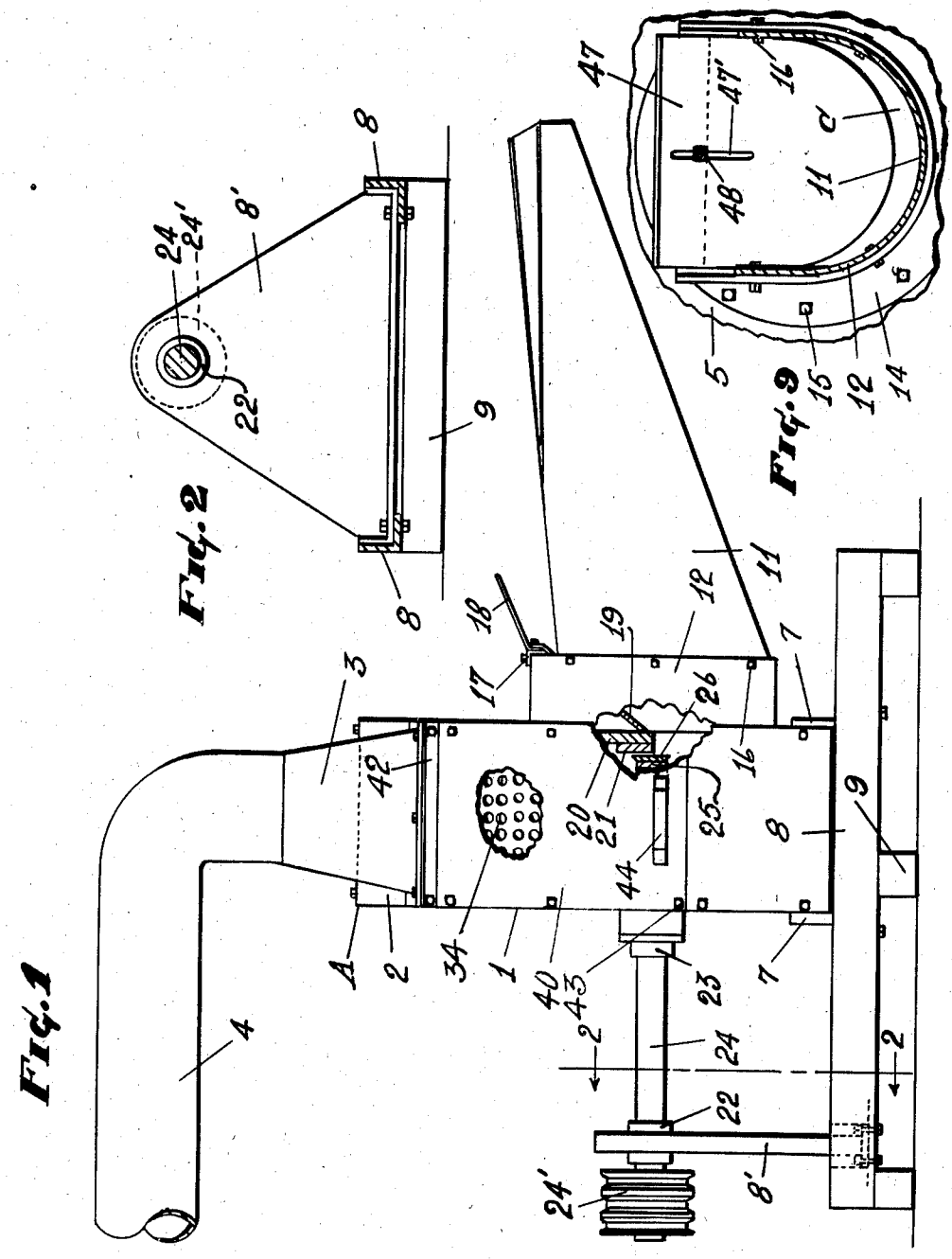
Oct. 13, 1942. H. J. MANKOFF 2,298,712

FEED GRINDING MACHINE

Filed Oct. 2, 1940 3 Sheets-Sheet 1



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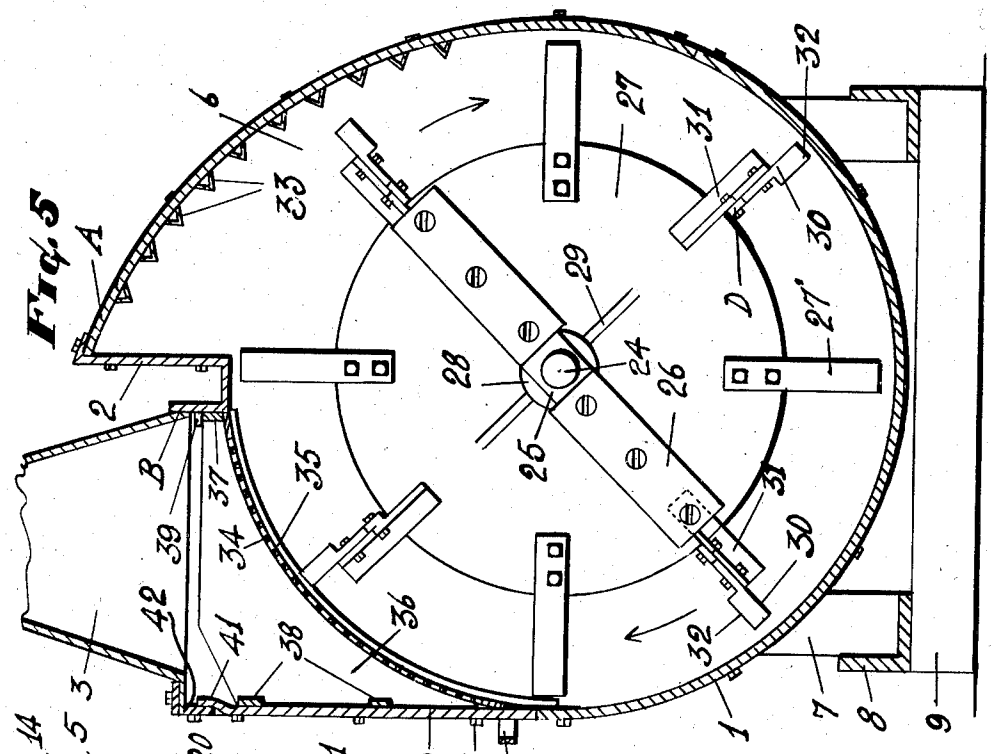


Fig. 5

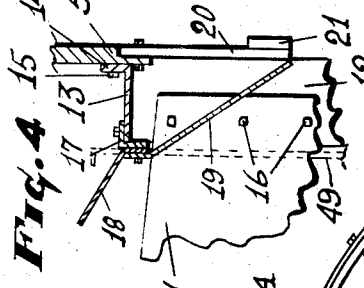


Fig. 4

Fig. 3

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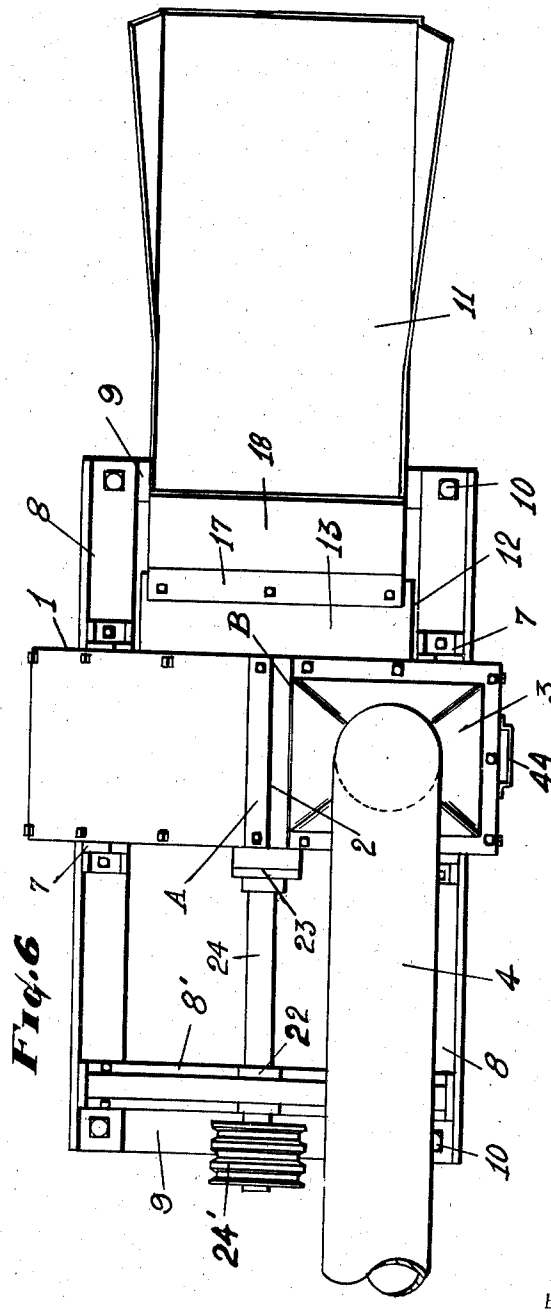


Fig. 6

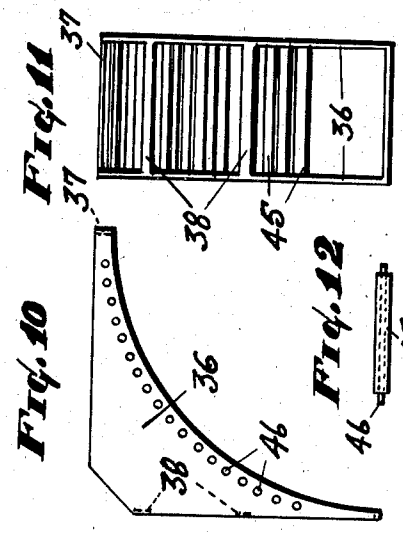


Fig. 11

Fig. 10

Fig. 12

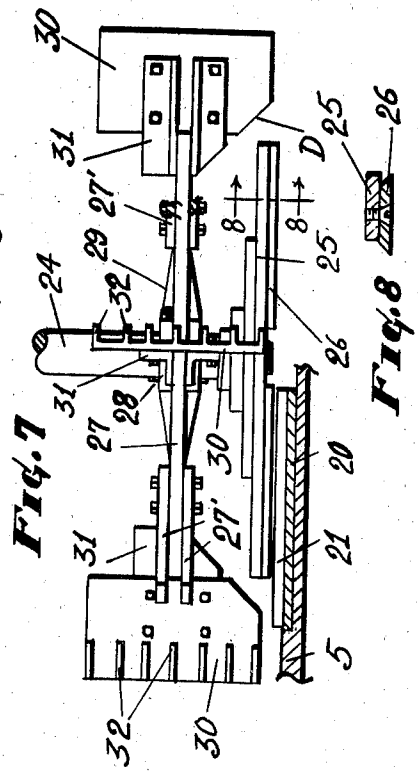


Fig. 7

Fig. 8

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UNITED STATES PATENT OFFICE

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FEED GRINDING MACHINE

Henry J. Mankoff, Wichita, Kans.

Application October 2, 1940, Serial No. 359,377

2 Claims. (Cl. 83—11)

This invention relates to improvements in a feed grinding machine, and has for one of its objects a grinding cylinder having reversible cutting blades secured to one end of the cylinder, and means to conduct substance to be ground inward at the end of the cylinder to which the blades are secured, the flow line of the substance being restricted to enter the cylinder at one side of its turning axis, said side feed entering at the upper stroke of the blades to engage with a bar with which the blades cut the substance, beginning at the said axis and along the blades to their outer extremities, the cutting movement being similar to that of scissors.

A still further object of my invention is to construct a cylinder and casing therefor that will function as a blower to effect an intake and ejection of substance treated by the machine.

A still further object of this invention is to provide an offset in the grinding chambers to function as a tumbling room for the substance after being cut in short lengths by the blades, and to return to the cylinder for further grinding.

A still further object of this invention is to provide a bolting screen in the casing as separating means for the fine and coarse substance, the fine passing outward through the conductor, while the coarse substance is discharged in the offset chamber for further grinding.

These and other objects will hereinafter be more fully explained, reference being had to the accompanying drawings, forming a part of this specification, and in which like characters will apply to like parts in the different views.

Fig. 1 is a side view of the machine, parts removed for convenience of illustration.

Fig. 2 is a sectional view taken on line 2—2 in Fig. 1.

Fig. 3 is a front view of the machine, the feed table fragmentarily shown in section.

Fig. 4 is a sectional view taken on line 4—4 in Fig. 3.

Fig. 5 is an enlarged end view of the cylinder, the casing being in cross section.

Fig. 6 is a plan view of the machine, the conductor pipe partly broken away.

Fig. 7 is a top or plan view of the cylinder and cutting bar, the casing being in section, taken on line 7—7 in Fig. 3.

Fig. 8 is a cross section through the cutting blade taken on line 8—8 in Fig. 7.

Fig. 9 is a feed control plate for the machine when grinding grain.

Fig. 10 is a substitute for the bolting screen of the machine.

Fig. 11 is a rear elevation of Fig. 10.

Fig. 12 is a side view of one of the rollers in Fig. 10.

The invention herein disclosed resides in the novel features of a grinding machine consisting of a casing and a grinding cylinder trunnioned in the casing, the features thereof being of such nature as to result in an efficient grinder of green or dry substance, also the efficiency of a blower to eliminate the usual requirement of an extra fan to discharge the substance comminuted thereby; and furthermore, the coaction of the component parts as hereinafter described is means to minimize cost of construction, motive power to actuate the machine, and maintenance thereof over a comparatively long duration of time.

To attain such is through the medium of parts consisting of a casing cylindrical in form, for the major portion of its circumference as at 1, and having an arcuate offset portion as at A, said portion tangentially extending from its circular portion, terminating at a point vertical to the turning axis of the cylinder. The space between the terminal outer end and terminal end of the circular portion is closed with a vertically disposed plate 2, the lower edge portion forming a rectangular U-bend, the outer leg of which, as at B, lies on the wall of the hopper 3 of a conductor pipe 4.

Upwardly extending from the circular wall of the housing is an exit, rectangular at its upper extremity and on which the said hopper seats, one wall being tangent with the circular wall of the casing, while the side walls at right angles thereto are flush with their respective front and rear heads 5 and 6 of the casing respectively, the rear head being a solid enclosure, while the front head has a circular opening C concentric to the axis of the cylinder, said opening hereinafter referred to as the eye of the machine.

The circular body portion above described is supported by a pair of legs 7 at each side thereof, the legs seating on steel L's 8 transversely extending from the heads of the body, and being secured to a plurality of timbers 9 by legs, screws or bolts 10. Vertically positioned adjacent the ends of the steel L's rearward of the casing is a standard 8' to function as a support for a shaft bearing (later described).

Secured to the front head having the eye opening therein is a feed trough 11, said trough extending outward and upward, the radii of which are equal to that of the eye, whereby substance to be ground is free to move downward

toward the eye where it enters the grinding cylinder (later described).

Extending around the lower half of the eye and upward therefrom is a U-shaped element 12, the upper extremity of the U-legs terminating a short distance above the eye as supporting means for a plate 13 connecting the legs and integrally joined thereto, the U-shaped element having a flange 14 integrally joined and extending outward at right angle to seat on the front head, and being secured by a plurality of bolts 15 spaced around the flange, said element as receiving means for the inner end of the feed trough seating therein as shown in Fig. 4, and secured by bolts 16 substantially as shown in said figure.

Secured to the outer edge of plate 13 is an L-shaped element 17, one leg of which extends downward and to which is secured an apron 18 obliquely slanting forward and upward, functioning as a stop or guide for haylike substance to direct it downward when the trough is well filled with the substance. Lapping on said apron and secured thereto is a guide plate 19 obliquely slanting inward and downward, said plate extending from one leg of the U-shaped element to the center of the eye and abutting the lower edge of a plate 20 that is secured to the front head of the machine, said plate 20 being rectangular to enclose a quadrant of the area of the eye opening, the inner edges of the plate being at right angles, will radially extend vertically and horizontally from the center of the eye opening, said plate also to function as a supporting means for a reversible cutting bar 21 that is secured inward of the plate, said bar extending along the lower edge of the plate, the cutting edge of the bar being on a horizontal plane with the lower extremity of the plate. Being so positioned, the lower edge of said cutting bar will coact with a cylinder's cutting blade in its upward stroke to slice substance as fed into the machine as the cylinder turns in its function. It will now be seen that alfalfa, corn, or other substance fed into the machine may be in such quantity as to fill the feed trough to its extremity, in which case, the eye of the head may be well covered but moved twistingly downward and toward the said cutting bar as the cylinder rotates, at which point, the volume of substance will be sliced into short particles as it enters the casing for further comminution.

Rotatably trunnioned in bearings 22 and 23 and extending into the casing is a shaft 24. Secured to the outer end of said shaft is plurally grooved pulley 24' to be engaged by V-belts as turning means for the shaft, the belts and motive power to drive the machine not shown in the drawings.

Removably secured to the end of the shaft extending into the casing is a cross bar 25, said bar having removably secured on each end portion thereof a two-edged cutting blade 26, the blades being reversible longitudinally to change edge engagement, and the said blades being carried in working relation to the said cutting bar 21 as the cylinder turns clockwise, whereby an upward stroke is had to cut substance in short lengths as fed into the cylinder.

Secured to the shaft inward of the casing is a grinding cylinder consisting of a disc 27, having a hub 28 to engage rigidly on the shaft and rotatable therewith, and the said disc being reinforced adjacent the hub by a plurality of ribs 29 radially extending outward from the hub a short distance. Secured to the disc and outwardly extending therefrom is a plurality of pairs of hammers 27', each pair being divided by the disc and rigidly secured thereto by bolts as shown. Positioned between the several pairs of hammers and peripherally secured to the disc is a plurality of grinding wings 30, said wings being braced and carried by a pair of angle bars 31 spaced apart to straddle the disc and being secured to the wings by bolts, whereby the wings are removable, the other ends that straddle the disc being secured thereto by welding. Positioned on the forward side of the wings, with respect to the cylinder's direction of rotation, is a plurality of ribs 32 spaced apart and integrally joined to their respective wings, said ribs extending outward from the sides of the wing body and directed inward from the outer extremity of the wing a short distance, the ends of each rib being blunt to function as hammers to shred the sliced particles of the substance as carried in rotation with the cylinder intermittently, the intermission being due to the substance, as thrown by centrifugal force in the said offset of the annular wall of the casing, and retained therein momentarily to tumble back for further grinding, and to avoid free sliding movement downward along the wall of the exploded portion there is secured a plurality of angle bars 33 crossing the wall transversely in spaced relation. It will be seen that each leg of each angle bar seats on the wall, while the apex or angle of the bars confronts the cylinder as a shredding surface for the substance, as well as a non-skid feature therefor. In other words, the extension of the annular wall is to receive substance thrown by the cylinder to break the circular line of travel and to cause tumbling of the substance in its return to the cylinder, whereby the mass formation is broken up for a new position of the particles for further grinding, the finely comminuted substance to pass outward through a bolting screen 34 that communicates with the conductor pipe and from thence to a place of storage as the wings of the cylinder and form of the casing will function as a fan, the exit being through the screen, while the intake is through the eye, in which instance, hay or the like, placed into the trough is fed into the machine by a twist motion to the position of the cutting bar for treatment heretofore described.

It will be understood that the said screen is interchangeable, with screens varying in mesh, or size of apertures in a sheet-like structure substituting the screen, whereby efficient bolting of the ground substance is accomplished; said screen, being arcuate, is adapted to seat on shoulders 35 having a like arc formed on each head of the casing, the screen being secured to the shoulders by a frame having its ends 36 secured together by cleats 37 and 38, said ends 36 fitting snugly on their respective heads of the casing, while their arcuate edges seat firmly on the edges of the screen that rest on the shoulders, the frame being secured at the upper end by a pair of studs 39 under which its respective edge of the frame will slidably engage to position, while the other end or outer portion of the end members are supported by a removable plate 40 provided with a lip 41 to engage inward of a plate 42 secured to the heads by an appropriate bolt at each end of the plate, the lower edge being secured to each head by bolts 43 and having a handle 44 to withdraw the plate when detached as accessible means to remove and replace the screen.

As a modification for the screen there is arranged a series of rollers **45** in close proximity and spaced apart so that the fine comminutions of the ground substance will pass therebetween, the rollers having a spindle on each end thereof formed by a rod **46** passing through a sleeve that forms the roller, by which means, the rollers are trunnioned in the ends of the frame as shown in Fig. 10, whereby clogging of the screen thus made will be avoided by the rollers as the same are free to turn by vibration or contact of substance passing across the rollers.

As heretofore stated with respect to grinding grain in the machine, there is provided a feeding control plate **47** that is slidably arranged, and adapted to cover the eye, fitting snugly in the end of the feed trough adjacent thereto, the plate having a centrally disposed elongated slot **47'** through which a bolt **48** will engage as securing means for the guard as selectively moved upward to provide an inlet for grain, as shown in Fig. 9, there being an aperture in the leg of the L member to register with the slot, said plate being positioned as shown by dotted lines **49** in Fig. 4, in which case apron **18** and plate **19** are removed.

It will be seen that the width of the cylinder wings extends from the peripheral edge of the eye outward to near that portion of the annular wall in parallelism with its sweep of said wings, while the length thereof terminates in close proximity to the inner side of the casing heads, whereby a fan structure as well as a grinding chamber is formed, the intake being at the eye, the exhaust at the screened opening. This arrangement will likewise respond for the flow of grain, hay, or the like entering the machine at its eye, while the fan blast functions as feeding means for substance to be ground, and ejecting means therefor when comminuted to a predetermined consistency. It will also be seen that the inner corners of each wing adjacent the eye as at D is means for an undisturbed entrance of grain through the eye to be picked up by the wings within the casing, while otherwise, a great portion of the grain would be ejected through the eye; consequently, efficient grinding of grain may be had should the cutting blade be removed.

And such modifications may be made as lie within the scope of the appended claims.

Having fully described my invention what I claim as new, and desire to secure by Letters Patent is:

1. In a feed grinding machine, a casing comprised of a circular portion having an arcuate offset extending upward and a plurality of V-shaped ribs carried on the inner side of the offset portion, said ribs spaced apart and transversely crossing the offset and a head secured to each end of the circular portion, one head being solid, the other head having a circular opening concentrically positioned in the head, a U-shaped chute secured to the last mentioned head in such a way as to partially encircle the opening whereby substance is fed into the casing, a rectangular plate and means to secure the same to the last mentioned head in such a way as to engage over a quadrant of the circular opening and being at the upper right hand side of the opening, a cutting bar removably secured to the lower portion of the plate and being inward thereof, said bar being reversible with respect to its edges, and the said circular portion of the casing having an opening upwardly positioned and a conductor pipe and hopper to connect the pipe in communication with the opening, an arcuate screen to cover the opening, said screen comprised of a plurality of rollers transversely crossing the arc, said rollers being in close but spaced relation to each other, the screen being carried by the heads of the casing, a shaft extending through the casing axial of its circular form, a bar secured to the shaft and equally extending each way therefrom, the bar having a cutting blade secured to each extending portion of the bar, the blades to engage with the cutting bar carried by said plate, and a fan grinding element secured to the shaft and set inward from the bar to engage in the circular casing and in working relation to the said screen and V-shaped bars, and power means to turn the shaft.

2. In a feed grinding machine of the class described, a casing comprised of a circular wall having an offset tangentially extending from the wall, and a plate radially disposed to the circular wall to connect the ends of said wall, and a head for each end of the wall, one head having a circular opening concentric to said head, and a plurality of inwardly extending pointed bars spaced apart and secured to the inside of the extending wall transversely crossing the same, and an apertured screen for a portion of the circular wall adjacent the radially disposed plate, and a conductor pipe secured to the casing in registry with the screen, and a U-shaped chute connected to the head having an opening therethrough, the chute to communicate with the opening, a shaft extending into a casing in axial alignment with the opening, and suitable bearings in which the shaft is journalled and power means to turn the shaft, a bar secured to the shaft adjacent its terminal end in the casing, and edged blades secured to the bar whereby the blades are oppositely disposed with respect to the turning axis of the shaft, said blades being in close proximity to the head through which the opening extends, a solid circular disc secured to the shaft a spaced distance inward from the bar, said disc and bar rotatable with the shaft, a plurality of wing elements spaced around the disc and transversely crossing the same and means to secure the wings to the disc, a plurality of pairs of bars straddling the disc in alternate relation to the wings, radially positioned and rigidly secured to the disc, the outer end extension of the bars and wings being equal with respect to a radii, a rectangular plate secured to the last mentioned head having an opening therethrough, the plate to partially close the opening, the inner edges of the plate being aligned with the axis of the shaft with respect to a vertical and horizontal plane, a cutting bar secured to the horizontally disposed edge of the plate to coact with the cutting blades of the shaft to sever substance as fed into the opening by an upward stroke of the cutting blades as moved by the shaft in its rotation.

HENRY J. MANKOFF.