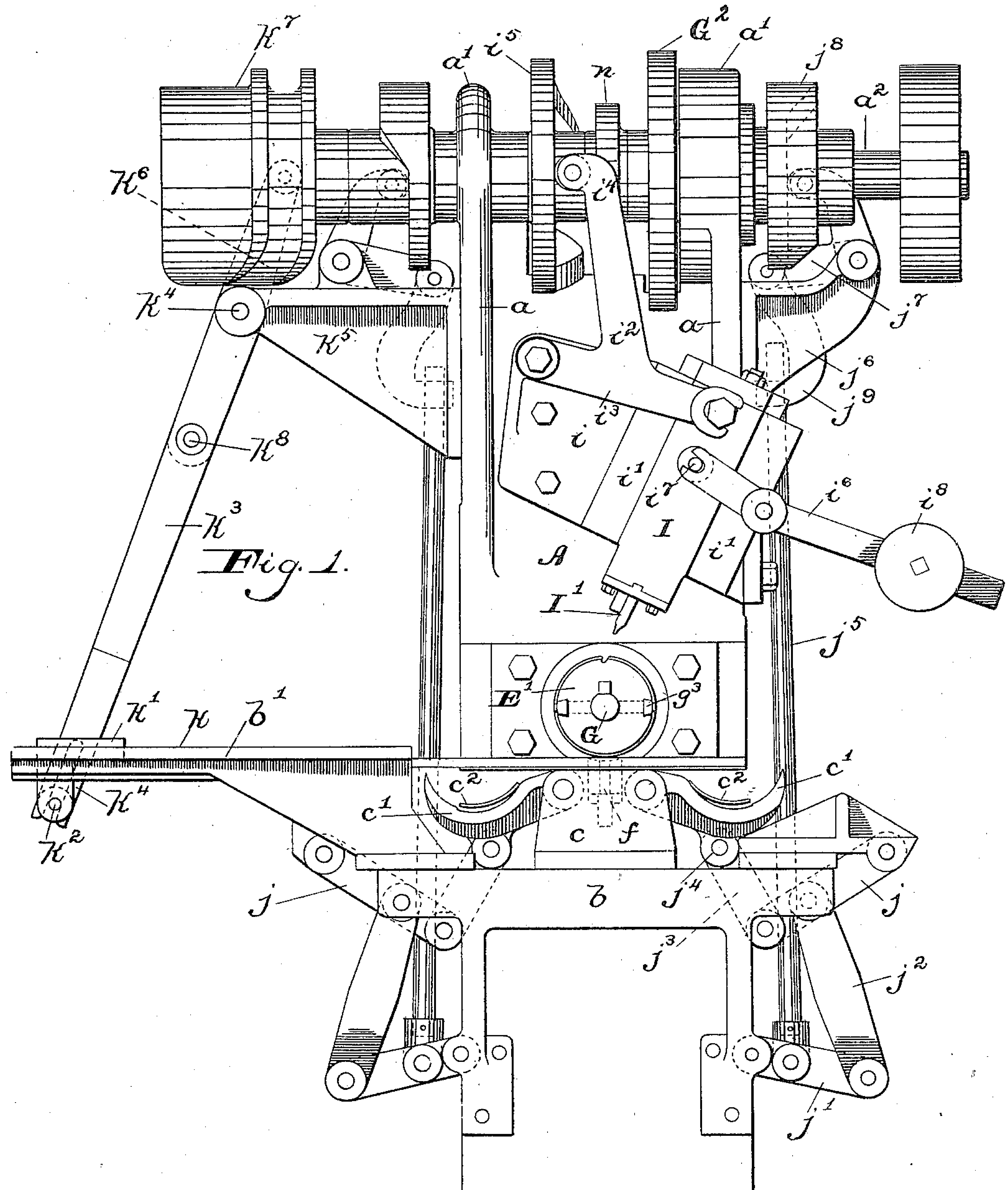
No. 725,163. PATENTED APR. 14, 1903.

R. T. SMITH & D. M. MONROE.

SHEET METAL LOCK SEAMING MACHINE.

APPLICATION FILED JULY 31, 1901.

NO MODEL. 4 SHEETS—SHEET 1.



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NO MODEL. 4 SHEETS—SHEET 2.

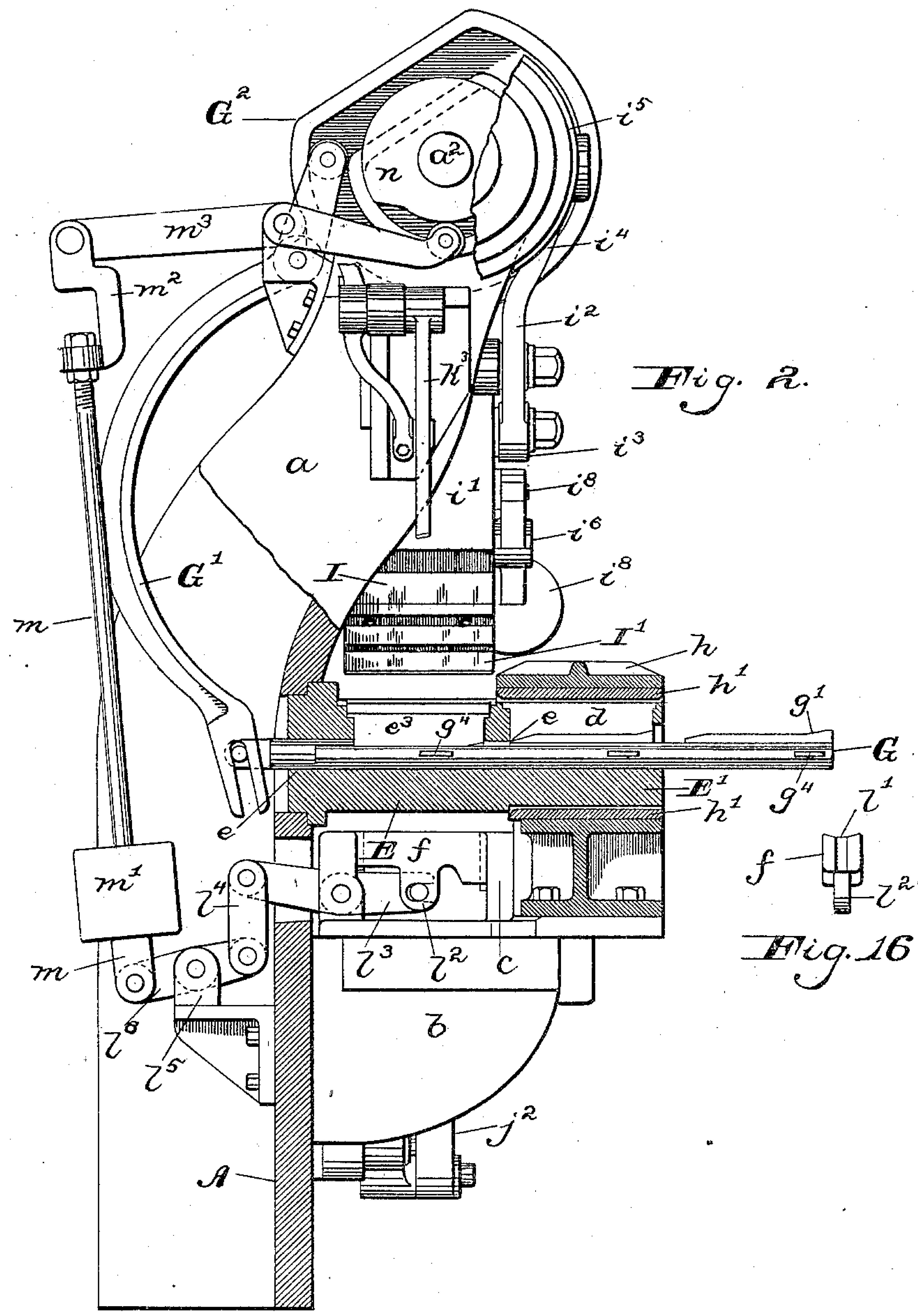

Fig. 2.

Fig. 16.

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NO MODEL. 4 SHEETS—SHEET 3.

Fig. 3.

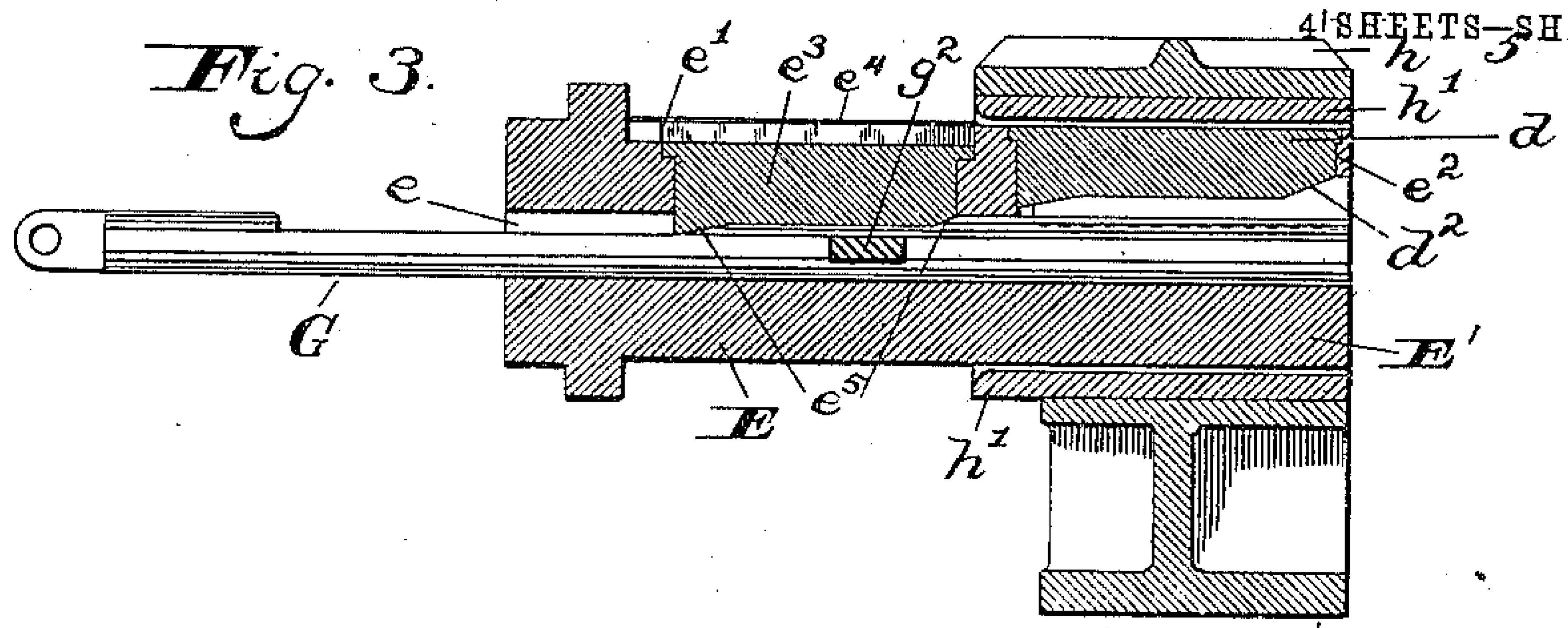


Fig. 4.

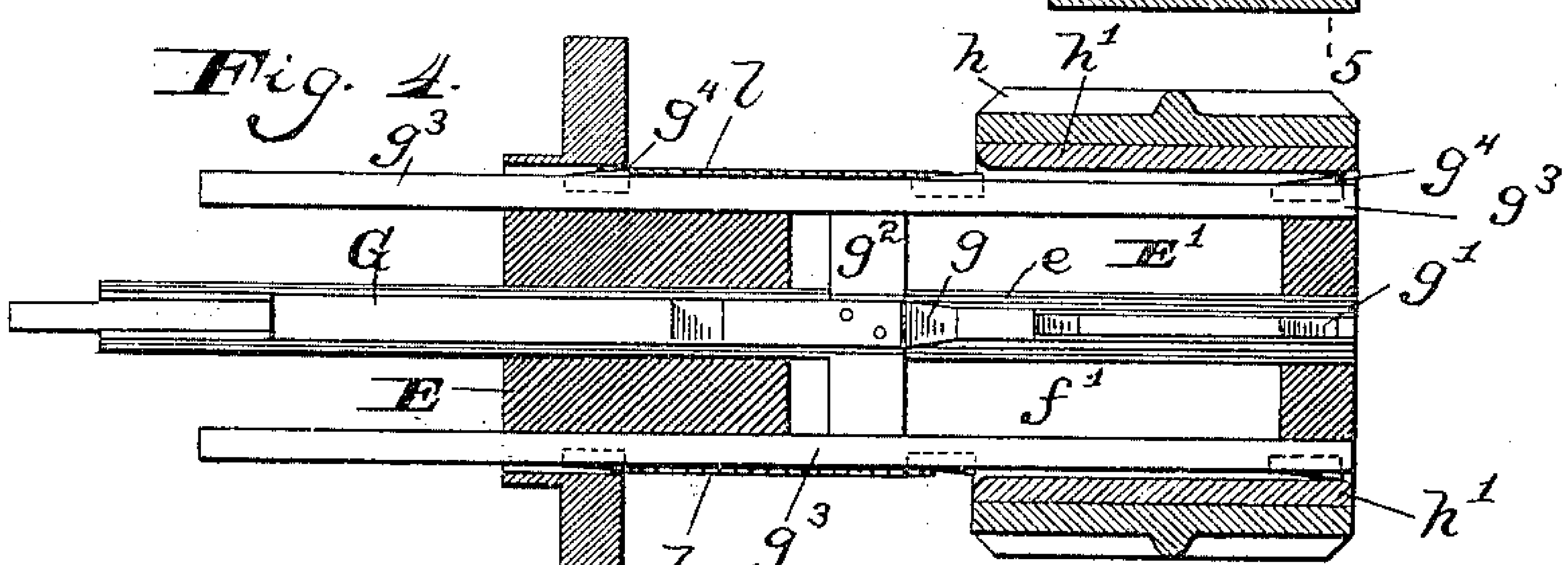


Fig. 5.

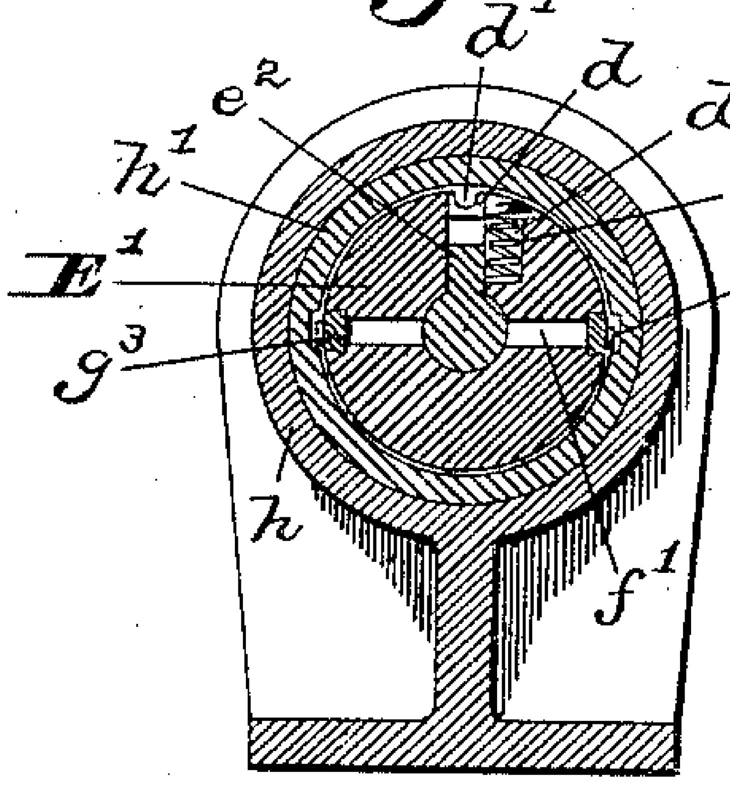
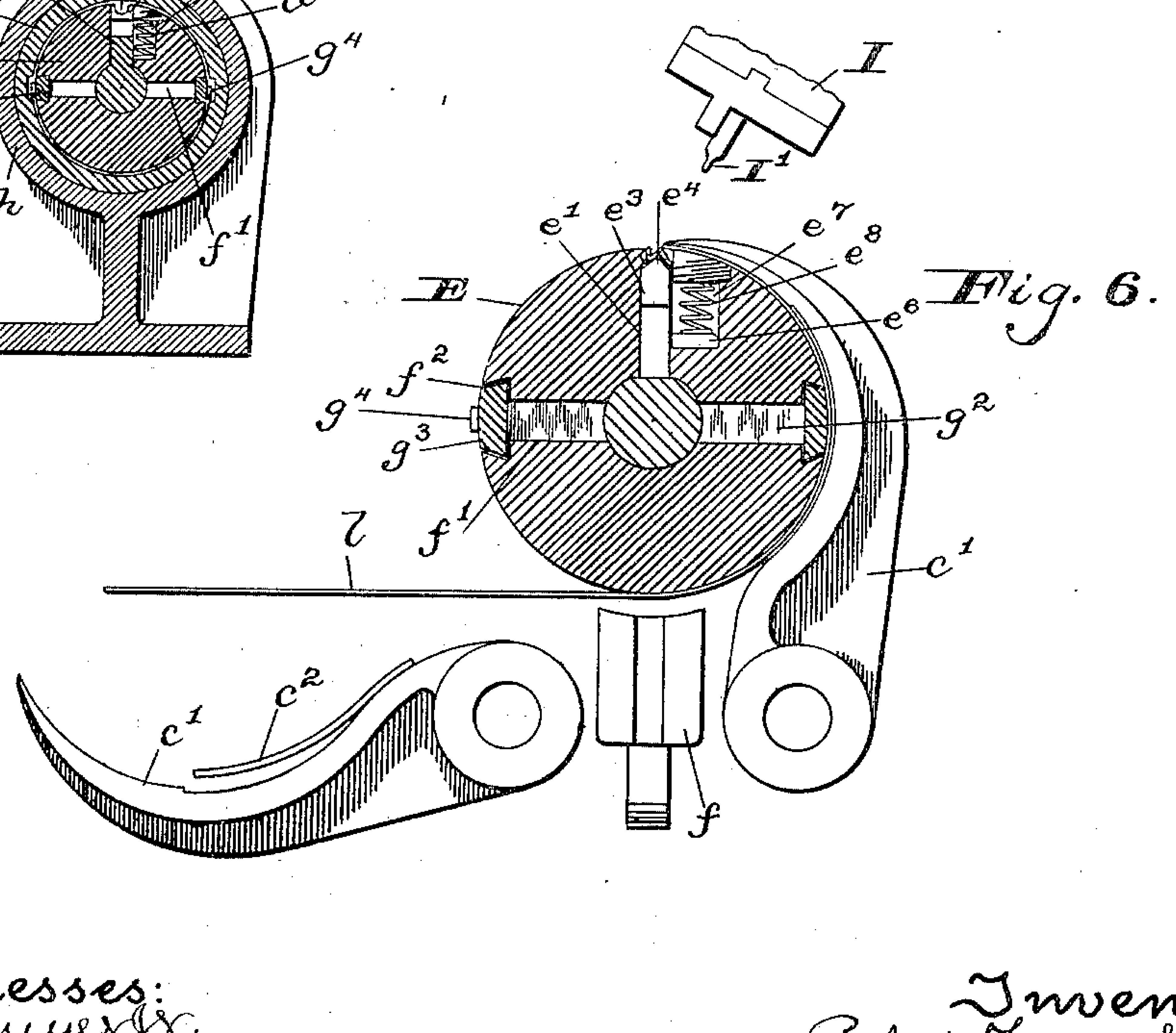


Fig. 6.



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NO MODEL. 4 SHEETS—SHEET 4.

Fig. 7.

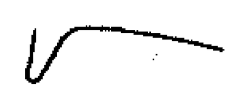


Fig. 8.

Fig. 9.

Fig. 10.

Fig. 11. Fig. 12. Fig. 13.

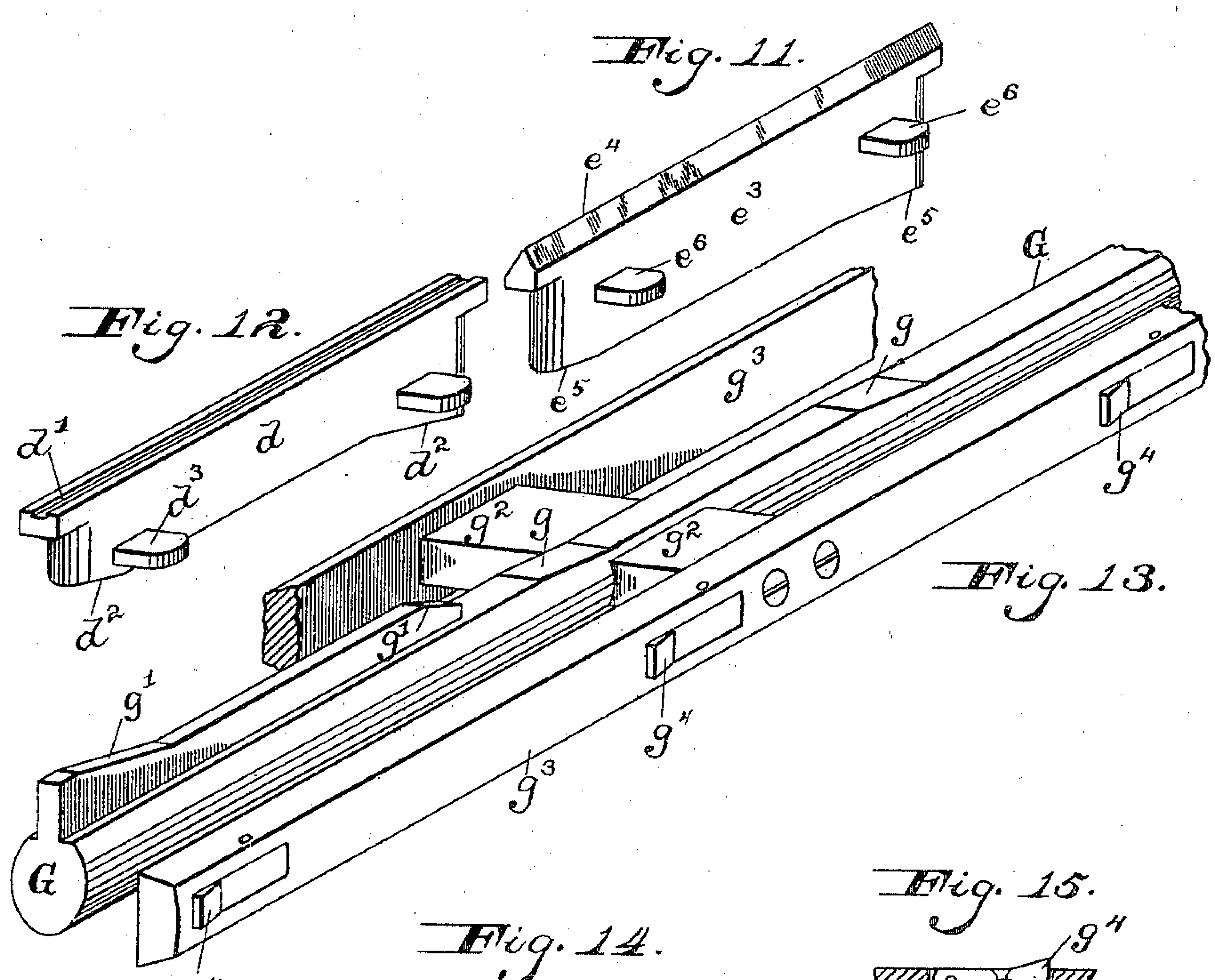


Fig. 15.

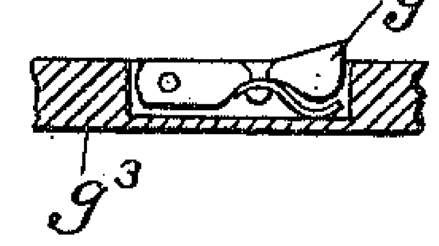
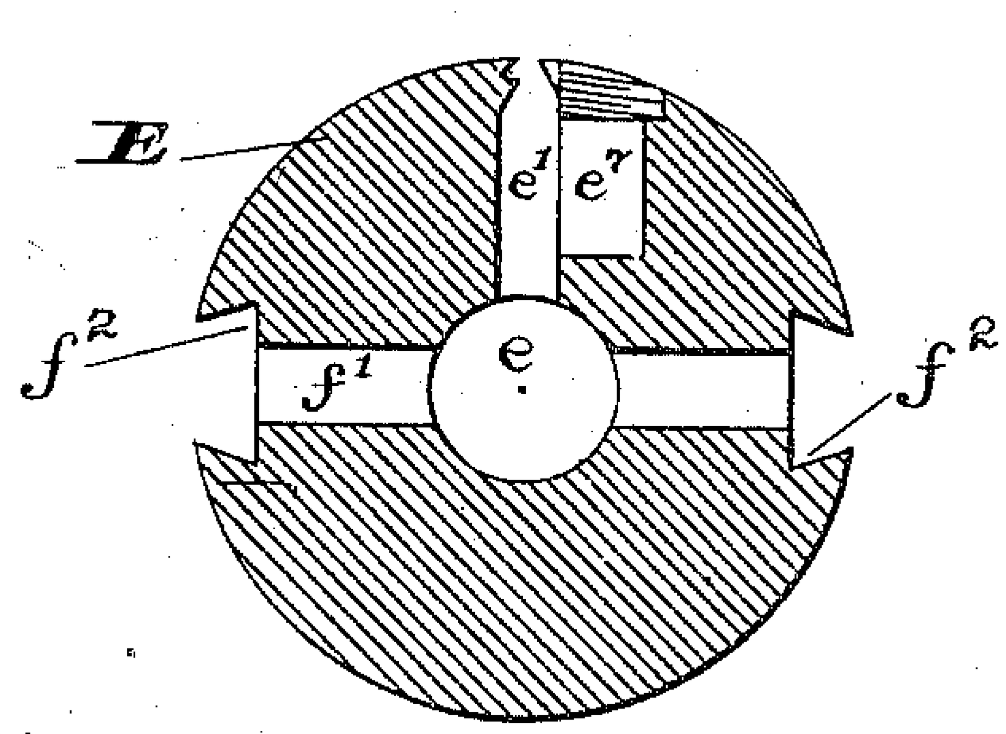


Fig. 14.



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UNITED STATES PATENT OFFICE.

ROBERT TYNES SMITH AND DAVID M. MONROE, OF BALTIMORE, MARYLAND, ASSIGNORS TO AMERICAN CAN COMPANY, A CORPORATION OF NEW JERSEY.

SHEET-METAL-LOCK-SEAMING MACHINE.

SPECIFICATION forming part of Letters Patent No. 725,163, dated April 14, 1903.

Application filed July 31, 1901. Serial No. 70,363. (No model.)

To all whom it may concern:

Be it known that we, ROBERT TYNES SMITH and DAVID M. MONROE, citizens of the United States, residing at Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Sheet-Metal-Lock-Seaming Machines, of which the following is a specification.

This invention relates to a machine for forming and locking the seams of sheet-metal bodies.

Among the objects of the invention are to provide improved means whereby the sheet-metal blanks are wrapped tightly around the mandrel.

Another object of the invention is to provide a mandrel of two sections, on one of which the body is wrapped and the side seam formed and interlocked, and the other on which the seam is locked after the body is sized exteriorly.

Another object is to provide means whereby in the several operations necessary before completing the side seam the seamed edges of the blank will not become disengaged, to form the seam in such manner that before the seam is completed the seamed edges may yield in order to permit the body to be sized without disengaging the seamed edges, and also to form the seam in such manner that the body may be sized from the exterior after the seam has been partly formed and after being sized the seam finally locked.

Another object of the invention is to combine in a machine means for sizing the body from the exterior while the seam of the body is hammered from the interior of the body.

With these and other objects in view the accompanying drawings illustrate one form of mechanism for carrying the same into practical effect without, however, intending to limit the invention to the particular mechanism shown, as the same may be varied or modified in many respects without departing from the principle of the invention.

In the drawings, Figure 1 is a front elevation of the machine with the housing of the outer mandrel-section removed. Fig. 2 is a sectional side elevation of the machine. Fig. 3 is a longitudinal vertical section through the mandrel and housing at the outer end thereof. Fig. 4 is a horizontal section through the same. Fig. 5 is a vertical cross-section on the line 5 5 of Fig. 3. Fig. 6 is a diagrammatic view showing a cross-sectional view of the mandrel and the two clamping-jaws, one of which has been swung up and folded one side of the sheet-metal blank around the mandrel. The seaming-die is also located in its up position with respect to said mandrel. Figs. 7, 8, 9, and 10 illustrate, on a larger scale, the successive operations which the seamed edges of the sheet-metal blank pass through in the machine. Fig. 11 illustrates a perspective view of the nipper-block on a larger scale. Fig. 12 is a similar view of the hammer-block on the same scale. Fig. 13 illustrates in perspective a portion of the mandrel-shaft and slide-bars. Fig. 14 is a cross-section of the inner mandrel-section with the nipper-block, the central shaft, and slide-bars removed. Fig. 15 is a vertical section through one of the slide-bars and shows one of the spring-pressed pawls, and Fig. 16 is an end view of the clamp which presses the metal blank against the mandrel.

In the drawings, A designates the frame of the machine, which in the present instance has an upright or vertical position and is provided at the top with two vertically-extending brackets a, which latter at their upper ends are each provided with a bearing a', which support a horizontal driving-shaft a^2. Secured to the front lower portion of the frame by any suitable means is a bracket b, which supports a table b', on which the sheet-metal blanks are placed preparatory to being fed into the machine. A block c is supported centrally on the bracket b and carries at each side a pivoted segment-shaped clamping-jaw c', each having on its concave face a spring-finger c^2, and each of these clamping-jaws when in the open position or at rest have position in a plane just below the feeding-table b', so that when the flat metal blank is fed into the machine and previous to being turned up into cylindric form the clamping-jaws will have position one beneath each end of the said blank. A vertically-movable clamp f has position in the block c and between the two clamping-jaws c'.

Above the block c and suitably secured to the front of the frame A is a mandrel, which latter is shown in detail in Figs. 3, 4, 5, and 6. By reference to these figures it will be seen that the mandrel is composed of two sections E E' in alinement, each section being of length sufficient for a can-body. The inner section E, next to the frame of the machine, is designed to accommodate the can-body blank while the preliminary work of forming the seam is going on, and the outer section of said mandrel supports the can-body while the seam is finished and put into condition to receive the flux, after which the can-body is ready for the solder. In the present instance the mandrel is cylindric or round and is designed to form a round body from a flat blank; but it is obvious that the mandrel in cross-section may have a shape which is square or angular.

As before stated, the mandrel comprises two sections. The first section E, on which the seam is formed, is of a slightly-larger diameter than the finishing-section E' in order that the can-body may be drawn down or contracted to the desired diameter after leaving said seam-forming section. This difference in the relative diameter of the two mandrel-sections is hardly perceptible to the eye; but it is nevertheless an important feature of the invention and is to be understood to be a part thereof. The two sections of the mandrel from one end to the other are provided with a central bore e, and each section on top is also provided with a slot. The slot in the first section E is designated e' and that in the second section e^2. These slots extend from the central bore e toward the circumference. The slot e' receives the mechanism which does the preliminary work of forming the seamed edges on the sheet-metal blank. By reference to Figs. 6, 11, and 14 this mechanism may best be understood. The slot e' receives a vertically-movable nipper-block e^3, and the upper edge e^4 of said block in cross-section has an inverted-**V** shape. The body of this block e^3 is shorter lengthwise than its top edge e^4, and said body occupies the slot e', and the bottom of the block is provided in the present instance with two inclined faces or cam-surfaces e^5. When the nipper-block e^3 is in its lowest position, these cam-faces e^5 project into the central bore e of the mandrel. The nipper-block e^3 carries at one side two laterally-projecting lugs e^6, (see Fig. 11,) and these lugs take in an offset e^7 in the slot e' and have a vertical movement therein. By reference to Fig. 14 it will be seen that the slot e' is contracted or smaller at its outer opening than at the point where it enters the central bore, and by reference to Fig. 6 it will be seen that the edge e^4 of the nipper-block e^3 projects up into said contracted opening. The side lugs e^6 on the nipper-block take in the offsetting-space e^7 in the mandrel, and a spring e^8 on top each of said lugs serves to keep the nipper-block e^3 normally pressed down. A screw-plug confines the spring. The slot e^2 in the outer section E' of the mandrel receives a hammer-block d, which is provided at its upper edge with a seam-groove d' and whose lower edge is provided with two inclined cam-surfaces d^2, which project down into the central bore e of the mandrel. The hammer-block is also provided with two laterally-projecting side lugs d^3, which project into an offsetting-space d^4 at the side of the slot e^2, and a spring d^5 on each lug serves to keep the hammer-block normally pressed down. A screw-plug confines each spring.

The mandrel E in the present instance is also provided with a radial longitudinal slot f', which extends in a horizontal direction and opens from the central bore e to the periphery of the mandrel. In the present instance the mandrel is also provided with two dovetailed grooves f^2, one diametrically opposite the other and extending longitudinally of the mandrel and also along the edges of the said slot f'. A rod G has position within the central bore e of the mandrel and extends from the forward or discharge end thereof back through the entire length of the mandrel and projects at the rear of the frame A. This rod G has its rear end connected to a vibrating lever G', which latter is moved back and forth by the action of a cam G^2 on the driving-shaft a^2. The movement of this lever G' imparts a reciprocating endwise movement to the rod G through the bore e of the mandrel.

The rod G is provided on its upper surface with two sets of inclined cam-faces g g', one set g of which takes beneath the cam-surfaces e^5 on the bottom of the nipper-block, while the other set g' of cam-faces takes position beneath the cam-faces d^2 on the bottom of the hammer-block d. It will thus be seen that when the rod G is moved forward the nipper-block e^3 and hammer-block d will both be lowered in their respective slots, and when the rod and cam-faces thereon are moved backward the said nipper and hammer-blocks will both be raised. The rod G is also provided with a cross-bar g^2, which extends at right angles to said shaft at either side thereof, and the ends of said cross-bar each support a dovetailed slide-bar g^3, each of which extends parallel with the rod G and one of which moves in each of the said dovetailed grooves f^2 on the mandrel sides and is reciprocated back and forth in said grooves by the movement of the rod with which it is attached by the cross-bar g^2. Each of the slide-bars g^3 in the present instance is provided in its outside vertical wall with a series of spring-actuated pawls g^4, which are designed to advance the sheet-metal can-body from one section E of the mandrel to the other section E' during its several operations, as will be hereinafter fully described.

Secured to the bracket b in front of the frame of the machine is a housing h, which is provided, preferably, with a cylindrical bushing h', which takes around the outer section E' of the mandrel, but leaves a surrounding space and incloses the upper grooved edge d' of the hammer-block d and also the two slide-bars g^3. The cylindrical bushing h' on the interior is bored to the exact size or dimension which it is desired the exterior of the can-body shall have in order that the flanges of the heads may fit accurately on the ends of the can-body. The inner section E of the mandrel contains mechanism that enables the side seam to be formed in a loose condition, so that the can-body may then be forced onto the forward mandrel-section E' and inside of the bushing h', which is of smaller diameter than the can-body it receives, while the seam of the latter is still in the loose condition in order that said bushing may give to the can-body the accurate exterior diameter. It is preferable that the inner mandrel-section E be of a slightly-larger diameter than the outer mandrel-section in order that the can-bodies may be reduced by being forced into the cylindric bushing which is of a smaller diameter and while in said bushing to hammer and lock the side seam from the interior of the can-body, and thereby accurately size the bodies exteriorly previous to the application of the flux and solder.

Attached to the frame of the machine above the mandrel is a plate i, having an up-and-down guideway i', which latter extends in a direction oblique with respect to a line drawn perpendicular from the top to the bottom of the machine, and said oblique guideway has a reciprocating block or head I, which is provided on its lower end with a seaming-die I'. An inverted-T-shaped lever i^2 is pivoted at one end of its head i^3 to the plate i, and the opposite end of said head is pivotally connected to the guide block or head I, while the other end i^4 of said lever projects upward and is provided with a roller which engages the cam-wheel i^5 on the driving-shaft a^2. A lever i^6 is also pivoted to the plate i, and one end is bifurcated and engages a pin i^7 on the guide block or head I, while the other end of the lever carries a counterbalance-weight i^8. In operation the guide block or head and the seaming-die are reciprocated in an oblique direction with respect to the mandrel, the cam i^5, and T-lever, causing same to be forced down and the weighted lever returning the head to the elevated position.

We will now proceed to describe the mechanism which operates the can-body-clamping jaws c'. These jaws, of which there are two, perform the function of wrapping the sheet-metal blank tightly around the inner section E of the mandrel beneath the seaming-die I', and a very desirable feature of the construction shown is the spring-fingers attached to the concave face of each jaw. In the present instance these jaws c' are operated by a series of levers coacting with a rod and cam, but other forms of mechanism may be substituted.

As there are two concave jaws c' and the mechanism for operating each is exactly alike, it will be unnecessary to describe each set, as the only difference is in the time operation of the two sets, one set operating before the other by reason of the relative position of the operating-cams on the driving-shaft a^2. Pivotally connected to the side of the bracket b is a lever j, and beneath said levers and pivoted to the lower end of the bracket is another lever j'. A link or rod j^2 connects the two levers j and j', while another link j^3 pivotally connects the lever j with an ear j^4 on the under side of the jaw c'. A rod j^5 extends in a vertical direction at the side of the frame, and at its lower end is connected to the lever j'. A bracket j^6 is supported at the top of the frame, and said bracket in turn pivotally supports a bell-crank lever j^7, one end of which lever is provided with a roller which engages the cam j^8. The other end of said bell-crank lever carries a depending link-hook j^9, which latter takes in the upper end of the said vertical rod j^5.

By reference to the drawings (see especially Figs. 1 and 6) it will be seen that the clamping-jaws c' are concaved and fit accurately around the mandrel when said jaws are in the elevated position. (See Fig. 6.) In order to insure a perfect fit of the can-body blank around the mandrel to a degree not heretofore attained, each of the clamping-jaws is provided on its concaved face with one or more spring-fingers c^2. These spring-fingers are secured by one end to the jaws near the pivot-point, and the other end of said spring-fingers have position within the concave face of said jaws and are unsecured, and when the jaws are folding the blank around the mandrel the spring-fingers press against the blank and by a frictional rub against the blank as the jaws are swung up tend to smooth the blank tightly around the mandrel and insure that the can-body will be of a uniform size at the time the seam is formed and also prevent the blank from puckering.

The mechanism for feeding the flat sheet-metal blanks into the machine will now be described.

The table b' is provided at each side with a guide-rail k, between which the metal blanks are placed one at a time. A sliding head k' has position on the guide-rails and is adapted to move back and forth thereon, and said head is provided with a pin k^2, which extends crosswise of said head, and a lever k^3, having a slotted or forked lower end k^4, takes over said pin. The lever k^3 at its upper end is pivoted to a pin k^4, supported on the end of a bracket k^5, which is secured to the frame of the machine. A lever k^6 is also secured to the pin k^4, and its lower end is bolted at k^8 to the lever k^3, while the upper end of said lever k^6 is provided with a roller which has position in the groove of a cam-wheel k^7 on the shaft a^2. As the cam-wheel k^7 revolves the levers k^6 and k^3 receive a vibrating motion, which in turn imparts a reciprocating movement to the sliding head k' behind the sheet-metal blank.

The mechanism by which the clamp f, that presses up below the can-body blank, is operated will next be described.

The clamp f in the present instance has position beneath the mandrel-section E and is secured against lateral displacement by means of the block c; but it is free to be moved vertically. The upper surface l' of the clamp is concaved to fit against the bottom of the mandrel or the can-body on the mandrel. The clamp on the bottom is provided with an ear l^2, and a lever l^3 is pivoted between its ends, and one end of said lever projects beneath said clamp and is pivoted to the said ear l^2 thereon, while the other end of said lever projects through an opening in the frame of the machine and is connected to a downwardly-projecting link l^4. A bracket l^5, suitably secured to the frame of the machine, carries a lever l^6, one end of which is pivoted to the end of the said link l^4, and the other end of said lever l^6 is pivotally connected to the lower end of a substantially vertical rod m, which near its lower end is provided with a weight m'. The upper end of the rod m is screw-threaded and receives the lower or head end of a link m^2, the upper end of which is pivoted to one end of a cam-lever m^3, which is pivoted approximately at its center to a stationary part of the machine, and the forward end of said cam-lever is provided with a roller which engages a cam n on the driving-shaft a^2. When the forward end of the cam-lever m^3 is depressed by the cam n, the rear end of said lever and the rod m are raised, and the rear end of lever l^6 is also raised. This movement of said levers causes the link l^4 and rear end of the lever l^3 to be pulled down, and thereby the forward end of said lever l^3 and the clamp f are raised or pressed upward.

The operation of the machine is simple and as follows: The sheet-metal blank is placed on the table b' between the guide-rails k, and the bar k^3 is vibrated by the cam-wheel k^7, which imparts a reciprocating movement to the head k' and feeds the flat blank between the mandrel E and clamp f, which latter then presses the sheet-metal blank firmly up against the under side of the inner mandrel-section E and holds the same there for a period. The cam j^8 on the right-hand side now contacts with the roller on the bell-crank lever j^7 and by means of the depending hook j^9 raises the rod j^5 and causes the levers j' and j to raise, and thereby swing the right-hand clamping-jaw c' up under the metal blank and, as previously described, wrap that end of the blank by means of the spring c^2 around the mandrel, with one edge of the blank overlapping the seaming-slot e'. The cam-wheel i^5 now acts on the roller end i^4 of the lever i^2 and causes the head I and seaming-die I' to move downward. It has hereinbefore been pointed out that the movement of the seaming-die is in an oblique direction with respect to the mandrel. This is an important feature, in that the grooved edge of the lock-seam is thereby formed on an incline, as clearly shown in Figs. 7 and 8, and not in a vertical line, as heretofore, and this method of forming the grooved edge on an incline prevents the loosely-hooked edge of the blank from becoming disengaged while the can-body is being transferred from the inner section E onto the outer section E' of the mandrel. The seaming-die I' when lowered by the action of the cam i^5 strikes the overlapping edge of the blank l, as shown in Figs. 6 and 7, and forms an inclined V-hook or grooved edge, and the seaming-die is then withdrawn or raised. The other clamping-jaw c' at the feeding-in end or left-hand side of the machine is then swung up and wraps the other end of the blank around the mandrel, with its edge overlapping the seaming-slot. This operation is performed precisely in the same manner and by similar mechanism to that which operated the first jaw. The seaming-die I' is again forced down on the overlapping edge of the blank and drives it down into the V-hook or grooved edge, and the two edges of the blank are then loosely hooked together in the condition shown in Fig. 8. The seaming-die is then immediately withdrawn or raised. The next operation is to bend or add to the inclination of the two hooked edges of the blank, so that they shall be in the position shown in Fig. 9. This is accomplished as follows: The cam G^2 in revolving vibrates the lever G', and this lever is connected to the end of the rod G, and as the lever G' is vibrated the rod G is reciprocated through the mandrel. It has heretofore been explained that the nipper-block e^3 in the seaming-slot e' has a vertical movement by reason of the cam-faces e^5 contacting and riding on similar cam-faces g on the reciprocating rod G as the latter is drawn into the mandrel. It will therefore be readily understood that in order to further incline or bend the two hooked edges of the blank into the position shown in Fig. 9 if the nipper-block e^3, having its upper edge e^4 inclined to the proper angle, is driven up under the hooked edges of the can-body blank while in the condition shown in Fig. 8 said two edges of the blank will assume the angle of the said edge e^4 of the nipper-block. Up to this time the seam-forming operation has been done entirely on the inner mandrel-section E; but the loose seam is not yet hammered or securely locked. The next operation is to transfer the can-body from the inner mandrel-section E onto the outer mandrel-section, where the body is accurately sized from the exterior and then locked. After the rod G has completed its inner stroke and forced the nipper-block e^3 up it will then be retracted or withdrawn and the nipper-block will drop and be freed from the edges of the blank. It has also been explained that the mandrel is provided at diametrically opposite sides with slide-bars g^3, which are connected to and move with the rod G, and that each of said slide-bars is provided with a series of push-pawls g^4. With this understanding it will readily be understood by reference to Figs. 3 and 4 that the sheet-metal blank l is first wrapped around the larger inner mandrel-section just in front of one of the pawls g^4 on either side of the mandrel and that as the rod G is moved outward the pawls will take against the rear cylindrical edge of the can-body and push it forward onto the smaller outer mandrel-section E', and as this latter section is inclosed by the bushing h', which is of an accurate internal size desired for the outer diameter of the finished body, the seam of the can-body as the latter is forced into the bushing will give and permit the can-body to be reduced to the desired size by the bushing irrespective of any variation in the thickness of the sheet metal. Now at the time the can-body is transferred from the inner to the outer mandrel-section another blank is being fed under the inner mandrel-section and formed around said section, so that when the rod G is drawn back inward the two edges of the second blank have been hooked and are ready to be acted upon by the nipper. It will now be understood that at this point in the operation two can-bodies are being treated. The one on the inner mandrel-section is ready to have its hooked edges inclined to the proper angle by the nipper, while the one on the outer mandrel-section, having been sized, is ready to have its loose seam locked. It will be remembered that at this point the rod G is at its extreme outer stroke and is ready to be drawn inward, and as the rod G is moved inward it will perform the same operation as previously described as far as the body on the inner mandrel-section is concerned; but it will perform an additional function to the body on the outer mandrel-section—to wit, to hammer and lock the seam of the sized body. This latter is accomplished as follows: The hammer mechanism in the outer mandrel-section has previously been described and consists, briefly, of a hammer-block d, having a seam-groove d' and also provided on its bottom with two cam-surfaces d^2, which latter contact with two cam-surfaces g' on the rod G. As the rod G is moved inward these two cam-surfaces d^2 and g' cause the hammer-block d to be driven upward, and thereby hammer and flatten the seam against the bushing h', and the seam is then in the finished condition ready to be soldered. (Shown in Fig. 10.) The rod G is again at its extreme inner stroke and is now moved outward, carrying the slide-bars g^3 with it, and the pawls g^4 on said bars will discharge the can-body from the outer mandrel-section onto a soldering-horn or other device, (not shown,) while the can-body on the inner mandrel-section will be forced into the bushing to be sized. While the machine is in continuous operation two can-bodies will be under treatment at all times.

While we have described and represented herein those details of construction which we consider best adapted for practical purposes, it is to be understood that the form and arrangement of the parts may be modified in many respects, which will be suggested by the judgment and experience of the skilled mechanic, without changing the general mode of action or departing from our invention.

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

1. In a machine for forming sheet-metal bodies, the combination of a mandrel around which the sheet-metal blank is wrapped; means for first forming a hook on one edge of the blank and then forming a hook on the opposite edge of the blank and interlocking said hooked edges loosely; means on the interior of the mandrel for inclining said loosely-hooked edges and means for inclosing and sizing the sheet-metal body on the exterior after the hooked edges have been formed and inclined and before the same have been permanently locked.

2. The combination with a mandrel, of means for wrapping the blank around the mandrel; means for forming the seam on one edge of the sheet and then on the other and interlocking them loosely; a device independent of the mandrel for exteriorly sizing the loosely-locked bodies, and a device on the interior of the mandrel for closing or bumping the said seam while the body is held by said exteriorly-sizing device.

3. A machine for forming the seams of sheet-metal bodies comprising a mandrel on which the seam-hooks are formed and loosely interlocked and a housing to receive the body after the seam is formed, said housing being of a smaller diameter than the body it is to receive in order to exteriorly size the said body by contraction.

4. A machine for forming the seams of sheet-metal bodies having a mandrel of two sections in alinement one of which is larger than the other and the smaller section being inclosed within a housing whereby the body will primarily be formed on the larger section and then transferred to the smaller and reduced to an accurate size exteriorly by being entered into said housing.

5. A machine for forming the seams of sheet-metal bodies having a mandrel of two sections, one of said sections on which the seam is to be partly formed being of a larger diameter than the one on which the seam is finished; and means coacting with the smaller section for exteriorly sizing and finishing the bodies.

6. A machine for forming the seams of sheet-metal bodies having a mandrel of two sections in alinement with respect to each other, one

of said sections on which the seam-hooks are formed and interlocked being of a larger diameter than the other section on which the seam is completed and means for sizing the body while the latter is on the smaller mandrel-section.

7. A machine for forming the side seams of sheet-metal bodies having a mandrel of two sections in alinement; a seam-forming slot in the first mandrel-section; means in said slot for inclining the partly-formed seam; a housing inclosing the second mandrel-section to receive and size the body; a hammer device in the interior of the second mandrel-section to lock the said seam while it is in said housing and means extending through both mandrel-sections for operating the devices therein.

8. A machine for forming the side seams of sheet-metal bodies having a mandrel composed of two sections in alinement and each section having a slot; means in the slot of one section for inclining the formed seam; means in the slot of the other section for hammering said inclined seam; a central bore through both sections of said mandrel; and means in the central bore for operating the mechanisms in both of said slots.

9. A machine for forming the side seams of sheet-metal bodies having a mandrel of two sections each of which is provided with a slot; a nipper-block in the slot of one section for inclining the loosely-formed seam, said block being provided with a cam-face; a hammer-block in the slot of the other mandrel-section which is provided with a cam-face; a central bore through both sections of said mandrel; a rod movable in said central bore, said rod being provided with cam-surfaces which engage the cam-faces on the nipper-block and hammer-block.

10. In a machine for forming the seams of sheet-metal bodies, the combination of means for forming the seam; a mandrel having a central longitudinal bore; two slots extending along diametrically opposite sides of said mandrel and each having a slide; a slot extending crosswise of said mandrel and connecting the two side slots; two vertical slots extending from the circumference of the mandrel to the said central bore; means in one of said slots for inclining the seam and in the other slot for hammering the seam; and means in said central bore for operating the slides and also for operating the means for inclining and the means for hammering the seam.

11. In a machine for forming the seams of sheet-metal bodies the combination of a mandrel; and two pivoted concave jaws each having a spring-finger wholly within its concave face and which, as the jaws are being clamped around the mandrel, has frictional contact with the sheet-metal blank while the latter is being wrapped about the mandrel in order to smooth and press the same.

12. A machine for forming the seams of sheet-metal bodies comprising a mandrel; and two pivoted concave jaws each having a spring-finger wholly within its concave face and having one end secured and the other end free and projecting toward the free end of said jaws, said springs, as the jaws are clamped around the mandrel, having frictional contact with the sheet-metal blank and smoothing the same around the mandrel.

13. A machine for forming the seams of sheet-metal bodies comprising a mandrel of two sections of differing diameters; means for forming the seam and interlocking it loosely while on the larger mandrel-section; a housing inclosing the smaller mandrel-section and having an interior diameter which is smaller than the diameter of the larger mandrel-section; means for forcing the body from the larger mandrel-section into the smaller housing while the seam is loosely interlocked whereby to size said body by contracting it from the exterior and means for bumping and locking the loosely-interlocked seam from the interior while the body is in said housing.

14. A machine for forming the seams of sheet-metal bodies comprising a mandrel having a seam-forming slot with an inclined wall; a seaming-die adapted to be reciprocated and entered in said slot in a direction oblique with respect to said mandrel whereby the seam will be primarily formed in an inclined position; a nipper-block having a vertical movement in the slot of said mandrel for increasing the inclination of said seam and means moving lengthwise through said mandrel for operating said vertically-movable nipper-block.

In testimony whereof we affix our signatures in the presence of two witnesses.

ROBERT TYNES SMITH.
DAVID M. MONROE.

Witnesses:
CHARLES L. VIETSCH,
FREDERICK S. STITT.