

[54] CUTTER FOR WOOD COMMINUTING MACHINE

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[58] Field of Search 144/218, 172, 162, 174, 144/176, 230, 42; 241/292.1, 293, 294, 295; 83/698

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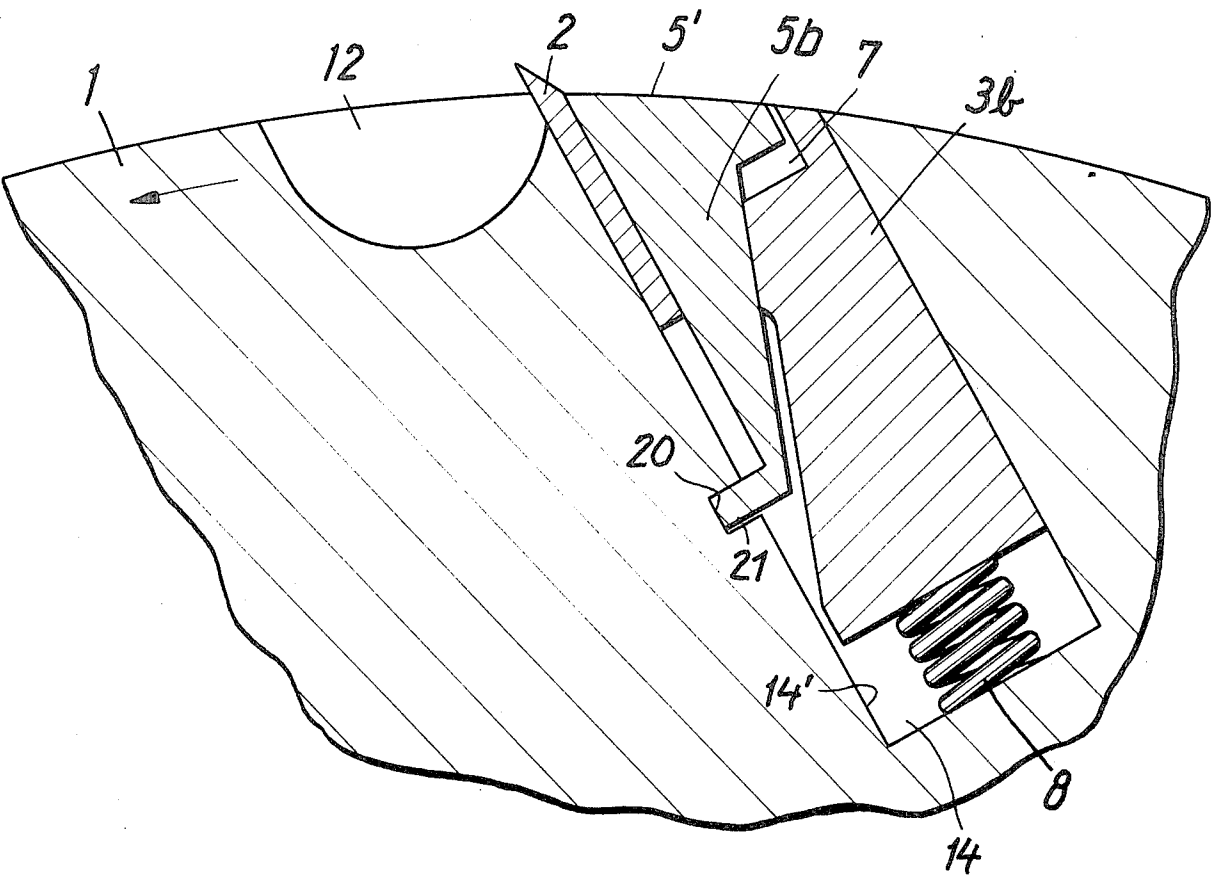
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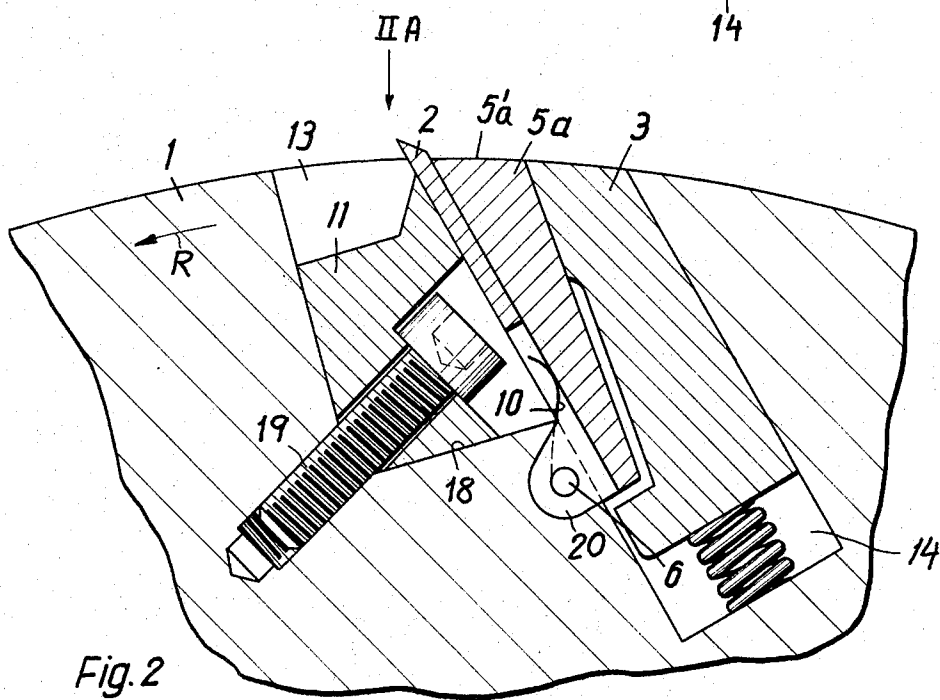
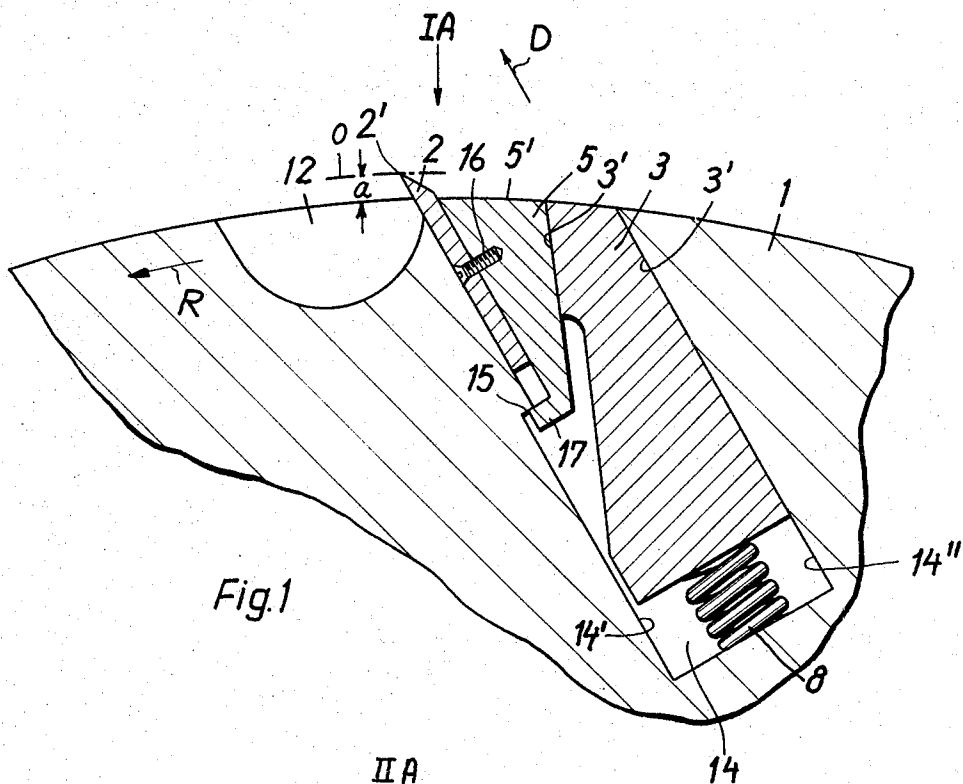
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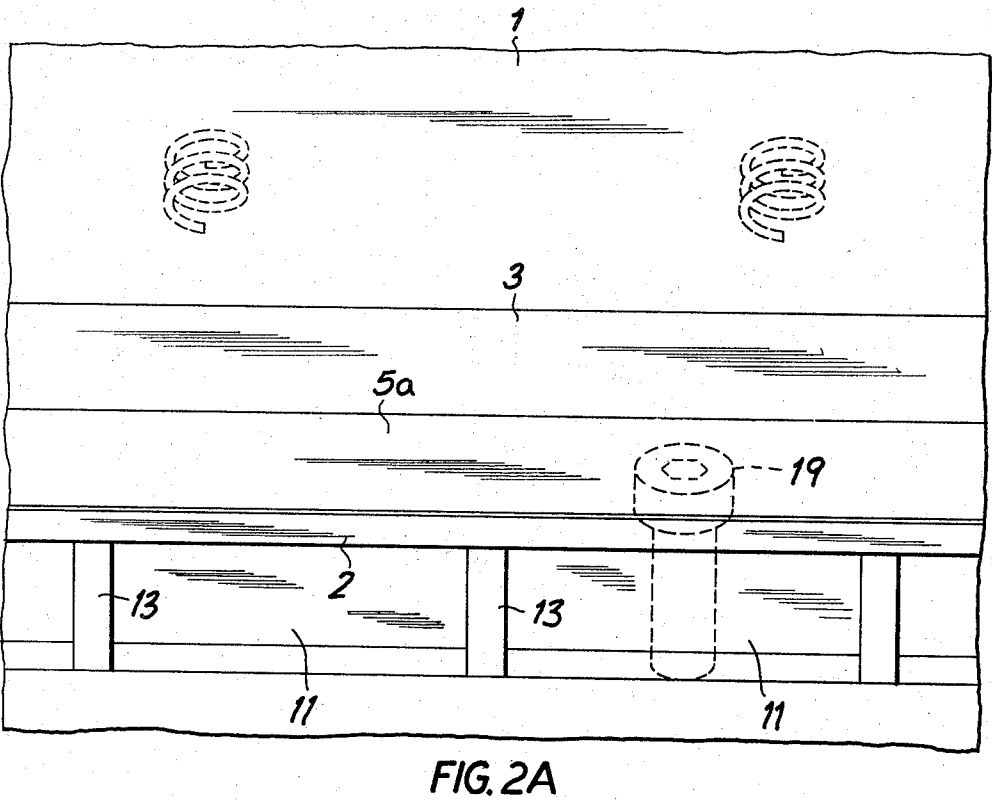
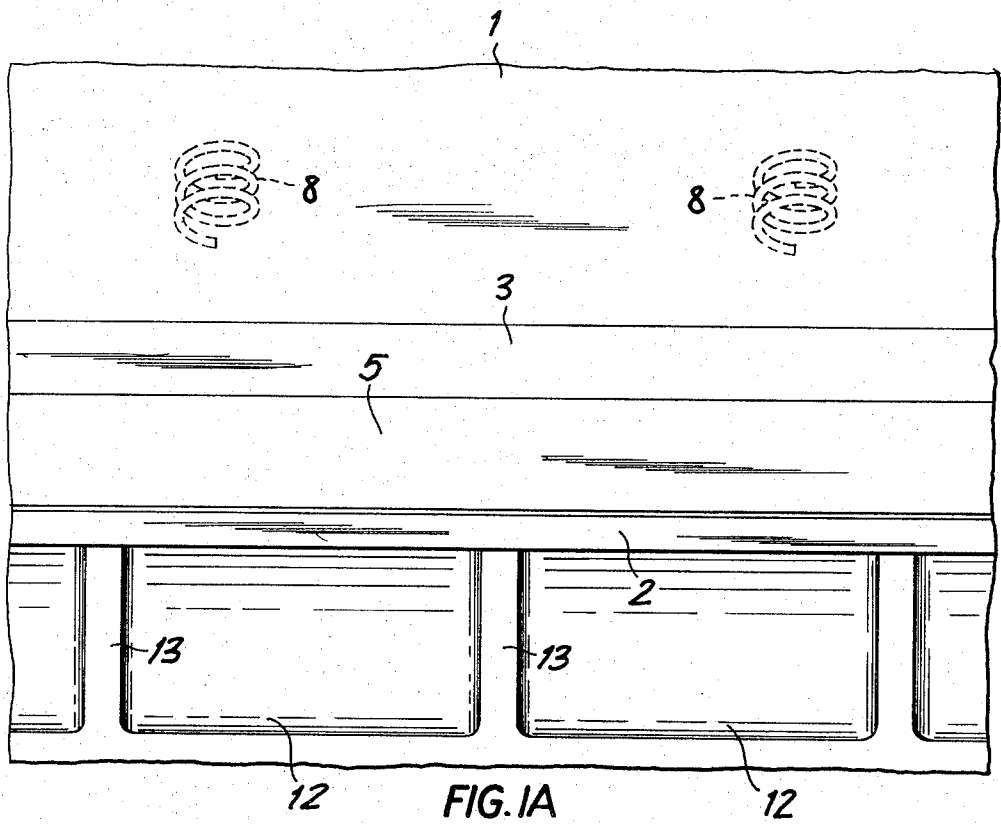
[57] ABSTRACT

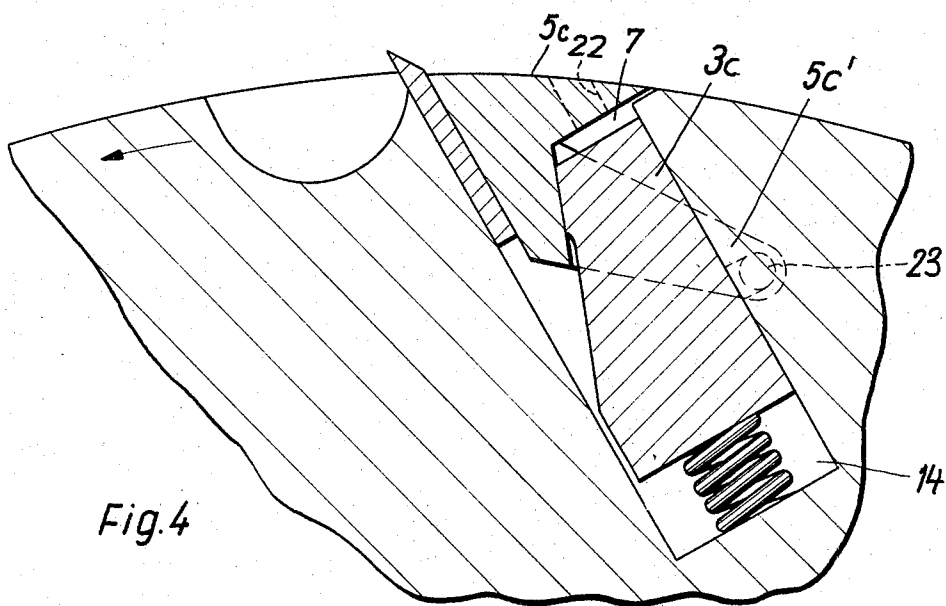
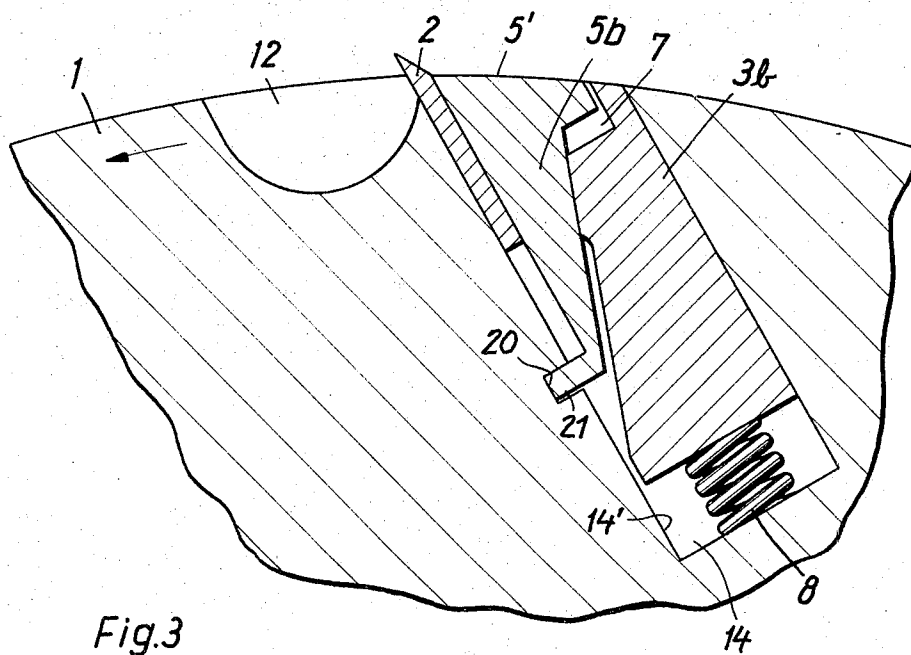
The drum of a wood-comminuting machine is formed with an axially extending slot having, relative to the rotation direction of the drum, a leading flank and a trailing flank. A flat blade is clamped against the front flank of the slot by at least one wedge having converging flanks which are biased in the direction of taper by a spring. Two such wedges can be provided, one carrying the blade and the other urged outwardly by the spring to wedge the blade-carrying wedge against the back of the blade. The blade carrier is either pivoted on the drum or otherwise engaged with the drum so that it cannot move outwardly relative to the drum. In front of the blade there are formed chip pockets or concavities, which can be defined by a support member secured to the drum and forming the leading flank of the slot.

13 Claims, 8 Drawing Figures









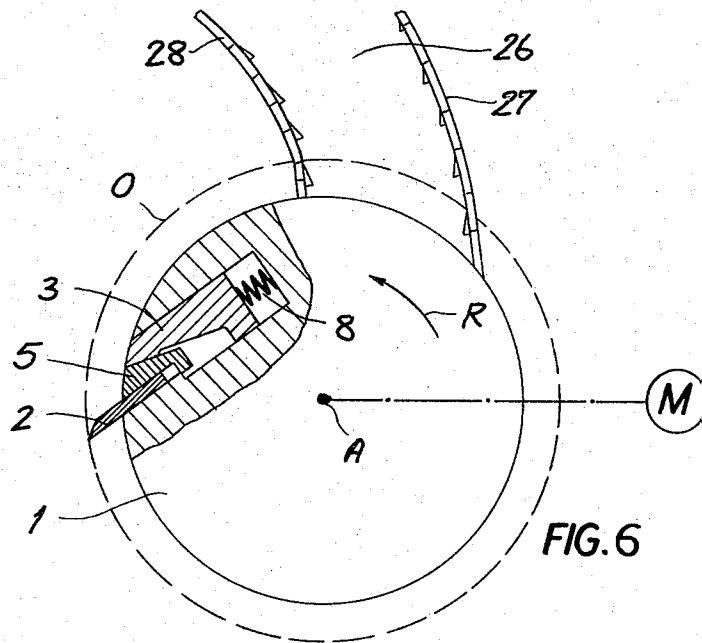


FIG. 6

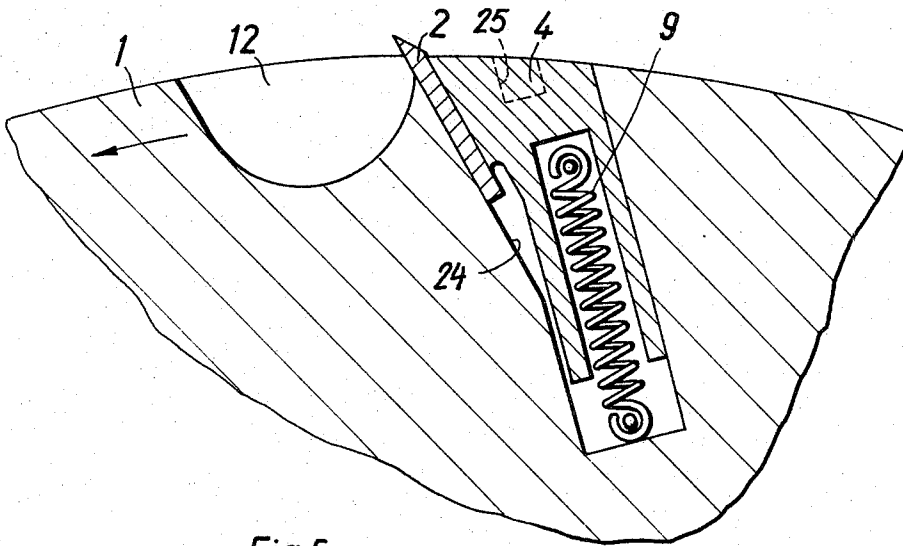


Fig. 5

CUTTER FOR WOOD COMMUNUTING MACHINE

FIELD OF THE INVENTION

The present invention relates to a cutter drum for a wood-communiting machine and, more particularly, to a cutter drum, shaft or arbor which can be used in a wood-chipping apparatus and has means for securing the blades in respective axially extending slots.

BACKGROUND OF THE INVENTION

A wood-chipping apparatus as described in U.S. Pat. No. 3,199,799 issued Aug. 10, 1965 and in the commonly assigned and copending application Ser. No. 332,108 filed Feb. 13, 1973 has a cutter which is formed as a cylindrical drum, shaft or arbor, provided on its periphery with one or more axially extending blades having edges projecting radially beyond the drum surface and defining a cylindrical orbit upon rotation of the drum or arbor. The radial distance between the drum surface and the orbit defines the thickness of the chips of wood cut from pieces thereof fed radially against the rotating cutter.

As a general rule the blades are each held in place on the cutter by means of elements bolted in front of them relative to the rotation direction and clamping them against the back of an axially extending slot in the arbor. The blade is clamped from the front so that it transmits force directly to the drum. In the most common system so-called centrifugal wedges are employed which are tapered radially and serve to wedge the blade and usually a holder for the blade against the back of its slot.

In order to produce chips all of the same thickness it is important that the surface of the arbor at least directly in front of the blade be of cylindrically arcuate shape. Since the clamping elements for the blade are located in this region it is the general practice to mount a dummy blade, which does not project above the surface of the drum, and then turn down the entire drum, thereby making it perfectly cylindrical.

The disadvantage of this system is that the lathe speed for such turning is much less than the angular velocity at which the drum is rotated during cutting. Thus the wedge for the blade is not displaced centrifugally as much during machining as it is when used to cut wood in use when it will ordinarily project from the drum. The obvious expedient to cure this has been machining the wedge or wedges down slightly more than the rest of the cutter. It has been found, however, to be virtually impossible successfully to machine a wedge so that it just lies on the surface since such factors as wear and temperature also affect its position.

OBJECTS OF THE INVENTION

It is therefore an object of the present invention, to overcome these disadvantages.

SUMMARY OF THE INVENTION

This object is attained according to the present invention in a cutter which is provided with clamping wedges located behind the blade, relative to the direction of rotation. The blade may be mounted on an element (movable intermediate body) which is mounted on the drum so that it cannot move radially outwardly, and the wedge engages between this element and the rear or trailing flank of the slot to wedge the blade tightly in place. Such an arrangement is particularly

adapted for a wood chipper, although the cutter of a shaper, router, planer or the like could also be so constructed.

An arrangement made in this manner overcomes the problem of machining down the wedge since the surface in back of the blade is far less critical than the surface in front of it. In addition it has been found that the worst wear on the arbor is in that region directly behind the blade. According to the present invention the blade-mounting element and the centrifugal wedge are both removable and replaceable so that this region of wear can be renewed easily. In other words, the blade is held against the leading flank of the slot in the drum (this term connoting also a blade-carrying shaft or arbor by a wedge or an intermediate body, which may be the blade carrier and is movable in the slot and received between the wedge and the blade.

According to another feature of the invention the blade carrier can have a foot engaging radially inside a lip or similar backwardly directed formation on the leading side of the slot so as to prevent the blade from working out. The blade carrier can be pivotally mounted on the arbor so as to pivot back from the leading edge of the blade-receiving slot.

In accordance with yet another feature of this invention the wedge is biased in a radial direction the same as the direction of convergence of the tapering flanks. With an inwardly tapering wedge a tension spring is connected between its inner end and the base of the slot; with an outwardly tapering wedge a compression spring is provided between its inner end and the base of the slot. In both cases simple displacement of the wedge in the direction opposite its taper serves to free the blade and blade carrier for replacement or other servicing.

DESCRIPTION OF THE DRAWING

The above and other objects, features, and advantages will become apparent from the following with reference to the accompanying drawing in which:

FIG. 1 is a transverse cross sectional view of a portion of a blade drum embodying the invention, the intermediate body underhanging a ledge formed in the leading flank of the slot and the wedge being biased outwardly by a compression spring;

FIG. 1A is a view taken generally in the direction of arrow 1A of FIG. 1;

FIG. 2 is a view similar to FIG. 1 of an arrangement wherein the intermediate body is provided with pivoting lugs defining a pivot axis ahead of the leading flank of the slot, this leading flank is formed by a body received in a channel ahead of the slot and this body defines a concavity ahead of the blade subdivided by axially-spaced ribs formed on the latter body, as distinct from FIG. 1 wherein the ribs are integral with the drum;

FIG. 2A is a view taken generally in the direction of arrow 1IA in FIG. 2;

FIG. 3 is a transverse cross section through an embodiment of the invention wherein the intermediate body has a rearward ledge overhanging the wedge;

FIG. 4 is a similar view of an embodiment wherein the intermediate body is bifurcated with pivot legs straddling the wedge;

FIG. 5 is another similar view of an embodiment of the invention, in which the wedge is engaged by a tension spring; and

FIG. 6 is an end view of a system employing the cutters according to the invention.

SPECIFIC DESCRIPTION

As seen in FIG. 1 the cylindrical drum 1 of a cutting machine as described in the above-mentioned patent and application is formed with an axially extending slot 14 having a front or leading flank 14' formed with a ledge 15 and a trailing flank face 14'' parallel to the front face 14'. Both faces 14' and 14'' are inclined into the direction R of rotation.

An elongated strip blade 2 extends parallel to the surface of the arbor or drum 1, and also parallel to this drum's rotation axis A (FIG. 6). This blade 2 has a cutting edge 2' which as shown in FIG. 6 defines a cylindrical orbit O spaced radially outwardly from the surface of the drum 1 by a distance a on rotation of this drum about its axis A by a motor 29. Pieces of wood are delivered to the cutter in a feed shaft 26 having one side 27 forming a flatter angle with the orbit O than its other side 28. The chain on side 27 moves faster than the chain of side 28 as described in the above-identified application. The blade 2 is secured by screws 16 to a wedge 5 serving as a blade carrier and tapered inwardly toward the center of the arbor 1. This wedge 5 has a curved side end 5' and at its narrow end is provided with a foot 17 which engages under the ledge 15 to prevent the blade 2 and carrier 5 from flying out of the cutter on rotation of this element.

The wedge 5 is held in place by a wedge 3 which tapers outwardly and has one flank 3' engaging against the back of the wedge 5 and another flank 3'' engaging against the face 14'. The narrow end of the wedge 3 is rounded so that it forms a continuous curved surface with the surface of the drum 1 and the end 5' of carrier 5. A plurality of springs 8 are prestressed between the wide end of wedge 3 and the base of slot 14 to urge the wedge radially outwardly in the direction D so that it presses the blade 2 against the face 14' of groove 14 above ledge 15.

The arbor 1 (FIG. 1A) is also formed in front of the blade 2 with a longitudinally extending semicircular groove or concavity 12 which forms a chip pocket for deflection of the cut-off chips, subdivided by axially spaced ribs 13.

In FIG. 2 similar reference numerals are used for similar structure. There is provided in front of the blade here a support 11 formed of a profiled steel bar which is secured in a slot 18 in front of the slot 14 by allen cap screws 19. This element 11 is formed with axially-spaced ribs 13 subdividing the outwardly open concavity 12 of FIG. 1 and continuing the drum periphery. The ribs between the pockets serve to support the pieces of wood being chipped (see FIG. 2A).

The blade carrier 5a is provided with a pair of arms 20 pivoted at 6 on the front side of the slot 14 so that this element 5a cannot displace itself radially out of the arbor, but can only swing back away from the element 11 to expose the screws securing the blade 2. It is also possible to provide the element 5a with short forwardly facing lugs which fit into corresponding holes in the blade 2 to hold it in place. A hairpin spring 10 serves to urge the element 5a back away from the support 11. The end surface 5a' of the wedge 5a lies on the cylindrical outer surface of the drum 1.

The embodiment of FIG. 3 is similar to that of FIG. 1 except that the wedge 5b has a foot 21 engaging in a

slot 20 formed in the front leading face 14' of the slot 14, and this wedge 5b overlaps the wedge 3b almost entirely. A space 7 is left between the wedges 3b and 5b for slight axial outward displacement of the wedge 3b.

In FIG. 4 the wedge 5c is formed with arms 5c' pivoted at 23 in back of the planar-sided slot 14. This wedge completely covers the slot 14 and is formed near its ends with two radial bores 22 which allow a punch to have access to the wedge 3c for freeing of the blade 2.

In all of the above embodiments the blade 2 is replaced by driving the wedge back against its spring 8 and then exposing the front of the blade so that it can be unscrewed or lifted off its lugs. The parts can be replaced easily if they wear. Alternately, the central arbor of the drum 1 can be used to release the wedges.

The arrangement of FIG. 5 shows a wedge 4 which is tapered inwardly and connected by a plurality of tension springs 9 in an outwardly flared groove 24. The blade is wedged against the front face of the slot 24 by the element 4. In this embodiment the wedge is formed with one or more threaded radial bores 25 allowing a tool to be screwed into it to pull it outwardly and free the blade 2.

I claim:

1. A cutter for a wood-comminuting machine or the like, comprising:

a rotatable generally cylindrical blade drum formed with an axially extending outwardly opening slot having a leading flank and a trailing flank relative to the direction of rotation of said drum;

a flat blade received in and lying against said leading flank of said slot and having a cutting edge projecting from said slot;

a first wedge received between said trailing flank of said slot and said blade for retaining the latter against the leading flank, said first wedge having outwardly converging faces;

a second wedge having inwardly converging faces and received between said first wedge and said blade; and

form-locking means between said second wedge and said drum limiting outward displacement of said second wedge from said drum.

2. The cutter defined in claim 1 further comprising spring means between said drum and said first wedge for biasing said wedge in the direction of convergence of said faces.

3. The cutter defined in claim 2 wherein said spring means includes at least one compression spring bearing against said wedge and said drum at the base of said slot.

4. The cutter defined in claim 2, wherein said blade is secured secured to said second wedge.

5. The cutter defined in claim 4 wherein said means is at least one arm on said second wedge pivoted on said drum.

6. The cutter defined in claim 5 wherein said arm is pivoted on said drum ahead of said leading flank relative to said rotation direction.

7. The cutter defined in claim 5 wherein said arm is pivoted behind said trailing flank relative to said rotation direction.

8. The cutter defined in claim 4 wherein said slot is provided at said leading flank with rearwardly directed formation, said means between said second wedge and

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said drum comprising a foot on said second wedge engageable inwardly under said formation.

9. The cutter defined in claim 1 wherein said drum comprises an axially elongated support element forming at least part of said leading flank, and means for securing said element to said drum.

10. The cutter defined in claim 2 wherein said leading flank is formed with rearwardly open groove, said intermediate body having a forwardly projecting formation fitting into said groove.

11. The cutter defined in claim 1 wherein said drum

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is formed with an outwardly open concavity ahead of said leading flank and terminating thereat.

12. The cutter defined in claim 11 wherein said concavity is subdivided by axially spaced ribs continuing the periphery of said drum.

13. The cutter defined in claim 12 wherein said drum is formed with an outwardly open channel ahead of said blade, said concavity being formed by a body received in said channel and provided with said ribs.

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