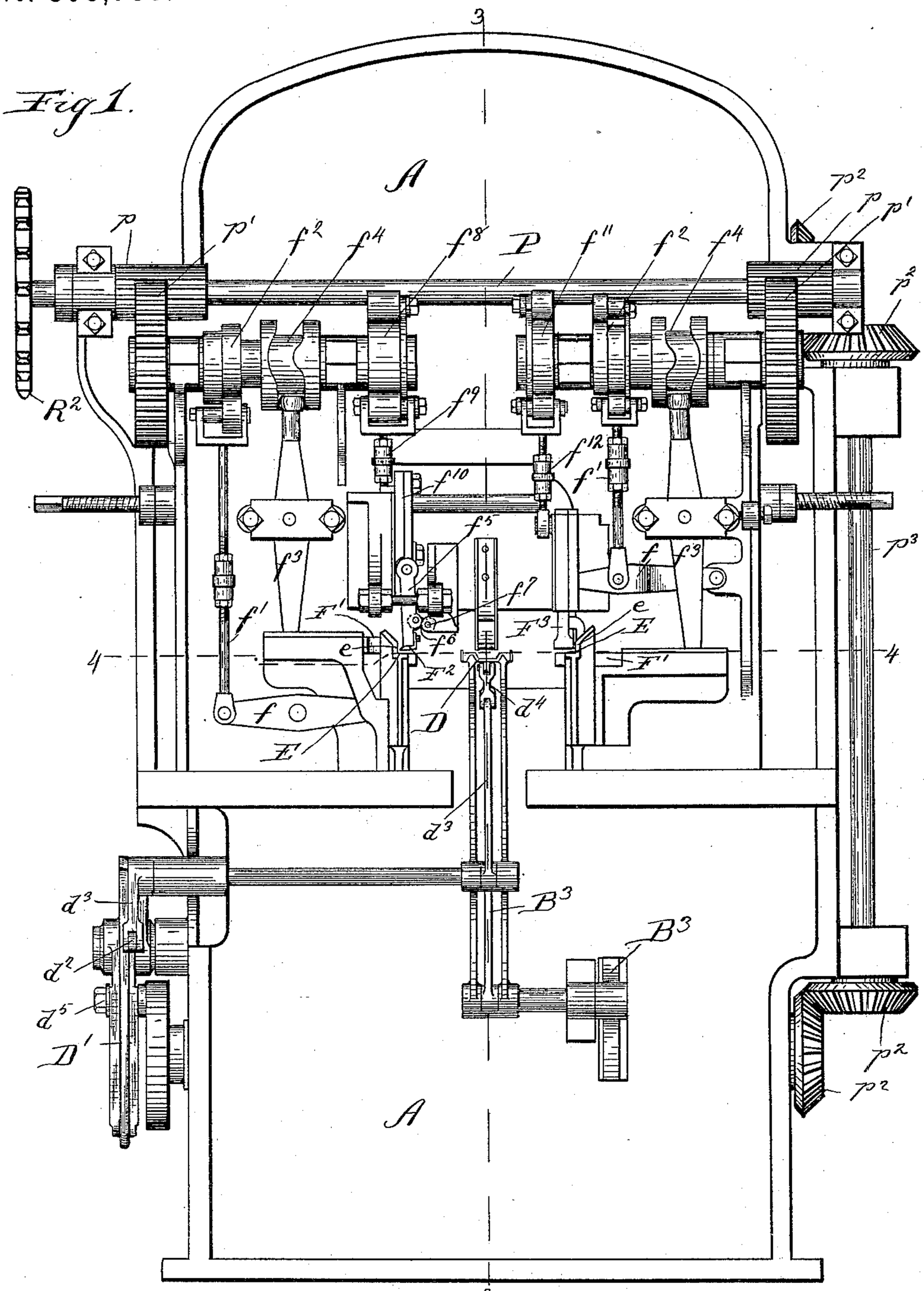
(No Model.) 6 Sheets—Sheet 1.

F. M. LEAVITT & E. NORTON.

CAN FORMING AND SOLDERING MACHINE.

No. 395,788. Patented Jan. 8, 1889.

Fig 1.



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(No Model.) 6 Sheets—Sheet 2.

F. M. LEAVITT & E. NORTON.

CAN FORMING AND SOLDERING MACHINE.

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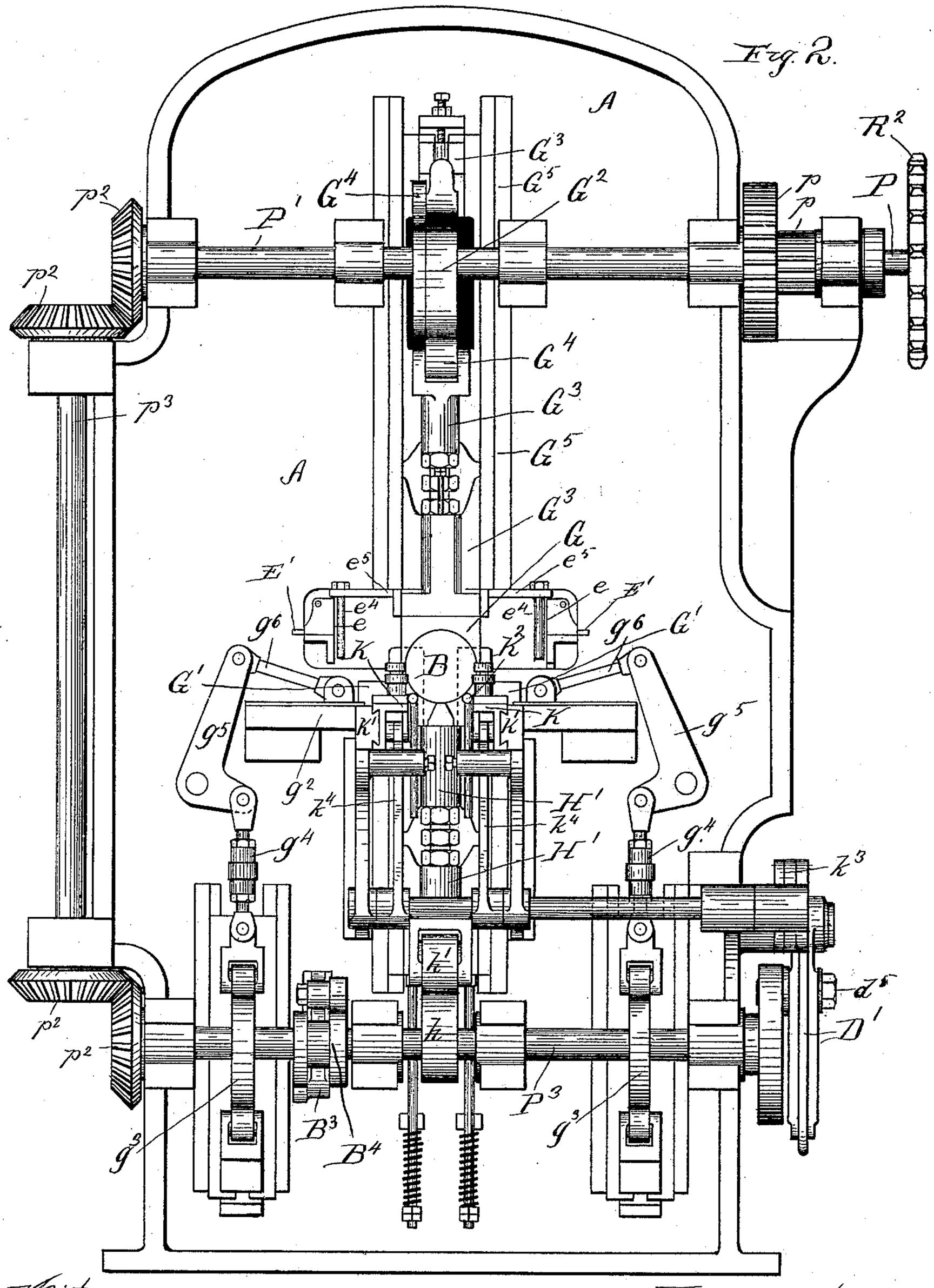
Fig. 2.



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(No Model.) 6 Sheets—Sheet 3.

F. M. LEAVITT & E. NORTON.

CAN FORMING AND SOLDERING MACHINE.

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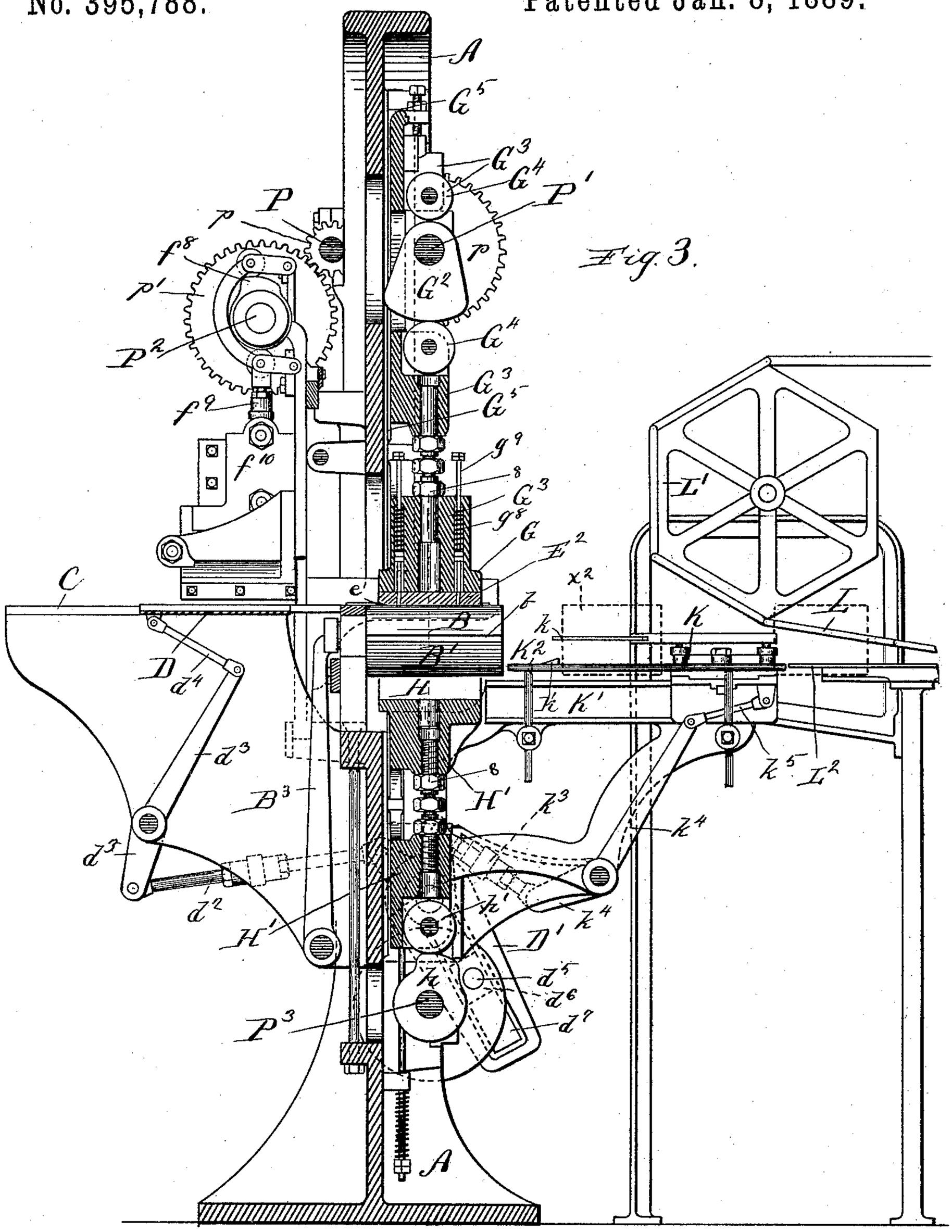

Fig. 3.

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F. M. LEAVITT & E. NORTON.

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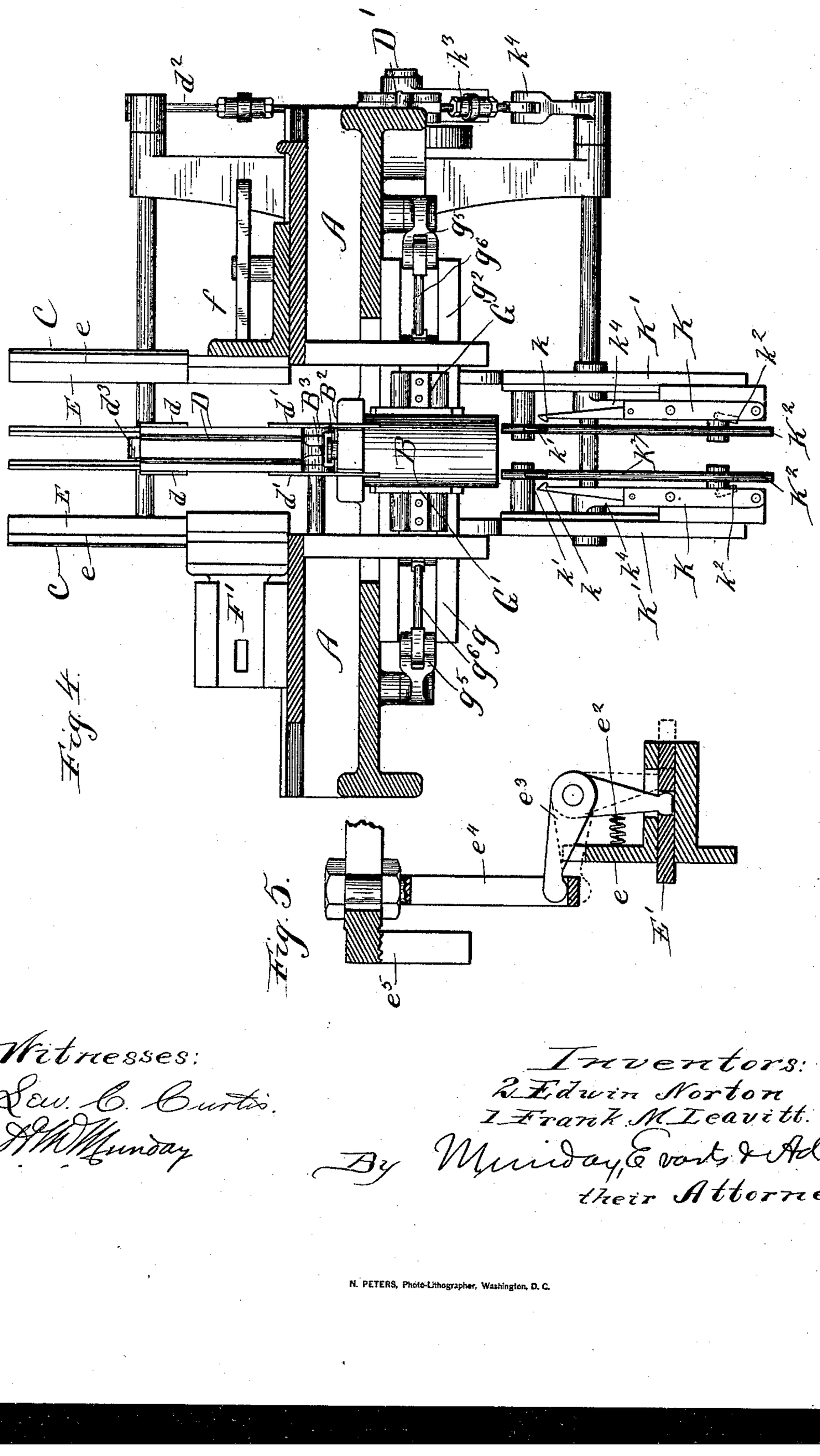

Fig. 4.

Fig. 5.

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CAN FORMING AND SOLDERING MACHINE.

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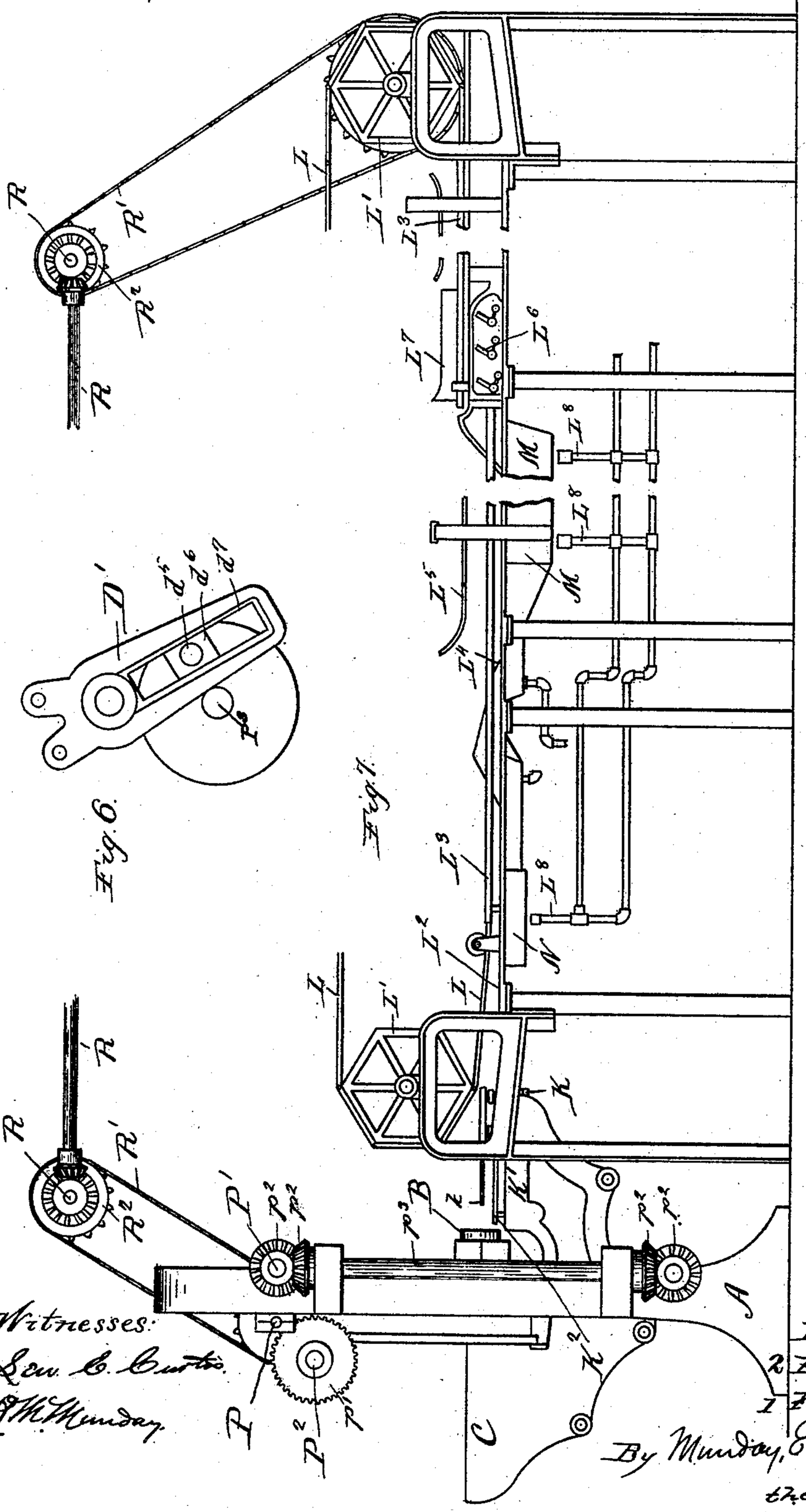

Fig. 6.

Fig. 7.

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(No Model.) 6 Sheets—Sheet 6.

F. M. LEAVITT & E. NORTON.

CAN FORMING AND SOLDERING MACHINE.

No. 395,788. Patented Jan. 8, 1889.

Fig. 8.

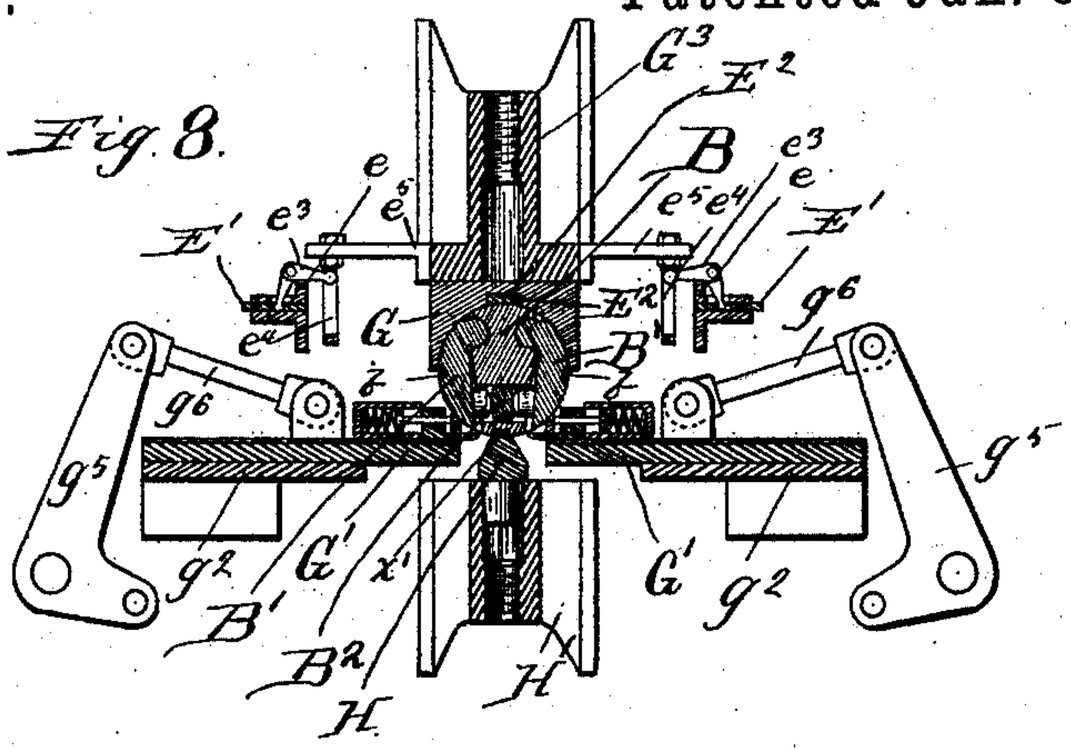


Fig. 9.

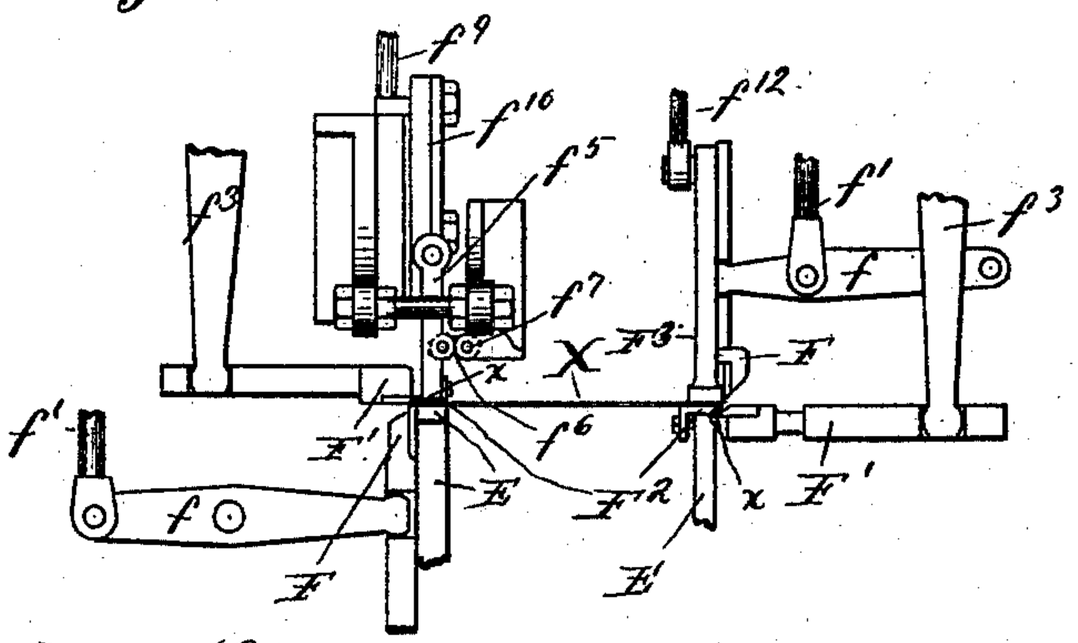
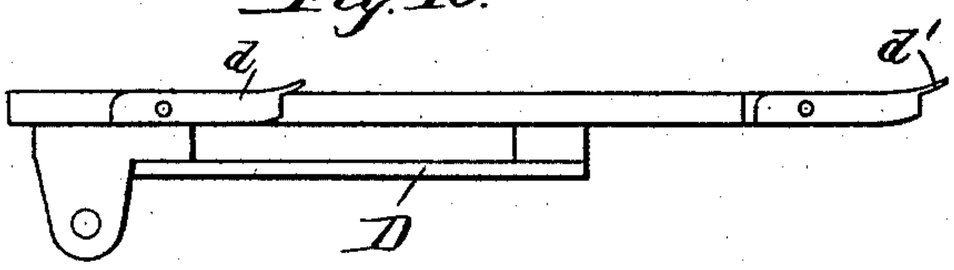


Fig. 10.



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UNITED STATES PATENT OFFICE.

FRANK M. LEAVITT, OF BROOKLYN, NEW YORK, AND EDWIN NORTON, OF MAYWOOD, ILLINOIS, ASSIGNORS TO SAID EDWIN NORTON AND OLIVER W. NORTON, OF CHICAGO, ILLINOIS.

CAN FORMING AND SOLDERING MACHINE.

SPECIFICATION forming part of Letters Patent No. 395,788, dated January 8, 1889.

Application filed September 11, 1888. Serial No. 285,105. (No model.)

To all whom it may concern:

Be it known that we, FRANK M. LEAVITT, a citizen of the United States, residing in Brooklyn, in the county of Kings and State of New York, and EDWIN NORTON, a citizen of the United States, residing at Maywood, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Can-Body-Forming and Side-Seam-Soldering Machines, of which the following is a specification.

Our invention relates to combined can-body-forming and side-seam-soldering machines.

The object of our invention is to provide a machine which will operate to form the can-body and solder the side seam at one continuous operation, to the end that the can-body may always have its side seams in proper position to the soldering devices while being conveyed to or through the same, and thus secure more perfect work than can be attained where the proper positioning of the can-body in the soldering device depends upon hand labor. Another result secured by our invention is the saving of time, labor, and expense, as the cans can be manufactured more rapidly and cheaply.

In practicing our invention any well-known type or kind of body-forming machine may be combined with any suitable or well-known form of side-seam-soldering machine. We prefer, however, to use the kind of can-body-forming machine which is shown and described in Patent No. 250,266, granted to said F. M. Leavitt, November 29, 1881, and the kind of side-seam-soldering machine which is shown and described in Patent No. 250,096, granted to said E. Norton, November 29, 1881.

The invention consists in the novel devices and novel combinations of parts and devices herein shown and described, and more particularly pointed out in the claims.

In the accompanying drawings, which form a part of this specification, and in which similar letters of reference indicate like parts. Figure 1 is a front elevation of a machine embodying our invention. Fig. 2 is a rear elevation of the body-former portion of the machine. Fig. 3 is a partial vertical longitudinal section on line 3 3 of Fig. 1. Fig. 4 is a horizontal section on line 4 4 of Fig. 1. Fig. 5 is a detail vertical sectional view showing the movable guides. Fig. 6 is an enlarged detail view of parts hereinafter to be described. Fig. 7 is a side elevation of the machine. Fig. 8 is a partial cross-section on line 8 8 of Fig. 3. Fig. 9 is a detail view showing the edge-folding devices. Fig. 10 is a detail view of the blank-feed slide.

In said drawings, A represents the frame; B, the horn around which the flat sheet out of which the can-body is formed is folded or bent.

C is the table upon which the flat sheet-metal blanks X are placed preparatory to being fed into the machine by the reciprocating feed-slide D.

E E and E′ E′ are the guides which support and guide the sheet as it is advanced by the feed-slide D, first to the vertically and horizontally reciprocating edge-folding devices F F′ F^2, and then from said folders into position over the horn B. The guides E E′ serve to support the sheet, and they or their supports have vertical flanges or parts *e e* for the edges of the sheet to abut against, in order to keep the sheet true and square with the edge-folding devices F F′ F^2 and with the horn B. The horn B is secured to the frame of the machine below the level of the feed-guides E E′, so that the feed-slide D will deliver the sheet above and on top of the horn B.

The edges of the sheet X, which are interlocked upon the side seam of the can-body, are folded one up and the other down by the edge-folding devices F F′ F^2, to form hooks *x*, as indicated in Fig. 9, and capable of being interlocked, as indicated in Fig. 8, when the sheet is wrapped around the horn.

When the blank X is fed or advanced over the horn B, its middle portion is supported by the horn B, while its edges are supported by the guides E′ E′. These guides E′ E′ are made movable, so that they may be withdrawn out of the way to permit the sheet to be bent or folded downward around the horn B. To insure the retention of the sheet in a

horizontal plane, so that the vertical guide-flanges *e* on the supports for the guides E will properly center the flat blank over the horn B, we provide a middle guide-bar, E^2, between which and the horn B the sheet X is fed. The front end of this guide is slightly turned up, as indicated at *e'*, so that the sheet may readily enter beneath the same. The space between the guide E^2 and the horn B should equal or but very slightly exceed the thickness of the sheet X.

The sheet X is folded downward around the horn B by the vertically-reciprocating semicircular-shaped bending device G, and the horizontally-reciprocating bending devices G' G', which also serve to interlock the hooked edges *x x* of the sheet, as indicated in Fig. 8. The folding device G is furnished with a longitudinal groove, *g*, to receive the central upper guide, E^2, as indicated in Fig. 8, so that said guide will not interfere with the proper bearing of the folder G against the surface of the sheet as it is folded around the horn. The under surface of the guide E^2 preferably conforms to the circle of the horn or the folder G, and it is preferably mounted on springs g^8, with guide-pins g^9, so that it will hold the sheet under the pressure of the springs against the horn B, and thus prevent displacement of the sheet when the guides E' are withdrawn and while the folder G is bending the sheet around the horn.

The horn B is expansible, having hinged or movable segments B' B', adapted to be contracted or expanded by a central wedge, B^2, so that the size of the horn may be contracted while the hooks *x x* of the sheet are being interlocked or passed by each other by the horizontally-reciprocating folders G' G', and then again expanded to the full interior diameter of the can to properly interlock or pull the hooks *x x* against each other preparatory to the seam closing or squeezing operation.

H is the device for closing or squeezing the interlocked hooks *x x* firmly together. This seam-closing device operates in conjunction with the lower surface of the horn B, closing the interlocked folds of the side seam against said horn. This closing device preferably consists of a reciprocating plunger or bar, H, adapted to be moved up against the horn. It however may be made of any other suitable construction known to the art—as, for example, a revolving roller.

The horn B or its segments B' is furnished with longitudinal grooves *b*, for the spring fingers or pawls *k* of the reciprocating can-body extractor or conveyer device K to fit in. The can-body, after being formed around the horn B, is extracted therefrom and delivered into the carrier device L of the soldering-machine by the reciprocating extractor or conveyer K.

The blank X is delivered centrally over the horn B and folded downward around it, so that when the hooks *x x* of the sheet are interlocked and the side seam, *x'*, formed, such seam will be at the lowermost point of the can, or diametrically underneath its axis.

The extractor device K operates to remove the can-body from the horn and deliver it into the carrier L of the soldering-machine without giving the can-body any axial rotation, so that the can-bodies will always have their side seams accurately and positively turned into proper position for soldering as they are conveyed over the soldering bath or device M and the aciding or fluxing device N by the carrier L.

The can-conveyer or extractor device K reciprocates on a suitable guide-way, K', on the frame of the machine. The hook-shaped spring fingers or pawls *k* operate to hook over the rear end of the can-body on the horn B and pull the can-body off the horn onto the track or guide K^2, which supports the can-body as it is advanced into the soldering device of the machine. The track K^2 is furnished with inclined projections *k'*, over which the can-body x^2 rides as the extractor-slide K advances, and which serves to prevent the spring-fingers *k k* from pushing the can-body backward on the return movement. The holding-projections *k'* are inclined or cam-shaped toward the horn and abrupt at their other end, as indicated clearly in Fig. 3, so that the can-bodies may ride over them in one direction, but not in the other.

The conveyer K operates simultaneously upon two can-bodies, being provided with a second pair of pawls, fingers, or projections, k^2, which serve to advance or convey the can-body which has been delivered by the extractor-fingers K from the horn B onto the guides K^2, into position to be caught and advanced by the carrier L of the soldering-machine. The fingers *k* move the can-body from the horn B into position beyond the projections *k'* on the track K^2, to be caught by the fingers or pawls k^2. The pawls or fingers k^2 are preferably normally pressed outward by springs. (Not shown.) If no springs, however, are employed, the can-body will yield or spring sufficiently, because it is removed from the horn when these fingers k^2 pass back of it.

The carrier device L of the soldering-machine preferably consists of a link chain mounted upon sprocket wheels or pulleys L', the openings in the links being large enough to receive the can-body within the same. As the links of this chain have, preferably, no devices for supporting the can-body, the can-body rides upon a guide-track, L^2, as it is advanced by the carrier. The carrier-chain L is guided or supported by a track or way, L^3, upon which it rides. The track L^2 is, in fact, but an extension of the track or guide K^2, along which the can-bodies are carried by the conveyer device K. The track L^2 is provided with suitable depressions, L^4, to permit the seam of the can-body to pass through or come in contact with the acid or flux in the bath N and the solder in the solder bath M. An upper guide,

L^5, serves to guide the can as it passes through the solder bath and insure its proper immersion therein.

L^6 is a wiper device for wiping the surplus solder from the outside of the seam as the can-body passes under the hood or guide L^7.

L^8 L^8 are heating devices for heating the solder and the acid or flux baths. These heaters are preferably gas-jets.

The pulleys L′ L′ are preferably six-sided. The pulley L′, which is adjacent to the can-body-forming devices, is mounted above the can-body tracks K^2 L^2, about as indicated in Fig. 3, so that the can-body-conveyer device K may carry the can into or under the link of the chain while said link is in an inclined position, and so that the rear end or cross-bar of the link as it advances and descends toward the can-body tracks K^2 L^2 will catch or strike against the rear end of the can-body and thus push it along. The reciprocating feed-slide K thus operates to push the can-body within the opening of the link of the chain while the link is in an inclined position.

The feed-slide D operates simultaneously upon two successive sheets, serving to advance one sheet from the edge-folders F F′ F^2 into position above the horn B, while the next succeeding sheet is advanced from the table C to the edge-folders F F′ F^2. The feed-slide D is provided with inclined projections or pawls d and d'. These pawls or projections are adapted to reciprocate under the sheet X, which lies upon the guides E or table C, when the feed-slide makes its backward movement, but catch the sheet and push it forward as the feed-slide makes its forward movement. As the slide D makes its backward movement, the sheet is supported and held by the guides. At this time also the forward sheet, which is over the horn, is also held and clamped by and between the horn and the movable spring-actuated central guide or clamp, E^2, as hereinbefore described.

P is the main driving-shaft of the machine. From this shaft motion is communicated to the counter-shaft P′ and the cam-shafts P^2 P^2 by suitable gears, p p', and to the lower counter-shaft, P^3, by beveled gears p^2 and vertical connecting-shaft p^3. The feed-slide D is reciprocated by a slotted lever, D′, connecting-link d^2, lever d^3, and link d^4, the slotted lever D′ being operated from the shaft P^3, through a crank or wrist pin, d^5, which is furnished with a slide, d^6, that reciprocates in the slot d^7 in the lever D′. The extractor-slide K, which operates to convey the can-bodies from the horn B to the carrier L, is reciprocated by this same lever D′ through similar connecting mechanism—viz, link k^3, lever k^4, and link k^5.

The vertically-reciprocating edge-folders F F—one on each side—are reciprocated in opposite directions from the cam-shafts P^2 P^2 by suitable levers, f f, connecting-links f' f', and cams f^2 f^2. The horizontally-reciprocating edge-folders F′ F′ are moved by levers f^3 f^3 and cams f^4 f^4. The lower folder, F^2, is stationary and constitutes, in fact, the continuation of the guide E. This lower steel folder-blade, F^2, is bolted or otherwise rigidly secured to the guide E, as shown in Fig. 9. The upper folder, F^2, is secured to a vertically-movable lever, f^5, pivotally connected by a link, f^6, to the frame at f^7, so that the folder F^2 may be given an up-and-down and also a lateral movement to release or loosen the sheet X from the folders after the hooks x are formed thereon. This folder F^2, or its sliding lever f^5, is operated by a cam, f^8, through the link f^9 and slide f^{10}. The upper folder, F^2, being thus movable, serves to clamp the sheet during the folding operation between itself and the guide E. To similarly clamp the sheet near the opposite edge, a clamp, F^3, operates in conjunction with the lower stationary folder, F^2. The clamp F^3 is operated by a cam, f^{11}, and connecting-link f^{12}.

The folder device G, which operates to bend or partially bend the sheet around the horn, is operated by a cam, G^2, on the shaft P′, the slide G^3, upon which the folder is G mounted, being furnished with friction-rollers G^4, that impinge against the cam. G^5 are the guides in which the slide G^3 reciprocates. The horizontally-movable folders G′ G′ are reciprocated in their guideways g^2 by cams g^3 on the shaft P^3, connecting-links g^4, levers g^5, and links g^6.

The horizontally-movable guide-plates E′ are withdrawn by springs e^2, Fig. 5, during the movement of the folding device G; and these guide-plates are held out in position for supporting the edges of the sheet, when the folder G is in its upper position, by a bent lever, e^3, which is connected to the slide G^3 by a slotted pin, e^4, secured to a bracket, e^5, on said slide G^3. When the slide G^3 begins to descend to cause the folder G to bend the sheet X down and around the horn B, the springs e^2 will at once withdraw the guides E′, and thus permit the sheet to be bent downward.

The wedge B^2, by which the horn B is contracted and expanded, is operated by a lever, B^3, from a cam, B^4, on the shaft P^3.

The seam closing or squeezing device H is reciprocated or operated by a cam, h, on the shaft P^3. The slide H′, to which the seam-closer H is secured, is provided with a friction-roller, h', to bear against the cam h.

The construction of the horn B, and of the mechanism for operating its expanding and contracting parts, of the table C, of the feed-slide D and the mechanism for operating it, of the hook or edge folders F F′ F^2 and the mechanism for operating the same, and of the body forming or bending devices G G′, are all well known to those skilled in the art, and are fully shown and described in said

Patent No. 250,266, before referred to, and need not, therefore, be here described more in detail.

The movable can-body carrier L is operated from the main driving-shaft P by suitable connecting-shafts and mechanism, R R′ R², communicating with the sprocket wheel or pulley L′ at the farther end of the machine. This connecting mechanism is made to drive the farther pulley L′, in order that the lower line of the chain L, which carries the can-bodies, may be pulled, instead of pushed, as would, to a greater or less extent, be the case if the power were communicated to the pulley L′ adjacent to the can-body-forming device.

The construction of the carrier L, the tracks L² and L³, the wiper device, and the other parts of the soldering portion of the machine are fully shown and described in said Patent No. 250,096, and need not therefore be here set forth in detail.

As the sheet X is fed in above the horn B and folded downward around it, the tendency of the sheet to bend or lop down at its ends or edges acts in the direction the sheet moves during the folding movement, and to aid or assist the folding of the sheet, instead of to oppose the same, as heretofore has been the case where the sheet has been fed in below the horn and folded upward around it.

We claim—

1. The combination, with a can-body-former horn, of two guides above the horn, each of said guides having two separate and distinct guide-faces, one of said guide-faces being parallel to the plane of the sheet for the sheet to rest upon and the other at right angles thereto for the edges of the sheet to abut against to prevent lateral displacement of the sheet, the parallel guide-face being movable to permit the sheet to be folded downward around the horn, substantially as specified.

2. The combination, with a can-body-former horn, of movable guides above the horn for guiding and supporting the edges of the sheet, and means for moving or withdrawing said guides to permit the sheet to be folded downward around the horn, substantially as specified.

3. The combination, with a can-body-former horn, of movable guides above the horn for guiding and supporting the edges of the sheet, means for folding or bending the sheet downward around the horn, and a device for closing or squeezing the seam against the horn, substantially as specified.

4. The combination, with a can-body-former horn, of movable guides above the horn, means for moving or withdrawing said guides to permit the sheet to be folded downward around the horn, and a feed-slide for delivering the sheet upon said guides above the horn, substantially as specified.

5. The combination, with a can-body-former horn, of movable guides above the horn, a feed-slide for delivering the sheet upon said guides, folders for bending the sheet downward around the horn, and means for withdrawing said guides out of the way of the sheet as it is bent downward around the horn, substantially as specified.

6. The combination, with a can-body-former horn, of movable guides above the horn for guiding and supporting the edges of the sheet, and a central guide adapted to receive the sheet between the same and the horn, substantially as specified.

7. The combination, with a can-body-former horn, of movable guides above the horn for guiding and supporting the edges of the sheet, a central guide adapted to receive the sheet between the same and the horn, and a folder for bending the sheet downward around the horn, provided with a longitudinal groove to receive said central guide, substantially as specified.

8. The combination, with the guides E, of movable guides E′, feed-slide D, edge-folders for forming hooks on the edges of the sheet, a body-former horn below said feed-guides, folders for bending the sheet downward around the horn, and a device for squeezing or closing the interlocked folds of the seam, substantially as specified.

9. The combination of feed-guides E with movable guides E′, feed-slide D, edge-folders F F′ F², horn B below said feed-guides, vertically-reciprocating folder G, and horizontally-reciprocating folders G′ G′, substantially as specified.

10. The combination of feed-guides E with movable guides E′, feed-slide D, edge-folders F F′ F², horn B below said feed-guides E′, vertically-reciprocating folder G, horizontally-reciprocating folders G′ G′, and vertically-reciprocating seam-closer H below said horn, substantially as specified.

11. The combination, with a can-body-former horn and mechanism for folding the sheet downward around the horn to bring the side seam centrally on the under side of the can-body, of a soldering device, M, a can-carrier chain, L, pulleys or sprocket-wheels L′ for said chain, mounted above said soldering device, and mechanism for moving or delivering the can-body from said horn under and within the link of said carrier-chain while the same is passing in an inclined position, substantially as specified.

12. The combination, of a body-former horn with can-body supporting tracks or guides, a link-chain carrier, L, and pulleys L′ above said tracks, and mechanism for conveying the can-body from said horn under and within the links of said chain-carrier, substantially as specified.

13. The combination of a can-body-former horn with mechanism for folding the sheet downward around the horn, so as to bring the side seam underneath, a solder bath, M, chain-carrier L, polygon wheels L′ for said chain, and a reciprocating conveyer, K, having extractor-fingers *k* and feed projections or pawls *k*², whereby the can-bodies are moved from

the horn within and under the links of said carrier-chain, one of said polygon wheels being mounted above said reciprocating extractor-slide K, substantially as specified.

14. The combination, with a can-body-former horn, of edge-folders, a reciprocating feed-slide, D, having feed pawls or projections d and d', for operating upon two sheets at a time, in front of and above said horn, and a reciprocating feed-slide, K, having pawls or projections k k^2, for conveying two can-bodies at a time, at the rear of said horn, and a soldering device having a carrier into which the cans are delivered by said feed-slide K, substantially as specified.

15. The combination, with a can-body-former horn, of edge-folders, a reciprocating feed-slide, D, having feed pawls or projections d and d', for operating upon two sheets at a time, in front of and above said horn, and a reciprocating feed-slide, K, having pawls or projections k k^2, for conveying two can-bodies at a time, at the rear of said horn, a soldering device having a carrier into which the cans are delivered by said feed-slide K, and a common lever, D′, for operating both of said feed-slides, substantially as specified.

16. The combination, with a can-body-former horn, of edge-folders, a reciprocating feed-slide, D, having feed pawls or projections d and d', for operating upon two sheets at a time, in front of and above said horn, and a reciprocating feed-slide, K, having pawls or projections k k^2, for conveying two can-bodies at a time, at the rear of said horn, and a soldering device having a carrier into which the cans are delivered by said feed-slide K, and a common lever, D′, for operating both of said feed-slides, connecting-link d^2, lever d^3, link d^4, link k^3, lever k^4, and link k^5, all combined and operating substantially as specified.

17. The combination, with a body-former horn, of movable guides E′, for supporting the sheet above the horn, reciprocating folder G, for bending the sheet downward around the horn, and mechanism operated or released by the downward movement of said folder or its slide to withdraw said movable guides E′ as the folder G descends, substantially as specified.

18. The combination, with table C, of feed-guides E, feed-slide D, edge-folders F F′ F², movable feed-guides E′, horn B below said feed-guides and above which the sheet is fed, and mechanism for folding or bending the sheet downward around the horn, substantially as specified.

19. The combination, with a can-body-former horn, of movable guides above the horn for supporting the edges of the sheet, a central guide for holding or clamping the sheet on the horn, and a folder mechanism for bending the sheet downward around the horn, substantially as specified.

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Witnesses to the signature of said Frank M. Leavitt:

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