Oct. 26, 1943. M. E. ROBINSON ET AL 2,332,531

FEED MECHANISM

Filed Oct. 9, 1941 2 Sheets-Sheet 1

Fig 1

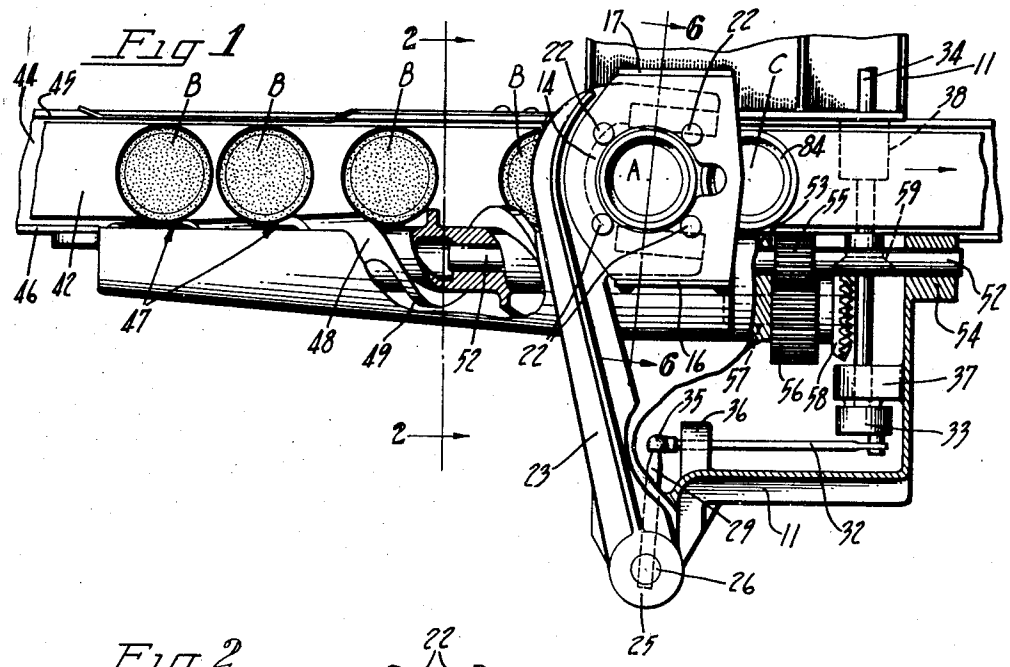


Fig 2

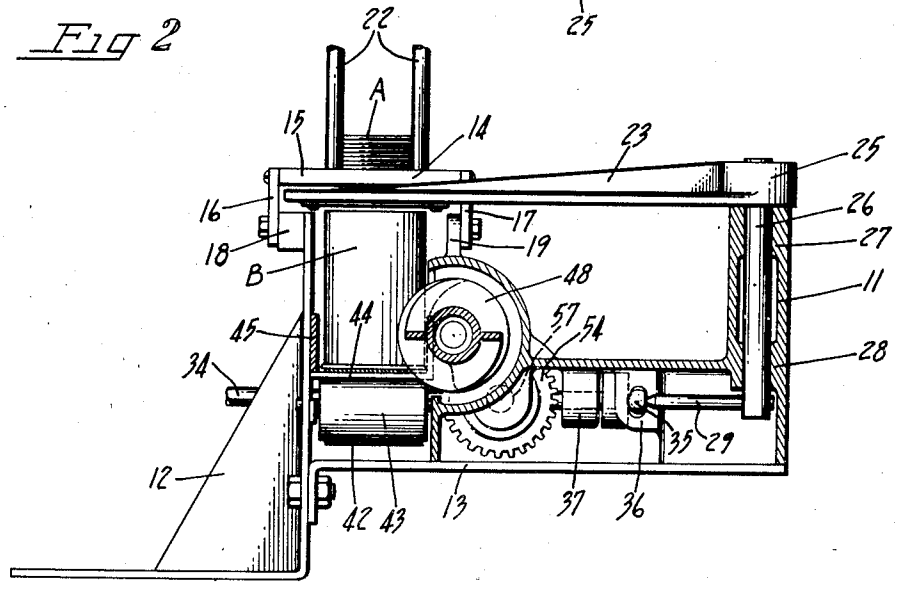
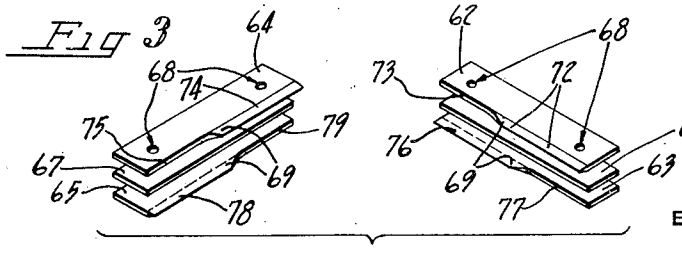


Fig 3



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FEED MECHANISM

Filed Oct. 9, 1941 2 Sheets-Sheet 2

Fig 4

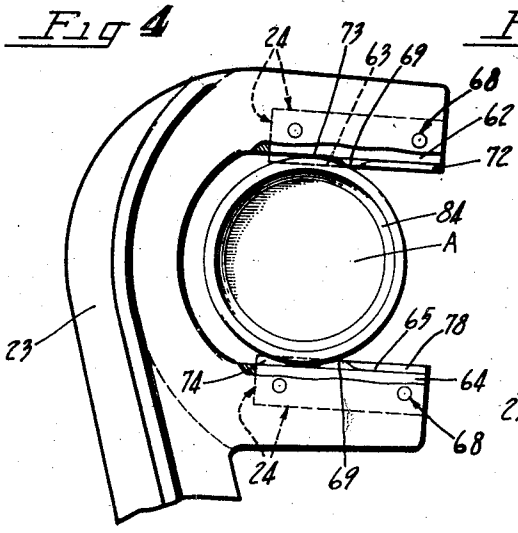


Fig 5

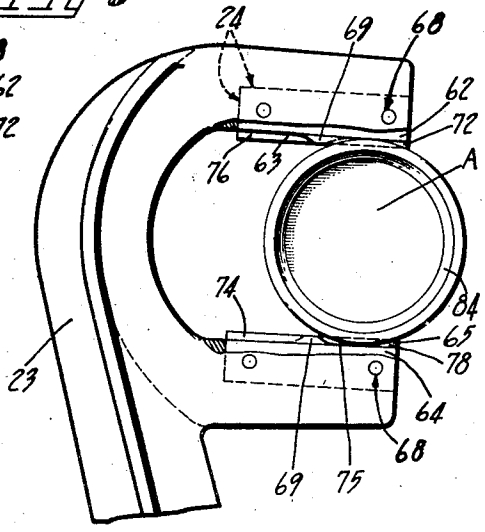


Fig 6

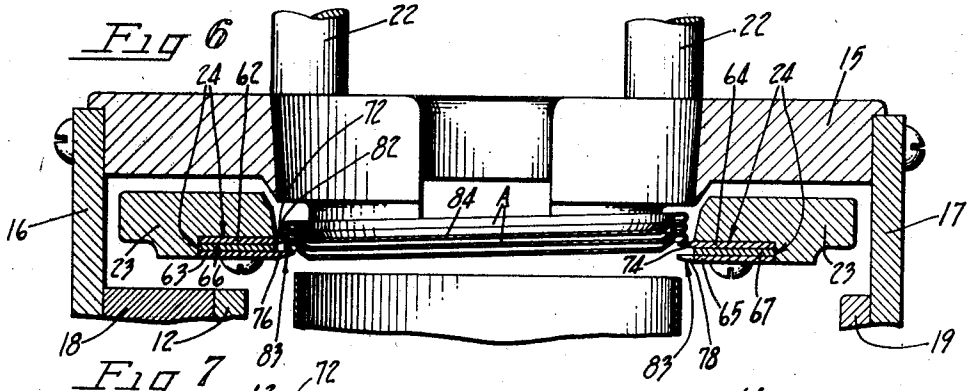


Fig 7

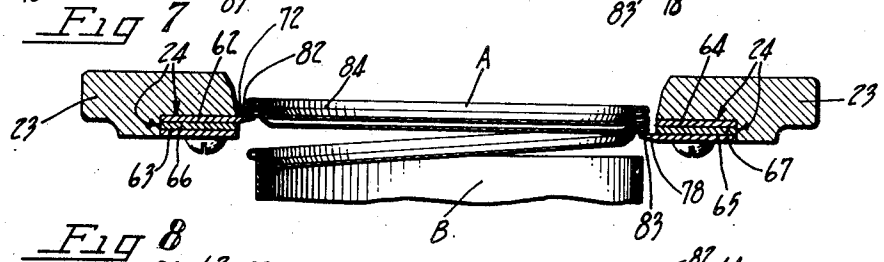
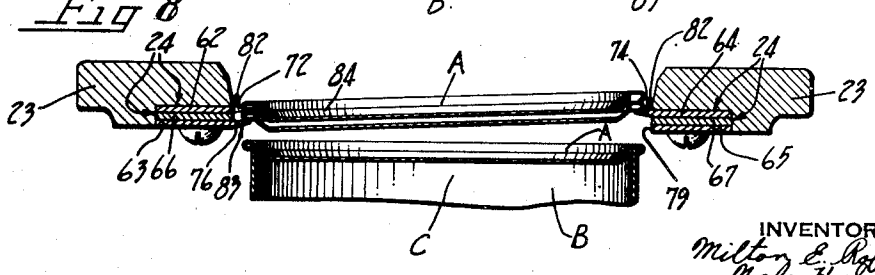


Fig 8



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UNITED STATES PATENT OFFICE

2,332,531

FEED MECHANISM

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Application October 9, 1941, Serial No. 414,384

3 Claims. (Cl. 113—114)

This invention relates to a feeding mechanism and has particular reference to separating an individual can cover or end from a supply of ends and to depositing the same onto the open end of a filled can.

An object of the invention is to provide a feeding device for separating and discharging a single can end from a positioned stack or supply of ends and which is adapted to operate in conjunction with other machines performing some subsequent operation on the end.

Another object of the invention is the provision of a feed of the character described which has a plurality of stationary knives carried in an oscillating feed arm, which knives are spaced apart to provide support ledges for can ends arranged in a stack, the lowermost end in the stack being separated by the oscillating movement of the arm for subsequent operation such as for delivery onto a filled can.

Another object is the provision in such a feed device of support ledges which are cut away in an opposite and alternate relation to permit stepped separation of the lowermost end and to permit the delivery of the same into the open end of a filled can while it is in transit to closing or seaming mechanism.

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

Referring to the drawings:

Figure 1 is a top plan view of an end feeding mechanism embodying the present invention with parts broken away and parts shown in section;

Fig. 2 is a combined vertical section and side elevation of the mechanism shown in Fig. 1 as viewed substantially along the line 2—2 in that figure some parts being broken back and shown in section;

Fig. 3 is an enlarged perspective view of the separating knives used in the end feed mechanism, the knives being shown in normal superimposed position;

Fig. 4 is an enlarged plan view of a portion of the feeding arm showing a can end in position on the separating knives the feed arm being in a forward position;

Fig. 5 is a view similar to Fig. 4 showing the arm in a rear position;

Fig. 6 is an enlarged vertical section of the feed magazine as viewed substantially along the line 6—6 in Fig. 1;

Fig. 7 is a similar view showing an end being separated and positioned in the open end of a container; and

Fig. 8 is a similar view showing a can end after it is positioned upon an open container.

In the usual form of feed mechanism devised for separating can ends, a reciprocating feed or push bar is arranged to operate beneath a stack of can ends, the object being to raise the stack of ends clear of the lowermost end and to hold the same in such position while the support for the lowermost end is removed so that the separated end may be delivered to a subsequent work position. Such a feed requires many expensive and accurately made machine parts which have close fitting contact and under certain conditions are subjected to excessive wear particularly when abrasive materials are being filled and sealed into cans as such abrasive material gets on the close fitting parts.

This invention contemplates the use of a simple, compact feeding mechanism which is less expensive to manufacture, having fewer moving parts and one which will eliminate the need of lifting a supply of ends in the stack so that the lowermost end may be separated. It also does away with the usual surfaces sliding one against the other.

As a preferred embodiment of the present invention the drawings disclose a housing or main frame 11 which carries all the operating parts of the feeding mechanism. Such a housing may be secured to a bracket 12 and to a support arm 13, which parts in turn are mounted on the main frame of some other apparatus such as a can crimping, end seaming or other closing equipment that would logically be used for securing a positioned can end onto a filled can.

The end feed mechanism comprises a can end magazine 14 which is arranged to hold a supply of can ends A. Such a magazine includes a base plate 15, carried by and fastened to side plates 16, 17 and which are secured to lugs 18 and 19. These lugs are shown by way of example as being formed as part of the housing 11 and of the bracket 12.

The can ends A are retained in stacked formation within the magazine by means of guide posts or rods 22 which are equally spaced around the center of the stack (Fig. 1). In the feeding operation the can ends A are separated by means of a plurality of knives which are carried on an arm 23. The stacked can ends are supported in the end feed by the arm 23 which operates within the feed magazine to cut out or separate the lowermost end.

The feed arm 23 has a U-shaped portion formed at one end with parallel cutout sections as at 24 (Figs. 4 to 8) for the reception of the separating knives which will be described hereinafter more fully. The opposite end of the arm is formed with a boss 25 by means of which the arm is mounted onto a vertical shaft 26. This shaft is journaled in bearings 27, 28 of the housing 11 (Fig. 2).

The shaft 26 oscillates the arm 23 through movement of a pin 29 fitted in the lower end of the shaft. This pin is rocked back and forth through a connecting rod 32, which at its opposite end joins with an eccentric 33 mounted on one end of a main feed drive shaft 34. The connecting rod has a pivotal connection with the pin 29 as at 35. The connecting rod 32 is slidable in a guide or lug 36 formed in the housing 11.

The drive shaft 34 is journaled in suitable bearings formed in lugs 37, 38 in the housing 11. This shaft may be driven by the closing equipment with which the feed mechanism is directly connected or by any other desirable means in timed relation with other moving parts to deliver a can end onto a filled can.

A continuous moving belt or conveyor feed 42 is disposed and operates beneath the end feed 14. This conveyor carries the filled cans, designated by the letter B (Figs. 1 and 2), along a predetermined path of travel in the direction of the end feed and toward the can closing equipment with which it may be associated.

The conveyor may be driven in a suitable manner as by a roller 43 (Fig. 2). The conveyor passes over a table or plate 44 which supports the moving belt 42 and the filled cans B carried thereby. Side guides 45, 46 maintain a straight line passage of the filled cans as they move on the belt.

The filled cans as they begin their advance along the conveyor belt 42 (Fig. 1) gradually engage within a groove 47 formed in the outer tapered wall of a feed screw 48. Such a groove at the large end of the screw is set off by a spiral thread 49. Feed screw 48 is rotated on a horizontal axis and is located at one side of the conveyor. It rotates in timed relation to other operations of the device. This screw properly spaces adjacent cans and positively controls the delivery of a filled can beneath the end feed. Thus the can is presented in synchronism with a separated can end A, the latter being deposited on the open end of the filled can. The assembled can and end thereafter continue along on the conveyor 42 (as at C in Fig. 1) into the crimping or seaming station of the can closing equipment with which the feed mechanism is associated.

The feed screw 48 is mounted in bearings in the housing 11 and is secured to and is rotated with a shaft 52. This shaft is journaled in bearings as at 53, 54 formed in the housing (Figs. 1 and 2). A pinion 55 mounted on the shaft 52 is driven by a mating drive gear 56 which is rotatable on a stud 57, the latter being secured in the housing 11. The drive gear 56 may be an integral part of a bevel gear 58 so that the entire unit rotates on the stud 57. The gear 58 meshes with and is driven by a bevel gear 59 keyed or otherwise secured to the drive shaft 34.

The separating knives carried by the oscillating arm 23 comprise an upper and lower right hand knife 62, 63 and an upper and lower left hand knife 64, 65 (Fig. 3). The upper and lower knives are spaced apart by a right and left hand intermediate blade or spacer block 66, 67. These blades preferably are of a thickness slightly greater than the curled dimension of a can end A so that a single end upon separation may be slid between the extended ledges on the separating blades. The knives may be made of similar gauge stock.

The separating knives and intermediate blades may be secured to the arm 23 by screws inserted in spaced openings 68 when they are placed in position in the cutout section 24 (Figs. 4 to 8). When assembled in this manner the two knives on each side are in overlapping relation at a mid or neutral position and these overlapping regions therefore come in opposite sides of the oscillating arm 23 as at 69 (Figs. 4 and 5).

The upper right hand separating knife 62 has an upper supporting ledge 72 and a cut away portion, section or recess as at 73. Likewise, the upper left hand knife 64 has an upper supporting ledge 74 and a cut-away portion 75. The lower right hand separating knife 63 has a lower supporting ledge 76 and cut-away portion 77. Similarly, the lower left hand knife 65 has a lower supporting ledge 78 and a cut-away portion 79.

The supporting ledges and the cut-away portions are arranged in opposite and alternate relationship both as to upper and lower knives on each side and as to upper and lower knives on opposite sides of the U-shaped feed arm. In other words the supporting ledge 72 of the right upper knife 62 (Fig. 3) is toward the front while the lower supporting ledge 76 of the lower knife 63 on that side is at the rear.

Just the opposite condition prevails as to the left side of the feed arm. The supporting ledge 74 of the left upper knife 64 is toward the rear while the lower supporting ledge 78 of the left lower knife 65 is at the front. This arrangement provides for a stepped separation of the lowermost end from the stack of ends in the magazine by mere movement of the knives forwardly and rearwardly relative to the stack of ends. This movement is made along an arc with the shaft 26 as the center.

As a result of the described arrangement of the knives and as best seen in Fig. 3, the rear supporting ledge 74 of upper knife 64 is disposed above rear cut away portion 79 of lower knife 65, while forward supporting ledge 78 of lower knife 65 is disposed immediately below forward cut away portion 75 of the upper knife 64. On the opposite side of the stack the described arrangement is longitudinally offset or reversed in respect to the location of the ledges and cut away portions longitudinally of knives 62 and 63. Forward supporting ledge 72 of upper knife 62 is disposed above forward cut away portion 77 of lower knife 63, while rear supporting ledge 76 of lower knife 63 is disposed immediately below rear cut away portion 73 of upper knife 62.

Therefore it will be seen, with added reference to Figs. 6, 7 and 8, that the stack of can ends is at all times supported at its opposite sides by upper and lower knife ledges in alternate relation depending upon the forward or rear position of the feed arm 23. The stack is thus tilted slightly laterally in opposite directions as the arm oscillates.

The inner edges of the intermediate blades 66, 67 are substantially flush with the edge of the cut-away section of the separating knives. This affords a free passage for an individual can end A as it is separated from the stack. Both upper and lower edges of the upper supporting ledges 72, 74 of the right and left hand separating knives 62, 64 are beveled as best illustrated at 82 (Figs. 6 to 8). The lower edge only of the lower supporting ledges 76, 78 of lower right and left hand separating knives 63, 65 may also be beveled as at 83.

The plan view in Fig. 4 and the section of Fig. 6

both illustrate the feeding arm **23** in its forward position, this being toward the right as to Fig. 4 relative to the can ends A in the magazine. In this position of the arm the curled edge on the lowermost end in the stack rests on the supporting ledge **74** of the upper knife **64**. The opposite curled edge of the can end A has dropped down through the cut-out section **73** of the upper knife **62** and now rests on the ledge **76** of the lower knife **63**. At this time a filled can A is in position beneath the lowermost end A.

Figs. 5 and 7 show the next step of feeding, the arm having now moved into its other position (to the left relative to the stack of ends in Fig. 5). In this position all of the stack of ends A at one side now rest upon the ledge **78** of the lower knife **65**, the lowermost end having dropped through the recess **75** of the upper knife **64** which is directly above the supporting knife **65**. On the opposite side the lowermost end is separated from the stack and now rests on the open end of the can B below. On this same side the remaining can ends in the stack, excepting the separated end, rest upon the supporting ledge **72** of the upper knife **62**.

As the oscillating arm **23** again moves into its forward position (Figs. 4 and 8) the high unseparated side of the lowermost end drops down through the cut-out **79** in the lower knife **65** and is deposited fully into the opened end of the filled can B. At the time this action takes place, the beveled supporting edge **74** of the upper knife **64** slides under the stack of ends on that side and the ends remaining in the stack now rest upon the lower knife **63** on one side and upon the upper knife **64** on the other side. Subsequent feeding operations which follow on subsequent can ends repeat this cut-out of the can end first on one side, which will always be the same side of the end, before the other side is released from the stack.

The can ends A (Figs. 6 to 8) have the usual countersink wall section as at **84** which permits close nesting of the ends in the magazine. This end construction together with its peripheral curl permits easy separation of the lowermost end and facilitates its deposit into position beneath the stack. The assembled can and cover C (Figs. 1 and 8) thereupon continue along with the conveyor **42** to the end crimping or end seaming station of the closing equipment or other mechanism where the container is finally sealed.

From the foregoing the simplicity of this can end feeding operation is evident. There is only one moving part, the arm **23** and each time the separating knives mounted on the arm move backward then forward an end is released from the stack. There are no slides or slideways or other accurate moving cooperating parts to be maintained in exact fitting condition. Such a feeding device is particularly adapted for use in the presence of fine powders, etc., such as abrasives which have caused so much difficulty with ordinary end 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.

We claim:

1. In a can end feed mechanism, the combination of a magazine for holding a stack of can ends, an oscillating arm operable beneath said magazine for separating and feeding said ends from the bottom of the stack, and a pair of end supporting knives carried by said arm in vertically spaced relation on each side of the stack, each knife of a said pair of knives including an inwardly projecting ledge for supporting the can ends and a longitudinally aligned cut away portion for releasing said ends, the ledge of each knife of a said pair being disposed opposite the cut-away portion of the knife on the other side of the stack.

2. In a can end feed mechanism, the combination of a magazine for holding a stack of can ends, an oscillatory arm operable beneath said magazine and having a U-shaped head at one end straddling the lowermost end in the stack, means for oscillating said arm in opposite directions for successively separating and feeding the lowermost can ends from the stack, a plurality of vertically spaced end supporting knives carried by said head on opposite sides of the stack, each of said knives including an inwardly projecting ledge for supporting the can ends and a longitudinally aligned cut away portion for releasing said ends, the ledge of each knife being disposed opposite the cut away portion of the knife on the other side of the stack, whereby to release the lowermost can end from the stack upon each reciprocation of said arm, and means movable beneath and relative to said magazine for successively advancing and positioning filled cans beneath said stack for respectively receiving the separated and gravity fed can ends as the latter are discharged from the stack.

3. In a can end feed mechanism, the combination of a magazine for holding can ends in stack formation, an arm movable in opposite directions beneath said magazine for feeding can ends, said arm including spaced can end supporting knives disposed on opposite sides of the stack, said knives comprising a pair of knives carried by said arm on opposite sides of the stack, each pair of knives comprising an upper can end separating knife and a lower can end separating knife secured to the arm in vertically spaced relation, each knife having a can end supporting ledge and a cut-away end releasing portion disposed in longitudinal alignment with said ledge, the ledge of the upper knife of each pair being disposed over the cut-away portion of the lower knife and the ledge of each knife being disposed opposite the cut-away portion of the knife on the other side of the stack, so that when said arm is moved in one direction across the stack the lowermost can end is released from engagement with the supporting ledge of the upper knife on one side of the stack so as to drop by gravity through said aligned upper knife cut-away portion onto the supporting ledge of the lower knife on the same side of the stack, and the opposite side of said end being likewise released when said arm is moved in the opposite direction, thereby releasing the lowermost can end from the stack upon each reciprocation of said arm.

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