May 5, 1931. L. L. JONES 1,803,621

CAN END COUNTING AND STACKING MACHINE

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Fig. 1

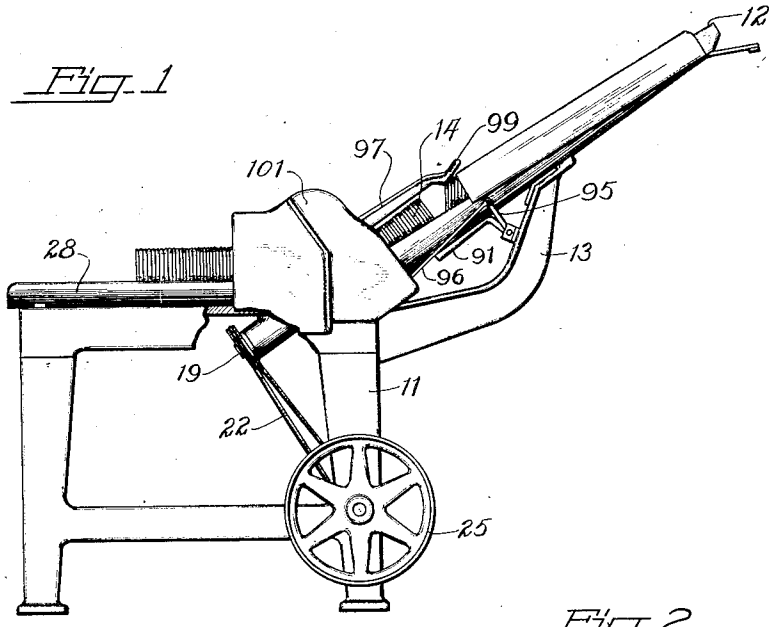
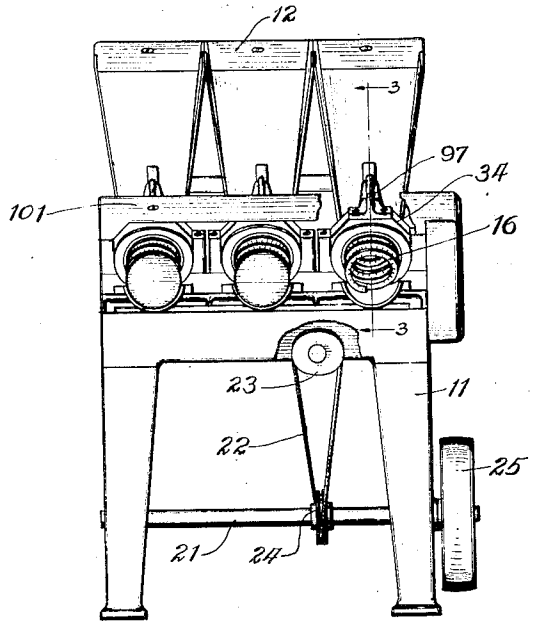


Fig. 2



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May 5, 1931. L. L. JONES 1,803,621

CAN END COUNTING AND STACKING MACHINE

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Fig. 3

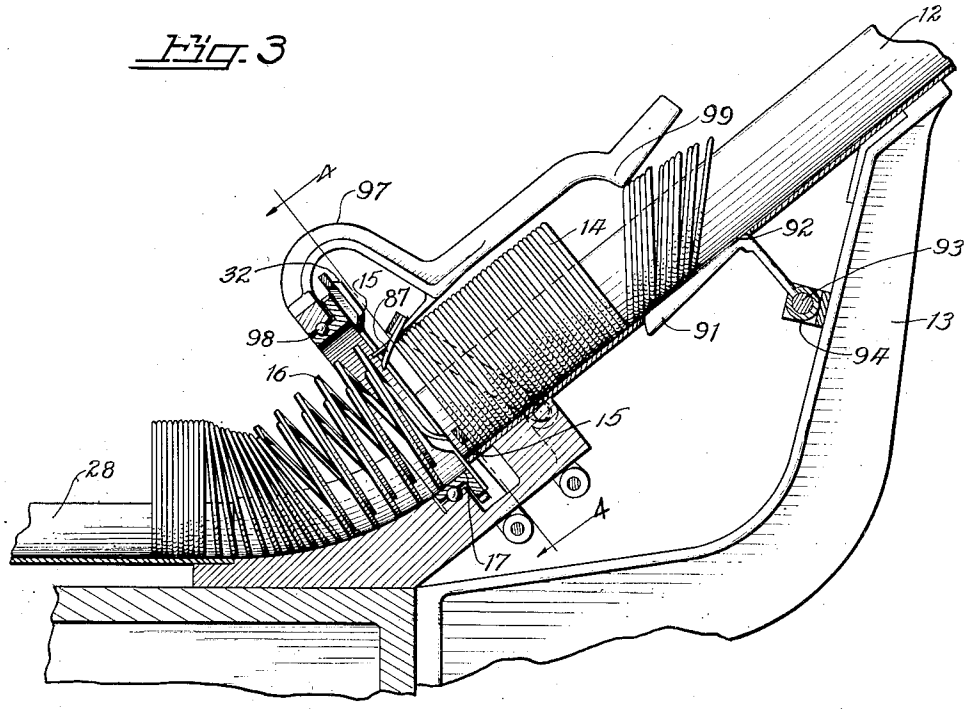
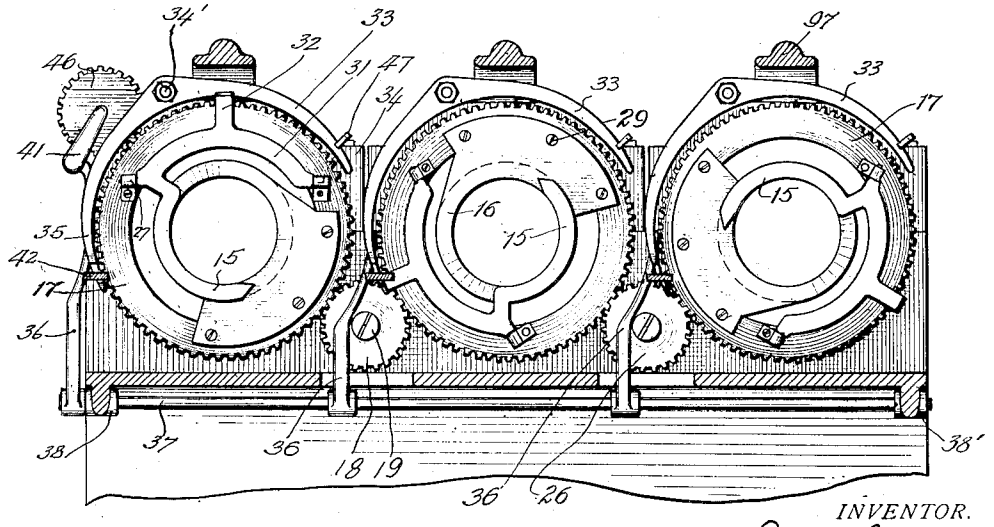


Fig. 4



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CAN END COUNTING AND STACKING MACHINE

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Fig. 5

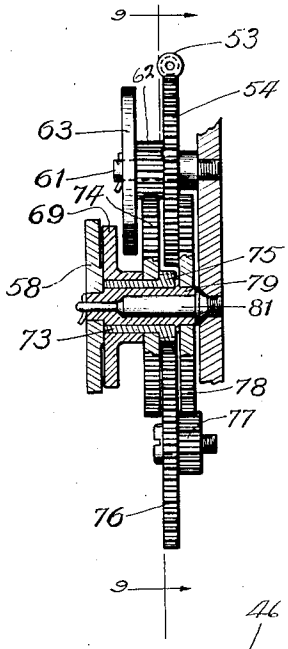


Fig. 6

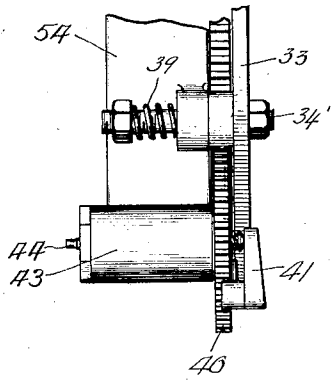
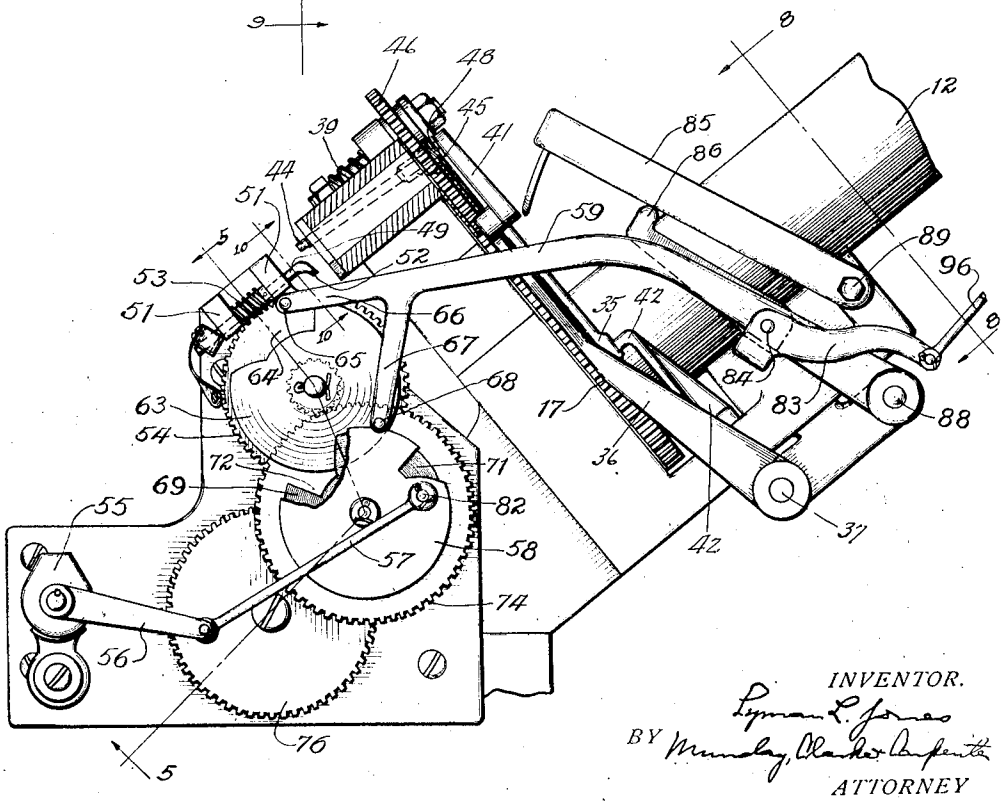


Fig. 7



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CAN END COUNTING AND STACKING MACHINE

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Fig. 8

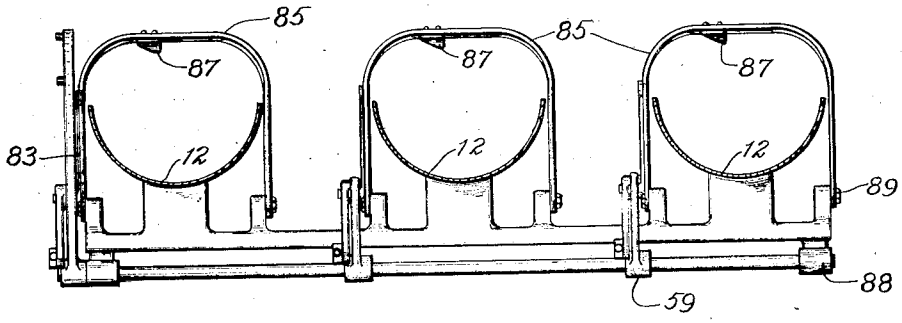


Fig. 9

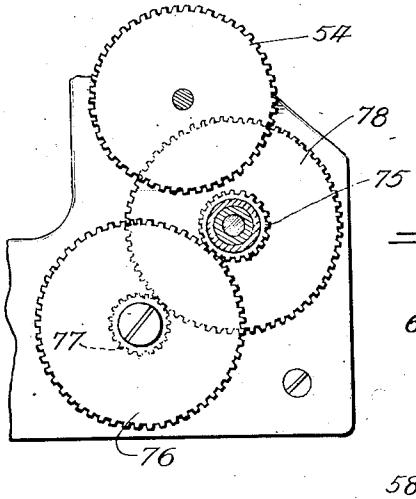


Fig. 10

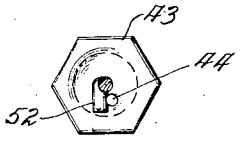


Fig. 11

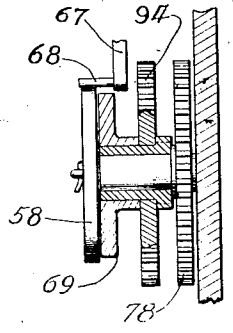
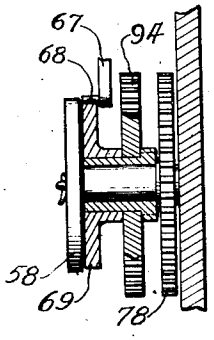


Fig. 12



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Patented May 5, 1931 1,803,621

UNITED STATES PATENT OFFICE

LYMAN L. JONES, OF SEATTLE, WASHINGTON, ASSIGNOR TO AMERICAN CAN COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY

CAN-END COUNTING AND STACKING MACHINE

Application filed April 18, 1923. Serial No. 633,030.

My invention relates to a machine having for a general object the counting of can ends, or the like, as they are delivered from forming machinery and arranging them in groups, or stacks, of predetermined size, conveniently located for removal and packing for shipment.

With the foregoing general object in view, the invention contemplates the provision of a machine of this character having very great capacity, being capable of construction in a plurality of units adapted to operate upon ends delivered from a plurality of different chutes while registering the count upon a single counting device.

A further object is the provision of automatically operable means for interrupting the feeding of ends through the machine upon the completion of a stack of predetermined size, provision being made for controlling said mechanism in accordance with the number of ends required in a stack for packing in boxes of varying size, the number being controllable over a wide range of variation.

Another object of the invention is the provision of controlling mechanism for interrupting the feeding of ends from any particular chute when the number in said chute runs low, and this without interfering with the operation of the feeding and counting units associated with other chutes. In this connection, it is to be observed that the machine, when constructed with more than one unit, is adapted to function when any one or more of said units is in operation, the arrangement preferably being such that when all of the units are in action, the counting mechanism operates continuously and when a less number of the units are in action, said mechanism will operate intermittently in the proportion that the number of units operating bears to the total number of operative units.

Other objects and advantages of the invention will be apparent as it is better understood from the following description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

Referring to the drawings,

Figure 1 is a side elevation of a machine in which my invention is embodied;

Fig. 2 is a front end elevation thereof;

Fig. 3 is an enlarged partial section taken through one of the chutes and feeding units;

Fig. 4 is a transverse section taken substantially on the line 4—4 in Fig. 3;

Fig. 5 is a sectional view of the counter gearing and control cams operable thereby, the section being taken substantially on the line 5—5 in Fig. 7;

Fig. 6 is a top plan view of a part of the counter operating mechanism shown in Fig. 4;

Fig. 7 is an enlarged side elevation of the counter operating mechanism and feed controlling means;

Fig. 8 is a transverse section taken substantially on the line 8—8 of Fig. 7;

Fig. 9 is a detail of the counter operating gearing taken substantially on the line 9—9 in Fig. 5;

Fig. 10 is a detail of the counter pin and bearing therefor;

Figs. 11 and 12 are sectional details of the controlling cams and means by which the feeding of the ends is controlled in accordance with the number desired in the delivered stack.

As thus illustrated, the mechanism comprises a supporting frame 11 upon which are mounted a plurality of feed chutes or can end guides 12, these chutes being three in number in the present instance and each having a separate feeding and stacking device, perhaps best shown in Figs. 3 and 4. The feed chutes are supported in inclined position by brackets 13, so that the ends may be fed by gravity and it may be here noted that the number of chutes employed may be readily varied in accordance with particular requirements. The ends are supplied in these chutes in stacks, as indicated at 14, and are separated and fed individually by means of feeding fingers 15 and feeding springs 16, it being understood that these parts are provided at the bottom of each chute 12.

The fingers 15 and springs 16 are fixedly secured to ring gears 17 adapted to be rotated by means of a drive gear 18 which is

mounted upon a shaft 19 driven from a power shaft 21 by means of a belt 22 extending over suitable driving pulleys 23 and 24. Said shaft 21 may be driven from any suitable source of power by means of a suitable connection taking over a pulley wheel 25. An intermediate gear 26 is employed to drive the ring gear 17 which is not in mesh with the driving gear 18. It will be understood that the gears 17 rotate continuously when the machine is in operation. The fingers 15 are pivotally mounted in bearings 27 upon the faces of the gears 17 and it will be observed that these fingers are so mounted that the points thereof are approximately 120° apart, so that the different fingers operate successively to cut out the can ends in the different chutes. The ends, when separated by the fingers 15, are directed into the upper part of the springs 16 and are fed by the latter into stacking chutes 28. This action will be understood by an inspection of Figs. 3 and 4, from which it will appear that the springs are of spiral form and permanently secured to the gears 17 by means of screws 29 so that the springs and gears rotate in unison.

The counting of the ends as they are fed to the different feeding units is accomplished by a mechanism to be now described. The fingers 15, as heretofore stated, are pivoted in the bearings 27 and are provided with arcuate portions 31 carrying projections 32 between said bearings. When the point of one of said fingers enters between the lowermost end in the stack and that next above it, the finger is rotated in the bearings 27, moving the arcuate portion 31 and projection 32 toward the front or away from the observer viewing Fig. 4, causing it to move into the plane of and engage a rocker 33, which is pivoted at 34′ on a fixed frame 34. Said rocker 33 is provided with a lower extension 35, first engaged by the said projection 32 as the same is carried around by the rotation of the gear 17, and said rocker 33 is oscillated about its pivot point 34′ under the action of the projection 32, and as its extension 35 moves outward it engages a finger 36 attached to a transverse shaft 37 bearinged at 38 and 38′. This shaft 37 is typical of any movable part which receives motion from all of the passing can ends and transmits its movement to the register. As the extension 35 moves outward or toward the observer viewing Fig. 7, a rounded part of the said extension 35 wedges itself between the fixed stationary part, mounted upon the chute 12 and overlying each rocker 33, and one of the fingers 36. This wedging action causes the shaft 37 to be slightly rotated on its own axis in a counterclockwise direction. One of said fingers 36 is provided with an extension 41 which contacts with the counter operating pin 44, see Fig. 7. Said pin extends diagonally through a short shaft 45, rotatably mounted in a bearing 43 formed in the frame surrounding the lower part of the chutes 12 and said shaft 45 is connected with and rotated by means of a counter drive gear 46 which meshes with one of the ring gears 17. The rear end of the pin 44 engages the extension 41 on the finger 36 and a spring 48 is provided to hold said pin in contact with said extension 41, and to return the shaft 37 to normal position after the extension 35 of the rocker 33 has been withdrawn. It will be manifest that the swinging movement of the rocker 33, of any feed unit, about its pivot point 34′ as acted upon by the projection 32, will first actuate the finger 36 and the shaft 37, forcing inwardly the counter operating pin 44 through the medium of the extension 41 of one of said fingers 36, secured to the shaft 37, to operate the counting mechanism in a manner which will be understood by reference to Figs. 4 and 7. The rocker 33 is held against longitudinal displacement exerted by the projection 32, by means of the spring 39 at the pivot point 34′, the stationary part 42 and a bracket 47 with which the forward extension of said rocker 33 is slidably connected. The said spring 39 also acts as a brake to insure smooth and positive oscillation of the rocker 33 as this moves by the projection 32 engaging the extension 35, or as it is returned to normal position by the projection 32 being further carried under the opposite arm of said rocker 33.

Said pin 44 extends at an angle from the axis of the gear 46, whereby the point of the pin is caused to describe a small circle by rotation of the gear. A counter worm shaft 49 is mounted in bearings 51 in the frame and has a downwardly curved rear end 52, which is disposed in the path of the pin 44 when the latter is projected and rotating in the manner heretofore described. A worm 53, mounted on said shaft 49, drives a worm wheel 54, which forms a part of the counter gearing illustrated in Figs. 5, 7 and 9. A counting device 55 is operated by this gearing by means of an arm 56 and a connecting rod 57, which has an end secured to a cam 58, which is rotated by said gearing, as will hereinafter appear.

If a supply of ends be present in each of the chutes 12, the counting mechanism will be continuously operated, by reason of the relationship of the projections 32 of the feed fingers 15, which, as has been heretofore stated, are differently positioned on the three gears 17, each extending approximately 120° about the circle. It will be apparent that, with said fingers all in operation, one or the other of the fingers 36 will always be in forward position, holding the extension 41 in engagement with the operating pin 44. The gear 46 is driven by the gear 17 with which

it meshes with a ratio of three revolutions to one of said gear 17 and, in the event that ends are not feeding through one of the feeding devices, the pin 44 may be retracted during one revolution of said gear 46, with the result that the counting mechanism is not operated. By this arrangement, it is possible to use a single counting mechanism for all of the feeding devices, said mechanism operating either continuously or intermittently, in accordance with the number of feeding devices which are functioning.

I provide means for terminating the feeding of ends after the total number of ends have been delivered to one or more of the chutes 28, it being understood that a certain number of ends will be required for a single packing case and that it is desirable to have the stack removed for packing when this number is reached. This is accomplished by an interrupter lever 59 controlled by cams illustrated in detail in Figs. 5 and 7. The worm wheel 54 is mounted on a shaft 61, which carries also a pinion 62 and a cam 63. Said cam 63 is formed with a slot 64 adapted to act upon a pin 65 carried in an upper arm 66 of the lever 59, and under certain conditions hereinafter set forth to lower and raise said lever 59. The lever 59 has also a lower arm 67 in which is a pin 68 adapted to ride upon either the cam 58 or a cam 69 mounted inwardly therefrom. The cam 58 is provided with a slot 71 and the cam 69 with a slot 72 adapted to act upon the pin 68, by permitting the interrupter lever 59 to drop and stop the feeding of the ends, and it will be understood that said pin is caused to ride upon one cam or the other by varying its length, as shown in Figs. 11 and 12. A long pin may be inserted in the lever arm 67, as shown in Fig. 11, in which event it will ride upon the outer cam 58, or a shorter pin may be employed, as shown in Fig. 12, so that it is acted upon by the cam 69.

The relationship of the cams will be understood by following the train of gearing shown best in Fig. 5. The cam 63, being driven directly by the shaft upon which the worm wheel 54 is mounted, will operate the lever 59 after a relatively small number of ends has been counted, the number, for example, being 48. The cam 69 is carried on a sleeve 73 upon which is provided a large gear 74 meshing with the pinion 62. Said cam, therefore, will be rotated at considerably lower speed than the cam 63, so that when the lever 59 is operating upon the said cam 69, as shown in Fig. 12, the number of ends delivered before the end feeding mechanism is stopped will be somewhat larger, as for example, 160. A pinion 75 is formed on the sleeve 73 and meshes with a large gear 76 which carries a pinion 77 meshing with another large gear 78, which is secured to a sleeve 79 mounted on a fixed shaft 81. The cam 58 is secured upon the outer end of the sleeve 79 and is driven thereby at a much slower speed than the cam 69, with the result that the number of ends counted under the action of this cam is relatively great, such, for example, as 2400. As has been heretofore stated, the counting device is operated by the rod 57 having an end secured at 82 eccentrically on the cam 58. When it is desired that the mechanism shall be controlled by the cam 63, the pin 68, of course, is removed and controlled by the cams 69 and 58 is cut off. When, however, a larger quantity of counted ends is desired, the proper length of pin 68 is inserted into the lever arm 67 to permit either cam 69 or 58 to control as previously described.

When the forward end of the lever 59 is allowed to drop down by the particular control cam employed, a regulator stop lever 83, which is pivotally secured at 84 to the body of said lever 59, is actuated and allows an interrupter bar, or bracket 85, resting upon a projection 86 at the upper end of said lever 83, to descend causing a finger 87 to move down into the path of the can ends. It should be understood that when the lever 59 is thus lowered, the shaft 88 is moved and shorter levers 59′, shown in Fig. 8, similar to the pivot end of the lever 59, are also lowered, and this action permits all of the brackets 85, of which there are three illustrated in the drawings, to project their respective fingers 87 in the path of the can ends in each chute, thus stopping the feeding of ends through all of the chutes. Said lever 59 is pivoted at 88 to the frame and the lever 85 is pivoted at 89 and operation of the machine may be resumed by lifting these fingers so that the finger 87 is removed from the path of the ends.

I also provide means for terminating the feeding of the ends in the event that they run low in any of the chutes 12, this means consisting of a finger 91 disposed in a slot 92 in the bottom of each of the chutes 12, this finger being movable upwardly into said chute in the absence of can ends resting thereon, by action of a spring 91′ attached to and positioned between the finger 91 and the bracket 13, as shown in Fig. 3, and serving to rotate a short sleeve 93′ positioned about a fixed shaft 93 secured at 94 to the bracket 13, and each sleeve 93′ carries an arm 95 to which is connected a rod 96 connecting at its opposite end with the lower end of its respective stop lever 83. Said rod 96 when drawn rearwardly under the action of spring 91′ causes the lever 83 to move about its pivot point 84 on the lever 59 or 59′, and to lower the projection 86, which action causes the bar 85 to be dropped down, so that the finger 87 obstructs the passage of the ends. It should be understood that this stopping of the feeding of ends by the finger 87 of the bar 85,

relates to an individual chute, and is controlled by each finger 91 of that particular chute.

Brackets 97 are provided in the frame and project rearwardly from the frame members 34 which provide bearings 98 for the gears 17. Said brackets have their rear ends bent downwardly at 99, so that they extend in the path of the ends and hold them in inclined position, as shown in Figs. 1 and 3, thus relieving the feeding devices from the excessive weight which would result from all of the ends in the chute resting thereon. A hood 101 extends up from the side frames and over the top of the machine above the feeding devices.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention, or sacrificing all of its material advantages, the form hereinbefore described being merely a preferred embodiment thereof.

I claim:

1. In a machine for counting and stacking can ends or the like, the combination of a rotary annular feeding device, and means operable by the feeding of can ends through said device for counting said ends.

2. In a machine for counting and stacking can ends or the like, the combination of a rotary annular feeding device, means for conducting the can ends through the interior of said annular feeding device, means operable by the feeding of can ends through said device for counting said ends, and means for terminating the delivery of ends to said device when a predetermined number have passed therethrough.

3. In a machine for counting and stacking can ends or the like, the combination of a rotary annular feeding and stack forming device, means operable by the feeding of ends through said device for counting said ends, and means for terminating the feeding of the ends when a counted stack containing a predetermined number has been formed.

4. In a machine for counting and stacking can ends or the like, the combination of an annular feeding device adapted to separate individual can ends or the like from a stack and transfer them to position wherein they are readily accessible for packing, and means for preventing further feeding of ends after a predetermined number have been delivered to said position.

5. In a machine for counting and stacking can ends or the like, the combination of an annular feeding device adapted to separate individual can ends or the like from a stack and transfer them to position wherein they are readily accessible for packing, and means for preventing further feeding of ends after a predetermined number have been delivered to said position, said means comprising counting mechanism operable by said feeding device and means controllable by said counting mechanism for regulating the supply of ends to said device.

6. In a machine for counting and stacking can ends or the like, the combination of a plurality of feeding and stacking devices, and single counting mechanism for counting the ends acted upon by all said devices.

7. In a machine for counting and stacking can ends or the like, the combination of a plurality of annular feeding and stacking devices, single counting mechanism for counting the ends acted upon by all said devices, and means controllable by said counting mechanism for preventing further feeding of ends after stacks of predetermined size have been formed.

8. In a machine for counting and stacking can ends or the like, the combination of an annular feeding and stacking device, and means operable thereby for regulating the size of the stacks being formed.

9. A machine for counting and stacking can ends or the like, the combination of an annular feeding and stacking device, and means operable thereby for reguating the size of the stacks being formed, said means comprising counting mechanism and means controllable thereby for stopping the supply of ends when stacks of desired size have been completed.

10. In a machine for counting and stacking can ends or the like, the combination of an annular feeding and stack-forming device, a counting mechanism operable thereby, and means controllable by said counting mechanism for limiting the number of ends in the stacks being formed, said means being arrangeable to vary the stack limit.

11. In a machine for counting and stacking can ends or the like, the combination of a delivery chute, a separator device rotary around the can ends and adapted to cut out ends individually from said chute, means operable by said separator device for counting the ends as they are separated, means for arranging the counted ends in stacked formation, and means for stopping the delivery of ends when a stack of desired number has been formed.

12. In a machine for counting and stacking can ends or the like, the combination of a delivery chute, a separator device rotary around the can ends and adapted to cut out ends individually from said chute, means operable by said separator device for counting the ends as they are separated, means for arranging the counted ends in stacked formation, and means for stopping the delivery of ends when the ends run low in said delivery chute.

13. A machine for counting and stacking can ends or the like, adapted to be combined with can end feeding means, comprising a ring gear, a separator finger pivotally secured to the side of said gear and having an operating projection movable to operative position by the action of a can end on said finger, and means controllable by said gear for counting the ends fed by the latter.

14. In a machine for counting and stacking can ends or the like, the combination of a feeding device including a rotary carrier, a feed finger carried by said carrier, a feed spring also carried by the carrier for removing the can ends as they are cut out by said feed finger, an operating projection movable to operative position by the action of a can end on said feed finger, counting mechanism, and means controllable by said projection under the influence of can ends to set said counting mechanism in operation.

15. In a machine for counting and stacking can ends or the like, the combination of a feeding device including a rotary carrier, a feed finger carried by said carrier, a feed spring also carried by the carrier for removing the can ends as they are cut out by said feed finger, an operating projection movable to operative position by the action of a can end on said feed finger, counting mechanism, means controllable by said projection under the influence of can ends to set said counting mechanism in operation, and means for cutting off the supply of ends to said feeding device when a counted stack containing a predetermined number of ends has been formed.

16. In a machine for counting and stacking can ends or the like, the combination of a feeding device including a rotary carrier, a feed finger carried by said carrier, a feed spring also carried by the carrier for removing the can ends as they are cut out by said feed finger, an operating projection movable to operative position by the action of a can end on said feed finger counting mechanism, means controllable by said projection under the influence of can ends to set said counting mechanism in operation, and means for cutting off the supply of ends to said feeding device when a counted stack containing a predetermined number of ends has been formed, said last-mentioned means comprising a cam operable by the counting mechanism and a lever controlled by said cam for interrupting the supply of ends to the feeding device.

17. In a machine for counting and stacking can ends or the like, the combination of a plurality of feeding devices, each including a rotary carrier, a feed finger carried by said carrier, an operating projection movable to operative position by the action of a can end on said feed finger, counting mechanism, and means controllable by said projection under the influence of can ends to set said counting mechanism in operation.

18. In a machine for counting and stacking can ends or the like, the combination of a feeding and stack forming device, counting mechanism including reduction gearing operable by said device for counting the ends acted upon thereby, a plurality of cams operable by said gearing, and means controllable by one or the other of said cams at will to interrupt the supply of ends when counted stacks of desired size have been formed.

19. A machine for counting and stacking can ends or the like, adapted to be combined with can and feeding means, comprising a rotary stack forming device, a lever operable through the instrumentality of can ends acted upon by said device, an operating pin projectable into operative position by said lever, and mechanism operable by said pin when projected to count the ends acted upon by said feeding device.

20. A machine for counting and stacking can ends or the like adapted to be combined with can end feeding means, comprising a rotary stack forming device, a lever operable through the inustrumentality of can ends acted upon by said device, an operating pin projectable into operative position by said lever, and mechanism operable by said pin when projected to count the ends acted upon by said rotary device, said operating pin extending eccentrically from its bearing and said counting mechanism including an operating worm and shaft having an offset portion disposed in the path of said operating pin.

21. A machine for counting and stacking can ends or the like, adapted to be combined with can end feeding means, comprising a plurality of stack forming devices, a lever operable through the instrumentality of can ends acted upon by said devices, an operating pin projectable into operative position by said lever, and mechanism operable by said pin when projected to count the ends acted upon by said stack-forming devices.

22. In a machine for counting and stacking can ends or the like, the combination of a plurality of feeding and stack forming devices, a lever operable through the instrumentality of can ends acted upon by said devices, an operating pin projectable into operative position by said lever, and mechanism operable by said pin when projected to count the ends acted upon by said feeding devices, said operating pin being continuously operable when all said devices are in operation and intermittently operable when a part only of said devices are in action.

23. In a machine for counting can ends, the combination of a plurality of can ends guiding devices, each device having means for cutting out individually the can ends which are guided to it, means for operating

all of said devices so as to have their cutting out actions at different times, a register for enumerating the total number of can ends so cut out, and means whereby each of said feeding devices operates the register at the feeding devices time of cutting-out action.

24. The combination of supports for conducting a plurality of rows of can ends, a register, means whereby the passage of each can end causes an actuation of the register, and devices cooperating with said actuating means and preventing any two of the same from actuating the register at the same time.

25. The combination of a plurality of can end chutes, counting elements adjacent said chutes respectively, each counting element being operated by can ends passing through its chute, a rock shaft which is given a counting movement by each of said counting elements, a register, and means whereby each movement of the rock shaft is imparted to the register to be counted thereon.

26. The combination of a plurality of can end chutes, counting elements adjacent said chutes respectively, each counting element being operated by can ends passing through its chute, said counting elements being differently arranged and operating at different times, a rock shaft which is given a counting movement by each of said counting elements, a register, and means whereby each movement of the rock shaft is imparted to the register to be counted thereon.

27. The combination of a plurality of can end guides, each having a feeder acting to feed can ends successively, means for operating said feeders at different times, a register acting to count each feeding operation, and means whereby said register is actuated once for each of said feeding operations.

28. Register-operating means consisting of the combination of a plurality of can end guides, each having a feeder acting to feed can ends successively, means for operating said feeders at different and closely spaced intervals of time, and means whereby the feeding movement of each can end is adapted to be communicated to the register to count the total number of can ends.

29. A means for causing the movements of can ends for counting the same consisting of the combination of a plurality of inclined can end chutes in which the can ends descend by gravity, a movable device for each chute whereby the can ends are permitted to pass by said device individually, means for actuating all of said movable devices at different and closely spaced intervals of time, and means whereby each permitted movement of any of said can ends may be communicated to a counting and registering device.

30. The combination of a plurality of downwardly extending can end guides, rotary gears extending around said chutes, fingers carried by said gears and adapted to remove can ends, from said guides, a shaft with which one of said gears is operatively connected, and counting means operated by said shaft.

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