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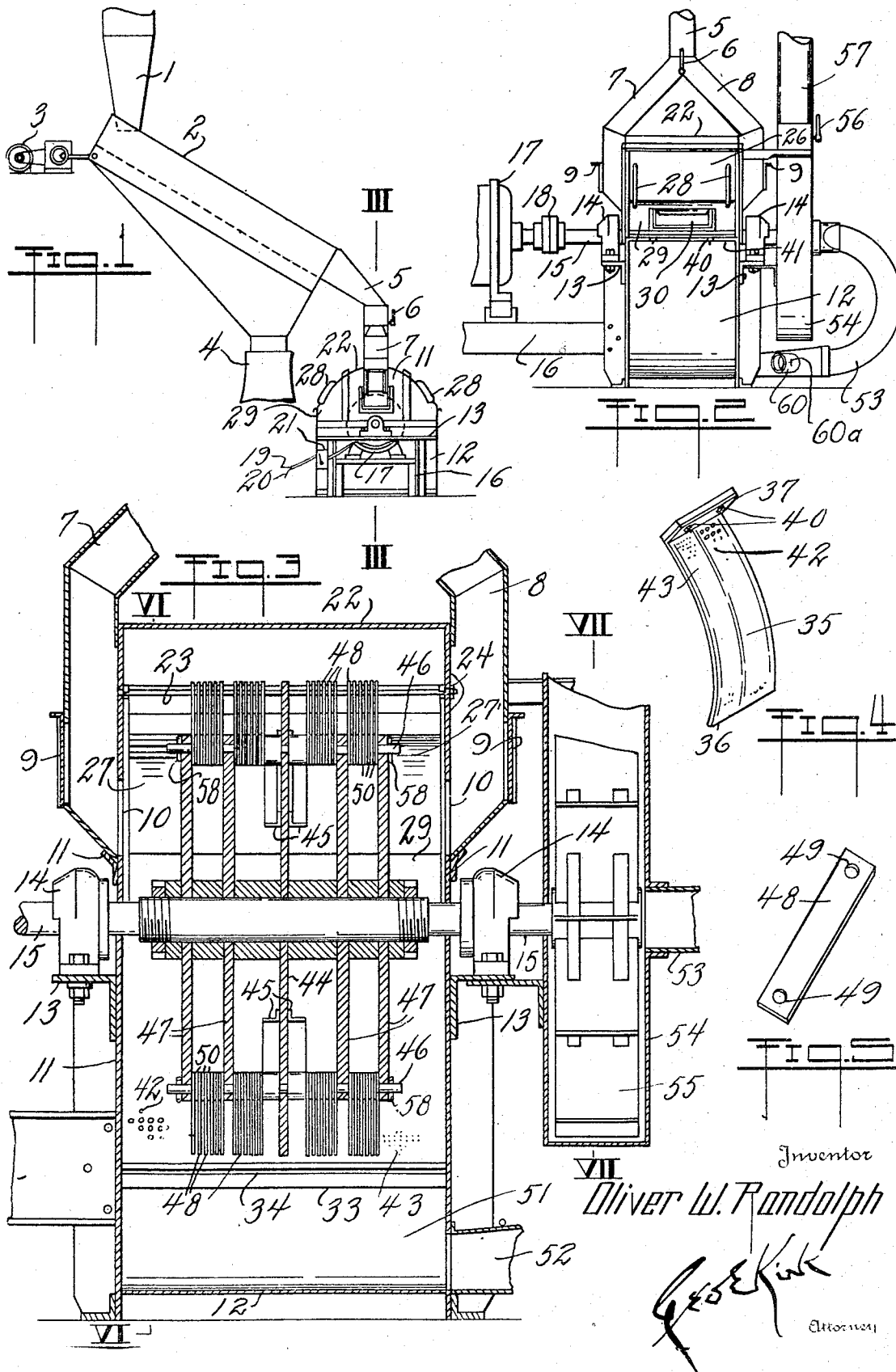
O. W. RANDOLPH

2,226,741

HAMMER MILL

Filed Oct. 24, 1938

2 Sheets-Sheet 1



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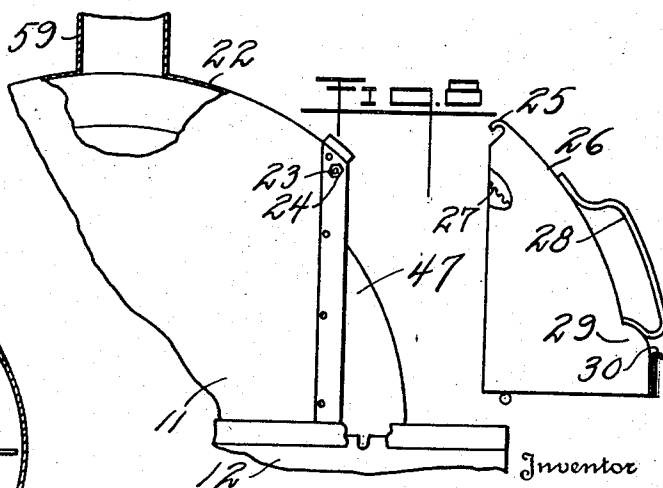
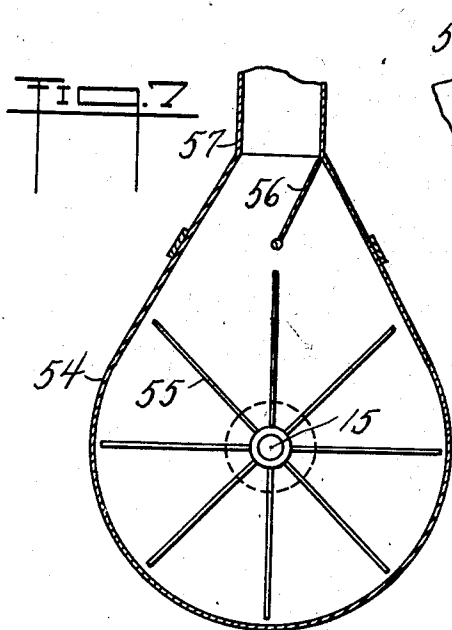
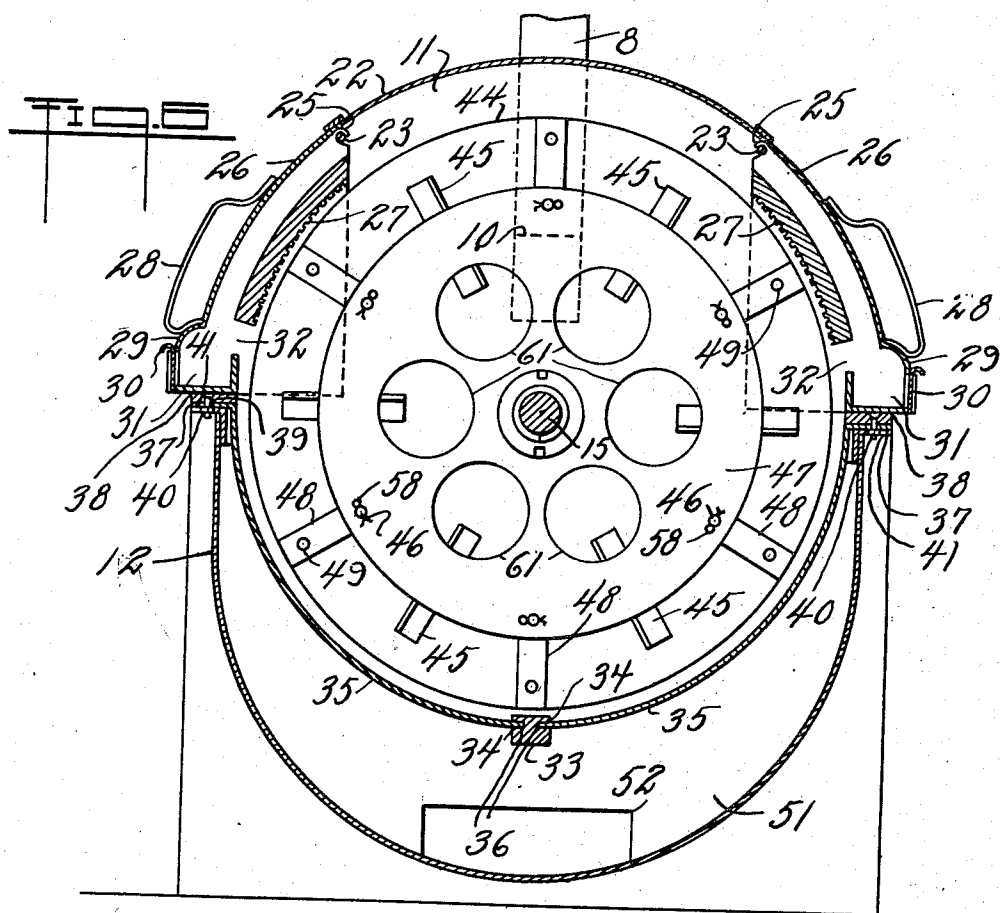
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

2,226,741

HAMMER MILL

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Application October 24, 1938, Serial No. 236,730

1 Claim. (Cl. 83—11)

This invention relates to disintegrating or subdividing material.

This invention has utility when incorporated in a hammer mill.

Referring to the drawings:

Fig. 1 is a side elevation of an embodiment of the invention in an installation, for subdividing materials such as cereals or alfalfa;

Fig. 2 is a view in side elevation of the mill, parts being broken away;

Fig. 3 is a longitudinal section through the mill on the line III—III, Fig. 1, with the hammers radially thrown;

Fig. 4 is a detail view of a removable foraminous section;

Fig. 5 is a detail view of a swingable beater or bar;

Fig. 6 is a transverse section of the mill on the line VI—VI, Fig. 3;

Fig. 7 is a view of the fan or blower on the line VII—VII, Fig. 3; and

Fig. 8 is a detail view of a replaceable abrader section and the portion of the mill from which it is taken.

Supply hopper 1 spills the material to be treated upon inclined screen 2 as agitated by motor 3. This effects separation of fines in receiver 4, thereby leaving the material to be treated to pass by chute 5. Wing valve 6 therein may be swung for effecting delivery from the chute 5 to duct 7 or to duct 8 as may be desired. These ducts near the lower portion have removable shutters 9 to permit inspection or ready access, as delivery therefrom is by port 10 (Fig. 3) into housing end 11 carried by housing base 12 having lateral or outstanding flanges 13 on opposite sides mounting bearings 14 for shaft 15. This housing base 12 has bracket extensions 16 therefrom effective to mount motor 17, having coupling 18 directly with the shaft 15 (Fig. 2). Electric current supply lines 19, 20, extend to reversible switch 21 for effecting control of this motor 17 and reversing the direction of the motor driving action.

Between the housing ends 11 at the upper portion is housing top section 22. Adjacent the terminal of this section 22 and between the housing ends 11 are rods 23 adjusted and secured with respect to the end 11 by nuts 24. These rods 23 may be engaged by hooks 25 of housing sections 26 having abrading face portions 27 of selected degree of dimension for the serrations or teeth—the smaller the teeth 27 the finer the subdivision. The sections 26 have handles 28 with which they may be rocked into hooked assembly

position to bring enlargements 29 into abutting relation with the housing base 12. At such position, shutter or window 30 may be opened to permit removal of accumulation in pocket 31 of this enlargement 29. Heavier particles, such as pebbles, metal, or foreign material, enter the port 32 and lodge in the pocket 31.

The base 12 lower portion has thereacross bar 33 having opposite parallel seats 34. Foraminous quadrant 35 may have terminus 36 enter a seat 34. This quadrant 35 has at its opposite terminal an angular outward upper offset 37, with which coacts packing 38 for dust-tight assembly with the section 26, secured at bolt holes 39, where bolts 40 not only pass from adjacent the chamber 31 through this flange 37 but engage flange 41 in the base 12. It thus follows that there may be a full assembly of the cylindrical shell with the housing, which cylindrical shell has upper abrading portions 27, and therebelow quadrant foraminous portions 35 which may on one portion have openings 42 of a coarse dimension and adjacent section openings 43 of a fine or less dimension in keeping with the degree of subdivision effected by the abrading portions 27.

On the shaft 15 and in this housing 11, 12, 26, approximately midway between the opposing housing ends 11, there is fixed a partition, diaphragm, or disk 44 approximately in the plane of separation between the coarser foraminous openings 42 and the relatively finer foraminous portions 43. This disk 44 has radially extending suction blades or wing sections 45 composed of angle iron fan portions stiffening this disk in peripheral regions thereof. Additionally, this stiffened disk has therethrough pins 46 engaging parallel mounting perforate support disks 47. Mounted on these pins 46 between the disks 47 and toward the disk 44 in such a position as in swinging on the pins to clear the blades 45 of the fan, are beaters 48. These beaters 48 have openings 49 and are spaced from each other by washers 50. The openings 49, being near opposite ends, permit these beaters of this hammer mill device to be reversed as free end corners wear down.

This housing base 12, being of larger arc than the foraminous portions 35, provides collector chamber 51 having outlet 52 connected by duct 53 axially of fan housing 54 in which is mounted radially bladed fan 55 on the shaft 15. In this fan exhaust housing 54, above the blade device 55 is located vane 56 which is automatically set, depending on the direction of rotation of the shaft 15, for cutting off downflow of the thrown

or lifted disintegrated material. Adjacent this vane 56 is upwardly extending duct 57.

The selectively available delivery ducts 7, 8, to the rotary mill or beater permit, when the valve 6 is set for delivery to both thereof, simultaneous sub-division on each side of the disk 44, which sub-division may be to the same degree of fineness in the event the openings in the sections 35 are of similar size in each of the sections thereof instead of being different sized ports 42, 43. If they be of the different sizes, then sub-division would of course have a wider range in the resultant product. This means that there may be one run through this hammer mill or beater at the coarse size and then the re-run through at the finer size; or one material may be supplied by duct 7 and a different kind and the same or different degree of fineness supplied through the duct 8.

As the hammers or beaters 48 in their swing clear of the shell have their active termini worn down at one corner for one direction of rotation of the shaft 15, it is only necessary to reverse the direction of drive of the motor 17 by oppositely throwing the switch 21. As the two free corners are worn on the beaters 48, the rods 46 may have cotter pins 58 removed and the beaters replaced end for end with the parts re-assembled, followed by replacing of the cotter pins.

There is thus a four-direction use for each of these beaters. The drive may run say 1750 to 1800 R. P. M. This with a 125 horsepower motor may mean production at the rate of four tons per hour for feed meal. At re-grinding, 75 per cent to pass through No. 28 screen, three tons per hour may be ground with a 75 horsepower. If 75 per cent be the proportion to pass through a No. 20 screen, two tons per hour may be ground with 50 horsepower when the substance is dried alfalfa. Lifting out of a section 26 permits change of the beaters 48 on one rod 46 at a time without tearing down the mill.

Likewise, each section 35 is accessible for different size substitution or replacement, effected by sliding such upward into the clearway provided by the removal of the adjacent section 26.

In lieu of supply ducts 7, 8, at opposite ends, a single medial supply duct 59 (Fig. 8) may be adopted.

The air pumping action through the mill by the blades 45, as supplemented by the fan 55, makes possible simultaneous additional feed 10 mixing from one or more further supply ways, such as duct 60 spilling into the duct 53 when its valve 60a is open. One or more other feed ingredients, which may be pre-ground, may thus be automatically commingled to complete the 15 desired product conveyed for storing, packaging, or use, by the duct 57.

Ports or openings 61 are in the disks 47.

What is claimed and it is desired to secure by Letters Patent is:

A material subdividing machine of the hammer mill type, comprising a housing having a top section and a base section, a horizontal shaft rotatably mounted in said housing, beater-supporting means carried by said shaft, beaters 25 loosely pivoted on said supporting means, a pair of foraminous screen sections of arcuate form carried by the housing base section below said shaft and concentric therewith, said screen sections cooperating to form a generally semi-cylindrical screen, a bar carried by said housing base section and serving as an abutment in which the lower termini of said screen sections detachably seat, said top housing section being generally fixed to said base housing section and being provided with opposed radially removable sections carrying abrading portions concentric with said shaft and adapted to lock releasably said screen sections in operative position.

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