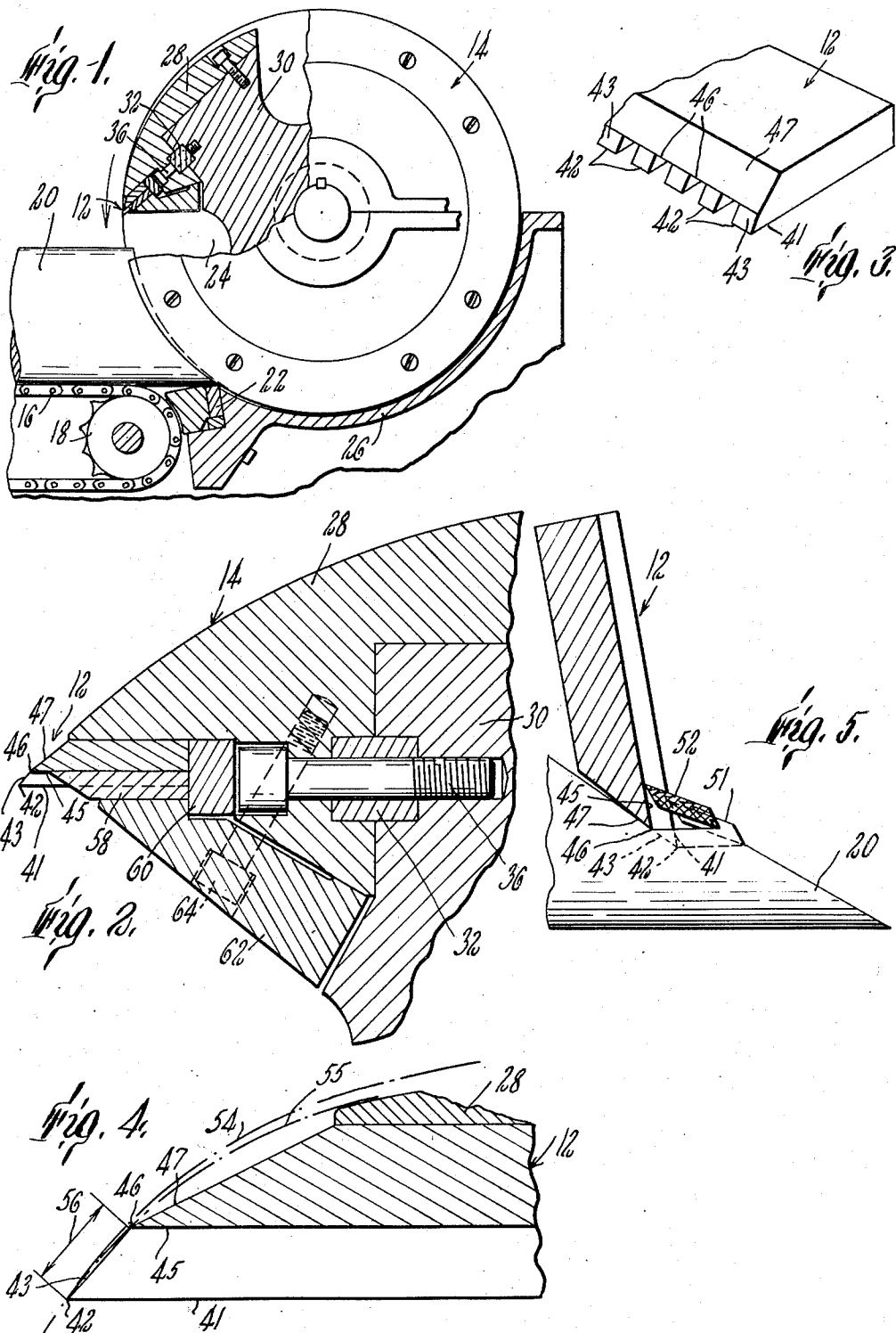


Nov. 19, 1957

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CHIPPING KNIFE CONSTRUCTION
Filed Dec. 6, 1955

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CHIPPING KNIFE CONSTRUCTION

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Application December 6, 1955, Serial No. 551,343

4 Claims. (Cl. 144—172)

This invention relates to machines for chipping wood, and more particularly, to cutting knives employed in such machines.

In the manufacture of chemical wood pulp for use in paper, it is of utmost importance that the wood chips employed be of as nearly uniform dimensions as possible, since the rate of penetration of the cooking liquors for digesting the wood, that is for converting it into pulp, is dependent in part on the dimensions of the chips to be digested.

Although conventional wood chipping machines are capable of producing chips to fairly close tolerances in two dimensions, namely, length along the grain of the wood and thickness through the wood, a considerable amount of difficulty has been experienced hitherto in adapting the machines for transverse sizing of the chips as well. To overcome this difficulty, it has been proposed in so-called drum type wood chippers that one or more pairs of serrated knives be mounted on the periphery of the drum so that the cutting edges of the trailing knife are individually aligned with the serrations in the leading knife edge. In this way, the chips are removed in two groups, the leading knife serving to produce the first group of chips whereby a series of alternate lands and grooves are described in the unchipped wood, and the trailing knife serving to remove the lands in the form of a second group of chips.

The difficulty with such an arrangement is, however, that continuous wood feed, as is necessary to produce uniform chips, is not possible. Also, the total quantity of chips which can be produced in a given period of time is halved from that which could be produced with straight knives.

For these reasons, so far as is known, cooperative knife arrangements such as those aforementioned have not been used to any appreciable extent in the more modern commercial wood chipping machines, but rather auxiliary breaker machines known to the art as rechippers have been resorted to for transverse chip sizing. Alternatively, there are sometimes employed impact breakers, often referred to as card breakers, which cooperate with the knives to transversely size the chips. These produce only crude results at best, however, and suffer from the additional defect that they produce wood fines and cause bruising to an unduly large extent in the process of transverse sizing.

It is an object of the present invention, therefore, to provide a cutting knife for a drum-type wood chipper which makes a complete cut all along the wood with a single pass of the knife so that continuous wood feed may be employed, producing chips of substantially uniform dimensions including the transverse dimensions.

It is a further object to provide a knife of the above-mentioned character which also aids in the continuous feed of the wood to be chipped.

It is a still further object to provide a knife for a drum-type wood chipper which is adapted to operate at a rela-

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tively high lineal rate of speed and therefore is capable of removing wood chips and the like at a relatively high production rate.

The novel features of the invention together with further objects and advantages thereof will become more readily apparent when considered in connection with the accompanying drawing in which:

Fig. 1 is a side view in cross section of a drum-type wood chipper incorporating the knife according to the present invention;

Fig. 2 is a fragmentary view on an enlarged scale of the portion of Fig. 1 wherein the knife is located;

Fig. 3 is a perspective view of a portion of the knife according to the present invention;

Fig. 4 is a side view in section of the knife according to the present invention; and

Fig. 5 is a fragmentary view in section showing the manner in which chips are removed from a log by the knife of the present invention.

Referring now to the drawing, and more particularly to Figs. 1 and 2, it will be observed that the knife of the present invention, which has been designated generally by the numeral 12, extends generally transversely of the periphery of an axially rotatable drum 14 associated with a drum-type wood chipper. A more detailed disclosure of the latter may be found, for example, in Patent No. 2,710,635 issued June 14, 1955 and only so much of the chipper as is necessary to aid in the understanding of the present invention has been shown herein. In essence, the chipper is seen to include an endless conveyor 16 driven by a sprocket 18 to present logs such as log 20 endwise to the lower quadrantal portion of the drum, and a fixed bed knife 22 which serves to prevent splitting of the wood towards the end of a cut by the knife 12. Adjacent the knife 12 there is a chip collecting recess 24 in the drum 14 which in combination with a housing member 26 surrounding an arcuate portion of the periphery of the drum serves to store the chips produced by each pass of the knife until the drum rotates sufficiently for recess 24 to clear member 26 whereupon the chips are ejected by centrifugal force from the machine. Preferably drum 14 and sprocket 18 are driven from a common shaft so that their respective speeds will be synchronized. This is because forward motion is imparted to the log 20 by knife 12 when in engagement with the log as well as by conveyor 16 and therefore it is important that such dual means for advancing the log work together.

The surface of the drum trailing the knife 12 is specially contoured and for this reason is formed with a member 28 keyed to the central portion of the drum 30 by a key member 32 and held in place by a machine bolt 36. More particularly, this surface is arcuate in cross section but has a lesser radius than that of the path described by the knife and also has its center somewhat offset from the axis of the drum, as is apparent from Fig. 1. Since this is disclosed in detail in the aforementioned Patent No. 2,710,635, suffice it to say here that in this way, a supporting surface having a receding contour approximating a spiral is in effect provided adjacent the knife to control the forward feed of the log and so determine the length of the chips that are removed.

With reference now to Fig. 2, 3 and 4, it will be observed that the knife itself, which forms the subject of the present invention, comprises a plurality of spaced forward blade edges 42 and a plurality of integral rearward blade edges 46 disposed between the forward blade portions immediately rearwardly of and between forward blade edges 42. As shown, edges 42 have respectively coplanar leading and trailing blade faces 41 and 43. The rearward blade edges 46, on the other hand, have leading

blade faces 45 spaced rearwardly from forward leading blade faces 41 and extending in a plane which is parallel thereto, and a single trailing blade face 47. As best seen in Fig. 3, rear blade faces 45 and 47 form at their intersection a series of spaced cutting edges 46 extending in a line coincident with the rearward extremities of faces 43 associated with the forward blade edges 42. Thus, in effect, there is formed with a single integral knife head a leading serrated knife edge 42 and a cooperating trailing knife edge 46 immediately behind it to remove the lands described by the leading edge and thereby make a complete cut all along the wood with a single pass of the knife with continuous forward feed of the wood being chipped. Since the width of the forward and rearward cutting edges 42 and 46 is substantially the same, it follows that the size of the chips such as chip 51 in Fig. 5 removed by the forward cutting edges 42 will be substantially the same as that of the chips, such as chip 52 removed by the rearward cutting edges 46. For continuous wood feed, it is important that both the forward and the rearward blade edges be positioned ahead of the arcuate contour 55. Preferably, the edges should be portions of an integral knife assembly and about 2 degrees apart as herein shown on a 30" diameter drum, to help to determine chip thickness as desired.

As shown in Fig. 4, for optimum results in chipping, it is preferable that knife 12 be mounted closely adjacent to and forward of member 28, with the forward cutting edge 42 on the radius 54 of the chipper drum and the rear cutting edge 46 on or slightly below the arcuate contour 55 which intersects said radius 54 at the forward cutting edge 42 and extends rearwardly to define the surface of member 28. The forward trailing face thus extends in a plane which subtends a portion of said contour, here about 2 degrees as shown at 56. The rearward trailing face 47 is positioned inwardly of said contour preferably about 5 degrees as here shown from the tangent of contour 55 an amount sufficient to provide the requisite knife relief for rearward edge 46, the chord of the forward trailing face 43 providing relief similarly for forward edge 42, although to a lesser extent, here shown about 2 to 3 degrees from the tangent of contour 55. The angles referred to above are dependent upon the diameter of the drum 14 which in turn is determined by the maximum size of material to be chipped and, among other things, by the desired length of chips 51 and 52.

The knife 12 of the invention may be mounted on member 28 by any suitable means, the mounting herein shown comprising a grooved plate 58 which cooperates with knife 12 to press against its leading faces 41 and 45 to position said knife against member 28, the innermost end of both said plate and said knife being positioned by a bar 60 mounted on said member 28. A clamp 62 mounted on member 28 by suitable bolts 64 presses the plate 58 together with knife 12 into pressure contact with member 28 to retain said knife in adjusted position.

In operation, then, as shown in Fig. 5, the drum is rotated so that the knife edges 42 and 46 move through a log 20 to simultaneously advance said log and to chip transversely sized chips 51 and 52 from the leading surface thereof, at the same production rate that a straight knife would operate. Thus, it will be seen that the invention provides a novel chipping knife having operating advantages not heretofore thought possible.

Various modifications of the herein described preferred embodiment of the invention within the spirit thereof and the scope of the appended claims will occur to those skilled in the chipper art.

I claim:

1. A wood chipper of the generally cylindrical drum type rotatable about a central axis including knife means mounted on said drum and extending generally lengthwise thereof, feed control means positioned on said drum between a rearward trailing face and the next succeeding forward leading face of said knife means, the surface of said feed control means being defined by a surface contour extending from a knife means forward cutting edge at a gradual decreasing radial distance from said central axis to a next succeeding knife means forward leading face and controlling the maximum depth of chipping cut, said knife means having a serrated forward cutting edge to produce a first group of chips of substantially uniform size with each pass of the knife through the wood, said forward cutting edge describing a series of alternate lands and grooves in the wood, and a rearward cutting edge to remove the lands in the form of a second group of chips of substantially the same size as the chips in said first-named group, said rearward cutting edges being positioned substantially on said surface contour forward of said feed control means.

2. A wood chipper as claimed in claim 1 wherein the trailing faces of both said forward and rearward cutting edges are positioned inwardly of a tangent to said surface contour at said edges respectively.

3. A wood chipper as claimed in claim 1 further including guide means to present pieces of wood to be chipped endwise to the surface of the drum.

4. A wood chipper as claimed in claim 3 wherein the trailing faces of said forward cutting edges extend to said rearward cutting edges in a straight line and the trailing faces of said rearward cutting edges are positioned inwardly of a tangent to said surface contour at said rearward cutting edges for knife relief.

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