March 25, 1958 J. T. LATIMER 2,827,934

APPARATUS FOR CHIPPING WOOD

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Fig. 1

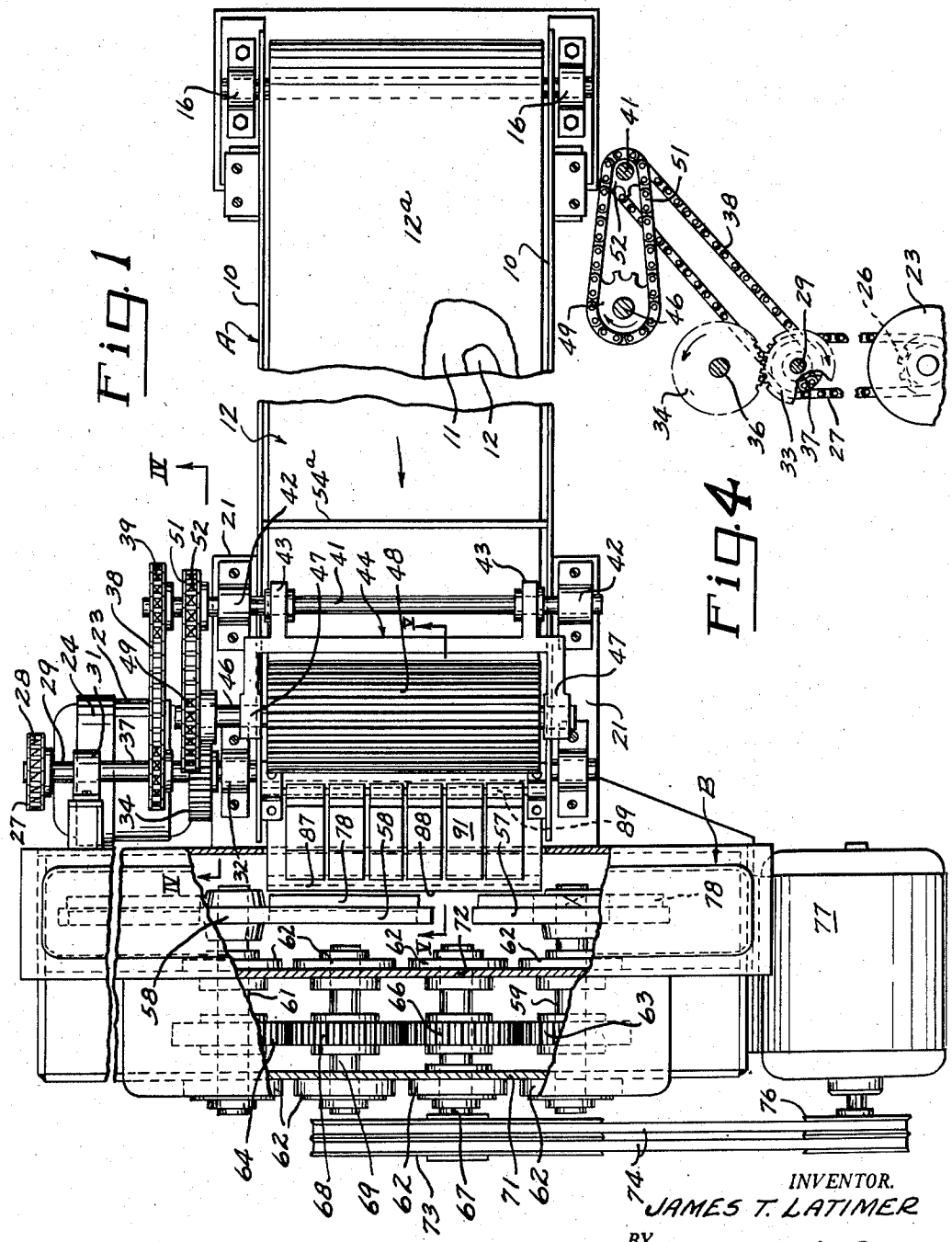


Fig. 4

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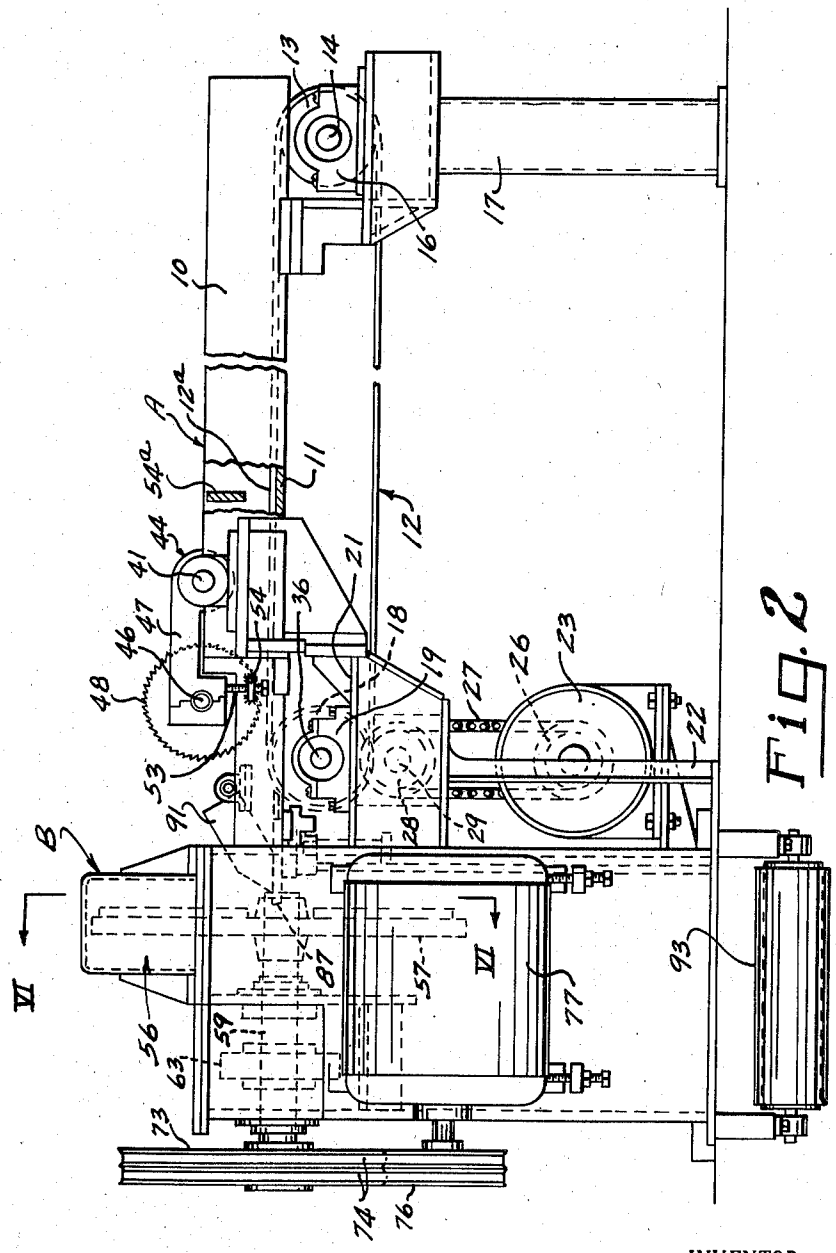


Fig. 2

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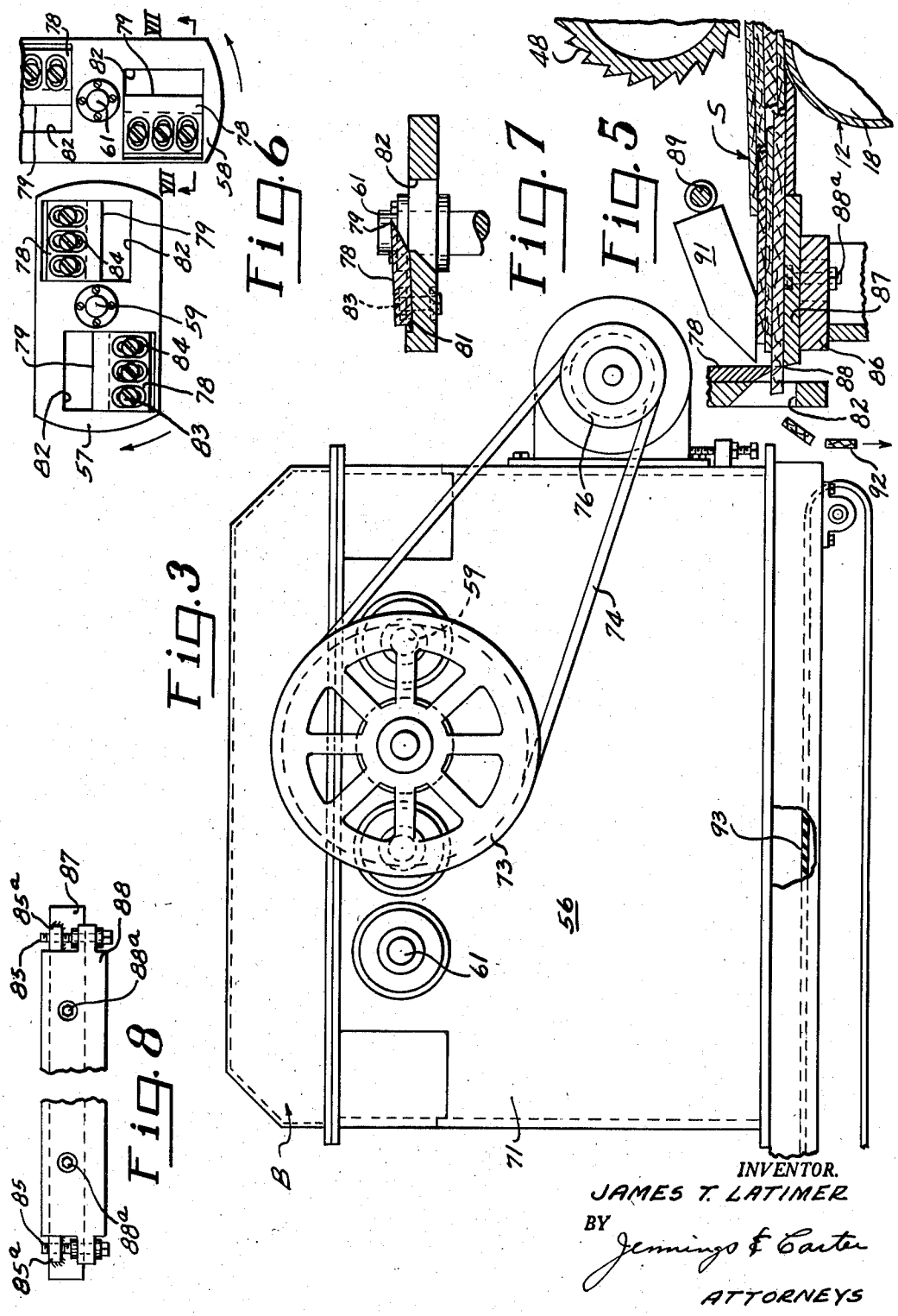


Fig. 6

Fig. 7

Fig. 5

Fig. 3

Fig. 8

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APPARATUS FOR CHIPPING WOOD

James T. Latimer, Birmingham, Ala., assignor to Jackson Industries, Inc., a corporation of Alabama

Application February 7, 1955, Serial No. 486,456

1 Claim. (Cl. 144—176)

My invention relates to apparatus for chipping wood and has for an object the provision of apparatus for converting wood into chips for use in hardboard manufacture, paper making and the like, and while not limited thereto relates particularly to such apparatus especially adapted to chip relatively thin waste wood products such as scrap veneer.

An object is to provide wood chipping apparatus in which the length of the chips cut thereby is dependent solely upon the ratio of the rate of rotation of the knives to the linear travel of the stock, whereby the length of chips cut may be varied by changing the above ratio without the necessity of adjusting the knives or of adjusting or changing any part of the chipping mechanism proper or its rate of rotation.

Another object is to provide a wood chipper in which the stock is positively fed to the cutting mechanism as distinguished from a random feeding, as for instance by forcing the stock against the face of a rotating disc carrying projecting knives, as is the case with some prior machines.

Another object is to provide a chipper for thin stock so constructed and arranged as to reduce to the minimum the shattering, breaking and splintering of the stock, thus materially increasing the percentage of chips of proper fiber length and decreasing the percentage of chips of undesirable fiber length.

Another object is to provide a wood chipper in which the effective cutting width thereof is materially increased over prior machines of like capacity.

A further and more specific object is to provide a wood chipper comprising at least a pair of rotatably mounted knife carrying members and an elongated stationary knife over which the stock is fed to be cut by knives on the members, together with means to rotate the knife carrying members oppositely and in synchronism so that the wood to be chipped may be fed inwardly over the stationary knife between the centers of rotation of the knife carrying members, whereby the stock is held against lateral shifting.

Still further objects are to provide a wood chipper of the character designated in which the stock is engaged by hold-down means immediately adjacent the stationary knife, further decreasing the shattering and splintering effect on thin stock; to provide a positively driven floating feed and hold-down roller, driven in synchronism with a feed belt with which it coacts and in synchronism with the rate of rotation of the knives; and in general to provide apparatus which shall be economical of manufacture and positive in operation.

Briefly, my improved apparatus comprises a horizontal conveyor feed belt adjacent the discharge end of which is a floating, positively driven hold-down roller. The stock to be fed, such as waste veneer, is placed on the belt and is engaged by the positively driven hold-down roller and moved off the delivery end of the conveyer belt. Immediately adjacent the delivery end of the conveyer belt I place a relatively long, stationary knife over

which the stock to be cut is fed from the belt and roller. Mounted on horizontal shafts are knife carrying members which rotate in synchronism in a common vertical plane and which carry knives coacting with the cutting edge of the stationary knife. Mounted close to the cutting edge of the stationary knife are a plurality of independently movable hold-down weights which engage the top of the stock at the time it is being cut by the rotating knives. Layers of veener, piled at random on top of each other up to the given thickness for the capacity of the machine are placed on the belt and pass under the floating, positively driven hold-down roller. The roller and conveyer belt force the layer of material under the pivoted hold-down means and the rotating knives cut chips of equal length. The conveyer belt and the hold-down roller may be driven by an electric motor while the knives are driven by a separate electric motor. In order to change the length of chip which is cut it is necessary only to vary the linear rate of speed of the conveyor belt while permitting the rate of rotation of the knives to remain constant. In this manner with my improved machine it is quite easy to change the length of chip. Further, in actual practice I have found that the hold-down members tend substantially to reduce the shattering effect of the cutting knives on thin stock such as veneer. The floating, positively driven hold-down roller accommodates itself to the difference in the thickness of the stock on the conveyor belt. The chips pass through openings in the knife carrying members and fall downwardly where they may be blown away or may be carried off on a conveyor belt or otherwise.

Apparatus illustrating the features of my invention is shown in the accompanying drawings forming a part of this application in which:

Fig. 1 is a fragmental plan view with certain parts thereof broken away and in section;

Fig. 2 is a fragmental side elevational view with certain parts broken away and in section;

Fig. 3 is an end elevational view;

Fig. 4 is a detail sectional view taken generally along line IV—IV of Fig. 1 and showing the drive means for the conveyor feed section of the apparatus;

Fig. 5 is a detail sectional view taken generally along line V—V of Fig. 1 and drawn to an enlarged scale;

Fig. 6 is a detail sectional view taken along line VI—VI of Fig. 2 and showing the rotating knife carrying members and knives removed from the remainder of the apparatus;

Fig. 7 is an enlarged detail sectional view taken generally along line VII—VII of Fig. 6; and,

Fig. 8 is a diagrammatic view of the stationary knife showing the means for adjusting the same toward and from the rotating knives.

Referring now to the drawings for a better understanding of my invention it will be seen that my improved apparatus comprises in general two main sections. These sections are the material feed section indicated generally by the letter A and the chipping mechanism indicated generally by the letter B. As will later appear, there is sufficient allowance in variation in length of the chip to permit the use of independent electric motors for driving the feed mechanism A and the chipper mechanism B and yet still to drive these in "synchronism." That is to say, the rate of speed of the rotating knives and the rate of speed of the feed mechanism A, when driven by independent electric motors, remain so nearly in a fixed ratio that an actual mechanical tie-in between these drives is not necessary. Therefore, when I speak in this specification and in the appended claims of driving the feeder A and the chipper B in "synchronism," or in "timed relation" it will be understood that this term is

used to mean that degree of speed control which may be attained by the use of ordinary electric motors.

Referring now more particularly to Figs. 1, 2 and 4, it will be seen that the forward section A comprises generally an open ended trough having side walls 10 and a bottom 11. A conveyer belt 12 is mounted to run in the trough and has its upper flight 12*a* disposed to slide on the bottom 11 of the trough. The belt 12 passes around an idler pulley 13 which is mounted on a cross shaft 14 which in turn is supported by suitable bearings 16. The bearings 16 are supported on suitable framework may be supported from the foundation by means of a post 17 or the like.

The belt 12 passes at its discharge end over a driven roller 18 which is mounted in suitable bearings 19, the bearings in turn being supported by a part of the framework 21 of the apparatus. The frame may be supported by posts or supports 22. The belt and all other mechanisms of the feeder section A are powered by the means now to be described.

Mounted underneath the frame in any suitable manner is an electric motor 23 which is connected to a gear box 24. There is a sprocket 26 on the output shaft of the gear box over which passes a sprocket chain 27. The chain 27 passes over a sprocket 28 fast on a shaft 29. The shaft 29 is journaled in a bearing 31 which is fast to a portion of the frame of the chipper B and in another bearing 32 which rests on the framework 21 of the feed section A.

Fast on the shaft 29 is a gear 33. The gear 33 is in mesh with a gear 34 in turn fast on a shaft 36 which carries the driven roller 18. Also, fast on the shaft 29 is a sprocket 37 over which passes a sprocket chain 38. The chain 38 passes over a sprocket 39 which is fast on a cross shaft 41. The shaft 41 is journalled in bearings 42.

Mounted to pivot about the shaft 41 are the arms 43 of a yoke indicated generally by the numeral 44. Fixedly mounted on a shaft 46 in the outer arms 47 of the yoke 44 is a serrated feed and hold-down roller 48. Fixedly mounted on the shaft 46 is a sprocket 49 over which passes a sprocket chain 51. The chain 51 then passes over a sprocket 52 fast on the shaft 41.

From what has just been described it will be apparent that the motor 23 drives the gear box 24 in turn driving chain 27 and jack shaft 29. The jack shaft 29 drives the conveyer belt 12 through the gears 33 and 34 and also drives the hold-down roller 48. The roller 48 is free to pivot up and down about the shaft 41 thus to accommodate itself to differences in height of the material on the belt 12.

As shown best in Fig. 2, the downward travel of the roller 48 toward the belt 12 may be adjustably limited by means of set screws 53 which pass through bracket 54 on the side of the framework of the section A.

Also as best shown in Fig. 2 there is placed across the trough a bar 54*a* which is spaced from the upper flight 12*a* of the belt. The purpose of this bar is to limit the height of the stack of material which may pass under the roller 48 and thence to the cutters. It will be understood that sheets of thin materials such as veneer may be piled one on top of the other to form a stack of material of several inches in height rather than to feed the sheets one at a time to the apparatus. The bar 54*a* therefore acts as a means to limit the overall height of the stack.

The actual chipping mechanism itself will now be described. This portion of the apparatus comprises a housing which is indicated generally by the numeral 56. The housing is open to accommodate rotating knife carrying members 57 and 58 which may be in the form of generally rectangular plates of sufficient thickness to stand the shocks of the operation. The plates are mounted for rotation in a common vertical plane on shafts 59 and 61, respectively. The shafts are mounted in suitable bearings indicated at 62. Fast on the shaft 59 is a gear 63. Fast on the shaft 61 is a gear 64. In mesh with the gear 63 is a driving gear 66 which is mounted on a shaft 67 in turn mounted in bearings 62. In mesh with the gears 66 and 64 is an idler gear 68 which is carried on a shaft 69 likewise mounted in bearings 62. All of the bearings are mounted in an outer plate 71 and an inner plate 72 of the housing 56. Fast on the shaft 67 is a pulley 73. Passing over the pulley is a V-belt 74 which is driven from a pulley 76 on the shaft of an electric motor 77.

By reference more particularly to Figs. 6 and 7 of the drawings it will be seen that the knife plates 57 and 58 carry cutting knives 78. The cutting edges of the knives are indicated at 79. Likewise, the direction of rotation of the plates and knives is indicated by the arrows and it will be seen that the same rotate oppositely. Due to the positive gear drive, it will be seen further that the plates rotate in synchronism.

The knives 78 are mounted on sloping seats 81. The seats are formed on the faces of the plates 57 and 58 and near the edges of the seats are openings 82 through the plates. The knives are secured to the seats by screws 83 and are so held that the cutting edges 79 thereof move in a plane which is forwardly of the remainder of the knife and the remainder of the members 57 and 58, thus to provide clearance for infeeding of the stock immediately after the cutting edge of each knife passes the stationary knife as will be described. It will further be noted that by making the knife carrying members rectangular rather than round, I am enabled to space the shafts 59 and 61 close enough together to obtain an overlapping of a portion of the cutting arcs of the knives. The knives may be provided with elongated slots 84 whereby they may be moved laterally relative to the openings 82 for adjustment purposes.

Mounted on a transversely and horizontally disposed portion of the main frame of the apparatus indicated at 86 is a stationary knife 87 having a cutting edge 88 with which the cutting edges 79 of the knives 78 coact to shear the stock S as shown in Fig. 5. As shown clearly in Fig. 8 of the drawings means in the form of set screws 85 and lugs 85*a* is provided for adjusting the knife 87 toward the path of rotation of the cutting edges 79. The knife is held in adjusted position by bolts and nuts 88*a*. In actual practice I have found that a clearance of about twenty-thousandths inch between the cutting edges 79 and the cutting edge 88 is satisfactory.

Extending across the framework of the apparatus is a shaft 89. Mounted on the shaft 89 for individual movement in vertical planes are a plurality of relatively heavy-hold-down members 91. These members hold the veneer or other wood stock while the knives engage and cut the chips indicated at 92 from the pile or sheet of veneer S. As shown clearly in Fig. 5 the chips fall downwardly, passing through the openings 82. The chips may be removed by means of a conveyer 93 which is placed in suitable manner below the housing 56.

From the foregoing the method of constructing and operating my improved apparatus will be readily understood. Veneer is fed by placing a plurality of superposed sheets, or a single sheet as desired, on the feed conveyer 12, between the side walls 10 of the trough. The wood stock is moved forwardly and is engaged by the floating, driven roller 48. This forces the stock under the hold-down members 91 and feeds the same inwardly, laterally between the shafts 59 and 61, in position for the knives 78 to cut the chips therefrom. Due to the sloping knife seats it will be seen that the veneer is cut far enough away from the faces of the knives 78 and the plates 57 and 58 that by the time a subsequent knife reaches cutting position, assuming the linear feed of the stock to be substantially constant, a chip of equal fiber length with those already cut will be cut from the stack of veneer. It will be noted that the hold down members 91, being independently pivoted on the shaft, are free to rise and fall independently and thereby accommodate themselves to

the height of the stack immediately therebeneath. This is true in a general way of the roller **48** although obviously it cannot accommodate itself to all variations in thicknesses of any given layer of sheets of veneer.

It will also be noted that in order to change the length of the chips it is only necessary to increase or decrease the speed of shaft **29** by changing the sprockets over which the chain **27** passes. Since the motors **23** and **77** run at substantially constant speeds I find that I can vary the length of the chip within the limits permitted simply by changing the rate of speed of the belt **12** and consequently and necessarily, the speed of the hold-down and feeding roller **48**. The change in chip length thus is accomplished without the necessity of resetting or in any way changing the position of the several knives **78** or their speed of rotation.

From the foregoing it will be apparent that I have devised an improved apparatus for chipping wood and one which is especially effective to chip wide, thin pieces of wood such as scrap veneer and the like. Apparatus embodying the features of my invention has been manufactured and is presently in operation. The apparatus has proven to be extremely effective and very practical and trouble free in every respect. The use of the two knife carrying heads not only reduces the overall size of the apparatus but also prevents the stack being cut from shifting to one side as would be the case if a single one were used. In other words, each successive cut tends to push the stack in opposite lateral directions with the end result that it does not shift appreciably either way.

While I have shown my invention in but one form, it will be obvious to those skilled in the art that it is not so limited but is susceptible of various changes and modifications without departing from the spirit thereof, and I

desire, therefore, that only such limitations shall be placed thereupon as are specifically set forth in the appended claim.

What I claim is:

In apparatus for chipping wood, a feed section and a chipping section, said feed section comprising conveyer means for feeding stock to the chipping section, a driven hold-down and feed roller above the conveyer means near the discharge end thereof coacting with the conveyer positively to feed wood stock on the conveyer to said chipper section at substantially a constant rate of speed, said chipper section comprising a stationary knife having a horizontally disposed cutting edge over which the wood stock is fed from the feed section, sets of spaced apart downwardly moving knives co-acting one at a time with the stationary knife to cut chips from the wood stock fed thereover, said downwardly moving knives being mounted for at least a portion of their cutting arcs to overlap, means to rotate the downwardly moving knives at substantially constant speed, and a plurality of independently movable hold-down members operable to engage the stock and press the same against the stationary knife while the downwardly moving knives are engaging and cutting the same.

References Cited in the file of this patent

UNITED STATES PATENTS

447,462	Crane	Mar. 3, 1891
1,736,641	Zimmerman	Nov. 19, 1929
2,024,353	Goodman	Dec. 17, 1935
2,269,352	Bacon	Jan. 6, 1942
2,652,077	Alexander	Sept. 15, 1953
2,712,842	Fahrni	July 12, 1955