

No. 827,148.

PATENTED JULY 31, 1906.

D. GORDON.
FERMENTER.

APPLICATION FILED AUG. 13, 1904.

2 SHEETS—SHEET 1.

Fig. 1.

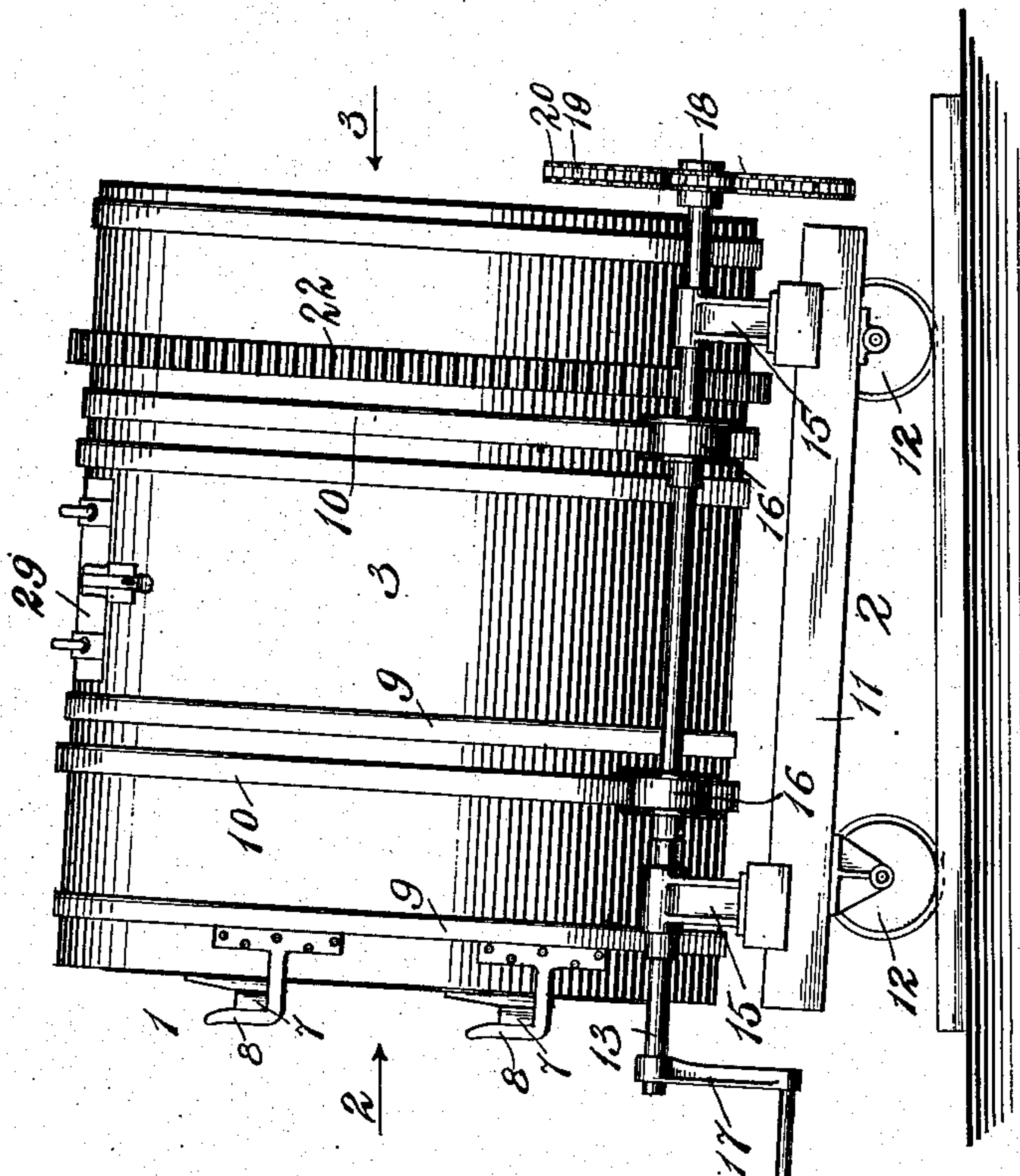
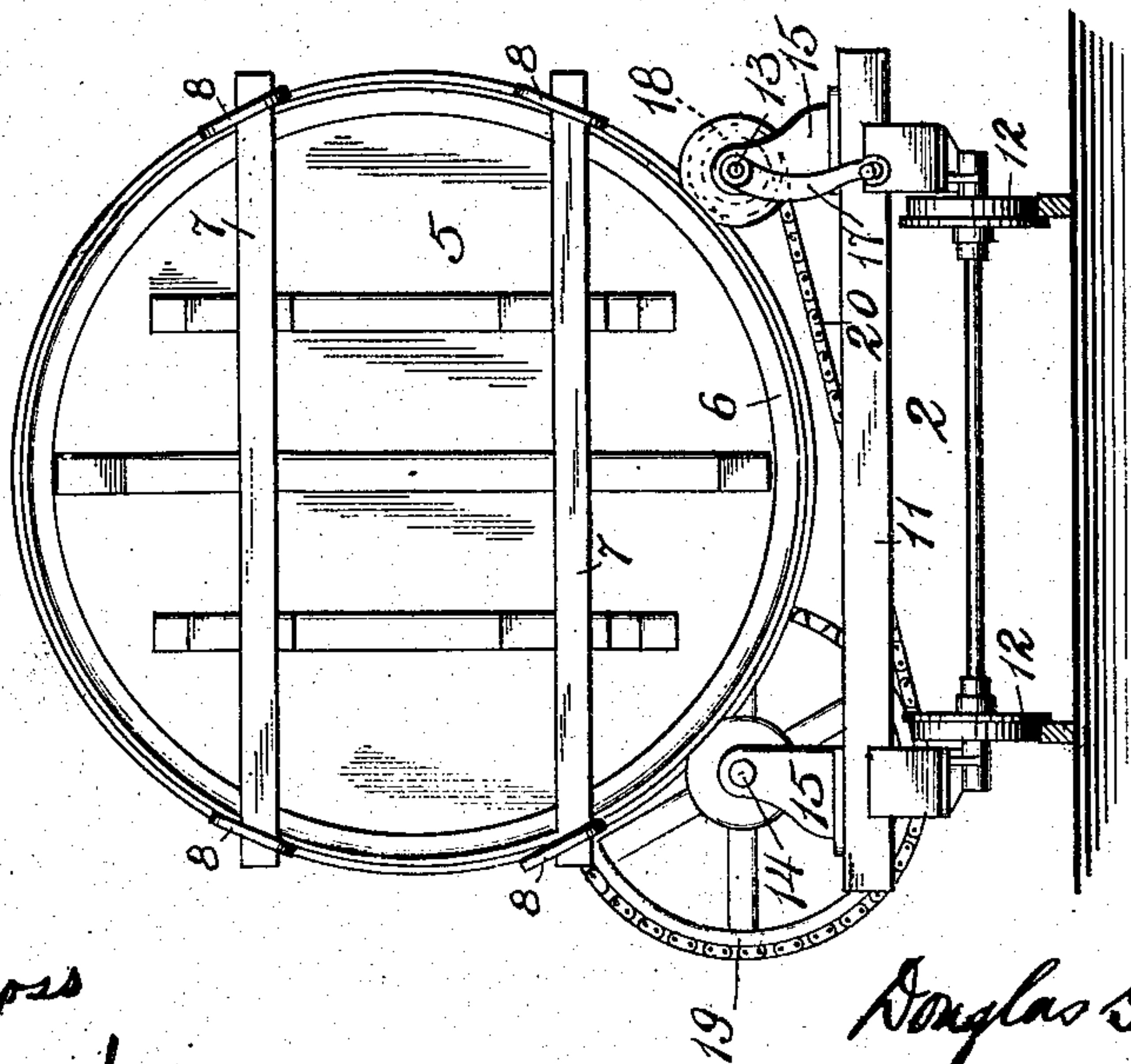


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 4,

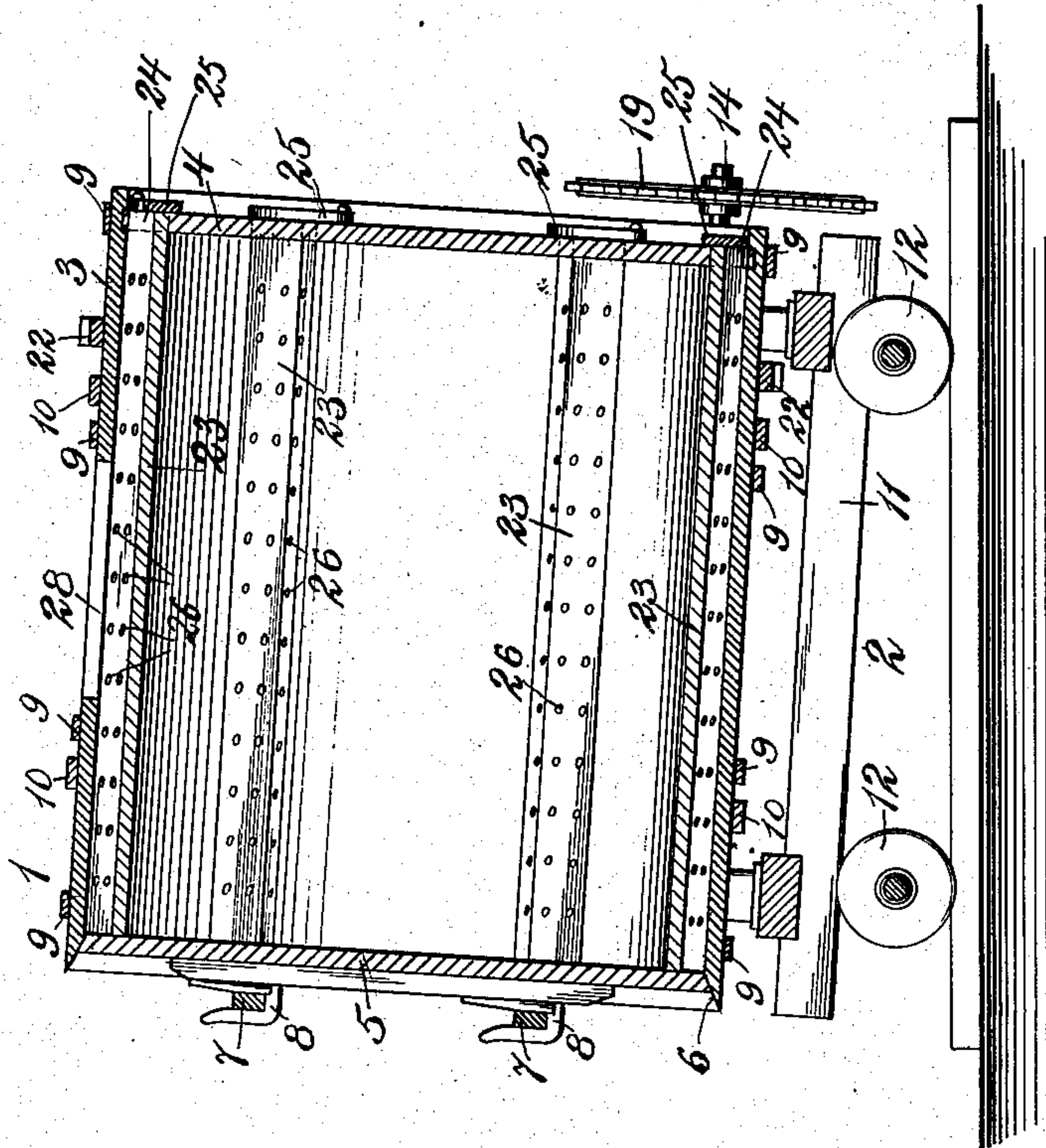
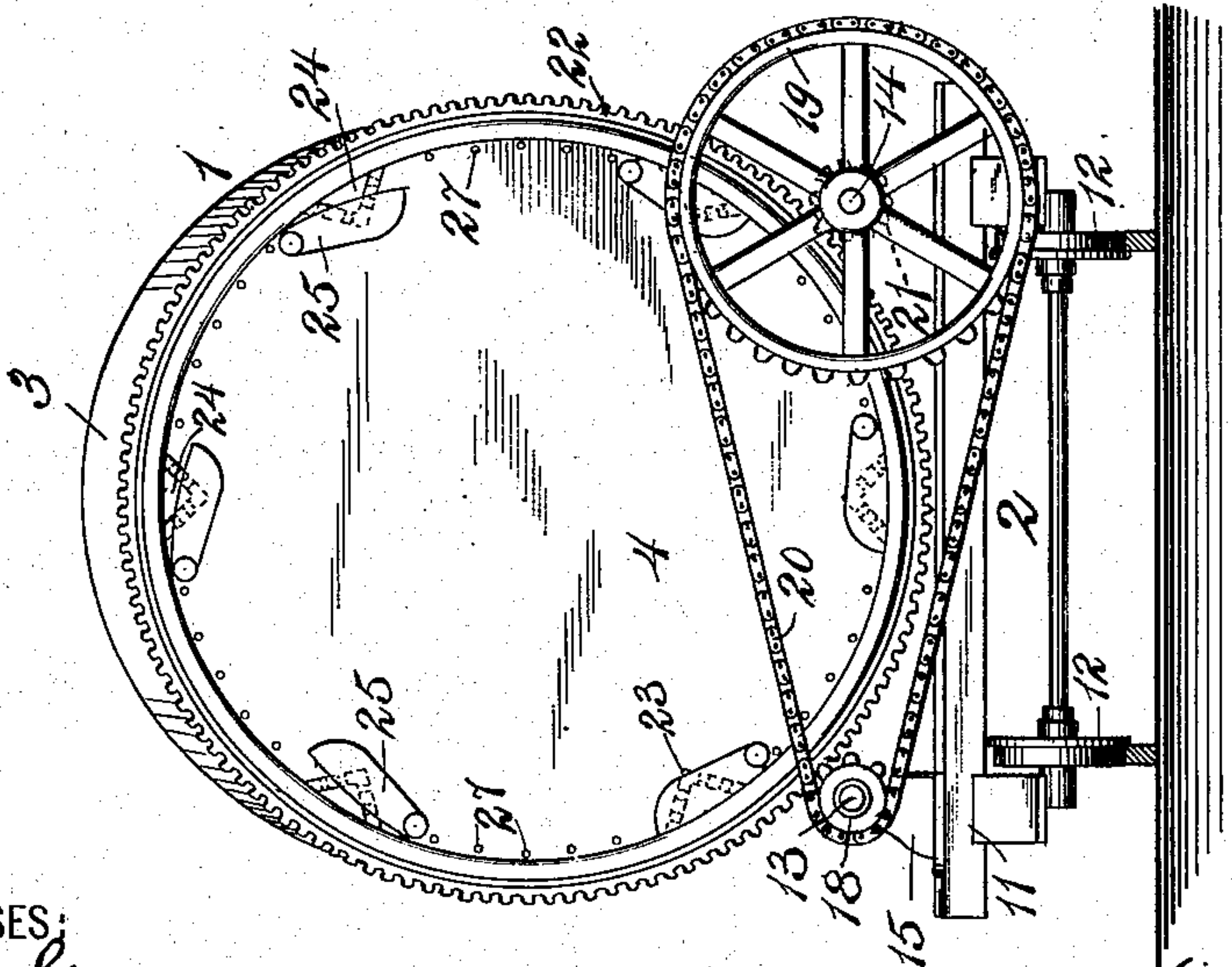


Fig. 3,



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UNITED STATES PATENT OFFICE.

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FERMENTER.

No. 827,148.

Specification of Letters Patent.

Patented July 31, 1906.

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To all whom it may concern:

Be it known that I, DOUGLAS GORDON, a subject of the King of Great Britain, and a resident of Worcester, county of Worcester, State of Massachusetts, have invented certain new and useful Improvements in Fermenters, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

My invention relates to machinery for treating cocoa-beans, and particularly to apparatus in which the beans may be fermented.

My device comprises a closed barrel or cylinder having suitable means for ventilating same and provided with means by which the barrel or cylinder may be revolved and with means for controlling the ventilation. Preferably the barrel or cylinder is arranged substantially horizontally, but with a slight inclination toward the rear, or that end pierced by the ventilating-holes.

The object of my invention is to economically ferment a large quantity of cocoa-beans at one time, causing the action to take place equally through the entire mass, so that the resulting product will be uniform.

In order that my invention may be clearly understood, I will now proceed to describe an embodiment thereof having reference to the accompanying drawings, illustrating same, and will then point out the novel features in claims.

In the drawings, Figure 1 is a view in side elevation of a fermenting apparatus embodying my invention. Fig. 2 is an end view of the same looking in the direction of the arrow 2 of Fig. 1. Fig. 3 is an end view of the same looking in the direction of the arrow 3 of Fig. 1. Fig. 4 is a view in central vertical longitudinal section through the device.

The machine consists generally of a cylinder or barrel 1, rotatably mounted upon a truck or carrier 2. The cylinder or barrel 1 comprises a cylindrical shell 3, which may be of wood or other material lined with wood or other acid-resisting substance, a rear end head 4, rigidly secured to the cylindrical shell, and a front end head 5, removably secured to the said shell. The front head is shown as having a conical periphery 6 fitted to a similar conical portion of the cylinder, and cross-bars 7 7, engaging hooks 8 8 upon opposite sides of the said shell, serve to keep the head in place. Metal straps or hoops 9

encircle the barrel or cylinder and serve to strengthen same, two of the said metal straps or hoops 10 10 serving also as circular tracks for supporting the cylinder and upon which it is adapted to be revolved. The truck 2 comprises a framework 11 and wheels 12, which may be arranged to run on suitable tracks, as may be desired. The frame 11 is preferably arranged at an angle with respect to the axes of rotation of the wheels 12, so that the cylinder supported thereby will have a slight rearward inclination.

The framework 11 of the truck supports two longitudinal shafts 13 and 14, journaled in suitable bearings 15, arranged upon opposite sides of the vertical plane in which the axis of rotation of the cylinder 1 lies. The shafts 13 each carry two flange-supporting wheels 16, arranged to engage the circular tracks 10. The said wheels 16 are preferably loosely mounted upon their respective shafts, so that they will turn freely thereon. The shaft 13 constitutes a drive-shaft and is provided at one end with a handle 17 and at the other end with a sprocket-pinion 18. The shaft 14 constitutes a driven shaft and is provided with a sprocket spur-gear 19. A sprocket-chain 20 connects the spur-sprocket 19 with the pinion-sprocket 18 in driving relation. The shaft 14 carries a gear-pinion 21, rigidly secured thereto, which is arranged in mesh with a gear-ring 22, secured around the cylinder or barrel 1. Power applied to the handle 17 to rotate the shaft 13 will slowly rotate the shaft 14, by reason of the sprocket-and-chain connection and will thereby slowly rotate the cylinder or barrel, the flanged wheel 16 turning freely upon the shafts, and revolubly supporting the cylinder.

The cylinder is provided longitudinally on its interior face with angular troughs 23, forming a plurality of longitudinal channels within the cylinder at the interior face thereof. The troughs pass through the rear stationary head 4, so that the said channels inclosed thereby open to the atmosphere, as at 24, through the said end head. Doors or gates 25, secured to the interior of the end head 4, serve as means for closing or opening the said channels. The troughs 23 are perforated throughout their length, as at 26, which perforations connect the said channels with the cylindrical chamber. The end head 4 is further provided with a number of small ori-

fices 27, arranged near the outer edge thereof, and opening into the interior of the cylinder-barrel against its inner face.

The cylinder or barrel may be conveniently provided with a charging-opening 28, which may be closed when the machine is operating by a door 29.

The apparatus is operated as follows: The cylinder is first charged to about two-thirds full with unfermented cocoa-beans, which it is desired to ferment. It may be partially charged, as a matter of convenience, when the front head 5 is removed, as a larger quantity may be admitted therethrough than through the charging-orifice 28. After the machine has been partially charged the head 5 must be placed in position and secured therein by means of the cross-beams 7. The remainder of the charge is then inserted through the charging-opening 28 and the door 29 finally closed. The passage of gases, air, or vapor through the openings 27 may be controlled by manipulation of the doors 25. In first starting up the machine it is usual to leave all the doors open, so as to admit free passage therethrough, and so to allow the escape of gases, vapors, and the like from the interior of the cylinder during fermentation of the beans. After a predetermined length of time, which may be for certain classes of beans and in certain climates say twelve hours, the cylinder will be partially rotated by power applied to the handle 17 and the doors or gates 25 may be readjusted, if desired. On the first partial turning of the cylinder it is usual to close the three doors or gates, which are at that time in the lowest positions, leaving the three upper doors open. This will ordinarily give enough ventilation for the apparatus. The apparatus will now be left again for another, say, twelve hours, so that the fermenting process may continue, and at the end of that time the cylinder may be given another partial revolution and the doors 25 again readjusted, so that the three lower doors will be closed and the three upper doors open. The cylinder may be partially rotated at intervals thereafter until the process of fermentation is complete, and at each partial revolution the doors may be readjusted, and, finally, if desired, all the doors during the final treatment may be closed and the orifices 27 only relied upon for ventilation. Usually, however, one or more of the doors or gates 25 are left open during the whole process. The actual time that is allowed to lapse between the turning movements of the fermenting-cylinder will depend entirely upon the class of cocoa treated and the climate in which it is treated or the heat of the room in which the apparatus is contained. In Trinidad, for instance, in a room at ordinary atmospheric temperatures it is usual to give the cylinder about one-third of a revolution every twelve hours for from seven to ten days.

In other climates and at other temperatures the process of fermentation is very much more rapid. The reason the lower doors are preferably left open during the first part of the process of fermentation is that during this period a considerable quantity of acid is given off by the beans, which will fall toward the bottom of the cylinder and will flow out through the lowermost channel. This acid will of course also flow out through the small orifices 27.

The form of the troughs 23 is such as not only to inclose channels, as specified, but to act as means for tumbling the beans when the cylinder is rotated and the cylinder is preferably filled, but about two-thirds full, so as to permit such free tumbling whereby all the material may get equal treatment.

After the process of fermentation is complete the front head 5 may be removed and the contents of the barrel removed.

It will thus be seen that my apparatus provides means whereby the beans may be shifted in their positions during the fermenting process, so that all portions of the mass may ferment equally, and it will also be seen that the apparatus is exceedingly accessible for cleansing purposes, it being understood that the cylinder requires thorough cleaning, usually between every fermenting operation.

The device is a simple one, easy to handle, unlikely to get out of order, the interior is ready of access, and the device as a whole is simple and inexpensive to manufacture.

What I claim is—

1. In apparatus of the class described, the combination with a rotatable cylinder mounted with its axis oblique to the horizontal, of a removable head therefor at its higher end, means for securing the door thereto, perforated longitudinal ventilating-troughs in the said cylinder against the interior face thereof, said troughs opening through the head at the lower end of the cylinder, and means for controlling discharge from the channels through the said head, said head having also a series of orifices therethrough, communicating with the interior of the cylinder in proximity to the inner face thereof.

2. Apparatus of the class described, comprising a carrier and a cylinder provided on its inner face with longitudinal perforated ventilating-channels discharging through the rear head, and also with a circular series of orifices opening to discharge through the rear head, in proximity to the interior face of the cylinder.

3. Apparatus of the class described, comprising a carrier and a substantially horizontal cylinder rotatably mounted thereon, said cylinder provided on its inner face with longitudinal troughs extending through the rear head and provided with means for controlling same, the walls of said troughs perforated throughout, connecting the channels there-

through with the interior chamber of said cylinders, and the rear head provided with a circular series of orifices therethrough, communicating with the interior of the cylinder, 5 in proximity to the interior face thereof.

4. In apparatus of the class described, the combination with a support, of two longitudinal shafts carried thereby, supporting-rollers loosely mounted thereon, gearing connecting the shafts to rotate at different speeds, 10 and a drive-pinion secured on one of said shafts, of a cylinder supported upon said rollers, said cylinder having a gear-ring arranged in mesh with the teeth of said drive-pinion.

5. In apparatus of the class described, the 15 combination with a support, two longitudinal shafts carried thereby, and arranged at a slight angle to the horizontal, supporting-rollers loosely mounted thereon, gearing connecting the shafts to rotate at different speeds, 20 and a drive-pinion secured on one of said shafts, of a cylinder supported upon said rollers, said cylinder having a gear-ring arranged in mesh with the teeth of said drive-pinion.

DOUGLAS GORDON.

In presence of—

FLOSSIE ABBOTT,
HENRY H. THAYER.