March 5, 1968 P. VOELSKOW 3,371,693

COMMINUTING MACHINE FOR WOOD

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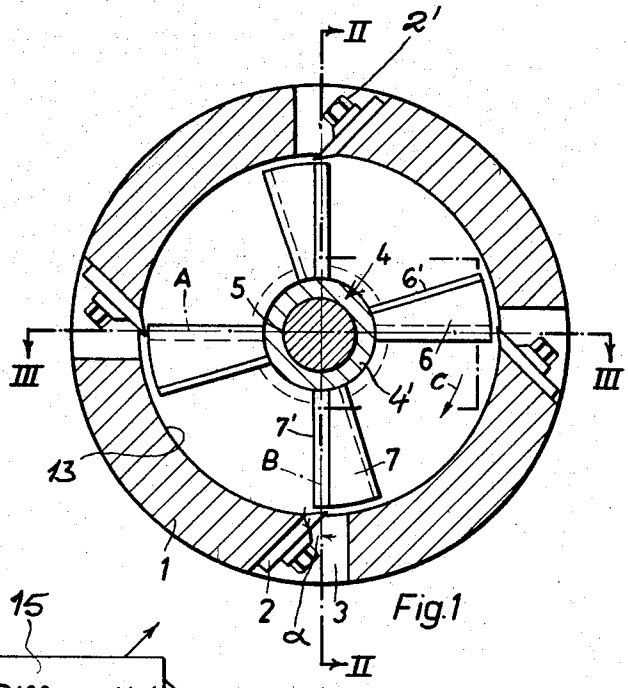


Fig.1

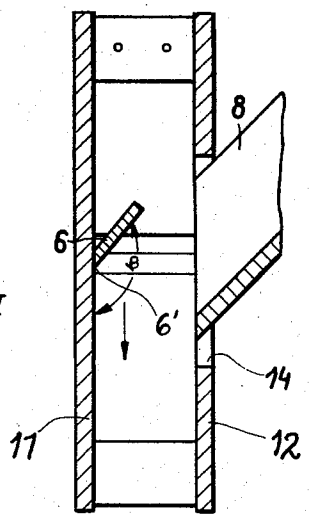


Fig.2

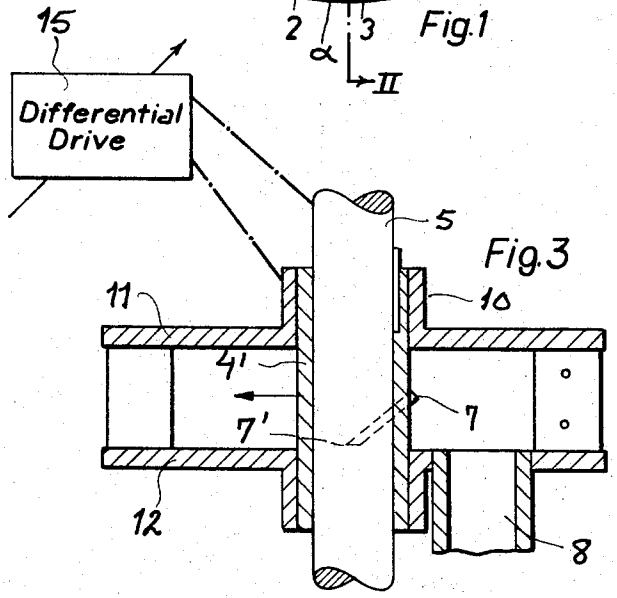


Fig.3

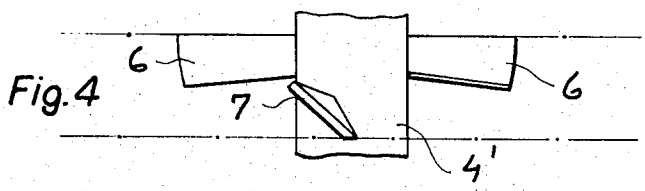


Fig.4

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COMMINUTING MACHINE FOR WOOD

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4 Claims. (Cl. 144—172)

ABSTRACT OF THE DISCLOSURE

A wood-comminuting machine having a blade ring with a plurality of angularly spaced openings about an axis, a respective blade in each opening projecting into the interior of said ring for comminuting wood particles swept past the blades, a rotor rotatable about this axis relatively to the ring and having a plurality of angularly spaced generally radial vanes alternately inclined to opposite sides of the axis with each sweeping only part of the axial width of the chamber and a drive for rotating the ring and the rotor relatively whereby the vanes deflect wood particles within the chamber alternately in opposite directions and away from the walls.

My present invention relates to a machine for cutting wood and, more particularly, to apparatus for the production of wood chips and especially relatively fine particles (e.g. shavings or chips) of wood.

In my copending application Ser. No. 397,908, filed Sept. 21, 1964, I disclose a machine for producing wood chips by the action of a rotating cutting tool upon a log or other block of wood which is fed progressively toward the cutting edges of the tool. As described in this application, smooth and regular wood chips can be produced with the aid of a scraping tool whose cylindrical body carries at least one blade but preferably a set of blades which extend askew to the axis of the body along its periphery. A rotatable support holds the log to be worked on at an acute angle to the cylindrical axis in such manner that a part of the log lies in the orbit of the rotating blades. While such apparatus is capable of producing uniform and regular wood shavings and chips from a relatively massive body of wood, it is often desirable to further subdivide the wood in order to produce even finer and smaller wood chips and especially wood particles of rod-like configuration cut with the grain. Prior-art devices for this purpose have included rotating or stationary blade rings having inwardly inclined blades and a rotor co-operating with this ring and rotatable or angularly oscillatable for centrifugally feeding the wood particles against the blades of the ring to further subdivide these particles.

It has been found, in practice, that conventional apparatus of this latter type is characterized by a wedging of the finely divided wood particles against the walls of the blade ring such that the efficiency of the comminuting operation is markedly reduced and the continuous operation of the device is prevented by the considerable friction heat developed. Furthermore, conventional devices were characterized by the need for large amounts of driving power and poor conversion of this power into effective centrifugal action with the result that the uniformity of the wood particles suffered and the cutting speed was relatively low.

It is the principal object of this invention to provide an apparatus for the further subdivision of wood particles whereby the foregoing disadvantages can be obviated and which will ensure an improved comminution while negativing the development of friction heat within a blade ring of the character described.

This object and others which will become apparent hereinafter are attained, in accordance with the present invention, in a wood-comminuting machine having a blade

ring provided with a plurality of angularly spaced inwardly extending blades mounted in respective passages permitting escape of wood particles from the interior of the ring; means for feeding wood particles to be comminuted to the interior of this ring; a rotor provided with a plurality of generally radial vanes angularly spaced about the common axis of the rotor and the ring; and drive means for relatively rotating the rotor and the ring. The present improvement resides in the orientation and configuration of these vanes which, according to my invention, are generally flat but angularly offset from the axial plane so as to be inclined to the axis alternately in opposite directions, i.e. with their leading edges (in the direction of rotation of the rotor) turned toward opposite axial sides of the cutting chamber formed within the ring; the vanes extend only over part of the axial width of the chamber defined by the blade ring and, when this chamber lies in an axial plane or is substantially upright, the vanes may be considered to be turned to the right and to the left of a median vertical plane through the chamber perpendicular to the axis thereof. The leading edges of alternate vanes thus sweep along opposite faces of the blade-ring housing in places perpendicularly to the axis so as to include with these housing walls obtuse angles in the direction of engagement of the vanes with the wood chips to be further comminuted. In this manner, the particles are thrown from one side to the other repeatedly and cross-grain cutting is avoided so that the comminuted product is generally fibrous and suitable for treatment in any of the industrial processes requiring fibrous wood particles. Aside from this, the inclination of the blades and their offsetting to opposite sides of the median plane causes a drawing of the wood chips across the blades and thereby also improves the characteristics of the particles.

The above and other objects, features and advantages of the present invention will become more readily apparent from the following description, reference being made to the accompanying drawing in which:

FIG. 1 is a cross-sectional view in a plane perpendicular to the axis through the blade-ring housing of a comminuting machine, according to this invention;

FIGS. 2 and 3 are cross-sectional views taken along the lines II—II and III—III of FIG. 1, respectively; and

FIG. 4 is an elevational view of the rotor of this machine.

In FIGS. 1–4 I show a machine for the comminution of wood in the form of chips which is designed to produce still smaller wood chips of good physical properties and thus to effect comminution generally along the grain of the wood. While only the essential elements of the machine are illustrated for the purposes of the present invention it will be understood that conventional drive means and housing means will usually be provided for the blade ring and rotor and that the hopper, diagrammatically illustrated in FIG. 2, may also be conventional.

The apparatus comprises a blade ring **1** whose angularly spaced blades **2** are mounted by bolts **2'** removably in outlet openings **3** extending through the ring **1**. The blades **2** extend inwardly and are inclined to respective axial planes A, B so as to include acute angles α therewith. The blades are directed in a sense opposite the sense of rotation (arrow C) of a rotor **4** whose hub **4'** is keyed to a shaft **5** which extends through a boss **10** in which the shaft is journaled.

The ring **1** is mounted in a housing formed by the axially spaced walls **11** and **12** which define with the ring **1** the compartments **13** into which the wood chips are fed by a hopper or chute **8** through an opening **14** in wall **12**. The rotor **4** is provided with equispaced vanes **6** and **7** which alternately are inclined (twisted) to the left (FIG. 2) and the right (FIG. 3) so that their leading edges **6'**, **7'** respectively sweep along the walls

11 and 12, as can be seen in FIG. 3. The boss 10 and the shaft 5 are driven differentially (i.e. at different speeds) by a drive 15 which may, according to the invention, also hold the blade ring 1 stationary. The vanes 6 and 7 sweep along the walls with their leading edges including obtuse angles β (FIG. 2) in the direction of engagement of the vanes with the particles within the chamber. Thus, the speed of the rotor 4 in the direction C with respect to the blade ring 1 can be adjusted by varying the speed differential between them.

As can be seen from FIG. 2, the vanes 6 will repeatedly throw the particles entering the chamber 13 to the right as they are swept across the blades 2 so that packing of the particles and jamming of the apparatus is avoided, and the wood chips engage the blades so as to be severed substantially along the grain to produce fiber-like or rod-like particles. The blades 7 shift the particles to the left (FIG. 2) after they have been swept to the right by the blades 6, the resulting movement of the particles being an oscillation thereof to opposite sides of a median plane through the chamber 13 as they rotate with the rotor across the blades. The centrifugal action throws them rapidly against the blades whereupon they are chopped up and pass in a comminuted state through the outlets 3. The vanes 6 and 7 need not be mounted upon the shaft 5, according to this invention, but can be carried by rings rotatably mounted upon the walls 11 and 12 of the housing.

The invention described and illustrated is believed to admit of many modifications within the ability of persons skilled in the art, all such modifications being considered within the spirit and scope of the appended claims.

I claim:

1. In a wood-comminuting machine, in combination, a blade ring having an axis and a plurality of angularly spaced openings about said axis, each receiving a respective blade projecting into the interior of said ring for comminuting wood particles swept past said blades; a pair of housing walls extending transversely to the axis of said ring and defining therewith a comminuting chamber; a rotor in said chamber rotatable about said axis relatively to said ring and having a plurality of angularly spaced generally radial vanes alternately inclined to opposite sides of said axis and each sweeping only part of the axial width of said chamber; and drive means for rotating said ring and said rotor relatively whereby said vanes deflect wood particles within said chamber alternately in opposite directions and away from said walls.

2. The combination defined in claim 1 wherein said vanes are provided with leading edges sweeping along said walls and including therewith obtuse angles in the direction of engagement of said vanes with the particles within said chamber.

3. The combination defined in claim 2 wherein said rotor is provided with four vanes in pairs extending along diameters of the chamber with the leading edges of the vanes of each pair lying close to a respective one of said walls, one of said walls being provided with an opening, said combination further comprising hopper means for feeding wood particles into said chamber through said opening, the other of said walls being provided with a boss rotatably supporting said rotor, said blades being inclined at acute angles to respective axial planes of the blade ring at their cutting edges in a sense opposite that at which said particles are swept by said rotor past said blades.

4. The combination defined in claim 1 wherein said drive means includes means for rotating said ring and said rotor in the same sense but with different speeds.

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