

April 10, 1956

O. BUTTERS  
CAN BODY READER

2,741,292

Filed June 1, 1951

4 Sheets-Sheet 1

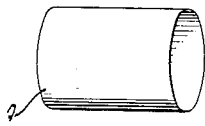


FIG. 2

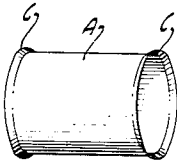


FIG. 3

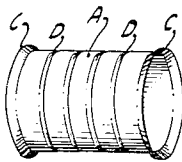
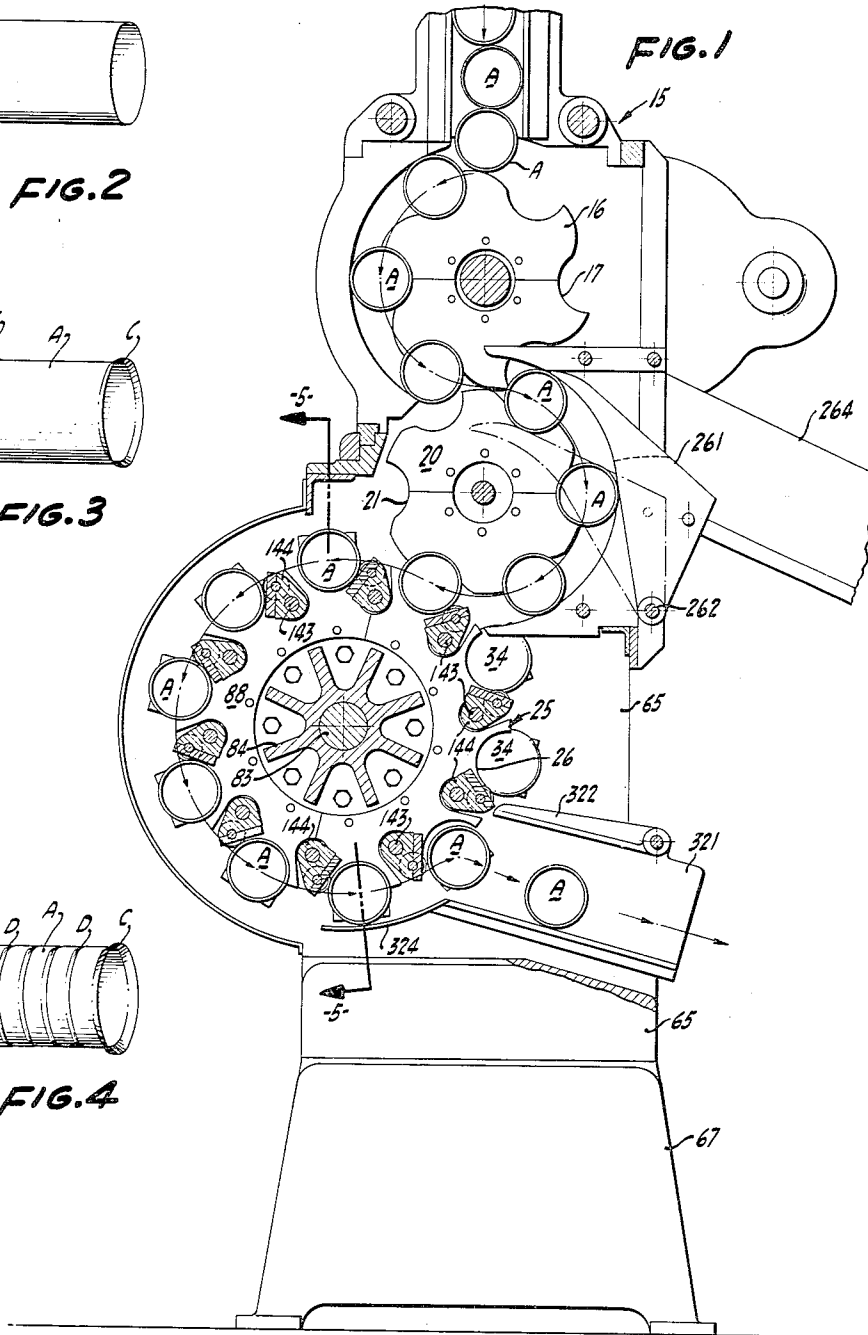


FIG. 4



INVENTOR.  
OTTO BUTTERS

BY

*Mellin and Houseman*  
ATTORNEYS

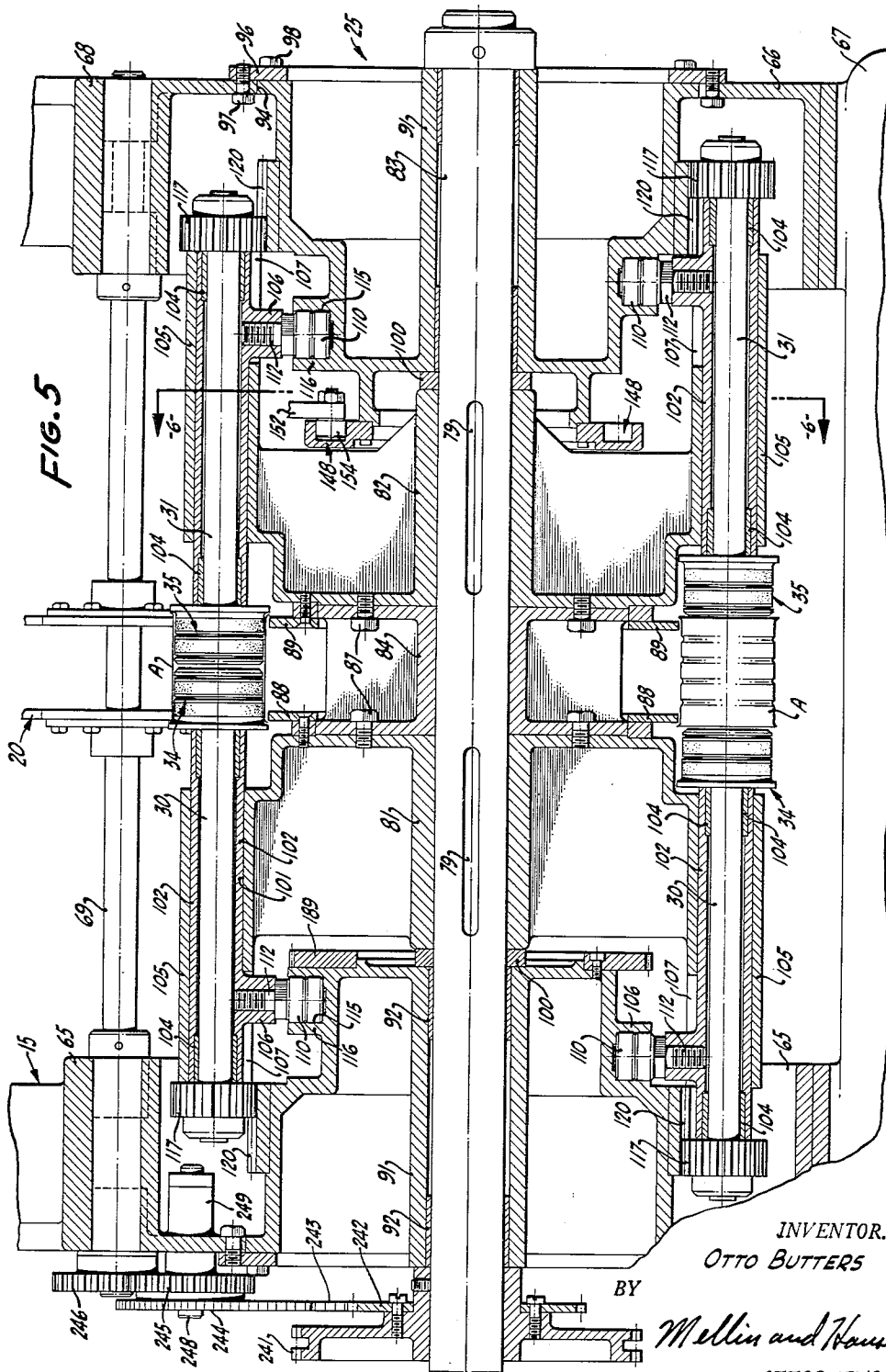
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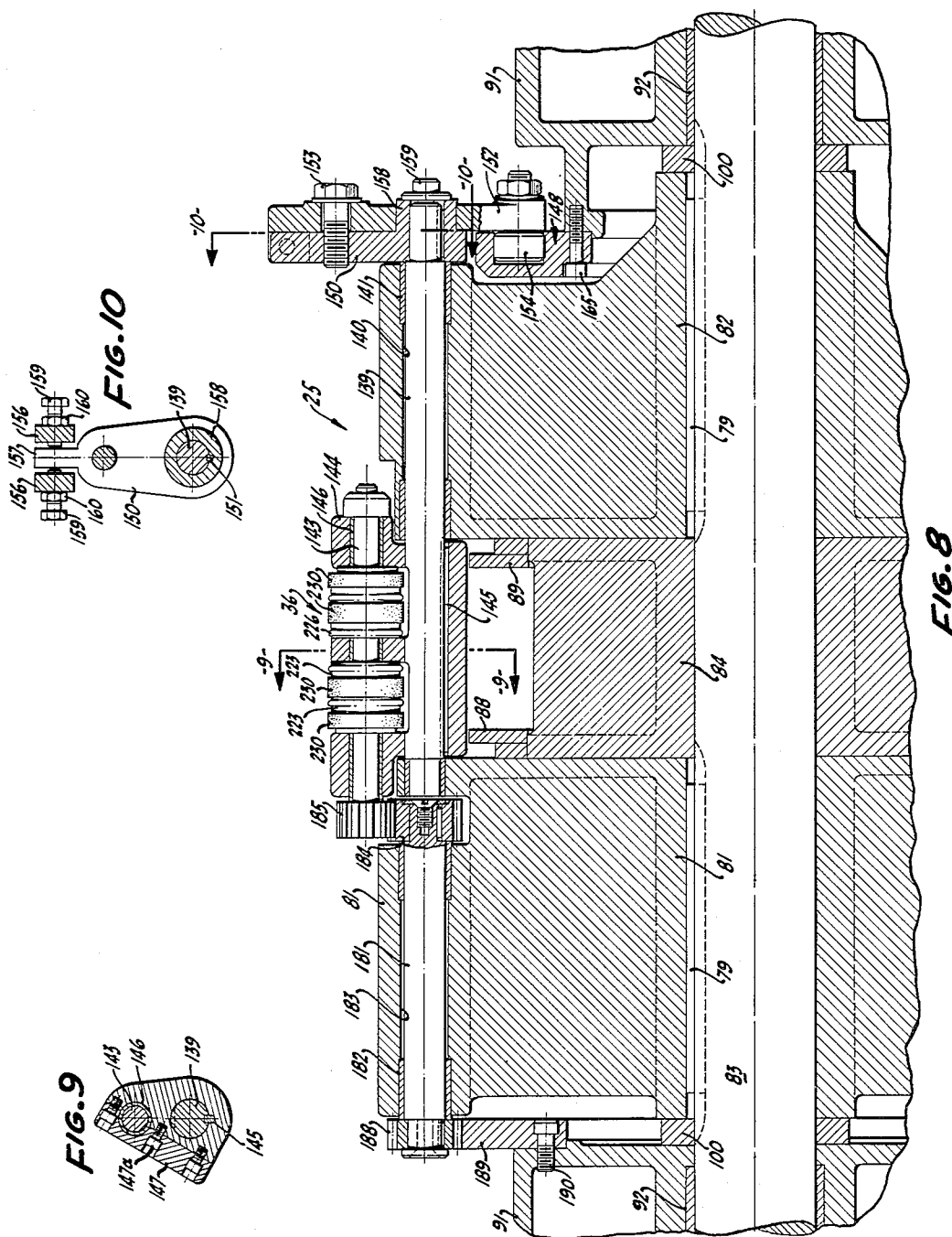
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O. BUTTERS  
CAN BODY BEADER

**2,741,292**

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4 Sheets-Sheet 4



INVENTOR.  
OTTO BUTTERS

*BY*

Mellin and Hanson  
ATTORNEYS

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2,741,292

## CAN BODY BEADER

Otto Butters, Oakland, Calif., assignor to Atlas Imperial Diesel Engine Co., Oakland, Calif., a corporation of Delaware

Application June 1, 1951, Serial No. 229,477

5 Claims. (Cl. 153—73)

This invention relates to machines for performing operations on can bodies.

A main object of the present invention is to provide a combined flanger and beader apparatus for flanging and beading can bodies.

A principal object of the present invention is to provide an improved beader for beading can bodies.

Another object of the present invention is to provide a flanger having a turret provided with can body receiving pockets, a beader having a turret provided with can body receiving pockets, and a transfer turret having can body receiving pockets and disposed between the turret for the flanger and the turret for the beader and which transfer turret is driven so that the pockets thereof successively register first with the pockets in the flanger turret, then with the pockets in the beader turret to provide continuous travel for can bodies through the machine.

Still another object of the present invention is to provide a beader so constructed that the capacity of the beader is increased by providing a female die composed of two separate die members, instead of a single member, mounted on opposed plungers which are reciprocated to insert and retract the female die members into and out of a can body, to thereby decrease the time required to insert and retract the female die.

Another object of the present invention is to provide a beader in which the can bodies are beaded in a two-step operation to avoid pre-bumping of the can bodies, and therefore allowing direct reception of can bodies from a flanger.

A further object of the invention is to provide a combined flanger and beader in a compact unit to save floor space and to avoid excessive handling and manipulating of the can bodies.

Various other objects of the invention will be apparent from the following description taken in connection with the accompanying drawings wherein:

Fig. 1 is a sectional view in elevation of a combined flanger and beader embodying the concepts of the present invention.

Fig. 2 is a view of a can body prior to flanging and beading.

Fig. 3 depicts a can body after having been flanged.

Fig. 4 depicts a can body after having been flanged and beaded.

Fig. 5 is a cross-sectional view taken generally in elevation along line 5—5 of Fig. 1.

Fig. 6 is a cross-sectional view taken along line 6—6 of Fig. 5 showing the mechanism for moving the male beader dies from inoperative to operative position.

Fig. 7 is a fragmentary sectional view through the male and female dies as the dies are positioned during a beading operation.

Fig. 8 is a fragmentary sectional view taken along line 8—8 of Fig. 6.

Fig. 9 is a sectional view along line 9—9 of Fig. 8.

Fig. 10 is a sectional view along line 10—10 of Fig. 8.

Referring to the accompanying drawings, the combined

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flanger and beader in general includes a flanger generally entitled 15, the construction of which is shown in the co-pending application of Ed Laxo for Feed Chute and Guide for Can Body Carrying Turret, Serial No. 724,378 filed January 25, 1947, now Patent No. 2,569,180, issued September 25, 1951. Flanger 15 has a turret 16 having can body receiving pockets 17 adapted to receive can bodies A and feed the can bodies to a transfer turret 20 having can body receiving pockets 21, said transfer turret being adapted to feed the can bodies to a beader turret 25 having can body receiving pockets 26, all as best shown in Fig. 1. The turrets 17, 20 and 25, are driven by means to be described so that the pockets of transfer turret 20 are caused to successively register first with the pockets of flanger turret 16 and then with the pockets of beader turret 25 so that a synchronous reception and transfer of the can bodies from the turret 16 to the turret 25 is achieved.

The cans A are flanged in the flanger 15 in a manner set out in the previously identified co-pending application, and in general by opposed oppositely-reciprocating plungers having flanging dies on the ends thereof (not shown). After flanging, the can bodies are fed to the beader turret 25. Each of the pockets 26 of the beader turret 25 has a pair of opposed plungers 30 and 31 associated therewith and carried by the turret 25 and driven by means to be described so as to oppositely reciprocate, said plungers carrying female die members 33 and 34 respectively which are inserted into and retracted from can bodies by the plungers. There is a male die generally entitled 36 (see Fig. 7) for each pocket 26 of the beader, which male dies are mounted for pivotal movement toward the female dies to co-act therewith for beading can bodies, and be moved away therefrom to allow removal of beaded can bodies, and depositing of unbeaded can bodies in pockets 26.

More in detail, the apparatus of the present invention includes a beader frame comprising spaced side frame members 63 and 66 supported by a base 67 and supporting the flanger 15 at 68.

The transfer turret 20 is rotatably mounted in frame members 65 and 66 on a shaft 69 which is provided with a sprocket 29 to enable the driving of the transfer turret 20 in timed relation to flanger turret 16 and beader turret 25.

The beader turret 25 includes framework sections 81 and 82 mounted on and keyed by keys 79 to a beader-turret drive shaft 83. There is a central section 84 for the turret 25 which is secured to the sections 81 and 82, as clearly shown in Fig. 5 by bolts 87. The pockets 26 on the turret 25 are provided by guide plates 88 and 89 secured to sections 81 and 82 respectively and suitably scalloped at their edges to provide the pockets 26.

The shaft 83 is supported at its ends by insert castings 91 having bearings 92 for the shaft and receivable through openings 94 in the frames 65 and 66. The sections 91 are secured to the frames 65 and 66 by annular rings 96 suitably bolted at 97 and 98 to the frames 65 and 66 and insert castings 91 respectively. There are thrust washers 100 disposed between the sections 81 and 82 and the insert castings 91.

The sections 81 and 82 are provided adjacent the peripheries thereof with a plurality of longitudinally disposed outwardly facing channels 101 to slidably receive sleeves 102, which in turn rotatably receive plungers 30 and 31 by means of bushings 104. Sleeves 102 are square in cross section and are retained in channels 101 by plates 103 (see Fig. 6). Sleeves 102 are provided with bosses 106 (see Fig. 5) which protrude therefrom and reciprocate within slots 107 provided in 81 and 82. Follower rollers 110 are rotatably mounted on studs 112 threaded within the bosses 106, said followers riding within the grooves

115 of cylindrical cams 116 which serves to reciprocate the plungers 30 and 31.

The outer ends of plungers 30 and 31 have spur gears 117 secured thereto, said spur gears being in driven engagement with ring gears 120 mounted on insert castings 91 as can best be seen from Fig. 5. Ring gears 120 are stationary and the plungers 30 and 31 are bodily rotated by being mounted on and supported by a beader turret 25 and axially rotated by engagement of the spur gears 117 with stationary ring gears 120.

The male dies 36 are mounted for three different movements, circular bodily movement resulting from being mounted on the beader turret 25, a pivotal or swinging bodily movement to and from an operative position, and an axial rotary movement for causing rotation and effecting beading of can bodies.

Male dies 36 are mounted for swinging movement about the axes of shafts 139 in a manner to be described, as best shown in Fig. 8, said shafts being received within bores 140 and bushed at 141 within the bores, said bores being provided in the sections 81 and 82 and being spaced alternately with respect to channels 101, as can best be appreciated from Fig. 6.

Each male die 36 includes a shaft 143 rotatably supported by bushings 146 in the outer end of an arm 144 keyed at 145 to the associated shaft 139, as shown in Fig. 8, said bushing being retained on each arm by a plate 147 and screws 147a. Each shaft 139 is adapted to be oscillated by a face cam 148 through an assembly comprising an arm 150 which is keyed at 151 to shaft 139 and retained on the shaft by a screw 150a. Each arm 150 is driven by a bell crank 152 rotatably mounted on a hub 158 on the arm and retained thereon by a screw 153 loosely received within the outer end of the bell crank, as shown in Fig. 8, and threadedly received by the outer end of arm 150. The outer end of each bell crank 152 has laterally disposed spaced ears 156, receiving a finger 157 on the outer end of each arm 150. Each of the ears 156 threadedly receives an adjusting bolt 159, having a lock nut 160 thereon for setting the adjustment, thereby permitting an initial adjustment of the parts when assembling the apparatus and permitting adjustment of the depth of the beads to be formed in a can body. Bell cranks 152 have follower rollers 154 rotatably secured thereto and riding within the groove of face cam 148 to thereby cause movement of male dies 36 to and from their operative positions. The face cam 148 is secured by bolts 165 to the righthand insert casting 91 as the parts are depicted in Fig. 8.

Means for axially rotating the male dies 36 are provided and each male die has associated therewith a rotary shaft 181 supported by bushings 182 in a bore 183 provided in the section 81, as clearly shown in Fig. 8. The righthand end of each shaft 181, as the parts are depicted in Fig. 8, has a spur-gear 184 thereon in mesh with a spur-gear 185 mounted on the lefthand end of shaft 143. Shafts 181 and 139 are co-axial, as clearly shown in Fig. 8, so that the axial drives to the male dies 36 do not interfere with the oscillating movement of the male dies caused by shafts 139.

Each rotary shaft 181 has a spur gear 188 fixed to the outer end thereof and in driven engagement with a ring gear 189, secured to the lefthand insert casting 91 by bolts 190 (see Fig. 8). Ring gear 189, being fixed to the insert casting 91 which is in turn fixed to frame 65, is stationary and since spur-gears 188 are bodily rotated because of being carried by the beader turret 25, a drive is established between the ring gear 189 and the spur-gears 188, so as to axially rotate the male dies 36.

The detail construction of a set of dies, which includes a pair of female die members and a male die, is clearly shown in Fig. 7 and there it can be seen that each female die member includes two sections, an inner main section 204 and a cap 205 which clamps the inner main section 204 against the associated sleeve 102, by

means of a cap screw 207. Each cap 205 has a beader groove 210 therein and there is a second beader groove 211 provided on an annular ring 214 which is retained in place of its main section 204 by spacers 215. There are suitable resilient rings 218 disposed on either side of each ring at 214 adapted to resiliently engage a can body. Each main section 204 of each female die member has a flange 217 to accommodate the flanged portion C on each can body A.

Each male die 36 includes its shaft 143 and two die members 221 and 222 mounted on shaft 143. Each die member has two flanged portions 223, each provided with a bead 226 for co-acting with grooves 210 and 211 on the female die members for providing beads D in cans A. The channels formed by flanges 223 and an outer flange 229 on each section receive resilient rings 230 which co-act with resilient rings 218 to grip and hold the wall of a can body between the male and female dies to prevent slipping thereof. The resilient rings 230 on male die 36, and 218 on the female dies 33 and 34 are obviously compressed when in engagement with the wall of a can body, as clearly shown in Fig. 7, to enable them to effect a gripping of a can body.

The flanger 15 is adapted to be driven by a suitable source of power not shown and the driving shaft 83 of beader 25 is adapted to be driven by a chain and sprocket mechanism of the flanger through a sprocket 241, which is fixed to the lefthand end of the driving shaft 83, as clearly shown in Fig. 5. The driving shaft 69 for the transfer turret 20 is driven by means of a sprocket 242, fixed to sprocket 241, through a chain 243, an idler sprocket 244, and by means of reversing gears 245 and 246, the latter being fixed to the outer end of shaft 69. Gear 245 and idler sprocket 244 are fixedly mounted on a rotary idler shaft 248 mounted in a base 249 provided on frame 65. The above described drive provides for a synchronous driving relationship between the transfer turret 20, the flanger turret 16 and beader turret 25, so that the pockets 21 of the transfer turret 20 successively register first with the pockets 17 of flanger turret 16 and then with the pockets 26 of the beader turret 25.

It is desirable in some cases to merely flange the can bodies without beading thereof. For this purpose, an ejector 261 (see Fig. 1) is pivotally mounted at 262 so as to be swingable from the full line position, as the parts are depicted in Fig. 1, to the dot-dash line position. Suitable means not shown are provided for latching the ejector 261 in either of its positions. In the full line position as shown in Fig. 1, the can bodies A are allowed to be picked up by the transfer turret 20 and transferred to the beader turret 25. However, when the ejector 261 is moved to the dot-dash position, the cans are ejected through a chute 264 and may be collected by any suitable means at the end of the chute.

In prior beadings, it has been necessary to pre-bump the cans so that there was no skip at the seam of the can. This pre-bumping operation consisted merely of bumping the cans at the seams thereof dent the cans at the seams to enable the beader to effectively provide a bead in the can without skipping the seams. In the present invention, the expensive operation of pre-bumping the cans is unnecessary for two main reasons: first, because the cans are beaded in a two-step operation, and, secondly, because the male and female dies are both positively driven, therefore eliminating slipping between the can body and the dies. The provision of the resilient rings 230 and 211 on the male and female dies respectively assist in preventing slipping between the can body and the dies.

The operation of the flanger and beader is as follows: With reference to Fig. 6, it can be seen that the groove of the face cam 148 for oscillating the male dies 36 has an inwardmost portion 291, an intermediate portion 292 and an outermost portion 293, considered in a radial direction, said portions corresponding respectively to the

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inoperative, first operative, and the second operative positions of the male dies 36.

In Fig. 6, the transfer point is appropriately marked and it can be seen that the clockwise male die, considered from the transfer point, has its associated cam roller in the inner portion 291 of the groove for face cam 148 and therefore the male die is clearly in inoperative position. The male die, immediately counterclockwise of the transfer point in Fig. 6, has its cam roller just about to enter the intermediate portion 292 of the groove of face cam 148.

A can body is transferred from the transfer turret 20 at the transfer point and cylindrical cam 115 has the channel thereof so arranged that just after a can body is deposited within a pocket on the beader turret 25, the plungers 30 and 31 and their female die members 33 and 34 are moved inwardly so that the female die members enter the opposite ends of the can and therefore retain the can in position to be operated on. The arrangement is such that the plungers will remain in the can body until the can body has been moved around to the bottom of the figure, as the parts are depicted in Fig. 6, and released during the arc labeled "plungers release can."

Soon after the plungers have entered the can body, the follower rollers 154 on the bell cranks 152 enter the intermediate section 292 of the cam groove of face cam 148 and the male dies 36 at this point are moved inwardly toward the can bodies to an intermediate position and put a set of shallow beads around the can body A and then, as the parts are shown in Fig. 6, the follower rollers 154 enter the outermost portion 293 of the cam groove and cause the male dies associated therewith to move inwardly still further to provide the full bead on the can. After the full bead has been provided, the follower rollers 154 then enter the innermost section 291 of the cam groove of cam 148 and therefore positively move the male dies back to inoperative position, to allow for the release of the can bodies. As clearly shown in Fig. 7, the female die members 33 and 34 are somewhat smaller than the interior diameter of the can bodies, to allow the female die members to be withdrawn from the can bodies after the beads D have been provided therein.

The can bodies are discharged after being beaded through an outlet chute 321, there being a suitable ejector finger 322 on the chute to positively eject any cans that do not of their own accord and under the influence of gravity drop into the outlet chute 321. There is a suitable guide 324 extending from the lower mouth of the discharge chute 321 to support the cans as they are released and until they reach the inlet of the inlet chute 321.

By the present invention a combined flanger and beader has been provided which is supported on a single base, thereby saving floor space and expensive runway work. The can bodies, in their travel through both the beader and the flanger, remain in the same traverse plane, eliminating moving of the cans from a beading position to a working position, and back to a discharge position and eliminating all the means for transporting and gaging the cans longitudinally. By providing a female die in two parts, the amount of travel of the female die has been cut in half as compared to prior devices wherein the female die is a single member, therefore enabling speeding up of the beading operation by taking less time to insert and retract the female die members from within the can bodies. The close support for the female die members obtainable by providing a female die in two parts results in eliminating bending of the plungers carrying the die members, which disadvantage has been encountered in prior machines. By the provision of a positive drive for both male and female dies and the two-step beading operation, the expensive pre-bumping of the side seams of can bodies has been eliminated

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and can bodies can be received directly from the flanger. By the provision of the ejector 261 between the flanger turret 16 and transfer turret 20, an optional operation of the machine is allowed, since only certain types of cans, usually large cans, are beaded.

Having thus described my invention, what I claim and desired to secure by Letters Patent is:

1. A device of the class described comprising a turret having a plurality of pockets to receive can bodies, means for rotating the turret, means for feeding can bodies in successive fashion to the turret, a pair of opposed plungers for each pocket, movable in unison with the turret and carrying female beading die members on the adjacent ends thereof, means reciprocating the plungers to cause insertion of the female die members into the opposite ends of the can bodies and retraction therefrom, a male beading die for each pair of plungers movable in unison with the turret and adapted to engage the exterior of a can body to co-act with the female die members within the body to bead the can body, a three-step cam means for shifting each male die to an inoperative position to allow a can body to be deposited in the associated pocket and then shifting each male die to a first operative position to effect a preliminary beading of the can bodies and then to a second operative position to effect a full beading of the can body and means for axially rotating the dies.

2. A device of the class described comprising a turret having a plurality of pockets to receive can bodies, means for rotating the turret, means for feeding can bodies in successive fashion to the turret, a pair of opposed plungers for each pocket, movable in unison with the turret and carrying female beading die members on the adjacent ends thereof, means reciprocating the plungers to cause insertion of the female die members into the opposite ends of the can bodies and retraction therefrom, a male beading die for each pair of plungers movable in unison with the turret and adapted to engage the exterior of a can body to co-act with the female die members within the body to bead the can body, means swingably mounting the male dies for movement toward and away from their associated pockets, means for swinging each male die to an inoperative position to allow a can body to be deposited in the associated pocket and then to an operative position to enable beading of the can body, and gear means for axially rotating each of the dies.

3. A device of the class described comprising a turret having a plurality of pockets to receive can bodies, means for rotating the turret, means for feeding can bodies in successive fashion to the turret, a pair of opposed plungers for each pocket, movable in unison with the turret and carrying female beading die members on the adjacent ends thereof, means reciprocating the plungers to cause insertion of the female die members into the opposite ends of the can bodies and retraction therefrom, a male beading die for each pair of plungers movable in unison with the turret and adapted to engage the exterior of a can body to co-act with the female die members within the body to bead the can body, means swingably mounting the male dies for movement toward and away from their associated pockets, means for swinging each male die to an inoperative position to allow a can body to be deposited in the associated pocket and then to a first operative position to effect a preliminary beading of the can body and then to a second operative position to effect a full beading of the can body.

4. A device of the class described comprising a turret having a plurality of pockets to receive can bodies, means for rotating the turret, means for supplying can bodies to the turret, a pair of opposed plungers for each pocket, movable in unison with the turret and carrying female beading die members on the adjacent ends thereof, means for reciprocating the plungers to cause insertion of the female die members into the opposite ends of the can bodies and retraction therefrom, a male beading die for

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each pair of plungers, movable in unison with the turret and adapted to engage the exterior of a can body to co-act with the female die members within the body to bead the can body, a three-step cam means for shifting each male die to an inoperative position to allow a can body to be deposited in the associated pocket and then to a first operative position to effect a preliminary beading of the can body and to a second operative position to effect a full beading of the can body, and gear means for axially rotating each of the dies.

5. A device of the class described comprising a turret having a plurality of pockets to receive can bodies, means for rotating the turret, means for feeding can bodies in successive fashion to the turret, a pair of opposed plungers for each pocket, movable in unison with the turret and carrying female beading die members on the adjacent ends thereof, means reciprocating the plungers to cause insertion of the female die members into the opposite ends of the can bodies and retraction therefrom, a male beading die for each pair of plungers movable in unison with the turret and adapted to engage the exterior of a can

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body to co-act with the female die members within the body to bead the can body, means swingably mounting the male dies for movement toward and away from their associated pockets, a three-step cam means for swinging each male die to an inoperative position to allow a can body to be deposited in the associated pocket and then to a first operative position to effect a preliminary beading of the can body and then to a second operative position to effect a full beading of the can body, and gear means for axially rotating each of the dies.

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