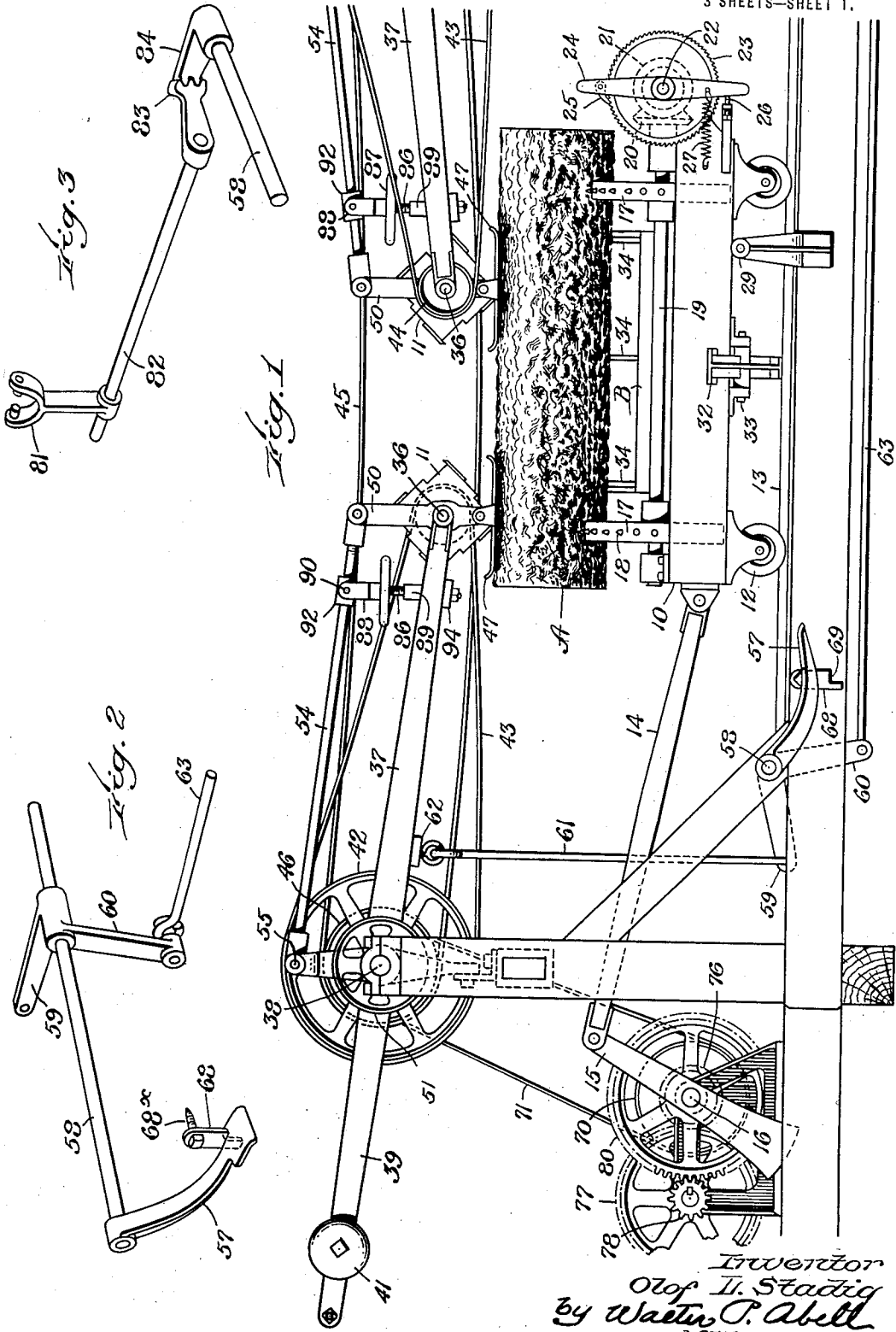


1,337,286.

O. L. STADIG.
PLANING MACHINE.
APPLICATION FILED DEC. 29, 1917.

Patented Apr. 20, 1920.

3 SHEETS—SHEET 1.



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3 SHEETS—SHEET 2.

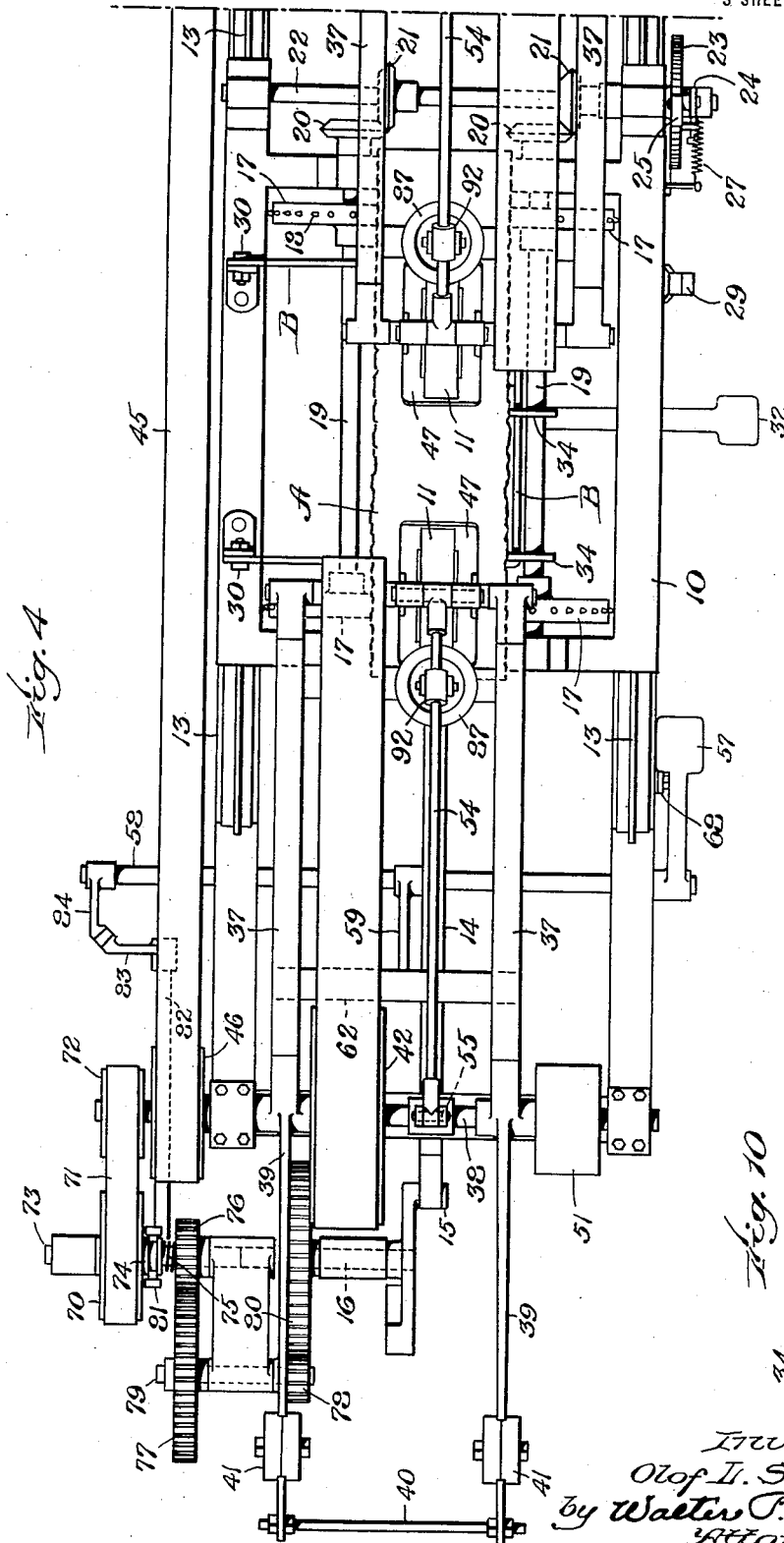
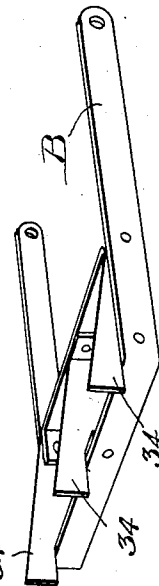


Fig. 10

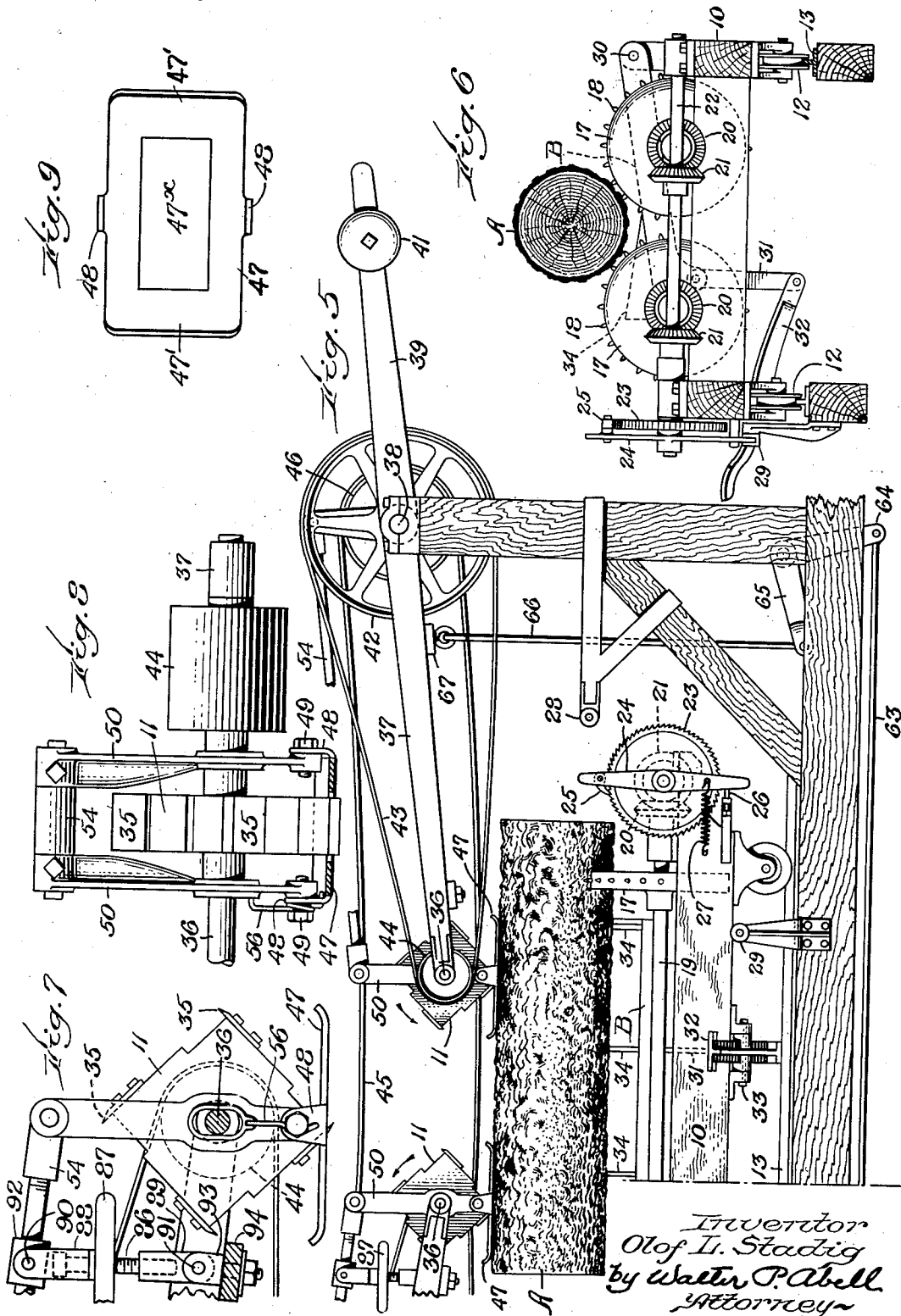


Inventor
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Attorney

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UNITED STATES PATENT OFFICE.

OLOF L. STADIG, OF ST. FRANCIS, MAINE.

PLANING-MACHINE.

1,337,286.

Specification of Letters Patent.

Patented Apr. 20, 1920.

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To all whom it may concern:

Be it known that I, OLOF L. STADIG, a citizen of the United States, residing at St. Francis, in the county of Aroostook and State of Maine, have invented new and useful Improvements in Planing-Machines, of which the following is a specification.

The object of the present invention is to provide an improved machine for removing the bark from billets of log wood that are to be used in the manufacture of pulp. One of the principal features of the invention is the arrangement of the operating devices whereby the bark may be removed with the least waste of wood stock that is desired for pulp. Another feature is the arrangement of devices whereby the bark-removing operation may be performed rapidly with a view to making the capacity of the machine as great as possible.

Before describing the details of the machine I shall describe in general the principal features of structure and operation. A billet from which the bark is to be removed is mounted upon a carriage so that its axis will be substantially horizontal. The cutting tool is brought to bear upon the upper side of the billet, and is preferably of the rotary type, and driven at a high speed, as is customary in rotary planers that are used for operating upon flat stock. While the billet is mounted upon the carriage the latter is reciprocated so that the billet will move in lines parallel to its axis. The carriage is provided with means for rotating the billet step-by-step about its axis, the rotative movements being caused to occur after each traverse of the carriage so that the cutter or cutters will operate upon the bark as much when the carriage is moving in one direction as when it is moving in the opposite direction. In order to cause such rotary movement of the billet I provide the carriage with two pairs of spur-wheels and arrange such wheels to form a trough into which the billet may be placed. Suitable mechanism is provided for turning the said spur-wheels a few degrees at the end of every traverse of the carriage, so that the billet will be turned to a corresponding degree, the spurs of the wheels being arranged to engage the bark and to turn the billet positively.

Of the accompanying drawings which illustrate my present invention in what I now consider the preferred form,

Figure 1 represents a side elevation of one end of the machine or apparatus, including a billet mounted upon a feed carriage in position to undergo the operation of the cutters. In the present instance the machine is provided with two rotary cutter-heads and the latter are arranged in tandem so as to be capable of removing conjointly a course of bark twice as long as the traverse of the carriage.

Fig. 2 represents a perspective view of a portion of the treadle mechanism by which the cutter-heads are retracted from operative position.

Fig. 3 represents a perspective view of the clutch-controlling mechanism by which the power may be disconnected from the traverse mechanism when the cutter-heads are retracted.

Fig. 4 represents a top plan view of the mechanism included in Fig. 1.

Fig. 5 represents an elevation similar to Fig. 1 but showing the mechanism at the opposite end of the machine or apparatus, the billet of wood, and the greater portion of the feed carriage being duplicated. These two figures may be read conjointly by placing them in end to end relation with Fig. 1 at the left and Fig. 5 at the right.

Fig. 6 represents an end elevation of the feed carriage looking from right to left.

Fig. 7 represents an elevation, on a larger scale of the left hand cutter head.

Fig. 8 represents an elevation of said cutter head as viewed from right to left, the guard or shoe that bears upon the bark being shown in section.

Fig. 9 represents a top plan view of the guard or shoe that traverses the bark to determine the depth of cut.

Fig. 10 represents a perspective view of a movable frame for discharging the billet from the feed carriage.

The same reference characters indicate the same parts wherever they occur. A log or billet from which the bark is to be removed is indicated by A, and is shown with the bark on, the bark being represented by solid black in Fig. 6. Although the dimensions of the billet and likewise those of the machine may be varied it may be stated that a machine of the present design is adapted to operate upon billets four feet in length. The feed carriage 10 upon which the billet is mounted is reciprocated so as to have a two foot traverse, and in order to be able to

remove the bark throughout the entire length of four feet, I provide two rotary cutter-heads 11, 11, and arrange the latter in tandem relation two feet apart from center to center. Thus while one cutter-head is removing a course of bark from one end of the billet to the middle the other removes the bark from the middle to the other end.

The feed carriage is provided with grooved wheels 12 and the latter run on tracks 13. Connecting rod 14 is pivotally connected at one end to the carriage, and at the other end to a crank 15. This crank is affixed to shaft 16 that is driven through the medium of a disconnectible clutch herein-after described.

The feed carriage is provided with two pairs of spur-wheels 17, each of which wheels is provided with a series of spurs 18 projecting radially from its periphery. These wheels are mounted upon two shafts 19, and are arranged to form a trough, as shown by Fig. 6, into which the billet is laid, so that its axis will be substantially parallel to the lines of traverse of the carriage. The cutter-heads 11 are arranged in vertical alinement with the center of the trough formed by the spur wheels.

As the carriage is completing its traverse in each direction the spur wheels are turned a few degrees all in one direction, to turn the billet on its axis, so that during each traverse the cutter heads will remove a new course of bark. The change of direction of traverse is immaterial so far as the cutting operation is concerned, because the speed of the cutters is much greater than the speed of traverse. I utilize the traverse motion of the carriage to effect the step-by-step rotary feed of the billet, which rotary feed may be called "cross-feed" because it is analogous to the usual cross-feed used in planing machines and in lathes.

Each shaft 19 is provided with a bevel gear 20. These two gears mesh with bevel gears 21, 21, mounted upon a transverse shaft 22. A ratchet wheel 23 is affixed to this shaft. A lever 24 is loosely mounted upon this same shaft, and is provided with a pawl 25 that engages the teeth of the ratchet wheel. The lower portion of lever 24 is normally held against the back stop 26 by means of a tension spring 27. The back stop is an adjustable screw and the normal position of the lever may be changed by moving the screw forward or back. When the feed carriage 10 is moving from left to right and has all but reached the end of its traverse, the upper portion of the lever 24 is arrested by a stop 28 so that a short additional traverse movement will result in angular motion of the lever in a counter-clockwise direction, the pawl 25 thereby acting upon the ratchet wheel to turn the shaft 22 and thereby turn the spur

wheels to impart the desired rotary motion to the billet. When the feed carriage begins to move in the opposite direction the lever 24 is returned to its back stop 26 by spring 27 and when the carriage, now moving from right to left, has all but reached its left hand limit of motion the lower portion of lever 24 is arrested by a stop 29. This stop being diametrically opposite stop 28 with reference to the axis of the lever, also produces counter-clockwise motion of the lever in consequence of the slight additional traverse of the carriage, and the ratchet wheel is thereby given a slight rotary motion to again turn the billet on its axis. The billet is thus turned step-by-step in one direction regardless of the direction of traverse of the feed carriage.

In the meantime the cutter-heads rest upon the billet and remove the bark in courses, the width of which is determined by the number of degrees of rotary motion imparted to the billet at each step. The degree of such rotary motion may be varied by changing the position of the back stop 26 to cause the pawl 25 to click over one, two, three, or more teeth of the ratchet wheel upon the occurrence of each return of the lever 24 to the back stop. In the majority of cases it would be expedient to adjust the back stop so as to require about twenty-four steps to turn the billet through one complete cycle. It will be understood, however, that a greater or less number of steps would be desirable according to whether the diameter of the billet were large or small, the principal consideration being to remove the bark without removing an appreciable quantity of the fiber of the wood.

The carriage is provided with a device for discharging the billet, said device being arranged to be operated manually. Referring to Figs. 6 and 10 the discharging device comprises a U-shaped frame B the ends of which are mounted upon pivots 30. This frame is arranged to underlie the billet as shown by Fig. 6, and the left hand portion is connected by a link 31 to a treadle 32. This treadle is mounted upon a fulcrum pin 33, and projects from the side of the carriage far enough to enable the attendant to depress the outer end and thereby raise the frame. In order to cause the billet to roll toward the opposite side of the carriage the U-shaped frame is provided with pieces 34, the upper edges of which are inclined relatively to the main body of the frame. As the frame is raised it lifts the billet, and the inclined upper edges of the pieces 34 cause the billet to roll toward the pivots 30, the frame being intended to rise high enough to lift the billet slightly above the spurs of the right hand wheels 17. The billet is therefore enabled to roll down the inclined track provided by the U-shaped frame and

to drop from the right hand side of the carriage.

The cutter-heads 11, 11, are identical in construction and arrangement and a description of one will be sufficient for both. Each cutter-head comprises a block to which a series of cutters 35 are affixed. The head is affixed to a driven shaft 36. This shaft is mounted in suitable bearings at the free ends of arms 37. Two arms 37 are provided for each cutter head and form a frame, said frame being mounted to rock upon a shaft 38 so that the cutter-head may be lifted from the billet whenever necessary. The arms 37 have extensions 39 at the opposite side of the shaft 38, said extensions being preferably connected by a tie rod 40 for the sake of rigidity and being provided with counter weights 41. The function of the counter weights is to facilitate the lifting of the cutter-heads, although the aggregate counter weighing is not sufficient in itself to lift the cutter-heads. The latter rest normally by gravity upon the billet, and require manual effort through mechanism herein-after described to raise them from the billet.

Referring to Figs. 1 and 5 it will be observed that there are two shafts 38, and that the arms 37 extend toward each other from said shafts. These shafts are driven continuously, and although the tilting frames that carry the cutter-heads are mounted upon said shafts the rotary motion of the latter does not affect the position of the frames, because the latter are loose relatively to the shafts. Pulleys 42 are affixed to shafts 38, and transmit rotation through belts 43 to pulleys 44. The latter pulleys are affixed to the shafts 36 that carry the cutter-heads. Both cutter-heads are driven in one direction, as indicated by arrows in Fig. 5, and for this purpose rotation is transmitted from one shaft 38 (Fig. 1) to the other (Fig. 5) by a belt 45 and pulleys 46, 46. In the present instance the shaft 38 in Fig. 1 is the main power shaft of the apparatus and is provided with a main pulley 51, arranged to be driven by a main power belt (not shown). Each cutter-head is provided with a depth gage, which is arranged to bear upon the billet. This gage may embody different forms, but for rough bark I prefer the sliding shoe as indicated at 47. The shoe is provided with an opening 47* through which the cutters 35 dip as the cutter-head rotates, Fig. 7 and 8 showing one of the cutters projecting below the bottom surface of the shoe so as to be capable of exercising its cutting action upon the billet. The shoe is provided with ears 48 and the latter are mounted upon pivot studs 49. These studs are carried by bars 50 that are adjustable up and down for the purpose of raising or lowering the shoe relatively to

the cutter-head so as to vary the depth to which the cutters may operate.

In the present instance the adjusting means for the depth gage comprises a turn buckle screw 86 having a hand wheel 87. The upper end of the screw has swivel connection with a coupling piece 88, and the lower end has screw connection with a coupling piece 89. The coupling piece 88 is pivotally connected by trunnions 90 to a collar 92 on link 54, and coupling piece 89 is pivotally connected by trunnions 91 to ears 93 on a cross-bar 94 fastened to arms 37. This adjusting means and likewise arms 37 and link 54 partake of a "parallel ruler" motion to maintain the bars 50 in substantially vertical position.

Link 54 is pivotally connected to a stationary anchoring pin 55 to prevent longitudinal displacement of the shoes or depth gages 47.

The shoes 47 are capable of turning slightly about their pivot studs 49 in response to the demands of irregularities in the surface of the billet upon which they slide, but they are normally held in a substantial horizontal position by springs 56. In the present instance each spring is anchored at its upper end to one of the bars 50, and at its lower end it is connected to the adjacent ear 48. Between its ends the spring is coiled about the adjacent pivot stud 49 as shown by Fig. 8. The shoes are thereby adapted to tilt so as to maintain a suitable bearing upon an irregular surface of the billet, and the cutter-heads are therefore adapted to traverse the billet without undue chattering. Each cutter-head may rise and fall independently of the other while traversing a billet, and will follow the general contour of the surface upon which it is operating.

Inasmuch as the shoe is a substantially oblong structure, as viewed from above (see Fig. 9) its transverse portions 47' bear on the work in the path of the cutter, one being in advance of the cutter and serving to adjust the latter vertically according to projections about to be encountered thereby. The cutter is thus relieved from too great a cutting burden in consequence of encountering stumps of branches and other lumps in its path.

A treadle 57 is provided for raising the cutter-heads through suitable connections now to be explained. This treadle is affixed to a rock shaft 58, and a bell-crank also affixed to shaft 58 has arms 59 and 60. The arm 59 is connected by link 61 to a cross bar 62 that is affixed to arms 37 of one cutter head carrying frame. Arm 60 of the said bell-crank is connected by a link 63 with an arm 64 of another bell-crank (see Fig. 5). The latter bell-crank has an arm

65 that is connected by link 66 with a cross bar 67, the latter being affixed to the arms 37 of the other cutter-head carrying frame. When treadle 57 is depressed from the position shown in Fig. 1 it lifts the two cutter-heads in unison, through the several levers and links just described. It is desirable to provide means for locking the treadle in its depressed position so as to hold the cutter-heads in their elevated position while removing one billet and putting another billet in its place. For this purpose I provide a latch 68 (see Fig. 2). This latch is mounted upon a pivot member 68* and hangs from the latter. The lower portion of the latch is cut away to provide the shoulder 69. The latch is arranged to be displaced from its normal vertical position by the foot portion of the treadle when the latter is depressed, and when the said foot portion has reached a position lower than the shoulder 69 the latch swings back to its normal vertical position with the shoulder 69 overhanging the foot portion. The latch is so disposed that the foot that is used to retard the lowering of the cutter-heads may first displace the latch to release the treadle.

In view of the fact that the cutter heads may be raised in unison by the described connections with treadle 57, the statement that they are movable up and down independently of each other to follow the surface of the billet is accounted for by the fact that there are several loose connections in the lifting mechanism, the aggregate lost motion of which is amplified by arms 37 in favor of the cutter heads.

Although any suitable driving mechanism may be provided to operate the crank 15, I will describe the mechanism shown, because the latter includes a disconnectible clutch whereby the crank may be disconnected from the main power shaft simultaneously with the raising of the cutter heads. As hereinbefore stated the shaft 38 shown in Fig. 1 is the main power shaft of the apparatus. The power for operating the crank 15 is transmitted from the main power shaft to a clutch pulley 70 (Fig. 4,) by means of a belt 71, said belt being driven by a pulley 72 on shaft 38.

Pulley 70 is loosely mounted upon a counter shaft 73 which in the present instance is in line with crank shaft 16 but not directly connected to the latter. Shaft 73, when driven, rotates at a relatively high rate of speed, whereas the crank shaft when driven rotates at a relatively slow speed, the reduction in speed being caused by the back gearing hereinafter described.

Any suitable clutch pulley or other clutch may be employed for driving shaft 73, and for the present purpose it will be sufficient to state that the pulley 70 is clutched to and unclutched from the shaft by a sliding

collar 74. This collar is movable longitudinally of the shaft and is normally pressed toward the pulley by a compression spring 75 to maintain driving connection between the pulley and the shaft. When the collar 70 is retracted from the pulley the latter is freed from the shaft and continues to rotate without driving the shaft. A gear 76 is affixed to the clutch shaft, and meshes with a gear 77. The latter gear and a pinion 78 are affixed upon a counter shaft 79, pinion 78 meshes with a gear 80 that is affixed to crank shaft 16.

The clutch collar 74 is engaged by a shipper 81, which as shown by Fig. 3, is mounted upon a rock shaft 82. A bevel gear segment 83, affixed to rock shaft 82, is arranged to oscillate by a companion segment 84. The latter is affixed to the rock shaft 58 upon which the treadle 57 is mounted. Connections last described enable the clutch pulley to maintain driving connection with the crank shaft 16 so long as the cutter heads are in operative position, but when treadle 57 is depressed to raise the cutter heads the gear segments 83, 84 oscillate the shipper 81 in a direction that unclutches the pulley. It is thus possible to arrest the traverse of the feed carriage 10 simultaneously with lifting the cutter heads.

In practice the attendant would disconnect the clutch pulley at a time that would result in leaving the carriage at rest when at or near its left hand limit of travel so that the discharging treadle 32 would come to rest at a position close to the treadle 57. The attendant could then depress the discharging treadle without being obliged to move from his accustomed location.

I believe that I am the first to have provided the combination of a plurality of cutters arranged in tandem relation, with a feed carriage having a stroke or traverse only long enough to merge the cuts of the series of cutters into one continuous cut, to obtain a working capacity equal to the aggregate number of cutters without increasing the length of traverse.

I claim:

1. A machine of the character described comprising, in combination, a movable work-support, a sliding shoe arranged to bear on the work, a pair of bars pivotally connected to said shoe and extending upwardly therefrom, said bars having longitudinally extending slots above the axis of the pivotal connection, a cutter-shaft extending through said slots, a rotary cutter affixed to said shaft and arranged between said bars so as to operate on the work through a hole in the shoe, an oscillatory cutter-frame having bearings in which said shaft is journaled, oscillatory means substantially parallel to said cutter-frame and pivotally connected to said bars to maintain the latter

in substantially vertical position, and adjustable means connecting said oscillatory means and the cutter-frame to adjust the cutter-shaft up and down relatively to said slots.

2. A machine of the character described comprising, in combination, a reciprocatory work-support, a gage arranged to rest upon the work, a gage-holder pivotally connected to and extending upwardly from the gage, means including substantially parallel links pivotally connected to the gage-holder to maintain the latter in upright position and to guide it up and down, one of said links being adjustable toward and from the other relatively to said holder, a rotary cutter journaled in the lower one of said links and arranged to operate on the work, and means arranged to adjust said links to vary the effective cutting depth of the cutter relatively to the gage.

3. A machine of the character described comprising, in combination, a work-support, a tool-holder movable toward and from the work, means to guide the tool-holder in respect to such movement, a rotary cutter mounted in said tool-holder, means to drive said cutter, means to cause relative feeding movement of the work-support and the tool-holder to cut progressively along the surface of the work, and a shoe pivotally connected to the tool-holder on an axis between that of the cutter and the periphery of the latter, said shoe having work-engaging portions arranged in the path of the cutter in advance of and behind the latter, respectively, to vary the depth of cut by irregularities of the work in the path of the cutter.

4. A machine of the character described comprising, in combination, a work-support, a tool-holder movable toward and from the work, means to guide the tool-holder in respect to such movement, means to cause relative feeding movement of the work-support and the tool-holder to cut progressively along the work, a shoe pivotally connected to the tool-holder to tilt in operation, said shoe having work-engaging portions arranged in advance of and behind the cutter, respectively, to determine the depth of cut by irregularities in the work traversed thereby, and means to adjust said shoe bodily with respect to the tool-holder to vary the depth of cut otherwise than by the tilting action of the shoe.

5. A machine of the character described comprising, in combination, a movable work support, means arranged to reciprocate the latter, a rotary cutter head, a holder for said cutter head, said holder being arranged to be movable up and down over the work, an arm pivotally connected to said holder, said arm being arranged to swing up and down

about an axis to raise and lower said cutter head, a link pivotally connected to said holder, an anchor pivot for said link, said link being arranged to maintain one angular position of said holder as the latter moves up or down about said axis, and a shoe carried by said holder and arranged to bear upon the work to determine the depth of cut.

6. A machine of the character described comprising, in combination, a movable work support, drive mechanism including a disconnectible clutch for reciprocating said work support, a tool holder arranged to be movable toward and from the work, and manually operative means having connections with said clutch and with said tool holder, said means being arranged to disconnect said clutch and retract said tool holder from the work.

7. A machine of the character described comprising, in combination, a movable work support, drive mechanism including a disconnectible clutch for reciprocating said work support, a plurality of tool holders arranged to be movable independently of each other to follow the contour of the work, and manually operative means having connections with said clutch and with said tool holders, said means being arranged to disconnect said clutch and retract said tool holders from the work.

8. A machine of the character described comprising, in combination, a work-carriage, means mounted on said carriage to hold a cylindric piece of work with its axis parallel to the lines of traverse of said carriage, a plurality of rotary cutters arranged in tandem relation to operate on the piece of work, means arranged to reciprocate said carriage to cause said cutters to cut courses parallel to said axis, said reciprocating means having a traverse sufficient to merge said courses one into another, and means arranged to move said work-holding means at the end of each traverse of said carriage to turn the piece of work about its axis.

9. In a machine of the character described, a cutter, means to guide the cutter toward and from the work, means arranged to feed the work, a shoe arranged to bear on the work to sustain the cutter and to determine the depth of cut, said shoe having work-engaging portions respectively in advance of and behind the cutter, pivotal means connecting the shoe and cutter between said work-engaging portions, and a spring arranged to maintain the shoe normally in a median angular position parallel to the path of the work.

In testimony whereof I have affixed my signature.

OLOF L. STADIG.