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Hamlin

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[54] **SHREDDER**

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[52] **U.S. Cl.**..... **241/101.7,** 56/13.2, 241/186 R, 241/188 R, 241/190, 241/193

[51] **Int. Cl.** **B02c 13/04,** B02c 13/10

[58] **Field of Search**..... 241/186 R, 101 M, 101.7, 241/188 R, 189 R, 152, 193, 190; 56/13.2; 193/17, 18

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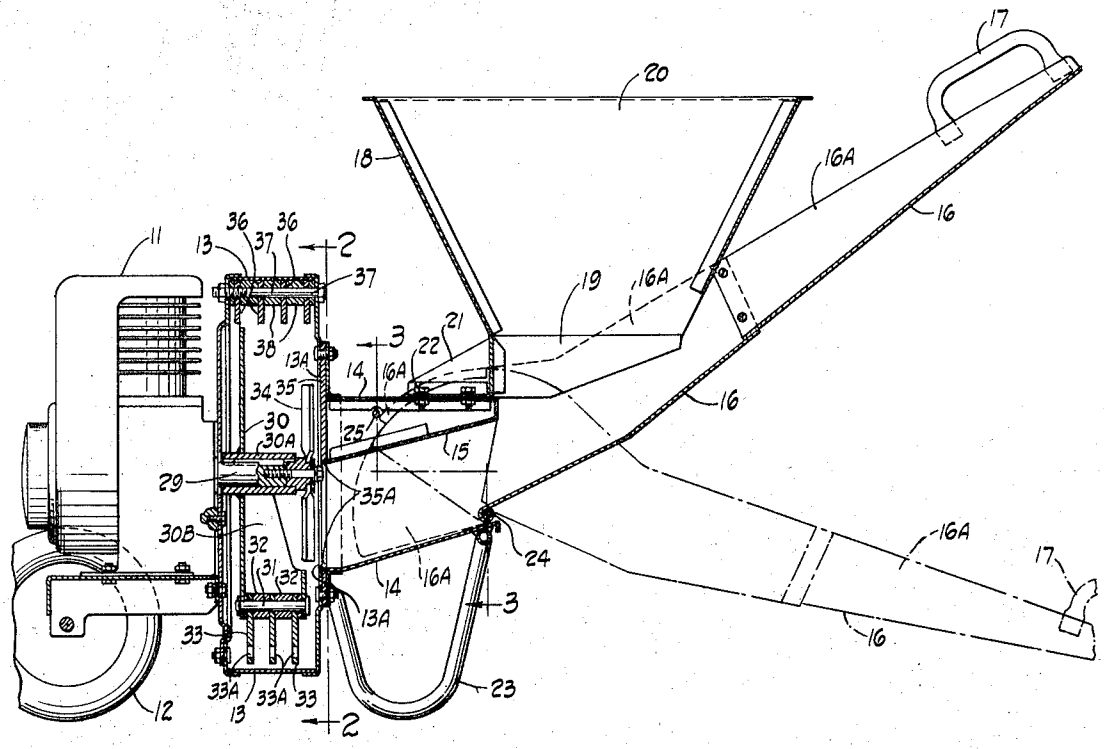
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[57] **ABSTRACT**

Mechanism for shredding vegetation and such material, including leaves, grass, twigs and the like. There is a chute for supplying the material to the shredding mechanism and a hopper positioned over the chute into which material may be placed. The mechanism includes an impeller, a rotatable blade, and flails carried by the impeller which drive material through spaced fingers carried by the housing.

17 Claims, 5 Drawing Figures



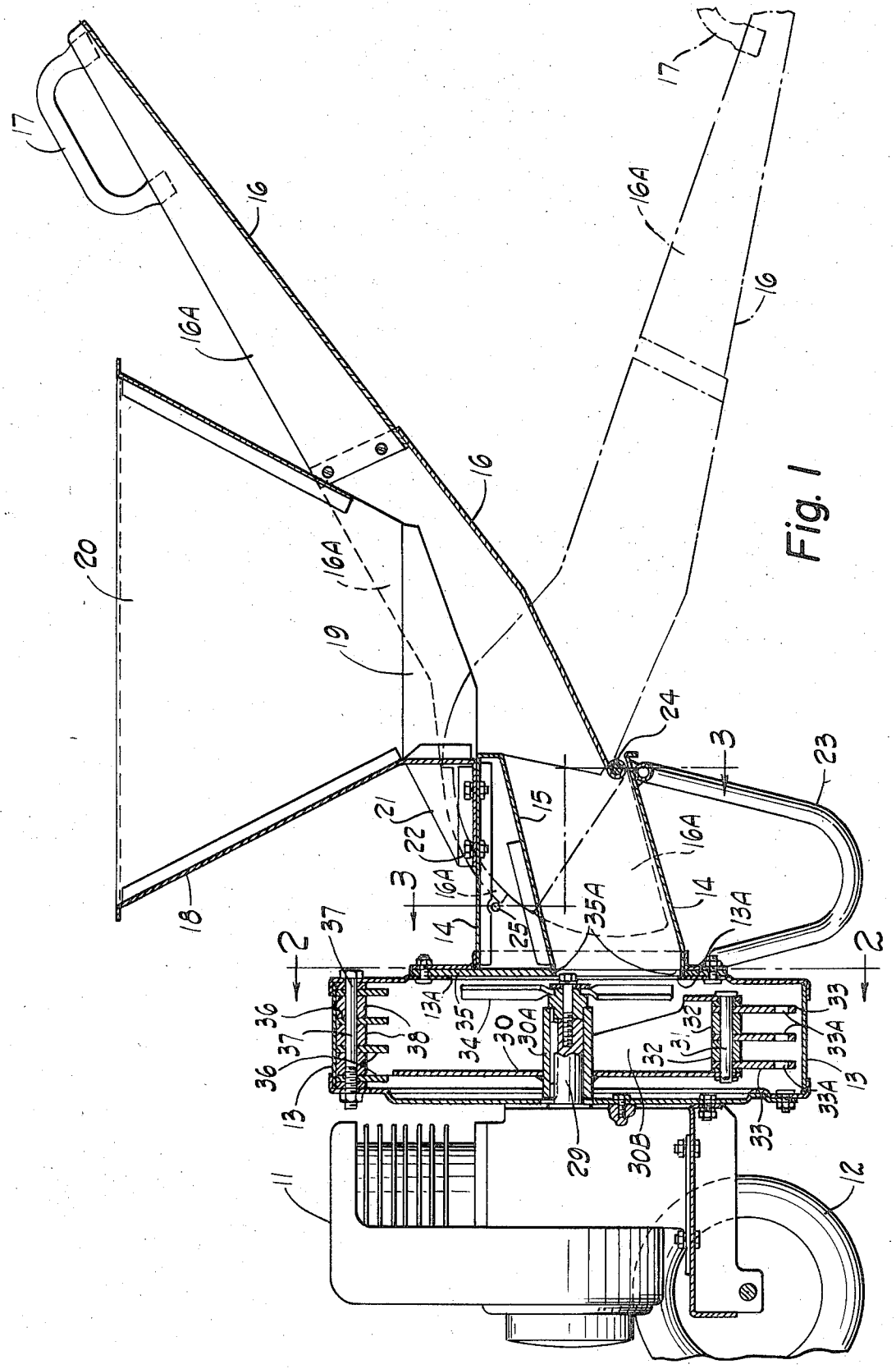

17
16
16A
20
19
18
21
22
15
14
25
35A
13A
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23
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30
30A
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32
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33A
13
29
30B
11
12

Fig. 1

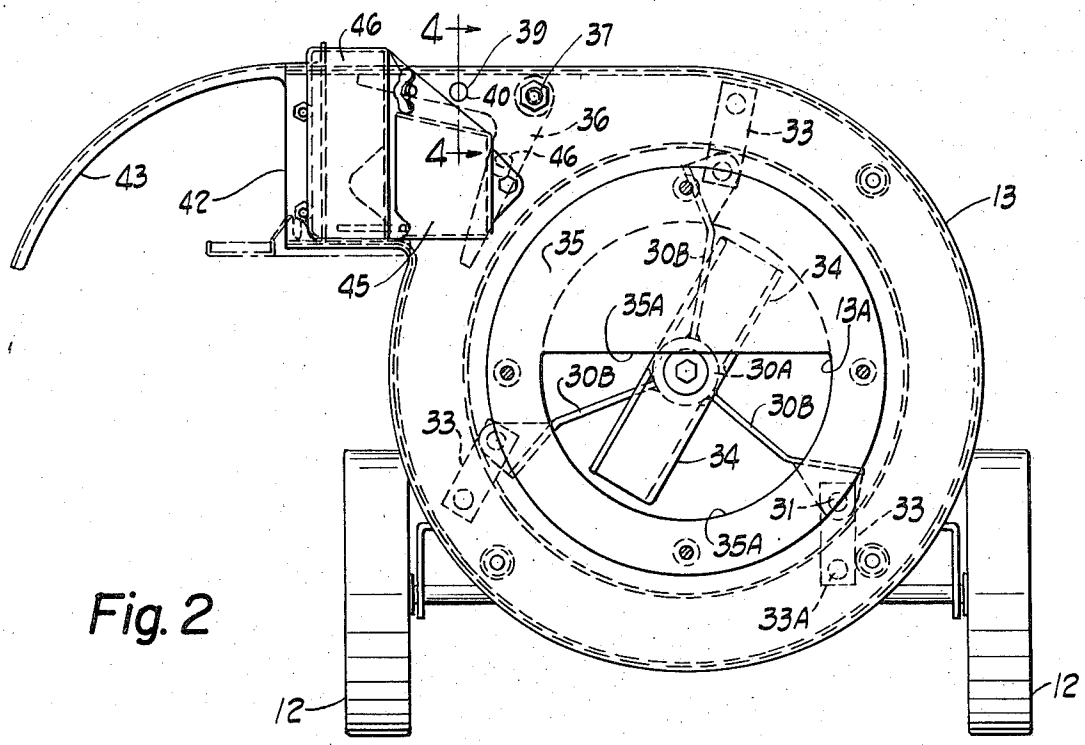


Fig. 2

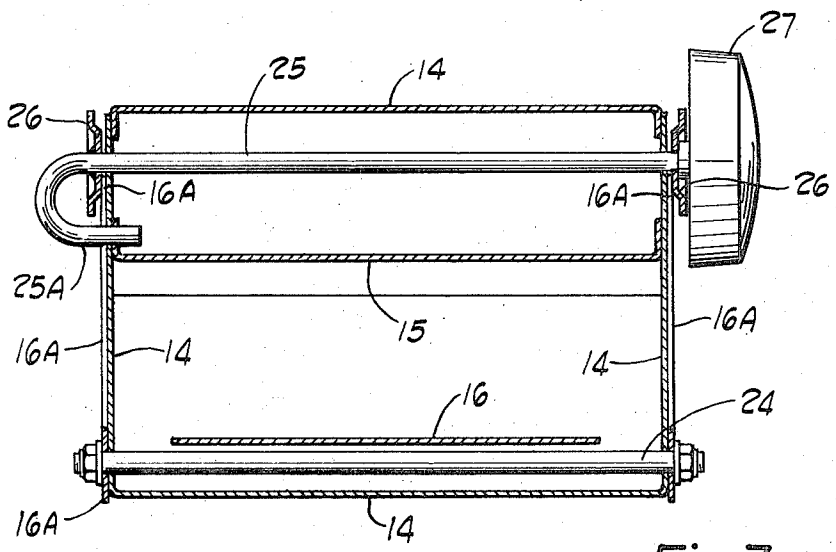


Fig. 3

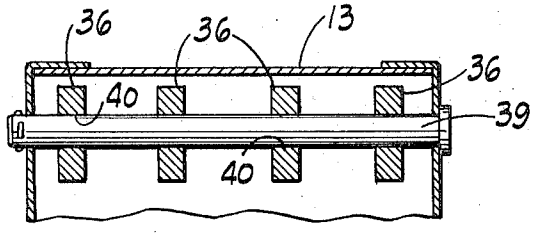


Fig. 4

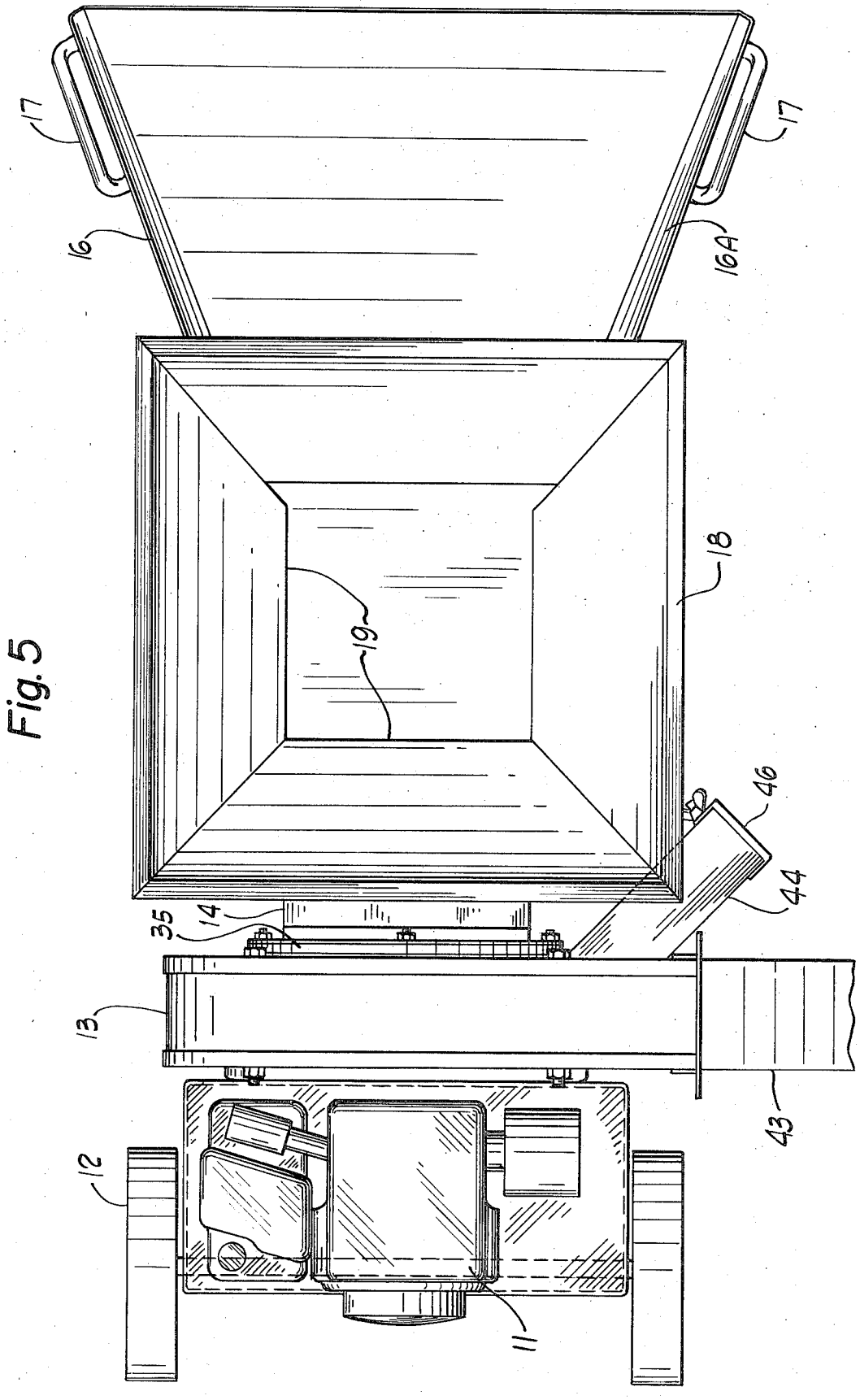


Fig. 5

SHREDDER

An object of my invention is to provide an improved shredding apparatus into which vegetation and the like may be placed for shredding or pulverizing the same. It is known that it is useful to shred leaves, grass, twigs and the like in order to pulverize it into a compost or finely comminuted form. The apparatus is particularly suitable for this purpose and is so structured and arranged as to provide for convenience and ease in the shredding operation. It is also structured so as to increase safety in its use while maintaining a high degree of efficiency.

Other objects and a fuller understanding of this invention may be had by referring to the following description and claims, taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a longitudinal view of the apparatus, partially in section;

FIG. 2 is a cross-sectional view looking in the direction of the arrows 2—2 of FIG. 1;

FIG. 3 is a cross-sectional view, somewhat enlarged, looking in the direction of the arrows 3—3 of FIG. 1;

FIG. 4 is a cross-sectional view, somewhat enlarged, taken in the direction of the arrows 4—4 of FIG. 2; and

FIG. 5 is a plan view looking down on the apparatus shown in FIG. 1.

In the apparatus an engine, such as a typical small horsepower gasoline engine, is denoted by the reference character 11. It is mounted upon a chassis supported on a pair of wheels 12. Mounted to the same chassis and immediately rearwardly of the engine 11 is a shredder housing 13. This shredder housing 13 is of general cylindrical shape having its axis disposed in a horizontal plane. Housing 13 has an inlet opening 13A disposed centrally of its rearwardmost wall.

There is an open-ended housing extension 14 bolted to the housing 13 so as to register with the inlet opening of the housing 13. A heavy steel wear plate 35 is mounted to the housing 13 intermediate of the housing 13 and extension 14. This wear plate 35 has an opening 35A which provides access from the interior of the extension 14 to the lower half portion of the inlet opening 13A.

There is a guiding wall 15 mounted to the extension 14 so as to lead downwardly to the opening 35A in the wear plate 35.

Hingedly connected to the outermost end of the extension 14 by a pivot pin 24 is a chute 16. For convenience this chute 16 is made of two parts bolted together. The chute 16 has sides 16A extending upwardly along its longitudinal edges. These sides 16A progressively get higher as they extend forwardly from the outer or free end of the chute 16. At the outer or free end of the chute 16 there are two handles 17 provided for easy movement of the apparatus and for readily lowering and raising the chute 16.

A hopper 18 of generally rectangular cross-section, is mounted upon the extension 14 by means of a bracket portion 21 on the hopper being bolted with nut and bolt assemblies 22 to the upper wall of extension 14. This hopper 18 has a top opening 20 into which material to be shredded is placed and has a bottom opening or outlet 19 through which the material in the hopper is discharged downwardly into the chute 16. As

shown, the hopper 18 has inclined sidewalls as in the usual hopper structure. It is noted that the hopper 18 in overhanging the chute 16 discharges the material onto the chute 16 in both the raised position of the chute 16 shown in full lines in FIG. 1 and also in the lower position of the chute 16 shown in broken lines in FIG. 1.

For providing stability to the apparatus there are provided a pair of similar leg structures 23 on opposite sides of the apparatus and secured to the housing 13 and extension 14 as shown. These legs 23 are U-shaped as illustrated. When in a position of rest, the apparatus is carried by the pair of wheels 12 and the pair of legs 23. However, when it is desired to move the apparatus, then the operator may lift up on the handles 17, in the raised position of the chute 16, so as to disengage the legs 23 from the ground surface and thus enable the apparatus to be rolled to a desired position on the wheels 12.

The chute 16 is selectively positioned either in the raised position shown in FIG. 1 in full lines, or in the lower position shown in FIG. 1 in broken lines. When in the lower position, leaves, grass and other such material may be swept from the ground surface onto the chute 16 through its outer open end. Upon raising the outer free end of the chute 16 to its raised position, then the material in the chute may flow by gravity down the chute, through the extension 14, through the opening 35A of the heavy wear plate 35 and through the inlet opening 13A of the housing 13. Also, with the chute 16 in its raised position, material may be placed in the hopper 18 which material then discharges into chute 16 and similarly through the extension 14 and hence into the housing 13.

In order to secure the chute 16 in its raised position when it is so desired, there is provided a securing bolt 25 which extends through the extension 14, as better seen in FIG. 3. The forwardmost portion of the sides 16A of the chute 16 are disposed to move closely adjacent to the bolt 25 outwardly of the sidewalls of the extension 14. A pair of dished washers 26 are carried on the bolt 25 adjacent its opposite ends and outwardly of the sidewalls of extension 14 and outwardly of the sidewalls 16A of chute 16. To prevent the bolt 25 from rotating it has a bent-over end portion 25A secured to the extension 14 as illustrated. The other end of the bolt 25 is threaded and a knob 27 is threadably engaged to the threaded end of the bolt 25. Upon rotating the knob 27 in a clockwise direction, the washers 26 are drawn toward each other and thus compress the sidewalls 16A against the outer sidewalls of extension 14. Thus, the forward portion of the sidewlls 16A are frictionally held by a squeezing action and sidewalls hold the forwardmost portion of the sidewalls 16A to a position closely adjacent to the securing bolt 25. This squeezing action and frictional resistance is sufficient to maintain the chute 16 in its raised position when it is desired to have it so elevated. To permit the chute 16 to be lowered, the knob 27 is rotated in a counterclockwise direction and thus to release the sidewalls 16A from the action of the washers 26.

The engine 11 has a rotatable shaft 29 which is driven by the engine 11. This shaft 29 extends into the housing 13 and is disposed centrally thereof. At the free end of the shaft 29 there is mounted a double-ended blade or knife 34, the opposite end portions of the knife 34 being inclined in opposite directions such as in the case

of a usual fan blade. The mounting of the knife **34** on the shaft **29** is such that the knife **34** revolves upon rotation of the shaft **29** and in the same direction. The mounting is also such that the knife **34** is reversible so that upon the forward edges thereof becoming worn, the knife may be removed and then mounted back on the shaft **29** in such manner as to present its other edges forwardly to meet material being advanced thereto. In this manner the life of the knife may be extended by its reversibility feature.

Also mounted upon the shaft **29** is an impeller structure **30.** The hub **30A** of the impeller structure is mounted non-rotatably upon the shaft **29** so that the impeller structure rotates with the shaft **29.** Included in the impeller structure **30** are three blades **30B** equidistantly spaced apart. These blades **30B** extend radially outward of the hub **30A** and are disposed to throw material in the housing in a generally circular path around within the housing. As seen, the blades **30B** are cut away to accommodate the knife **34** disposed on the end of the shaft **29.** Mounted upon the outer free ends of the three impeller blades **30B** are a set of three flails **33.** These flails **33** are spaced apart by spacers **32.** The spacers **32** and flails **33** are carried upon a pin **31** mounted on the end of each blade **30B.** Thus, as there are three blades **30B,** there are three sets of flails **33** pivotally carried on pivot pins **31** mounted on the ends of these respective blades **30B.** The fit of the flails **33** on the pins **31** and between the spacers **32** is such that the flails may freely swing radially outwardly by centrifugal force upon rotation of the impeller structure **30.** Each flail **33** has openings **33A** disposed adjacent its opposite ends for receiving the pin **31.** Thus the flails **33** are reversible to accommodate for wear in that the pin **31** may be placed through the holes **33A** on either end of a flail **33.** Life of the flails may thus be prolonged by reversing the flails as described.

Mounted adjacent to the upper wall of the housing **13** is a set of four fingers **36** which protrude downwardly and radially into the housing. The disposition of the fingers **36** is such that the flails **33** when centrifugally flying outwardly pass between the fingers **36** and thus macerate or shred material thrown radially outwardly by the impeller **30.** The interfit of the flails **33** between the fingers **36** is such that the material tends to be finely shredded or composted.

It is noted that each of the four fingers **36** is of angular shape, as particularly illustrated in FIG. **2,** and has one arm disposed along the upper wall of the housing **13** and the other arm extending downwardly and radially into the housing. It is the downward arm which cooperates with the flails **33** and between which the flails **33** pass. A mounting bolt **37** extends through the four fingers **36** near the apex of each and secures the fingers **36** to the sidewalls of the housing **13.** To maintain the fingers in position and to prevent them from rotating on the bolt **37,** a bolt **39** carried by the housing **13** extends thru aligned holes **40** in the fingers **36.** To permit reversibility of the fingers **36** and thus to accommodate for wear thereof, there are holes **40** in each of the angular arms of the fingers **36** equidistant from the bolt **37.** Thus the bolt **39** may extend through the holes **40** in either arm of the fingers **36.** To hold the fingers apart in proper spacing, there are a plurality of spacers **38** mounted on the bolt **37** and intermediate the fingers **36.**

The housing **13** has a discharge port **42** through which shredded material revolving within the housing is thrown tangentially out of the housing **13.** The housing adjacent the discharge port **42** extends outwardly to limit access into the housing and the shredding mechanism therein from outwardly of the housing. A curved deflector **43** is carried by the housing to deflect material being thrown outwardly of the housing to the discharge port **42** downwardly and into a pile alongside the housing. Alternatively, a bag, such as a plastic bag, is tied to the housing around the discharge port **42** so as to receive in the bag the discharged material.

There is provided an auxiliary feeding inlet **44.** This inlet **44** communicates with the interior of the housing at a radial distance out from the axis of the housing. A closure **46** is hingedly connected to the outer end of the guiding walls **45** around the inlet **44.** Thus, the outer end of the guiding walls **45** may be selectively closed to prevent access thereto. This auxiliary feeding inlet is provided for feeding branches, twigs and the like into the housing if desired and provides an alternative method of supplying material into the housing.

In one of the usual ways of using the apparatus, the chute **16** is lowered and material swept or raked onto its free end from the ground surface. The free end of the chute is then raised upwardly and the material flows by gravity down through the chute, through the extension **14,** through the opening **35A** of wear plate **34,** through the inlet opening **13A** and to the interior of the housing where the material is met by the revolving knife **34.** This tends to cut the material into smaller pieces or portions. The material is then thrown radially outwardly by the impeller **30** so as to revolve around within the housing **13.** The flails **33** extending radially outward under centrifugal force, forces the material between the fixed fingers **36** and further shred the material. The shredded material being thrown around in the housing **13** under centrifugal force is then thrown tangentially out of the housing through the discharge port **42,** where it is collected either in a pile or in a bag. In some instances, it may be desired to insert branches into the housing through the guiding walls **45** of the auxiliary feeding inlet **44.** It is noted that the edge of the wear plate **35** around its opening **35A** disposed generally below the axis of the shaft **29** cooperates with the knife **35** in the shearing. The interaction of the knife **34** and the edge of the opening **35A** of wear plate **35** provides a good shearing action in the initial shredding operation.

In some instances, it is desired to feed the material by use of the hopper **18.** When the hopper is thus utilized the chute **16** is secured in its uppermost position and the material placed in the hopper **18** falls downwardly into the chute **16** and hence through the extension **14** and into the housing **13** to be shredded by the shredding mechanism therein.

The moving parts are well protected so that it would be most difficult for an operator to place his hand in a dangerous position to be cut or injured by the shredding mechanism. An excellent shredding function is obtained, convenience in handling the mechanism is provided, and a maximum of safety is assured.

The present disclosure includes that contained in the appended claims, as well as that of the foregoing description.

Although this invention has been described in its preferred form with a certain degree of particularity, it is

understood that the present disclosure of the preferred form has been made only by way of example and that numerous changes in the details of construction and the combination and arrangement of parts may be resorted to without departing from the spirit and the scope of the invention as hereinafter claimed.

I claim:

1. A shredding apparatus having a housing and power-driven shredding mechanism within the housing, said housing having an inlet opening therein for feeding material to be shredded therethrough to the shredding mechanism, the combination of a chute having one end portion pivotally connected to the housing to permit the swinging of the chute in a generally vertical plane, said one end portion being alignable with said inlet opening to provide communication between said chute and said housing, said chute havig a free end portion positionable, upon downward swinging of the chute, to a location adjacent a ground surface to receive material to be shredded upon raking, sweeping or moving the said material from the ground surface onto said chute, said free end portion being positionable, upon upward swinging of the chute, to an elevated location above the level of said inlet opening to facilitate the sliding movement of said material on said free end portion down the chute and into said inlet opening to the shredding mechanism, and a hopper carried by said housing in fixed position above the level of said first end portion of the chute and located to discharge material to be shredded placed in the hopper downwardly onto said chute for sliding down the chute toward said inlet opening when the chute is swung to elevate said free end portion, whereby material to be shredded can be fed into the said inlet opening by said chute from said free end portion and from said hopper.

2. The combination claimed in claim 1 and in which said housing includes an open-ended guiding extension in alignment with said inlet opening, one end of the extension communicating with said inlet opening and the other end of the extension being spaced outwardly therefrom, and in which said one end portion of said chute is pivotally connected to said extension at a distance from said inlet opening, said chute and extension having manually operating cooperable fastening means for holding said chute selectively in elevated position.

3. The combination claimed in claim 1 and in which said housing includes auxiliary feeding means at a radial distance from said inlet opening for feeding material directly therethrough to the shredding mechanism in said housing and not through said inlet opening, said auxiliary feeding means having a guiding wall structure leading to a port into said housing, and a pivotally movable closure carried by said guiding wall structure at the entrance to said guiding wall structure for selectively opening and closing said auxiliary feeding means.

4. The combination claimed in claim 2 and in which said apparatus includes axially aligned wheels for facilitating movement of the apparatus to desired locations about a ground surface, and including supporting leg means operatively connected to said housing at a distance from said wheels for providing support for the apparatus and stability about the axis of said wheels upon the supporting leg means engaging the ground surface.

5. The combination claimed in claim 2 and in which said hopper is mounted on said extension to over-hang said chute and located to discharge material to be shredded placed in the hopper onto said chute in any position of said chute.

6. The combination of a power-driven shredding mechanism revolvable in a generally vertical plane about the generally horizontally disposed axis of the mechanism, a housing for said mechanism, said housing having an inlet opening adjacent the axis of said mechanism for providing access to the interior of the housing generally centrally of the mechanism, said housing having a discharge port adjacent the radially outer wall thereof to provide for tangential movement from the housing of shredded material thrown radially outward by the shredding mechanism, said housing having a discharge wall structure at said discharge port for guiding the flow of shredded material thrown through said discharge port, said housing having an open-ended extension at said inlet opening and aligned therewith, and a chute pivotally connected to said extension and aligned therewith, said chute upon being pivotally swung downwardly being positioned to receive thereon material to be shredded and said chute upon being pivotally swung upwardly being positioned to permit material thereon to flow under the force of gravity through said extension into said inlet opening for shredding by said shredding mechanism.

7. The combination claimed in claim 6 and including a hopper carried by said extension and over-hanging said chute to discharge material to be shredded from the hopper onto said chute and hence into the said inlet opening.

8. The combination claimed in claim 7 and including auxiliary feeding means in an end wall of the housing at a radial distance from said inlet opening for feeding material therethrough to the shredding mechanism within the housing, and movable closure means for selectively closing said auxiliary feeding means.

9. Apparatus for shredding material such as twigs, leaves, grass and other vegetation, comprising in combination a housing of generally cylindrical shape having its axis disposed generally horizontally, said housing having an inlet opening in an end wall thereof, a plurality of fingers carried by said housing adjacent the outer cylindrical wall thereof and extending inwardly of the housing, a power-driven shaft extending into the housing and disposed axially thereof for rotation therein, a multi-bladed impeller mounted on said shaft and rotative therewith, said impeller being disposed to act on material fed into the housing through said inlet opening and to throw the same centrifugally in said housing, a plurality of flails pivotally carried by said impeller adjacent the outer ends of the blades thereof and positioned to pass between said fingers as the flails are swung radially outward upon rotation of said impeller, said housing having a discharge port through which material is discharged in a tangential direction by the said impeller rotating in said housing, the material being thrown centrifugally outward by the impeller being shredded by the flails cooperating with said fingers, said plurality of fingers being positioned at a location about the circumference of said cylindrical housing adjacent said discharge port athwart the tangential path of material being thrown toward said discharge port to intercept and act upon said material being thrown in said tangential direction by said impeller.

10. Apparatus as claimed in claim 9 and including a knife blade mounted on and carried by said shaft to rotate therewith, said knife blade extending radially of said shaft on opposed sides thereof, the said knife blade being positioned within the housing adjacent the said inlet opening to meet and cut material fed into the housing through the inlet opening prior to the material meeting said impeller.

11. Apparatus as claimed in claim 10 and including a wear plate carried by the housing and defining said inlet opening through which material is fed, the edges of said inlet opening in the wear plate cooperating with said knife blade in the shearing of material inserted into said inlet opening.

12. Apparatus as claimed in claim 11 and in which said opening is shaped to direct substantially all of the material fed therethrough into the blade substantially into the portion of said knife blade then extending only on one side of said axis.

13. Apparatus as claimed in claim 9 and in which each of said fingers has two arm portions extending at an angle to each other, one of said arm portions being disposed adjacent the said outer cylindrical wall of the housing and secured to the housing to extend the other arm portion inwardly of the housing into cooperative relationship with said flails, said fingers being demountable from the housing and reversible to dispose said other arm portion adjacent the outer cylindrical wall of the housing and secured to the housing to extend said one arm portion inwardly of the housing in cooperative relationship with the said flails, whereby said fingers may be reversed to accommodate for wear thereof.

14. The combination of a power-driven shredding mechanism rotatable on a generally horizontal plane, a housing for the shredding mechanism, said housing having an inlet opening for the feeding of material to be shredded centrally of the shredding mechanism, said housing having a discharge port positioned to permit material shredded by the shredding mechanism and thrown centrifugally in the housing to be thrown tangentially out of said housing, said shredding mechanism including a knife for cutting material fed into the housing, an impeller for throwing the material centrifugally in the housing, and cooperating flails and fingers carried by the impeller and housing, respectively, for shredding material thrown centrifugally by the impeller and meeting said flails and fingers, said fingers being located in the housing adjacent said discharge port athwart the tangential path of said material being thrown toward said discharge port to intercept and act upon said material moving tangentially toward the said discharge port.

15. The combination claimed in claim 14 and including a chute pivotally connected to the housing and aligned with said inlet opening to feed material on the chute into said inlet opening, said chute being pivotally swingable to lower its free end toward the ground surface to receive material thereon from the ground surface, and swingable to raise its free end to permit material on the chute to flow under force of gravity into said inlet opening.

16. The combination claimed in claim 15, and including a hopper carried by the housing and over-hanging said chute to discharge material from the hopper onto said chute from where the material may flow under force of gravity into the said inlet opening upon the free end of the chute being in raised position.

17. The combination claimed in claim 16 and including cooperating securing means carried by the chute and housing for selectively securing the chute to swing to raised position and for permitting the chute to swing to lowered position.

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