Feb. 23, 1943. F. KRUEGER 2,312,102

SEAMING MECHANISM

Filed March 5, 1940 4 Sheets-Sheet 1

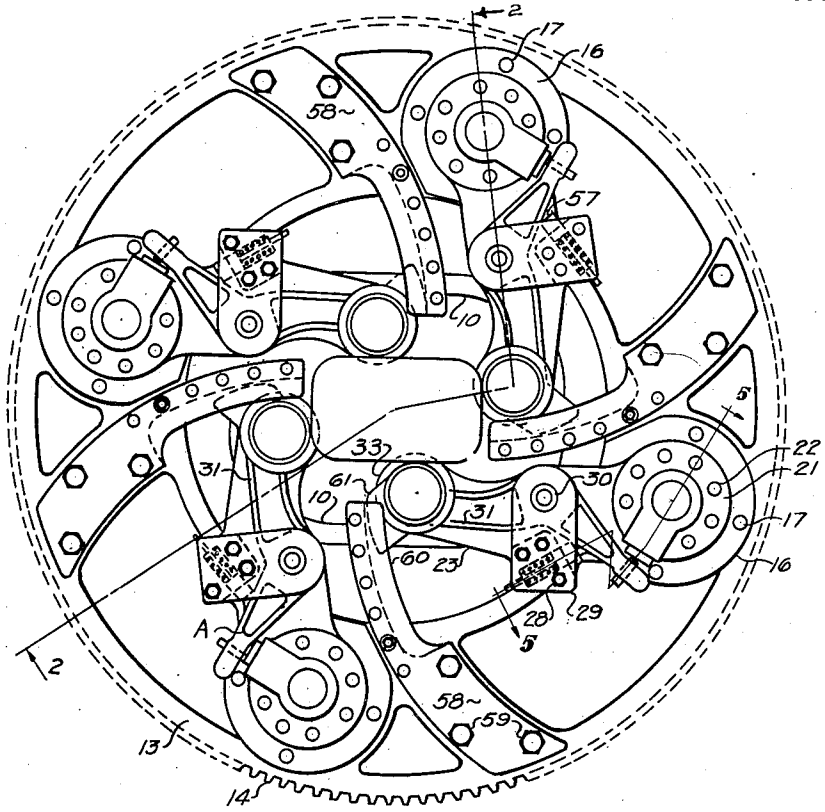


Fig. 1

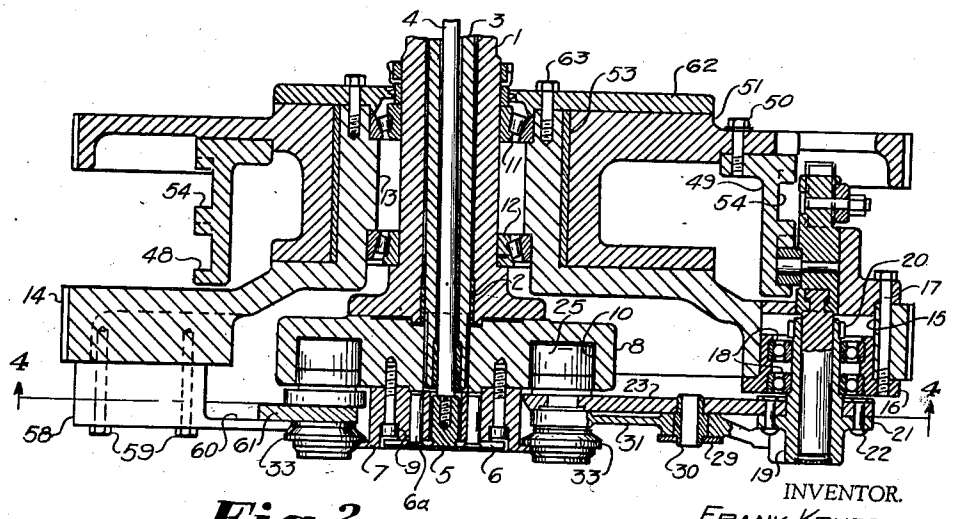


Fig. 2

INVENTOR.
FRANK KRUEGER

BY

Fay, Golrick, Williams & Fay
ATTORNEY

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SEAMING MECHANISM

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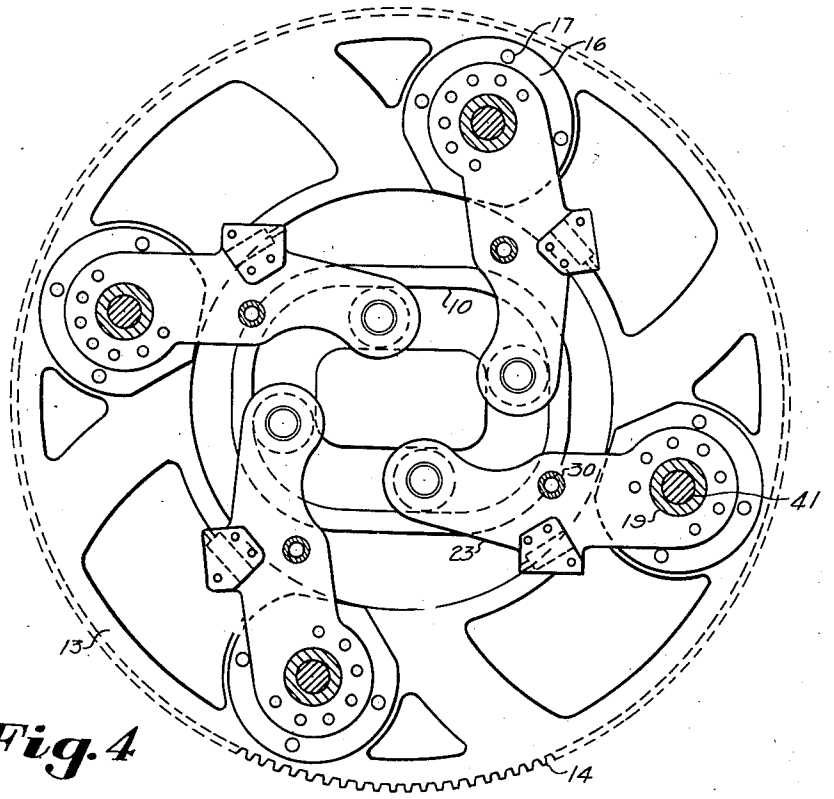


Fig. 4

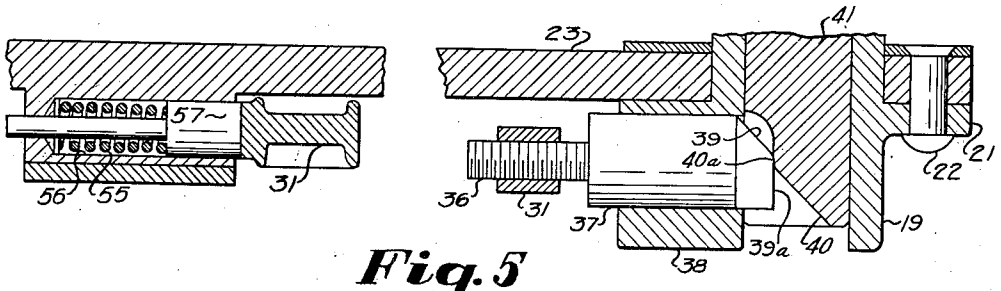


Fig. 5

INVENTOR.
FRANK KRUEGER

BY

Fay, Golrick, Williams & Fay
ATTORNEY.

Feb. 23, 1943. F. KRUEGER 2,312,102

SEAMING MECHANISM

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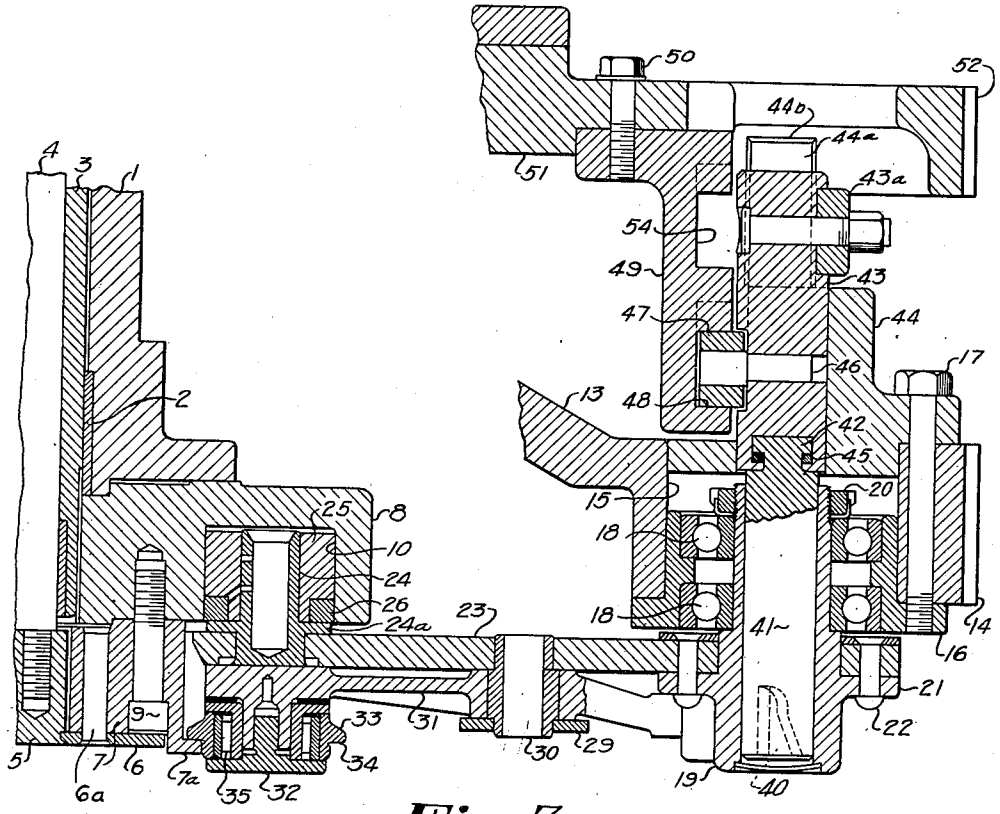


Fig. 3

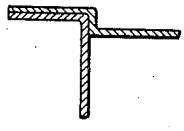


Fig. 6

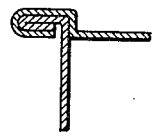


Fig. 7

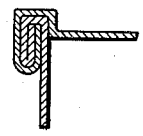


Fig. 8

INVENTOR.
FRANK KRUEGER

BY
Fay, Golwick, Williams & Fay
ATTORNEY

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SEAMING MECHANISM

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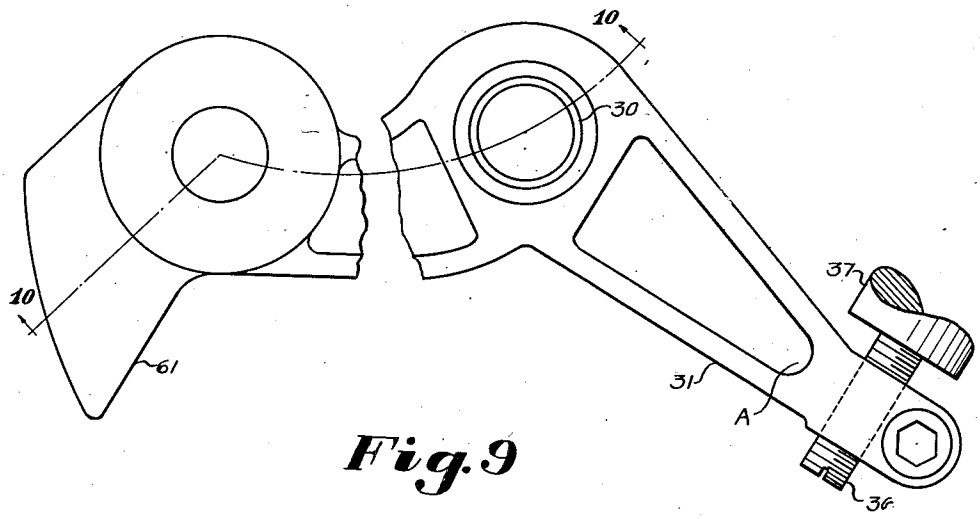


Fig. 9

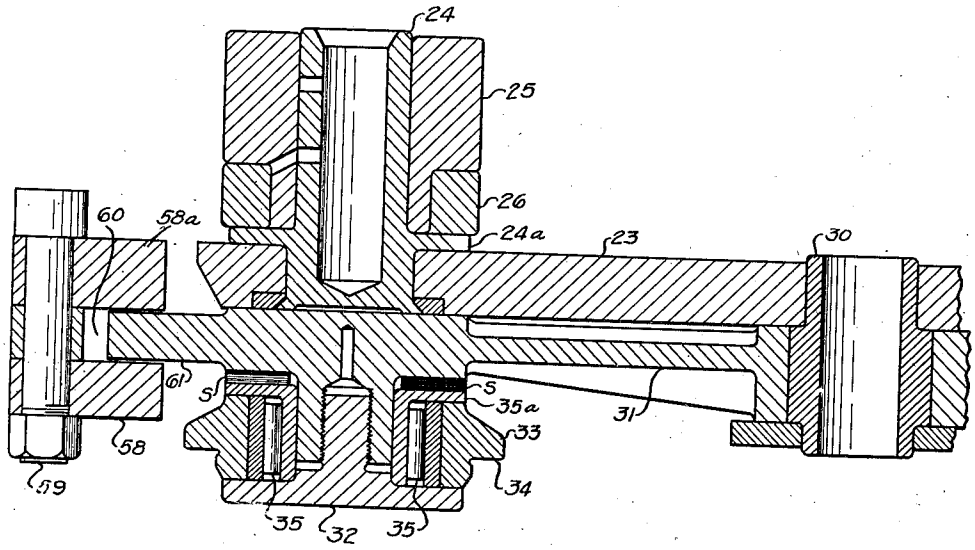


Fig. 10

INVENTOR.
FRANK KRUEGER

BY

Fay, Gobrick, Williams & Fay
ATTORNEY.

Patented Feb. 23, 1943 2,312,102

UNITED STATES PATENT OFFICE

2,312,102

SEAMING MECHANISM

Frank Krueger, Milbrae, Calif., assignor to E. W. Bliss Company, Brooklyn, N. Y., a corporation of Delaware

Application March 5, 1940, Serial No. 322,326

6 Claims. (Cl. 113—24)

This invention relates, as indicated, to seaming mechanism, but has reference more particularly to mechanism of this character which is especially for securing ends on irregularly shaped can bodies.

The invention has as its primary object improvements in the seaming mechanism described in my copending patent application Serial No. 129,262, filed March 5, 1937, which are designed to eliminate wear at critical points, render the mechanism more compact and efficient in operation by elimination of unnecessary parts, and avoid breakage or damage to parts by suitable control over the movement or deflection thereof.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawings, forming part of this specification, and in which like numerals are employed to designate like parts throughout the same,

Fig. 1 is a bottom plan view looking upwardly toward the seaming head, chuck and seaming rolls of a mechanism embodying this invention;

Fig. 2 is a section taken on the line 2—2 of Fig. 1;

Fig. 3 is a fragmentary cross-sectional view on an enlarged scale, of a portion of Fig. 2, showing the seaming roll in section;

Fig. 4 is a cross-sectional view taken on the line 4—4 of Fig. 2;

Fig. 5 is a fragmentary cross-sectional view, on an enlarged scale, taken on the line 5—5 of Fig. 1;

Figs. 6, 7 and 8 are views showing respectively a can head on a body before flanging, after the first flanging operation and at the completion of the seaming operation.

Fig. 9 is a fragmentary enlarged plan view of one of the seaming-roll arms, and

Fig. 10 is a fragmentary cross-sectional view, taken on the line 10—10 of Fig. 9.

The present seaming head is shown as adapted for the mounting of heads on flat-sided or square cans, but it will be understood that it may be employed for cans of other shapes.

Referring more particularly to the drawings, 1 designates a stationary spindle, which is supported by a bracket arm (not shown), as in my aforesaid application, and which depends below the bracket arm to aid in supporting the seaming tools.

At its lower end, the spindle 1 carries a bushing 2, by means of which a hollow sleeve 3 is secured in spaced relation to the inner wall of the spindle. Extending through the sleeve 3 is a knock-down rod 4, carrying at its lower end a head 5 to which a plate 6 is riveted at its center; guide pins 7a are riveted to plate 6 which pins are slidable in the chuck 7 to guide the plate in its vertical movements. Plate 6 is seamed can from the chuck 7 to which it is otherwise inclined to cling. The knock-out is operated by mechanism which is described in my aforesaid application.

The chuck 7 is secured to a seaming can 8 as by means of sunken-head cap screws 9, the cam 8 being non-rotatable relatively to the spindle 1, and being retained in the position shown in Fig. 2 by other parts of the mechanism which will presently be described. The cam 8 has a cam groove 10 therein adjacent the periphery thereof which conforms in contour to the shape of the can end for which the machine is to be used, which in this case, is rectangular.

Supported for rotation about the spindle 1 as by means of vertically spaced tapered roller bearings 11 and 12 is a circular head 13 provided at its outer periphery with gear teeth 14 whereby the head may be driven. The head has four circumferentially and equally spaced openings 15 therein into which flanged collars 16 extend, the collars being secured to the head by means of bolts 17. Mounted within these collars are roller bearings 18 in which are journalled sleeves 19 which are supported by nuts 20 which bear on the upper bearings 18. Each of the sleeves 19 is provided with a flange 21 intermediate its ends which is secured as by rivets 22 to the outer end of an arm 23, the inner end of which has riveted thereto a hollow stud 24 on which is mounted a cam roller 25 which is adapted to ride in the cam groove 10. A second roller 26, which is preferably made of a wear-resistant material, is carried by the roller 25, being interposed between the radially outward portion of the latter and a flange 24a of the stud 24, the roller 26 also engaging the walls of the cam groove 10. By thus using two rollers which are rotatable, independently of each other, the roller 26 is free to turn in the event the roller 25 binds. Moreover, the roller 26 takes up wear which would otherwise occur in the cam roller and cam groove as a result of the seaming operation. By making the arm 23 of aluminum or other light metal, and the stud 24 hollow and of steel, lightness is secured, without sacrifice of strength.

Secured to the arm 23, as by means of cap screws 28, is a plate 29, which supports a hollow pivot pin 30 on which a seaming-roll arm 31 is

pivoted. The inner end of the arm 31 has secured thereto, as by means of a retainer member 32, a seaming roll 33, the seaming line of which is indicated at 34. A roller bearing 35 is interposed between the roll and the arm. The outer end of the arm 31 has threadedly mounted therein a screw 36, one end of which bears against a plunger 37 slidably mounted in a boss-like extension 38 of the sleeve 19. The plunger 37 has a tapered end 39, which is adapted to bear against the inclined surface 40 of a rod 41 which is mounted for vertical reciprocal movement in the sleeve 19.

The rod 41 has an upper end portion 42 of T-shaped cross-section which is connected to a roller-carrying member 43 which is vertically reciprocable in a guide block 44, secured to the head 13 as by the bolts 17. A washer 45 of a compressible material is inserted between the horizontal element of the portion 42 of the rod 41, and the member 43, and permits a slight amount of relative axial as well as universal movement between the rod and roller-carrying member. To prevent rotation of roller-carrying member 43 along its longitudinal axis, an arm 43*a* is secured thereto and engages a flat surface 44*a* of an upward projection 44*b* of the guide block 44.

The member 43 has projecting therefrom a stub shaft 46 upon which is revolubly mounted a cam roller 47 which is adapted to traverse a cam groove 48 in a cam ring 49. The cam ring 49 is secured, as by bolts 50 to a ring gear 51 which is concentric with the head 13 and is provided at its periphery with gear teeth 52. A bushing 53 is interposed between the head 13 and the gear 51 to facilitate rotation of these parts relatively to each other.

Since there are two pairs of seaming rolls provided in this seaming mechanism, one pair for performing the first, and the other for the second seaming operation, there are two pairs of cam rollers for actuating the two pairs of seaming rolls. The members 43, which have just been described in connection with Fig. 2, therefore alternate with others, also provided with stub shafts similar to the shafts 46, on which are mounted cam rollers similar to the rollers 47, which are adapted to traverse a cam groove 54 in the cam ring 49.

For the purpose of normally biasing the seaming rolls out of operative position, expansion springs 55 are disposed in recesses 56 in the arms 23 and bear against pistons 57 which are slidably mounted in said recesses, forcing such pistons against the seaming-roll arms 31 and causing these arms to rotate counter-clockwise about the pins 30, as viewed in Fig. 1. This occurs only when the rods 41 have been elevated, as will be presently described.

For the purpose of avoiding deflection of the seaming roll arms 31 from their normal horizontal position as shown in Figs. 2 and 10, arcuate vertically spaced guides 58 and 58*a* are secured to the head 13, as by means of bolts 59 and are formed to provide a groove 60 therebetween in which stop elements 61 on the seaming roll arms 31 ride, the elements 61 bearing against the guides, which thus prevent said deflection.

For the purpose of maintaining the head 13 and ring gear 51 against relative axial movement, a cover plate 62 is provided which abuts the upper ends of these parts and is secured to the head 13 as by means of cap screws 63. The plate 62 also serves to retain the outer race of the bearing 11 in position and functions also as a seal for preventing entrance of dirt into the bearings 11 and 12.

Operation

The operation may now be briefly described as follows:

As already mentioned four seaming rolls are provided, one pair of diametrically opposed rolls performing the first seaming operation, and the other pair the second seaming operation.

The seaming head is brought into operation after an end has been placed on the can body and the latter moved against the chuck 7. The seaming rolls, by reason of the drive of the head 13 and the ring gear 51 rotate continuously about the spindle 1.

After the can body and the top which is loosely mounted thereon are moved against the chuck 7, the first operation seaming rolls are moved inwardly to perform the first seaming operation, changing the appearance of the can body and top from that of Fig. 6 to that of Fig. 7, due to the coaction of the rolls 33 with the flange 7*a* of the chuck 7. Each of the seaming rolls 33 is moved inwardly as follows: The cam groove 48 has a portion which at a predetermined time forces the cam roller 47 downwardly, causing the member 43 and the rod 41 to move downwardly. This, in turn, causes the arm 31 to rock in a clockwise direction about the pivot pin 30, as viewed in Fig. 1, bringing the seaming roll into operative position. After completion of the first seaming operation, the rod 41 is moved upwardly, permitting the spring 55 to move the arm 31 in a counter-clockwise direction, thereby moving the seaming roll out of operative position.

It will be noted that when the rod 41 is moved downwardly, the surface 40 thereof forces the plunger 37 to the left, as viewed in Fig. 5, this movement continuing until the vertical surface 40*a* of the rod engages the vertical surface 39*a* of the plunger 37, thereby locking the plunger, and, as a result, the seaming roll, in operative position.

The second operation seaming rolls are then brought into operation in a manner similar to that in which the first operation seaming rolls were brought into operation, that is to say, the cam groove 54 is so formed as to coact with cam rollers on the members 43 which actuate the second-operation seaming rolls. In the second operation, the appearance of the can body and top is changed from that shown in Fig. 7 to that shown in Fig. 8.

After the second operation has been completed and the seaming rolls withdrawn from engagement with the can, the knock-out rod 4 is actuated to force the plate 6 downwardly against the can top to strip the can from the chuck 7, and permitting other apparatus, not shown, to discharge the finished can from the seaming head.

The present seaming mechanism is more compact and efficient in operation than that described in my aforesaid application, since a large number of elements have been omitted.

Moreover, the life of the mechanism is increased by reducing wear at critical points and by preventing uncontrolled movement and deflection of the seaming arms and associated elements.

It will be noted (Figs. 3 and 10) that the inner races of the bearings 35 are provided at their upper ends with outwardly extending flanges 35*a*

and that a number of shims S are interposed between such flanges and the adjacent faces of the seaming-roll arms 31. By removing or adding shims, the seaming rolls may be adjusted vertically in order to properly align such rolls with the chuck 7.

Another feature which may be noted is the fact that the arms 31 are made of spring steel and are hollowed or thinned at the points A (Fig. 1). This permits a slight flexing of these arms in a horizontal plane at these points, thereby preventing breakage of the arms when the seaming rollers pass over the can body seam, and also to provide against breakage of the arms when used in forming seams with different thicknesses of tin plate.

It is to be understood that the form of my invention, herewith shown and described, is to be taken as a preferred example of the same, and that various changes in the shape, size and arrangement of parts may be resorted to, without departing from the spirit of my invention, or the scope of the subjoined claims.

Having thus described my invention, I claim:

1. In a seaming mechanism of the character described, a head, seaming-roll carrying arms carried by said head and movable to operative and inoperative positions, and means for moving said arms to operative positions, said means comprising a rotatable cam and elements actuated by said cam, said elements comprising members in axial alignment with each other and connected to each other in such a manner as to permit both axial and universal movement of one member relatively to the other.

2. In a seaming mechanism of the character described, a head, arms carried by said head and movable to operative and inoperative positions, and means for moving said arms to operative position, said means comprising cam-roller carrying members and rods connected to said members and movable axially as well as universally relatively to the latter, and spring means for returning said arms to inoperative position.

3. In a seaming mechanism, the combination of a stationary cam having a cam groove therein, a head, arms carried by said head and means carried by said arms adapted to traverse said groove, said means comprising a hollow stud, a cam roller mounted on said stud and rotatable with respect to the latter, and a cam roller ring of a material more wear-resistant than said roller, said ring being mounted on said roller and being rotatable independently of the latter, whereby said ring is free to turn in the event that the roller binds in said cam groove.

4. In a mechanism of the character described, the combination of a rotatable head, seaming-roll carrying arms carried by said head and movable in a plane normal to the axis of rotation of said head and about axes parallel to but spaced from said axis of rotation, and guide means secured to said head for preventing deflection of said arms from said plane.

5. In mechanism of the character described, the combination of a rotatable head, seaming-roll carrying arms carried by said head and movable in a plane normal to the axis of rotation of said head and about axes parallel to but spaced from said axis of rotation, and means for preventing deflection of said arms from said plane, said means comprising spaced arcuate guides secured to said head and providing a groove therebetween, and means on said arms adapted to move in said groove and engage said guides.

6. In a seaming mechanism of the character described, a head, seaming-roll carrying arms carried by said head and movable to operative and inoperative positions, means for moving said arms to operative position, said means comprising plungers each having an inclined surface and rods each having a tapered surface adapted to engage the inclined surface of the plunger, and means for locking said arms in operative position, said last-named means comprising cooperating vertical surfaces on the plungers and rods respectively.

FRANK KRUEGER.