Oct. 3, 1939. F. PELOT ET AL 2,174,593

WOOD CHIPPER

Filed Oct. 27, 1937

Fig. 1.

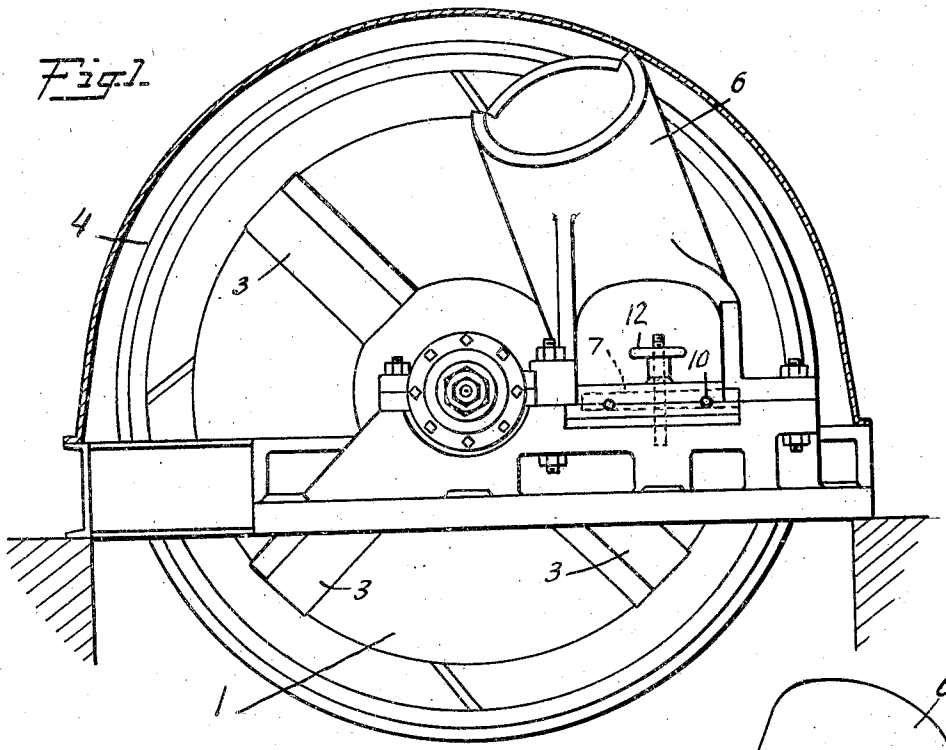


Fig. 2.

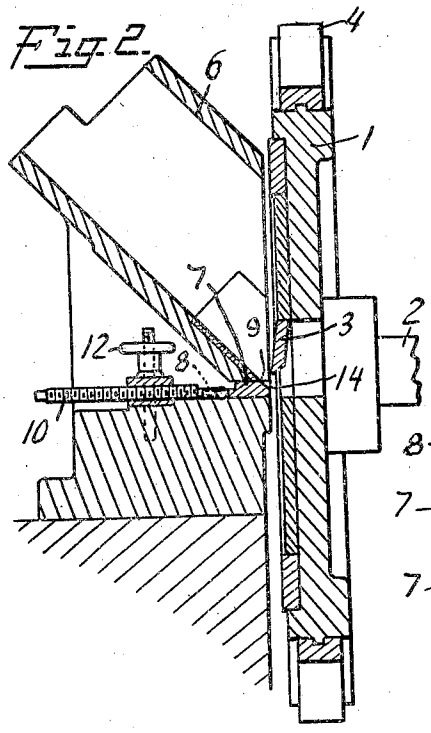


Fig. 3.

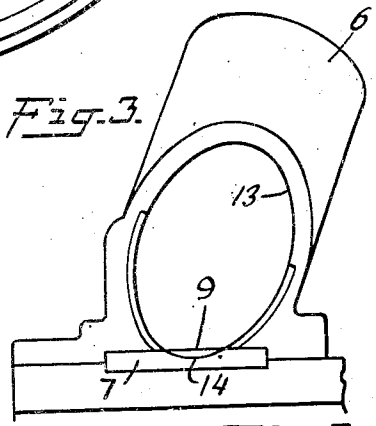


Fig. 4.

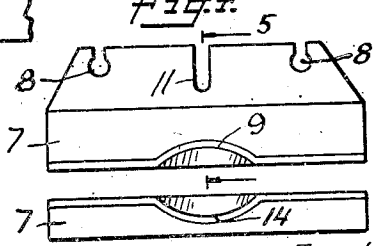


Fig. 5.

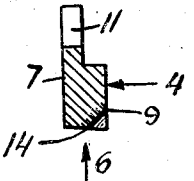


Fig. 6.

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WOOD CHIPPER

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Application October 27, 1937, Serial No. 171,220

1 Claim. (Cl. 144—176)

The present invention relates to certain new and useful improvements in wood chipping machines of the type commercially used for the purpose of cutting wood into chips of the proper kind preparatory to making pulp therefrom for use in the manufacture of paper, paper board and the like. Wood chipping machines of this general kind may be said to comprise essentially a rotatable disc carrying one or more cutting knives located in radial slots therein so that the chips cut may pass through the disc where they are taken care of, a feeding spout or trough arranged in a suitably inclined position and adapted to bring the wood into contact with the rotatable disc so that the knives may act upon the wood, and a stationary bed knife arranged in a horizontal position so that it may coact with the knife or knives of the rotatable disc to cut off or shear the chips from the wood. In order to obtain the best results it is quite necessary that the stationary bed knife should be kept sharp and effective at all times.

The stationary bed knife therefore provides a cutting edge against which the disc knives can shear off the ends of sticks fed down toward them at the angle of the chute or spout. When the knife is passing through the upper part of a stick the lower fibers of the wood act as bed knives for the upper ones, but when it comes to the last or bottommost fibers a good sharp edge on the bed knife is necessary or the fibers will bend down and peel off without being cut. These peelings or slivers will not cook satisfactorily in the digester and are very difficult to break up into usable chips. It is therefore necessary to keep the bed knife sharp and hence an easy means of removing it for grinding is necessary with which a horizontal adjustment seems to be the most feasible plan. Therefore it is customary to have a successful bed knife bevelled on its upper front edge where it is associated with the lower end of the feed spout so that said bevelled part may serve as a continuation of the feeding spout in order that the end of the wood may be kept at all times very close to the cutting knives.

But even with this bevelled upper front edge on the bed knife although quite successful results are obtained if the feed spout is square in cross-section yet when the feed spout is round as is quite often the case serious difficulties arise in forming the cutting action because of the limited area of the bevelled edge of the bed knife where it serves as a continuation of the round inner surface of the spout and it is the object of our invention to overcome this difficulty and provide coinciding edges between the bed knife and the inner wall of the spout that will receive the entire substance of the wood and enable it to be all cut effectively into the proper chips.

This we accomplish by forming the upper front edge of the bed plate at the bevelled portion with a curved cutout line both on the upper horizontal surface of the bed knife and on the vertical surface, the curvature of the arc thereof coinciding with the curvature of the inner wall of the spout in a manner to be hereinafter more fully explained.

The principal object of our invention is therefore to provide a cutting tool of such construction that it will at all times and during the entire process of cutting afford a cutting edge of perfect coincidence with the feed spout and providing therewith a feed spout particularly a round one having a continuation surface within itself and along the bevelled curved outline of the bed plate so that it will extend into direct contact with the cutting tool and knives. Obviously a portion of the bed plate or cutting tool will serve as a wear member in addition to the performance of its other function of a sharp bed knife.

The invention therefore may be said to consist essentially in the construction, combination and arrangement of the various parts and in numerous details and peculiarities thereof substantially as will appear from the following detailed description of the construction and use which is to be considered in conjunction with the accompanying drawing and will hereinafter be definitely pointed out in the claim.

In the drawing illustrating our invention:

Fig. 1 is a view in elevation of our improved wood chipping machine, certain parts being broken away or represented conventionally to simplify the illustration;

Fig. 2 is a longitudinal vertical section of the same;

Fig. 3 is a perspective detail view of the feed spout viewed from a point looking into the same through the elliptical lower end;

Fig. 4 is a front perspective view of the bed plate in inverted position;

Fig. 5 is a cross section of the same on the line 5—5 of Fig. 4;

Fig. 6 is an edge view of the bed plate in its normal horizontal position.

Like characters of reference designate like parts throughout all the figures of the drawing.

The rotatable disc 1 is mounted on a shaft 2,

which is driven by any suitable source of power not shown. This disc 1 is provided with one or more slots of suitable size and shape which are in a substantially radial location and near each slot is mounted a knife 3, which as shown in Fig. 2 has the proper position to enable it to exert an effective cutting action upon the wood presented thereto by the spout or chute 6 which is located contiguous to the disc and supported on the main frame. The knife 3 as shown in the drawing projects out slightly from the surface of the disc 1, and the distance between the cutting edge of the knife and the disc 1, determines the thickness of the chips or cuttings produced. A casing 4 is preferably used to enclose the upper portion of the disc 1, while the lower portion of the disc extends downwardly into a suitable space formed by the main frame or the construction walls of the apparatus. The feeding spout 6 is located in any desired position but usually it is found preferable to locate it eccentric with respect to the shaft 2 and inclined at an angle to the horizontal plane through said axis and arranged to project through the casing 4 into close proximity to the disc 1 as shown in Fig. 2. The particular spout illustrated in the drawing is circular and while it is obvious that spouts of square or rectilinear or other suitable cross section may be employed, it will be understood that our present invention which applies more particularly to a bed plate having a curved outout portion is intended chiefly for use with a circular spout.

Our improved stationary bed knife 7, is supported at substantially right angles to the disc 1, by suitable means consisting of a portion of the frame or the sub-structure of the walls of the machine. Stationary bed knife 7 preferably comprises a single piece of tool steel ground so that it has what may be termed an obtuse tool angle which, if further description be needed, is one in which the tangent of the angle between the lower active face of the tool as shown at the bottom in Fig. 5 or at the right hand edge in Fig. 2 and the disc 1 is say, $\frac{1}{16}$, that is to say, good results may be expected to be obtained by using a tool having a clearance angle of 1:16 for example. As already stated the upper active face of the tool or knife 7 which is shown in front in Fig. 4 and at the right in Fig. 5 and at the top in Fig. 2, is ground with a bevel in its central portion so that when the tool is placed in the chipping machine as it is shown in Fig. 2 this bevel portion forms a substantially continuous extension of the inner face of the feeding spout, all as is clearly shown in Fig. 2.

The bed knife 7 is adapted to be advanced or retracted with relation to the rotary disc 1, and its knife or knives 3, by means of adjusting screws 10, which have a round end so that they may have a ball and slot connection with the knife 7 by having the said ball shaped ends enter the round ended slots 8, 8 in the rear and thinner portion of the said bed knife. Further the said screws after being adjusted and thereby adjusting the position of the cutting tool 7 so that the sharp edge thereof may be properly related to the cutting edge of the knife 3, may be fixed in any desired position by means of the clamping screw 12 which passes through a slot 11 in the cutting tool 7 and employs appropriate blocks above and below the thinner rear portion of the cutting tool 7 so as to hold the tool tightly in its adjusted position by merely turning the hand wheel 12 so as to loosen or tighten the same.

It has already been suggested that peculiar difficulties arise in the use of a circular spout and that it is the chief object of our present invention to overcome such difficulties. It will be noted that at the point where the cylindrical surface of the spout intersects the plane passing through the sloping surface at the upper front edge of the bed knife 7, there can be only one line which must be just at about the middle, where the slopes of the two surfaces, that is the surface on the inside wall of the spout and the surface on the bevel of the upper edge of the bed knife, are perfectly lined up with each other although they are parallel, unless something is done to cure this objection which we seek to obtain by the use of our improved cutout section in the bed knife. Obviously a horizontal plane passing through the top surface of the bed knife when it is in its normal position as shown in Fig. 2, or in Fig. 3 will cut the elliptical opening of the spout that faces the rotary disc 1 at a point on each side. This is clearly shown in Fig. 3. From these intersecting points to the line along which the cylindrical surface of the spout coincides with the plane of the sloped section of the bed knife face the spout obviously overhangs the bed knife. This we avoid by cutting an arc in the top of the bed knife at 9, and another arc in the front face of the bed knife at 14, between which two arcs the sloping or bevel portion is arranged as shown at 9 and 14 in Fig. 5 and these curves enable the bevel portion to coincide with the inner cylindrical face of the spout 6 at its elliptical end 13 so that there is a continuation and complete extension which is not confined to just one line and by this means the overhanging of the bed knife is avoided and rectified.

The nearer towards the sides of the spout that a stick of wood may lie within the same, the more its last fibers to be cut must bend down over this overhanging portion of the spout before they are cut by the bed knife. This intensifies the wear on the spout at the sides and causes it to be finally considerably steeper at the bottom than at the top. The stick then is supported only at the top until the knife hits it and catapults the top part up using the corner where the wear starts as a fulcrum. This bouncing makes uneven lengths of chips and slivers and decreases the capacity of the machine by slowing down the feed.

When however, the bed knife has the curved bevel section the cylindrical surface of the spout is carried right down to the cutting edge, which as described is in the shape of an arc of an ellipse on the vertical face. The sticks do not need to bend down to get out. The wear on the spout surface is reduced and the logs therein feed better. And it is also determined as another result of the use of the curved bevel section that the bed knife may be made much thicker than has been the practice heretofore. The intersection of the horizontal plane through the top of the surface of a bed knife 2 or 3 inches thick with the elliptical opening in the spout comes down so low that the two points of intersection are not as near to the sides of the spout as they should be; but if the bed knife is made substantially thicker, say 6 inches thick or more, then the points of intersection would be much farther apart and the cutting edge would then be able to cover substantially the whole of the elliptical opening of the spout which is a decided and very material advantage in obtaining the best results.

We find it very desirable to cover the curved surface with some hard material like stellite and also the vertical surface of the knife across so

that the sharp edge may last much longer after being ground. This hard material can be replaced by welding after it has been all ground off. The feature is of importance and we lay special stress thereon.

It will be understood that the sizes and proportions of the various parts and their exact relative arrangement with reference to each other may be varied to a wide degree without departing from the principle of the invention which is not confined to the particular improvement shown and described. The curved bevel portions may vary in size within wide limits and the angle of the bevel from the upper face to the side face of the bed knife may be changed to accommodate the best results and the invention is intended to include such other improvements as may fall within the scope of the appended claim.

What we claim is:

In a wood chipper of the class described, a feed spout curved in cross section, an adjustable stationary cutting knife, having its upper and lower surfaces in parallel planes, at the bottom of the outlet end of the feed spout, and a knife rotatable in a plane substantially at right angles to the stationary knife, said stationary knife having the plane of its upper surface intersecting the curved lower end portion of the spout and having a concaved cut-out at the upper forward edge thereof conforming to and coinciding with the inner curvature of the inner surface of the lower end portion of the feed spout and forming a continuation of said inner surface whereby the lower end of a log in the chute will not be thrown out of alinement with the chute supporting surface as the log is being cut.

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