

Sept. 6, 1966

N. E. HESS ETAL  
BRUSH CHIPPING MACHINE

3,270,968

Filed May 20, 1963

3 Sheets-Sheet 1

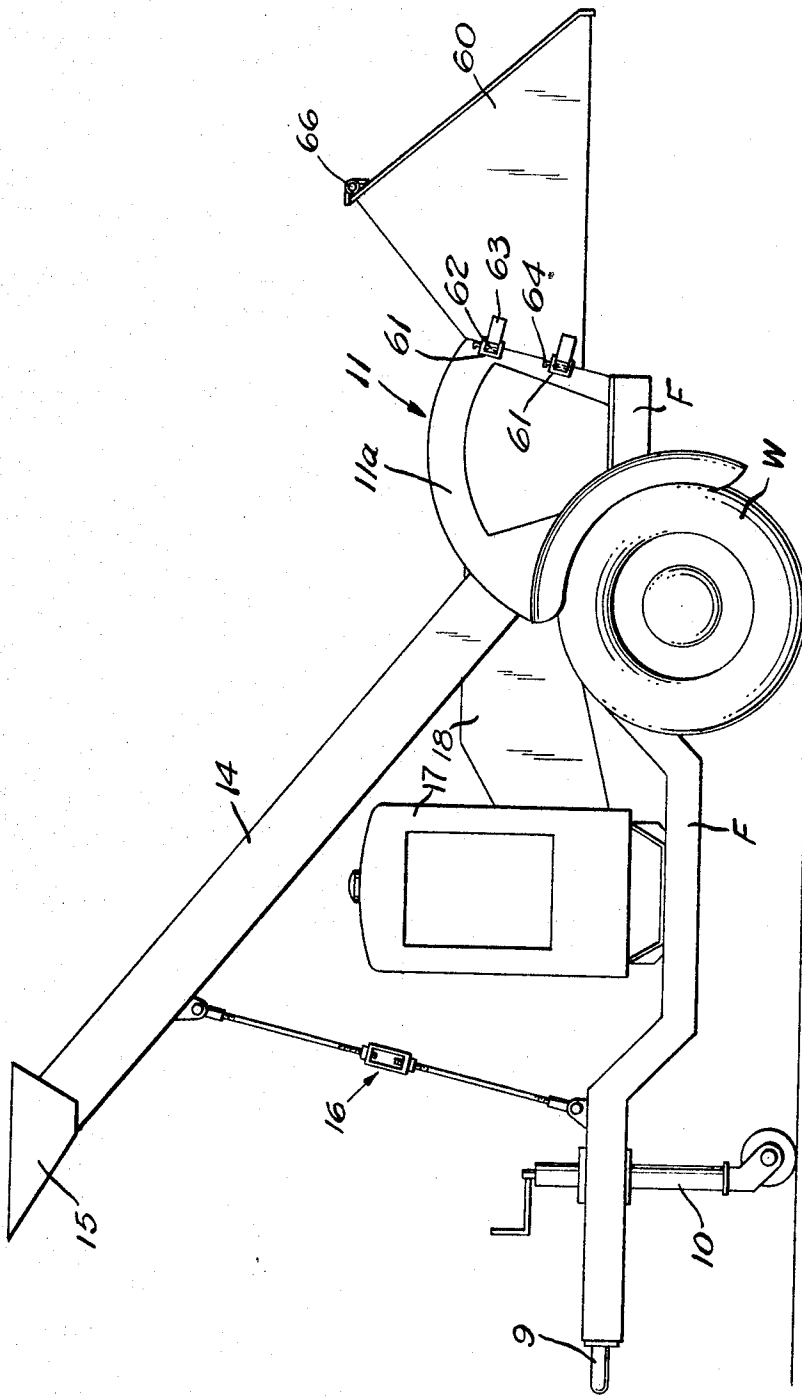


FIG. 1

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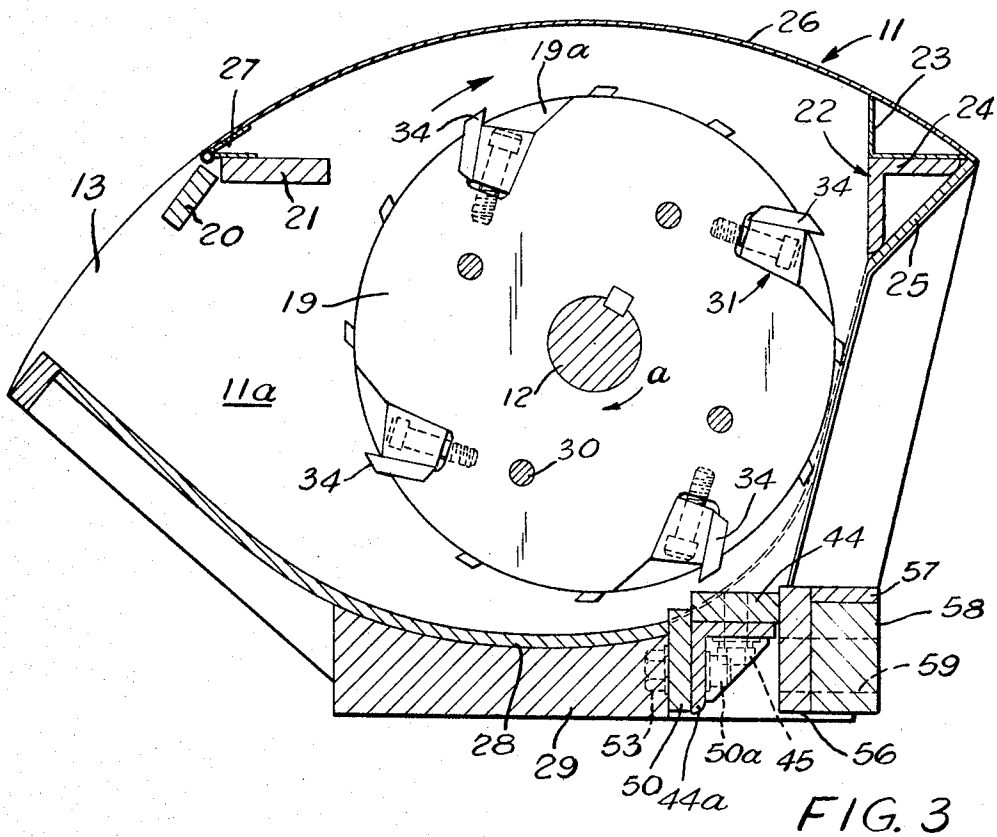


FIG. 3

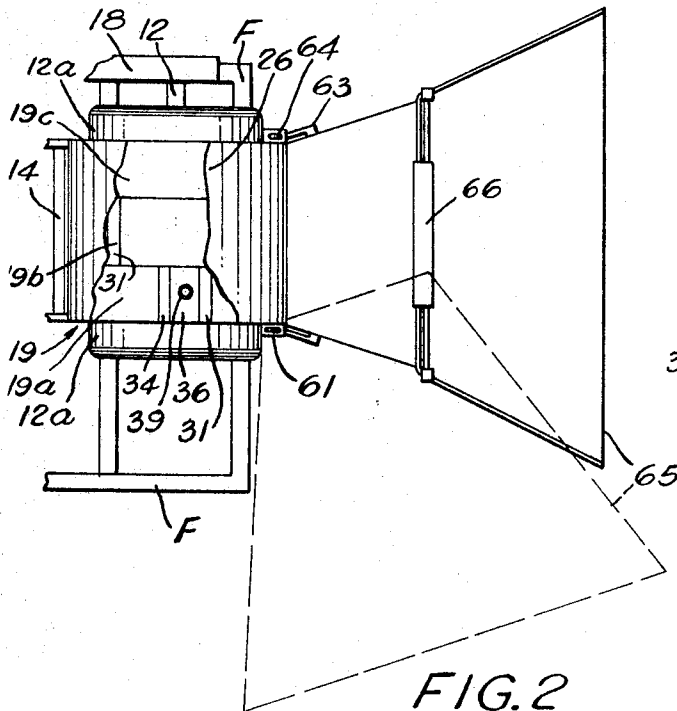


FIG. 2

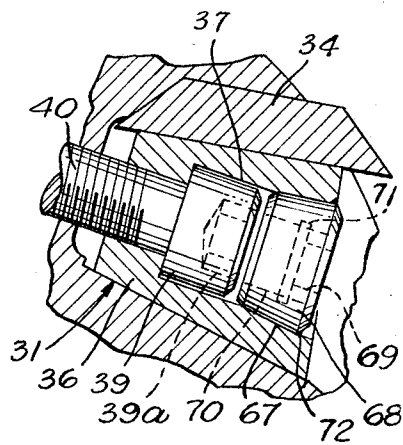


FIG. 7

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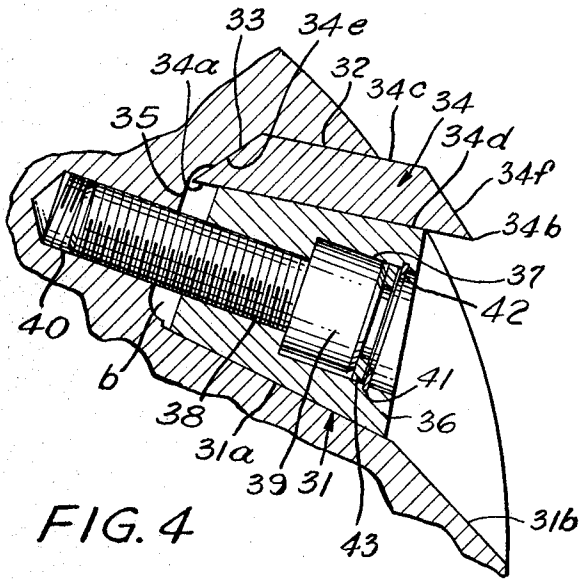


FIG. 4

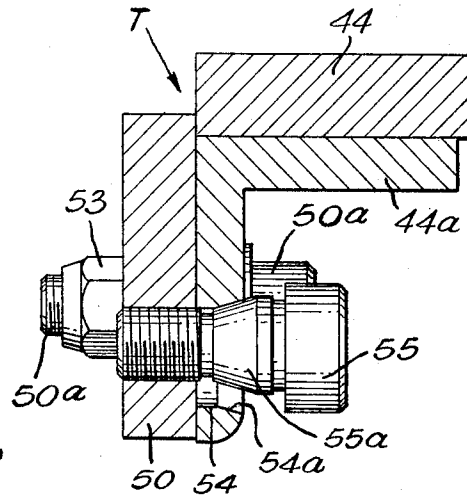


FIG. 6

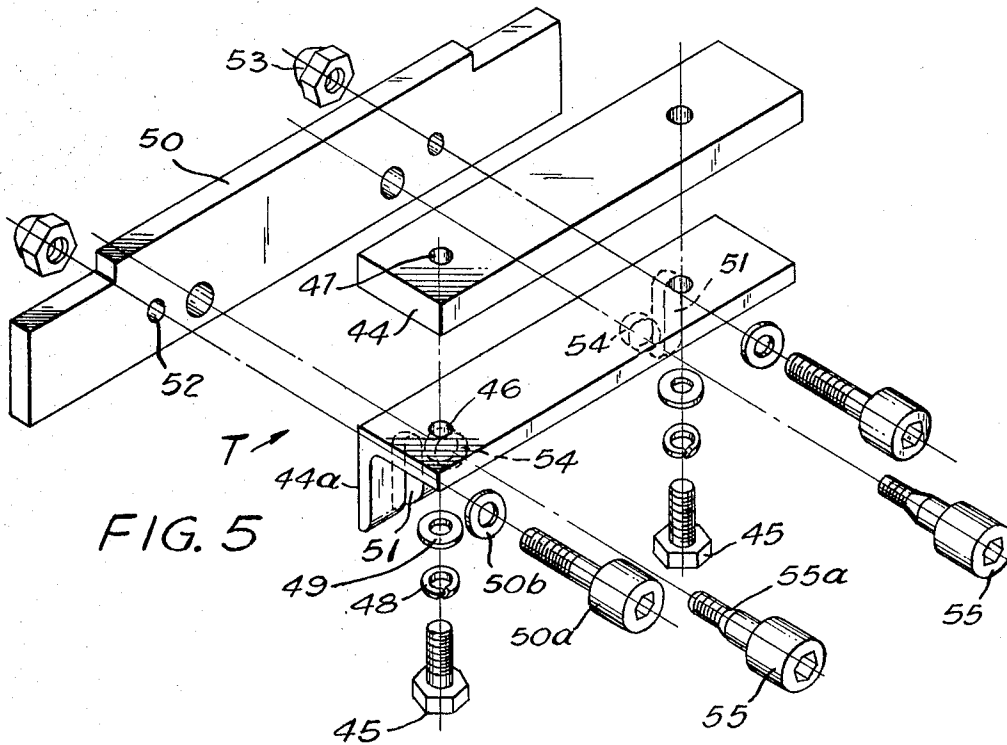


FIG. 5

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**BRUSH CHIPPING MACHINE**

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11 Claims. (Cl. 241-186)

This invention relates to brush chipping machinery and more particularly to certain novel and useful improvements in machines of the type which are purchased by municipalities, public utilities, highway departments and the like for disintegrating brush and branches into small chips, which are in increasing demand as fertilizer, mulch and the like. The improvements which comprise the invention are concerned with the chipping cylinder and throat bar assemblies and the hopper through which the brush is fed to the chipping cylinder assembly.

More particularly, the invention is concerned with the manner in which the interchangeable double-edged knives are mounted by wedge blocks in the chipping cylinder, with each wedge block being secured so that the wedged fit is easily broken to facilitate the easy reversal of each of the knives when necessary. The invention is also concerned with the manner in which a throat bar which cooperates with the knives is mounted for movement toward and away from the peripheral path of the knives, and the manner in which the hopper forming the feeding surface can be swung to a remote position to provide access to the throat bar assembly and the chipping cylinder.

One of the prime objects of the invention is to provide a chipping cylinder assembly mounting double-edged knives having twice the life of conventional knives, which are securely fixed in position in a manner not to dull their inwardly disposed cutting edges, the assembly accomplishing this while utilizing the positive locking of wedge blocks which can be readily removed to permit reversal or sharpening of the knives because the wedge blocks carry their own "wedged fit" breaking members.

A further object of the invention is to provide a brush chipper cylinder in which positive end locations are provided for the symmetrical, reversible knives, and the need for having to set up each knife to obtain a required clearance is obviated.

Another object of the invention is to provide a brush chipper of the character described including a throat bar assembly which is readily adjustable to compensate for the loss of length which occurs when the knives are sharpened.

A further object of the invention is to provide brush chipping machinery which provides ready access to the chipping cylinder and throat bar assemblies.

A still further object of the invention is to provide highly efficient, reliable brush chipping apparatus which is of relatively simple and economical construction.

Other objects and advantages of the invention will be pointed out specifically or will become apparent from the following description when it is considered in conjunction with the appended claims and the accompanying drawings, in which:

FIGURE 1 is a side elevational view of a brush chipper machine;

FIGURE 2 is a top plan view of the rear end of the chipper, the chain lines illustrating a swung over position of the brush feeding hopper;

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FIGURE 3 is an enlarged, sectional, side elevational view taken through the chipper housing;

FIGURE 4 is a still further enlarged, fragmentary, side elevational view of one of the chipping knife assemblies;

FIGURE 5 is an exploded, isometric view illustrating the various parts of the throat bar assembly on an enlarged scale;

FIGURE 6 is an enlarged, sectional, side elevational view illustrating the manner in which the throat bar is moved upwardly and downwardly; and

FIGURE 7 is a view similar to FIGURE 4 of a modified embodiment of the invention.

Referring now more particularly to the accompanying drawings and, in the first instance, to FIGURE 1, a letter F generally indicates the frame of the machine, which is supported by rear wheels W in the usual manner. A tow bar 9 is provided so that the vehicle can be drawn behind a truck or other motive vehicle, and a raisable jack 10 is also provided to support the front end of the machine when the tow bar is detached. Mounted on the frame F of the machine is a chipper cylinder housing generally designated 11 having end bearings 11a which journal a chipper cylinder shaft 12 (see FIGURE 3). The chipper cylinder housing 11 is open at its front end as at 13 to a chip discharge chute 14 having an adjustable bonnet 15 thereon and it will be seen that the chute 14 may be supported from the frame F by a rod and turn-buckle assembly generally designated 16. Preferably, a gasoline or diesel motor 17 is employed to drive the shaft 12, and the box 18 shown in FIGURE 1 houses the drive belts and associated parts for driving the shaft 12 in the direction of rotation a.

Mounted on the shaft 12 is the cylinder generally designated 19, which may comprise a single elongate part or a number of disks clamped together to form a composite chipper cylinder. The housing 11 for the cylinder 19 comprises side walls 11a joined by spanning members 20 and 21 at the front and 22 at the rear, the brace member 22 at the rear comprising angle members 23 and 24 and a rear wall section 25. The housing 11 has a top wall or cover 26 which is hingedly mounted in position as at 27, and a curvilinear bottom 28 mounted on spaced apart support blocks 29 which may be fixed to the frame F of the machine in any suitable manner.

For purposes of the present disclosure, it will be assumed that the cylinder or cutting head 19 is comprised of a plurality of disks 19a, 19b and 19c (FIGURE 2), assembled together in fixed relationship by bolts 30 for rotation as a unit to present a working face to the brush subjected to the chipping operation. Formed transversely of the periphery of each of the disks at predetermined circumferentially spaced intervals are knife openings generally designated 31 (see FIGURE 4) which extend transversely across the width of the particular disk. It is to be understood that the openings 31 formed in adjacent disks are staggered circumferentially with relation to one another.

Each opening 31 includes an inwardly extending back wall portion 32 connecting with a wall portion 33 which extends angularly from it, the wall portion 33 forming a locating support surface for a reversible, symmetrical blade knife generally designated 34, as shown in FIGURE 4. It will be noted that the wall 33 terminates short of the innermost wall 35 of the opening 31 and the knife 34 is of such thickness that the inwardly disposed

cutting edge 34a does not engage either wall. When mounted in position, each knife 34 extends outwardly beyond the periphery of the disk at an acute angle thereto, taken in the direction of rotation of the disk, and presents a leading cutting edge 34b. Each knife 34 includes parallel back and front walls 34c and 34d which are connected by sloping end walls 34e and 34f. When a knife 34 is mounted in position the wall 34d is convergent relative to the front wall 31a of the opening 31 which includes an angularly extending leading portion 31b. A wedge block 36 is received between the walls 34d and 31a, as shown, the angularity of the walls being such that when a wedge block 36 is wedged in position there is a space *b* between the inner end of the wedge block 36 and the wall 35 of the opening 31.

Each wedge block is provided with a counterbored opening 37, communicating with a bore 38, to accommodate a socket-headed bolt 39 which extends into a threaded opening 40 communicating with the opening 31, as shown. It will be seen that the counterbore 37 is grooved as at 41 to receive a ring 42 and that a washer 43 is provided between the ring 42 and the head of the bolt 39. To turn a bolt 39 it is only necessary to insert a socket wrench through the ring 42 and washer 43 into the socket in the head of bolt 39.

Cooperating with the knives 34 in their rotary travel is a horizontally disposed throat bar assembly generally designated T which includes a throat bar 44 mounted for movement upwardly and downwardly so as to be adjustable inwardly and outwardly relative to the path of travel of the knife edges. The throat bar 44, which extends the full length of the cutter head 19, is secured to an angle member 44a (see FIGURES 3 and 5) by bolts 45 which extend upwardly through openings 46 in the angle member 44 into threaded openings 47 in the throat bar 43, lock washers 48 and washers 49 being also employed. The angle member 44a is mounted on a front plate 50, which is fixed to the members 29, by socket-headed bolts 50a which extend through vertically slotted openings 51 provided in the angle members 44 and through openings 52 in the front plate 50, there being nuts 53 welded to the plate 50 to receive the bolts 50a, and washers 50b also being utilized. Also provided in the angle member 44a are enlarged openings 54 adapted to receive the socket-headed members 55 which have frustoconical portions 55a thereon cooperating with tapering portions 54a (FIGURE 6) of the enlarged openings 54. Plainly, if the members 55 are moved inwardly in FIGURE 5 conjunctively, the angle member 44a and throat bar 44 will be raised, whereas if the members 55 are backed off, the angle bar 44a and throat bar 44 will be permitted to descend.

At the rear of the cutting head assembly are support members 56, 57 and 58, which have slotted openings 59 to permit ready access to the bolts 50a and 55. The plate 57 and member 56 form a feed surface which is an inner continuation of the floor of a feed hopper 60 (see FIGURES 1 and 2) which is hinged to the housing 11 for swinging movement lateral. Mounted on the housing 11 are hinges or clevises 61 which receive the sockets 62 of straps 63 which are fixed to the hopper 60. L-shaped pins 64 may be provided to detachably connect the straps 63 to the hinges or clevises 61 and it is to be understood that the hopper 60 is connected to the housing 11 in exactly the same manner on both sides. Thus, to swing the hopper 60 laterally in a horizontal plane to either side, it is merely necessary to first remove the pins 64 from the hinges or clevises 61 on one side of the hopper. When the hopper 60 is swung aside, the throat bar assembly is accessible to permit its ready adjustment, and the cutting knives are also readily accessible to permit them to be easily reversed. An inwardly swinging metal flap 65 can be hingedly connected to the hopper 60 as at 66 or a rubber flap may be provided for the entrance end of the hopper, if desired.

In operation, revolution of the cylinder 19 in the direction *a* continuously chips or shaves chips from the branches and the like which are manually fed endwise into the hopper 60, the rotation of the cylinder 19 tending to continuously feed the branches inwardly once it engages them. Chips are blown out through the chute 14 and distributing bonnet 15 and may be discharged to the truck which is pulling the brush chipping apparatus, for instance. To reverse the knives 34, it is merely necessary to remove the pins 64 from one side of the hopper 60 and swing the hopper 60 laterally to expose the chipper cylinder 19. Insertion of a socket wrench through a ring 42 and washer 43 into the socket in a bolt 39, and rotation of the bolt 39, will then cause the washer 43 to be forced into engagement with the ring 42. Continued rotation of the bolt 39 in the same direction will "break the wedge" and permit the knife blade 34 to be drawn outwardly and simply turned end for end. Since sharpening the knives is along the wall 34d, rather than along the walls 34e or 34f, there never is any question of the knife 34 seating properly on the wall 33 of the knife opening 31. Sharpening of the edges 34a and 34b, when this is necessary reduces the length of the wall 34d by an amount which may be .015 to .020 of an inch, for example. When this has occurred it is a simple matter to insert a socket wrench through the slotted opening 59 in the members 58 and 56 and to slightly loosen bolts 50. It the same wrench is then used to manipulate the socket-headed bolts 55 inwardly a predetermined distance, the tapered portions 55a thereof will, through their engagement with the tapered portions 54a of the openings 54, move the angle member 44a and throat bar 44 upwardly to compensate for the material removed when the knives were sharpened. In this way the position disturbing effect of sharpening the knives can be negated by a simple adjustment of the throat bar 44.

It should be apparent that a greatly improved brush chipping machine is provided which can be easily maintained at a peak of operating efficiency.

In FIGURE 7 a modified and preferred embodiment of the invention is shown in which the bore 37 includes a tapered portion 67 which is threaded to receive a tapered, hexagonally socketed pipe plug 68 which is similarly threaded. The hexagonal socket opening is shown at 69 as communicating with the bore 70, and the portion 71 is simply the relief necessary to formation of the hexagonal opening 69. The threaded pipe plug 68 takes the place of the rings 41 and 43 of the previously described embodiment and is staked securely in position by deforming the threads at spaced circumferential points, as at 72. In practice, to reverse the knife 34 a hexagonal socket wrench is inserted through the openings 69 and 70 into the hexagonal socket 39a in the bolt 39. Rotation of the bolt 39 in a direction to back it off will cause the head of the bolt 39 to engage the inner radial face of the pipe plug 68 and continued rotation of the bolt 39 in the same direction will "break the wedge" and permit the knife blade 34 to be drawn outwardly and simply turned end-for-end.

It is to be understood that the drawings and descriptive matter are in all cases to be interpreted as merely illustrative of the principles of the invention, rather than as limiting the same in any way, since it is contemplated that various changes may be made in the various elements to achieve like results without departing from the spirit of the invention or the scope of the appended claims.

We claim:

1. In a brush chipper machine; housing means; revoluble cylinder means therein; a material feeding surface for said housing means leading in toward said cylinder means, said material feeding surface including throat section means adjacent the path of said cylinder means; said

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cylinder means having a plurality of wedge block openings therein at spaced intervals around the periphery thereof; a chipping knife received in each opening and extending a predetermined distance peripherally beyond the cylinder means; a wedge block received in each opening and bearing against each knife; anchoring means extending from each wedge block into said cylinder means for anchoring said wedge blocks and knives in position; and means carried by said wedge blocks outwardly of said anchoring means engaged by said anchoring means when the latter are moved outwardly to break the wedged fit of the blocks in the openings and move the blocks outwardly.

2. The combination defined in claim 1 in which each said anchoring means comprises a socket-headed bolt and said means carried by the wedge blocks comprises a ring seated in a groove in each said wedge block outwardly of each bolt head.

3. The combination defined in claim 1 in which said throat section means comprises: a throat bar member; a support member on which it is supported having openings with axially tapering portions; and a front plate secured to said housing means; there being threaded members, received in threaded openings provided in said front plate, having tapered sections cooperating with said tapering portions for causing relative travel of said support member and throat bar toward and away from said cylinder means.

4. The combination defined in claim 1 in which said material feeding surface includes the floor of a hopper hingedly mounted to said housing means to swing laterally away therefrom.

5. The combination defined in claim 1 in which each knife comprises an outer wall joined to a shorter opposite wall by end walls defining an acute angle with the outer wall and forming opposed cutting edges on opposite ends thereof; each wedge block opening is shaped to define a knife locating inclined marginal wall portion terminating short of the bottom of the opening and shaped to accommodate an end wall of the knife; and the knife between said outer wall and shorter opposite wall is of greater lateral dimension than the said inclined wall portion so that the inwardly disposed cutting edge is disposed laterally outward of the said portion of the opening and outward of the bottom of the opening.

6. In a brush chipper machine; housing means; revoluble cylinder means therein; a material feeding surface for said housing means leading in toward said cylinder means, said material feeding surface including throat bar means with a leading edge adjacent the path of said cylinder means; actuating means having a tapered surface engageable with a cooperative surface on said throat bar means for moving said throat bar means toward said cylinder means; said cylinder means having a plurality of openings therein at spaced intervals around the periphery thereof; a chipping knife received in each opening and extending a predetermined distance peripherally beyond the cylinder means; and anchor means received in each opening and bearing against each knife to hold it in position.

7. In a brush chipper machine; housing means; revoluble cylinder means therein; a material feeding surface for said housing means leading in toward said cylinder means, said material feeding surface including throat bar means with a leading edge adjacent the path of said cylinder means; means actuatable to move said throat bar means toward said cylinder means; said cylinder means having a plurality of wedge block openings therein at spaced intervals around the periphery thereof; an elongate, reversible chipping knife blade having a chipping edge at each end received in each opening against a wall thereof and extending a predetermined distance peripherally beyond the cylinder means; a wedge block received in each opening and bearing against each knife

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blade; anchor bolt means extending from each wedge block into said cylinder means for anchoring said wedge blocks and knife blades in position; means carried by said wedge blocks outwardly of the anchor bolts engaged by said anchor bolts when the latter are backed off to break the wedged fit of the blocks in the openings and move the blocks outwardly; and a hopper hinged to said housing and having a floor forming a portion of said material feeding surface swingable laterally to one side to provide access to said throat bar means and chipping knife blades.

8. The combination defined in claim 1 in which each said anchoring means comprises a socket-headed bolt and said means carried by the wedge blocks comprises a pipe plug, threaded in each wedge block outwardly of each bolt, having a through opening to permit a socket wrench to be inserted through to the bolt.

9. In a brush chipping machine; housing means; revoluble knife carrying means therein; a material feeding surface for said housing means leading in toward said knife carrying means; said knife carrying means having a plurality of circumferentially spaced wedge block openings therein; a chipping knife received in each opening and having a chipping edge extending a predetermined distance beyond the knife carrying means; a wedge block received in each opening and bearing against each knife; anchoring means extending from each wedge block into said knife carrying means for anchoring said wedge blocks and knives in position; and means carried by said wedge blocks outwardly of said anchoring means engaged by said anchoring means when the latter are moved outwardly to break the wedged fit of the blocks in the openings and move the blocks outwardly.

10. In a brush chipping machine; housing means; revoluble knife carrying means therein; a material feeding surface for said housing means leading in toward said knife carrying means, said material feeding surface including throat bar means with a leading edge adjacent the path of said knife carrying means; a hopper having a floor portion comprising said material feeding surface also; means mounting said hopper on one side of said housing means for swinging movement laterally about a generally vertical axis away from said housing means; releasable means for securing the hopper in "swung in," operative position; said knife carrying means having a plurality of openings therein at spaced intervals around the periphery thereof; a chipping knife received in each opening and having a chipping edge extending a predetermined distance beyond the knife carrying means; and anchoring means for each opening bearing against each knife to hold it in position.

11. In a brush chipping machine; housing means; revoluble knife carrying means therein; a material feeding surface for said housing means leading in toward said knife carrying means; said knife carrying means having a plurality of knife holder member openings therein at spaced circumferential intervals; a reversible chipping knife blade, having a front wall with angularly extending end walls defining a chipping edge at each end of the front wall, received in each opening with a rear wall against a generally radial side wall thereof and with a chipping edge extending a predetermined distance beyond the knife carrying means; each opening having, in addition to said generally radially extending side wall, an inner wall, and a wall portion angled to receive an end wall of a chipping knife; said angled wall portion being of less lateral depth than the thickness of said knife and the radial depth of each opening being such that the inner chipping edge of the knife does not engage any surface; a holder member received in each opening and bearing against each knife blade; and anchor means for each holder member anchoring said holder members and knife blades in position.

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