ABSTRACT

A wood comminuting apparatus has a fixed drum cage on the periphery of which are mounted a plurality of axially extending blade bars. Each blade bar has a surface upon which is supported a blade and a blade retaining plate. A clamping lever is mounted on a bracket which is fixed to the blade bar. The clamping lever acts upon the blade retaining plate to press the plate and blade against a supporting surface of the bar and to position the cutting edge of the blade to expose a predetermined portion of the cutting edge.
WOOD COMMUTING APPARATUS

The present invention relates to apparatus for commutating wood pieces, more particularly, to the mounting of the blades on the periphery of a fixed drum cage of the apparatus.

One form of a wood commutating apparatus which cuts pieces of wood into chips includes a fixed drum-type blade cage with a number of blade bars being arranged on the periphery of the cage. Each blade bar has a blade supporting surface upon which blade sets are mounted. Each blade set consists of a blade retaining plate and a blade which is replaceable and is mounted on the blade bar so as to be axially extending with respect to the cage. The blade is always positioned at an acute angle with respect to a radial plane of the cage passing through the blade bar.

Such an apparatus functions as a rotary commutator by providing an impeller or blade wheel which has a cylindrical or conical outer surface and which rotates in the comminution chamber defined by the blade cage. The material which is to be reduced to chips is conveyed to the narrow space between the blade wheel and inner surface of the cage wherein the material is acted upon by the blades.

Such blade sets have been mounted on the blade cage by means of bolts attached to the blade bars. The blades together with their respective retaining plates are connected into blade sets by suitable fastening means such as bolts and the like. These comminuting machines are generally arranged in production lines so that a stoppage of a machine for replacing dull blades represents a highly undesirable and costly interruption of production. Since the blades may have to be replaced several times during a working day it is extremely important that worn blades be replaced as quickly as possible. Not only must the blades be quickly replaced but the projections of the cutting edges of the blades must be properly set with respect to the blade cage in order to obtain the desired thickness of the comminuted wood chips. Structure is generally provided exteriorly of the cage to adjust the position of the blades with respect to the blade retaining plates.

In an effort to reduce as much as possible the stoppage or downtimes of such machines during the replacement of blades, it has been proposed to provide two blade cages for every commutator so that the blades can be replaced on the cage not in operation without disturbing the sequence of production. When the blades on the machine in operation become worn and must be replaced then the entire cage with the worn blades is removed and replaced with the second cage provided with new blades. While this operation is advantageous in that it can be carried out relatively quickly it becomes costly since it requires the investment of a second blade cage as well as corresponding auxiliary devices such as crane for lifting of the cages and other tools for the removing and replacing of the cages.

It is therefore the principal object of the present invention to provide a novel and improved apparatus for the comminution of wood in which the cutting blades can be quickly replaced.

It is another object of the present invention to provide a structure for the rapid replacement of cutting blades of a wood commutator which does not require the investment of a second cage.

It is a further object of the present invention to provide an improved device for the mounting of blades on the cage of a wood commutator wherein the blades can be removed and replaced with a minimum of time and labor.

It is an additional object of the present invention to provide for the rapid replacement of blades on a wood commutator wherein the cutting edges of the blades are quickly set to obtain the desired thickness of chips.

The objects of the present invention are achieved and the disadvantages of the prior art as described above are overcome by the present invention. In an apparatus for commutating wood pieces the present invention may comprise a plurality of axially extending blade bars on the periphery of a fixed drum-type cage. Each blade bar is provided with a surface to support a blade set comprising a blade and a blade retaining plate at an acute angle to the radial plane of the cage passing through the blade bar. Means are mounted on the blade bar for clamping the blade set firmly against the blade supporting surface. The clamping means may further comprise a bracket affixed to the blade bar and a clamping lever pivotally mounted on the bracket and having a clamping head engageable with the blade set to press the blade set onto the blade supporting surface. A toggle lever including an operating handle is pivotally connected to the clamping lever and to the bracket. The blade set is clamped in position against an abutment on the bracket so as to set the cutting edge of the blade at a predetermined exposure within the cage.

The clamping means may also comprise an arm affixed to the blade bar and extending over the blade set with there being opposed grooves in the arm and the blade retaining plate. A wedge is inserted into the opposed grooves to retain the blade set in position.

Other objects and advantages of the present invention will be apparent upon reference to the accompanying description when taken in conjunction with the following drawings, which are exemplary, wherein:

FIG. 1 is a vertical sectional view through a portion of a cage and a blade bar and showing in elevation clamping means mounted on the bar according to the present invention;

FIG. 2 is a portion of the view of FIG. 1 but showing the clamping means in the clamped position;

FIG. 3 is a view similar to that of FIG. 1 but showing a modification of the clamping device;

FIG. 4 is a plan view of the modification of FIG. 3 viewed in the direction of the arrow III; and

FIG. 5 is a view similar to that of FIG. 1 but on a smaller scale of a further modification of the clamping device.

Proceeding next to the drawings wherein like reference symbols indicate the same parts throughout the various views a specific embodiment and modifications of the present invention will be described in detail.

Upon reference to FIG. 1, wear-resistant cover plates 6 are attached to a portion of the blade bar 7 that forms the drum-type blade cage. Cover plate 6 encloses a cylindrical or conical comminution chamber 8 in which there is rotatably mounted a rotor 9 having splitting blades 10 thereon and rotating in the direction of the arrow. It can be appreciated that only a portion of the rotor is illustrated in FIG. 1.

Each blade bar 7 is provided with an inclined blade supporting surface 17 upon which a blade set consisting
of a blade retaining plate 11 and blade 12 fastened together by bolts 13 are pressed firmly against the surface by a clamping lever 14. The clamping lever 14 has a clamping head 15 which is mounted on threads so as to be adjustable and engages an inclined surface 16 on the blade retaining plate 11. The clamping lever 14 is pivotally mounted at 19 to a bracket 18 which is fastened to the blade bar. The clamping lever is pivoted around its fulcrum 19 by a toggle lever mechanism consisting of an operating lever 20 having one end pivotally mounted on the clamping lever 14 and a guide rod 21 which is pivotally connected to both the bracket 18 and the operating lever 20. The clamping lever is shown in FIG. 1 in its open position. The components of the clamping device are shown in their respective positions in FIG. 2 when the clamping device is in the clamped position.

As a result of the inclination of surface 16, the force exerted by clamping head 15 against the retaining plate 11 forms a compressive force component which acts on blade set 11, 12 to urge the blade set against the abutment 22 on the bracket 18. When the blade set abuts the bracket 18 in this manner the cutting edge of the blade 12 will project into the chamber a distance m. The blade and blade retaining plate have been already placed in their respective positions and secured therein by the bolts 13. Thus the mere assembly of the blade set against the abutment 22 will position correctly the cutting edge of the blade.

Guides 23 are provided on both sides of the inclined surface 16 to provide form-locked holding in the axial direction. The guides 23 may also be positioned on the clamping head 15 of the clamping lever 14.

A so-called splitting cutter blade 24 is also attached to the blade bar 7 and its distance from the blade 12 will determine the thickness of the chips produced during the comminution process.

It is immediately apparent that a cage provided with clamping devices as disclosed herein permits a simple and rapid replacement of the blade. The blade sets to be newly placed in position are previously prepared and adjusted so that they need only to be inserted laterally, namely, in the axial direction. A precise axial adjustment is not required. During assembly, it is only necessary that both ends of the cutting edges of the blades, the blades being made longer than the effective length of the cutting edges, project axially beyond the comminution chamber 8.

The precise distance that a blade cutting edge projects into the comminution chamber is determined by positioning the assembled blade set against the abutment 22 on the bracket 18 as described above. A force component produced by the clamping head acting on the inclined surface 16 will continuously urge the blade set against the abutment 22. In this manner, the position of the blade set transversely with respect to its longitudinal dimension is clearly determined in the plane of the blade supporting surface 17.

In the modification of FIGS. 3 and 4, the bracket 18' is provided with an arm 25 which extends closely over the retaining plate 20'. The arm 25 and plate 11' are provided with opposed grooves into which is positioned a key or rod 26 to position the blade set 11', 12', transversely with respect to the supporting surface 17. In a similar manner, a toggle lever mechanism 14', 20' and 21', which functions similar to that described in FIG. 1 is provided with an adjustable clamping head 15' which functions merely to press the blade set 11', 12' against supporting surface 17' of the blade bar.

As can be seen in the plan view of FIG. 4, the groove and key 26 extends axially a sufficient distance so as to project beyond that of the clamping device which are spaced from each other. The blades 12 are constructed somewhat longer than the effective cutter length 1 which may be determined by the width of the apparatus. The end flange of the blade cage is indicated at 27.

The modifications of FIGS. 3 and 4 have the advantage of avoiding inaccurate positioning of the blade set which may be caused by chips becoming lodged in front of the abutment 22 of FIG. 1 during the replacement of a blade. The groove and key interlinking connection as disclosed in FIGS. 3 and 4 is thus independent of any abutting surfaces on the bracket and at the same time provides a locking perpendicular to the blade edge in the plane of the blade supporting surface.

The keys 26 may already be positioned into the grooves if the blade sets during the preparation of each blade set outside of the cage. Any chips which may become lodged in the short grooves of the arm 25 will be pushed out during the axial insertion of the blade sets.

The key 26 thus properly aligns and positions the blade set with respect to the cage and when the clamping lever is moved to its clamped position as shown in FIG. 3 its clamping head 15' exerts a force against the retaining plate 11' directly against the supporting surface 17.

Instead of the continuous groove and key as disclosed above, shorter grooves extending beyond each particular clamping device and comprising correspondingly short keys may also be disposed on the clamping devices.

In FIG. 5, there is disclosed a modification wherein the toggle lever mechanism is eliminated and there is provided a bracket 18' which is fixed to the blade bar 7 and has an arm 25' extending over the blade set. Opposed grooves are formed in the arm 25' and retaining plate 11' and a wedge 28 is inserted in the opposed grooves. The wedge 28 will exert forces to press the blade set 11', 12 against the blade bar 7 and to also lock the blade set on the supporting surface transversely to its axial dimension.

It is pointed out that the invention is not limited to mechanical clamping devices but can also be employed in hydraulically or pneumatically operated clamping devices. Further, the clamping arrangement is not to be limited to wood comminution apparatus but can be effectively utilized in a wide variety of machines wherein it is desired to quickly and accurately position cutting blades or other components.

Thus it can be seen that the present invention has provided a simple but effective clamping structure for the blades of wood comminution apparatus which permits the blades to be quickly replaced and accurately positioned with a minimum of effort. Each blade may be accurately positioned with respect to its blade retaining plate before assembly on the cage and the assembled retaining plate and blade may be exactly mounted on the blade bar. The mounting of the blade set so that its position is determined either by an abutment or key arrangement will precisely position the cutting edge of the blade.

It will be understood that this invention is susceptible to modification in order to adapt it to different usages.
and conditions, and accordingly, it is desired to comprehend such modifications within this invention as may fall within the scope of the appended claims.

What is claimed is:

1. In an apparatus for comminuting wood pieces, the combination of a blade bar on the periphery of a fixed drum cage, a blade set comprising a blade and a blade retaining plate, said blade bar having a surface to support said blade set at an acute angle to the radial plane thereon, and means mounted on said blade bar for clamping said blade set firmly against said blade supporting surface.

2. In an apparatus as claimed in claim 1 wherein said clamping means comprises a bracket attached to said blade bar, a clamping lever pivotally mounted on said bracket and engageable with said blade set to press said blade set onto said blade supporting surface, and toggle lever operating means pivotally connected to said clamping lever and said bracket.

3. In an apparatus as claimed in claim 2 wherein said bracket has an abutment thereon against which said blade is clamped to position the cutting edge of the blade in a predetermined manner, a clamping head on said clamping lever and engageable with a surface of said blade retaining plate in the clamped position, said surface of the blade retaining plate being so inclined to apply a force component on said blade set urging said blade set against said abutment.

4. In an apparatus as claimed in claim 3 and comprising a pair of spaced guides on said blade retaining plate surface extending axially thereof for positioning said clamping lever thereon.

5. In an apparatus as claimed in claim 2 and comprising means perpendicular to the blade edge and in the plane of the said blade supporting surface between said bracket and said blade set for positioning the cutting edge of said blade.

6. In an apparatus as claimed in claim 5 wherein said blade positioning means comprises a portion of said bracket extending over said blade set, there being opposed grooves in said bracket portion and said blade retaining plate, and means for interlinking said opposed grooves.

7. In an apparatus as claimed in claim 1 wherein said clamping means comprises an arm attached to said blade bar and extending over said blade set, there being opposed grooves in said arm and said blade retaining plate, and a wedge inserted into said opposed grooves.

8. In an apparatus as claimed in claim 1 and comprising a plurality of axially extending blade bars on the periphery of a cage and a corresponding plurality of blade sets and clamping means.

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