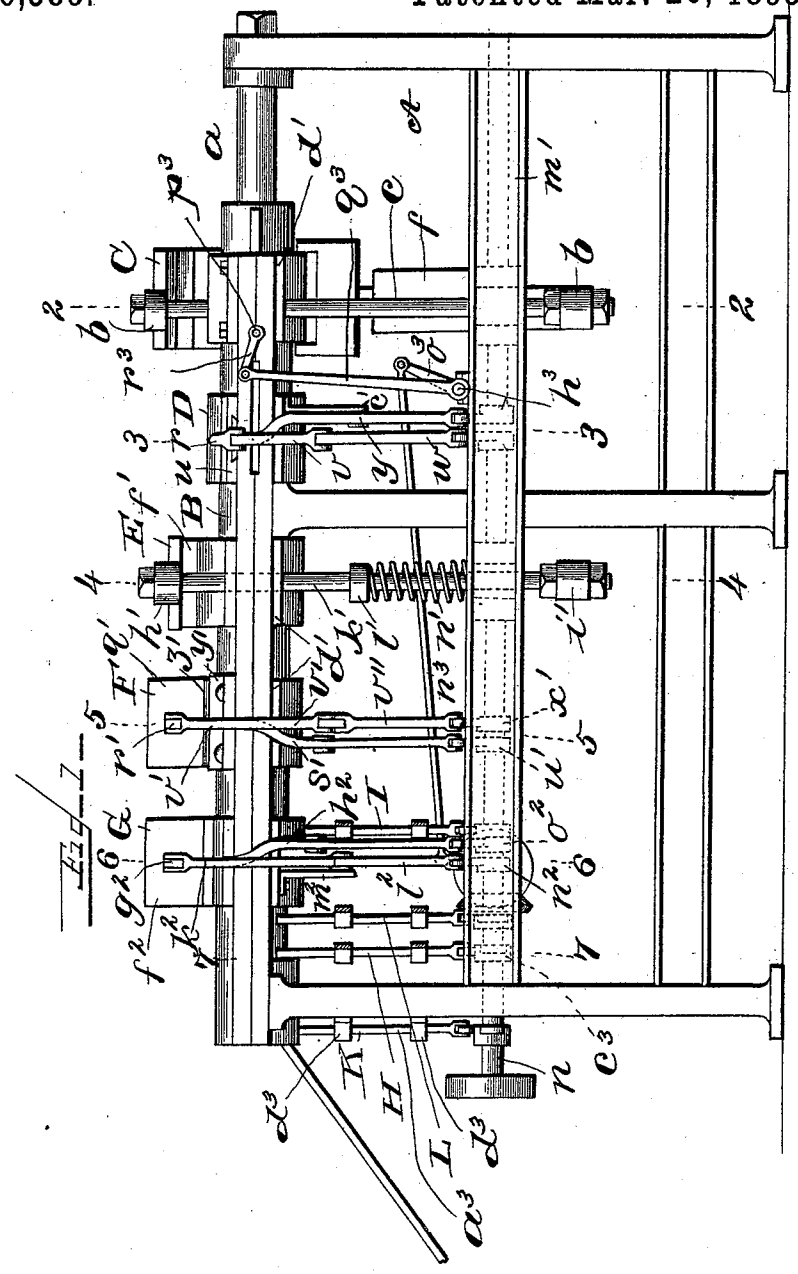
(No Model.) 9 Sheets—Sheet 1.

G. T. PILLINGS.

MACHINE FOR FORMING AND SOLDERING LOCK SEAMS OF SHEET METAL CANS.

No. 536,589. Patented Mar. 26, 1895.



Witnesses
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(No Model.) 9 Sheets—Sheet 2.

G. T. PILLINGS.

MACHINE FOR FORMING AND SOLDERING LOCK SEAMS OF SHEET METAL CANS.

No. 536,589. Patented Mar. 26, 1895.

Fig. 3.

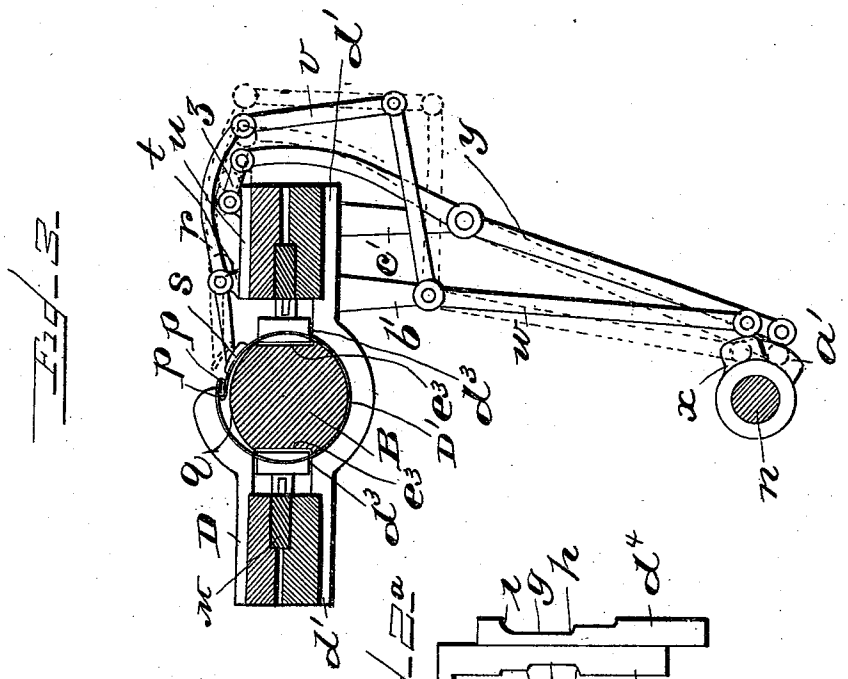
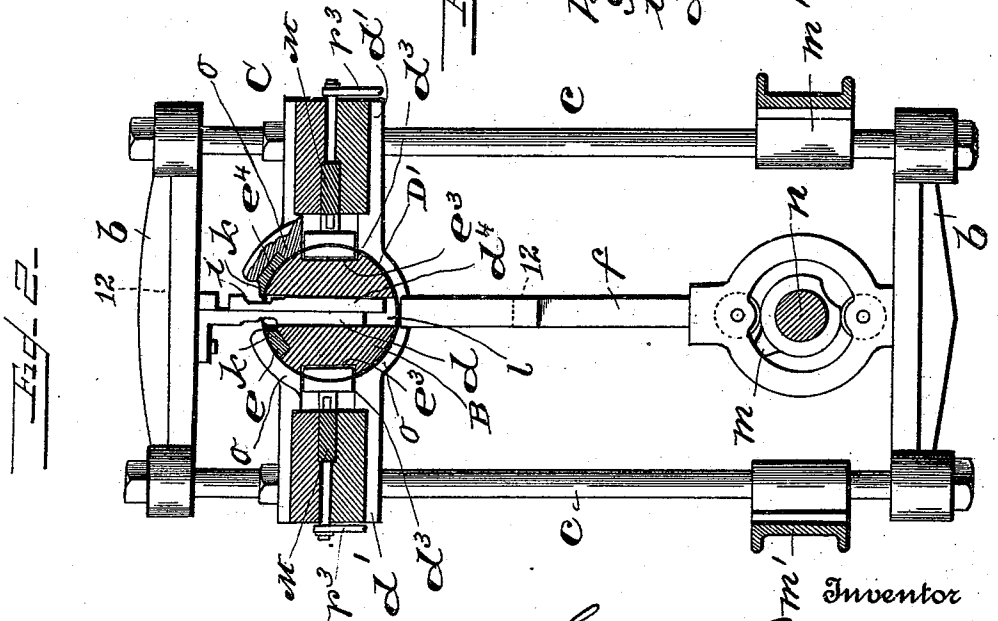


Fig. 3a.

Fig. 2.



Witnesses

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(No Model.) 9 Sheets—Sheet 3

G. T. PILLINGS.

MACHINE FOR FORMING AND SOLDERING LOCK SEAMS OF SHEET METAL CANS.

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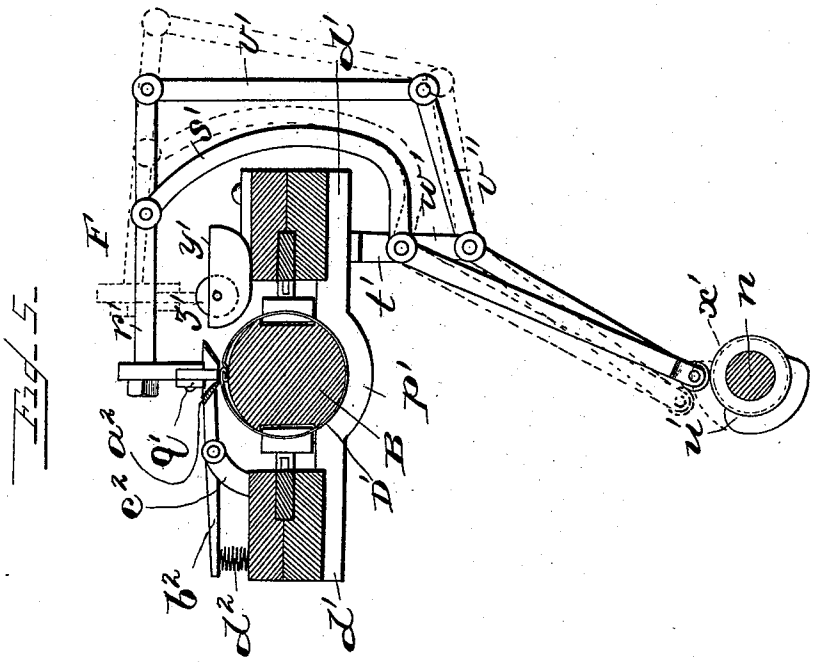

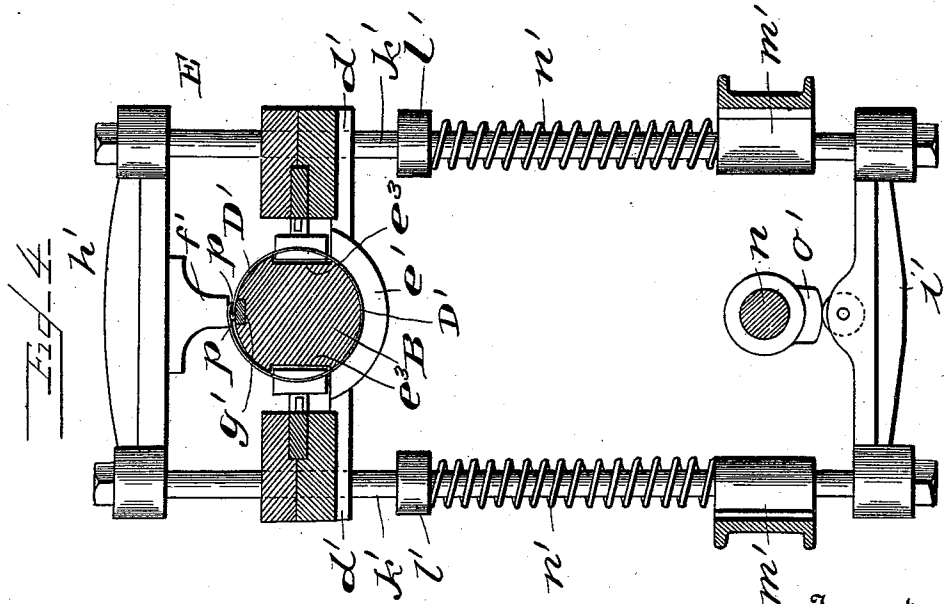

Witnesses
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(No Model.) 9 Sheets—Sheet 4.

G. T. PILLINGS.

MACHINE FOR FORMING AND SOLDERING LOCK SEAMS OF SHEET METAL CANS.

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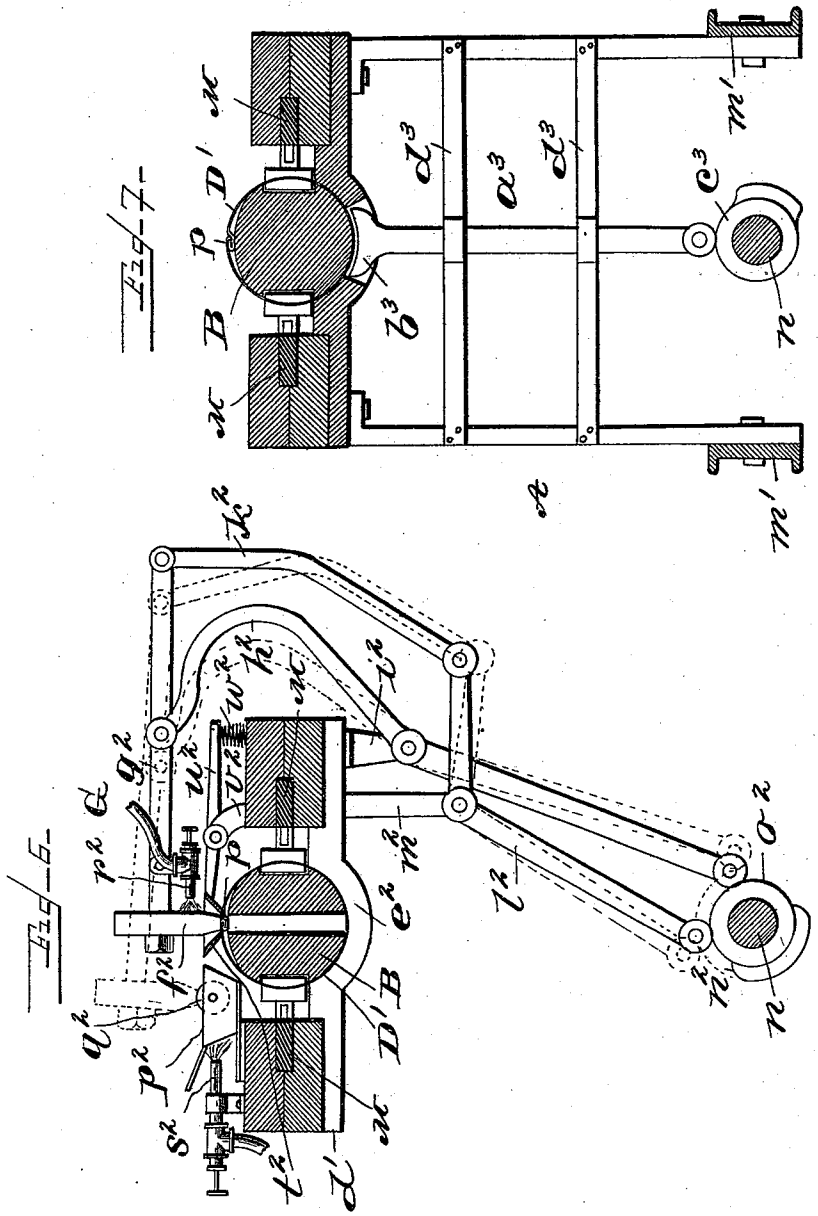

Witnesses
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(No Model.) 9 Sheets—Sheet 5.

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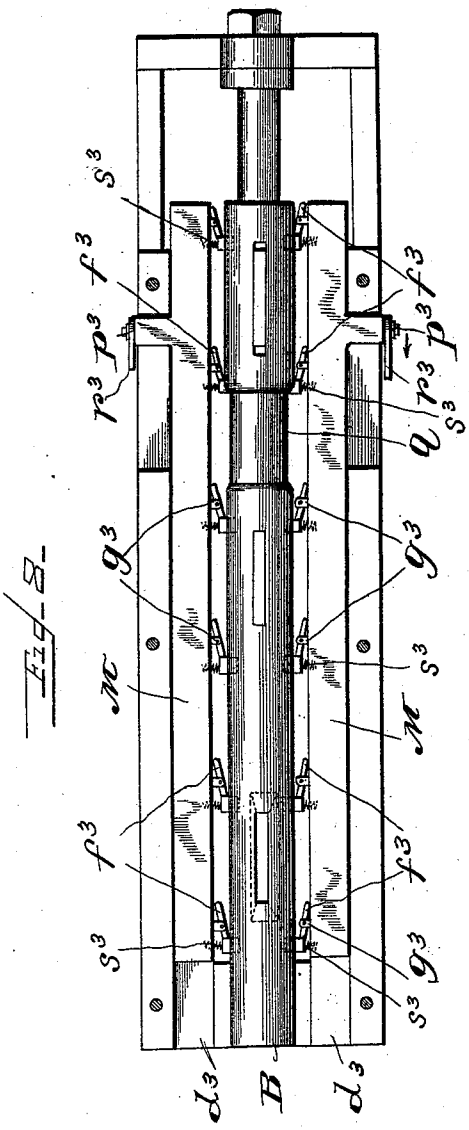
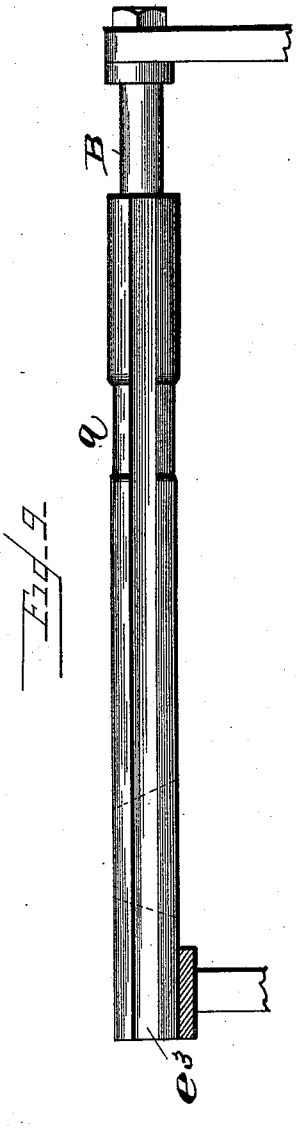
MACHINE FOR FORMING AND SOLDERING LOCK SEAMS OF SHEET METAL CANS.

No. 536,589. Patented Mar. 26, 1895.





Witnesses.
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(No Model.) 9 Sheets—Sheet 6.

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MACHINE FOR FORMING AND SOLDERING LOCK SEAMS OF SHEET METAL CANS.

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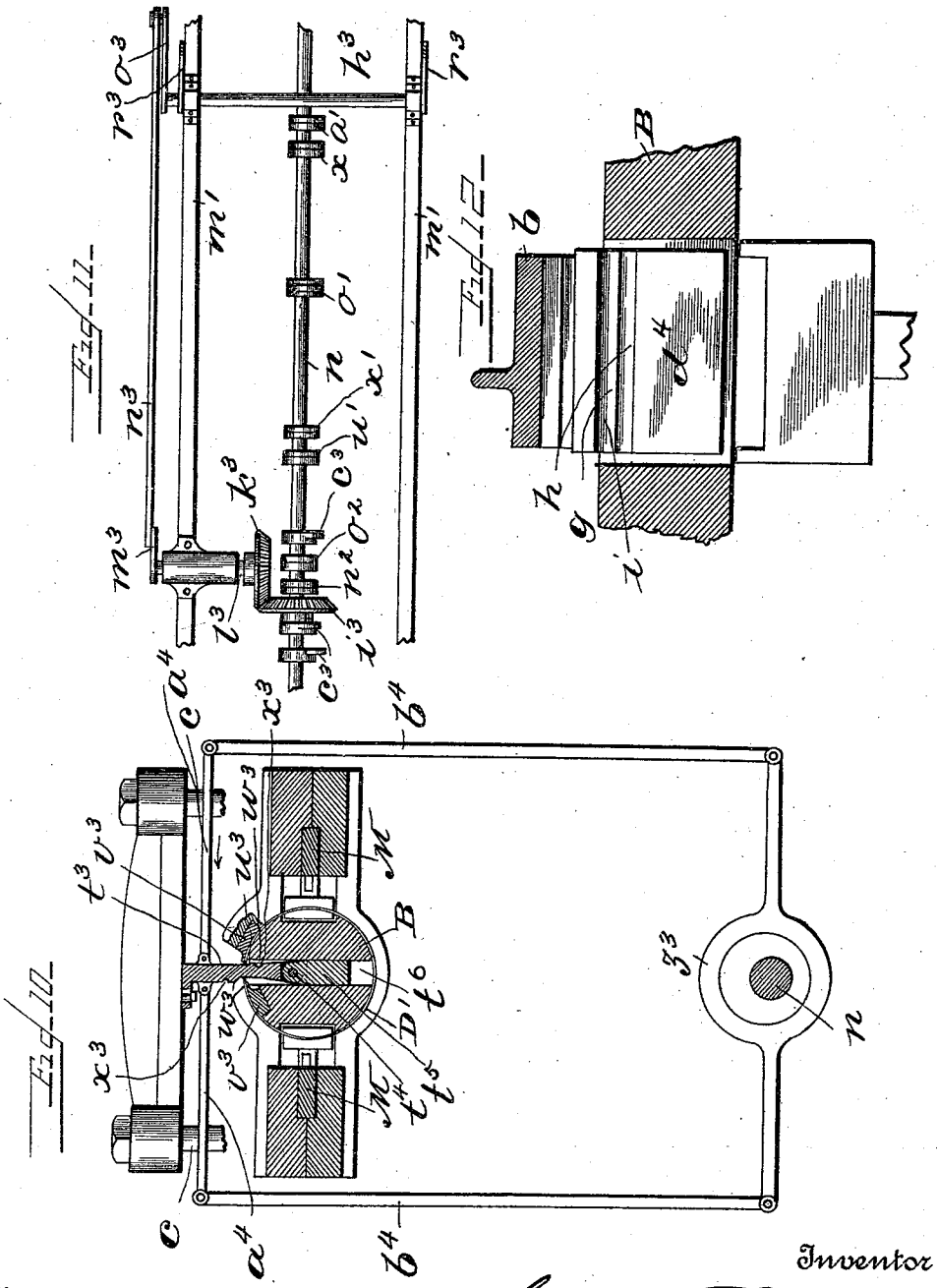

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(No Model.) 9 Sheets—Sheet 7.

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MACHINE FOR FORMING AND SOLDERING LOCK SEAMS OF SHEET METAL CANS.

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Fig. 11.

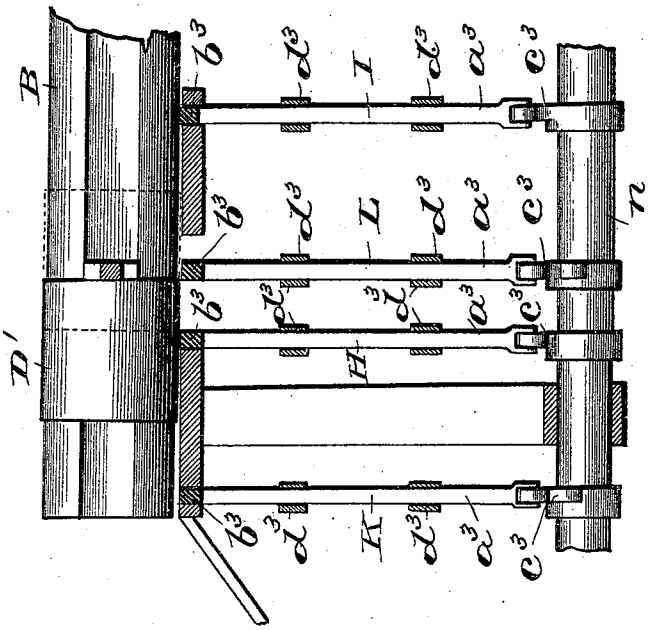
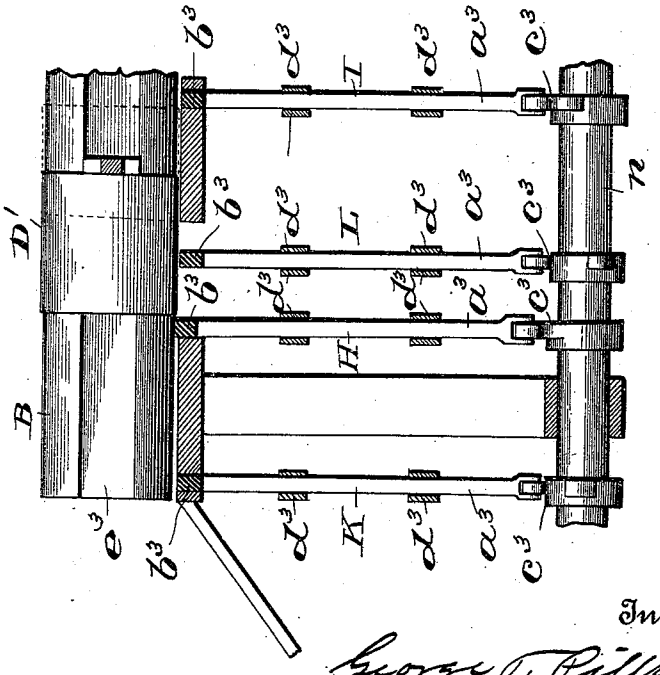


Fig. 12.



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(No Model.) 9 Sheets—Sheet 8.

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MACHINE FOR FORMING AND SOLDERING LOCK SEAMS OF SHEET METAL CANS.

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Fig. 15.

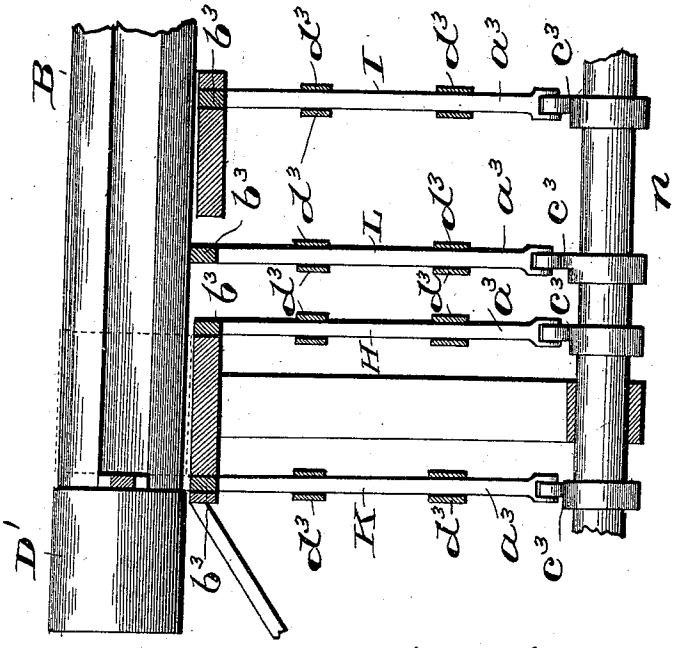
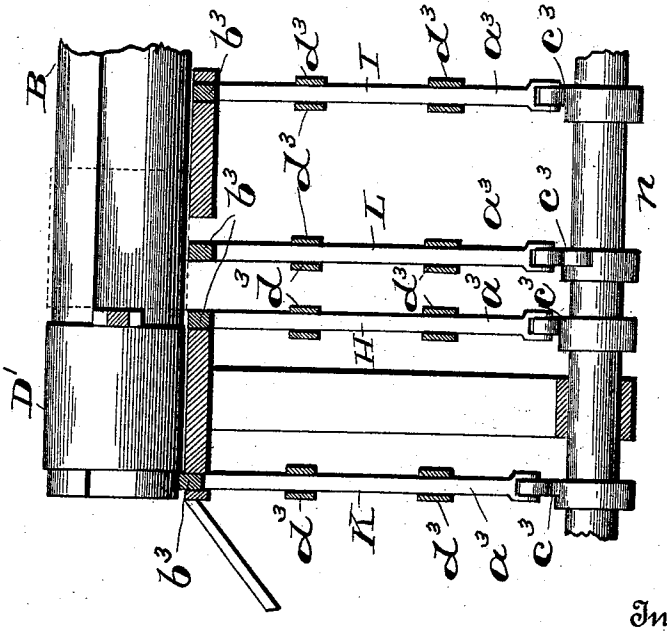


Fig. 15.



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(No Model.) 9 Sheets—Sheet 9.

G. T. PILLINGS.

MACHINE FOR FORMING AND SOLDERING LOCK SEAMS OF SHEET METAL CANS.

No. 536,589. Patented Mar. 26, 1895.

Fig. 17.

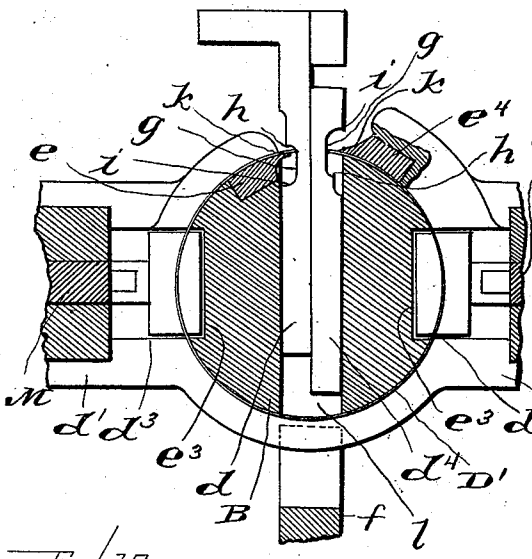


Fig. 18.

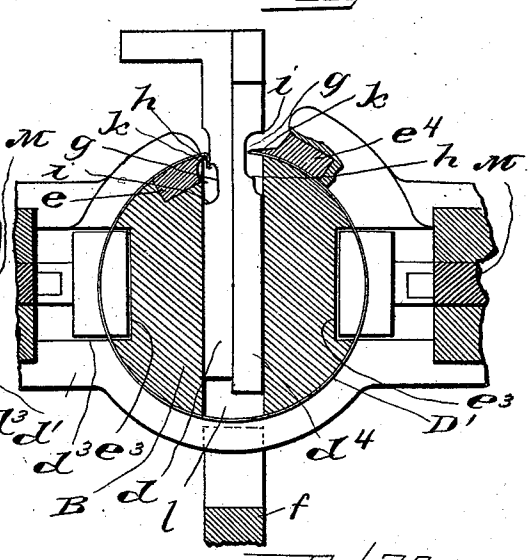


Fig. 19.

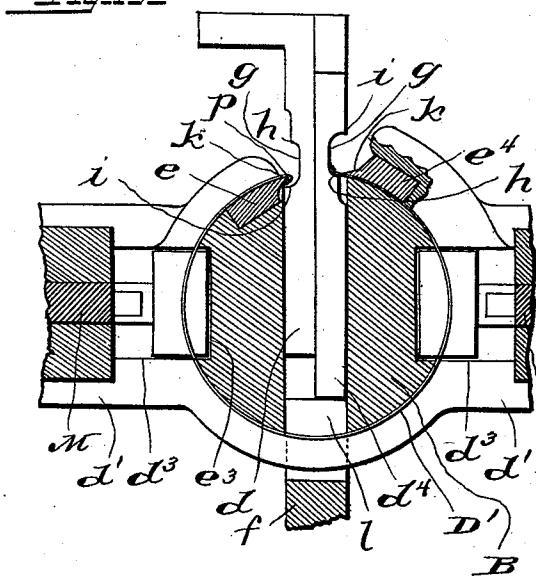
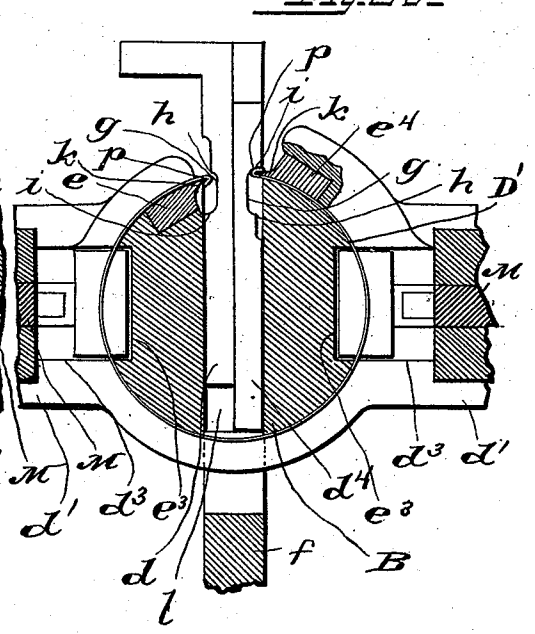


Fig. 20.



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UNITED STATES PATENT OFFICE.

GEORGE T. PILLINGS, OF BALTIMORE, MARYLAND, ASSIGNOR TO R. TYNES SMITH, OF SAME PLACE.

MACHINE FOR FORMING AND SOLDERING LOCK-SEAMS OF SHEET-METAL CANS.

SPECIFICATION forming part of Letters Patent No. 536,589, dated March 26, 1895.

Application filed January 11, 1895. Serial No. 534,585. (No model.)

To all whom it may concern:

Be it known that I, GEORGE T. PILLINGS, a citizen of the United States, residing at the city of Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Machines for Forming and Soldering Lock-Seams of Sheet-Metal Cans; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My present invention relates to machines for making sheet metal cans and has especial reference to machines for making cans provided with a lock seam, and it is my purpose to construct a machine that will consecutively bend the edges of the tin and form flanges thereon, then lock the flanges, then press the flanges down upon each other and form a seam, then flux the seam and finally solder the seam, and which machine shall be capable of being operated by unskilled labor.

With this object in view the invention will be fully disclosed in the following specification and claims.

In the accompanying drawings, which form part of this specification, Figure 1 represents a side elevation of my improved machine, some of the supports for the levers being omitted to avoid crowding the drawings; Fig. 2, a transverse section on the line 2, 2, showing the mechanism for bending the edges of the tin; Fig. 2^a, an enlarged section of the bars for bending the edges of the tin and forming the flanges; Fig. 3, a like view on the line 3, 3, showing the mechanism for engaging the flanges; Fig. 4, a like view on the line 4, 4, showing the mechanism for pressing the flanges upon each other and forming a seam; Fig. 5, a like view on the line 5, 5, showing the mechanism for fluxing the seam; Fig. 6, a like view on the line 6, 6, showing the mechanism for soldering the seam; Fig. 7, a like view on the line 7, 7, showing part of the mechanism for raising the mandrel to remove the soldered can-bodies from the mandrels; Fig. 8, a top plan view of the can moving mechanism resting on the frame of the machine; Fig. 9, a side elevation of the same; Fig. 10, a transverse section on the line 2, 2, showing a modification of the mechanism for forming the flanges on the edges of the tin; Fig. 11, an inverted plan view on the line 11, 11, showing the cam shaft and the connections for moving the cams while they are being operated upon; Fig. 12, a transverse section on the line 12, 12, on Fig. 2 showing the face of one of the dies for forming the flanges. Figs. 13, 14, 15 and 16, are vertical longitudinal sections of the machine beyond the point where the seam is soldered and show the mechanism for raising the mandrel to remove the can-body therefrom. Figs. 17, 18, 19, and 20 are enlarged sectional details showing the mechanism for bending the flanges in its several positions.

Reference being had to the drawings and the letters thereon, A indicates the frame of the machine in which is supported a mandrel B on which the can-bodies are operated upon as will hereinafter more fully appear.

The tin having been cut into proper length and width according to the size of can to be made, the pieces of tin are bent into an approximately cylindrical form preparatory to being placed in the machine and are opened and passed over the mandrel at the part *a* and are pushed forward by hand until the can-moving mechanism engages the can body D′ and pushes it into the portion of the machine C where the edges of the can-body are bent in opposite directions and flanges formed thereon. This mechanism is best shown in Figs. 2, 2^a, 17, 18, 19, and 20 and comprises a yoke consisting of bars *b*, *b*, connected by rods *c*, *c*, a pair of vertically reciprocating bars d d^4 and formers e e^4. The bar is attached to the under side of the upper bar *b* of the yoke and the other bar d^4 is normally held in the slot *l* by frictional contact between its sides and the adjacent bar and the wall of the slot rests upon a rod *f* while it is being raised thereby and said bar d^4 is pushed down or returned to its normal position by the upper bar *b* of the yoke in its down stroke. The bars d d^4 are each provided with a recess *g* in their outer sides, the upper end of one of which recesses and the lower end of the other terminate in a shoulder or projection *h* which bend the tin at a right angle and form flanges in opposite directions, the tin being supported

by the formers e e^4; and at the opposite end of the recess is a concave wall i which bends the flange down upon the curved face k of the former and forms a hook like flange such as is commonly used for forming lock seams in sheet metal ware.

The bars d^4 reciprocate in a slot l in the mandrel B and are operated by a cam m on the shaft n which alternately raises and lowers the yoke, carrying one of the bars d and the rod f which raises the other bar d^4. The flanges on the can-body are bent at an angle at one stroke of the bars d d^4 moving in opposite directions and are then bent back toward the can-body by the return stroke of the bars, and the can-body is supported by the mandrel B and the wall o of the portion of the machine C which conforms to the desired diameter of the can-body.

The next step in the operation is, engaging the flanges p p to form a lock seam and the mechanism therefor is best shown in Fig. 3 and the portion of the machine which performs this work is designated by the letter D. The can-body is supported by the frame and by mandrel B which is cut away on its upper side at q to admit of pressing one edge of the can-body with its flange under and beyond the opposite edge to hook to engage the flanges. This operation is performed by an arm or lever r having a pad s on its free end, the inner face of which pad conforms with the can-body. The arm r is pivoted to a lug t on a sliding plate u and is connected by a link v to a bell-crank lever w whose lower end is engaged by a cam x on the shaft n to reciprocate the plate u, lever r and pad s to lock the flanges p p on the can-body. The arm r and its pad s are raised out of engagement with the can-body by the cam x and the plate u, lever r and pad s are reciprocated by a lever y having a short arm z which engages a lug at the outer end of the plate and is operated by a cam a' on the shaft n. The levers r and y are respectively supported and pivotally fulcrumed on brackets b' c' on the under side of the frame A. As soon as the pad s is removed from the can-body the resiliency of the metal causes it to expand and engage the flanges p p in locked position.

The next step in the operation is pressing the locked flanges p p upon each other and forming a seam and is performed in the portion of the machine designated by the letter E and the mechanism therefor is best shown in Fig. 4. The can-body is supported on the mandrel B and in the wall e' and is operated upon by a hammer f' and an anvil g' the latter being inserted in the mandrel. The hammer f' is connected to the upper bar h' of a yoke composed of said bar, a bar i' and two connecting rods k' k' which rods are provided with collars l' between which collars and the center side-rails m' of the frame are interposed springs n' to raise the hammer f' out of engagement with the can-body as soon as the flanges p p of the seam have been pressed together. The yoke carrying the hammer f' is moved downward by a cam o' on the shaft n and the flanges p p pressed upon the anvil g' and the lock-seam formed. The side rods of this yoke and that of the part C which forms the flanges p p pass through the upper and center side rails of the frame A and are guided thereby in their reciprocations. After the seam has been pressed it must be fluxed preparatory to soldering, and this step of the operation is performed in the portion of the machine designated by the letter F, the mechanism of which is best shown in Fig. 5. The can-body is still supported by the mandrel B and by the wall p' and the flux is applied to the seam by a brush q' pivotally supported on an arm r' which is connected near its longitudinal center with the upper end of a lever s' which is fulcrumed on a bracket t' and at its lower end engages a cam u' on the shaft n, and at its outer end the arm r' is connected to a link v' which connects with a lever v'' fulcrumed on a bracket w' and at its lower end engages a cam x' on the shaft n. The flux is contained in a vessel y' provided with a revoluble flux carrier z' which may be revolved by any suitable means. The brush q' operates in a trough a^2 the length of the can-body and is supported on an arm b^2 pivotally attached to a bracket c^2 on the upper surface of the side rail of the frame and the trough is pressed down upon the can-body by a spring d^2. The several positions of the brush q' and its operating parts are shown in full and dotted lines.

The next step required to complete the can-body is soldering the seam, which is done in the portion of the machine designated by the letter G and is best shown in Fig. 6. The can-body is supported by the mandrel B and the curved wall e^2 of the portion G and the solder is applied to the seam by a soldering-iron f^2, supported by an arm g^2 which is pivotally connected near its longitudinal center to a lever h^2 which lever is fulcrumed to a bracket i^2 and at the rear end of the arm g^2 is attached a link k^2 which connects it with a lever l^2 pivotally connected and fulcrumed to a bracket m^2 and said levers at their lower ends engage cams o^2 n^2 respectively which are supported on shaft n. The solder is contained in a bath p^2 which is provided with a revoluble solder-carrier q^2 which like the flux-carrier may be revolved by any suitable means. The soldering-iron is heated by a suitable gas burner r^2 and the solder-bath is heated by a burner s^2. The soldering iron is raised and reciprocated by the levers h^2 and l^2 as shown in full and in dotted lines and a trough t^2 is provided in which the soldering iron is applied to the seam of the can-body. The trough t^2 is also the length of the can-body and is supported on an arm u^2 pivotally connected to a bracket v^2 and is held in engagement with the can-body by a spring w^2. The soldered can-body must now be removed from the mandrel and to accomplish this the mandrel is raised to allow

the can-body to be pushed off the mandrel. The mandrel is raised by a series of bars operated intermittently by cams on the shaft n.

In Fig. 7 is shown on an enlarged scale one of the bars a^3 which is provided at its upper end with a seat b^3 to conform to the periphery of the mandrel and at its lower end the bar engages a cam c^3 of the shaft n. The bar is held in proper alignment by bars d^3 which cross the frame A transversely. There are four of these bars the operation of which will be more fully set forth in connection with Figs. 13, 14, 15, and 16. I have designated the bars a^3 in said figures by letters H, I, K, and L in the order in which they are elevated by their respective cams c^3. After the solder has been applied the bar H rises and raises the mandrel sufficient to enable the can-body to be moved into the position shown in Fig. 13, when said bar falls and the bar I rises and the can-body is moved into the position shown in Fig. 14, when the bar I falls and the bar K rises and the can-body is moved into the position shown in Fig. 15, when the bar K falls and the bar L rises and the can body is moved into the position shown in Fig. 16. The operation described is intermittent and is repeated with each successive can-body made, and the can-body on the outer end of the mandrel is pushed off by the next one coming from the soldering section of the machine. The mandrel being supported by the ends of the frame of the machine only and secured to the front end of the frame, the mandrel is sprung sufficiently by the bars to enable the can-body to be discharged from the mandrel between it and its bearing in the outer end of the frame of the machine.

The mechanism for moving the can-bodies is shown in Figs. 1, 8, 9, and 11 and comprises primarily a pair of bars M, M, which rest in grooves d^3 in the frame A and in grooves e^3 in the sides of the mandrel B as shown in Figs. 2, 3, 4, 5, 6, 7, and 10. On the inner and adjacent sides of said bars are levers f^3, pivotally connected to lugs g^3 and pressed outward toward the mandrel at one end by springs s^3 to engage a can-body on each side of the mandrel and push or move the can-body from one stage of operation thereon to another until it is pushed off the mandrel at its outer end. The bars M, M, are reciprocated intermittently by a rock shaft h^3 supported on the center side bar m' of the frame of the machine and is operated by the gear wheels, i^3, k^3 the former being secured to shaft n as shown in Fig. 11 and the latter to a shaft l^3, to the outer end of which is connected a crank m^3 which is attached to pitman n^3 which at its opposite end is connected to the cranks o^3 on the rock-shaft h^3, and the rock-shaft is connected to wrist pins p^3 on the sides of the bars M, M, by crank lever q^3 and rods r^3 shown in Fig. 1. The bars M, M, are reciprocated the length of a can-body and at each forward stroke in the operation of the machine each oppositely arranged pair of pushing levers f^3 are forced outward by the springs s^3 and engage a can-body and push it forward the length of the stroke of the rock-shaft which stroke is equal to the distance the can-body is required to move from one part to another of the machine to be operated upon in the consecutive order heretofore described. In the back stroke of the bars the levers f^3 do not engage the ends of the can-bodies.

In Fig. 10 is shown a modification of the mechanism for bending the edges of the can-body and forming the flanges p, p thereon. In this construction only one bar t^3 is shown which is pivotally connected at t^4 to a block t^5 which reciprocates in a slot t^6 in the mandrel B, and it is provided with means u^3 on each side for forming the flanges in connection with the formers v^3; one edge being turned at each stroke or reciprocation of the bar. The flange p having been turned at a right angle by the bead w^3 the flange is bent back toward the body by the sides of the groove x^3 which is effected by the bar being drawn toward the flange by means of the yoke z^3 on the shaft n, which yoke is connected to the bar t^3 by rods a^4 and b^4 on each side thereof said bars b^4 being rigidly attached to the yoke z^3; and the bar t^3 is reciprocated by the yoke as in Fig. 2 by its connection with the main shaft n. The lower portion of the operating yoke has been omitted in Fig. 10 to avoid confusion, but it may here be stated that it is the same as the yoke shown in Fig. 2.

The cams on the shaft n are so set that none of those operating the bars a^3 cause the mandrel to rise when the can-body is being operated upon.

The operation of the machine as a whole briefly stated is as follows: The bent can-body D′ is placed upon the mandrel B at a and moved by hand into the portion of the machine designated by C where the reciprocating bars d d^4 bend the edges of the can-body and form the flanges p p thereon. The levers f^3 on the bars M. M. then engage the can-body and move it into the portion of the machine designated by D, where the flanges p p are engaged. The can-body is then moved by the bars M. M. and their levers f^3 into the portion of the machine designated by E where the flanges p, p are pressed upon each other and the seam formed, after which the can-body is moved into the portion of the machine designated by F where flux is applied to the seam and then into the portion of the machine designated by G, where the seam is soldered. The mandrel B is then raised intermittently at its outer end by the bars H. I. K and L. and the can-body pushed off the mandrel by the succeeding can-body which is being pushed along by the bars M. M. and their levers f^3.

While the foregoing operation is being performed upon one can-body other can-bodies are following it upon the mandrel B to undergo the same operation consecutively.

Having thus fully described my invention, what I claim is—

1. In a machine for making sheet metal cans, a fixed support for the can-body, a mandrel having a vertical slot therein, in combination with reciprocating bars seated in said slot and provided with means on their sides for forming with cooperating formers lock flanges on the edges of the metal.

2. In a machine for making sheet metal cans, a mandrel having a vertical slot therein, in combination with vertically reciprocating bars seated therein and provided with means on their outer sides for bending with cooperating formers the edges of the metal, a yoke supporting one of said bars, a rod supporting the other bar and means for operating said bars alternately.

3. In a machine for making sheet metal cans, a mandrel having a vertical slot therein, and formers on both sides of said slot, in combination with bars seated in and adapted to reciprocate in the slot and between the formers, whereby lock flanges are formed on the edges of the metal, and means for operating said bars alternately.

4. In a machine for making sheet metal cans, a mandrel having a vertical slot therein, formers on both sides of said slot, and bars seated in and adapted to reciprocate in the slot and between the formers, whereby lock flanges are formed on the edges of the metal, in combination with means for moving the can-body longitudinally and a device for engaging said flanges one with the other.

5. In a machine for making sheet metal cans, a mandrel having a vertical slot therein, formers on both sides of said slot, and bars seated in and adapted to reciprocate in the slot and between the formers, whereby lock flanges are formed on the edges of the metal, in combination with means for moving the can-body longitudinally and a lever for pushing one edge of the can-body under the opposite edge to engage the flanges one with the other.

6. In a machine for making sheet metal cans a mandrel having a vertical slot therein, formers on both sides of said slot and bars seated in and adapted to reciprocate in the slot and between the formers, whereby lock flanges are formed on the edges of the metal, and said mandrel cut away on its upper side, in combination with means for moving the can-body longitudinally and means for pushing one edge of the can-body under and beyond the opposite edge to engage the flanges one with the other.

7. In a machine for making sheet metal cans, a mandrel for supporting the can-body and cut away on its upper side, and an external support for the can-body, in combination with a movable plate supporting a lever which engages the can-body and means for operating said plate and lever to engage the lock flanges.

8. In a machine for making sheet metal cans, a mandrel for supporting the can-body and cut away on its upper side, and an external support for the can-body, in combination with a movable plate, a lever engaging the can-body to engage the lock flanges and supported on said plate, and cams, and intermediate levers for moving said plate.

9. In a machine for making sheet metal cans, a mandrel having a vertical slot therein, formers on both sides of said slot and bars seated in and adapted to reciprocate in the slot and between the formers, whereby lock flanges are formed on the edges of the metal, in combination with means for moving the can-body longitudinally, means for engaging the lock flanges and a device for pressing the flanges one upon the other and forming a lock-seam.

10. In a machine for making sheet metal cans, a mandrel having a vertical slot therein, formers on both sides of said slot and bars seated in and adapted to reciprocate in the slot and between the formers, whereby flanges are formed on the outer edges of the metal, in combination with means for moving the can-body longitudinally, means for engaging the flanges, a hammer, and an anvil supported by the mandrel.

11. In a machine for making sheet metal cans, a mandrel having a vertical slot therein, formers on both sides of said slot and bars seated in and adapted to reciprocate in the slot and between the formers, whereby flanges are formed on the edges of the metal, in combination with means for moving the can-body longitudinally means for engaging the flanges, a hammer and a yoke to which said hammer is attached, an anvil supported by the mandrel and means for operating said yoke.

12. In a machine for making sheet metal cans, a mandrel having a vertical slot therein, formers on both sides of said slot and bars adapted to reciprocate in the slot and between the formers whereby flanges are formed on the edges of the metal, in combination with means for moving the can-body longitudinally, means for engaging the flanges, means for pressing said flanges one upon the other and a device for fluxing the seam of the can-body.

13. In a machine for making sheet metal cans, a mandrel having a vertical slot therein, formers on both sides of said slot and bars adapted to reciprocate in the slot and between the formers whereby flanges are formed on the edges of the metal, in combination with means for moving the can-body longitudinally, means for engaging the flanges, means for pressing said flanges one upon the other and an automatic fluxing device.

14. In a machine for making sheet metal cans, a mandrel having a vertical slot therein, formers on both sides of said slot and bars adapted to reciprocate in the slot and between the formers whereby flanges are formed on the edges of the metal, in combination with means for moving the can-body longitudinally, means for engaging the flanges, means for pressing said flanges one upon the other

and a fluxing device comprising a flux containing vessel, means for applying the flux to the seam of the can-body and suitable connections for operating the fluxer.

15. In a machine for making sheet metal cans, a mandrel, having a vertical slot therein, formers on both sides of said slot and bars adapted to reciprocate in the slot and between the formers whereby flanges are formed on the edges of the metal, in combination with mechanism for moving the can-body longitudinally, means for engaging the flanges, means for pressing said flanges one upon the other, and a fluxing device comprising a brush, an arm supporting said brush, a lever on which said arm is fulcrumed, a lever for reciprocating said arm and suitable operating mechanism for said bars.

16. In a machine for making sheet metal cans, a mandrel having a vertical slot therein, formers on both sides of said slot and bars adapted to reciprocate in the slot and between the formers whereby flanges are formed on the edges of the metal, in combination with mechanism for moving the can-body longitudinally, means for engaging the flanges, means for pressing the flanges one upon the other, means for fluxing the seam and a device for soldering the seam.

17. In a machine for making sheet metal cans, a mandrel for supporting the can-body, in combination with an automatically operated soldering device comprising an iron, an arm to which the iron is attached, a lever on which said arm is fulcrumed, a lever connected to said arm and cams for operating said levers.

18. In a machine for making sheet metal cans, a mandrel for supporting the can-body, in combination with a solder bath a soldering iron, an arm supporting said iron and fulcrumed on a movable lever, a lever for reciprocating said iron and cams for operating both of said levers.

19. In a machine for making sheet metal cans, a mandrel having a vertical slot therein, formers on both sides of said slot, bars adapted to reciprocate in the slot and between the formers whereby flanges are formed on the edges of the metal, in combination with means for engaging and pressing the flanges and forming the seam on the can-body, fluxing and soldering the seam, and mechanism for moving the can body intermittently.

20. In a machine for making sheet metal cans, a mandrel, means for forming and soldering a lock seam on the can-body, in combination with mechanism for moving the can-body longitudinally and means for raising one end of the mandrel to remove the can-bodies.

21. In a machine for making sheet metal cans, a mandrel, means for forming and soldering a lock seam on the can-body, in combination with mechanism for moving the can-body longitudinally and a plurality of intermittently operated devices for raising one end of the mandrel to remove the can-bodies.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE T. PILLINGS.

Witnesses:
D. C. REINOHL,
D. WEINER REINOHL.