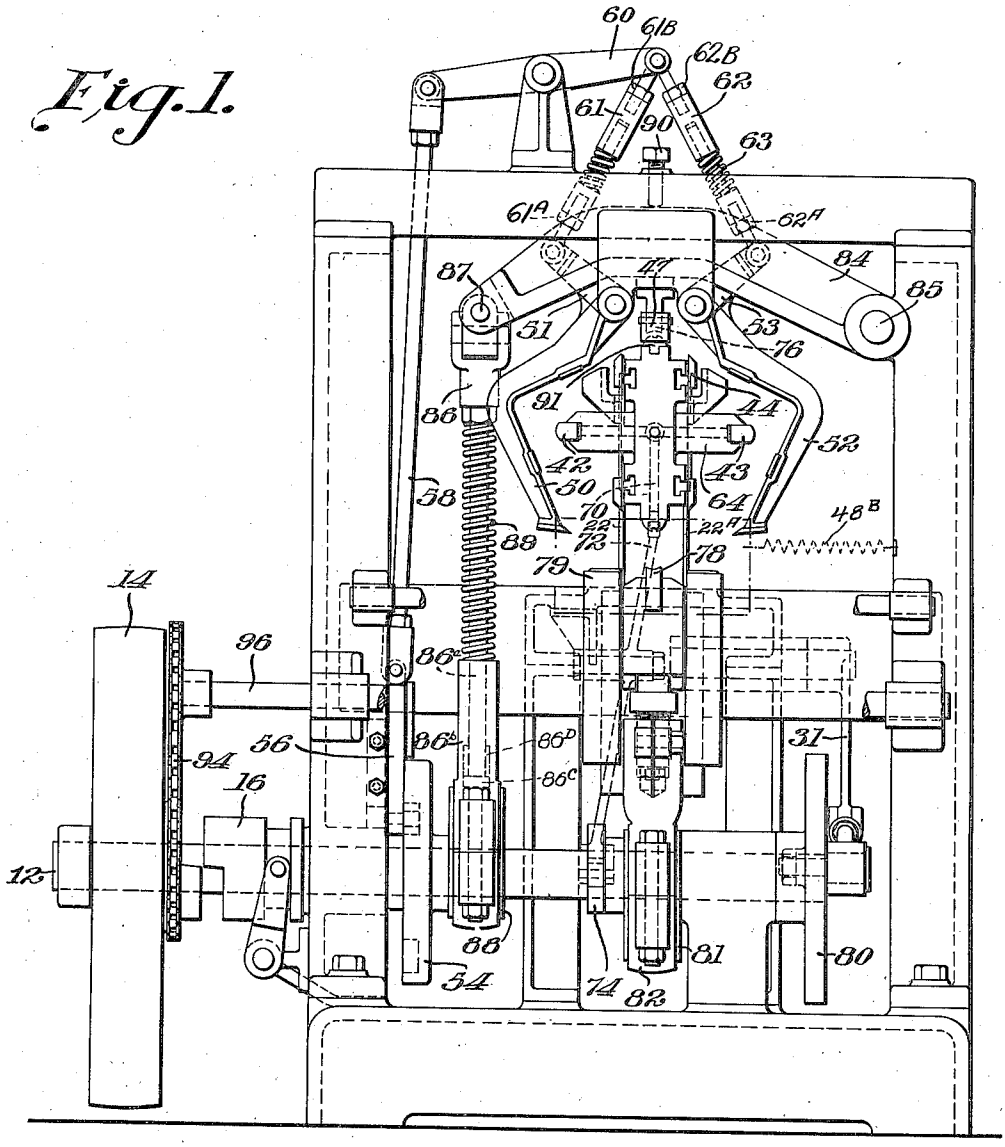
Oct. 27, 1936. L. D. TITUS 2,059,061

SEAMING AND SOLDERING MACHINE FOR METAL CAN BODIES

Filed May 18, 1933 6 Sheets-Sheet 1

Fig. 1.



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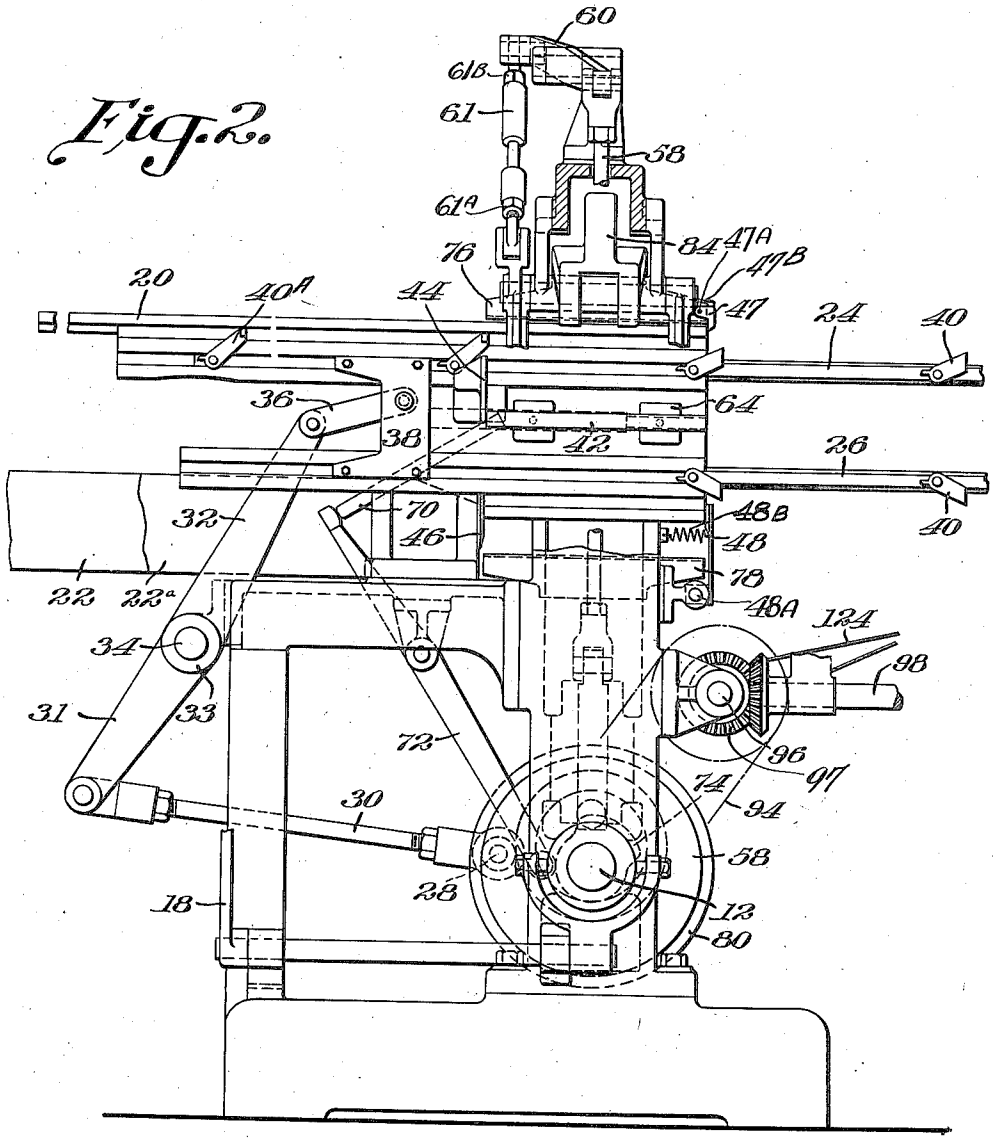
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SEAMING AND SOLDERING MACHINE FOR METAL CAN BODIES

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Fig. 2.



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SEAMING AND SOLDERING MACHINE FOR METAL CAN BODIES

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Fig. 3.

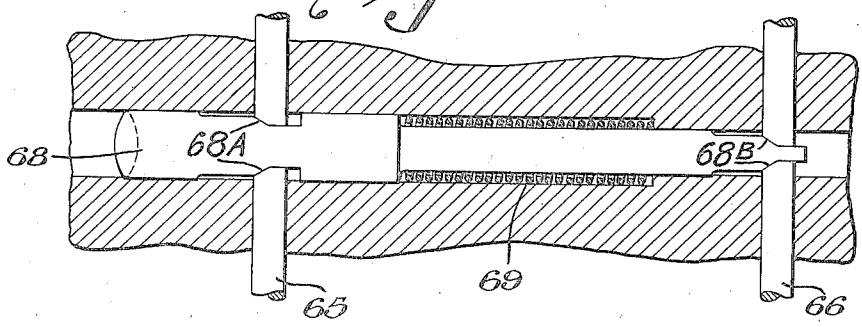
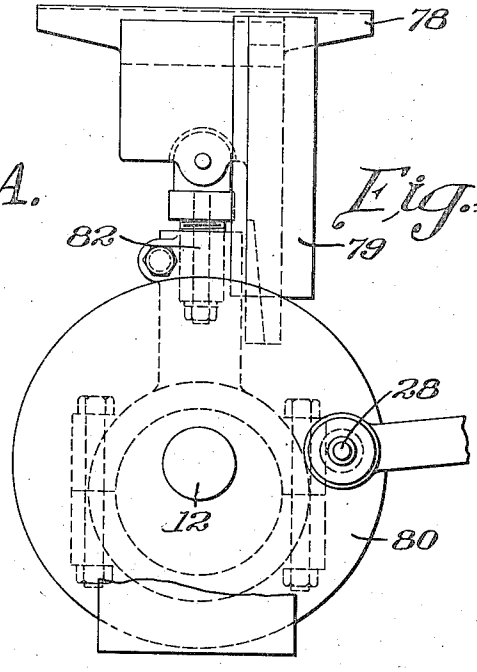


Fig. 11A.

Fig. 4.



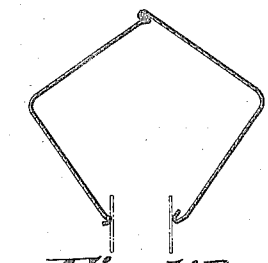


Fig. 11B.

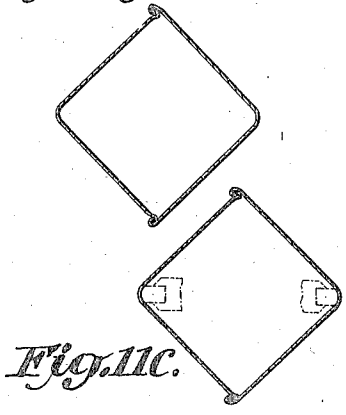


Fig. 11C.

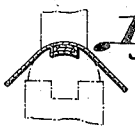


Fig. 11D.

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SEAMING AND SOLDERING MACHINE FOR METAL CAN BODIES

Filed May 18, 1933 6 Sheets-Sheet 4

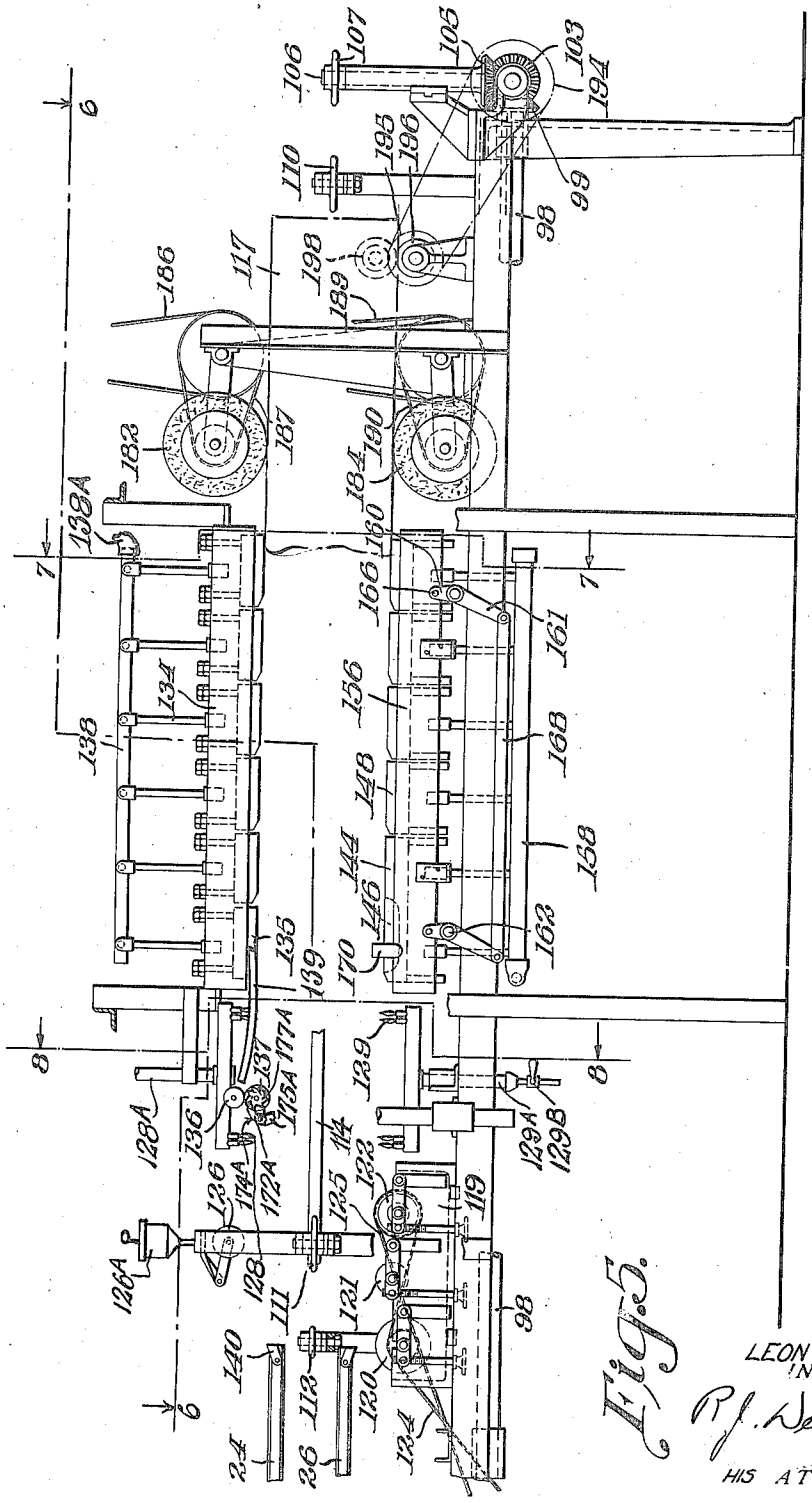


Fig. 5.

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SEAMING AND SOLDERING MACHINE FOR METAL CAN BODIES

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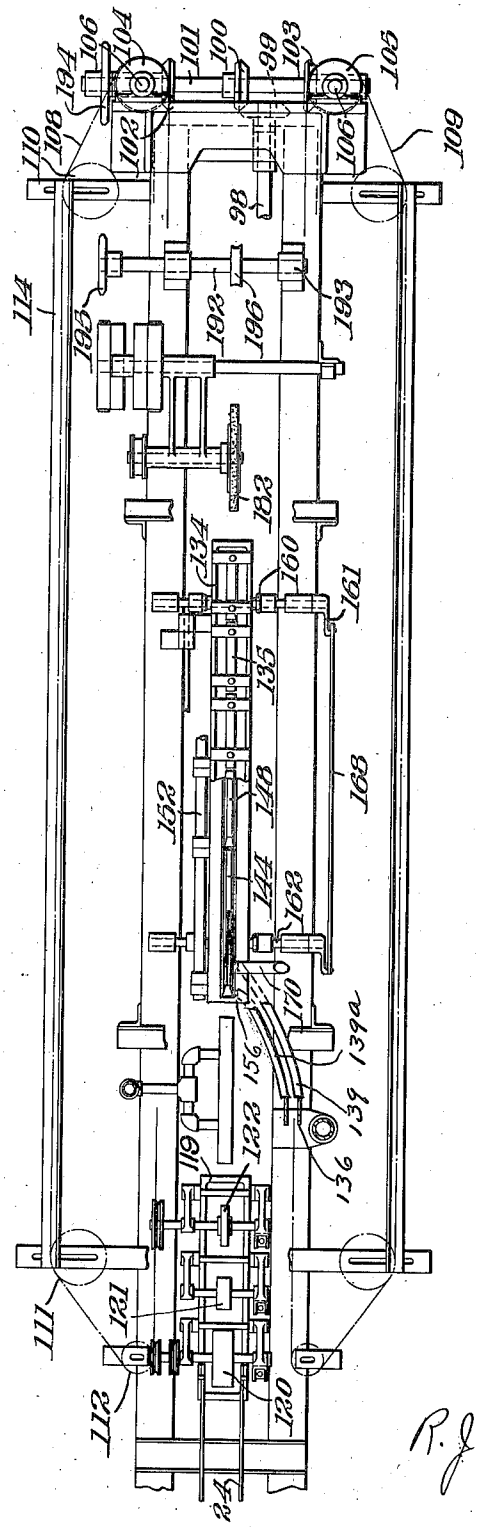


Fig. 6.

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SEAMING AND SOLDERING MACHINE FOR METAL CAN BODIES

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Fig. 7.

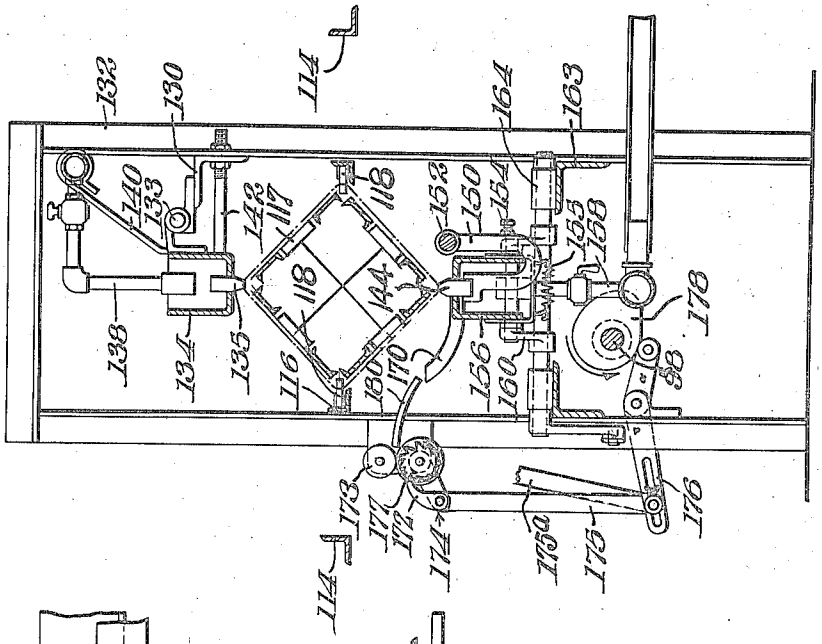
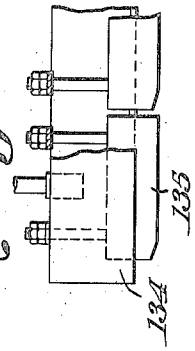


Fig. 10.



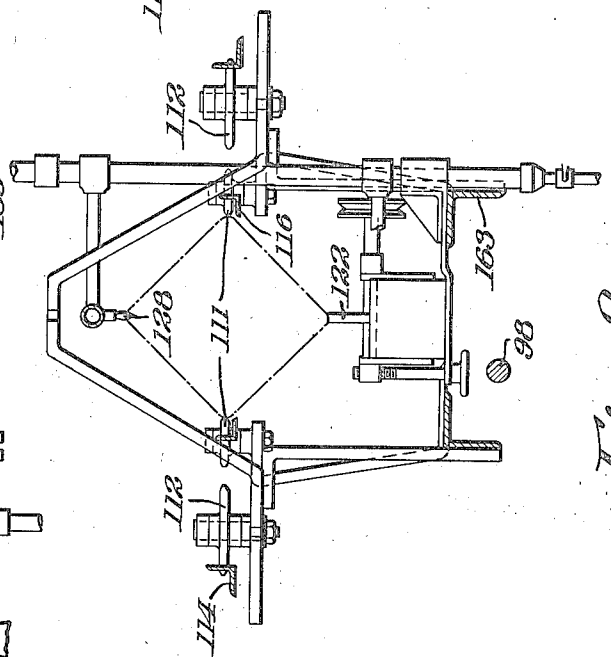
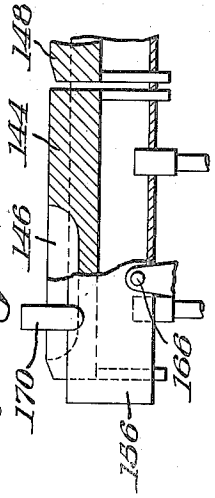


Fig. 8.

Fig. 9.



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Patented Oct. 27, 1936 2,059,061

UNITED STATES PATENT OFFICE

2,059,061

SEAMING AND SOLDERING MACHINE FOR METAL CAN BODIES

Leon D. Titus, Port Arthur, Tex., assignor to The Texas Company, New York, N. Y., a corporation of Delaware

Application May 18, 1933, Serial No. 671,621

9 Claims. (Cl. 113—9)

This invention relates to a machine for forming cans, the machine being particularly adapted to the formation of large rectangular or circular can bodies formed in two sections having upper and lower flanged and interlocked edges, the edges of which are brought into interlocked position, stamped into a tight seam, fluxed and soldered so that the can body is completely formed and sealed.

The above and other objects will appear more fully from the following description when considered in connection with the drawings in which:

Fig. 1 is a rear elevational view of the can body stamping apparatus constructed in accordance with the present invention.

Fig. 2 is a view taken at right angles to Fig. 1 on the line 2—2 of Fig. 1.

Fig. 3 is an enlarged horizontal sectional view illustrating the expander actuating cams and rods.

Fig. 4 is an enlarged view of the stamping or bumping press and eccentric actuator.

Fig. 5 is a side elevational view of the soldering apparatus showing its relation to the discharge devices on the forming machine.

Fig. 6 is a horizontal view thereof, taken substantially on the line 6—6 of Fig. 5.

Fig. 7 is a vertical sectional view taken on the line 7—7 of Fig. 5.

Fig. 8 is a similar sectional view taken on the line 8—8 of Fig. 5.

Figs. 9 and 10 are enlarged detailed views, parts being broken away, illustrating the solder applying and seam sweating steels for the lower and upper seams, respectively, of the can.

Figs. 11A, 11B, 11C and 11D are diagrammatic views illustrating the series of steps which occur during the formation of the can body in the forming machine.

The machine disclosed herein is designed to form a can body from two body parts, and in the present disclosure each of the body parts is angularly formed so that in the finished can the body will be of square cross-section (see Fig. 11C). It has been found easier to form cans of two parts in this manner than from one continuous piece of sheet metal, but heretofore proposals for automatically and simultaneously stamping the two parts of the cans together and soldering the upper and lower seams have not been successful.

Referring first to the forming machine, illustrated in Figs. 1 to 4, the main drive shaft 12 is driven through the fly wheel 14 clutched to or unclutched from the shaft 12 by means of the jaw clutch 16 actuated in the usual manner through the clutch collar and yolk shown, controlled from the handle 18. The machine is designed to receive two half can bodies, each of which is formed with flanged edges adapted to be interlocked or hooked together and placed upon the support 20 formed as a longitudinal bar extending through the machine. This condition of the body parts of the can is illustrated in Fig. 11A. The lower free edges of the two body parts may rest against plates 22 and 22A while in the first or idle station of the machine. Carrier bars 24 and 26, shown in their advanced position in Fig. 2, are reciprocated by means of disk 80 rotatable with shaft 12. Motion is transmitted from pin 28 on disk 80 through link 30, lever arms 31 and 32, rigidly mounted on rock shaft 34, and link 36 to plates 38, bolted to the upper and lower reciprocating bars 24 and 26. Pivoted carrier dogs 40A and 40 mounted on the upper and lower bars 24 and 26, serve to advance the body parts from the feeding station, shown at the far left in Fig. 2, into the idle station and then into the forming and stamping station and then into the outer or discharge station, the movement being step by step to permit the forming devices to perform their functions, as described below. The rearward advancing lugs 40A are required only upon the upper advancing bars 24. These lugs are formed with tips positioned to engage the can bodies which are in extended or open position, as shown in Fig. 1, when contacted by lugs 40A.

As the blanks pass into the forming station with their upper edges hooked together, the lower edges of the body blanks pass beyond the plates 22 and 22A and fall inwardly against the expander bars 42 and 43. In this position the blanks will have moved rearwardly past the forward gauging or spacing plates 44 and 46 which align the ends of the two sheets and prevent the blanks from being moved forwardly beyond these plates as the carrier bars move to the left, as seen in Fig. 2, in preparing for a subsequent operation. The advance edges of the blanks are positioned by means of upper and lower gauges 47 and 48. Gauge 47 is pivoted at 47A and is normally held in the position shown by means of spring 47B. Gauge 48 is mounted on shaft 48A and is normally held in the position shown by means of springs 48B. The gauges 47 and 48 are displaced on the further movement of the formed can body during a subsequent operation of the advancing bars.

After the blanks have passed into the seaming

station in front of the spacing plates 44 and 46, the body blanks are moved into their final or operative position, shown in Fig. 11B, by means of wings or clamping arms 50 and 52. These wings are formed of two or more angular members connected by longitudinal reenforcing strips, the angular members being shaped to conform to the particular shape of can body being constructed. The wings are connected for simultaneous operation by means of cam 54, cam follower and slide 56, connecting link 58, pivoted rocking lever 60 and connecting links 61 and 62. The links 61 and 62 connect respectively to levers 51 and 53, formed on the wings 50 and 52. The links 61 and 62 are made adjustable in length and are slightly compressible so that wing 50 may be moved to its closed position slightly in advance of the other and thus provide for proper hooking of the lower edges of the sheets. The adjustment in length may be accommodated by means of the adjustable connections 61A, 61B, 62A and 62B, as shown. The links are formed of telescoping sections normally held in their extended positions by springs 63, the extension of the links being limited by the pin and slot arrangements shown (Figs. 1 and 2). It will be understood that the wing which is associated with the inside of the overlapped seam of the can body will be the one which first reaches its final inner position and that the other wing will then move inwardly to its final position and hook the flanged edge of the outer body member over the flange of the inner member.

The wings hold or clamp the body members in place until the expander bars 42 and 43 take up the slack and lock the body parts together, a condition illustrated in Fig. 11C. The bars 42 and 43 are elongated members mounted in suitable slides in a central block 64, the bars 42 and 43 being controlled by the four push rods 65 and 66, the inner ends of which are placed in engagement with cam surfaces 68A and 68B formed on the operating bar 68. The bar 68 is normally retained in its inoperative position by means of the spring 69, the bar being moved against the tension of said spring by means of a push rod 70 and walking lever 72, the latter being controlled by a face cam 74 which coacts with a suitable roller or other bearing member on the lower end of the walking lever 72.

After the can body parts are expanded and while the wings are being opened, the upper and lower hammers 76 and 78 are operated to compress the overlapped flanged edges and form the seams, this operation pressing the overlapped hooked ends into a locked seam spline on the stationary members of the dies. The can body following this operation is illustrated in Fig. 11D.

The lower hammer 78, which coacts with die 78A, is mounted in a vertical slide formed of the vertical members 79, the hammers being operated through the eccentric 81 and a strap and connecting rod assembly 82 having the usual adjustment for length. The upper hammer 76 is carried by arm 84 pivoted at 85 to the framework and connected to an operating link 86 through a universal joint 87. The link 86 is actuated through an eccentric 88. The link is constructed to permit compression thereof during upward movement of the eccentric, this operation moving the sleeve 86B upwardly with relation to inner rod 86A which is free to move in the enlarged opening 86D in the sleeve. This movement compresses the spring 89, as illustrated in Fig. 1. On downward movement of the eccentric the head 86C of the rod 86A is picked up by the sleeve 86B at the upper end of the enlarged opening 86D, thus moving the overhead lever 84 downwardly for operating the hammer 76. The purpose of forming the link 86, as illustrated, is to permit only a limited upward movement of the lever 64 controlled, for example, by means of the set bolt 90, for affording only a limited clearance between the hammer 76 and the coacting stationary die 91. In this way, when the upper edges of the flanged body parts are hooked together and carried under the hammer 76, the limited clearance prevents them from being separated again during movement of the can parts through actuation of the carrier bars 24 and 26 or when the expander bars 42 and 43 are actuated.

The can bodies, after they have been hooked together and clinched in position, are advanced from the forming station into the idle station, shown at the right in Fig. 2, one or more idle stations and corresponding advancing lugs 40 being provided, depending upon the distance between the forming machine and the soldering apparatus described below.

The cans are picked up from the last idle station of the forming machine by a continuously moving feed device for carrying the cans by a continuous movement through a seam soldering device. In order to have the two advancing mechanisms synchronized, the drive for the can advancing mechanism of the soldering device is taken from the fly wheel 14 by means of a chain 94 which drives an intermediate shaft 96 connected by bevelled gearing 97 with a longitudinal shaft 98 extending along the frame of the soldering apparatus. At the rearward end of the shaft 98 there is provided an additional bevelled gear 99 which meshes with a coacting gear 100 mounted on a transverse shaft 101. The latter carries at its ends two similar bevelled gears 102 and 103 which mesh with gears 104 and 105 mounted on short vertical shafts 106. Shafts 106 carry sprocket gears 107 (removed from Fig. 6) for driving the can feeding chains 108 and 109. The chains 108 and 109 pass around corresponding idlers 110, 111 and 112 and are supported for the main portion of their lengths by means of angle bars 114 and 116, the latter supporting the chains in their operative positions while advancing the can bodies. The chains 108 and 109 are provided with the usual engagement projections 118, one pair of which engages behind each can for moving the same through the soldering apparatus while supported on the inside solder horse 117, supported at one end on the central portion of the framework of the forming mechanism and at the other (rearward) end by means of roller 198 referred to below.

The can body has upper and lower seams corresponding to the positions of the upper and lower hammers in the forming mechanism. The lower seam is supported and advanced into position to be engaged by the chains 108 and 109 by means of a driven rubber roll 120 and idle roll 121 and is fluxed by a fibre brush 122 which is driven against a can. The drive for the roll 120 is taken from the transverse shaft 96 by means of belt 124. The brush 122 is driven from the shaft of roll 120 through the crossed belt 125 and suitable pulleys. The fluxing rolls are preferably mounted in a housing 119 with the exterior surfaces only of the rolls exposed so as to prevent unnecessary wastage of the flux into the atmosphere. The upper seam is fluxed by a felt roll

126 which receives the flux from a large sight feed cup 126A.

As the can bodies are advanced into the machine, they are preheated by means of the upper and lower burners 128 and 129, each consisting of a number of small burners for gradually heating the can body adjacent the seams to a proper temperature for receiving the solder. The burners are supplied with gas by means of the pipes 128A and 129A and valves 129B as shown.

The top seam soldering device is supported on a frame angle 130 attached to the main overhead frame 132 and pivotally connected, as indicated at 133, to the box 134 which carries the soldering steels 135. There are preferably provided a number of soldering steels 135 rather than one continuous steel as it has been found that this construction more effectively supplies and distributes the solder on the cans and sweats the solder into the seams. Solder is applied to the first steel 135 by means of rolls 136 and 137 which feed the solder into curved tubes 139, 139A for guiding the solder wire or wires from the feed rolls to the side of the first steel 135. The feed rolls are operated intermittently and may be actuated by means of a cam and ratchet mechanism 174A comprising an operating link 175A, latch 172A and toothed wheel 177A. Link 175A is actuated by lever 176 referred to below.

Gas for heating the soldering steels is supplied throughout the length of the box 134 by means of the gas pipes and manifolds 138, the gas pipes and manifolds being supported on brackets 140 attached to the box 134. Gas is supplied to the pipes through a flexible connection 138A so that the entire system of pipes can be removed when the box is hinged about its pivot 133 whenever it is necessary to reflux or retin the soldering steels. One or more adjustable stop pins 142 are provided for positioning the steels 135 in proper position with respect to the upper seam of the can body, illustrated in dot and dash lines in Fig. 7. The pins 142 prevent the box 134 and the steels carried thereby from moving downwardly to an extreme degree but permit upward movement of the soldering steels, box 134, etc., when moved by the can body.

The lower seam is also preferably soldered on the outside and to this end the first soldering steel 144 is provided with a recess 146 extending for a substantial portion of the length of the steel, the recess 146 being approximately $\frac{3}{32}$ of an inch wide or slightly less, through which molten solder is fed to the bottom seam of the can. The additional steels 148 are provided to convey heat to the solder which the seam has taken from the slot 146 and thereby cause the solder to flow inside the locked seam or, in other words, to sweat the seam. Steels 144 and 148 are held in alignment and in contact with the seam by means of the curved arms 150 which are pivoted on shaft 152 carried by the box 156, the arms 150 being held in their adjusted position by means of set bolts 154 mounted on the curved arms 150 and which bear against the inverted box 156. The arms 150 are normally maintained in the position shown, to the limit permitted by the adjustment of the set screws 154 by means of springs 155, these springs permitting downward movement of the steels 144 and 148 under the influence of the can body being soldered. The gas burners are supplied with gas through the piping 158 and valves as shown. The fire box 156, similarly to the box 134, conserves the heat and also prevents the heat of the gas flame from striking the sides of the can and destroying the paint on lithographed cans. The entire assembly of the inverted box 156, steels 144 and 148, etc., is mounted on a set of parallel levers 160 pivotally supported at 162 on the angle bars 163 by means of bearings 164. The upper levers 160 are connected at 166 to the boxes 156, the lower levers 161 being connected together by a link 168. Movement of the link 168 to the left, for example, permits the box 156 and supported soldering steels to be dropped sufficiently so that they are accessible for being refluxed and retinned.

Solder is supplied to the recess 146 through the bent tube 170, welded against the side of the steel 144 and communicating with the recess 146 so that the interior of the tube 170 and of the recess 146 form a reservoir for molten solder. Solder is fed into the tube 170 by means of the pair of coacting rollers 173, the lower roller being driven by a pawl and ratchet device 174 driven through the link 175, latch 172, ratchet wheel 177 and lever 176, the latter being actuated by a cam 178 mounted on the longitudinal shaft 98. Lever 176 has a roller bearing engageable with the outer surface of the cam 178 and an adjustable connection with the link 175 for varying the amount of solder introduced. Strip solder fed inwardly between the rollers 172 and 173 is guided through the curved tube 180 into the heated supply tube 170 so that as the solder contacts with the wall of the tube 170 or with the solder therein it is melted and forms a part of the molten body in the reservoir.

As the can progresses beyond the soldering and sweating steels, the seams are brought into position to be wiped by the two cloth wheels 182 and 184 which wipe the seams immediately after soldering operation and while the solder is hot. The upper wheel 182 is driven from a countershaft by means of belts 186 and 187, the lower wheel 184 being similarly driven from the overhead countershaft by belts 189 and 190.

There is provided a transverse shaft 192, supported in bearings 193 and driven from the rearward transverse shaft 101 by sprockets 194 and 195 and a chain (not shown) encircling the same. The shaft 192 carries a horse support roll 196 coacting with a roll 198 built in the soldering horse and shaped to conform to the can body and lower roll 196, the roll 198 supporting the rearward end of the soldering horse, the forward end of which is supported adjacent the point of discharge from the body forming apparatus.

The operation of the above described apparatus will be clear from the above description. It is merely necessary to hook together the two body parts of which the can is to be formed at the idle station in front of the body forming machine. Thereafter the can blanks are carried in, step by step, first into the clinching or stamping station where the flanged edges are hooked together and the seam stamped in the formation of the rigid can body. The can is then automatically removed and placed in position to be picked up by the continuously moving chain driven from the main drive shaft of the forming machine so that the forming and soldering devices will be properly coordinated. During the passage of the can through the soldering apparatus the upper and lower seams are fluxed, soldered, sweated and brushed and finally discharged as finished can bodies ready for the addition of the remaining can parts, such as the bottom and top caps, supplied by other machinery not described herein.

Obviously many modifications and variations of the invention, as hereinbefore set forth, may be made without departing from the spirit and scope thereof, and therefore only such limitations should be imposed as are contained in the appended claims.

I claim:

1. In a can making machine for forming a can body from two body sections having cooperative flanged edges, one pair of which is preliminarily interlocked, a forming support, movable clamping arms for moving said sections into cooperative relation on said support with said flanged edges interlocked, one of said arms moving inwardly before the other to cause the flanges on said sections to interlock uniformly and means for clinching the interlocked edges of said body sections.

2. In a can making machine for forming a square can body from two angular body sections having cooperative flanged edges, one pair of which is preliminarily interlocked, a forming support, means for clamping said sections against said support with said flanges interlocked, means movable to and from position to engage within the angular bend in said sections for spreading the same for maintaining said edges interlocked, and means for clinching said interlocked flanged edges.

3. In a can making apparatus, a soldering device for applying solder to the under surface of a can seam, said device including a solder applying steel having a recess opening upwardly in position to be contacted by said can body, said recesses being of restricted width for preventing said can body from entering the same, a tube for supplying solder to said recess, said tube and recess constituting the entire reservoir for molten solder, means for heating said iron and tube and means for supplying solder to said tube.

4. In a can making apparatus, a soldering device for applying solder to the under surface of a can seam, said device including a solder applying steel having a recess of restricted width opening upwardly in position to be contacted by said can body, means for supplying solder to said recess, a plurality of heated steels adjacent said first named steel for sweating said solder into said seam and means for conveying a can body along said steels and through said soldering device.

5. In a can making apparatus, a soldering device for applying solder to the under surface of a can seam, said device including a solder applying steel having a recess of restricted width opening upwardly in position to be contacted by said can body, means for supplying solder to said recess, a plurality of heated steels adjacent said first named steel for sweating said solder into said seam, means for conveying a can body along said steels and through said soldering device and means for moving said soldering steels away from their normal operating position for repairing the same.

6. In a can making machine, a can support for receiving two can body parts having flanged edges, two of which are interlocked, a seam stamping station, reciprocating pushers for advancing said body parts into said stamping station, means for bringing said body parts into their final position with the edges thereof interlocked, means for stamping the interlocked edges into locked seams, means for removing said can body from said stamping station, a soldering device, means for advancing said can body uniformly into and through said soldering device, said soldering device including a fluxing mechanism, solder applying device, seam sweating steels and seam wiping element, operating simultaneously on both seams.

7. In a can making machine, a can support for receiving two can body parts having flanged edges, two of which are interlocked, a seam stamping station, reciprocating pushers for advancing said body parts into said stamping station, means for bringing said body parts into their final position with the edges thereof interlocked, means for stamping the interlocked edges into locked seams, means for removing said can body from said stamping station, opposed upper and lower soldering devices for simultaneously applying solder to the outer sides of both seams, means for advancing said can body uniformly into and through said soldering device with an upper and a lower seam on said can body, each of said upper and lower soldering devices including a fluxing mechanism, solder applying device, seam sweating steels and seam wiping element, operating successively on said seams.

8. In a can making machine, means for clinching opposed seams on can bodies formed from a plurality of body parts, means for conveying the clinched can bodies to a soldering apparatus and means for simultaneously soldering the exterior surface of the two opposed seams as said can bodies pass through said soldering apparatus.

9. In a can making machine for forming a can body from two body sections having cooperative flanged edges, one pair of which is preliminarily interlocked, a forming support, clamping arms positioned exteriorly of said sections, control means for moving said arms into cooperative relation on said support and coincidently interlocking the other pair of said flanged edges, means for expanding said sections, said control means thereafter operating to unclamp said arms and means for clinching said interlocked edges.

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