July 16, 1929. W. E. BURNS 1,720,663

CAN JOINT MAKING AND APPARATUS

Filed Jan. 27, 1928 4 Sheets-Sheet 1

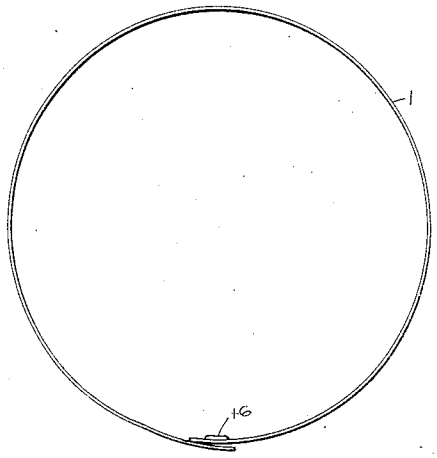


Fig. 1.



Fig. 3.

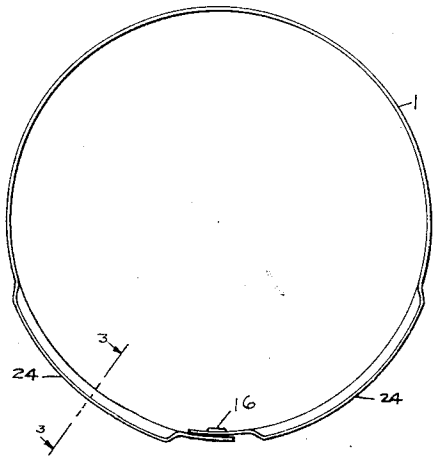


Fig. 2.

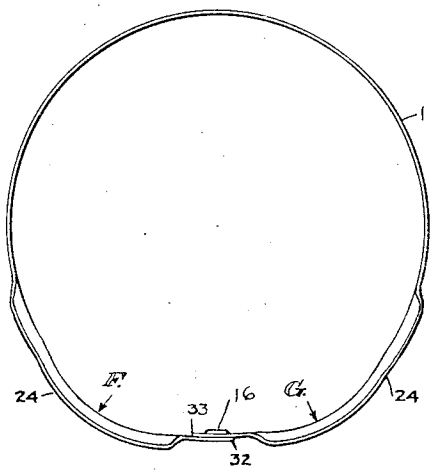


Fig. 4.

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CAN JOINT MAKING AND APPARATUS

Filed Jan. 27, 1928 4 Sheets-Sheet 2

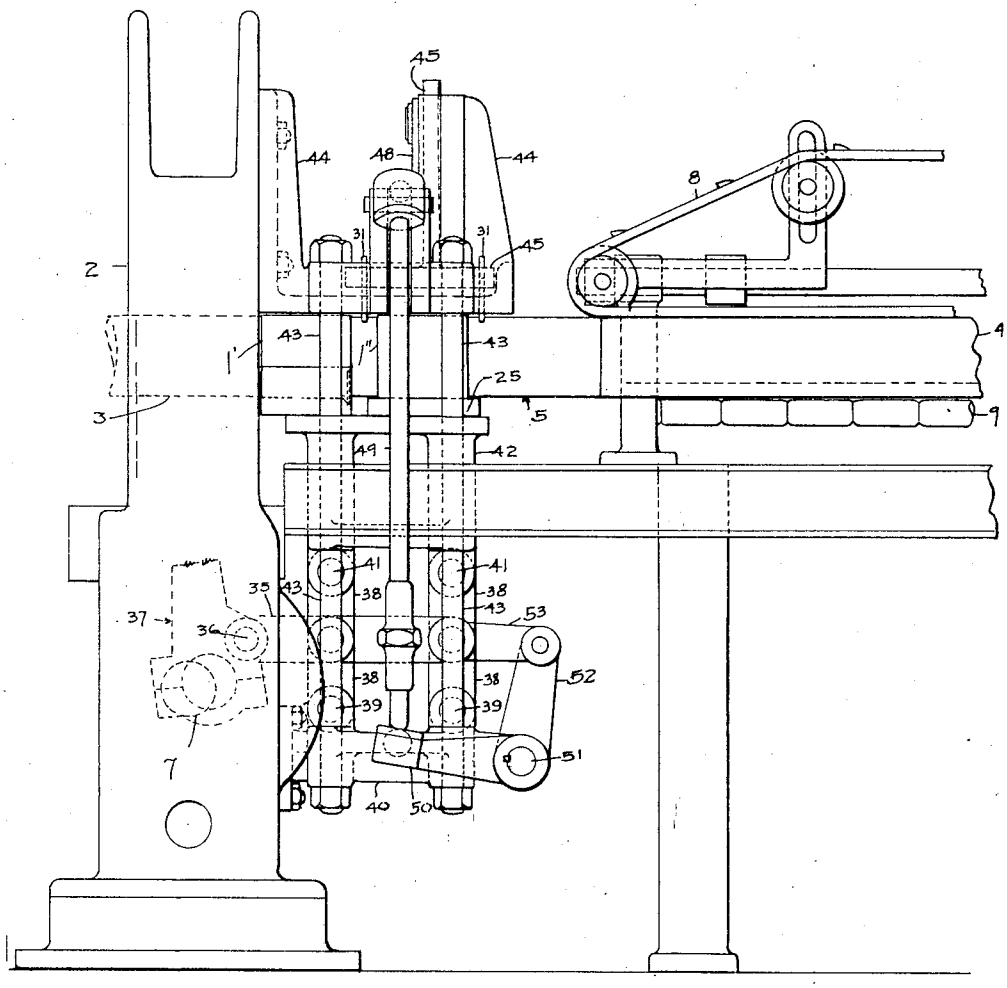


Fig. 5.

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CAN JOINT MAKING AND APPARATUS

Filed Jan. 27, 1928 4 Sheets-Sheet 3

Fig. 6.

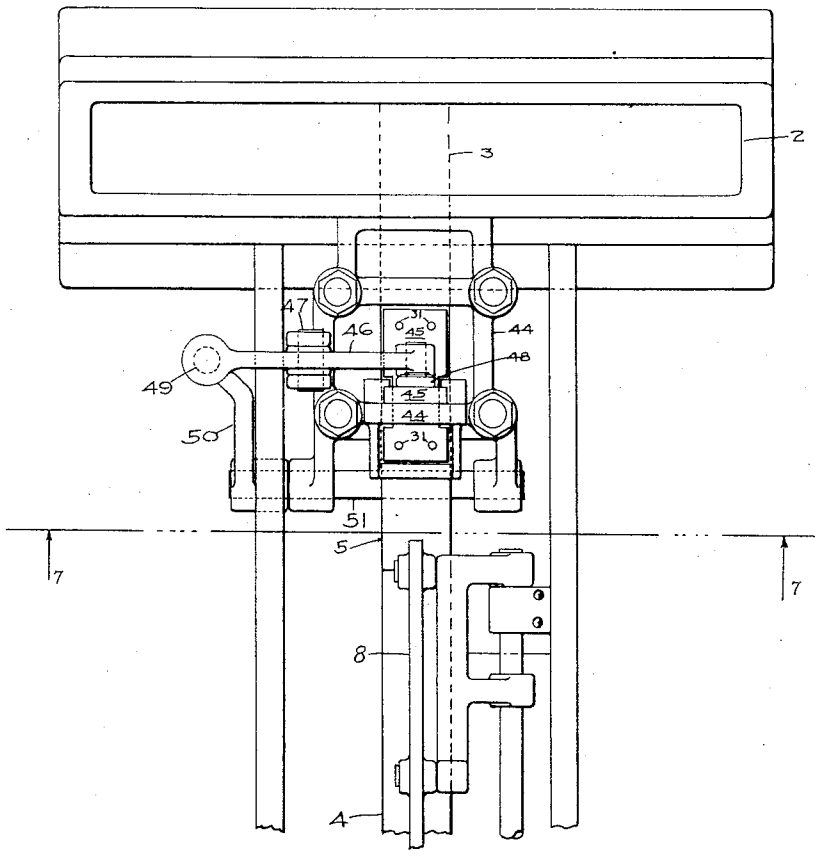
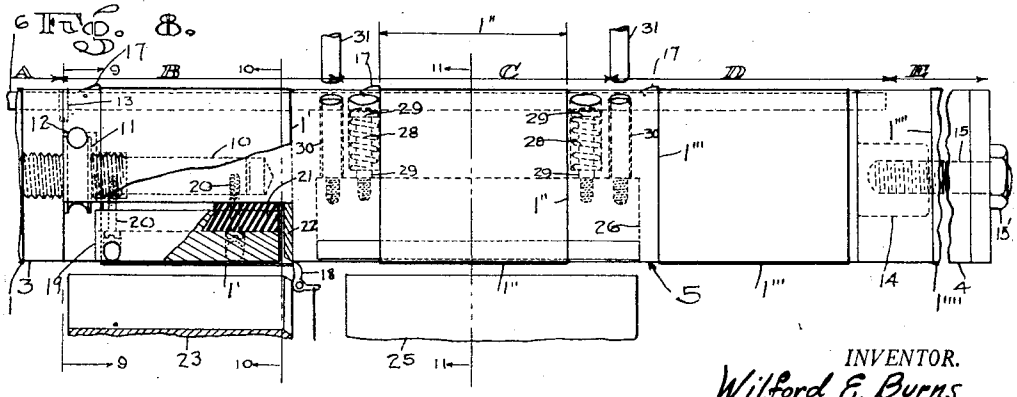


Fig. 8.



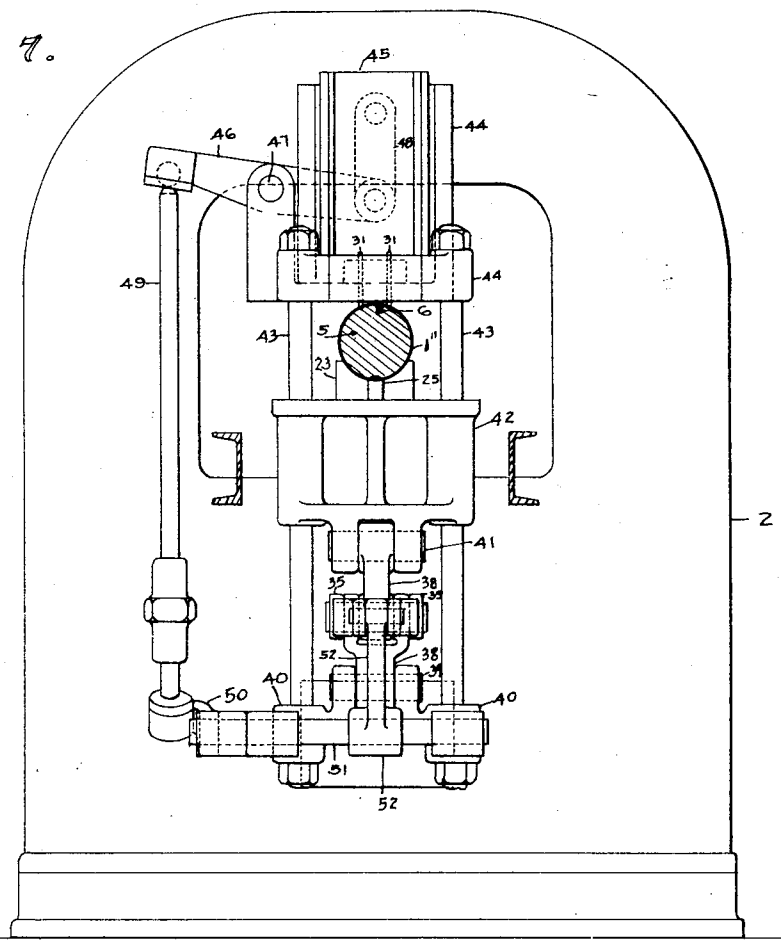
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CAN JOINT MAKING AND APPARATUS

Filed Jan. 27, 1928 4 Sheets-Sheet 4

Fig. 7.



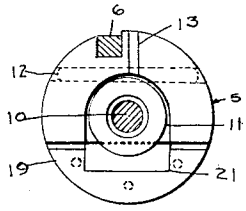


Fig. 9.

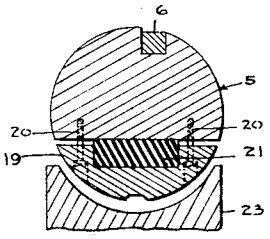


Fig. 10.

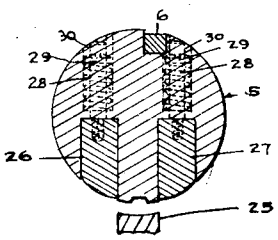


Fig. 11.

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Patented July 16, 1929. 1,720,663

UNITED STATES PATENT OFFICE.

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CAN-JOINT MAKING AND APPARATUS.

Application filed January 27, 1928. Serial No. 250,031.

This invention relates to the manufacture of tin cans and has for its objects improvements in the steps of making such cans whereby a better body joint is secured.

The method was evolved to improve the joint on a certain type of round can, i. e. a can in which the longitudinal body joint or seam was not all of the "lock" type from end to end of the can, but consisted of at least in portion adjacent an end of the can of a "lap seam."

Several examples of such cans are extant, some of which leave a plain lap seam from end to end, but more frequently cans are seen which have a lock seam on the body from the bottom up to a given point and from which point up a plain lap seam is used so as to make it possible to use a scored tearing strip around the upper end of the can.

The latter type of can is shown in my Patent #1,615,930 of February 1, 1927, as well as in the patent to Young #1,582,956 of May 4, 1926.

In this type of can a difficulty is found in soldering the body seam after forming the can body, for on account of the upper end of the seam not being a lock seam the metal layers do not lie tightly together but they open up in passing over the hot soldering roll with a result that the seam is faulty at this point, contains a large amount of solder which interferes with flanging and double seaming of the heads, and causes leaks and other trouble.

In the Young patent referred to a means of overcoming the difficulty is disclosed and which consists of electric spot welding together of the plain lap portions of the seam so they would be retained in contact.

The present invention discloses a means of overcoming the aforesaid difficulty by pure mechanical means, thus dispensing with electric welding.

Briefly described the method consists in performing certain bending operations on the tubular can body after it has been formed on the common can body machine and just before it passes along the soldering horn for soldering of the body seam.

The operations which I believe to be new comprise forming two short flanges on the end of the tubular body, one at each side of the body seam, before soldering the seam, spaced apart for clearance of the soldering roll, and also preferably distorting the normal curve of the body at one or both sides of the seam so that the plain lap portion of the seam adjacent the end of the can will be tightly closed before soldering and so remain during passage along the soldering horn.

Since this specification is addressed to those skilled in the art it must be assumed that all the details of tin can manufacture and automatic operations of the body machine as carried out on round cans, and soldering the bodies before flanging and double seaming of the heads is thoroughly understood, and consequently in an attempt to condense the case as much as possible none of the common features of such machines will be shown or described herein.

However, in the common method of making round tin cans the blanks advancing by intermittent motion through the body machine are finally bent around the forming horn and the lock seam closed by bumping, and after which the tubular bodies pass directly on the soldering horn.

The additional steps which form the subject matter of the present invention take place between the end of the forming horn and the soldering horn, and the mechanism really becomes a part of the body forming machine as it includes an extension of the forming horn with operating parts worked by or in unison with the body machine so as to be in proper time therewith, but the operation of the mechanism or practice of the method is not dependent on a specific type of body forming machine, though reference is made to the patent of Troyer #1,543,460, June 23, 1925, describing such a machine in detail.

In the drawings accompanying this application Fig. 1 is an end view of a can body showing the extreme end or lap part of the body joint, as it would appear after being formed and in accordance with present practice ready for passage along the soldering horn for soldering of its body seam by the soldering roll.

Fig. 2 shows the same end of the can as provided with two short flanges (step B) before passage to the soldering horn. Fig. 3 is a section of the can body of Fig. 2 as seen from the line 3—3 thereof.

Fig. 4 shows the flanged end of the can as

per Fig. 2 further operated upon (step C) deforming it slightly at the points F—G, as also done before soldering.

Fig. 5 is a side elevation of can making apparatus with the final end of the can body forming machine shown at the left and the forward end of the soldering machine at the right, joined by a continuation of the forming horn to the soldering horn equipped with operative devices to carry out my improvements.

Fig. 6 is a plan view of Fig. 5 and Fig. 7 is an end view in section as seen from the line 7—7 of Fig. 6.

Fig. 8 is an enlarged side view partly in section of the extension horn on which steps B and C are carried out, and with some of the adjacent dies and mechanism indicated.

Fig. 9 is an end view of the extension horn as seen from the line 9—9 of Fig. 8. Fig. 10 is a section as seen from the line 10—10 of Fig. 8 and Fig. 11 is a section of Fig. 8 as seen from the line 11—11 thereof.

In the drawings the can body is designated 1, the can body machine 2, forming horn of the body machine 3, soldering horn 4 and my extension horn which joins the forming and soldering horns is generally designated 5.

No details of the standard body forming machine need be given other than to state that it terminates in a forming horn 3 on which suitable mechanism, not shown, forms the flat blank into a round tubular body and locks the seam by a jaw closing the same against an anvil.

The operations of the body machine are carried out on the blanks at different stages along the machine as the blanks are intermittently advanced therealong by a reciprocating feeder such as the bar 6 which works in a groove in the can support and is actuated in time with the revolution of a shaft 7 on the body machine which operates the seam closing jaw, or bumper.

The final body forming operation is termed herein step A and heretofore the tubular bodies have been passed directly from the forming horn to the soldering horn 4 where they were carried along by a chain conveyor 8 for soldering of the body seam by contact therewith against the longitudinally extending and revolving solder roll 9.

The soldering operation is termed herein E. Between these well known steps A—E I interpose the steps of special flanging as per Fig. 2 termed step B, then distort the same as per Fig. 4 termed step C, after which an idle position is reached by the body herein called step D before the body is passed to the soldering step E.

Step D is simply an idle step to get sufficient clearance for the machine elements involved.

My auxiliary or extension horn 5 upon which steps B and C are carried out consists of a cylindrical guide bar over which the can slides and which is secured at one end to the forming horn 3 and at the opposite end to the soldering horn 4.

The means for securing members 3 and 5 together comprises a centering stud 10 secured to and projecting from the forming horn, a nut 11 threaded on said stud provided with a circumferential groove in which a taper pin 12 driven in a hole in member 5 is seated. A key or pin as at 13 is provided to prevent relative rotation of the members, and the nut 11 provides for initial adjustment so that the members are tightly drawn together upon driving the pin 12 in place.

The means for securing the opposite end of member 5 to member 4 comprises a centering hub 14 on member 5 fitting a recess on member 4 and a rod 15 screwed into and projecting from the hub extending entirely through member 4 (usually about 5 or 6 feet long) and provided with a threaded nut 15′ at its outer end so that by turning the nut the member 4 can be forced longitudinally against member 5. It is understood that the connected members 3—5 and 4 while round do not rotate, as member 3 is rigid in the body machine.

To feed the cans along my extension horn 5 I extend the usual intermittent feed bar 6 which carries pivoted and yieldingly mounted hooks 17 to advance the cans step by step as well understood, and which when their exact distance of travel cannot be relied upon are supplemented with stops for accurately stopping the can blanks, such a stop being indicated at 18 for positioning the can at step B and which stop is intermittently removed from the path of the can after the operation thereon has been completed, and as any synchronously moving part of the machine may be hooked up to operate said stop, such hook-up is omitted from the drawing for clarity sake since it involves no invention.

At position B member 5 is formed with a loose lower section 19 guided on headed screws 20 and is seated against a block of resilient rubber 21, and provided with a fixed beveled edged die 22. The can arrives in position as indicated at 1′ and a curved shoe 23 rises and engages the under side of the can, forces it upward thereby compressing the rubber 21 and outwardly flanging the end of the can through overlapping of the same on die 22. The parts are so formed that the flange is produced on both sides of the seam as shown at 24 in Fig. 2 and extending at an angle to the can body substantially as shown in Fig. 3.

After the flanging operation the shoe 23 moves away and the flanged body advances

to position C on member 5 whereat a shoe 25 rises to firmly clamp the seam of the can against member 5 while a pair of internal jaws 26—27 are forced outwardly to deform or stretch the can slightly at the points F, G indicated in exaggerated form in Fig. 4.

Fig. 11 shows the form of jaws 26, 27 slidably mounted in member 5 and normally held retracted therein by springs 28 reacting against the heads of screws 29 secured to the back of the jaws.

The jaws are also each provided with two pins 30 secured to the jaws and operating freely in holes in member 5 and which pins are always below the upper surface of member 5 so that the can bodies can freely slide thereover, the pins are spaced longitudinally of member 5 to freely accommodate a can body between them as indicated at 1'' in Fig. 8.

The jaws 26—27 are forced outwardly after the can body is in position 1'' by means of four exterior pins 31 which are aligned over pins 30 and which descend upon them by means to be described later.

Fig. 4 shows the forward end of the can after it has been operated on at position C and in which figure the distortion caused by outward movement of jaws 26—27 is respectively indicated at F and G. The movement of jaw 26 is somewhat greater than that of jaw 27 so that the lap seam layers 32—33 will fit and lie tightly together, as shown in Fig. 4 and in contradistinction to the condition shown in Fig. 2 wherein the layers of metal diverge slightly though not as much as they do in Fig. 1. After the distortion at points F and G the metal will be under a strain to preserve the seam in this condition as the can body is further advanced to position D as shown at 1''' and thence to the soldering horn 4 for soldering over the soldering roll 9 in the well known manner.

It should be noted, that in the type of can here under consideration part of the body seam is of the lock type as indicated at 16 in Figs. 1, 2, 3 or the body otherwise held together so that it will not open up, and the operations herein described are for the purpose of securing a proper joint and overcoming the difficulties attendant upon soldering the extreme end of the seam which is not of the lock type.

To operate shoe 23 and the pins 31 in syncronism with the intermittent advancing of the can bodies from the forming horn 3 along member 5 any suitable connections may be made with a moving part of the body machine, in the present disclosure the required motion is derived from one of the main operating shafts of the body machine such as its seam bumper actuating shaft 7, a link 35 being pivoted at 36 to the bumper crank rod 37 of the machine and to toggle arms 38 pivotally anchored at the lower ends at 39 to a bracket 40 secured to the body machine, and pivoted at the upper ends at 41 to a vertically movable carrier 42 slidably supported on guide rods 43 carried on bracket 40 and an upper bracket 44 secured to the body machine, the arrangement being such that upon each revolution of shaft 7 the toggle arms will be straightened and force the carrier 42 upward at each positioning of the cams along member 5.

Shoes 23 and 25 are mounted on the reciprocable carrier 42 so as to operate on the can bodies at positions B and C respectively as explained, and are of suitable form and height for their work.

In order to reciprocate the jaw actuating pins 31, they are mounted on a vertically slidable carriage 45 guided on bracket 44 and the required motion is transmitted to the carriage by means of a rocker arm 46 pivoted at 47 to bracket 44 linked at one end at 48 to the carriage and connected at the other end by a universal jointed push rod 49 seated at its lower end in a crank arm 50 connected to a rock shaft 51 mounted on bracket 40 and which shaft is provided with a crank 52 pivotally connected by means of a link 53 to a suitable moving part such as the toggle arms 38.

By the arrangement described there will be a relatively large motion to jaw actuating pins 31 at a time when the toggles are crossing the center line, hence the can seam will be clamped with shoe 25 substantially motionless during the outward forcing of the jaws 26—27, it being understood that the actual motion of the jaws is very little and all the parts are so proportioned, and centers of links, cranks, etc., all arranged to produce the required effect.

In considering my invention as above set forth it will be seen that the mechanism necessary to carry out the operations may either be built as an integral part of a can body machine, or it may consist of devices for attachment thereto or cooperating therewith, and/or with the soldering machine.

It is to be noted that the two small flanges 24 as made on the can end preparatory to soldering, are after soldering extended entirely around the can so as to receive the head for double seaming thereto in the usual way, and the opposite end of the can is likewise flanged and double seamed to a head in the usual way. The initial short flanging of the can adjacent the seam evens up the work of the flanging operation as it provides some of the work already done and thereby compensates for the extra work of flanging the soldered lap joint.

The slight deformation of the can body at F, G is entirely obliterated in the common body flanging and double seaming machine

operations which follow the soldering of the body seam.

The deformation of the can as shown in Fig. 4, and the gap in the lap seam shown in Figs. 1 and 2 are exaggerated somewhat so as to more clearly show the points of importance.

I claim:

1. In the automatic manufacture of sheet metal cans, the step between the forming of the body and the soldering of the body seam which comprises outwardly flanging the end of the can while preserving a portion unflanged for clearance of the soldering roll.

2. In the automatic manufacture of sheet metal cans, the step between the forming of the body and the soldering of the body seam which comprises outwardly flanging the end of the can at a point at one side of the body seam while preserving a portion unflanged for clearance of the soldering roll.

3. In the automatic manufacture of sheet metal cans, the step between the forming of the body and the soldering of the body seam which comprises outwardly flanging the end of the can at a point at both sides of the body seam while preserving a portion unflanged for clearance of the soldering roll.

4. In the automatic manufacture of sheet metal cans, the step between the forming of the body and the soldering of the body seam which comprises outwardly flanging the end of the can while preserving a portion unflanged for clearance of the soldering roll, and of distorting the normal curvature of the body so as to give the metal a tendency to urge the layers of metal together at the joint.

5. In the manufacture of sheet metal cans having a lap seam adjacent one end of the body, the step before soldering of the seam of deforming the body adjacent the seam to hold said lap seam closed.

6. In the manufacture of sheet metal cans having a lap seam adjacent one end of the body, the step before soldering of the seam of deforming and outwardly flanging the body adjacent the seam to hold said lap seam closed.

7. In the manufacture of sheet metal cans having a lap seam adjacent one end of the body, the step which comprises flanging the end of the can outwardly at one side of the body seam before soldering the same.

8. In the manufacture of sheet metal cans having a lap seam adjacent one end of the body, the step which comprises flanging the end of the can outwardly at both sides of the body seam before soldering the same.

9. In can making mechanism of the character described, a guide, means for advancing a tubular can body along the guide, and means operating on said body at a point on the guide arranged and adapted for deforming the end of the can adjacent its body seam for promoting better contact of its metal layers.

10. In can making mechanism of the character described, a guide, means for advancing a tubular can body along the guide, and means operating on said body at a point on the guide arranged and adapted for flanging the end of the can adjacent its body seam while said seam is unsoldered.

11. In can making mechanism of the character described, a guide, means for advancing a tubular can body along the guide, and a plurality of means arranged and adapted for flanging the body end at spaced points adjacent the body seam and for changing the normal curve of the body adjacent said seam for promoting better contact of its metal layers.

12. In can making mechanism of the character described, a guide, means for advancing a tubular can body along the guide, and means operating on said body at a point on the guide arranged and adapted for flanging the end of the can adjacent its body seam comprising a resiliently mounted support for the inside of the can body, a die over which the end of the body projects, and a shoe arranged to contact the outside of the body and force it against said support and retract the same thereby flanging the projecting end of the body, and means for actuating said shoe as described.

13. In can making mechanism an extension horn adapted to slidably guide a tubular can body, said horn arranged in axial extension of a can body machine forming-horn, means for feeding can bodies from said forming horn to said extension horn, and means operating against said extension horn and actuated in synchronism with said can body machine arranged and adapted for outward flanging of the end of said can body while the body seam of the can is unsoldered.

14. In can making mechanism of the character described, a guide, means for advancing a tubular can body along the guide, and means operating on said body at a point on the guide arranged and adapted for deforming the end of the can adjacent its body seam for promoting better contact of its metal layers comprising an outwardly movable jaw within said guide adapted to force a portion of said can outwardly, means for actuating said jaw, and means for supporting the seam of the can during such actuation.

15. In can making mechanism of the character described, a guide, means for advancing a tubular can body along the guide, and means operating on said body at a point on the guide arranged and adapted for deforming the end of the can adjacent its body seam for promoting better contact of its metal layers comprising an outwardly movable jaw within said guide adapted to force a

portion of said can outwardly, means for actuating said jaw comprising a pin at each end of said jaw slidable in openings in said guide and spaced beyond opposite ends of the can to be operated upon, and means for moving said pins and thereby actuating said jaw.

16. In can making mechanism of the character described, a guide, means for advancing a tubular can body along the guide, and means operating on said body at a point on the guide arranged and adapted for deforming the end of the can adjacent its body seam for promoting better contact of its metal layers comprising an outwardly movable jaw within said guide adapted to force a portion of said can outwardly, means for actuating said jaw comprising a pin at each end of said jaw slidable in openings in said guide and spaced beyond opposite ends of the can to be operated upon, and means for moving said pins and thereby actuating said jaw comprising an additional pin aligned with the pin at each end of the jaw, a slidingly supported carriage in which the additional pins are mounted, the additional pins being normally without and clear of said guide, and a connection between said carriage and a source of power for operating said additional pins.

17. In can making machinery of the character described, an extension horn adapted for interposition between the forming horn of a body machine and a body seam soldering machine horn, means for feeding can bodies from said forming horn over said extension horn to said soldering horn, and means for operating on said bodies at points along said extension horn.

18. In can making machinery of the character described, an extension horn adapted for interposition between the forming horn of a body machine and a body seam soldering machine horn, means for feeding can bodies from said forming horn over said extension horn to said soldering horn, and means for operating on said bodies at points along said extension horn, said extension horn joined to said forming horn in endwise abutting relation through means of a centering stud projecting from said forming horn into said extension horn, a nut on said stud grooved peripherally and a transversely extending pin in said extension horn engaging the groove of said nut.

19. In an automatic can body making machine in which the body blank is advanced to different stages for progressive operations thereon, a stage after the body forming operation stage and means operative on the body at said stage arranged and adapted for outwardly flanging the end of the body while the body seam of the can is unsoldered.

20. In an automatic can body making machine in which the body blank is advanced to different stages for progressive operations thereon, a stage after the body forming operation stage and means operative on the body at said stage arranged and adapted for outwardly flanging the end of the body at a point spaced to one side of the body seam.

21. In an automatic can body making machine in which the body blank is advanced to different stages for progressive operations thereon, a stage after the body forming operation stage and means operative on the body at said stage arranged and adapted for outwardly flanging the end of the body at points spaced to both sides of the body seam.

22. In an automatic can body making machine in which the body blank is advanced to different stages for progressive operations thereon, a stage after the body forming operation stage and means operative on the body at said stage arranged and adapted for outwardly flanging the end of the body and a further stage thereon provided with means arranged and adapted for deforming the curvature of the body adjacent the seam thereof for holding the layers of the seam together preparatory to soldering.

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