

[54] **HOLDING DEVICE FOR KNIFE SETS IN A SHREDDING DEVICE**

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[57] **ABSTRACT**

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In a knife cage assembly, a drum-shaped knife cage, a multiplicity of knife crosspieces disposed on the periphery of the drum-shaped knife cage and having respective knife support surfaces, extending in axial direction of the drum-shaped knife cage and disposed at an acute angle to a radial plane through the drum-shaped knife cage, a knife set including a knife holder plate and a shredding knife held thereby supported on one of the knife support surfaces, the knife holder plate having a surface facing away from the knife, a tensioning bar disposed on the surface of the knife holder bar and extending in longitudinal direction of the knife, the tensioning bar being fastened at both ends thereof to the knife holder plate and being braced at least at a central region thereof against the knife holder plate.

[30] **Foreign Application Priority Data**

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241/221; 241/292.1

[51] **Int. Cl.²**..... **B02C 18/18**

[58] **Field of Search** 241/191, 192, 221, 282.1,
241/286, 292.1, 300.1; 144/172, 212;
83/356.3, 698, 699, 856

[56] **References Cited**

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6 Claims, 5 Drawing Figures

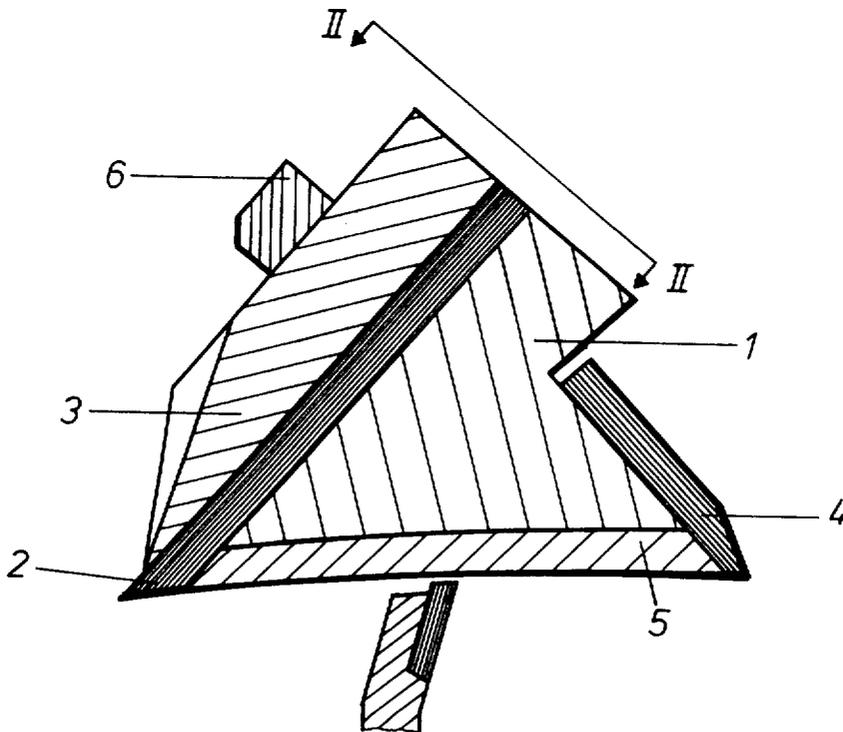


Fig. 1

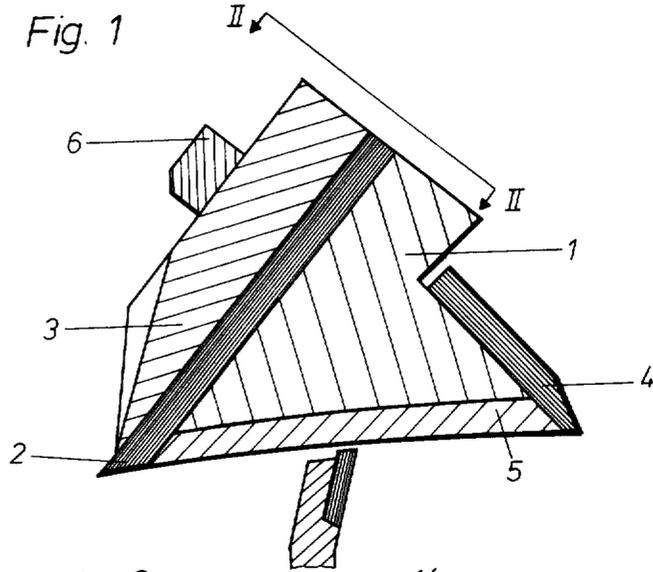


Fig. 2

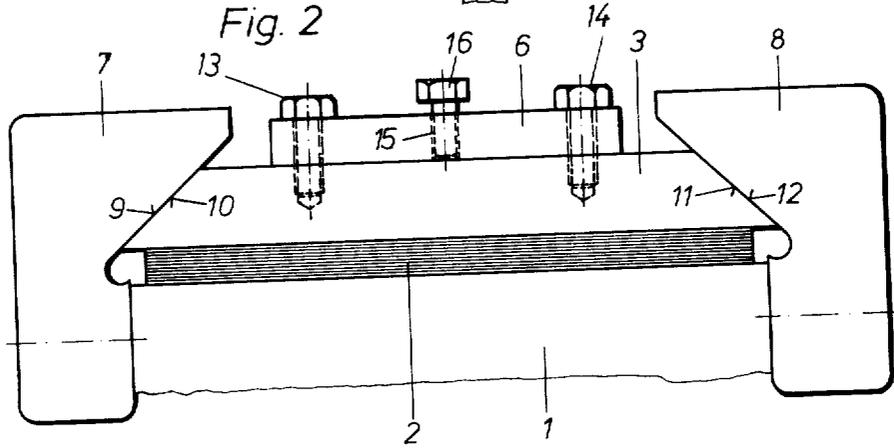


Fig. 3

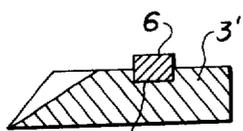
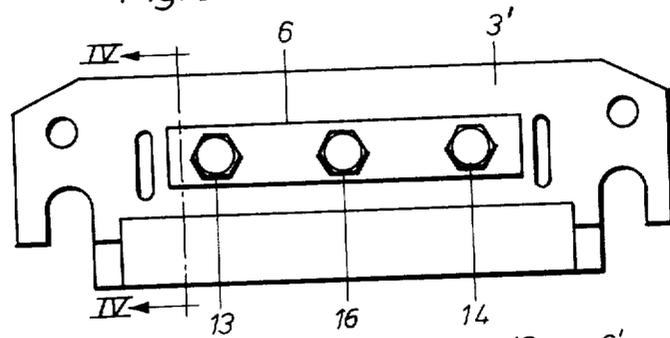


Fig. 4

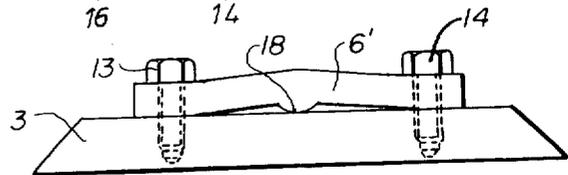


Fig. 5

HOLDING DEVICE FOR KNIFE SETS IN A SHREDDING DEVICE

The invention relates to a holder device for exchangeable knife sets or packets including knife holder plates and knives for a shredding device, particularly for preliminary or coarsely comminuted wood, with knife cage crosspieces that are disposed at the periphery of a drum-shaped knife cage and have respective knife support surfaces for knife sets fastened at their ends and extending in axial direction of the drum-shaped knife cage and disposed at an acute angle to a radial plane through the cage.

The knife sets can be secured to the knife cage in different ways. Fastening by screws is one possibility. Fastening by clamps has also been proposed heretofore in German Patent 2,205,489, for example.

In such fastening devices are used, it has been known heretofore to locate them at the ends of the knife sets, in order to ensure free removal of the chips (German Petty Patent 1,992,749). However, it may be desirable also for other reasons to fasten a knife set exclusively at both ends thereof. The invention of the instant application relates to such construction of a knife cage.

It has been found, however, that in the case of long knives, chips become jammed between the knife and the knife holder plate and bend the holder plates upwardly. Furthermore, vibrations are set up in the knives during the cutting operation when relatively long knives are employed, thereby producing an unfavorable effect on the chip quality. For this reason, a fastening screw has been provided heretofore in the central region also of the knife set, by which the knife set is additionally fastened to the support, i.e. to the knife cage crosspiece.

However, such a fastening screw requires the formation of a slot in the knife. This affects the regrinding length of the knife and leads to higher knife procurement costs. Apart from this, the provision of a fastening screw in the center of the knife set results in increased time consumption when exchanging knives which is sought to be avoided at all times.

It is accordingly an object of the invention to provide a knife cage of the aforementioned type with knife sets clamped only at the ends, in such a manner that, in spite of the absence of a fastening screw between the ends, flush contact between the individual knife holder plates and the cutting knives is ensured during operation for relatively long knives also and without the occurrence of vibration in the knives.

With the foregoing and other objects in view, there is provided in accordance with the invention, in a knife cage assembly, a drum-shaped knife cage, a multiplicity of knife crosspieces disposed on the periphery of the drum-shaped knife cage and having respective knife support surfaces extending in axial direction of the drum-shaped knife cage and disposed at an acute angle to a radial plane through the drum-shaped knife cage, a knife set including a knife holder plate and a shredding knife held thereby supported on one of the knife support surfaces, the knife holder plate having a surface facing away from the knife, a tensioning bar disposed on the surface of the knife holder plate and extending in longitudinal direction of the knife, the tensioning bar being fastened at both ends thereof to the knife holder plate and being braced at least at a central region thereof against the knife holder plate.

In accordance with another feature of the invention, the tensioning bar has preferably between its two ends, and also preferably in the central region thereof, a lifting or backing-off screw for bracing the tensioning bar against the knife holder plate. Due to this construction, the knife holder plate can be forced to bend, and, in fact, in such a direction that the central region of the knife holder plate flexes or bends toward the knives. If the knife set is pressed at the end thereof, the set therefore rests with its center portion on the support with pre-stressing. This has the same effect as that of the fastening screw in the center which had been used heretofore. Bending of the knife holder plate in upward direction is avoided even in the case where the knives are relatively long. No accumulation of chips occurs between the knife holder plate and the knives, and no vibration of the knives takes place. Moreover, the aforementioned elongated slot in the knives can also be dispensed with.

The tension force of the tensioning bar can, of course, also be adjusted by two fastening screws, which can be provided, respectively, at both ends of the knife holder plate for attaching the tensioning bar thereto. In this case, the aforementioned lifting or backing-off screw is not even necessary. Rather, in accordance with an alternate feature of the invention, a pressure lobe disposed on either the tensioning bar or the knife holder plate so that it is therebetween suffices instead. However, the first-mentioned embodiment, namely the embodiment with the lifting screw may well be the more advantageous.

In accordance with another feature of the invention, the tensioning bar is of rectangular cross section and rests on the knife holder plate edgewise, i.e. is disposed in a plane extending perpendicularly to the direction of application of the tensioning force. With such a construction, large tensioning forces can be exerted with a relatively small cross section of the tensioning bar.

The invention of this application is particularly applicable in a construction of the knife cage with knife holder plates that are beveled at both ends thereof to form wedge surfaces and with which clamping jaws having matching or opposing wedge surfaces corresponding to the wedge surfaces of the holder plates engage to form a clamping device.

Since the tensioning bar is essentially a smooth, continuous strip which also need not project too far above the knife holder plate, it presents no appreciable obstruction to the chips that run off. Nevertheless, it may be advantageous, in accordance with another feature of the invention, to set the tensioning bar more or less into a recess formed in the knife holder plate.

Other features which are considered as characteristic for the invention are set forth in the appended claims.

Although the invention is illustrated and described herein as holding device for knife set in a shredding device, it is nevertheless not intended to be limited to the details shown, since various modifications may be made therein without departing from the spirit of the invention and within the scope and range of equivalents of the claims.

The invention, however, together with additional objects and advantages thereof will be best understood from the following description when read in connection with the accompanying drawing in which:

FIG. 1 is a fragmentary cross-sectional view of a knife cage assembly according to the invention, taken per-

pendicularly to the axis of the drum-shaped knife cage;

FIG. 2 is a top plan view of FIG. 1 as seen in the direction II—II;

FIG. 3 is a top plan view of FIG. 1 taken from the upper left-hand corner thereof of another embodiment of a knife holder plate with a tensioning bar constructed in accordance with the invention;

FIG. 4 is a cross sectional view taken along the line IV—IV of FIG. 3 showing the knife holder plate with a tensioning bar; and

FIG. 5 is a top plan view similar to that of FIG. 2 but only of a knife holder plate with a tensioning bar in an alternate embodiment.

Referring now to the drawing and first, particularly, to FIG. 1 thereof, there is shown one of a multiplicity of knife cage cross pieces 1, uniformly distributed over the circumference of a drum-shaped knife cage, extending in a direction parallel to the axis of the knife edge. The cross section of these knife cage crosspieces 1 is substantially triangular as seen in FIG. 1. They carry on one of their outer surfaces a so-called knife set, each consisting of knives 2 and a knife holder plate 3. On the other outer surface of each substantially triangular knife cage crosspiece 1, a stock shave or knife 4 is fastened or otherwise secured. The lower side of the knife cage crosspiece 1 facing radially inwardly toward the cage is covered by a wear-resistant pressure plate 5. Against the knife holder plate 3 there is braced a tensioning bar 6, which will be described in greater detail hereinbelow.

From FIG. 2 it can be seen that the knife sets 2 and 3 are tightly held only at the ends thereof. Two clamping jaws 7 and 8 are provided for this purpose. The clamping jaws 7 and 8 are bolted, on the one hand, to the knife cage crosspiece 1, as shown diagrammatically by the dot-dash lines, and are in engagement, on the other hand, with the knife holder plate 3 through pairs of wedge surfaces 9, 10 and 11, 12, respectively. The tensioning bar 6 is firmly threadedly secured at both ends thereof to the knife holder plate 3 by means of screws 13 and 14. At its center, the tensioning bar 6 has a tapped hole 15, through which a set screw or lifting screw 16 extends. Upon being tightened, the lifting screw 16 is braced against the surface of the knife holder plate 3 and sets up in the latter a bending stress which tends to bend the center of the knife holder plate 3 in direction toward the knives 2. Thus, flush contact of the knife holder plate 3 with the knives 2 is achieved not only at the ends but also in the central region of the knife holder plate 3 when the knife set 2, 3 is in the clamped condition thereof. However, the bending force applied by the lifting screw 16 also extends to the knives 2 themselves. They, too, are thereby pressed against the knife support surface of the knife cage crosspiece 1. A result thereof is the avoidance of the formation of a gap between the knife cage crosspiece 1 and the knives 2 during the cutting operation.

FIG. 3 shows a different embodiment of the knife

holder plate 3 of the invention which is not attached by a clamping device, but is threadedly secured at its ends to the knife cage crosspiece 1 shown in FIGS. 1 and 2, but not shown in FIG. 3. The tensioning bar 6 is threadedly fastened to the knife holder plate 1 by screws 13 and 14. In the center, the lifting or backing-off screw 16, corresponding to that of the embodiment of FIG. 2, can be seen. As can be seen in FIG. 4 in this embodiment the tensioning bar 6 is received in a recess 17 formed in the knife holder plate 3'.

In the embodiment according to FIG. 5, the tensioning bar 6' is screwed at both ends thereof to the knife holder plate 3 by screws 13 and 14. Between both screws, a pressure-applying bump 18 is disposed at the tensioning bar 6'.

It is believed to be readily apparent that the invention of the instant application is applicable to rotary knife cages as well as to stationary knife cages. Similarly, the invention of this application is applicable to knife cages of both conical as well as cylindrical construction.

We claim:

1. In a knife cage assembly, a drum-shaped knife cage, a multiplicity of knife crosspieces disposed on the periphery of said drum-shaped knife cage and having respective knife support surfaces extending in axial direction of said drum-shaped knife cage and disposed at an acute angle to a radial plane through said drum-shaped knife cage, a knife set comprising a knife holder plate and a shredding knife held thereby supported on one of said knife support surfaces, said knife holder plate having a surface facing away from said knife, a tensioning bar disposed on said surface of said knife plate and extending in longitudinal direction of said knife, said tensioning bar being fastened at both ends thereof to said knife holder plate and being braced at least at a central region thereof against said knife holder plate.

2. Knife holder device according to claim 1 including a lifting screw carried by said tensioning bar between the two ends thereof for bracing said tensioning bar against said knife holder plate.

3. Knife holder device according to claim 2 wherein said lifting screw is located at a central region of said tensioning bar.

4. Knife holder device according to claim 1 wherein said tensioning bar has a rectangular cross section and is disposed in a plane extending perpendicularly to the direction of application of the tensioning force.

5. Knife holder device according to claim 1 wherein said tensioning bar is received in a corresponding recess formed in said knife holder plate.

6. Knife holder device according to claim 1, wherein said tensioning bar is screwed at both ends thereof to said knife holder plate by a respective screw fastener, and a pressure-applying bump disposed on one of said tensioning bar and said knife holder plate.

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