No. 653,312. Patented July 10, 1900.

G. H. POND.

DISINTEGRATING MACHINE.

(Application filed Jan. 18, 1900.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 3.

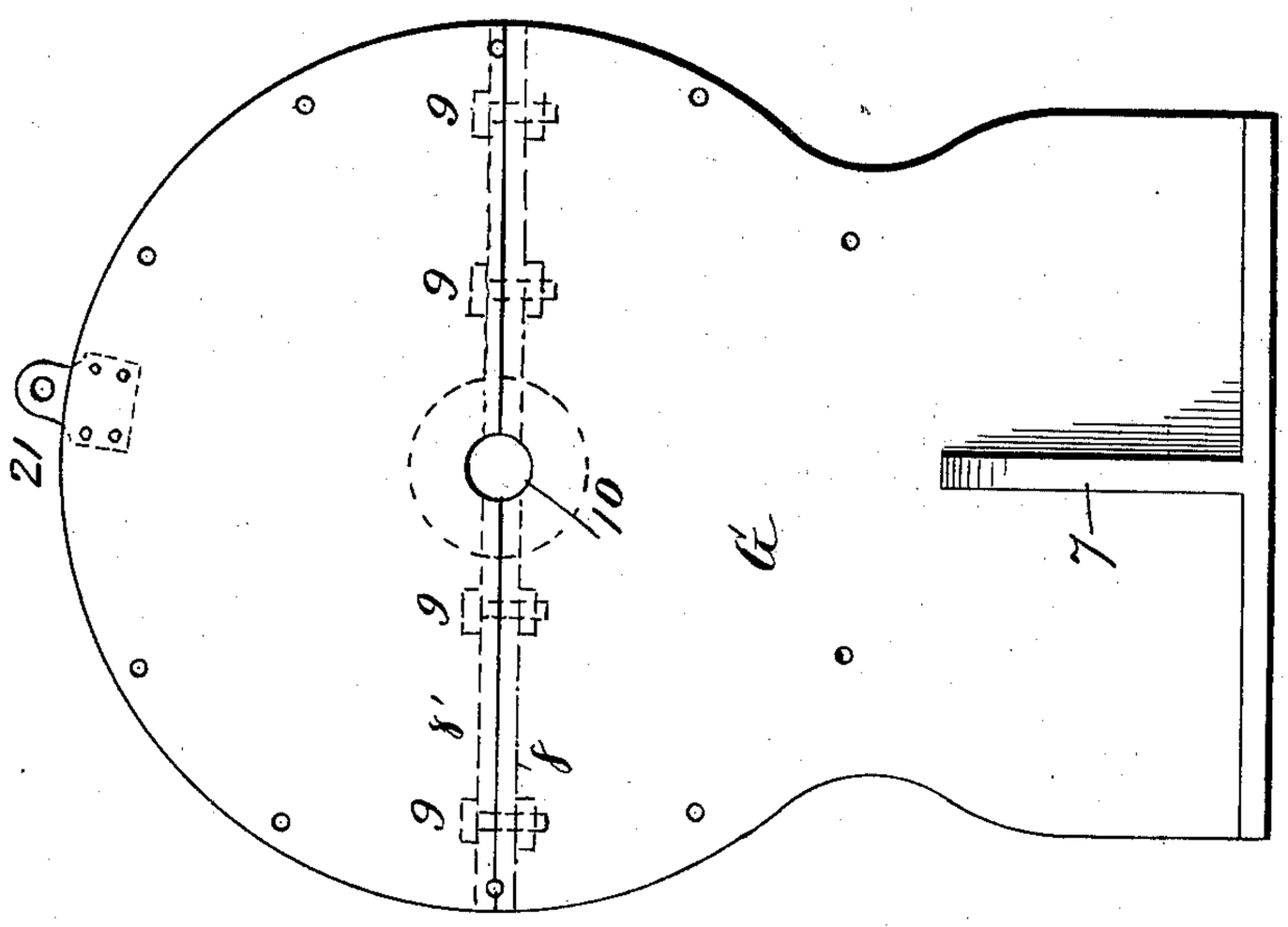
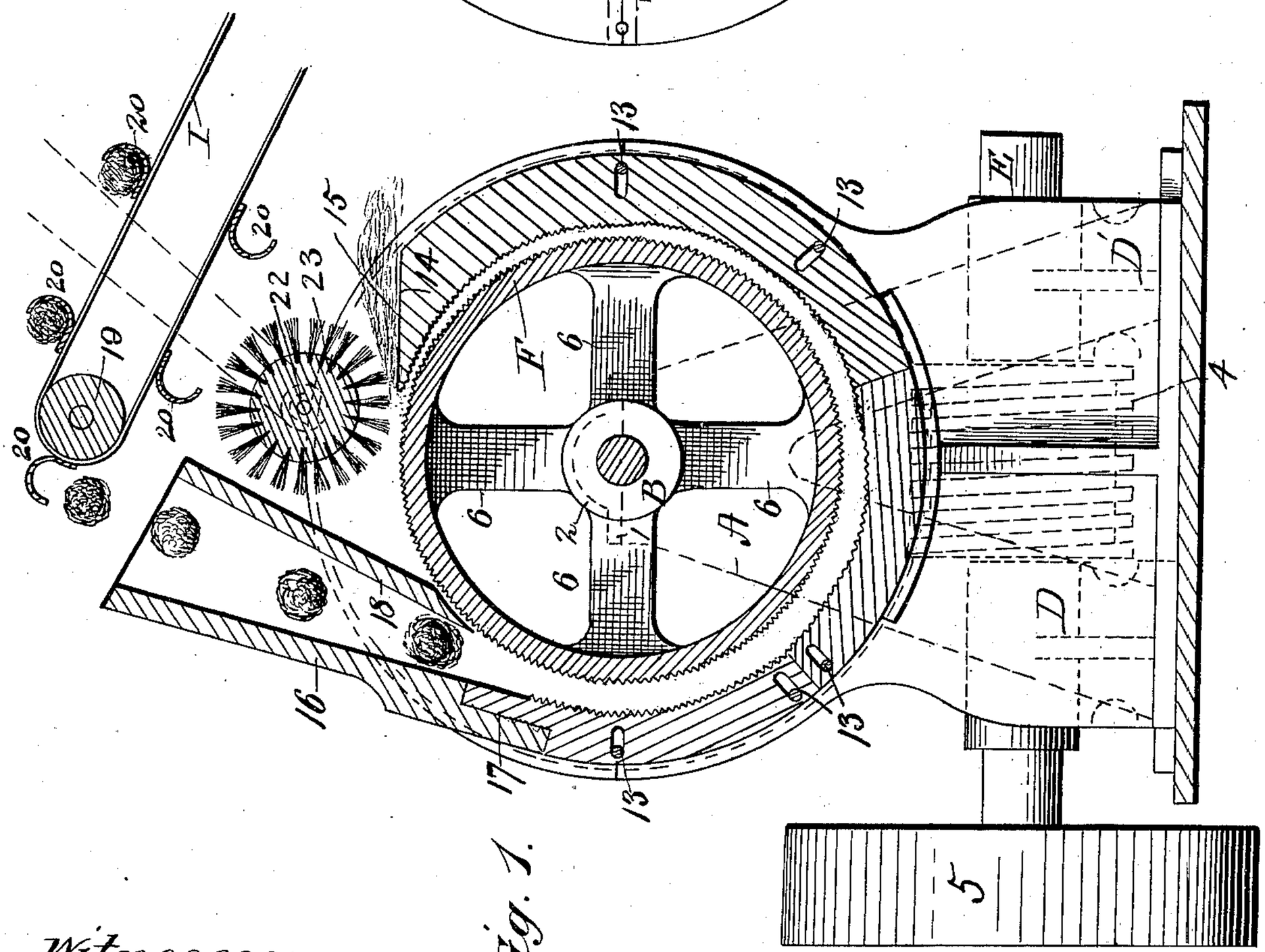


Fig. 1.



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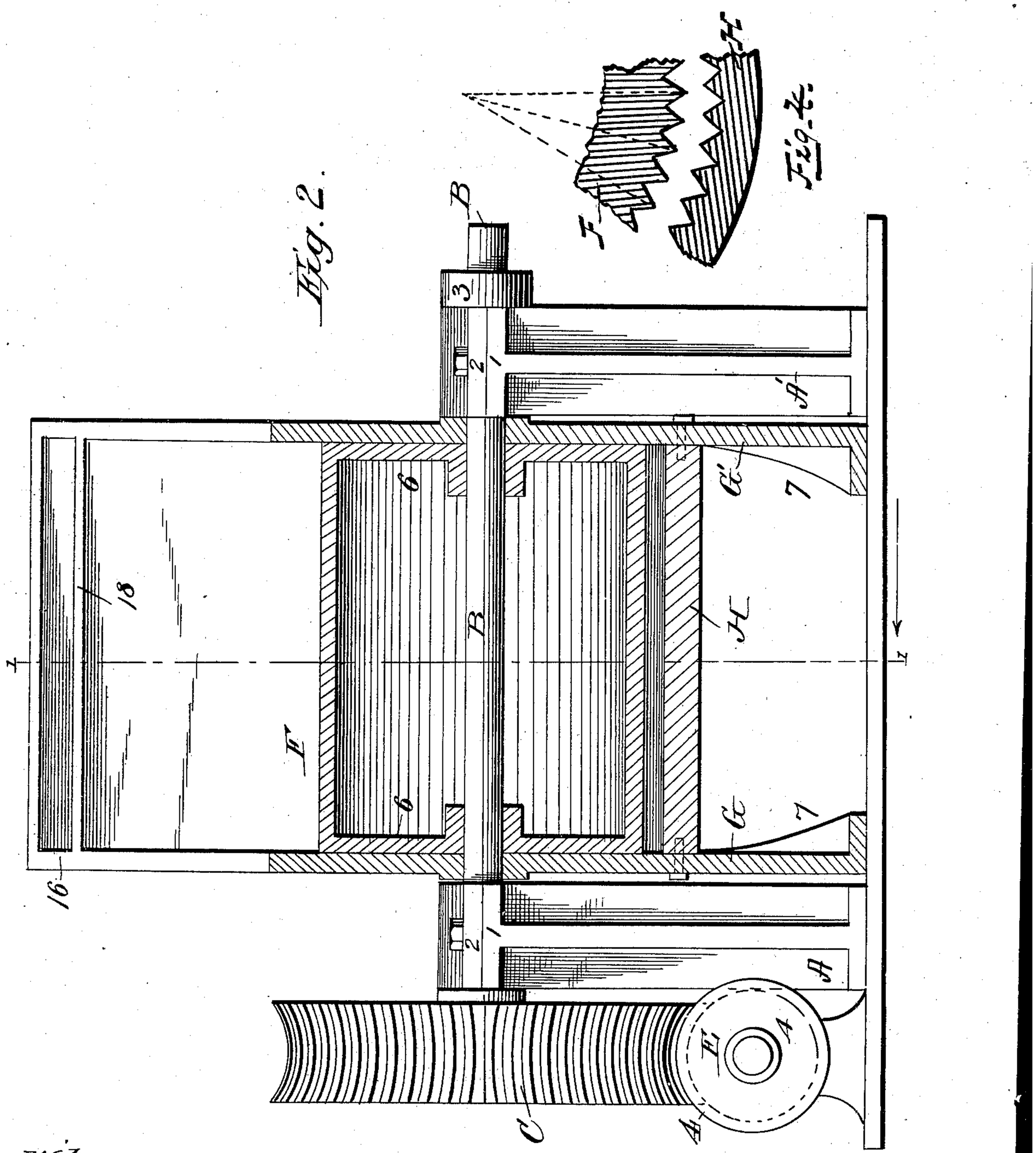

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UNITED STATES PATENT OFFICE.

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DISINTEGRATING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 653,312, dated July 10, 1900.

Application filed January 18, 1900. Serial No. 1,946. (No model.)

To all whom it may concern:

Be it known that I, GOLDSBURY HARDEN POND, a citizen of the United States of America, residing at Ashburnham, in the county of Worcester, in the State of Massachusetts, have invented a new and useful Disintegrating-Machine, of which the following is a specification.

My invention has relation to improvements in mechanism for making fibrous material into pulp by rolling the same through a regularly-tapering channel located between a rotating cylinder and a stationary rigidly-fixed concave shell substantially surrounding the cylinder under constantly-increasing compression from start to exit.

The object of the invention is to simplify and improve the existing art by providing a machine of the kind named and for the purposes intended which is simple in construction, efficient in operation, and of assured durability. With this object and purposes in view the invention consists in the novel construction of parts and their combination, as will be hereinafter described and the novelty particularly pointed out in the claims.

I have fully and clearly illustrated the invention in the accompanying drawings, to be taken as a part hereof, and wherein—

Figure 1 is a vertical cross-section through the machine, taken on the line 1 1 of Fig. 2. Fig. 2 is a view in elevation, partly in vertical longitudinal section, centrally through the rotary cylinder and the outer stationary eccentric casing or shell, also showing the supports for the machine and the means for rotating the cylinder. Fig. 3 is an inner face view in elevation of one of the two-part end plates and support of the stationary outer casing or shell, the central base or bearing and the meeting flanges and fastenings being indicated by the dotted lines, also showing one of the bearings for the shaft of the rotary clearing-brush. Fig. 4 is a detail showing the coincident relation and construction of the interacting corrugations of the cylinder and the concave.

Referring to the drawings, A A′ designate strong standards of such height and dimensions as may be required and suited to the capacity of the machine. In the top of each standard is formed a shaft-bearing 1, covered by a suitable cap 2, which is bolted in position in the usual manner. In the bearings thus provided is journaled a strong shaft B, held against longitudinal movement or thrust by a strong collar 3, bearing against the outer face of the standard A′, and on the outer end of the shaft B is mounted a worm-wheel C of proper size and strength to impart rotation to the shaft.

D D′ designate supports fixed to the bed of the machine and provided with bearing-boxes on their upper ends in which is journaled a shaft E, on which is mounted a worm-pinion 4, in mesh with the worm-wheel C. Motion is imparted to the shaft E and communicated to the associated mechanism by means of a pulley 5 on the said shaft, which pulley has proper connection with a source of power. (Not shown.) It will be perceived that other forms of gearing than that shown and described may be substituted, such as of the well-known type of pinion and gear-wheel.

On the shaft B is mounted and suitably secured in any known manner to be rotated by the shaft a rotary cylinder F, which is a true cylinder, having its perimetral face corrugated, as indicated in the drawings, which corrugations are sharply defined, so that the central or apex line of the corrugations shall present a biting-surface to the material being acted on by the machine. This cylinder may be made with closed ends, or it may be provided with arms 6, arranged adjacent to the ends of the cylinder, as indicated in the drawings. The corrugations extend directly across the faces of the cylinder and the shell and are identical in shape and contour, their adjacent faces or sides being substantially at right angles to each other and equally inclined from a radius passing through the line of intersection of said faces.

G G′ designate duplicate two-part standards constituting the end supports and end closures of the casing for the shell, and thus constitute the sides of the regularly-tapering channel inclosing the material being acted upon and keeping it closely confined between the faces of the corrugated cylinder and the concave shell during the rolling, compression, and fibrillation of the material. The

lower parts of these end pieces are preferably formed with inwardly-directed flanges 7, by which they are secured to the base by any suitable means, and from thence extend vertically to a point on a line with the axis of the shaft B, the upper end being formed with a flange 8. The upper parts are substantially one-half of a circular disk and rest with the diametrical or straight edge on the top of the lower sections or parts, being formed with a flange 8′, coincident with the flange 8, the two flanges being held together by any suitable fastening-bolts 9, as indicated in Fig. 3 of the drawings. In the center of the meeting edges of each of these parts G G′ is formed a round opening 10, through which the shaft B is loosely projected and freely turns.

It will be perceived that by making the end supports two-part and extending the lower portion to form the support and there securing them the machine may be more readily and conveniently assembled and that this construction, including the concave eccentric shell, relieves much of the strain on the shaft during the operation of the machine by transferring the strain to the supports instead of imposing it all on the shaft.

The shell H is held in position between the end pieces by means of suitable fastening-bolts 13, let through the end pieces and passages in the shell or concave, and the bolts being tightened up the parts are held securely and rigidly in position, with the shell or concave in operative relation to the cylinder. It will be perceived by reference to the drawings that the shell H tapers from the discharge end to the feed end, the outer surface being concentric to the feed end of the cylinder and the inner surface being in a parabolic eccentric thereto, a regularly-tapering channel being thus formed, and the thicker and broader end of the shell being at the upper or discharge end thereof, so that the greater strength of the shell is located at the place where the greater strain occurs, and so that when the upper end of the shell is cut off, as at 14, on a plane substantially parallel with the horizontal radius of the rotary cylinder and on a line substantially at right angles to the terminal of the vertical radius a table or floor 15 will be formed and provided over which the disintegrated or fibrillated material is swept by the action of the rotary clearing-brush. The concave shell may be made of two or more sections, as indicated in the drawings. The concave shell H substantially surrounds the cylinder, only such space being left between its approaching ends as will afford sufficient room for feeding the material and action of the clearing-brush to sweep it over the table or discharge.

At the feed end of the stationary shell or concave H is mounted and secured a feed-hopper 16, the union being effected by a lapped joint 17, and the inner side 18 of the hopper extending down close to the rotary cylinder. The hopper extends clear across the machine lengthwise.

One of the objects of my invention is to provide an automatic feed device and an automatic clearing device in combination with the disintegrating mechanism, and this I accomplish by the following-described means:

I designates a carrier belt or apron running over a suitable drum or roller 19 and supported at the other end by a similar roller, (not shown,) suitable arms or prongs 20 being secured to the belt in any well-known manner. The discharge terminus of the carrier I is in such relation to the hopper that the material is dropped from the arms directly into the hopper, as indicated in the drawings. In any suitable bearings on the casing of the machine, as 21, is journaled a shaft 22, extending the length of the machine, on which is mounted a rotary brush 23, located between the approaching ends of the concave and so disposed that its rotating brush-surface is free from the teeth of the cylinder, but will engage and encounter the discharging material as it issues from the machine, thus preventing the material from being carried back over the cylinder and sweeping it forward and off the table or floor 15. The rotary brush 23 has connection with any source of power, as by a belt, (indicated in dotted lines.)

My knowledge of the art and experience in the manufacture of fibrillated pulp warrants the statement that there is no prior machine which rolls the material through a continuously-tapering channel substantially surrounding the cylinder and subjecting the material to constantly-increasing compression to separate the fibers thereof or which by a single passage of the material produces a completely-finished fibrillated pulp. It is the usual mode of treatment to run the material through successive treatment in different machines of varying approaching surfaces until the end is attained, whereas in my machine the process of treatment is accomplished by a single operation.

My earlier patent, No. 591,494, dated October 12, 1897, for disintegrating-machine, shows a rotating cylinder and an adjustable vibrating casing substantially surrounding the cylinder, and between the cylinder and casing is formed a tapering channel by reason of the disposition of the parts. This construction and aggroupment of elements differ from that shown and described in my present application in that the concave shell in the present invention is stationary and rigid and each of them formed with corrugations in line with the axis of the cylinder and equally inclined to a radius intersecting their apex, and the concave being curved upon radii decreasing regularly from the entrance to the discharge end.

The operation may be stated as follows: Motion being imparted to the respective movable elements of the machine, the material

to be subjected to fibrillation is placed on or otherwise supplied to the carrier and is carried upward and thereby delivered to the hopper down which it falls, lodging within the bite of the cylinder and concave shell, the action of these elements rolling the material and causing it to assume an elongated oblong form at the start and continuing to be so rolled under the constantly-increasing compression throughout the entire course through the regularly-tapering channel, being by the movement of the rotary cylinder forced into less and less space created by the taper of the space between the cylinder and the stationary concave shell, and is thereby fibrillated and broken up into smaller and smaller quantities until finally forced out and discharged at the exit of the tapering channel in a fibrous pulpy condition.

What I claim is—

1. In a fiber-disintegrating machine, the combination of a rotary cylinder having a continuous working surface composed of angular corrugations in line with the axis and presenting sharp edges, the faces of which corrugations are equally inclined to a radius of the cylinder, and a stationary, rigidly-held, concave shell substantially surrounding the cylinder and having a continuous working surface corrugated similarly to that of the cylinder; said concave surface being curved upon radii decreasing regularly from the entrance to the discharge end, and means for feeding and permitting the discharge of the material located between the adjacent ends of the concave, substantially as specified.

2. In a fiber-disintegrating machine, the combination of a rotary cylinder having a continuous working surface composed of angular corrugations in line with the axis and presenting sharp edges, the faces of which corrugations are equally inclined to a radius of the cylinder, and a stationary, rigidly-held, concave shell substantially surrounding the cylinder and having a continuous working surface corrugated similarly to that of the cylinder; said concave surface being curved upon radii decreasing regularly from the entrance to the discharge end, and a rotating brush located between the approaching ends of the concave in the path of the discharging material, whereby the material discharged is prevented from being carried over the cylinder and is swept free from the discharge end of the channel.

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