March 29, 1927. 1,622,558

R. O. WILSON ET AL

MEANS FOR FORMING FLANGES ON CAN BODIES

Filed May 12, 1925 3 Sheets-Sheet 1

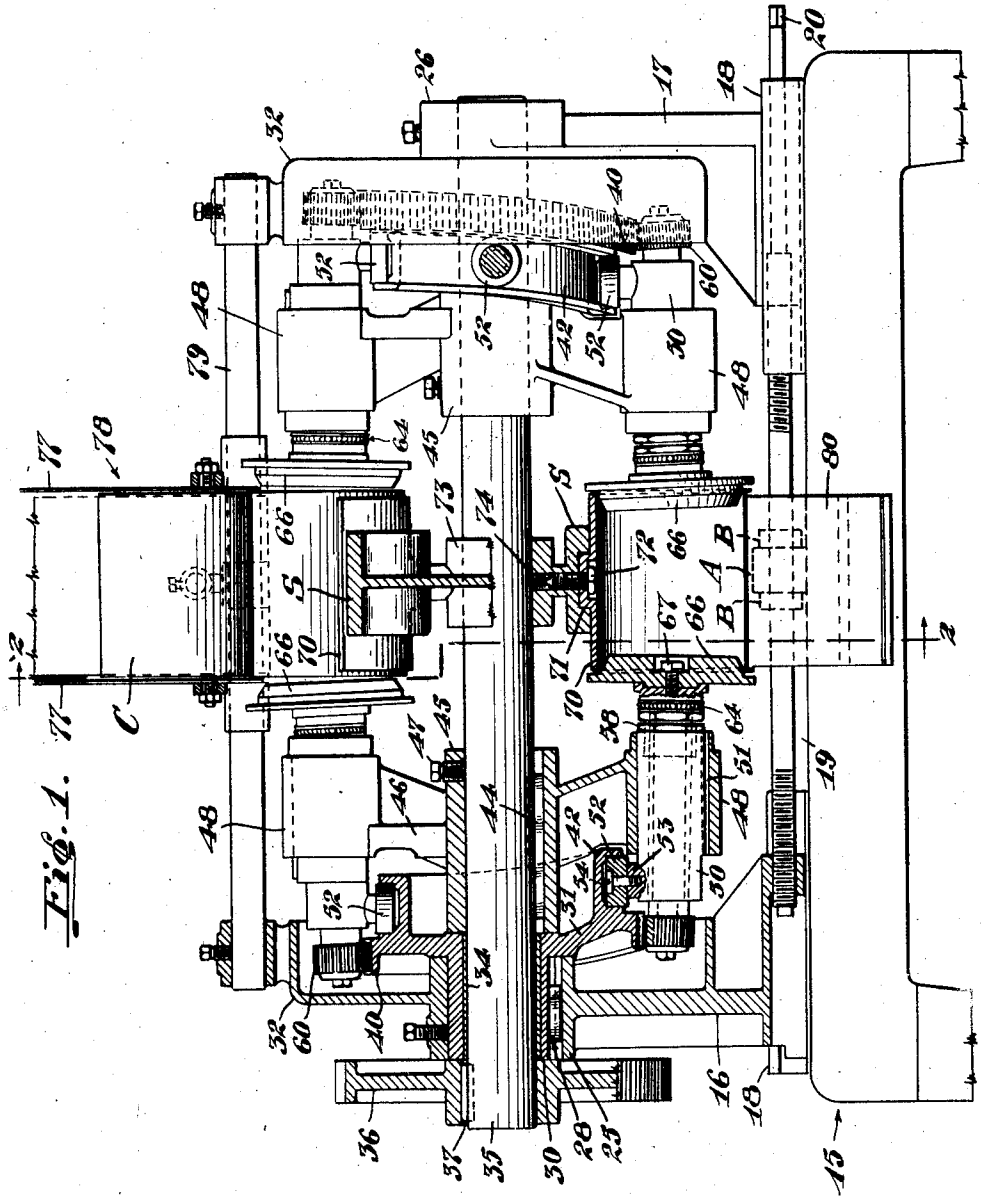


Fig. 1.

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Filed May 12, 1925 3 Sheets-Sheet 2

Fig. 2.

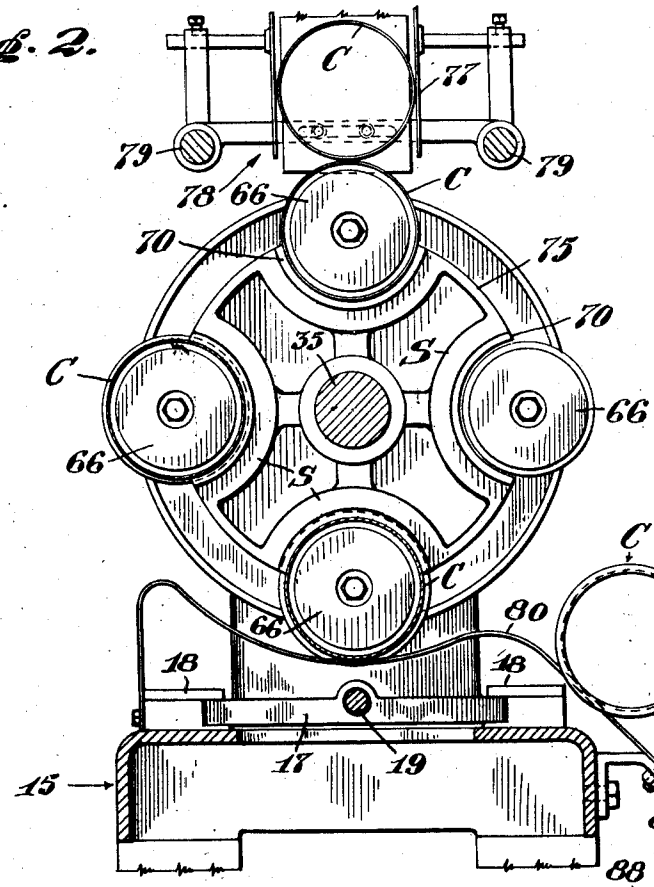
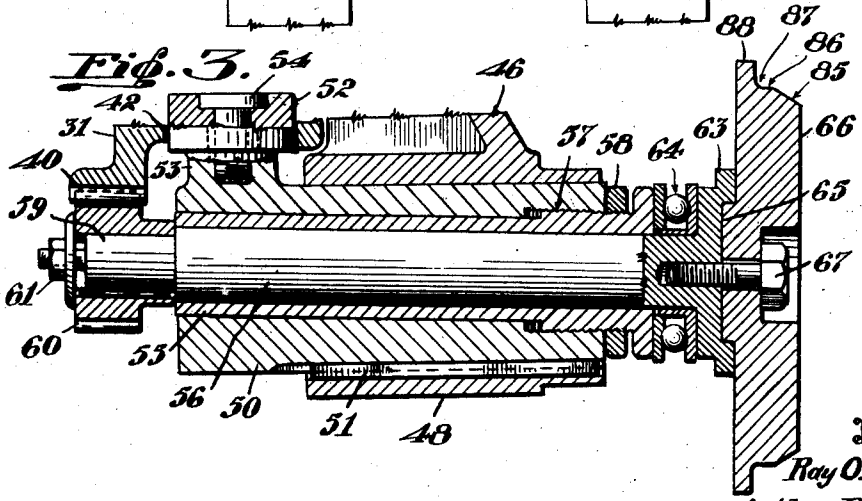


Fig. 3.



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Filed May 12, 1925 3 Sheets-Sheet 3

Fig. 4.

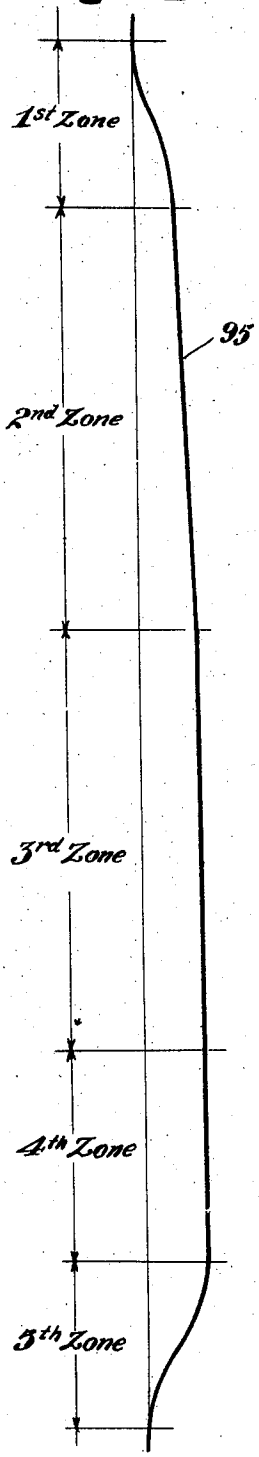


Fig. 5.

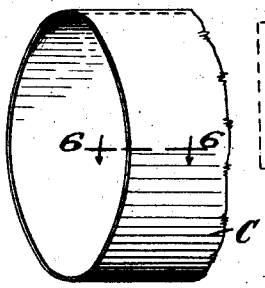


Fig. 6.

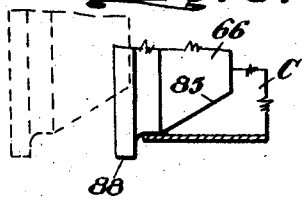


Fig. 7.

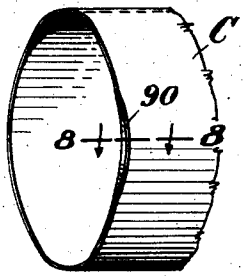


Fig. 8.

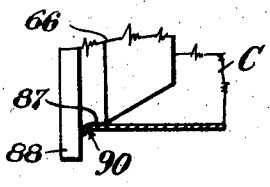


Fig. 9.

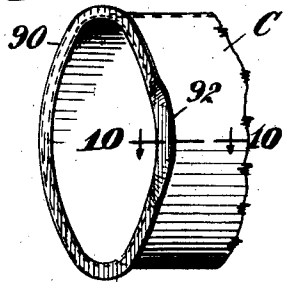


Fig. 10.

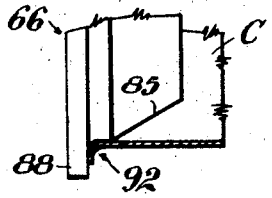


Fig. 11.

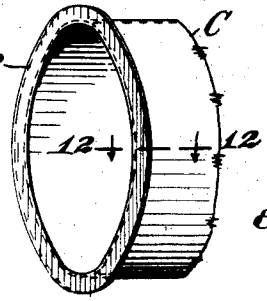
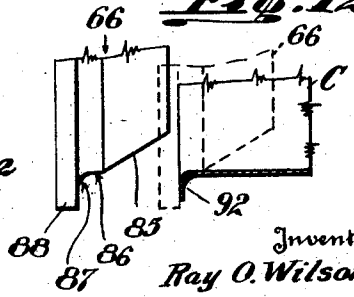


Fig. 12.



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UNITED STATES PATENT OFFICE.

RAY O. WILSON AND ARTHUR D. SUMNER, OF LOS ANGELES, CALIFORNIA.

MEANS FOR FORMING FLANGES ON CAN BODIES.

Application filed May 12, 1925. Serial No. 29,701.

This invention relates to the manufacture of sheet metal cans and especially pertains to the formation of the end flanges on can bodies, which flanges are employed in forming a double seam connection between the can body and can ends or caps, and while it is adapted to the handling of the smaller sizes of can bodies it has been designed more particularly for operation upon can bodies of larger diameters, such as are used in the manufacture of gallon cans.

Means heretofore employed in can body flanging operations have resulted in the splitting of a large percentage of flanges during formation and in buckling of the sides of the can bodies to the forcible engagement of the flange-forming means with the entire rim of the can body in effecting simultaneous formation of the entire flange or because of too abrupt bending of the metal where the flange is formed by a rolling action.

The chief object of the present invention is to overcome these difficulties and to insure the formation or perfect flanges and without subjecting the can bodies to undue strains and too sudden turning of the metal.

Another object is to so form flanges that there will be no splitting thereof during the subsequent crimping or double seaming operation employed in attaching can tops to the can bodies.

A further object, which is attained as a natural result, is to reduce the cost of production.

Briefly, the operation consists in formation of the flanges by a progressive, rolling operation whereby flange formation proceeds steadily and gradually from stage to stage. In the apparatus rotary flanging die is employed the axis of which is disposed at a slight angle to the axis of the can body being worked so as to operate upon a short section only of the can body rim at any instant, and means are provided for rotating the flanging die to form the flange progressively and for advancing the flanging die to enlarge the flange progressively in a gradual manner.

The invention resides in the new and useful combination and arrangement of parts and features of construction and in the features and methods of operation indicated in the drawings, described generally hereinafter and pointed out in the claims, it being understood that the invention is limited only as defined by the claims.

In the accompanying drawings, wherein certain embodiments are disclosed by way of illustration;

Figure 1 is a view partially in elevation and partially in vertical section showing a flange forming machine embodying the invention;

Figure 2 is a cross section taken approximately on the line 2—2 of Figure 1 as seen in the direction indicated by the arrows;

Figure 3 is a longitudinal sectional detail through the flanging die and the mounting thereof;

Figure 4 is a profile of the advancing and retracting portions of a cam which actuates the flanging dies and illustrating diagrammatically the progress of the can body relatively thereto;

Figure 5 represents a can body in original form;

Figure 6 indicates the initial application of a flanging die to the can body by the first zone portion of the cam of Figure 4;

Figure 7 indicates on an exaggerated scale the commencement of the first operation in the formation of the flange under influence of the second zone of the cam;

Figure 8 indicates the position of the flanging die in the can for performing the initial flange forming operation indicated in Figure 7;

Figure 9 shows on an exaggerated scale the can body having a flange as partly formed entirely therearound in the first operation by the second zone of the cam and also showing a portion of the completed flange as formed by the second operation in the formation of the flanges as occurs in the third zone of the cam;

Figure 10 indicates the position of the flanging die in operation upon the can under influence of the third zone of the cam;

Figure 11 shows a can body with the completed flange on an exaggerated scale after the second operation thereon by the flanging die under influence of the third zone and of the fourth zone of the cam, which last mentioned zone is employed for insuring completion of the flange; and

Figure 12 indicates the removal of the flanging die from the can under influence of the fifth zone of the cam.

In the drawings the apparatus is shown as supported upon a base 15 and as including a pair of horizontally slidable standards 16 and 17 working in guides 18 and movable toward and away from each other by means of a right and left screw 19 which is turnably supported in a bearing b and held against longitudinal movement by collars C; the screw being manually rotated to effect shifting of the standards as by means of a crank adapted to be placed upon a squared end 20 of said screw. The standards provided with hubs 25 and 26, and within each of the hubs 25 and 26 there is keyed at 28 a journal 30 of a cam and gear carrier 31, each carrier being positioned within a protecting housing 32 carried by the respective standard 16 or 17. Within each journal 30 a bushing 34 is provided in which there is journalled the main drive shaft 35 which is adapted to be driven by gear 36 keyed at 37 on the outer end thereof.

Each carrier 31 is provided with an annular gear rack 40 and with an offset annular cam 42, these parts being held against rotation by the key 28. Adjacent each carrier 31, the shaft 35 has splined thereon at 44 the hub 45 of a carrier 46 for the flanging dies, said hub being secured in position on the shaft 35 by means of a set screw 47 or the like. The carrier 46 is in the form of a plurality of arms each of which is provided at its outer end with a sleeve 48 which receives a journal 50 splined at 51 and extending at one end beyond the sleeve 48 and carrying at one side a roller 52 mounted on an offset 53 to which it is secured by a screw 54, said roller 52 being positioned to travel in the cam 42 of the carrier 31. The journal 50 contains an adjustable bushing 55 whose axis is canted or disposed at a slight angle with relation to the axis of rotation of the main shaft 35, said bushing 55 receiving a flanging die driving shaft 56. The bushing 55 is threaded into the journal 50, as indicated at 57 and is retained in said position by means of a lock nut 58. By this means fine adjustment of the flanging dies may be had. The end of shaft 56 project beyond the journal 50 in the form of a reduced end 59 upon which there is keyed a pinion 60 which engages the gear rack 40 and is retained on said reduced end 59 by means of a nut 61. The opposite end of the flanging die shaft 56 is enlarged, as indicated at 63 and a thrust bearing 64 is placed between said enlargement and the enlarged end of the bushing 55. Said enlargement 63 of the shaft 56 is provided with a squared recess which receives the squared offset 65 of the flanging die 66 to insure driving of the die by rotation of the shaft 56, the flanging die being secured to the shaft 56 by means of headed screw 67.

Mounted upon the middle of the main drive shaft 35 between the two flanging die carriers 46 is a can body carrier embodying a plurality of can body receiving and positioning pockets 70, each of which is offset at 71 and is secured by means of a countersunk screw 72 to a saddle S carried by a hub 73 secured on the shaft 35 by means of a set screw 74. Extending between each of the saddles S is circumferentially disposed portion 75 which provides a curved track for rolling engagement by a can body preparatory to the latter's dropping into one of the pockets 70. The can body C may be carried between the sides 77 of a holder such as indicated at 78, which is mounted upon supporting rods 79 carried on top of the housings 32. Obviously, when a pocket 70 passes beneath the can body carrier 78 a can body C will drop into said pocket and the following can body during rotation of the pockets 70 will then drop down upon the track 75 and travel therealong until the next pocket 70 comes into position, the can body being held against previous displacement by means of the sides 77 of the holder. The lower part of the machine beneath the can body carriers 70 is provided with a discharge track 80 which receives the can bodies after release by the flanging dies 66 and discharges them, the lower end of said track being secured at 82 to a bracket 83.

Each of the flanging dies 66 is beveled to provide a frusto-conical guiding face 85 adapted to freely enter the open end of a can body; a short annular tread 86 adjoining said face 85 and having its face parallel with the axis of the flanging die. From the annular tread 86 a beveled annular flanging surface 87 extends outward from the axis of the flanging die 66 forming an outer annular flange 88.

In the operation of the machine the can holder 78 will be supplied with can bodies C to be flanged, one of which can bodies will drop into the first can body receiving pocket 70 which is presented. In this position a flanging die 66 is spaced somewhat from each end of said can body C as indicated by the upper position of Figure 1. As the shaft 35 is rotated through the medium of the gear 36 the flanging dies 66 are rotated by engagement of the pinions 60 with the stationary rack 40, inasmuch as the flanging die carriers 46 rotate with the shaft 35. As rotation of the flanging die carriers 46 continues, the flanging dies will be advanced axially toward and into the open ends of the can body C through engagement of the rollers 52 with the stationary cams 42, this movement being permitted by reason of the splines 51 which position the journals 50 in the sleeves 48.

At the commencement of this movement, the first zone of the cam indicated in the showing of the cam profile 95 of Figure 4,

will advance the flanging die 66 into engagement with the ends of the can body C. Inasmuch as the axes of the flanging dies are canted or disposed at slight angles to the axis of the drive shaft 35 and to the axis of the can body C, engagement of the flanging faces 87 of the flanging dies 66 with the can body C will occur along short sections only of the ends of the can body. Thus, as rotation of the flanging dies 66 continues and advancement of the flanging dies 66 along their axes under influence of the second zone of the cam continues, the flanging operation on each end of the can body will commence at a single point only as indicated at 90 in Figures 7 and 8 and then continue progressively, the can rolling in its pocket 70 by reason of engagement by the flanging dies 66. At the end of the flanging operation performed under influence of said second zone of the cam, a narrow flange 90 will have been formed entirely around each of the ends of the can body. As the flanging operations come under the influence of the third zone of the cam, enlargement or widening of the flange will commence as indicated at 92, in Figures 9 and 10, and when the flange is completed under the influence of said third zone the wide flange 92 will have been formed entirely around the end of each can. In order to insure complete formation of the flange a straight fourth zone of the cam is provided so that ample opportunity will be provided for completion of the flange in event of any slippage or the like which might have occurred to prevent completion of the functions of either the second or third of the cam zones at the proper time. Upon completion of the flange 92, the flanging dies 66 are withdrawn from operative position by a fifth zone of the cam 42, as indicated in Figure 12. This operation permits the can body C to ride upon the track 80 and to be discharged from the machine thereby. The flanging dies will then be held in retracted position by said cam and again passed under the can holder 78 to receive another can body.

From the foregoing it will be clear that the can is flanged progressively, a relatively small flange being rolled up at the beginning of the operation, this operation continuing more or less gradually from one stage to another, until the complete flange has been formed. Completion is insured by the fourth zone of the cams as above mentioned. Thus perfect flanges may be formed readily on can bodies of large diameters, whereas heretofore much difficulty has been experienced in attempts to prevent splitting of flanges. By the present means and method the cost of production is materially decreased due to the practical elimination of loss from imperfectly formed cans.

Obviously, the flanging operation may be performed in many more stages than those indicated herein, in order to obtain the effect sought, if necessary or desirable. When it is desired to work upon cans of different sizes, can receiving pocket 70 of sizes to correspond to the size of the can body to be worked will be mounted in the saddle, and flanging dies to suit will be provided. The movable standards 16 and 17 may be adjusted, carrying the gear and cam carrier 31 and the flanger carrier 46 with it according to the length of the can body. Fine adjustment of the flanging dies 66 may be then made through the medium of the threaded portions 57 of the bushings 55 and the lock nuts 58.

We claim:—

1. In a can body flanging machine, a pair of opposed flanging dies adapted to engage a can body, the axes of the flanging dies being canted with respect to the axis of the held can body, and means to rotate the flanging dies whereby the ends of the can body are flanged progressively from a starting point.

2. In a can body flanging machine, a pair of opposed flanging dies adapted to engage a can body, the axes of the flanging dies being canted with respect to the axis of the can body, means to rotate the flanging dies whereby the ends of the can body are flanged progressively from a starting point, and means to advance the flanging dies whereby the flanges are enlarged progressively.

3. In a can body flanging machine, a can body seat, a pair of opposed flanging dies adapted to engage a can body positioned in said seat, the axes of the flanging dies being disposed out of alignment with the axis of the can body, and means to rotate the flanging dies for rolling engagement with short sections only at any instant for progressively flanging the ends of the can body.

4. In a can body flanging machine, a rotary can body seat, a pair of opposed flanging dies adapted to engage the ends of a can body positioned in said seat, and having their axes at slight angles to the axis of the can body, means for rotating said flanging dies bodily with said seat, and means for rotating said flanging dies on their axes when engaging the ends of the can body.

5. In a can body flanging machine, a rotary can body seat, a pair of opposed flanging dies adapted to engage the ends of a can body positioned in said seat, and having their axes at slight angles to the axis of the can body, means for rotating said flanging dies bodily with said seat, means for rotating said flanging dies on their axes when engaging the can body ends, and means for shifting the flanging dies longitudinally of their axes.

6. In a can body flanging machine, a rotary can body seat, a pair of opposed flanging dies adapted to engage the ends of a can body positioned in said seat, and having their axes at slight angles to the axis of the can body, means for rotating said flanging dies bodily with said seat, means for rotating said flanging dies on their axes when engaging the can body ends, said can body seat being removable and the supporting and actuating means for said flanging dies being adjustable.

7. In a can body flanging machine, a rotary body can seat, a pair of opposed flanging dies adapted to engage the ends of a can body positioned in said seat, and having their axes at slight angles to the axis of the can body, means for rotating said flanging dies on their axes when engaging the can body ends, means for shifting the flanging dies longitudinally of their axes, said can body seat being removable, and the supporting and actuating means for at least one of said flanging dies being adjustable.

8. In a can body flanging apparatus, rotary means to position a can body, a pair of opposed flanging dies bodily rotatable with the can body positioning means, rotary carriers for said flanging dies, mountings in said carriers for the respective flanging dies, means for moving said mounting axially to move the flanging dies to and from the can body, means to rotate said flanging dies, said carriers and moving means and rotating means being adjustable axially, and means for adjusting the position of said flanging dies with respect to said mountings.

9. In can body flanging apparatus, a rotary flanging die carrier, a journal axially movable in said carrier, a shaft rotatably secured in said journal, means for adjusting said shaft axially, and a flanging die carried on said shaft, the axis of the shaft being canted slightly with respect to the axis of the carrier.

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