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GRINDER AND DRIVING MOTOR, INCLUDING CANTILEVER TYPE MOTOR ROTOR

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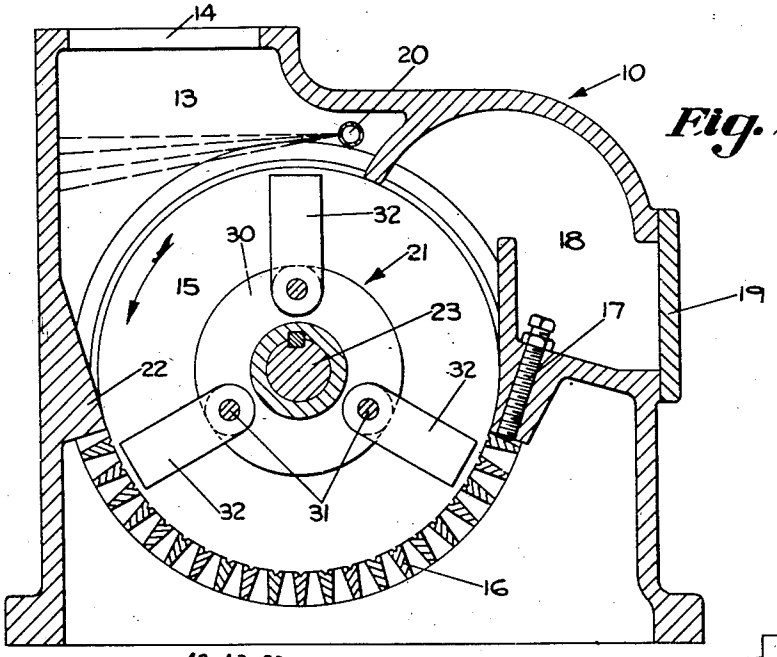


Fig. 2

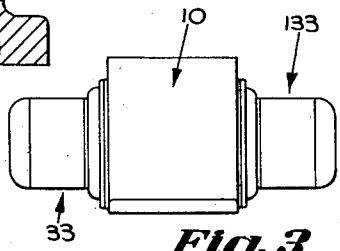


Fig. 3

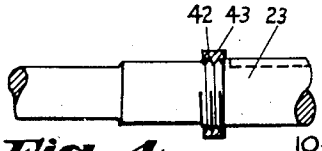


Fig. 4

Fig. 1

INVENTOR;
FRED J. WRIGHT,
BY
Harker H. Hitton
ATT'Y.

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GRINDER AND DRIVING MOTOR, INCLUDING CANTILEVER TYPE MOTOR ROTOR

Fred J. Wright, Upper Arlington, Ohio, assignor, by mesne assignments, to The Jeffrey Manufacturing Company, a corporation of Ohio

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1 Claim. (Cl. 241—38)

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This invention relates to a grinder and more specifically to a garbage grinder.

An object of the invention is to provide an improved grinder in which the rotor is mounted on only two bearings which support opposite sides of the rotor and in which there are one or more driving motors, the rotors of which are directly connected on and supported by the shaft of the grinder rotor.

A further object of the invention is to provide an improved and simplified garbage grinder in which the garbage grinder rotor and driving motor rotor are mounted on the same shaft, and in which the garbage grinder rotor is directly supported by bearings on opposite sides thereof.

Other objects of the invention will appear hereinafter, the novel features and combinations being set forth in the appended claim.

In the accompanying drawings,

Fig. 1 is a sectional elevational view taken along the axis of the garbage grinder and motor;

Fig. 2 is an elevational view taken at right angles to the view of Fig. 1, and through the center of the grinder;

Fig. 3 is an elevational view of a modified form of combination grinder and driving motors, employing two driving motors; and

Fig. 4 is a fragmentary view of a shaft that is preferably employed in the modified grinder shown in Fig. 3.

Referring particularly to Figs. 1 and 2 of the drawings, it will be seen that the grinder includes a housing or casing 10 formed as a main casting and including a pair of spaced upright side walls that include openings which are closed by closure members 11 and 12. The housing or casing 10 provides a feed throat 13 leading from a top feed opening 14. The central or main portion of the housing or casing 10 provides a reducing chamber 15, the bottom of which is closed by an arcuate bar screen 16. The bottom of the housing or casing 10 is open to provide for a free discharge of material which is adequately reduced to pass through the bar screen 16. Clamping of the bar screen 16 is provided by one or more clamp screws 17.

Adjacent its forward portion, the housing 10 provides a tramp material bin 18 having a removable access door 19. Within the feed throat 13 is a water feed pipe 20 which supplies water to the reducing chamber 15 to aid in the reduction of the material, such as garbage.

In the preferred embodiment of my invention the grinder is designed particularly for the reduction of garbage, though it is to be understood that certain broader aspects of my invention may be utilized in other types of grinders.

Within the reducing chamber 15 is a grinder rotor 21 which co-operates with a ledge 22 of the casing 10 and with the bar screen 16 to grind and

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reduce material, such as garbage, sufficiently to permit it to pass through the screen 16 and be discharged out the open bottom of the casing 10.

The rotor 21 includes a shaft 23 which is mounted for rotation on a horizontal axis and which is supported on opposite sides in the two closure members 11 and 12 by spaced anti-friction bearings 24 and 25, the former being supported in closure member 11 and the latter in closure member 12. Said closure members 11 and 12 are removably attached to the main frame portion of the housing or casing 10 to cover openings therein, as illustrated in Fig. 1 of the drawings.

Mounted on the shaft 23 between the two bearings 24 and 25 and consequently between the closure members 11 and 12, is a pair of end discs 26 and 27 which have integrally formed abutting hubs 28 and 29 extending inwardly therefrom and keyed to the shaft 23. Extending through aligned openings in the end discs 26 and 27 and in integrally formed smaller discs 30 formed on hubs 28 and 29, are axially extending pivot pins 31 which pivotally support reducing means in the form of swing hammers or cutters 32.

From the above description it is obvious that the grinder rotor 21 is supported on opposite sides by virtue of the support of the shaft 23 in the bearings 24 and 25. This is very desirable in a grinder, since the material fed thereto as well as the grinding action which takes place therein, causes a severe and varying load to be thrown onto said rotor 21. This load is taken by bearings at opposite ends of the rotor and is transmitted to the casing 10, thus preventing bending or distortion of the shaft 23.

At the same time it is very desirable in a compact unit of this type to eliminate any flexible coupling between the driving motor and the rotor, and to do this it is extremely desirable that the rotor shaft be mounted only on two bearings rather than more than two bearings. This, of course, eliminates the necessity of exact alinement of more than two bearings.

To provide these desirable characteristics, I employ a driving electric motor 33 for driving the rotor 21. The electric motor 33 includes a rotor 34 which is keyed to and mounted directly on the free extension or portion of the grinder rotor shaft 23. In other words, the left-hand portion of the rotor shaft 23, as viewed in Fig. 1 of the drawings, is a cantilever or freely extending portion, extending through the closure member 11 and beyond the supporting bearing 24. The rotor 34 of the electric motor is rigidly mounted on this free end of said shaft 23 and carried solely thereby. The stator portion 35 of the electric motor 33 includes an open ended housing that is mounted directly on the removable closure member 11.

To provide for proper lubrication of the bear-

ing 24, it is mounted in a grease housing 36 formed in the closure member 11 and provided with a removable cap 37 with which a grease packing seal 38 co-operates and which surrounds the adjacent portion of the shaft 23. A labyrinth type grease seal 39 is provided adjacent the inner portion of the grease housing 36 and is formed between the adjacent portions of end disc 26 and closure member 11. A grease passageway 40 leading from a grease fitting, is provided in the closure member 11 and leads to the grease housing 36.

In Fig. 3 of the drawings I have illustrated a modified form of grinder in which there are two electric motors 33 and 133, instead of a single electric motor. When the two electric motors 33 and 133 are employed, the rotor shaft 23 is made symmetrical and it has two free ends extending on both sides of the housing 10 or, in other words, beyond the closure members 11 and 12. In this construction the grinder and motors are substantially duplicated on opposite sides of a vertical plane passing through the center of the rotor 21 and at right angles to the axis of the shaft 23. As a consequence, the opposite free ends of the shaft 23 will carry motor rotors.

A slight modification of the structure of the shaft 23, seen in Fig. 4, is preferably employed where the two motors 33 and 133 are used. That is, the center portion of the shaft 23 is the largest portion thereof and instead of an abutment on said shaft 23, which is seen at 41, the shaft at this portion is of reduced diameter, as compared with the central portion, and is provided with threads 42 which receive a nut 43. This arrangement is duplicated on opposite sides of the shaft, and the mentioned nuts may be removed to provide for removal of the end discs 26 and 27 and integral hubs 28 and 29 of the rotor 21.

The two motor arrangement is provided in case a larger unit is desired and the H. P. rating of the driving motors is individually maintained at a minimum.

In the operation of the device, material to be reduced, such as garbage, will be fed through the opening 14 and feed throat 13 into the reducing chamber 15. The rotor 21 while rotating in the direction of the arrow, will co-operate with the ledge 22 and the arcuate bar screen 16 to effect a grinding and reducing of the garbage. This grinding and reducing action will be aided by the water fed to the feed chamber 15 from the pipe 20, which water will also aid in carrying away the reduced garbage through the screen 16. Tramp material, such as metal, glass and other hard pieces, will be thrown by centrifugal action from the reducing chamber 15 into the tramp material bin 18.

It is to be particularly noted that the motor and grinder as a unit require only two bearings to support the motor rotor and the grinder rotor, thus making bearing alinement a minimum problem and completely eliminating the necessity of any flexible coupling between the motor and grinder.

It is also to be noted that the closure member 11 is common to an opening in the side wall of the grinder casing 10 and to an open end of the motor stator 35, that is, the closure member 11 forms a wall for closing an opening in the grinder housing 10 and an end of the associated motor stator housing 35. The closure members 11 and 12, in addition to performing the above described functions, also form bar screen retaining means for screen 16. Referring to Fig. 1 of the drawings, it will be seen that the bar screen 16 is supported between the closure members 11 and 12 by the housing 10 and that the closure members overlap the sides of the bar screen to retain it in the desired position.

Furthermore, by virtue of the fact that the grinder rotor is directly supported on bearings on opposite sides thereof, there will be an equal distribution of the load between the bearings, and load variations on the grinder rotor will not have to be taken by any cantilever or freely extending axle structure. Obviously, the motor rotor 34 is not subject to the same or equivalent type of load variations.

In the modification of the invention, shown in Fig. 3, where two motors 33 and 133 are employed, the motors are symmetrically arranged with respect to the grinder, and the motor stators are both directly connected to and supported by the closure members on the grinder housing or casing. The above mentioned desirable characteristics also fully apply to this modified form of unit.

Obviously those skilled in the art may make various changes in the details and arrangement of parts without departing from the spirit and scope of the invention as defined by the claim hereto appended, and I therefore wish not to be restricted to the precise construction herein disclosed.

Having thus described and shown an embodiment of my invention, what I desire to secure by Letters Patent of the United States is:

A garbage grinder including a housing, a rotor in said housing, a bar screen below said rotor, means on said rotor cooperating with said bar screen to reduce garbage, means for introducing water into said housing to aid in the reduction of said garbage, said rotor including a shaft having at least one free end extending beyond the grinder housing, a pair of bearings supporting said shaft on opposite sides of said housing whereby the rotor is supported in said housing on both sides thereof, and a motor for driving said rotor, said motor including a rotor mounted rigidly on and carried solely by the free end of said shaft and a stator rigidly connected to and supported by said grinder housing.

FRED J. WRIGHT.

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