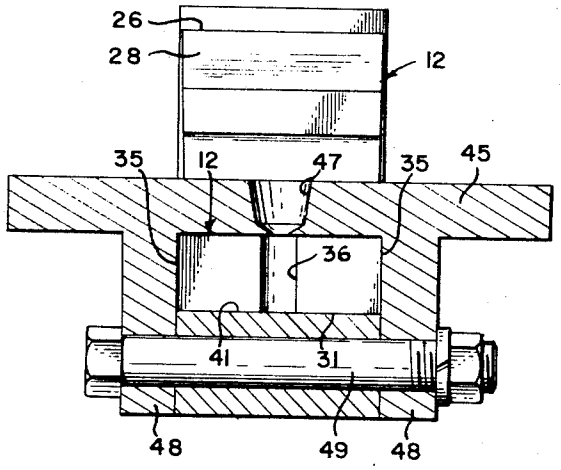


FIG. 7

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United States Patent Office

3,447,578

Patented June 3, 1969

3,447,578

CUTTER HEAD STRUCTURE

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Filed Oct. 11, 1965, Ser. No. 494,633
Int. Cl. B27g *13/10, 13/00*
U.S. Cl. 144—218 5 Claims

ABSTRACT OF THE DISCLOSURE

A cutter head and knife assembly having the knife shimmed as an accommodation to re-sharpening operations, and apparatus permitting the shim to be poured in such a manner that the cutting edge of the knife is always precisely located regardless of the cumulative amount of metal which may be ground from the knife by a succession of re-sharpening operations.

This invention relates to cutter heads, and for its general object aims to provide a head with a perfected cutting knife, a knife particularly in which prescribed cutting characteristics can be easily maintained with absolute precision regardless of the number of times, throughout the knife's usable life, that the same may be re-sharpened.

A further and important object is to provide a cutter head having its knife so mounted as to substantially preclude any liability of the same becoming shifted in use.

With the above objects in view and additionally aiming to provide an efficient cutter head of comparatively simple and inexpensive construction, the invention consists in the novel construction and in the adaptation and combination of parts hereinafter described.

In the accompanying drawings:

FIGURE 1 is a fragmentary side elevational view, partly in section, showing a cutter head and knife constructed to embody the preferred teachings of the present invention.

FIG. 2 is a similar view showing the knife as it appears after being subjected to a number of re-sharpening operations.

FIG. 3 is a fragmentary front elevational view of said head and knife.

FIG. 4 is a perspective view of the knife, shown following a re-sharpening operation preliminary to applying a toe-strip of babbitt-metal as a replacement for a previous toe-strip which was removed before the re-sharpening operation.

FIG. 5 is a front elevational view showing the knife as it appears after the replacement toe-strip has been applied.

FIG. 6 is a fragmentary longitudinal vertical sectional view showing the knife occupying a position, preparatory to pouring the babbitt-metal, within a chest which is correlated to reference planes which govern the re-sharpening operation; and

FIG. 7 is a transverse vertical sectional view on line 7—7 of FIG. 6.

The cutter head of the present invention is or may be of a type used in producing pulp chips and has several head sections each carrying a single chipping knife. The head sections are keyed or otherwise securely attached side-by-side upon a power-driven arbor, being so positioned upon the arbor that radial lines projected through the cutting edges of the knives are spaced at equidistant intervals of the circumference of the arbor. In the drawing the numeral **10** denotes the arbor, **11** one of the head sections, and **12** a chipping knife carried by the head.

According to the present invention the head section presents a radial leg which is forked to produce a re-

entrant open-sided pocket which serves as a mounting socket for the chipping knife. The socket is forwardly hooked, and this is to say that its longitudinal median plane is biased, say 15° toward the direction of rotation, from a plane radial to the rotary axis. The front and back walls **14–15** of the socket parallel said median plane, and the end wall **16** lies normal to said front and back walls. The arm **18** of the fork which lies to the front of the socket is cut back so as to be considerably shorter than the other or trailing arm **19**. The perimeter of such trailing arm is concentric to the head's rotary axis.

Two tapped holes **20** are bored and counter-bored from the front of the short leg **18** on side-by-side axes. These axes lie parallel with the median plane of the radial leg, one at one side and the other at the other side of said plane. Considered from a vantage point at an end of the head section, the plane which is common to the two axes is angled moderately, say 5°, relative to the plane in which the end wall **16** lies, in a direction such that the inner ends of the holes **20** are in closer proximity than are the outer ends to said plane occupied by the end wall. Each hole accommodates a respective Allen-headed screw **21** for clamping the chip-knife in the socket.

Said knife, when viewed from the side, has an angular shape to provide a mounting leg which lodges in the socket and a cutting leg which projects forwardly therefrom in a position overhanging the short leg **18** of the head section. The exterior surface of the cutting leg is ground back from a cutting edge **26** to produce two meeting flats **24** and **25** which are angled in progressively greater degrees from a reference plane including the cutting edge and which parallels and is spaced from a second reference plane related to a shimming strip, hereinafter to be described. Desirably, flat **24** lies at an angle of 10°, and a flat **25** at an angle of 23°, from said first reference plane. For the purpose of a babbitting pour performed by the use of apparatus which will hereinafter be described, the grinding of the flat **25** is so performed, both initially and in re-sharpening operations, that predetermined spacing, say $15/16''$, is maintained at all times between said first reference plane and a heel edge **27** of such flat **25**. The cutting edge **26** is produced between said flat **24** of the exterior face and an undercut interior face **28** lying at an angle, say, of 42° relative to the flat **24** (i.e. 52° relative to the reference plane). The cutting process of the chip-knife is relieved along its sides by having the span across the flanking faces **29—29** progressively narrow from the cutting edge **26** toward the heel edge **27**.

The mounting leg has a thickness between its front and back walls **30** and **31** somewhat less than the fore-and-aft width of the socket, and said front and back walls are flat and lie normal to the reference planes. A shimming strip **32** of poured babbitt-metal extends along the nose of the leg, and is locked thereto by an ear part **33** (see FIG. 5) which is contained in a pocket **36** formed in the mounting leg. The babbitt-metal flows into the pocket in course of making the pour which forms the shimming strip. In such pour the shimming strip is produced to such a thickness that its exposed face, which is flat, occupies the second reference plane.

Two oblong cavities **34** are formed in the front wall of the mounting leg, each in a position to have a respective one of the two clamping screws **21** bear upon the cavity floor. Such cavities are rimmed about their entire perimeter with a sharply defined enclosing wall, and have flat bottoms occupying a plane normal to the axes of the clamping screws hence are progressively deeper, i.e. wedge-shaped, from the inner toward the outer end of each cavity. Before drawing down on the screws **21** incident to clamping the mounting leg of the chip-knife in the socket of the head section, the exposed face of the babbitt strip

32 is brought to bear against the end wall 16 of the socket. This places the heel edge 27 of the chip-knife in a flush position relative to the perimeter of the head section's fork-arm 19.

It will be understood that when the chip-knife is to be re-sharpened the babbitt-metal is removed by melting and the sharpening is then performed by first grinding the flat 24 and then grinding the flat 25, each in strict accordance with specifications, as is customary. The two said flats are ground not only to maintain a specified angularity, the flat 25 relative to the face 31 and the flat 24 relative to the flat 25, but also so that the cutting edge 26 is contained in a plane which is perpendicular to the face 31 and spaced a specified distance from the line of intersection between the face 31 and the flat 24. Proceeding now to describe the above-mentioned apparatus which is used in making a pour, there is provided a chest 40 desirably formed with twin open-sided pouring pits, one at each of its two ends, so that the chest will accommodate two chip-knives. The pits have a flat bottom wall 41 on which the wall 31 of a chip-knife seats, and provide at the inner end a transversely extending wall 42 which lies perpendicular to the bottom wall and rises to a height corresponding to the thickness of the chip-knife's mounting leg. The mounting leg of the chip-knife present flanks 35 which lie flush with side faces of the chest. At the outer end of the floor there is provided a transversely extending wall 43 of moderate height and spaced beyond this wall there is provided a high transversely extending wall 44. The walls 43 and 44 serve as indexing surfaces against which the chip-knife's wall 25 and cutting edge 26 respectively bear. The former lies in the same relation to the wall 42 as the knife's wall 25 bears to the wall 16 of the cutter head. The latter is a counterpart of the reference plane used in grinding the knife, paralleling said wall 42 and spaced therefrom in correspondence with the distance to which the two reference planes are spaced apart. A pouring gate 45 which seats upon a shelf 46 is provided, and presents a sprue hole 47 through which babbit-metal is poured to produce the nosing strip 32. Wing sections 48 of the gate lap the open sides of the pit to contain the poured metal. Cross-bolts 49 draw said wing sections tight against the chest.

It will be apparent that the poured nosing strip functions to locate the knife relative to the head so that, regardless of the degree to which the faces 24 and 25 may be ground back as re-sharpening operations are performed, the radial distance to which the cutting edge 26 is spaced from the head's rotary axis, and the tooth's "angle of attack," remains constant. The clamping screws 21, bearing against the sloping floors provided by the cavities 34, with the bearing ends of such screws taking a snug fit in the cavities, securely lock the knife against liability of displacement in any direction.

It is my intention that no limitations be implied and that the hereto annexed claims be given the broadest interpretation to which the employed language fairly admits.

What I claim is:

1. In combination, a cutting knife formed to an angular configuration in side elevation to provide two legs one serving as a mounting leg and the other as a cutting leg, and a rotary head formed with a radial leg forked to provide a re-entrant opening in its perimeter serving as a socket in which the mounting leg of the knife is received, the inner wall and the back wall of said socket being each flat and occupying a respective plane which in the former instance lies tangent to a circle having the rotary axis of the head as its center and in the latter instance lies normal to said tangent plane, the arm of said forked leg which lies to the front of the socket providing a threaded drill-hole leading to the socket, the mounting leg of the knife having a planar back face which seats against the back wall of the socket, being provided along the nose portion with a poured shimming strip which has a flat face bearing against the inner wall of the socket, and being formed in its front face with an oblong cavity which extends longitudinally of the mounting leg in registration with the drill-hole and has a floor occupying a plane which converges in an outward direction relative to the plane in which the back face of the mounting face lies, a clamping screw being provided which threads in the drill-hole and bears against the floor of the cavity to secure the mounting leg in the socket, the cutting leg of the mounted knife extending forwardly from the mounting leg with its inner and outer faces converging at the front to form a cutting edge occupying a reference plane which is in paralleling relation to a reference plane occupied by said bearing face of the shimming strip and is spaced a predetermined distance therefrom, the outer face of the cutting leg being ground back in a predetermined degree from the former reference plane.

2. Structure according to claim 1 in which the cavity is provided about its entire perimeter with a sharply defined wall.

3. Structure according to claim 2 in which there are two of said clamping screws each threading in a respective one of two drill-holes to bear against the floor of a respective one of two cavities located at opposite sides of the longitudinal median line of the mounting leg.

4. Structure according to claim 1 in which the shimming strip is locked to the mounting leg and is comprised of a replaceable pour of babbitt-metal correlated in point of its thickness to a respective one of a succession of re-sharpening operations so that the spacing between the strip's bearing face and said reference plane is maintained constant regardless of the cumulative degree to which the outer face of the cutting leg is ground back in said re-sharpening operations.

5. Structure according to claim 1 in which the axis of the drill-hole lies perpendicular to the plane occupied by the floor of the cavity.

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U.S. Cl. X.R.

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