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D-4000 Düsseldorf 1(DE)(54) **An apparatus for cutting wood into small pieces, such as logs into pieces of firewood.**

(57) An apparatus for cutting wood into small pieces, such as logs into pieces of firewood, and comprising a rotatably mounted knife means (1) with a helicoidal blade (4, 5), the cutting edge (8, 9) of which is helical. A support means associated with the knife means (1) and supports the material to be cut. The cutting edge (8, 9) is situated on the edge (10, 11) of the blade (4, 5) facing the axis of rotation (2) of the knife means (1), and the distance between the cutting edge (8, 9) and the axis of rotation (2) of the knife means (1) decreases towards the feeding direction (12) of the wood.

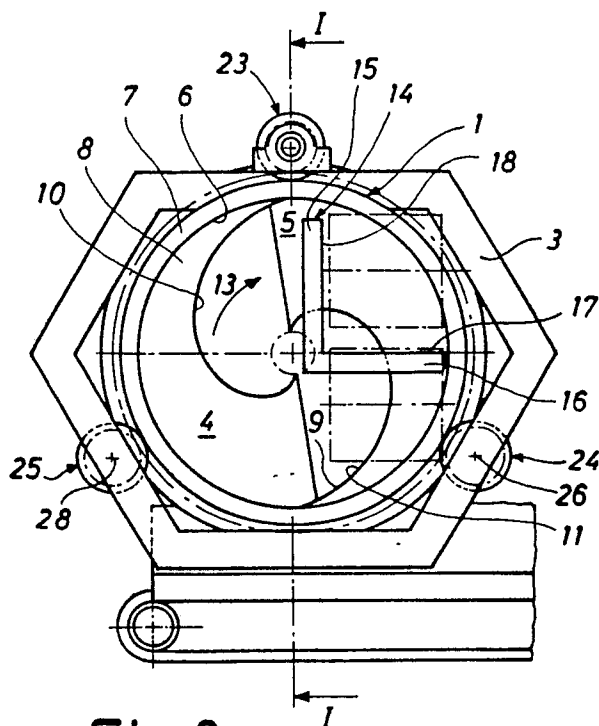


Fig. 2

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An apparatus for cutting wood into small pieces, such as logs into pieces of firewood

The invention relates to an apparatus for cutting wood into small pieces, such as logs into pieces of firewood, and comprising a rotatably mounted knife means with a helicoidal blade, the cutting edge of which is helical, and a support means associated with the knife means and supporting the material to be cut.

US-PS No. 4,053,004 discloses an apparatus of the above type. This apparatus comprises a knife means with a cutting edge formed by the outer edge of a conical, helical blade mounted on a shaft. In order to induce the apparatus to be self-feeding the helical blade comprises several windings, and the radial length of the blade increases from the feeding end of the wood to be cut, i.e. from the front end of the knife means, towards the outlet end, i.e. the back end of the knife means. The apparatus comprises furthermore an anvil situated in close proximity to a point where the blade is of a maximum radial length. the shape of the cutting edge of this apparatus and the positioning of the anvil thereof have, however, the effect that all the logs are cut and consequently influenced by the portion of the cutting edge of the blade farthest from the axis of rotation of the knife means. A consequence thereof is that the apparatus uses an unsuitably large momentum arm and thus involves an unnecessarily high momentum when cutting logs of a cross section smaller than the adjusted maximum cross section.

The object of the invention is to provide a simple apparatus of the above type, where the momentum influencing the knife means during the cutting has been minimized.

The apparatus according to the present invention is characterised in that the cutting edge is situated on the edge of the blade facing the axis of rotation of the knife means, and that the distance between the cutting edge and the axis of rotation of the knife means decreases in the feeding direction of the wood.

As a result the cutting of logs of a smaller cross section than the adjusted maximum cross section of the apparatus is always carried out by means of the smallest possible momentum arm and consequently involving the lowest possible momentum. The latter is due to the fact that the shape of the edge causes the logs to be pulled towards the axis of rotation of the knife means whereby the influence of the blade and consequently the risk of damaging said blade have been reduced.

According to the invention the distance of the cutting edge from the axis of rotation may decrease constantly.

In this manner each angular movement of the

knife means causes the edge to move the same distance into the log, said procedure being considered the most suitable procedure.

Furthermore according to the invention the helicoidal blade may be situated on a helicoid.

In this manner a very uniform and clean cut is obtained, and the knife means is influenced by a minimum force because theoretically speaking the wood will not influence the blade in axial direction. Simultaneously the small pieces of wood are substantially of the same shape as known pieces of firewood provided the starting material is fed parallel to the axis of rotation of the knife means.

Moreover according to the invention the blade and consequently the cutting edge may extend across max. 360° .

As a result the risk of small cut pieces of wood getting stuck between succeeding blade windings has been eliminated as such windings do not exist. In addition the blade is advantageously only in engagement in one area of separation at a time.

In addition according to the invention the knife means may be provided with two substantially identical blades being displaced substantially 180° relative to one another, each blade extending substantially across 180° .

In practise the above is considered to be the most suited embodiment as a suitable ratio of capacity to demand is obtained.

Finally, according to the invention, the blade or blades may be secured to the inner side of an axially symmetrical cylinder which by way of a transmission can be induced to rotate about the axis of rotation.

This embodiment is preferred because a high rigidity is obtained.

The invention is described in greater detail below with reference to the accompanying drawing, in which

Figure 1 is a longitudinal, sectional view taken along the line I-I of Figure 2 through an embodiment of the apparatus according to the invention, and

Figure 2 is a front view of the apparatus according to the invention, i.e. from the feeding end of the material to be cut.

The apparatus of Figures 1 and 2 comprises a knife means 1 rotatably mounted about a horizontal axis of rotation 2 in a frame 3. The knife means comprises two identical helicoidal blades 4, 5 positioned on a helicoid and secured to the inner surface 6 of an axially symmetric cylinder 7. The two blades 4, 5 extend substantially across 180° and are displaced substantially 180° relative to one another. The cutting edges 8, 9 of the blades

are situated on the edges 10, 11 of the blades 4, 5 facing the axis of rotation 2. These cutting edges are conical and helical and their distance from the axis of rotation 2 of the knife means decreases constantly in the feeding direction 12 of the logs to be cut. By this embodiment of the cutting edges 8, 9, each angular movement of the knife means 1 in the direction indicated by the arrow 13 causes the cutting edge to move the same distance towards the axis of rotation 2 of the knife means.

A support means 14 is situated in close proximity to and extends into the knife means 1. The support means 14 comprises a vertical support member 15 and a horizontal support member 16 situated perpendicular to said vertical support member 15. The abutment surface of the horizontal support member flushes with the axis of rotation 2 of the knife means 1, whereas the abutment surface 18 of the vertical support member 15 is displaced to the right in Figure 2 relative to a vertical plane through the axis of rotation 2 of the knife means 1, cf. Figure 2. The edge surfaces 19, 20 of the support members 15, 16 projecting into the knife means 1 are inclined in such a manner that the cutting edge 8, 9 of the blades 4, 5 closely brush past said cutting surfaces when the knife means 1 is rotating in the direction indicated by the arrow 13, said edge surface 20 of the horizontal support member 16 being obliquely bevelled, cf. Figure 1.

On the outer surface of the axially symmetrical cylinder 7 the knife means 1 comprises two symmetrically situated toothed rims 21, 22 engaging three pairs of gear wheels 23, 24, 25 uniformly distributed at the periphery of the axially symmetrical cylinder. Each pair of gear wheels 23, 24, 25 is fixed to a shaft 26, 27, 28 rotatably mounted on the frame 3. Two of these pairs of gear wheels 23, 24, 25 operate as supporting gear wheels for the knife means, whereas the third pair of gear wheels causes the knife means 1 to rotate in the direction indicated by the arrow 13.

A feeding means is provided at the front end of the apparatus when seen in the feeding direction 12. This feeding means comprises two horizontally extending feeding rollers 29, 30 positioned atop one another. At a constant velocity the feeding rollers continuously feed the material to be cut. The axis of rotation of the lower feeding roller 30 is permanent, and the periphery of said roller flushes substantially with the abutment surface 17 of the horizontal support member 16, whereas the upper feeding roller 29 is pivotally mounted by means of a rocker bar 31 in such a manner that the centre distance between the two feeding rollers can be altered. The pivotally mounted upper feeding roller 29 is preloaded towards the lower feeding roller 30 in such a manner that the feeding rollers squeeze

and retain the logs fed against the rotation. A gear (not shown) drives the lower feeding roller 30 synchronously with the speed of rotation of the knife means 1 in such a manner that the feeding velocity of the logs into the knife means is adapted to the pitch of the blades. In this manner the logs are cut into equally long pieces independent of the cross section thereof. In addition and theoretically speaking no horizontal tractive forces arise in the blades 4, 5 as said blades need not pull the logs forwards through the apparatus during the cutting thereof.

A conveyor belt 32 is situated at the back end of the apparatus, when seen in the feeding direction 12 of the logs, said belt removing the small cut pieces of firewood.

The apparatus operates in the following manner:

The wood, such as logs with or without branches, is advanced onto the support means 14 and into the knife means 1 by the two feeding rollers 29, 30 of the feeding means. As mentioned above the knife means is driven synchronously with the feeding means. When the log has been fed a distance substantially corresponding to the pitch of blade, the cutting edge of said blade engages the log and cuts said log substantially perpendicular to the longitudinal direction thereof on account of the above shape of the blade and of the support members 15, 16 of the support means. The small cut piece falls down on the conveyor belt 32 and is removed. Immediately upon the cutting of the first piece of log and depending on the cross section of said log, the second blade engages the log and cuts another piece thereof, said second piece also falling down on the conveyor belt 32 so as to be removed.

The invention can be modified in many ways without thereby deviating from the scope thereof. Thus the cutting edge of the blade or blades can have a more progressive course in the direction from the inner surface 6 of the axially symmetric cylinder 7 towards the axis of rotation 2 of the knife means 1, whereby the cutting edge adjacent the axis of rotation takes a more rapid course towards said axis. As a result a comparatively constant momentum applies during the cutting of the log. In this connection the shape of the edge surfaces 19, 20 of the support members 16, 17 must be altered so as to correspond to the shape of the cutting edge.

Finally it should be mentioned that the apparatus can be shaped with a separate source of energy driving the knife means and the feeding means, or as an apparatus driven by the source of energy of a vehicle, such as a tractor.

Claims

1. An apparatus for cutting wood into small pieces, such as logs into pieces of firewood, and comprising a rotatably mounted knife means (1) with a helicoidal blade (4, 5), the cutting edge (8, 9) of which is helical, and a support means associated with the knife means (1) and supporting the material to be cut, characterised in that the cutting edge (8, 9) is situated on the edge (10, 11) of the blade (4, 5) facing the axis of rotation (2) of the knife means (1), and the distance between the cutting edge (8, 9) and the axis of rotation (2) of the knife means (1) decreases in the feeding direction (12) of the wood.
2. An apparatus as claimed in claim 1, characterised in that the distance of the cutting edge (8, 9) from the axis of rotation (2) of the knife means (1) decreases constantly.
3. An apparatus as claimed in claim 1, characterised in that the helicoidal blade (4, 5) is situated on a helicoid.
4. An apparatus as claimed in one or more of the preceding claims 1-3, characterised in that the blade (4, 5) and consequently the cutting edge (8, 9) extend across max. 360° .
5. An apparatus as claimed in one or more of the preceding claims 1-4, characterised in that the knife means (1) is provided with two substantially identical blades (4, 5) being displaced substantially 180° relative to one another, each blade extending substantially across 180° .
6. An apparatus as claimed in one or more of the preceding claims 1-5, characterised in that the blades (4, 5) are secured to the inner side (6) of an axially symmetrical cylinder (7) which by way of a transmission can be induced to rotate about the axis of rotation (2).

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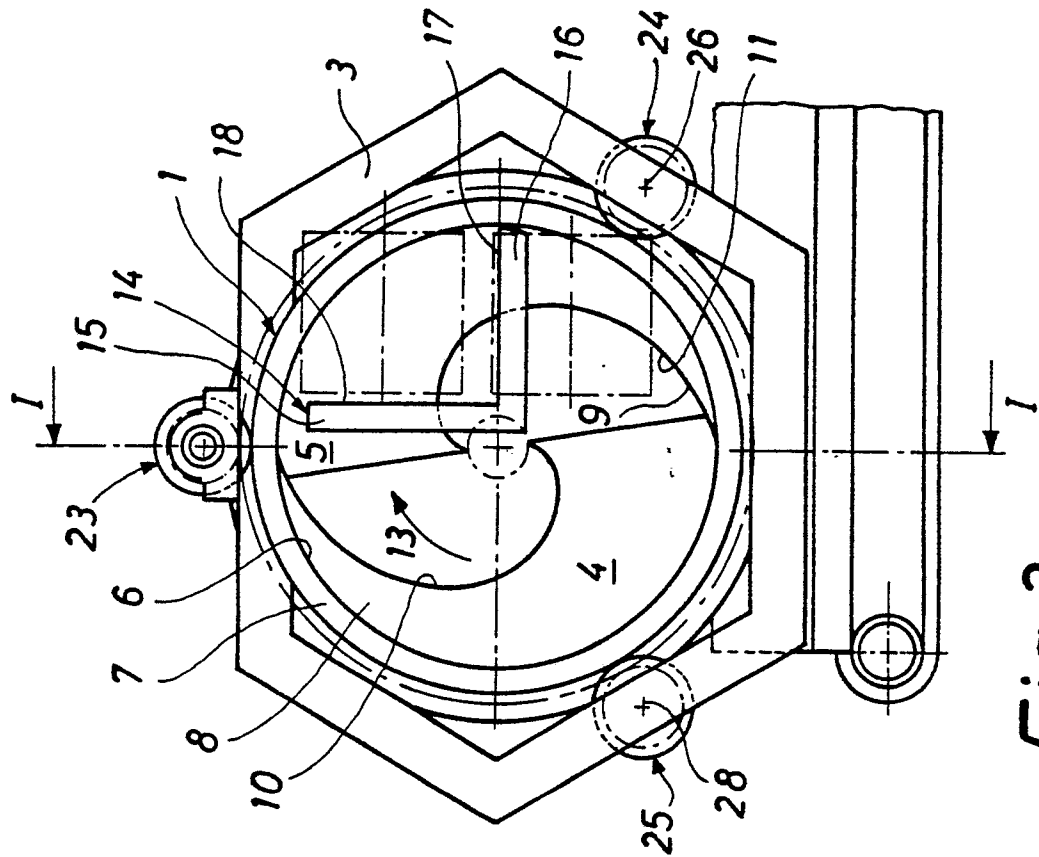


Fig. 2

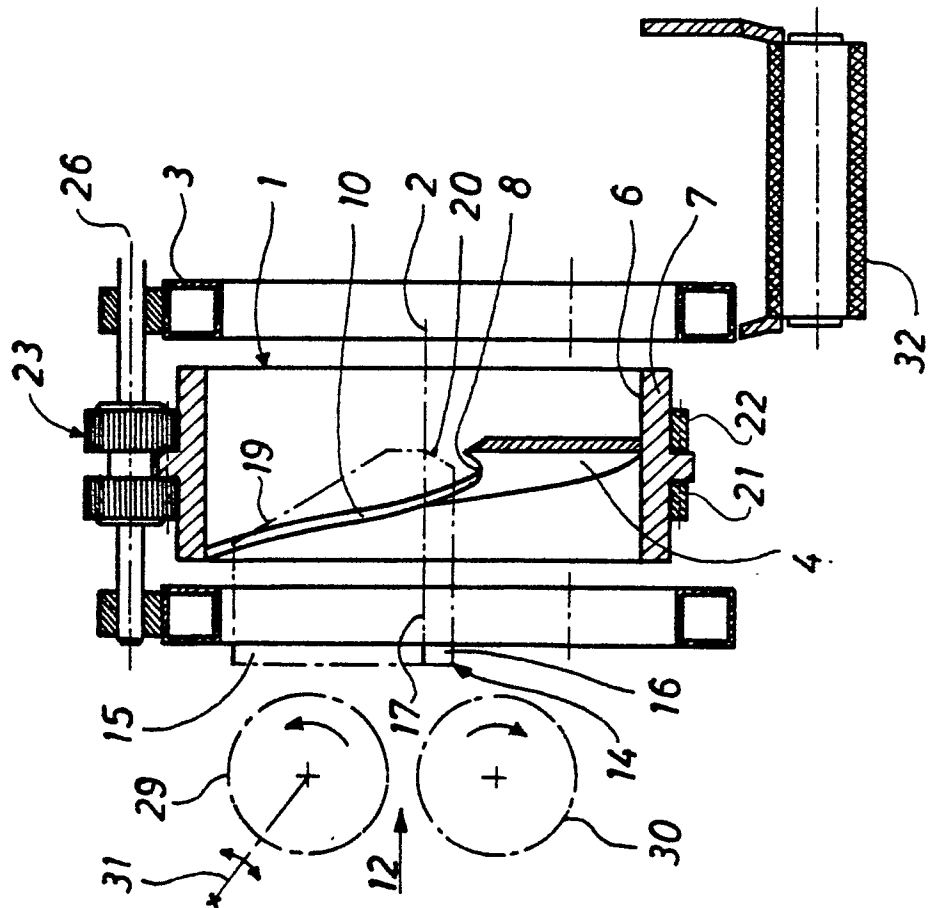


Fig. 1



DOCUMENTS CONSIDERED TO BE RELEVANT			EP 88113238.5
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
A	AT - B - 369 312 (TUIKOLA) * Totality * --	1	B 27 L 7/00
D,A	US - A - 4 053 004 (BARWISE) * Totality * ----	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			B 27 L B 26 D
The present search report has been drawn up for all claims			
Place of search VIENNA		Date of completion of the search 19-12-1988	Examiner TRATTNER
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