No. 664,903. Patented Jan. 1, 1901.

J. J. SELDNER.

APPARATUS FOR DRYING FERTILIZERS.

(Application filed Mar. 15, 1900.)

(No Model.) 2 Sheets—Sheet 1.

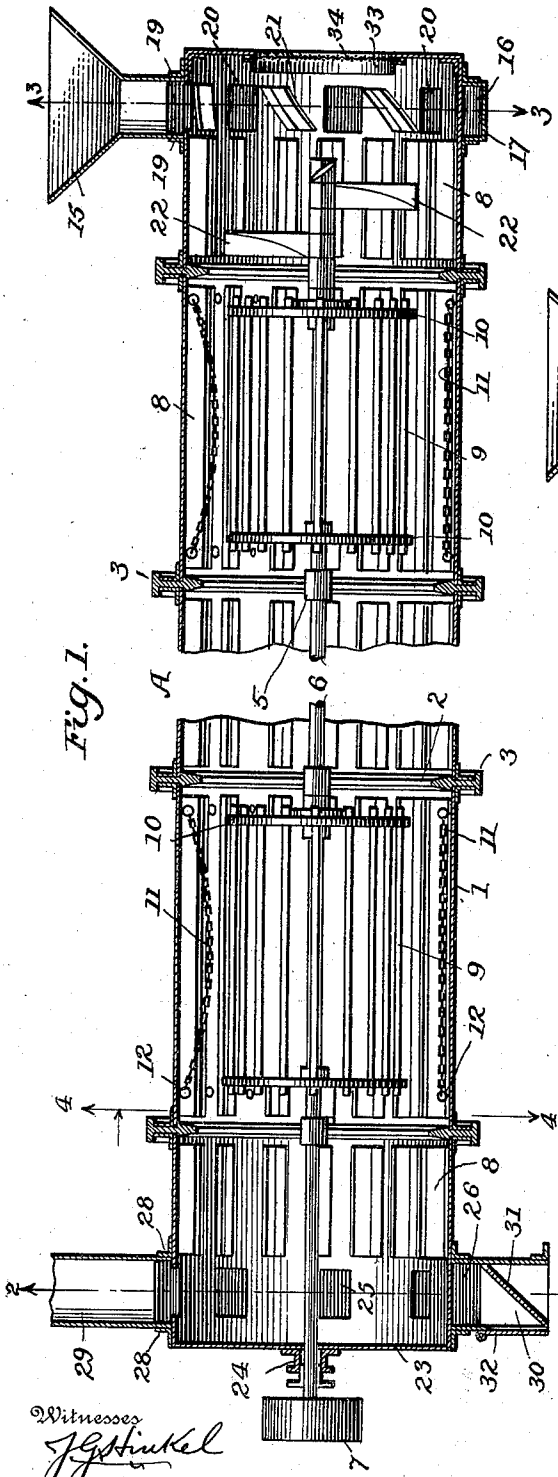


Fig. 1.

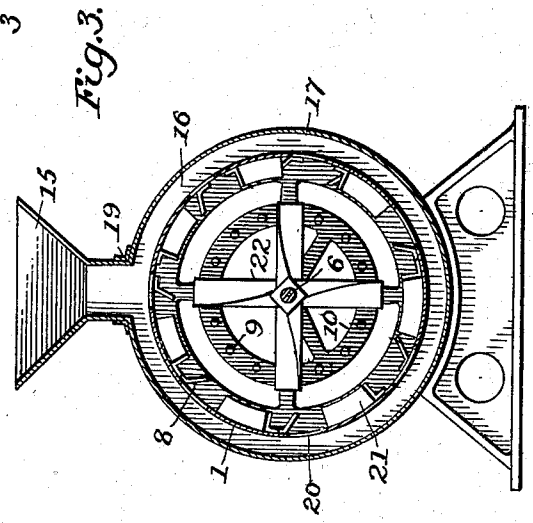


Fig. 3.

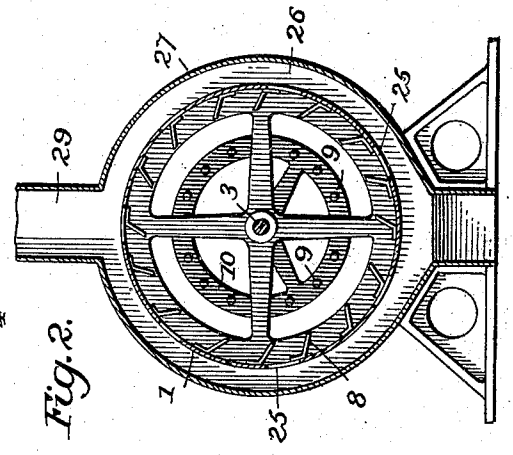


Fig. 2.

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Fig. 4.

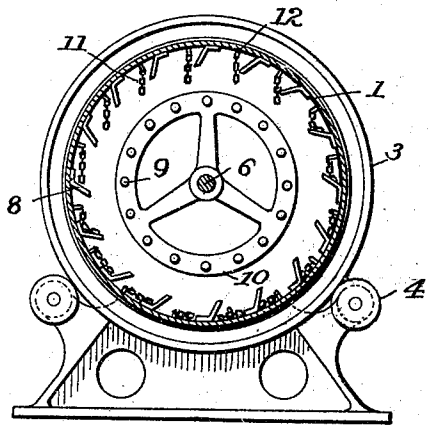


Fig. 5.

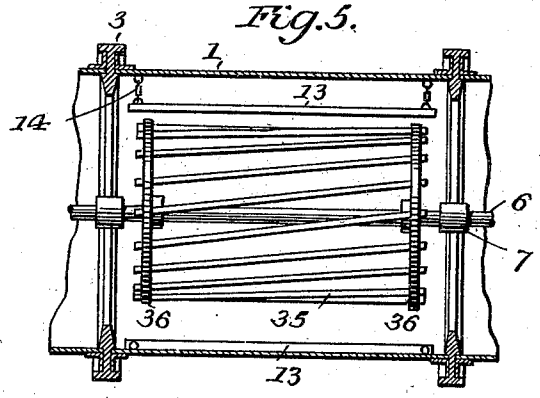


Fig. 6.

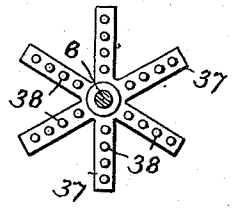
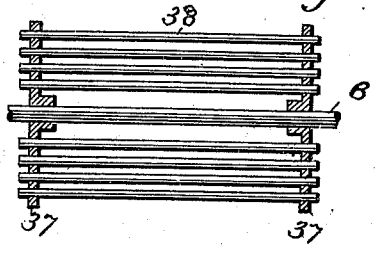


Fig. 7.



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UNITED STATES PATENT OFFICE.

JONAS J. SELDNER, OF BALTIMORE, MARYLAND, ASSIGNOR OF ONE-THIRD TO LEOPOLD STROUSE, OF SAME PLACE.

APPARATUS FOR DRYING FERTILIZERS.

SPECIFICATION forming part of Letters Patent No. 664,903, dated January 1, 1901.

Application filed March 15, 1900. Serial No. 8,812. (No model.)

To all whom it may concern:

Be it known that I, JONAS J. SELDNER, a citizen of the United States, residing at Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Drying Apparatus, of which the following is a specification.

This invention relates to apparatus for evaporating, drying, and comminuting various materials. It is also applicable to other purposes, such as collecting dust and condensing vapors.

I shall first describe the invention as applied to evaporating and comminuting materials and afterward point out several other uses to which it may be applied, it being understood that the claims following the specification are intended to protect the invention as applied to all purposes for which it is adapted.

In the accompanying drawings, which form a part of this specification, Figure 1 is a longitudinal central section illustrating the preferred form of the invention. Figs. 2, 3, and 4 are sections respectively on the lines 2 2, 3 3, and 4 4 of Fig. 1. Fig. 5 illustrates a modification; and Figs. 6 and 7 illustrate a second modification in end and side views, respectively.

Referring to Figs. 1 to 3, inclusive, A indicates a barrel or casing which is made up of a series of sections, each section consisting of a cylindrical casing 1, connected at its ends by flanges to frames or spiders 2, which frames have peripheries 3 resting on gears or rollers 4, which support and rotate the cylinder. The barrel may be made up of as many sections as are desired, all of the sections being exactly alike excepting the end sections. The frames or spiders 2 have central bearings 5, in which is supported a shaft 6. The cylinder A is intended to be slowly rotated, while the shaft 6 is intended to be rapidly rotated, the pulley 7 being mounted on the shaft for that purpose.

Material within the barrel A is continually raised to its upper portion and then dropped by a series of suitable blades or buckets 8, which may be varied according to the material to be operated or the especial use to which the product is to be applied. In some instances buckets which will hold a fluid will be used, while in others mere blades or paddles will be better adapted for the work. The material raised by the paddles is struck as it falls by rapidly-revolving bars 9, extending between heads 10, which are supported on the shaft 6 adjacent to the frames 2. The material if liquid will thus be dashed into spray, and if solid it will be broken up and pulverized.

In operating upon solid damp material it is found that the material will accumulate on the inner wall of the cylinder between the blades or buckets, sometimes forming a coating so deep as to be flush with the blades. To prevent this, I employ heavy chains connected at their ends to the cylinder or equivalent devices, such as bars of metal loosely connected. Thus in Fig. 1 I have shown the chains 11, connected at 12 to the cylinder. When these chains are at the bottom of the cylinder, they lie loose upon its surface. As they rise on one side they slide in one direction, and as they fall on the other they slide in the opposite direction, thereby tending to keep the surface of the cylinder clean. As the chains pass the top of the cylinder they fall away from it and break away any material which may tend to accumulate between the paddles, which material drops onto the revolving bars 9. These chains or equivalent devices I have found very useful in operating upon certain classes of material. In Fig. 5 I have shown in lieu of chains bars 13, connected by loose links 14 to the cylinder. These bars will slide upon the cylinder excepting when passing their uppermost position, when they will fall away and detach material, operating the same as the chains.

The material to be operated on is fed into a hopper 15, Fig. 3, and passes into an annular space 16, inclosed by a stationary ring 17, which ring rests on the support 18 and carries the hopper 15. The ring 17 is arranged between flanges 19 near one end of the barrel A. Between said flanges the barrel is provided with openings 20, through which the material from the hopper passes into the interior of the barrel. Between the openings 20 and on the inner surface of the barrel are inclined blades 21, which move the material inward to

engage with the first series of buckets 8. These buckets raise the material, and as it falls it is struck by paddles 22, which have inclined faces and throw the material toward the middle of the barrel, where it is operated on by the bars 9. The opposite end of the cylinder is closed by a head 23, in which the shaft 6 is centrally supported by a stuffing-box 24. Near the head 3 the cylinder is provided with a series of discharge-openings 25, which discharge into an annular space 26, inclosed by a circular wall 27, which extends between two flanges 28 upon the outer side of the barrel. The upper portion of the space 26 is in communication with an exhaust-pipe 29, and the lower portion of said space communicates with a discharge-chute 30. This chute has an inclined bottom 31, which causes the material to slide to one side of the chute, and that side has a discharge-opening closed by a door 32, hinged at its upper side. The door 32 tends to close by gravity, and the suction caused by the exhaust through the pipe 29 also tends to close it. The chute 30, however, is sufficiently deep to cause the weight of the material which accumulates therein to open the door when the chute becomes full, or nearly so. The discharge end of the apparatus is therefore normally closed with the exception of the exhaust-pipe 29. The charging end has a central opening 33, through which air or heated gas is drawn when the apparatus is used as a drier and through which vapor to be condensed or dust to be collected may be drawn when the apparatus is used as a condenser or dust-collector. The opening 33 is preferably provided with a screen 34 to prevent large pieces of hard material which might injure the machinery from entering.

Various equivalent devices may be substituted for the cage-like bars 9 and heads 10. Thus in Fig. 5 I have shown spirally-arranged bars 35, carried by heads 36. These bars operate exactly like the bars 9, except that their spiral arrangement tends to feed the material toward the discharge-opening of the cylinder. In Figs. 6 and 7 I have shown a series of radial arms 37 as a substitute for the heads 10 and parallel bars 38 extending between said arms. Other forms of beating devices may be substituted without departing from the spirit of the present invention.

The operation of the apparatus is as follows: When used for drying and comminuting solid material, such as animal matter for fertilizers, the substance is placed in the hopper and gradually fed in through the openings 20. Hot air or the exhaust-gases from a furnace are drawn through the apparatus, and the current of air or gas, together with the inclined blades 21, moves the material toward the opposite end of the cylinder. The buckets 8 constantly raise the material and drop it first upon the paddles 22 and then upon the bars 9, which are rapidly rotated either in the same direction with the cylinder or in the opposite direction. The material is thus simultaneously broken up and dried, and it is gradually carried through the cylinder, the drier particles being more rapidly carried through by the blast on account of their lighter weight. The cylinder is sufficiently long to insure the thorough drying of every particle of material before it is discharged through the openings 25 and the chute 30.

When the apparatus is used as a condenser of vapor, the vapor is drawn in through the opening 33, and water in limited quantity is fed into the hopper 15. The water as it travels through the cylinder is dashed into fine spray by the bars or beaters 9 and thoroughly commingled with the vapor, which thereby becomes condensed and passes off with the water. In the same manner dust-bearing air or gas may be drawn through the cylinder and the solid matter collected by means of water dashed into spray. The dust and water will find an exit through the hopper 30, while the air or gas which carries the dust will pass off through the flue 29.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In apparatus of the class described, the combination with a rotatable cylinder, and rotatable beaters within the same, of an annular wall surrounding the cylinder near one end thereof, a hopper communicating with the space between said wall and cylinder, a series of openings in the cylinder communicating with said space, and a series of inclined inwardly-projecting blades on the inner surface of the cylinder between said openings arranged to direct the material longitudinally of the cylinder.

2. In apparatus of the class described, the combination with a rotatable cylinder, and rotatable beaters within said cylinder, of a fixed chute below the discharge end thereof, an annular wall surrounding the cylinder and connecting with said chute, and a series of openings in the cylinder arranged to discharge the material into said chute, said chute having an inclined bottom, a discharge-opening, and a door for said opening hinged at its upper edge and adapted to close by gravity.

3. In apparatus of the class described, the combination with a rotatable cylinder, and rotatable beaters within said cylinder, of an annular wall surrounding the cylinder and inclosing an annular space between said wall and cylinder, an exhaust-flue communicating with the upper end of said space, a discharge-hopper communicating with the lower portion of said space, a door, for controlling the passage of the material from the hopper, adapted to be closed by gravity and by suction through the exhaust-flue, and a series of openings in said cylinder through which gases and solid materials may pass respectively to said flue and hopper.

4. In apparatus of the class described, the combination of a rotatable cylinder, with blades or buckets attached to the inner wall

thereof, and devices loosely connected to the cylinder and extending longitudinally thereof between said blades, said devices being adapted to fall away and detach material from the cylinder-wall as the cylinder rotates.

5. In apparatus of the class described, the combination of a rotatable cylinder, rotatable beaters within the cylinder, blades or buckets upon the inner wall of the cylinder, devices loosely connected to the cylinder and arranged between said blades or buckets, said devices being adapted to fall away from the cylinder-wall by gravity and to discharge material upon the beaters, for the purpose set forth.

6. In apparatus of the class described, the combination of a rotatable cylinder, with blades or buckets attached to the inner wall thereof, and chains arranged between said blades or buckets, said chains being arranged to hang loosely between their points of connection whereby material is prevented from accumulating between the blades or buckets.

In testimony whereof I affix my signature in presence of two witnesses.

JONAS J. SELDNER.

Witnesses:
JAMES A. WATSON,
S. A. TERRY.