No. 807,551. PATENTED DEC. 19, 1905.

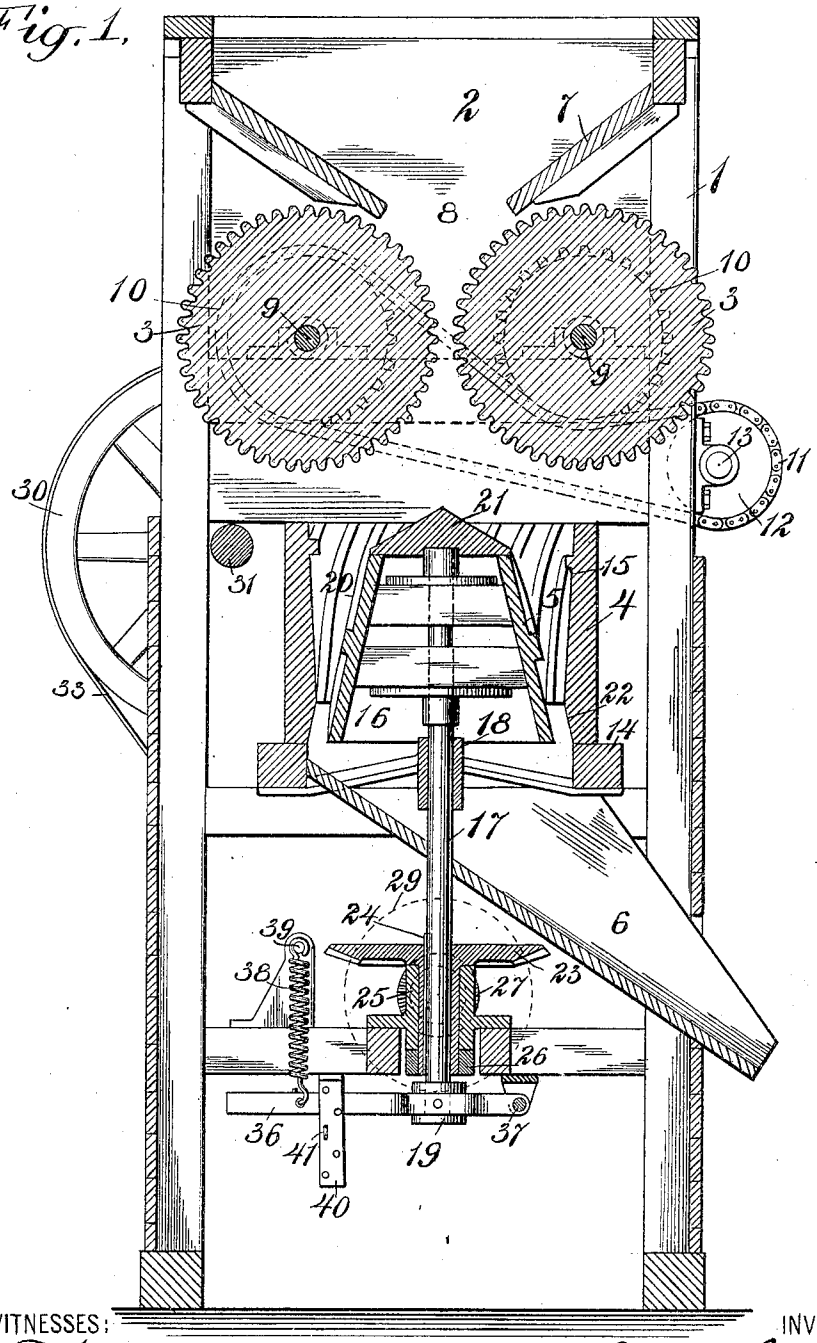
D. GORDON.

POD OPENING MACHINE.

APPLICATION FILED JULY 26, 1904.

2 SHEETS—SHEET 1.

Fig. 1.



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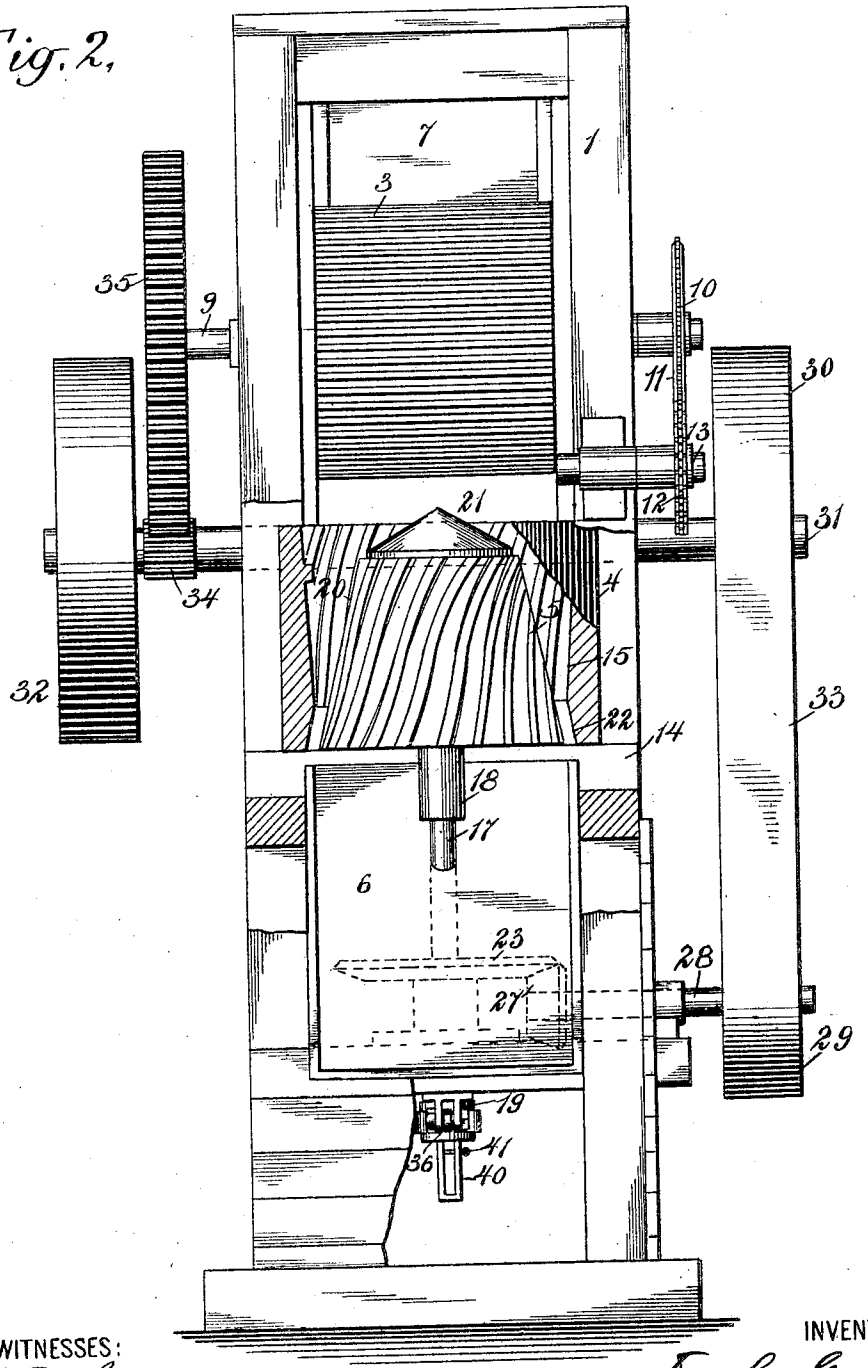
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2 SHEETS—SHEET 2.

Fig. 2.



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UNITED STATES PATENT OFFICE.

DOUGLAS GORDON, OF WORCESTER, MASSACHUSETTS, ASSIGNOR TO MARCUS MASON & COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

POD-OPENING MACHINE.

No. 807,551. Specification of Letters Patent. Patented Dec. 19, 1905.

Application filed July 26, 1904. Serial No. 218,218.

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 Pod-Opening Machines, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

My invention relates to improvements in machinery for treating cocoa-beans, and particularly to machines for opening the pods in which the cocoa-beans are contained.

In the drawings forming a part of this specification I have illustrated a pod-opening machine embodying my invention, and I will now proceed to describe same in detail and will then point out the novel features in claims.

In the drawings, Figure 1 is a view in central vertical section through the machine; and Fig. 2 is a side elevation viewed at right angles to the point of view of Fig. 1, certain of the parts being broken away in order to illustrate other parts.

The machine comprises generally a main frame 1, a feed-hopper 2, feed-rolls 3, stationary and revolving pod-opening members 4 and 5, and a delivery-chute 6. The hopper 2 has a slanting bottom 7, with the discharge-opening 8 arranged to discharge material therefrom to the feed-rollers 3. The feed-rollers 3 are secured upon shafts 9 9, journaled in suitable bearings upon the frame of the machine. The shafts 9 9 carry sprocket-wheels 10 10, engaged by a sprocket-chain 11, which also passes over an idler-wheel 12, mounted upon a counter-shaft 13, suitably journaled upon the frame of the machine. The chain passes over one of the said sprocket-wheels 10 and under the other said wheel, so as to connect the wheels in proper driving relation to turn toward each other. The outer peripheries of the wheels 3 are preferably grooved or serrated, as shown, so that they will take a grip upon the material fed thereto to positively feed the same forward.

The pod-opening device comprising the stationary and revoluble members 4 and 5 is located immediately beneath the feed-rollers 3 and about a vertical axis, which preferably passes midway between them. The stationary member 4 comprises a hollow open-ended drum, supported upon a stationary support 14, secured to the frame of the machine. The interior of the drum is provided with a number of oblique ribs 15, comprising a number of right-handed spirals, the spirals preferably forming an angle of about thirty degrees with the vertical. The revolving member 5 comprises a truncated cone 16, secured upon a vertical shaft 17. The said shaft is journaled toward its upper end in a bearing 18, supported by spider-arms secured to the stationary support 14. The lower end of the shaft is supported in a step-bearing 19. The cone 16 has spiral ribs 20 on its outer face, such spiral ribs being left handed—*i. e.*, in opposite direction to the ribs 15 of the drum 4—preferably forming an angle of about thirty degrees with the vertical. A conical head 21 surmounts the truncated cone 16, closing the top and forming a tapered guide toward the outer surface thereof. The opposing surfaces of the drum 4 and the cone 5 gradually converge toward their lower eads to the point where the ribs 15 on the drum 4 terminate. From the lower end of the ribs the surface 22 of the drum is smooth and diverges from the ribbed surface in a slope substantially equal to that of the cone 5. The ribs on the cone 5 extend to the lower end thereof and oppose the smooth portion 22 of the drum. The delivery-chute is arranged immediately beneath the drum 4 and cone 16, being supported by the stationary support 14. The delivery-chute is inclined outwardly and downwardly, so as to deliver material falling from the pod-opening device.

A bevel gear-wheel 23 is mounted upon the vertical shaft 17, being secured thereon against rotation by a splined connection 24, the said splined connection arranged to permit vertical sliding movement between the shaft and the bevel gear-wheel, but to prevent relative rotation thereof. The hub of the said bevel-wheel is journaled in a stationary bearing 25 upon the main frame of the machine, and a collar 26 prevents vertical movement of the said gear-wheel, as will be clear by reference to Fig. 1 of the drawings. A beveled pinion 27 meshes with the teeth of the said bevel-gear 23, said pinion mounted upon a horizontal shaft 28, suitably journaled upon the frame. A band-wheel 29 is secured upon the outer end of the shaft 28, and a corresponding band-wheel 30 is mounted upon a drive-shaft 31,

said drive-shaft driven by a suitable connection with a drive-pulley 32, mounted thereon at its opposite end. A belt 33 connects the band-wheels 29 and 30 in driving relation. The drive-shaft 31 also carries a pinion 34, which engages a spur-gear 35, mounted upon one of the feed-wheel shafts 9.

The step-bearing 19 for the lower end of the vertical shaft 17 is carried by a lever 36, pivoted at 37 to the frame 1, a spring 38, supported at a stud 39 upon the frame, being connected to the free end of the lever and forming a yielding support for same. A guide 40 may be conveniently employed for guiding the free end of the lever, and a stop-pin 41, adjustable to various positions in the guide, may be employed to limit the downward movement of the said lever.

The operation of the machine is as follows: Pods containing the cocoa-beans are fed into the hopper 2 and from thence downward through the mouth 8 to the feed-rollers 3. The feed-rollers are rotated in a proper direction to carry the pods onward and feed them at a proper rate of speed to the pod-opening device beneath them. The pods thus delivered fall upon the cone 21 and thence between the left-handed external spiral ribs 20 upon the cone 16 and the right-handed internal ribs 15 of the drum 4. The revolution of the member 5 will cause the pods to be rolled between the two converging surfaces, and thus to be cracked and opened, being finally delivered onto the delivery-chute 6 It is of course desirable that the beans shall not be crushed or broken after the pods are opened, and the parts will be so arranged that the beans will be able to pass through the most contracted part of the passage—*i. e.*, where the ribs on the drum terminate—without injury, and the object of the smooth diverging portion 22 of the drum-surface is to facilitate the free delivery of the material, for the ribs on the cone will still tend to carry the material downward, and after passing the ribs on the drum the resistance to such downward movement will cease. It sometimes happens in the operation of the machine that the pods become more or less jammed between the stationary and revolving members 4 and 5, the result of which is to increase downward pressure upon the vertical shaft 17. The downward shaft 17 is held in its upward position by the spring 38, and hence will yield to a force greater than that exerted by the spring. In moving downward the space between the ribs 20 of the cone 16 and the ribs 14 of the drum 4, and particularly the space between the lower portion of the periphery of the cone and the inner surface 22 of the drum 4, will be made larger, whereby the material, having a tendency to jam, will be freed and discharge upon the chute 6. The conical surfaces of the stationary and revoluble members 4 and 5, coupled with the longitudinal yielding of the revoluble member, form an effective means for preventing and relieving jamming of the material between the coacting surfaces of the pod-opening device.

It will be understood, of course, that the foregoing is but one embodiment of my invention and that the same is capable of many and varied modifications within the spirit and scope thereof.

What I claim is—

1. In a pod-opening machine, the combination with a revoluble cone arranged to rotate about a vertical axis, of a hollow stationary drum concentrically surrounding same, the interior face of said drum being arranged throughout part of its length at an angle to form with the face of the cone an annular convergent channel for the pods, and arranged throughout another part of its length at an angle to form with the cone a concentric annular channel, said drum having spiral ribs on its interior terminating at the lower end of the convergent channel, and said cone having spiral ribs extending throughout its length.

2. In a pod-opening machine, the combination with a revoluble cone having on its periphery spiral ribs extending throughout its length, of a hollow stationary drum concentrically surrounding the cone, the upper portion of the interior surface of said drum being spirally ribbed and forming with the cone a convergent channel, and the lower portion of said interior surface being smooth and divergent from the ribbed surface in a slope substantially equal to that of the opposing ribbed surface of the cone.

3. In a pod-opening machine, the combination with a revoluble cone having on its periphery spiral ribs extending throughout its length, of a hollow stationary drum concentrically surrounding the cone, the upper portion of the interior surface of said drum being spirally ribbed and forming with the cone a convergent channel, and the lower portion of said interior surface being smooth and divergent from the ribbed surface in a slope substantially equal to that of the opposing ribbed surface of the cone, the ribs of one member forming right-handed spirals, and those of the other member left-handed spirals.

In witness whereof I have hereunto set my hand this 14th day of July, 1904.

DOUGLAS GORDON.

Witnesses:
D. HOWARD HAYWOOD,
C. L. HALL.