

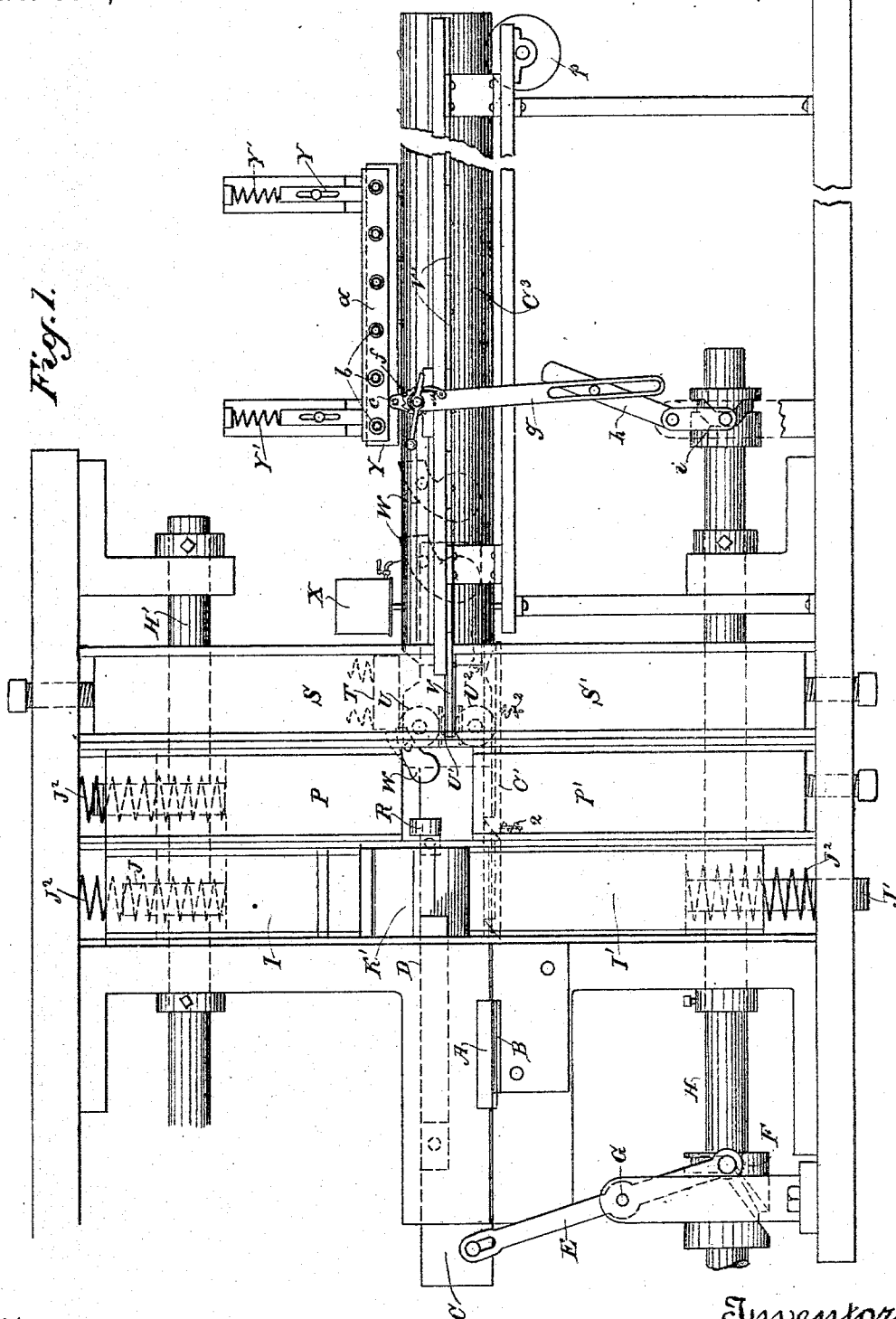
(No Model.)

3 Sheets—Sheet 1.

C. M. SYMONDS.
CAN BODY MAKING MACHINE.

No. 516,033.

Patented Mar. 6, 1894.



Witnesses,
J. H. Morse
J. F. Aschbeck

Inventor
Clarence M. Symonds
By Dwyer & Co.
attys

(No Model.)

3 Sheets—Sheet 2.

C. M. SYMONDS.
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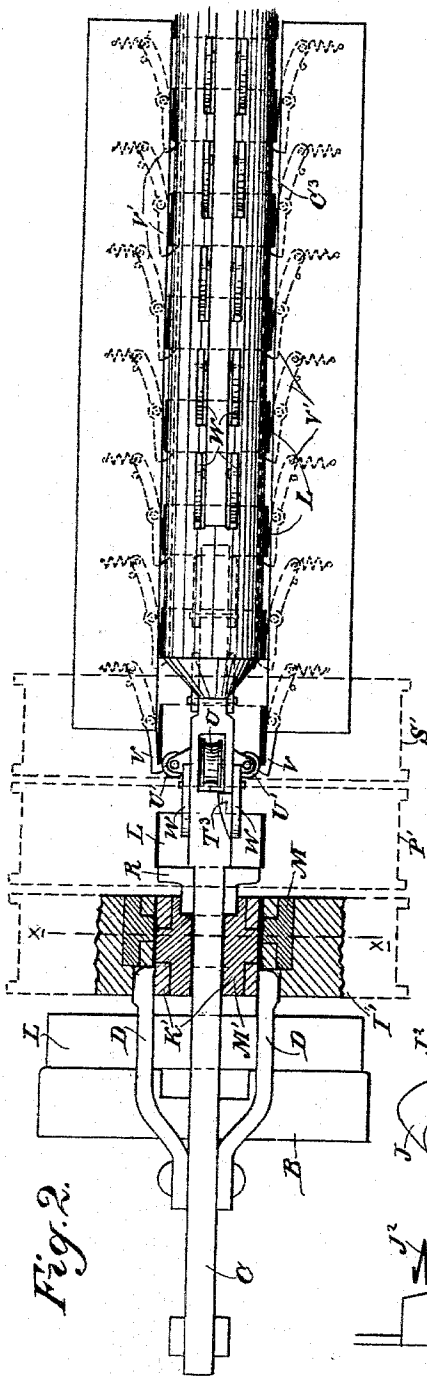


Fig. 2.

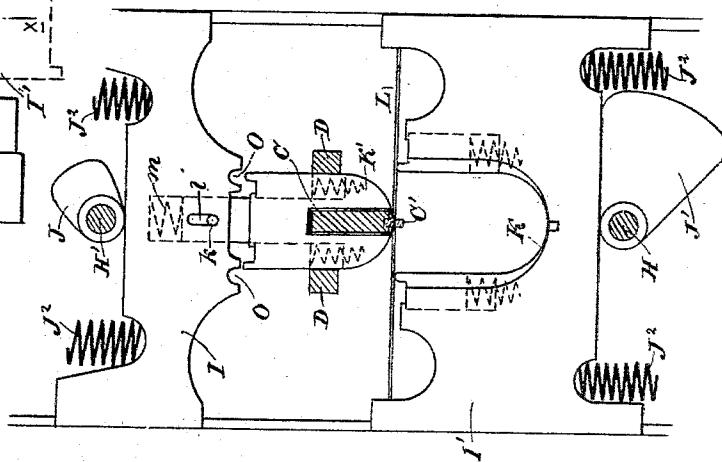


Fig. 3.

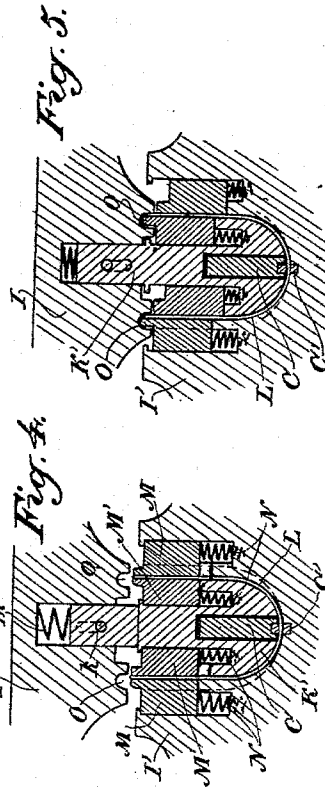


Fig. 4.

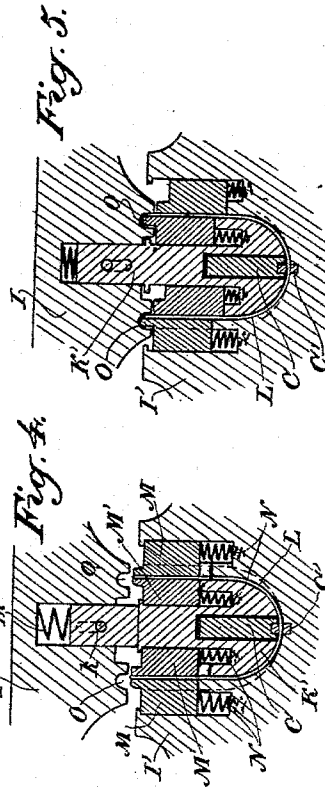


Fig. 5.

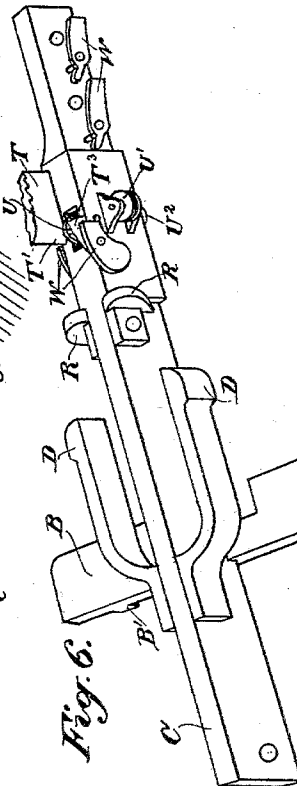


Fig. 6.

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UNITED STATES PATENT OFFICE

CLARENCE M. SYMONDS, OF SAN FRANCISCO, CALIFORNIA.

CAN-BODY-MAKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 516,033, dated March 6, 1894.

Application filed October 3, 1893. Serial No. 487,084. (No model.)

To all whom it may concern:

Be it known that I, CLARENCE M. SYMONDS, a citizen of the United States, residing in the city and county of San Francisco, State of California, have invented an Improvement in Can-Body-Making Machines; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to an apparatus for making can bodies.

It consists in certain details of construction which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 is a side elevation of a part of my apparatus. Fig. 2 is a plan view and partial section of the same. Fig. 3 is a transverse section, showing the first of the forming jaws separated from each other. Fig. 4 is a similar section on the line $x-x$ of Fig. 2 showing the jaws brought nearly together and in readiness to form the hooks upon the up-turned edges of the can. Fig. 5 is a similar section on said line $x-x$ showing the jaws closed and the hooks formed. Fig. 6 is a perspective view of part of the independent carrier. Fig. 7 is an end view showing the second pair of jaws open and the sheet of metal between them in readiness to be closed and the hooks clasped. Fig. 8 is an end view showing the jaws brought together and the sheet of metal closed into a cylindrical form, with the hook edges overlapping. Fig. 9 shows the can body with the overlapping edges closed to form the side seam. Fig. 10 is an end view showing a portion of the carrier and former. Fig. 11 is a transverse section showing the can in position with relation to the soldering apparatus. Fig. 12 is a perspective view of the movable guide blocks M. Fig. 13 is a modification of the supporting bar over which the can body passes after the seam is closed. Fig. 14 is a section showing the seam closing devices.

In carrying out my invention I employ successive sets of independent jaws; and an independent reciprocating interior carrier by which the prepared sheets of metal are advanced intermittently and delivered to the jaws, mechanism by which the sheet so delivered is bent, hooks formed upon the edges, said hooks caused to interlock, and the seam

thus formed finally closed, the can so formed then advanced to the soldering mechanism where the seam is finally sealed and completed, and mechanism by which these parts are operated with relation to each other at the proper intervals.

The sheet of which the can is to be formed is cut into the proper size and shape by any suitable mechanism, not here described, and is then delivered upon a table A in front of a cross-plate B which is secured to the longitudinal reciprocating carrier bar C. The cross-plate B has downwardly projecting lugs B' which enter the corresponding grooves in the table, and serve to guide and steady it in its movements, and also to prevent the tin from slipping beneath the cross-plate. Secured to the reciprocating bar C are two arms D projecting upon each side of the bar, and forming a sort of yoke, as shown in Figs. 2 and 6 so as to pass the forming die K'. These arms serve to advance the can body at a certain stage in its formation as will be hereinafter described. The lower jaw I' is recessed to pass over the ends of the arms when the jaw is raised.

The carrier bar C is reciprocated by means of an arm or link E connected with it at one end, having the other end actuated by a suitable cam F, and its intermediate portion fulcrumed as shown at G. The cam F is fixed upon a shaft H extending longitudinally with relation to the carrier bar, and other parts of the machine, and this shaft furnishes power to actuate the other portions of the apparatus at the proper times. An upper shaft H' carries cams to move the upper jaws, and is connected with and driven in unison with the shaft H, by gearing not here shown. The reciprocation of the bar C first delivers the sheet of tin between the upper and lower jaws I and I' which are caused to reciprocate toward each other by means of cams J and J' mounted respectively upon the shafts H' and H. Projections upon the outer ends of the jaw I' serve to keep the sheet in the center. A bar C' fits in grooves in the jaws and is held in place by pins extending down into the jaws P' and S', and is pressed up by springs 2 held in the same jaws. Hooks upon the bar C' engage the sheet of metal after it is carried forward and prevent its being drawn

back by the retraction of the bar C. The bar C has a groove or channel in the bottom, into which the points of the hooks fall when the sheet has passed. The lower jaw I' has a U-shaped channel formed in it as shown at K, and when the sheet of tin has been delivered by the carrier above the jaw I', as shown at L (Fig. 3) it lies just beneath a U-shaped former die K' of such shape and size that when the lower jaw I' is elevated, the sheet is folded by the U-shaped channel K around the U-shaped former die K'. The die K' has a shank extending up into a corresponding socket in the jaw I, and a pin *k* projects from the shank through a slot *l* in the jaw which limits the motion of the die. Above the shank in the socket is a spiral spring *m* of sufficient strength to hold the die down while the tin is being bent around its lower surface, but this spring yields as the jaws come together, and allows them to close and bend the upper edges of the tin into a hook form as herein-after described. The jaws I and I' are, as before stated, moved toward each other by the cams J J', and they are retracted by springs J² when released from the pressure of the cams. The former die moves up with the upper jaw of which it forms a part, and when thus lifted is suspended above and clear of the carrier C. The upper edges of the bent sheet extend upward between the vertically sliding blocks M and M', which by their position upon each side of the sheet of metal serve to support it and prevent its being buckled when the upper jaw engages its upper edges for the purpose of turning them to form the hooks of the seam. These movable blocks M M' are supported upon springs, as shown at N, which allow them to move downwardly when the upper jaw I is depressed so as to bring its forming surface into contact with the upper edges of the sheet of metal. The lower part of the jaw I has two semicircular grooves or channels O made at such points that when the jaw I is brought down, the upper edges of the sheet of tin will enter these grooves or channels upon one side. In the present case, the position of the grooves with relation to the upper edges of the sheet of tin are such that the tin enters the right side of each groove and as the jaw approaches, the spring-actuated blocks M M' recede, thus allowing the sheet of tin to project up between them and form contact with the grooves, as before stated. The movable blocks M M' serve as supports upon each side of the body of the sheet of tin and prevent its being buckled by the pressure of the upper jaw, and the upper edges of the tin will thus follow the curves around and be bent into semi-circular form as plainly shown in Figs. 5 and 7. I have shown raised ledges upon the upper edges of the blocks M M', but these have nothing to do with the formation of the hooks, but may in some instances prevent the outer ends of the hooks being bent around too far and curved inwardly. The lower part of the former die K' is slotted so that the carrier bar C may reciprocate freely through the slot, as previously described. Before the sheet of metal is bent into the form here described, the carrier bar will have been retracted, so that the ends of the arms D are behind the sheet, and after the sheet is bent into this form, the forward movement of the carrier bar brings the ends of these arms into contact with the sheet and advances it to the next set of jaws P and P', where it is retained by a second lug or projection on the bar C'. The upper jaw I remains down while the tin is advanced into the next pair of jaws P P' in order to prevent the sides of the sheet from springing apart. The lower jaw P' is stationary and has a flaring mouth or opening similar to that shown in the jaws S S' in Fig. 14 to receive and guide the tin as it enters. When the upper jaw is reciprocated toward the lower one, the curvature of the lower jaw is such that it retains the shape of the lower curved portion of the sheet which is approximately semicircular, while the two arcs of different curvature forming the upper jaw, as shown in Fig. 7, impinge upon the opposite hooked edges of the sheet, and draw the hooks Q, which were formed in the previous operation, together and cause them to overlap each other, as shown in Fig. 8. When the jaws are again separated, the elasticity of the sheet of metal produces a tendency of the edges to spring apart, and this draws the overlapping hooks together, and causes them to engage, leaving the sheet of tin in an approximately cylindrical form. The carrier bar C has lugs R upon each side, which pass between the sides of the sheet when the bar is retracted, and before the sheet has been closed and hooked together. The upper jaw has recesses P² into which the lugs R are received when this jaw closes down to hook the edges of the tin together. After the sheet is closed, as above described, it is in front of the two lugs R, and the ends of these two lugs project sufficiently beyond the diameter of the partially formed can body, so that the next advance of the reciprocating carrier bar, causes these lugs to engage the body and transfer it from the second pair of jaws P and P' into the last set of jaws S S' which are stationary with relation to each other, and have an open flaring mouth, as shown in Fig. 14, into which the body as formed is moved from the jaws P P'. As the can body enters the cylindrical opening in the jaws S S', it is guided by a spring actuated bar T in the jaw S, the front end of which is beveled off as shown at T' (Fig. 6) so that the seam will pass along this beveled end. The carrier bar has a beveled projection T³ which, when the bar is retracted, presses the two hooks together in readiness to be closed by the compression wheel. Upon the top of the carrier bar C, at a point beyond the position occupied by the can when it is introduced into the jaws S S', is a wheel or roller U, shown in Figs. 2, 6, 9 and 14. This

roller has a channeled face which adapts it to fit the inner surface of the seam, and as the carrier bar C is retracted, the can body is grasped by two hooks V which prevent its being withdrawn as the carrier bar moves backward, and the roller U passing over the interlocked seam closes it firmly against the interior of the jaws S S' within which the can body now rests. Two other rollers U' travel against the sides of the can body and jaws S S' during this process, to keep the carrier bar central, and a bottom roller U² travels against the bottom of the can and jaw S' holding the bar in place within the jaws, against the pressure of the seam closing top roller. The side rollers U' are grooved or channeled to allow the hooks of the holding arms or dogs V to pass when the carrier bar and rollers are retracted.

Upon each side of the carrier bar C are fulcrumed the gravity pawls W, shown plainly in Fig. 6, and as the bar is retracted so as to move these pawls through the can body, the front ends are depressed until they have reached the rear of the can, when the weight of the rear ends tilts them upward, and causes them to engage with the rear edge of the now completed can. The next forward movement of the carrier bar causes these engaged pawls to force the can out of the jaws S S', and it is then held by the hooks V', and as the carrier bar is retracted, the can passes upon the supporting extension, or continuation C³ of the carrier bar, over which the can is moved intermittently, first passing beneath the acid tank, then beneath the soldering bar, and finally being delivered over the end of the extension. These intermittent movements are effected by the series of gravity pawls W and the spring-actuated hooks V', the springs yielding to allow the hooks to pass over the body of the can when the carrier bar is moved forward, and retaining the can in position when the carrier moves back. The pawls W of the support C³ are hung in channels formed in the support, and the sides of the support are channeled longitudinally to admit the points of the hooks V'. The soldering bar Y has its upper part inclosed in a casing a, through the bottom of which its lower edge projects so that the seam of the can body passes beneath and in contact with the edge of the soldering bar. Springs Y' press the bar down with a yielding pressure. Within the channel, on the top of the support and between the gravity pawls W, is a bed of slate or other non-metallic substance which prevents the solder from adhering when it comes in contact with the surface. b b are gas jets entering the sides of the casing a, and the former impinges upon the sides of the iron, thus keeping it heated to the proper temperature.

The solder is applied in the form of small rods c, one end of which is secured in a holder d, and the other is moved forward intermittently so as to press against the soldering

bar Y which melts off a sufficient amount from the rod to solder the can as it passes. As many of these rods of solder may be employed as are necessary along the line of the soldering bar. I have shown but one for the purpose of illustration.

The holder d travels between guides and has a nut formed in its lower end which fits upon a screw e. This screw is turned by a pawl and ratchet mechanism f shown plainly in Figs. 1 and 11, the ratchet wheel being fixed upon a screw shaft, and the pawl upon a swinging arm g which is actuated by a lever h moved by a cam i upon a shaft H. After the can has passed beneath the soldering bar and the work is completed, it is finally delivered at the end of the apparatus in a completed state.

p is a roller journaled beneath the outer end of the extension portion of the carrier, over which the cans pass to support and keep it in line.

I have heretofore described the apparatus so placed that the seam is formed upon the top, and is passed beneath a soldering iron, but the machine can be reversed without change, and the seam formed upon the bottom, so that the soldering may be done from below by means of a solder bath in any well known manner. The extension C³ of the carrier may be made cylindrical, or in the form of a cross as shown in Fig. 13.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a can body forming machine, jaws movable to and from each other and adapted to receive sheets of tin between them, a forming die projecting from one jaw and a U-shaped channel formed in the opposing jaw, adapted to fit the corresponding die and to bend the sheet of tin around the lower part of said die, semi-circular grooves or channels formed in the first named jaw into which the upper edges of the sheet of metal are forced by the approach of the jaws, and by which these edges are bent into a hook-form when the jaws are brought together, substantially as herein described.

2. In a can body forming machine, jaws situated one above the other, movable toward each other, and adapted to receive sheets of tin between them, a forming die depending from the upper jaw, a U-shaped channel formed in the lower jaw adapted to fit the correspondingly shaped die and to bend the sheet of tin around the lower part of said die, semi-circular grooves or channels formed in the lower part of the upper jaw into which the upper edges of the sheet of metal are forced, and by which they are curved into a hook-shaped form when the jaws are brought together, and movable supporting blocks M and M' between which the sides of the sheet of metal pass, and by which it is prevented from buckling, while the hooks are being formed, substantially as herein described.

3. In a can body making machine, vertically moving jaws, cams by which they are caused to approach each other, and springs by which they are retracted when relieved from the pressure of the cams, a U-shaped channel formed in the lower jaw, a forming die depending from the upper jaw around which the middle part of a sheet of metal introduced between the jaws is bent when the lower jaw is moved upward, semi-circular grooves or channels formed in the lower face of the upper jaw, into which the upper edges of the sheet of metal pass when the jaws approach, and by which these edges are curved into a hook-shaped form, spring-actuated holding blocks M M' between which the sides of the sheet of metal are supported, while the upper edges are being curved into the hook-shaped form, substantially as herein described.

4. In a can body forming machine, jaws and mechanism by which they are moved to and from each other, a forming die around which the sheet of tin is bent, and grooves or channels by which the upper edges are bent into a hook-shaped form, in combination with a reciprocating carrier by which the sheets of metal are moved forward between said jaws, and by which the partially bent sheet with its hook flanges is moved out of the former by the intermittent motions of the carrier, substantially as described.

5. In a can body forming machine, the movable jaws by which the sheet of metal is first bent into a U-shaped form and the upper edges bent into hooks, a second pair of jaws between which the bent sheet is advanced, the lowermost of said jaws serving to support the semicircular lower portion of the sheet, and the upper jaw having curves formed in its lower face by which the hooks on the upper edges of the sheet are brought together and interlocked when the upper jaw approaches the lower one, substantially as herein described.

6. In a can body forming machine, the jaws by which the sheet of metal is bent, hook-shaped flanges formed upon it and interlocked with each other, and other jaws having a cylindrical opening made through them into which the sheet with its interlocked edges is moved, a reciprocating interior carrier bar by which the forward movements of the sheet are produced, and a roller journaled in the upper part of the bar, and adapted to close the interlocking edges of the seam when the carrier bar is retracted through the jaws in which the can body is held, substantially as herein described.

7. The cylindrical stationary jaws, a carrier bar reciprocating through the interior, devices attached thereto by which the can body is advanced into the jaws, an exterior guide against which one of the interlocked edges of the seam is moved when the can enters the jaws, and a second interior guide by which they are pressed together, a roller journaled in the top of the carrier bar at such a point

that it is in front of the can body when the latter is moved into the jaws, and is rolled backwardly over the interior of the seam so as to close it when the carrier is retracted, and guide rollers upon the sides and bottom of the carrier bar, substantially as herein described.

8. In a can body forming machine, the jaws into which the can body is introduced, a reciprocating carrier bar with lugs by which the can is advanced into the jaws, and interior closing and guide rollers upon the carrier bar, as shown, in combination with the hooks V adapted to engage the rear edge of the can body and retain it in position while the bar is being retracted and the seam is being closed, substantially as herein described.

9. In a can body forming machine, the independent successive pairs of jaws between which the sheet of metal is introduced and bent into the form of a can, and its edges closed to form a seam, in combination with a reciprocating bar with devices by which the sheet and can are successively moved forward from one set of jaws to the other and delivered from the final seam closing jaws, an interior reciprocating support upon which the can is carried from the seam closing jaws to pass successively beneath an acid tank, and a soldering bar, and spring-actuated hooks adapted to engage the rear edges of the can to hold it in position when it has been advanced by the carrier, and prevent its being retracted when the carrier recedes, substantially as herein described.

10. In a can body forming machine, the independent successive forming jaws I, P and S, a carrier bar reciprocating longitudinally between them, a transverse bar B attached thereto having the downwardly projecting guide lugs B' and adapted to move the sheets forward into the first set of jaws, substantially as herein described.

11. In a can body forming machine, the successive sets of independent jaws by which the sheet of metal is formed into a can, a longitudinally reciprocating carrier bar having a transverse plate by which the sheet is advanced between the first set of jaws, a yoke consisting of arms D D attached to the bar and the ends adapted to engage the rear edge of the sheet after it has been bent by the first named jaws and advance it between the jaws by which the sheet is closed and the edges interlocked, lugs R R fixed to the carrier bar in such position that when the sheet has been closed and the edges interlocked, these lugs engage the rear edges of the sheet and move it forward into the jaws in which the seam is closed, substantially as herein described.

12. In a can body forming machine, the successive independent sets of forming jaws by which the sheet of metal is bent into the form of a can and the edges interlocked and compressed to form a longitudinal seam, a plate T having a beveled edge adapted to

guide the seam, as it enters the final jaws, and hooks engaging the edge of the can to retain it in position in said jaws, and guide and compression rollers attached to the carrier bar which close and compress the seam when the bar is retracted through the interior of the cans, substantially as herein described.

13. In a can body forming machine, the successive sets of jaws between which the sheet of metal is bent into the form of a can body, jaws into which the can is moved after the edges have been interlocked, and within which the seam is closed, said jaws having a divergent or funnel shaped mouth to act as a guide for the body of the can, and a spring actuated bar having a beveled front end by which the outer edge of the seam is guided as the can enters the jaws, and an inner bar between which and the outer one the parts of the seam are retained in line until compressed, substantially as herein described.

14. In a can body forming machine, the successive sets of forming jaws, a reciprocating carrier by which the sheet of metal is advanced intermittently between said jaws until the can body is formed and the seam closed, an interior reciprocating support which carries the can from the final jaws beneath an acid tank, a spring-actuated soldering bar extending along above the upper edge of the support, so that the lower edge will press upon the seam of the can when the latter passes beneath it, gas jets upon each side of the soldering bar by which it is kept hot, and solder rods with a mechanism by which they are held and approached to the soldering bar so that the ends are melted thereby and the solder delivered upon the seam, substantially as herein described.

15. The interior reciprocating support by which the cans are advanced, the pawls by which they are moved, a soldering bar extending along above the support and adapted to form contact with the seam as the cans pass beneath it, a means for applying solder to the seam while the can is passing, and an interior bed of slate over which the seam passes while being soldered substantially as herein described.

16. A reciprocating support over which the cans pass, pawls by which they are moved, a soldering bar dependent above the support and in line with the seam of the can which passes beneath it, a holder or holders in which rods of solder are supported with the ends approximate to the soldering iron and the seam of the can which has passed beneath it, a means for advancing the solder so that it will be melted and applied to the seam, consisting of a screw and traveling nut by which the holder is advanced, a pawl and ratchet, a swinging arm and a connection between said arm, and a cam upon the shaft H, substantially as herein described.

17. In a can body forming machine, the vertically disposed jaws between which the sheets

of metal are delivered cam shafts and cams by which the jaws are caused to approach, a yielding former die connected with one of the jaws, and a correspondingly shaped channel in the other between which the sheet of metal is first bent into a U form, and grooves by which the upper edges are bent into a hook form by the approach of the jaws, and springs by which the jaws are retracted when relieved from the pressure of the cams, substantially as herein described.

18. In a can body forming machine, independent jaws reciprocating to and from each other, and adapted to receive sheets of metal between them, a U-shaped channel made in one of the jaws, and a correspondingly shaped die having a shank extending into the other jaw, a spring acting against the end of the shank, a guide slot and pin by which the movements of the shank and die are limited, substantially as herein described.

19. In a can body forming machine, independent jaws reciprocating to and from each other and adapted to receive sheets of metal between them, a U-shaped channel made in one of the jaws, a correspondingly shaped die yielding connected with the other jaw about which the sheet of metal is folded by the approach of the jaws to each other, a carrier bar reciprocating freely through the open slot in the lower part of the die having a groove or channel made in its lower surface and a hook bar with dogs adapted to engage the rear edge of the sheet of metal to prevent its being retracted by the rearward movement of the bar, and a channel in the carrier bar into which said hooks fall, substantially as herein described.

20. In a can body forming machine, jaws movable to and from each other with a channel in one, and a corresponding die connected with the other, whereby the sheets of metal are first bent into a U-shaped form, and grooves in one of the jaws by which the upturned edges of the sheet are curved into hook form, a movable and stationary jaw succeeding the first named jaws, and adapted to receive the partially bent sheet, a reciprocating carrier bar and attachments by which the sheet is moved from the first to the second jaws, the uppermost of the first jaws remaining in its depressed position until the sheet has moved into the second jaws whereby the grooves O by which the hook flanges are formed continue to engage the upper edges of the sheet of metal and prevent their springing apart until they have been introduced between the second set of jaws, substantially as herein described.

21. In a can body forming machine, reciprocating jaws between which the sheet of metal is received, and by which it is partially bent into cylindrical form, and hook-shaped flanges formed upon its upper edges, a second set of jaws and a reciprocating carrier by which the partially bent sheet is advanced from the first set of jaws to the second, the

lowermost of the second set of jaws being stationary and having a U-shaped channel formed in it to receive the lower part of the sheet, and a movable upper jaw having its lower edges formed with concave channels of different curvature and radius, whereby the upper edges of the metal are drawn toward each other when the upper jaw approaches the lower one, and the hook-shaped edges are caused to interlock with each other, substantially as herein described.

22. In a can body forming machine, jaws by which the sheet of metal is bent, and hook shaped flanges formed upon its upper edges, other jaws, and a carrier by which the sheet is advanced from the first named jaws between the second ones wherein the sheet is bent and the hook edges interlock, a third pair of stationary jaws into which the partially formed can is delivered by the carrier, a guide projecting downward from the upper jaw which forms contact with the upper portion of the seam as the can enters the jaws and guides it into position, and a corresponding guide upon the top of the carrier by which the inner portion of the seam is guided into close contact with the outer one, and a roller journaled in the upper part of the carrier bar rolling in contact with and closing the seam in the interior of the can when the bar is retracted, substantially as herein described.

23. In a can body forming machine, the jaws into which the can body is moved after the hook edges of the seam have been interlocked, guides by which the two parts of the seam are directed and pressed into contact with each other, a roller in the top of the car-

rier by which the seam is finally closed on the interior of the can when the carrier bar is retracted, a corresponding supporting roller in the bottom of the carrier bar, and side rollers by which the bar is retained centrally within the jaws and the can body, said side rollers having channels or grooves formed in them, and spring-actuated hooks V pivoted to the jaws and adapted to engage the rear edge of the can to hold it in place in the jaws while the carrier bar is being retracted, said hooks passing through the slots in the said rollers as the latter are drawn backward, substantially as herein described.

24. In a can body forming machine, jaws movable to and from each other and adapted to receive sheets of metal between them, a forming die on one jaw and a channel in the opposing jaw adapted to fit said die whereby the sheet of metal is shaped around the said die, said jaws also provided with means by which the edges of the sheet are bent into hook-form by the approach of the jaws, other pairs of jaws adapted to operate respectively upon the sheet or can body when advanced to said pairs of jaws to respectively complete the formation of the can body and to close the seam thereof, and means for advancing the sheets and can bodies, said machine adapted to be reversed and operate with either side uppermost.

In witness whereof I have hereunto set my hand.

CLARENCE M. SYMONDS.

Witnesses:

S. H. NOURSE,

J. A. BAYLESS.