No. 892,808. PATENTED JULY 7, 1908.

O. CARR.

# WOOD CHIPPING MACHINE.

APPLICATION FILED JULY 16, 1906.

3 SHEETS—SHEET 1

Fig. 2.

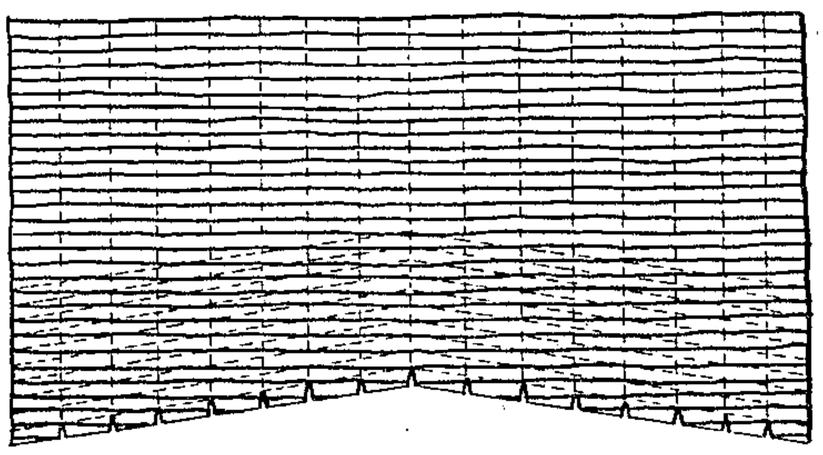

Fig. 1.




Witnesses
Edwin L. Yewell
L. B. Bridgen

Inventor
Ona Carr
By Davis & Davis
Attorneys

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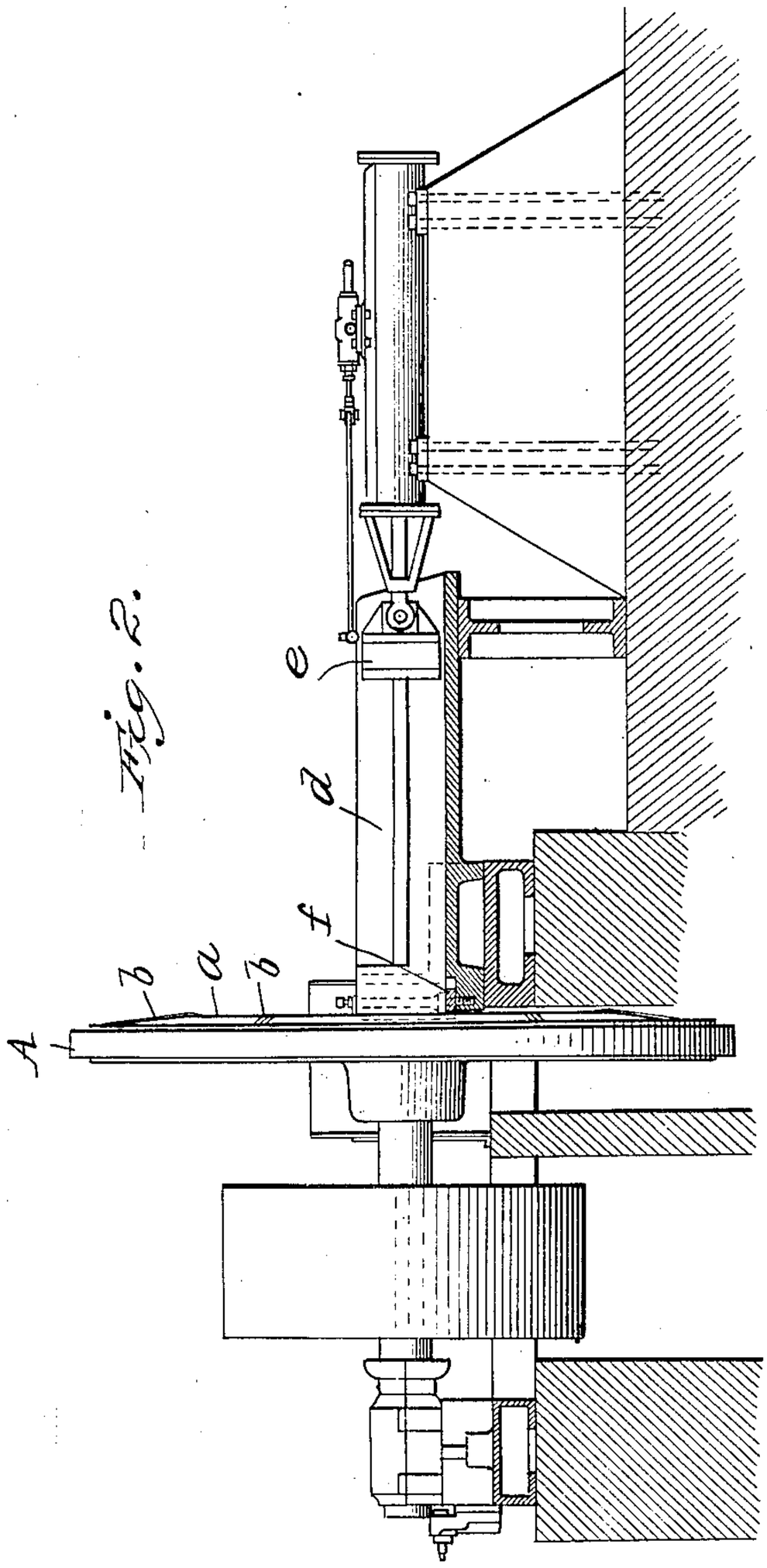
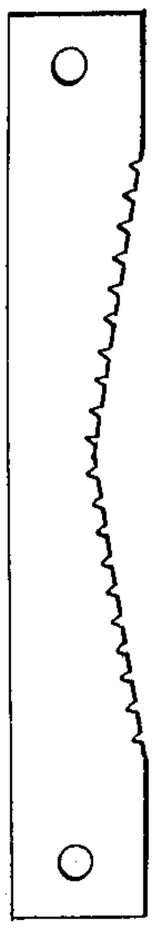



Fig. 7.




Witnesses
Edwin L. Yewell
R. B. Bridges

Inventor
Ona Carr
By Davis & Davis
Attorneys

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3 SHEETS—SHEET 3.

Fig. 3.

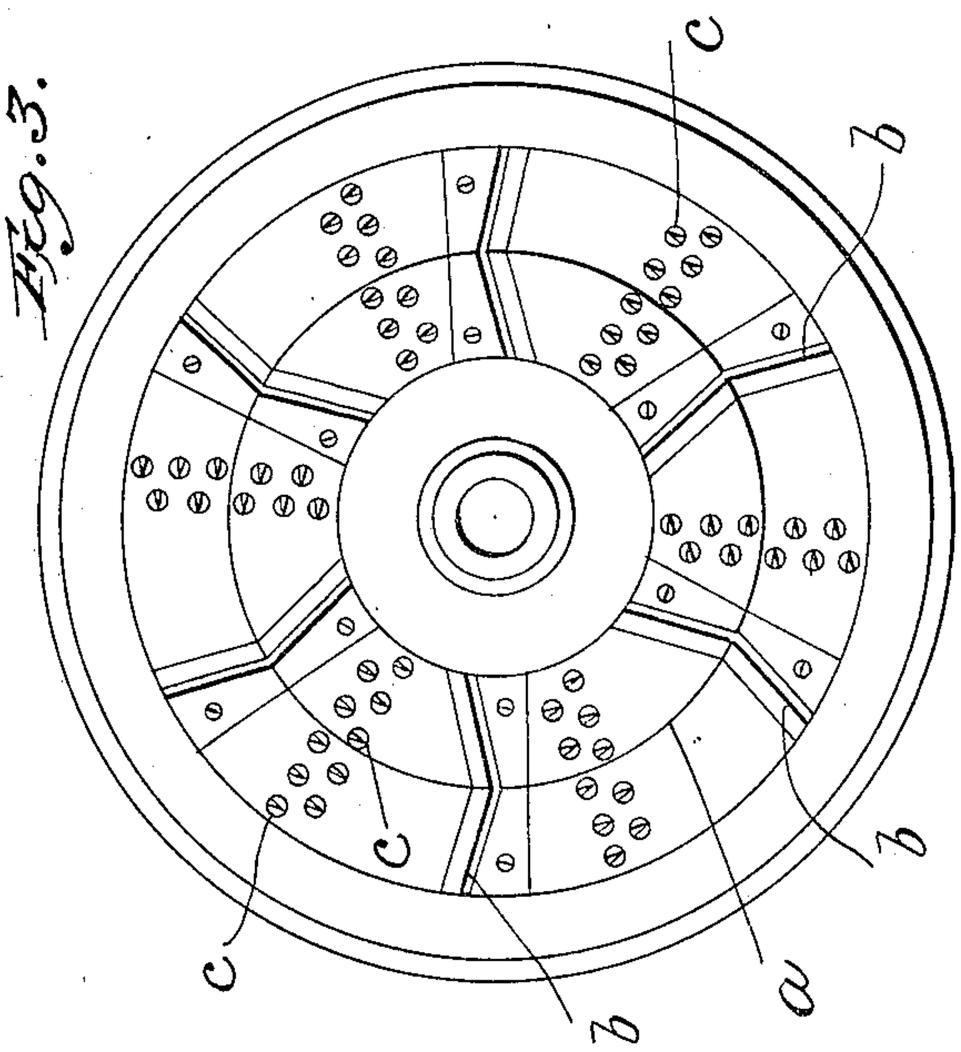



Fig. 8.

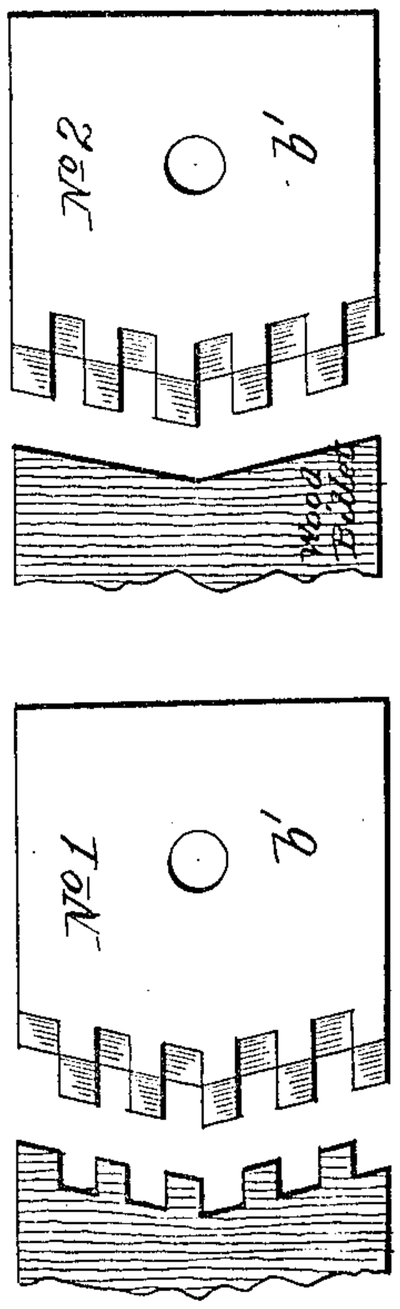



Fig. 5.

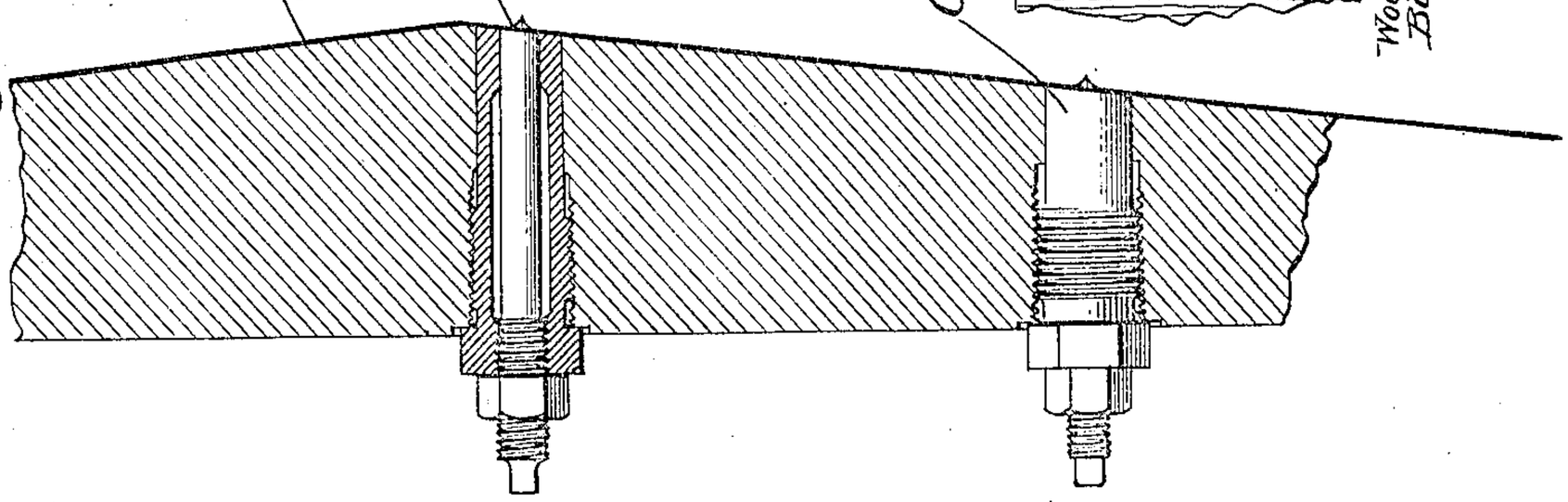
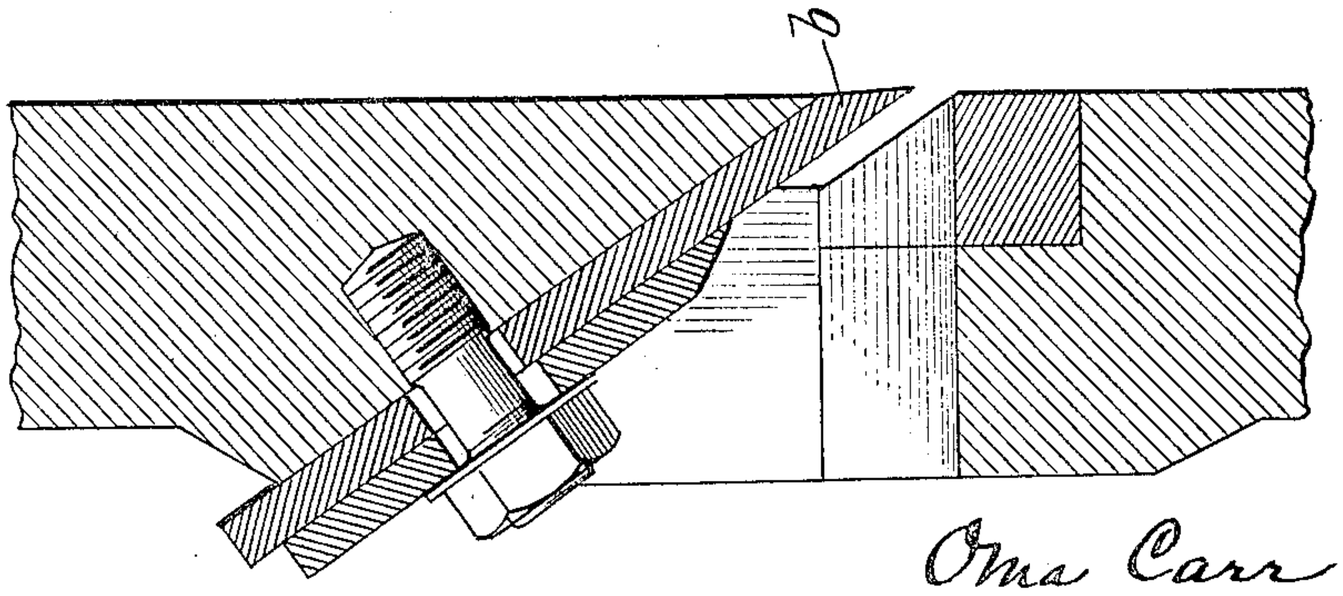



Fig. 4.




Witnesses

Edwin L. Jewell

L. B. Bridges.

Inventor

Ora Carr

By Davis & Davis

Attorneys

# UNITED STATES PATENT OFFICE.

OMA CARR, OF CANTON, NORTH CAROLINA.

## WOOD-CHIPPING MACHINE.

No. 892,808. Specification of Letters Patent. Patented July 7, 1908

Application filed July 16, 1906. Serial No. 326,434.

*To all whom it may concern:*

Be it known that I, OMA CARR, a citizen of the United States of America, and resident of Canton, county of Haywood, State of North Carolina, have invented certain new and useful Improvements in Wood-Chipping Machines, of which the following is a full and clear specification, reference being had to the accompanying drawing, in which—

Figure 1 is a plan showing one form of embodiment of my invention; Fig. 2 a side elevation thereof partly in section; Fig. 3 a face view of the chipping disk; Fig. 4 a detail section showing the manner of mounting one of the knives; Fig. 5 a detail section through a portion of the disk showing the construction and arrangement of the slitters or slashers; Fig. 6 a detail perspective of the cutting end of one of the slitters; Fig. 7 a plan view in detail of the deadplate; Fig. 8 detail views showing a pair of modified blades, the use of which would do away with the slitting knives.

In the manufacture of various products from woods it is necessary to separate the fibers by chipping, in order that the intercellular matters may be extracted by the action of a solvent. Cases in point are, the manufacture of paper pulp by the soda and sulfite processes, the extraction of tannins, resins, gums, etc., the expulsion of volatile oils, etc. In these operations various degrees of fineness and length of fiber are required in the chip used, the purpose determining the most satisfactory form of chip. Thus, in the simple extraction of tannins, colors, gums, etc., and in the winning of volatile oils, where the residual fiber is to have no future application other than for fuel, the effort has been to divide the fiber very completely in order that the maximum of fiber may be exposed to the extracting solvent, or to the steam used in expelling the volatiles. In such industries the wood is chipped across the grain at an angle of about 45°, and the chips so made subjected to further division in some form of defibrator, producing fibers of very ununiform length and much dust.

In the manufacture of paper pulp by the processes above mentioned, the initial chips are much larger than those just cited, and the degree of defibration is not carried beyond the point of breaking up the large pieces. Owing to the very high temperatures and pressures used in making pulp by the processes referred to, the use of a fine chip is not essential, such necessity arising only when the pulping process is to be preceded by an extraction process at atmospheric pressure and temperature not exceeding 212° F.

Recent developments in the manufacture jointly of tanning extract and paper pulp from tannin bearing woods, indicate the desirability of a chipping mechanism operating, not across the grain of the wood at an angle of 45°, but parallel, or nearly parallel with the grain, whereby the wood is divided parallel with the fiber to retain the normal length of the same, but thin enough to permit ready penetration by the solvent required for complete removal of the tannins. This condition of fiber, as essential to the joint manufacture of tanning extract and paper pulp, is covered in Letters Patent of the United States Serial No. 762,139, granted to me June 4, 1904. In the practical employment of that patent several devices have been worked out to satisfy the condition of fiber required, and of these the one herein described appears to possess exceptional advantages.

I use either a vertical or horizontal disk machine, or a cylinder machine, mounting devices thereon at such intervals as will give the best capacity per unit of power applied—on the disk machines up to 7′ 0″ diameter, six knives, on the cylinder machines up to 5′ 0″ diameter, four to five knives. These knives I mount by projecting them through the face of the disk or cylinder, as the point of a plane projects. Beneath the points of the knives slots in the disk or cylinder face permit the chip to pass through and away from the cutting edge.

My invention consists in swelling out the disk or cylinder face at the central or middle line of the knife path sloping back this swell towards the side lines of the knife path to the normal face of the disk or cylinder and providing a deadplate of corresponding shape. On the machines using knives 24″ in length and upwards I make this swell about 1½″, which means 1½″ rise in half the length of the knife edge, the deadplates being shaped to correspond.

To indicate the purpose of this swell of the face carrying the knives, take the case of a flat-faced disk chipper with straight knives. With such machines the wood is cut endwise, at an angle of 45° across the grain. The pur-

pose I accomplish with my chipper is to greatly reduce this angle of cut, preferably to about 8°, and to cut the wood sidewise with the grain. If to the ordinary flat-faced chipper we present a piece or billet of wood sidewise of the grain, the knives will take off veneers of a thickness equal to the outset of the knife, and of a length equal to the length of the billet, and when the billet is consumed to a degree at which the remaining section is in thickness equal to the clearance between face of machine and deadplate, it will be pulled through. Thus we have, to secure a veneer not exceeding $\frac{1}{32}''$ thick, these requirements: The knife must not be set out more than $\frac{1}{32}''$ and the clearance between face and deadplate the same—clearly practically impossible, as the knife point would strike the deadplate and be knocked off. In practice the minimum permissible clearance is, on exceptionally well-built and rigid machines, not less than $\frac{1}{8}''$—which means that, working sidewise on the billet in an ordinary straight-face machine, the final part or "sliver" of each billet will be pulled through $\frac{1}{8}''$ thick. If all the preceding veneers from the same billet have been taken off $\frac{1}{32}''$, and the final sliver is drawn through $\frac{1}{8}''$ thick, the prepared material is so variable as to be worthless.

The object of my invention is to provide veneers of constantly uniform thickness, such thickness not to exceed $\frac{1}{32}''$, and at the same time give a slight shear across the grain to open the fibers. If we present a billet to a swell-faced machine, we find that the point of the knife enters the billet first, and keeps in advance of the sides of the knife to the extent of the swell. The billet is consumed to a stage at which the knife-point has taken off its last cut, leaving two triangular shaped pieces lying at either side of the center-line of the knife-path. These pieces, being $1\frac{1}{2}''$ thick at one end and sloping to a point at the other end, are pushed forward by the succeeding billet and consumed without the formation of a sliver. All veneers are taken off at the thickness determined by the set-out of the knives. It is found, too, that the cut is so devoid of shock when taking off the veneers $\frac{1}{32}''$ thick with the slight shear employed, that the clearance between face and deadplate may be carried at $\frac{1}{16}''$.

Now, the right thickness of veneer and absence of sliver being obtained, there remains the desirability of shortening the veneer to a degree at which it becomes more easily handled in conveyers. Two methods are available for this purpose. First, by cutting out, or corrugating the knives, as shown in Fig. 8, so that they present to the wood a number of cutting points instead of a continuous cutting edge. So made, the knives are set so that, one following another, the wood is scored out in different paths. If the knives are cut out so that the cutting edges are 2″ wide, the veneers will be cut that width. This method has the disadvantage of losing the cutting capacity of the spaces cut out. Second, as shown in the other views, by setting in the face, between the knives, hardened cutting points or slashers, which precede the knives, cutting out narrow paths about $\frac{1}{8}''$ deep in the wood, such slashers spaced apart as the width of ribbon is desired. With the paths so cut, the knife follows and cuts out the narrowed veneer. In my large machines I space these slashers about 2″ apart. It is understood that the deadplate or plates must be slotted out to allow the slashers to pass. This method I prefer as it leaves the knife at liberty to take a full cut at each stroke.

It is obvious that the arrangement of knives, swell of face, corrugation of knives or provision of slashers, applies to either vertical or horizontal machines, or to cylinder machines. On the horizontal disk, or on the cylinder machine, multiple feed-boxes may be used. In such machines the dead knives must be carried on the housing or cover, which must be sufficiently heavy and rigid to prevent vibration. In the vertical disk machine but one feed-box is usually employed, being horizontal at right angles to the disk face, and provided with suitable forced feed, preferably a ram running in the feed-box and driven by a compressed air or steam cylinder. In the horizontal disk and cylinder machines the feed-boxes may be vertical or on a strong incline, so that the weight of the billet in the box holds the lower billet against the knives. Forced feed can, however, be applied in such machines. Inasmuch as the vertical disk machine is much cheaper to build for moderate capacities I confine my detailed description and drawings to that type.

In the drawings annexed I have shown my invention embodied in a vertical disk machine. In these drawings the letter A designates the disk which is mounted as usual on a horizontal shaft suitably journaled, and *a* designates the annular angular swell formed on the face of the disk; *b* the knives extending through openings in the disk and having their cutting edges conforming to the angular swell on the disk; *c* the cutting points arranged in one or more radial rows and staggered between the knives.

The letter *d* designates the trough or chute in which the billet is supported as it is forced against the disk by the cross-head *e* which latter is forced forward and retracted by any suitable means. The letter *f* designates the deadplate fastened at the inner end of the billet trough or channel.

In Fig. 8 the notched knives *b′* hereinbefore explained are shown.

Having thus fully described my invention,

what I claim and desire to secure by Letters Patent is:—

1. In a wood-chipping machine, the combination of a rotary member having an annulas swell on its face, knives projecting therethrough and having their cutting edges conforming approximately to said swell, means for dividing the chips into short lengths, and means for supporting and feeding the billet.

2. In a wood-chipping machine, the combination of a rotary member having an annular angular swell on its face, knives projecting therethrough and having their cutting edges conforming approximately to said swell, means for dividing the chips into short lengths, and means for supporting and feeding the billet.

3. In a wood-chipper, the combination of a rotary member having on its face an annular projection or swell and openings through the swell at intervals, knives carried by said member and projecting obliquely through the openings in said annular swell and having their cutting edges conforming to the contour thereof, said openings forming throat-like passages for the exit of the chips through the rotary member, and means for supporting and pressing a billet of wood against said swelled portion of the rotary member.

4. In combination, a rotary member having on its face a swell having angular sides which meet at the center of the swell, said rotary member having an annular series of openings extending through the swell, knives adjustably secured in said openings and having their cutting edges extending beyond the angular faces of the swell, said cutting edges conforming approximately thereto, said openings forming throat-like passages below the edges of the knives for exit of the chips through the rotary member, and means for supporting and feeding a billet of wood against said swelled portion of the knives.

5. In combination, a rotary member having on its face a swell having angular sides which meet at the center of the swell, said rotary member having an annular series of openings extending through the swell, a knife attached to the rotary member adjacent to each of said openings and having its cutting edge conforming approximately to the contour of the swell, said openings forming throat-like passages below the edges of the knives for exit of the chips, and means for supporting and feeding a billet of wood against said swelled portion of the rotary member.

In testimony whereof I hereunto affix my signature in the presence of two witnesses this 13th day of July 1906.

OMA CARR.

Witnesses:
C. D. DAVIS,
L. B. BRIDGES.