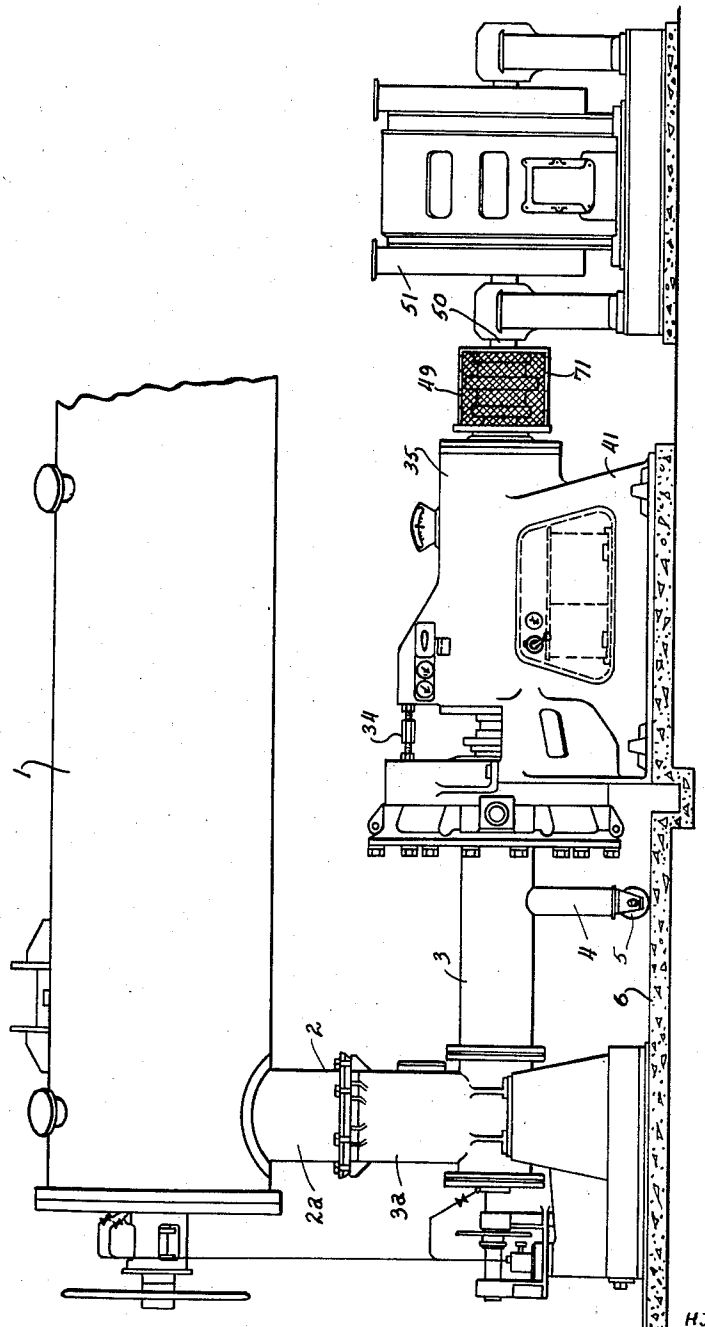
April 5, 1960 H. S. MESSING 2,931,586

GRINDING DEVICE FOR THE BREAKING DOWN OF WOOD FIBRES

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Fig. 1



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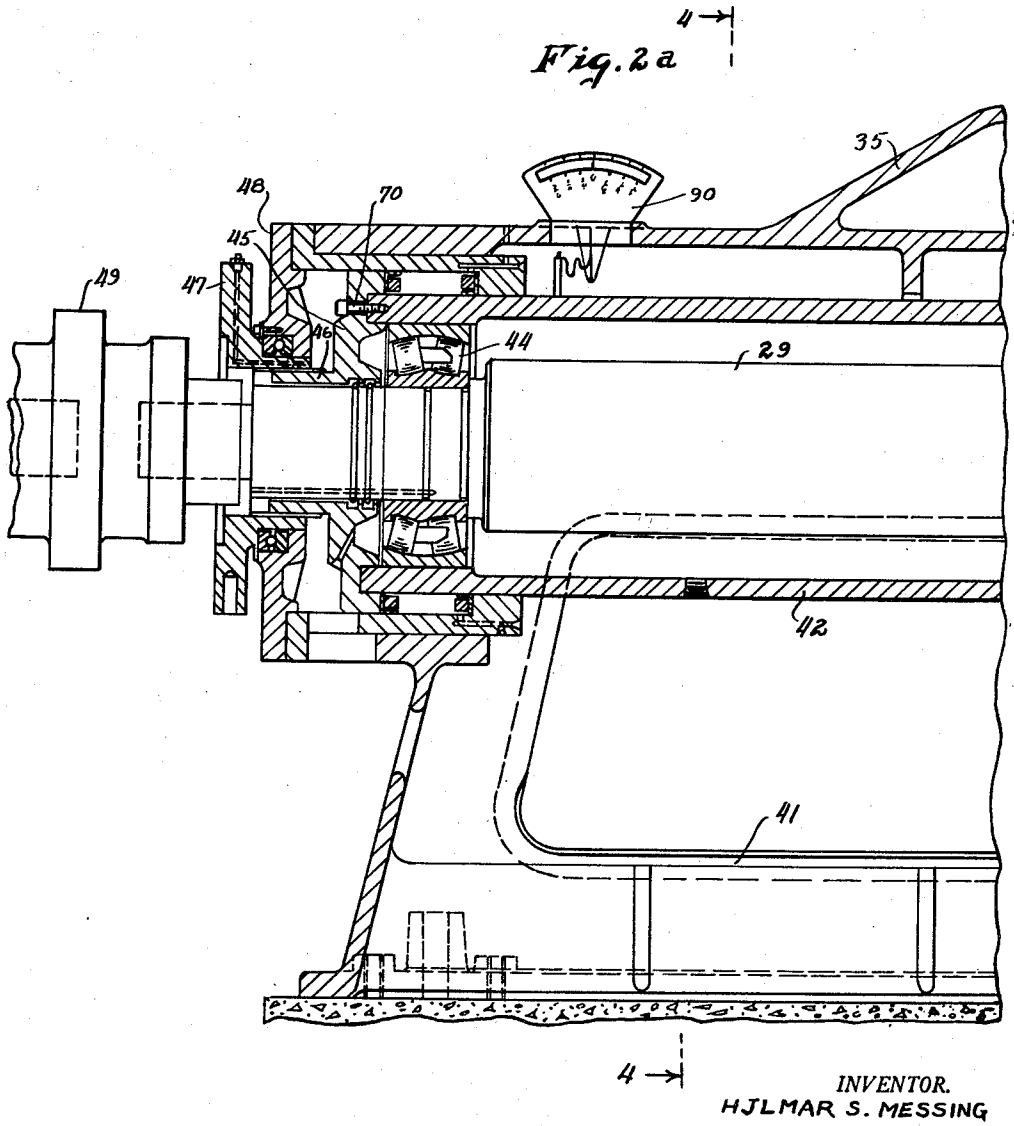
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GRINDING DEVICE FOR THE BREAKING DOWN OF WOOD FIBRES

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Fig. 2a



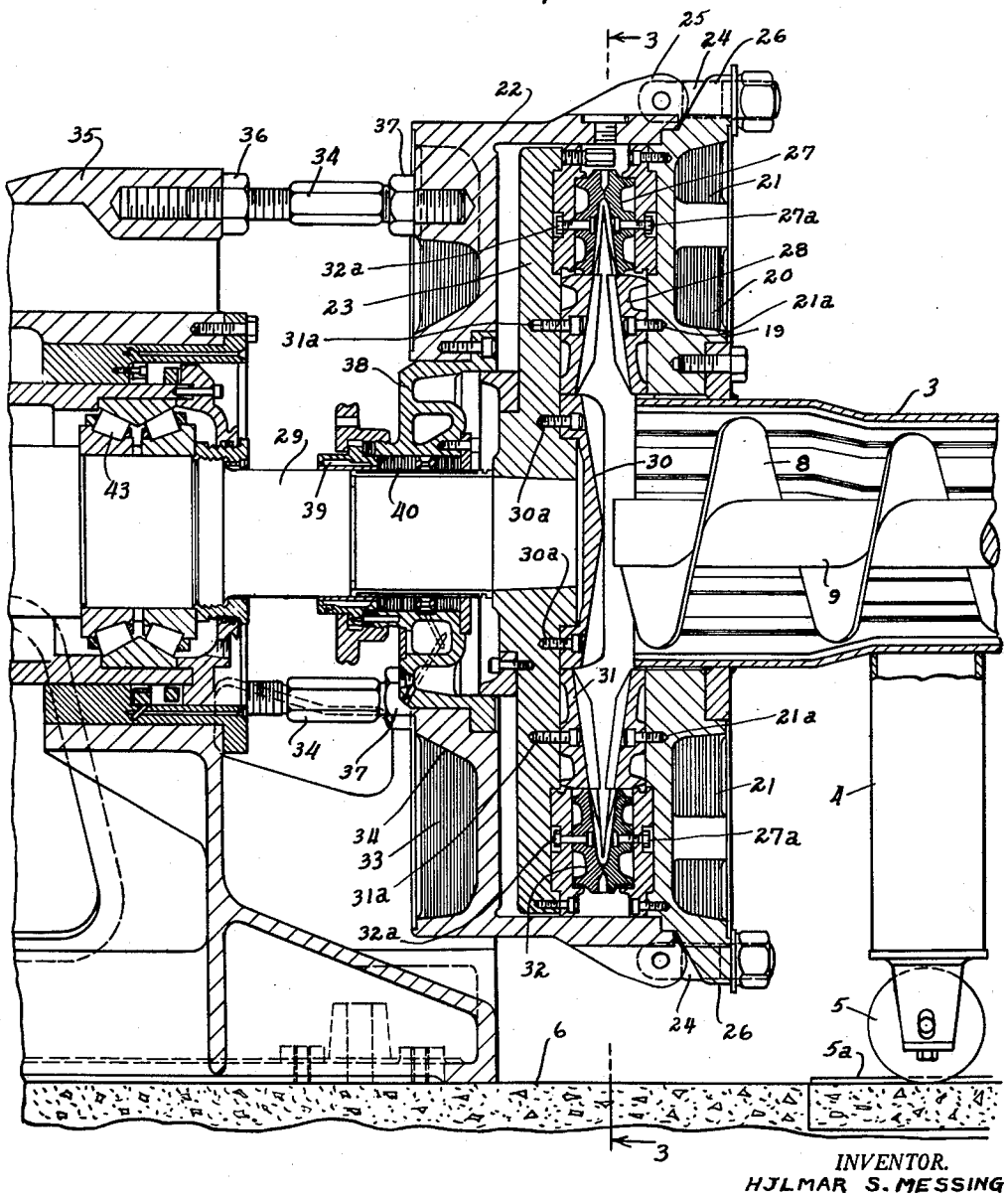
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Fig. 2 b



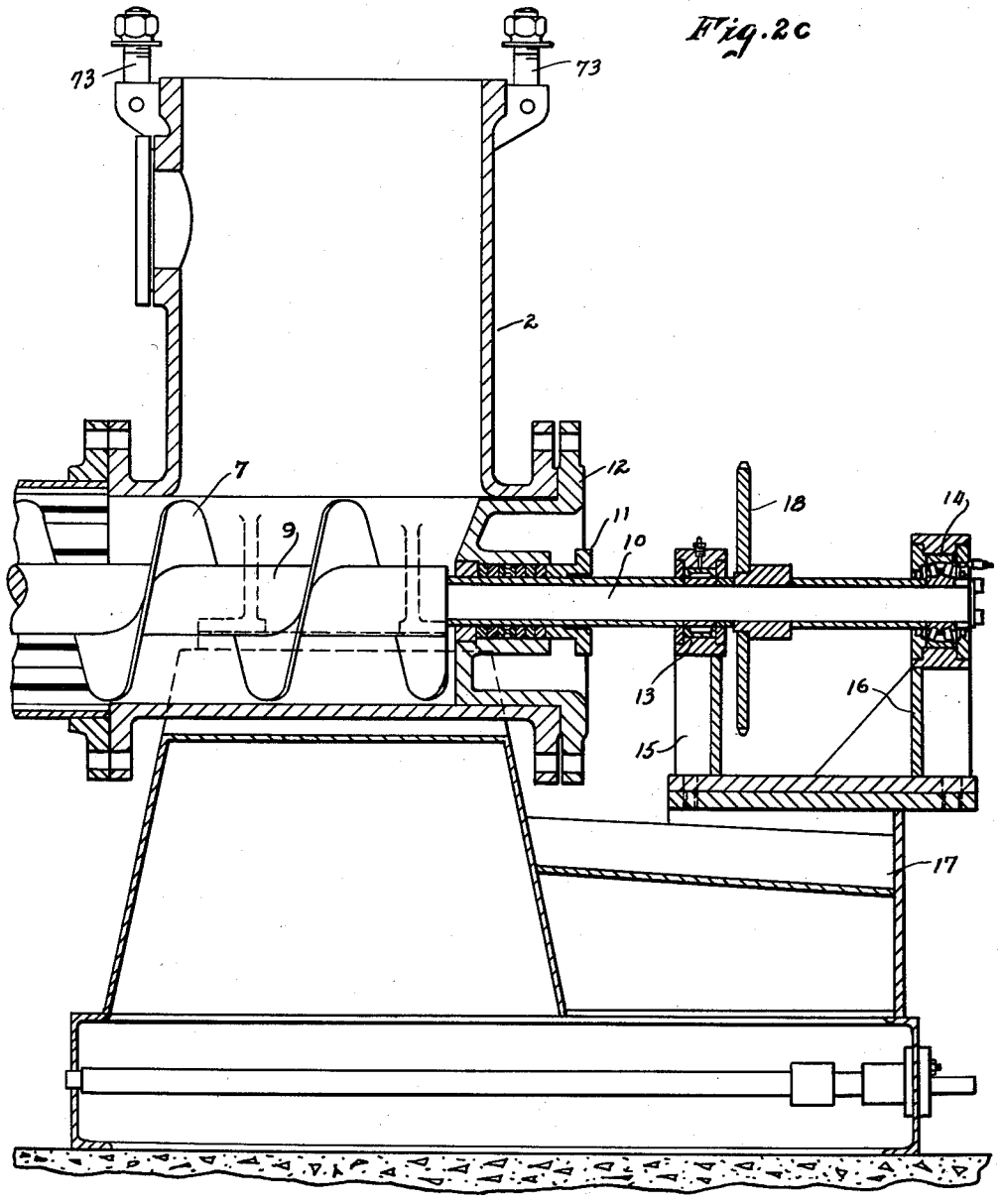
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GRINDING DEVICE FOR THE BREAKING DOWN OF WOOD FIBRES

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Fig. 2c



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GRINDING DEVICE FOR THE BREAKING DOWN OF WOOD FIBRES

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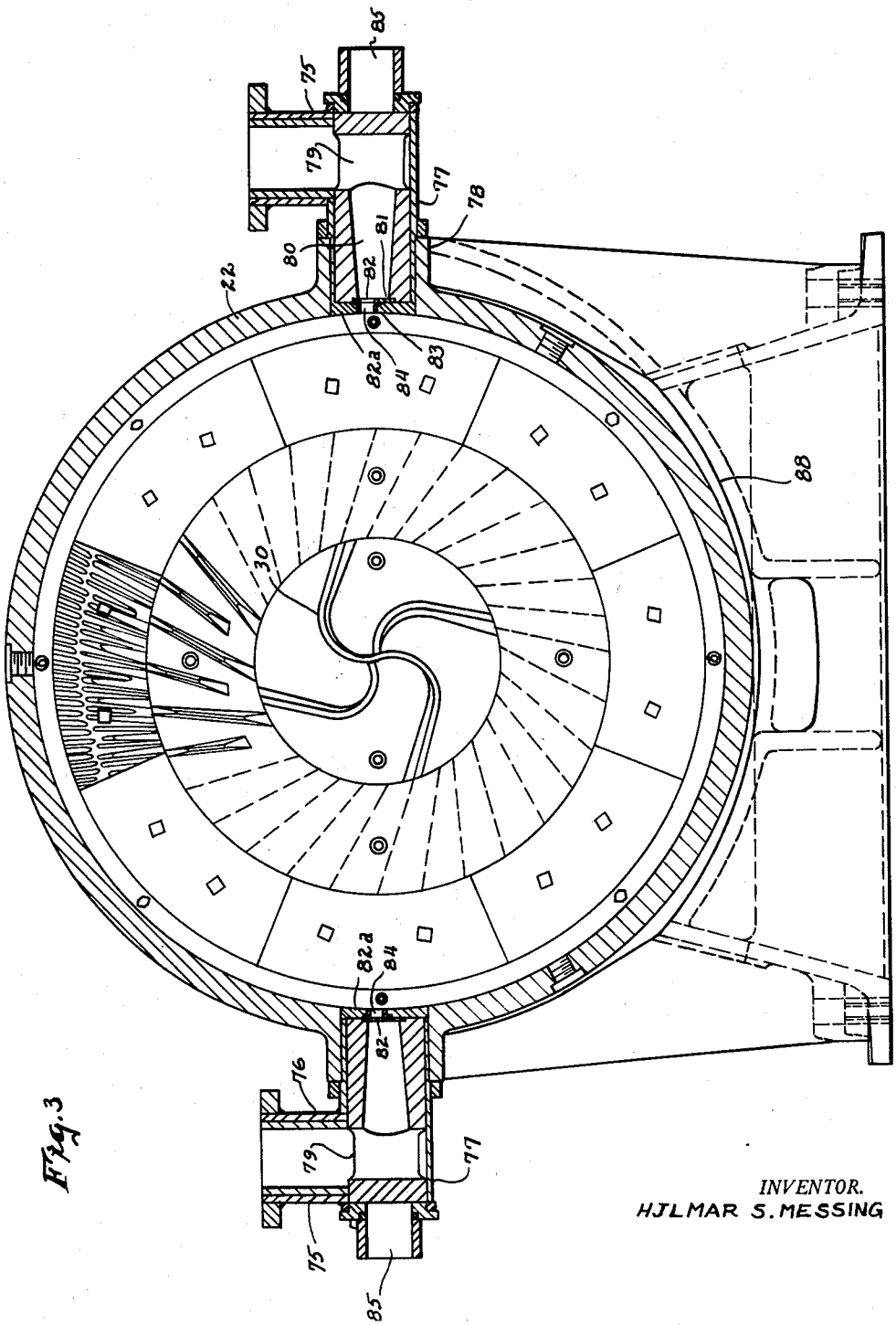


Fig. 3

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Fig. 4

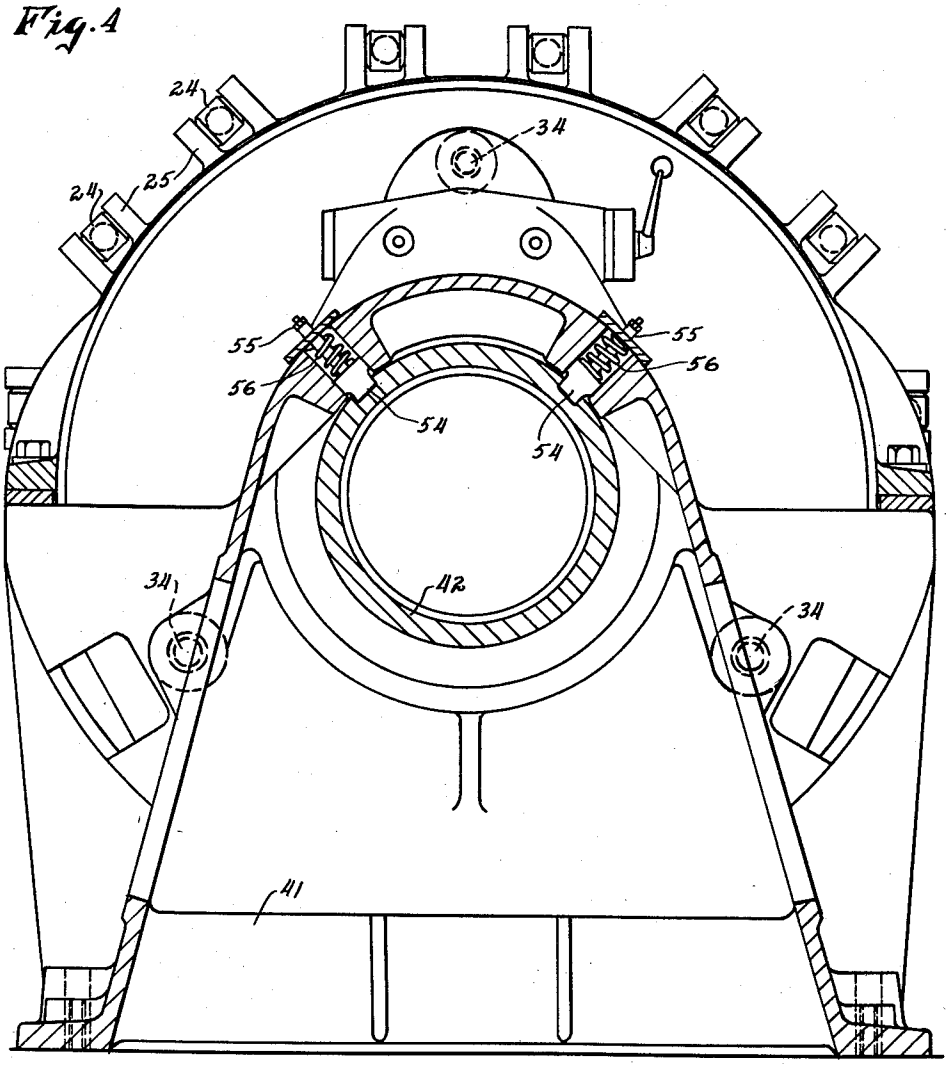
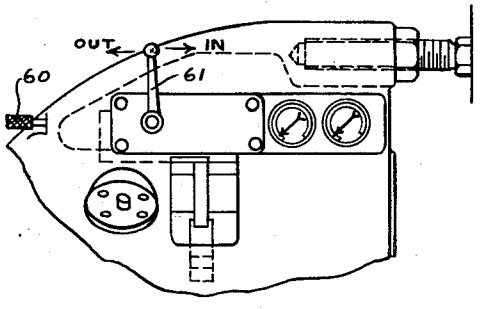


Fig. 5



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United States Patent Office 2,931,586 Patented Apr. 5, 1960

2,931,586

GRINDING DEVICE FOR THE BREAKING DOWN OF WOOD FIBRES

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Application August 16, 1957, Serial No. 678,511

7 Claims. (Cl. 241—256)

This invention relates to defibrators or grinding apparatus employed for the breaking down of wood fibres or similar fibrous material, which apparatus is of the type in which a rotatable and non-rotatable grinding member co-operate in acting upon the fibrous material.

It is an object of the invention to provide an apparatus of this character in which numerous structural improvements are incorporated in a manner to result in sturdy construction, long wear, efficient operation, an increased factor of safety and other features and advantages tending to not only result in improved operation, but in the production of a superior product.

It is an object of the invention to provide an improved mounting for the rotatable grinding member whereby accurate setting of the spacing between the movable and non-rotatable grinding members will be obtained; to provide feeding means for the securement of an even and constant flow of the material to be ground; to provide a frame or mounting for the apparatus of exceptional strength and to effect numerous other structural and functional advantages apparent to those skilled in this art.

In the accompanying drawings, wherein an illustrative embodiment of the invention is disclosed,

Fig. 1 is a side elevational view of the defibrator or grinding apparatus constructed according to the invention;

Figs. 2*a*, 2*b* and 2*c* constitute jointly a vertical longitudinal sectional view of the defibrator;

Fig. 3 is a sectional view, taken substantially on the line 3—3 of Fig. 2*b* looking in the direction of the arrows;

Fig. 4 is a sectional view, taken substantially on the line 4—4 of Fig. 2*a*, looking in the direction of the arrows; and

Fig. 5 is a view showing the disk-adjustment controlling means.

Referring to the drawings, and more particularly to Fig. 1 thereof, 1 indicates an extended horizontal preheater in which the wood chips or other fibrous material is moved while subjected to the action of high temperature and steam. This device is of known construction and houses a spiral feeder by means of which the chips are moved into and through a vertical preheater or stack 2, to enter therefrom into the horizontal feed tube 3 and fed by the spiral feeder 7 therein, (Fig. 2*c*) into position between the grinding disks to be described. The stack 2 includes an upper section 2*a* and a lower section 3*a*, the two sections being coupled together by pivot bolts 73 shown in Fig. 2*c*.

The feed tube 3 is supported between its ends by one or more posts 4, (Fig. 1) each of which is provided at its lower end with an adjustable roller 5 resting upon a plate 5*a*, (Fig. 2*b*) or on the floor 6 or other supporting surface. Rotatable within the feed tube 3 is the spiral feeder 7 (Figs. 2*b* and 2*c*) which is operative to move the stock from the lower part of the vertical preheater or stack 2 to position between the grinding disks.

The shaft 9 of the spiral feeder 7 has an extended end 10 rotatable in and extending through a stuffing box 11 in the closure head 12 at the lower end of the stack 2. Said extended end 10 of shaft 9 is rotatively supported in bearings indicated respectively at 13 and 14 mounted in supports 15 and 16 on the base indicated at 17. Carried on the extended end portion 10 of shaft 9 is a sprocket 18 driven by a chain extending from a motor (not shown) to thereby rotate the spiral feeder 7 at the required speed.

It will be noted from Fig. 2*b* that the feed tube 3 is increased in diameter adjacent to its joinder with the housing 19 in which the grinding disks are operative, to thereby enable the last two or three flights 8 of the spiral feeder 7 to be of larger outside diameter than the remaining and preceding flights. This insures an even, uniform and regular flow of the material from the entry of the same into the feed tube 3 into the grinding zone.

One end of the feed tube 3 is secured to the non-rotative housing cover 19 provided in its outer face with an annular channel 20 containing heat-insulating material 21, such as asbestos. The housing for the rotative grinding disk is shown at 22 and is supported by cradle 88, the rotative grinding disk operative in said housing being shown at 23. Cover 19 is secured to the housing 22 in a manner to close one side of the same, by means of the pivoted bolts 24 pivotally mounted in clevises 25 on the periphery of the housing and engaging lugs 26 provided on the edge of cover 19.

The fixed grinding disk includes a plurality of toothed rings 27 and 28 made up of a number of separate segments fixedly secured to the inner face of cover 19 by the screws 21*a* and bolts 27*a* so that said disk constitutes the fixed grinding disk.

The rotatable grinding disk 23 is fixed to a shaft 29 in any suitable manner, such as by tapered threads or by a hydraulic pressure joint and the said disk is toothed on its face by the central finned cap 30 secured in place by screws 30*a* as well as by the toothed rings indicated respectively at 31 and 32 and each composed of several segments. Rings 31 are secured to disk 23 by the screws 31*a*, while bolts 32*a* fasten the rings 32 in place. The housing 22 is heat insulated as shown at 33, the insulation being maintained in an annular groove in the outer side of the housing 22 as shown at 34. The housing 22 is adjustably supported at three spaced points by means of turn-bolts 34, each having one end threadable into the body of the housing 22 and the other end threadable into the frame 35 of the apparatus. Since the fixed cover 19 for the non-rotative grinding disk, is secured to and carried by the housing 22, it is apparent that adjustment of the housing by means of the three bolts 34 will permit micrometer setting of the stationary disk with respect to the rotating disk, insuring the securement of accurate parallelism of the two disks. It is desirable that the three adjusting bolts 34 shall be made with right-hand threads and with a different number of threads to the inch at each end of each bolt, as for example 16 threads per inch at one end, and 12 threads per inch at the opposite end. Lock nuts 36 and 37 adjustable on the opposite ends of each bolt maintain the bolts in any adjusted position.

The central part of the housing 22 consists of a hub 38 constituting a bearing in which shaft 29 rotates, said hub being provided with a stuffing box 39 containing packing 40 and through which shaft 29 is axially adjustable.

Frame 35 includes a base portion 41 secured to and supported on the floor 6 and it also includes an upper, axially adjustable cylindrical casing 42 which encloses the greater portion of the shaft 29 and is axially movable with the shaft and contains lubricating and cooling fluid

that is circulated through it and around the shaft. At its opposite ends the cylindrical casing 42 is provided with the roller bearings 43 and 44 in which the shaft 29 is rotative.

The casing 42 and shaft 29 contained therein are axially adjustable by the means disclosed in Fig. 5 and which is not described in detail herein, since per se is not of my invention. At one end, the casing 42 is closed by a disk 45 secured at the end of the casing by the bolts 70 and provided with a hub 46 which is externally threaded for engagement with the internal threads on the hub of a hand wheel 47 rotatably mounted in the end member 48 on the frame 41. This arrangement is such that should the automatic adjusting means shown in Fig. 5 and described in the application above mentioned, fail to operate, rotation of the hand wheel in the required direction will cause emergency separation of the grinding disks.

Beyond the hand wheel 47, the shaft 29 is connected into a flexible coupling 49 surrounded by a protective enclosure 71 and connected to the shaft 50 of the motor 51. The casing 42 is spring loaded or resiliently mounted, as shown in Fig. 4, by means of the spring-pressure heads 54 on pins 55 surrounded by springs 56 and urged against the casing to maintain it stable during operation of the apparatus.

The apparatus shown in Fig. 5 includes a plunger adapted to be urged in either of two directions by pressure against one or the other of its two faces by pressure fluid. An adjusting screw shown at 60 acts as a stop to limit the movement of the plunger. The device also includes a lever 61 which, when moved toward the left as viewed in Fig. 5, will separate the grinding disks from their operative position and when moved right will restore them to the desired position for operation.

Located diametrically opposite to one another on housing 22 are similar blow valves indicated respectively at 75 and 76. These valves are similar in construction so that a description of one will suffice for both. Each valve includes a housing 77 mounted in and projecting from a boss 78 on the housing 22. The valve member 79 rotatively adjustable in the housing, has a passage 80 provided at one end with a Stellite plate 81 having an aperture 82 offset with respect to the axis of passage 80. The end wall 82*a* of the housing 77 has a bushing 83 defining an opening 84 constituting an outlet nozzle and the relationship of opening 84 to the axis of the valve 79 is such that by rotative movement of the valve 79 in its housing 77 the opening 82 can be aligned or partly aligned with opening 84 to thereby regulate the effective size of the outlet. The valve 79 has a stem 85 by which it may be rotatively moved to secure the above-mentioned adjustment.

The indicator shown at 90 is employed to show wear on the grinding disks, thereby indicating the necessity for adjustment or perhaps the replacement of the grinding elements.

From the foregoing description, the operation of the apparatus will be readily understood. The stock to be ground moves downwardly through the stack 2 to reach the spiral conveyor 7 and is moved thereby through the feed tube 3 to enter housing 22 between the two grinding disks by which it is pulverized. The mounting of the housing 22 permits of its adjustment by means of the turn-bolts 34. The longitudinal movement of shaft 29, carrying the rotatable disk 23 takes place as required under the control of the device of Fig. 5.

Having described a single embodiment of the invention, it is obvious that the same is not to be restricted thereto but is broad enough to cover all structures coming within the scope of the annexed claims.

What I claim is:

1. A grinding apparatus for disintegrating fibrous material comprising, a frame, an axially-movable hollow cylinder mounted on the frame, spring means operative against the cylinder to stabilize the same, a shaft rotative within the cylinder and lubricated by a lubricant contained therein and axially movable with the cylinder, the cylinder being closed at its opposite ends around the shaft, a housing in the form of a hollow body having stationary grinding elements mounted within it, and threadable means coupling the housing to the frame and permitting adjustment of the housing and the grinding element carried thereby relatively to the frame and to a rotatable grinding element contained in the housing, said rotatable grinding element being mounted on the shaft.

2. A grinding apparatus for disintegrating fibrous material comprising, a frame, an axially-movable shaft in the frame, a rotatable grinding disk carried by the shaft, a housing surrounding said disk, said housing having a non-rotatable grinding element within it for co-operation with the rotatable grinding disk, and means arranged at the marginal edge of the housing for adjustably coupling the housing to the frame and permitting of adjustment of the housing and the grinding element carried thereby relatively to the rotative grinding disk, said means consisting of a plurality of turn-bolts threaded at their opposite ends and having one end threadably received in the housing and the other end threadably received in the frame, the threads at one end of each bolt being finer than those located at its opposite end.

3. A grinding apparatus for disintegrating fibrous material comprising, a frame, an axially-movable hollow cylinder horizontally mounted on the frame, a horizontal shaft rotative within the cylinder and lubricated by a lubricant contained therein, a housing in the form of a hollow body having stationary grinding elements mounted within it, threadable means coupling the housing to the frame and permitting adjustment of the housing and the grinding element carried thereby relatively to the frame and to a rotatable grinding element contained in the housing, said rotatable grinding element being mounted on the shaft, the threadable means being turn-bolts coupling the housing to the frame, each of the turn-bolts having a finer thread at one end than the thread at the other end.

4. In an apparatus of the character described, a housing containing rotative and non-rotative grinding elements, a passage entering the housing and through which material to be disintegrated is fed, the housing having a blow valve consisting of a valve casing having a rotatively-adjustable valve within it, said valve having an axial passage, a closure plate at one end of the passage having an opening located off-center with respect to the passage, an outlet opening provided in the housing and with which the opening in the closure plate can be aligned or completely or partially disaligned with the outlet opening by rotataive adjustment of the valve in its casing.

5. In an apparatus of the character described, a base, a hollow cylinder supported horizontally thereon, said cylinder being capable of axial adjustment relatively to the base, a shaft extending axially within the cylinder and spaced from the interior thereof to provide a lubricant chamber in the cylinder around the shaft, the opposite ends of the cylinder being closed around the shaft spring means operative at spaced points against the outer side of the cylinder for urging it toward the base, the shaft protruding at one end beyond the cylinder, a rotatable grinding element carried by the shaft, a housing in which said grinding element is located, a fixed grinding element contained within the housing, and means for adjusting the housing relative to the base.

6. In an apparatus of the character described, a housing containing rotataive and non-rotative grinding elements, a cylindrical passage entering the housing and through which material to be disintegrated is fed, the housing having a blow valve consisting of a valve casing having a rotatively adjustable valve within it, said valve having an axial passage, a closure plate at one end of

the passage having an opening off center with respect to the passage, an outlet opening provided in the housing and with which the opening in the closure plate can be aligned or completely or partially disaligned with the outlet opening by rotative adjustment of the valve in its casing to thereby control the effective size of the outlet opening, and a second blow valve located diametrically opposite on the housing.

7. In an apparatus of the character described, a base, a hollow cylinder supported horizontally thereon, said cylinder being capable of axial adjustment relatively to the base, a shaft extending axially within the cylinder and spaced from the interior thereof to provide a lubricant chamber in the cylinder around the shaft, the cylinder being closed at both ends around the shaft said shaft being rotative within the cylinder, bearings in the cylinder at the opposite ends thereof and in which the shaft is rotative, spring means operative at spaced points against the periphery of the cylinder for resiliently urging it toward the base, the shaft protruding at one end beyond the cylinder, a rotatable grinding element carried by the shaft, a housing in which said grinding element is located, a fixed grinding element contained within the housing, and means for adjusting the housing relative to the base.

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