

May 16, 1944.

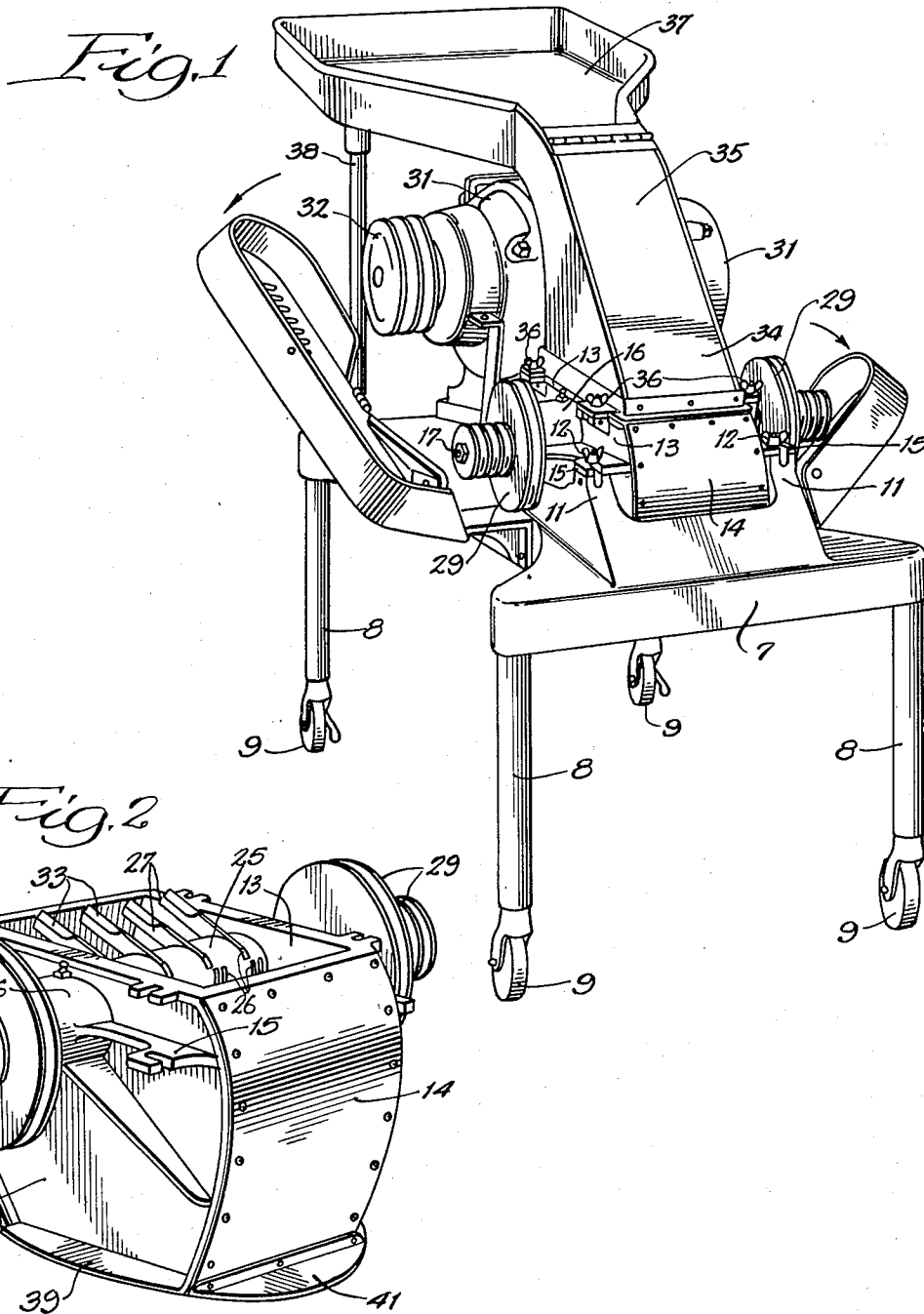
E. G. MAGNUS

2,348,916

COMMUNUTING MACHINE

Filed Oct. 16, 1941

3 Sheets-Sheet 1



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3 Sheets-Sheet 2

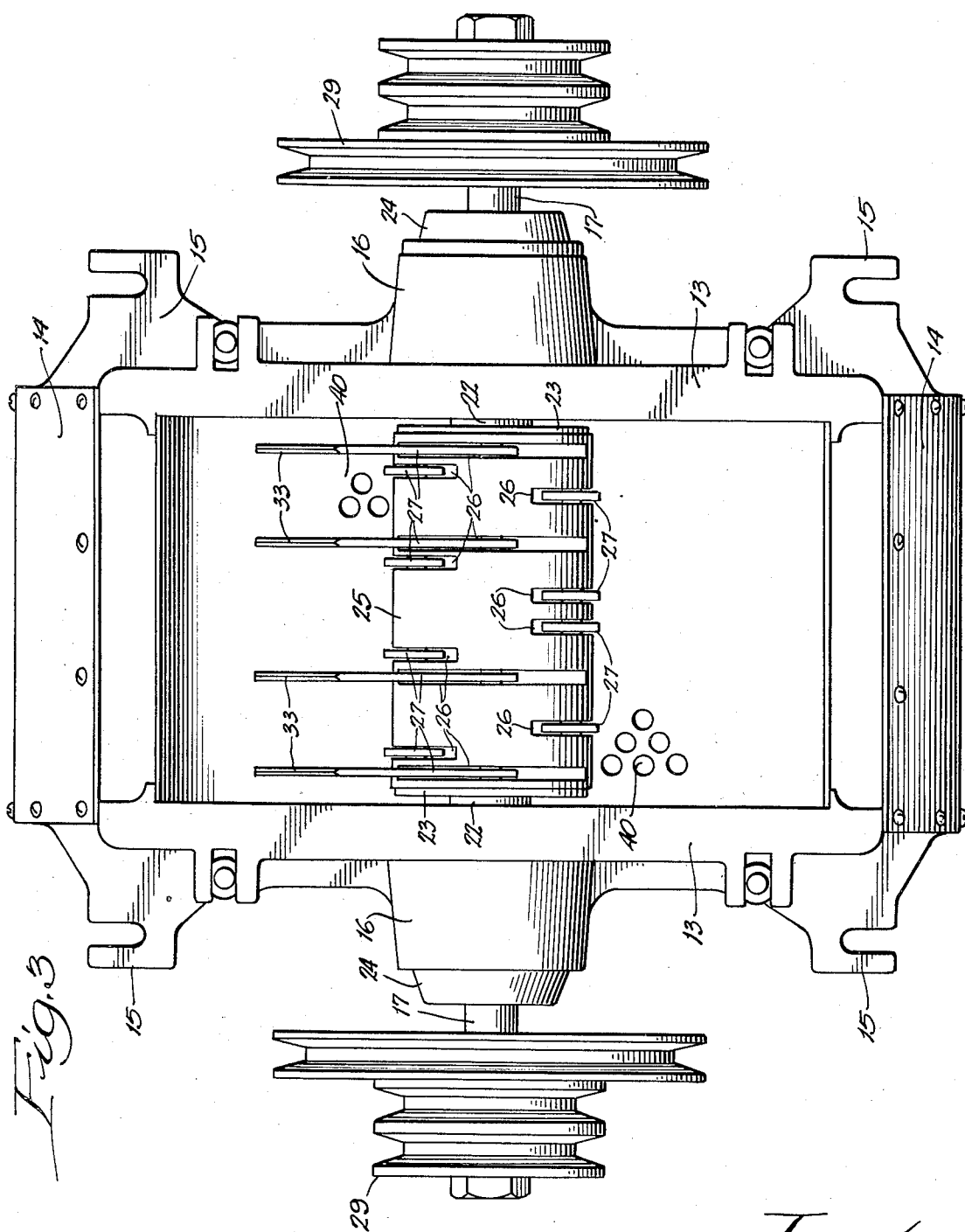


Fig. 3

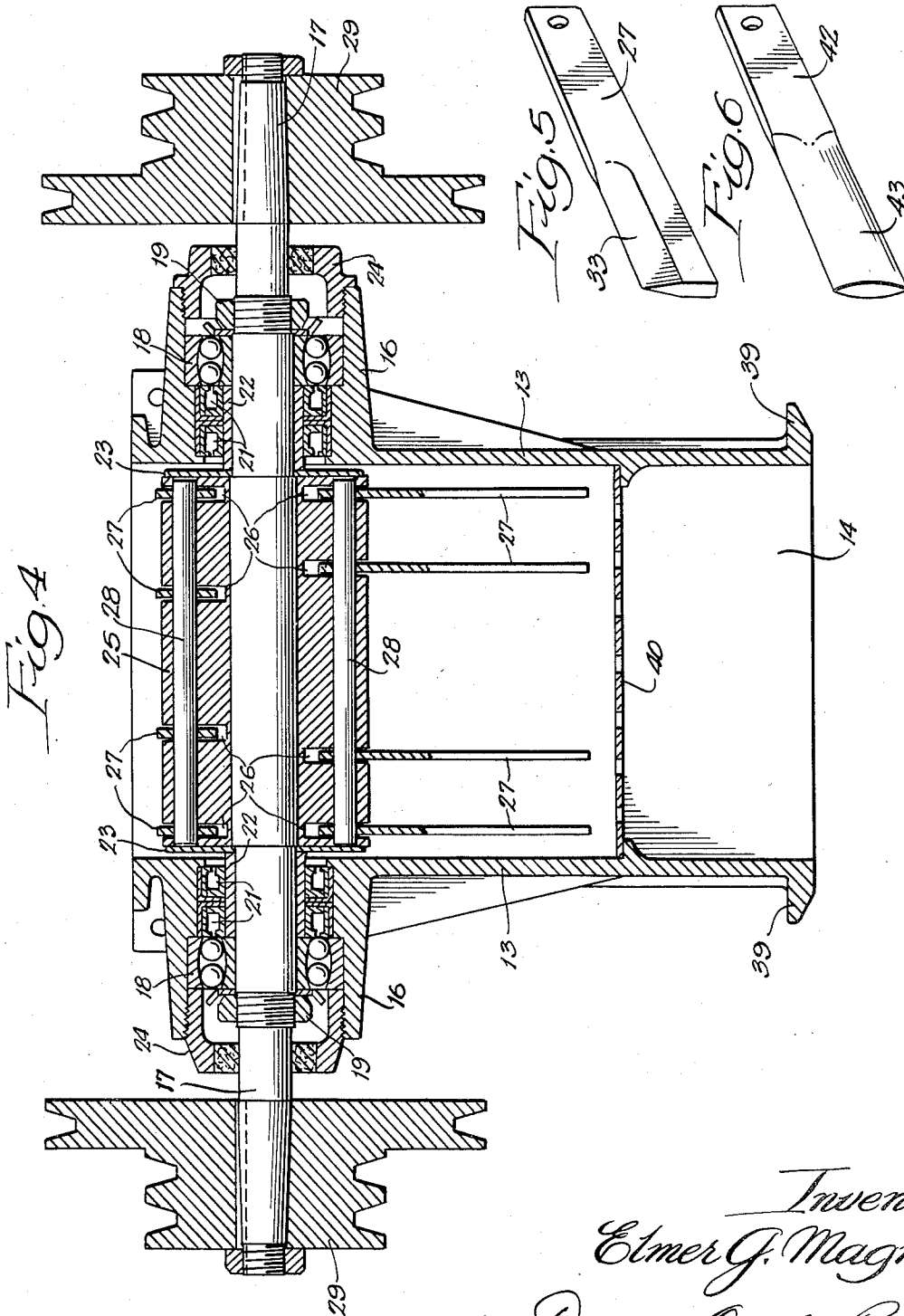
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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

2,348,916

COMMUNUTING MACHINE

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Application October 16, 1941, Serial No. 415,163

3 Claims. (Cl. 146—96)

This invention relates to comminuting machines and more particularly to machines for comminuting food and pharmaceutical materials and the like.

One of the objects of the invention is to provide a comminuting machine which can be selectively controlled to provide different comminuting actions. Preferably, the machine is so constructed as to comminute materials either by impact or by a slicing operation, or a combination thereof.

Another object of the invention is to provide a comminuting machine in which extremely high uniformity of particle size is obtained.

Still another object of the invention is to provide a comminuting machine in which dried materials may be comminuted without permitting the escape of any dust particles into the air.

Other objects, and advantages of the invention, including novel structural features and desirable subassemblies, will be apparent from the following description when read in connection with the accompanying drawings, in which:

Figure 1 is a perspective view of a comminuting machine embodying the invention;

Figure 2 is a perspective view of the lower casing part;

Figure 3 is an enlarged plan view of the lower casing part;

Figure 4 is an axial section through the rotor assembly;

Figure 5 is a perspective view of one type of plate; and

Figure 6 is a similar view of another type of plate.

The illustrated machine comprises a base or table 7, supported on legs 8, which may, if desired, be provided with casters 9 for ready movement of the machine. The base 7 is formed with an opening therethrough around which there is provided a supporting frame comprising posts 11, carried by the base and pivotally supporting wing bolts or like fastenings 12. The posts 11 are adapted to support a casing or body part, shown in Figures 2 to 4 as formed by side plates 13 connected by arcuate end plates 14. The side plates are formed with supporting lugs 15 extending laterally therefrom, adjacent the opposite ends, and adapted to rest on the post 11. As shown, the lugs 15 are formed with end opening slots to receive the pivoted wing bolts 12 for securing the body rigidly to the frame.

The side plates 13 are also formed with bosses 16 supporting a rotor shaft 17, which extends completely through the body part. As best seen in Figure 4, the shaft is supported by ball bearing units 18, received in the hub portions 16 on the side plates, and held assembled on the shaft by nuts 19. The shaft is sealed by oppositely facing seals 21, which serve to prevent lubricant

on the bearings from passing along the shaft into the casing, and to prevent material in the casing from flowing out along the shaft into the bearings. The seals seat against sleeves 22, rigidly supported on the shaft, and which hold plates 23 in place thereon. The bearings are held in the hubs 16 by means of gland nuts 24.

In its central portion, the shaft 17 carries a rotor 25 formed by a solid cylindrical sleeve rigidly fitted to the shaft. The rotor is formed in its periphery with a series of slots 26 extending across chords of the rotor and intersected by longitudinal bores. Blades 27 are received in the slots 26 and are held therein by means of pins 28 extending through the bores in the rotor and through openings in the ends of the blades. The rods 28 are held against movement out of the rotor by means of the plates 23, but are preferably loosely mounted, so that they may turn freely in the rotor during operation. In this way, localized wear of the blades on the pins is eliminated, and the pins are worn uniformly throughout their circumference, thereby increasing their life. It will also be noted that with this construction, the rotor may easily be disassembled, simply by removing one or both of the nuts 19 to permit removal of one or both of the plates 23, so that the rods 28 and the blades 27 can be removed.

The shaft 17 projects beyond each end of the body part and carries at each of its ends a pulley 29. As shown, the pulleys are compound pulleys having two diameters to produce two different speeds, but it will be understood that a single speed pulley or one having more than two speeds could be provided, if desired.

The rotor is adapted to be driven by a motor 31, shown as mounted on the base 7, and having a double diameter drive pulley 32 on one end of its shaft. The motor is adapted to be connected to one or the other of the drive pulleys 29, depending upon the position of the body part, so as to drive the rotor. When the belt is so arranged as to operate the rotor at high speed, it preferably turns the rotor at a speed in excess of 4500 R. P. M., for the reasons more particularly set forth in the co-pending application of Harold H. Wagner, Serial No. 272,208. When the drive belt is located to turn the rotor at a lower speed, it preferably operates it at approximately 1200 R. P. M., although it will be understood that variations in these speeds are permissible for different types of operation. The pulleys and belt may be covered by hinged covers 30 for protection.

The blades 27, as more particularly shown in Figure 5, are elongated blade members of substantially rectangular section, sharpened along the outer portion of their length at one edge, as indicated at 33. The sharpened portion pref-

erably extends throughout approximately one-third of the length of the blade. On its opposite edge, the blade is plain and substantially square, as shown.

For impact types of comminuting, as for example with many relatively dry materials, it is preferred to have the dull or plain edge of the blades as the leading edge, so as to break up the material by impact. For other types of comminuting, as for example in slicing materials such as vegetables, the sharpened edge should lead. I have also found that in comminuting certain types of dry materials, as for example certain pharmaceutical compositions, it is preferable that the sharpened edge shall lead, since more uniform particle size is obtained under these conditions when the rotor is driven at high speeds. In order that the blades may readily be turned to present either edge as desired, the fastening lugs 15 on the body part are symmetrically arranged on opposite sides to correspond with a similar symmetrical arrangement of the supporting frame posts 11. Thus, the body part may be turned with either end forward on the frame, and the driving pulley 32 of the motor may be connected through the driving belt with proper driving pulley 29, so as to turn the rotor in either direction, as selected.

The upper end of the body part, as shown, is open and is adapted to be closed by a cover 34, formed with an elongated feed chute 35. The cover part 34 is connected to the main body part by wing bolts 36, cooperating with fastening lugs on the body and cover parts. The fastening lugs are symmetrically arranged on the opposite sides of the parts so that the cover may be placed on the body in either direction. Thus material may always be fed into the machine in the most advantageous direction, and the feed chute 35 may be maintained in the same position regardless of the position of the main body part. The feed chute, as shown, cooperates with a table 37, supported on legs 38 on the base 7, so that by turning the cover part around when the main body part is turned around, the feed chute will always cooperate properly with the table. Material entering the comminuting chamber formed by the body part and cover part may be prevented from backing up through the feed chute by suitable valves therein, and after being comminuted by action of the blades 27, is discharged through an arcuate screen 40, supported between the side plates 13 and forming the lower wall of the comminuting chamber.

In order to prevent the escaping of fine particles passing through the screen 40, the lower edges of the side plates 13 are preferably formed with horizontal, outwardly extending flanges 39, and similar flanges 41 are provided on the end plates 14. The flanges 39 and 41 provide a continuous flange around the lower portion of the body part, over which a sack or other like receptacle may be fitted, and may be securely fastened. Thus, material passing through the screen is confined to the receptacle provided for it, and these particles are not permitted to escape into the air. This is of particular advantage in comminuting of materials such as pharmaceutical products, whose escape into the air might be hazardous.

For comminuting certain materials which are extremely fibrous, such, for example as celery, I have found that a different blade shape providing a more definite slicing action is ad-

vantageous. A blade of this character is shown in Figure 6 as comprising a rectangular base portion 42 on which the blade is pivoted and an outer end portion 43 substantially of streamlined shape, with both edges sharpened. The outer portion 43 of the blade is relatively thin compared with its width, and I have found that a blade of this character will comminute fibrous materials without tangling and will produce a uniform particle size.

While one embodiment of the invention has been shown and described in detail, it will be understood that this is illustrative only and is not intended as a definition of the scope of the invention, reference being had for this purpose to the appended claims.

What is claimed is:

1. A comminuting machine comprising a supporting frame, a hollow body part adapted to be supported on the frame, fastening means symmetrically arranged on the body part and the frame so the body part can be supported on the frame with either end at the forward end of the machine, a rotor shaft extending through the body part, drive means on the rotor shaft, blade members carried by the rotor shaft and differently shaped on their opposite edges, drive means carried by the frame and rotatable in one direction only, and means to connect the drive means on the frame to the drive means on the rotor shaft in either position of the body part whereby the effective direction of rotation of the rotor shaft will be reversed.

2. A comminuting machine comprising a supporting frame, a hollow body part adapted to be supported on the frame, fastening means symmetrically arranged on the body part and the frame so the body part can be supported on the frame with either end at the forward end of the machine, a rotor shaft extending through the body part, drive means on the rotor shaft, blade members carried by the rotor shaft and differently shaped on their opposite edges, drive means carried by the frame and rotatable in one direction only, means to connect the drive means on the frame to the drive means on the rotor shaft in either position of the body part whereby the effective direction of rotation of the rotor shaft will be reversed, said body part being open on its upper side, a cover part fitting over the open upper side of the body part and formed with a feed opening, and symmetrically arranged fastening means securing the cover part to the body part in either of two end to end positions.

3. A comminuting machine comprising a supporting frame, a hollow body part adapted to be supported on the frame, fastening means symmetrically arranged on the body part and the frame so the body part can be supported on the frame with either end at the forward end of the machine, a rotor shaft extending through the body part, drive pulleys on each end of the rotor shaft at opposite sides of the body part, blade members carried by the rotor shaft and differently shaped on their opposite edges, a drive motor carried by the frame and rotatable in one direction only, a drive pulley driven by the motor, and a drive belt connecting the last named drive pulley with the first named drive pulleys respectively when the body part is in different positions.

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