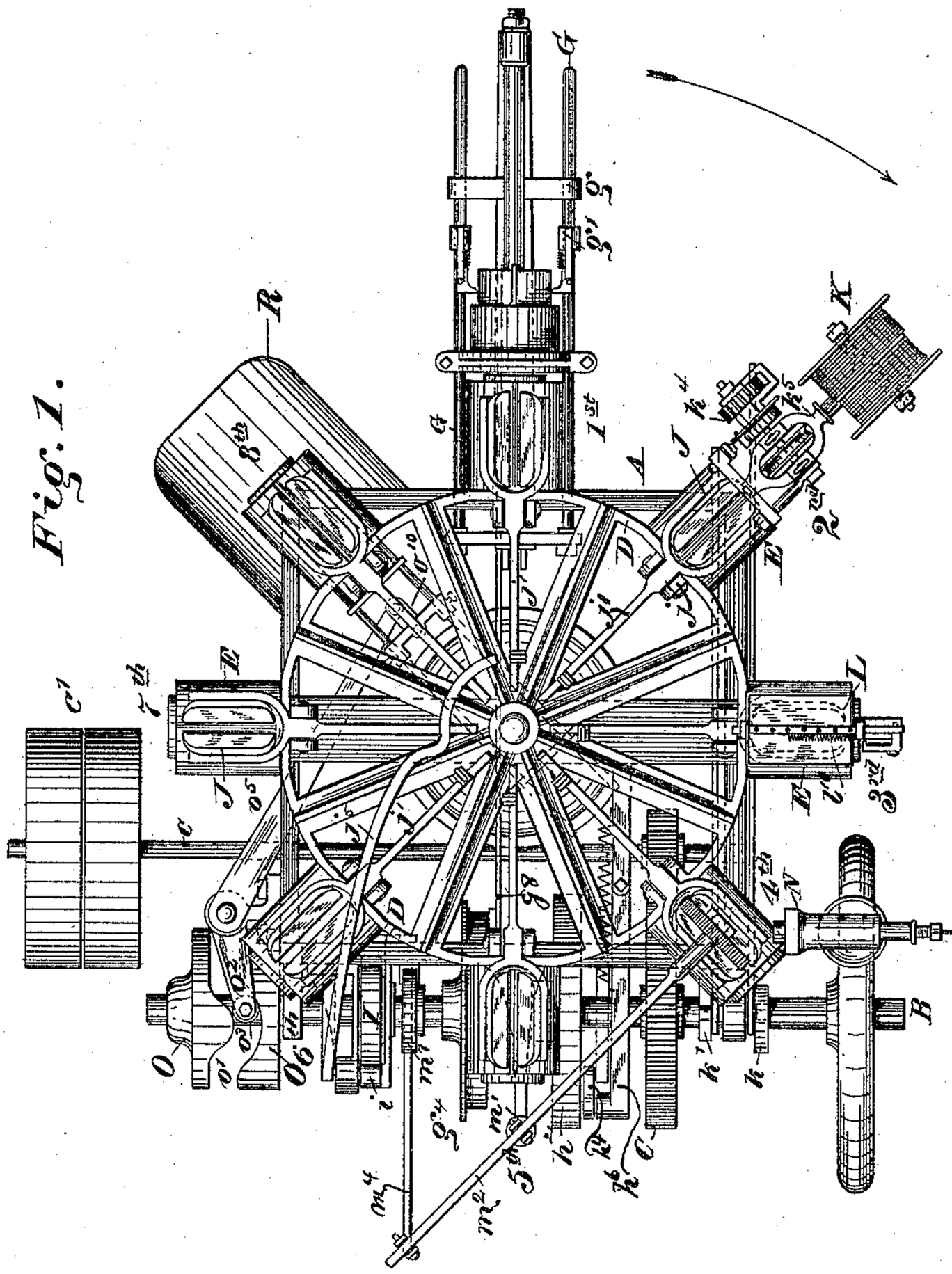
(No Model.) 7 Sheets—Sheet 1.

G. T. PILLINGS.

MACHINE FOR SOLDERING THE LONGITUDINAL SEAMS OF SHEET METAL CANS.

No. 344,856. Patented July 6, 1886.

Fig. 1.



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(No Model.) 7 Sheets—Sheet 2.

G. T. PILLINGS.

MACHINE FOR SOLDERING THE LONGITUDINAL SEAMS OF SHEET METAL CANS.

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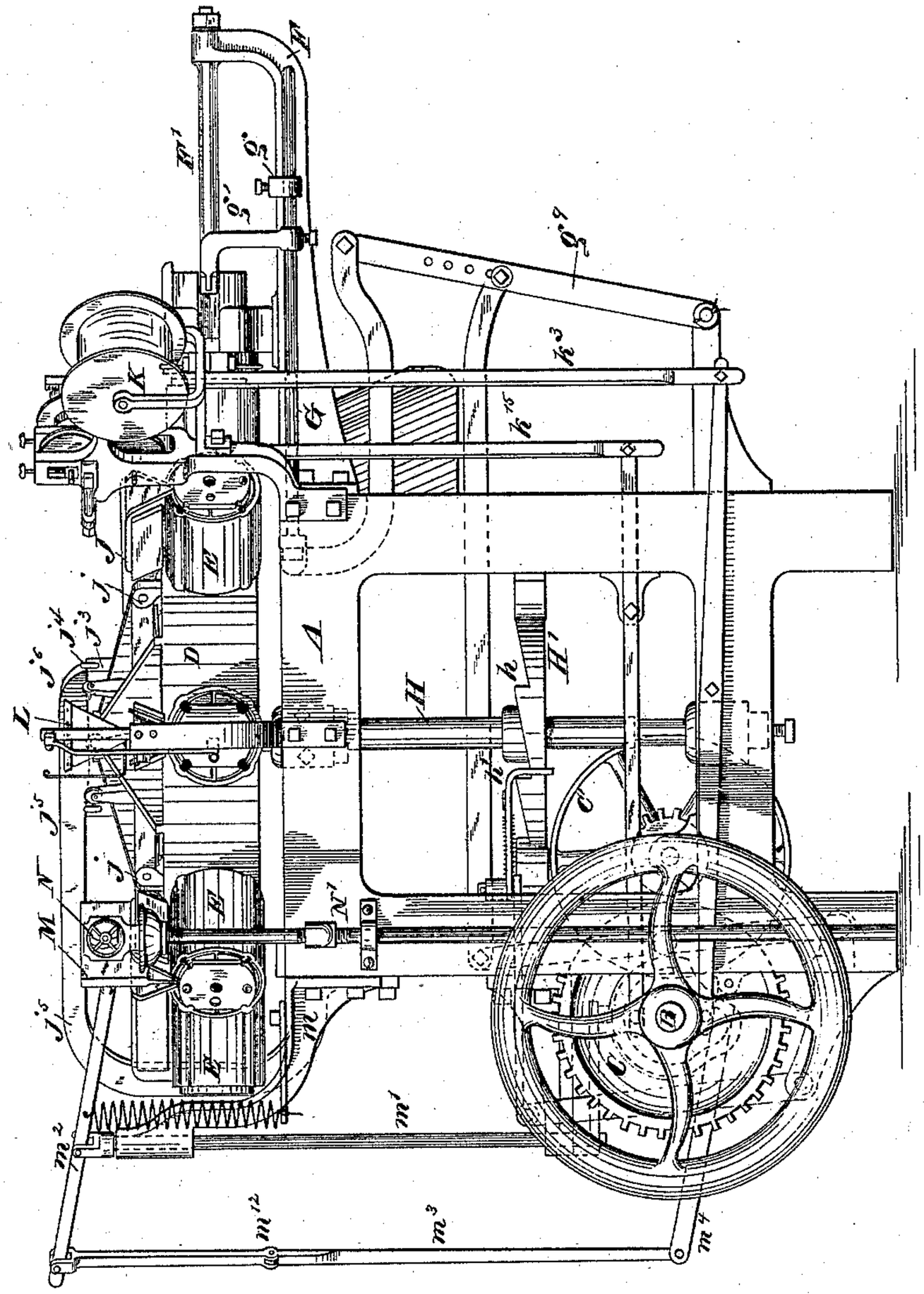
Fig. 2.



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(No Model.)

7 Sheets—Sheet 3.

G. T. PILLINGS.

MACHINE FOR SOLDERING THE LONGITUDINAL SEAMS OF SHEET METAL CANS.

No. 344,856. Patented July 6, 1886.

Fig. 5.

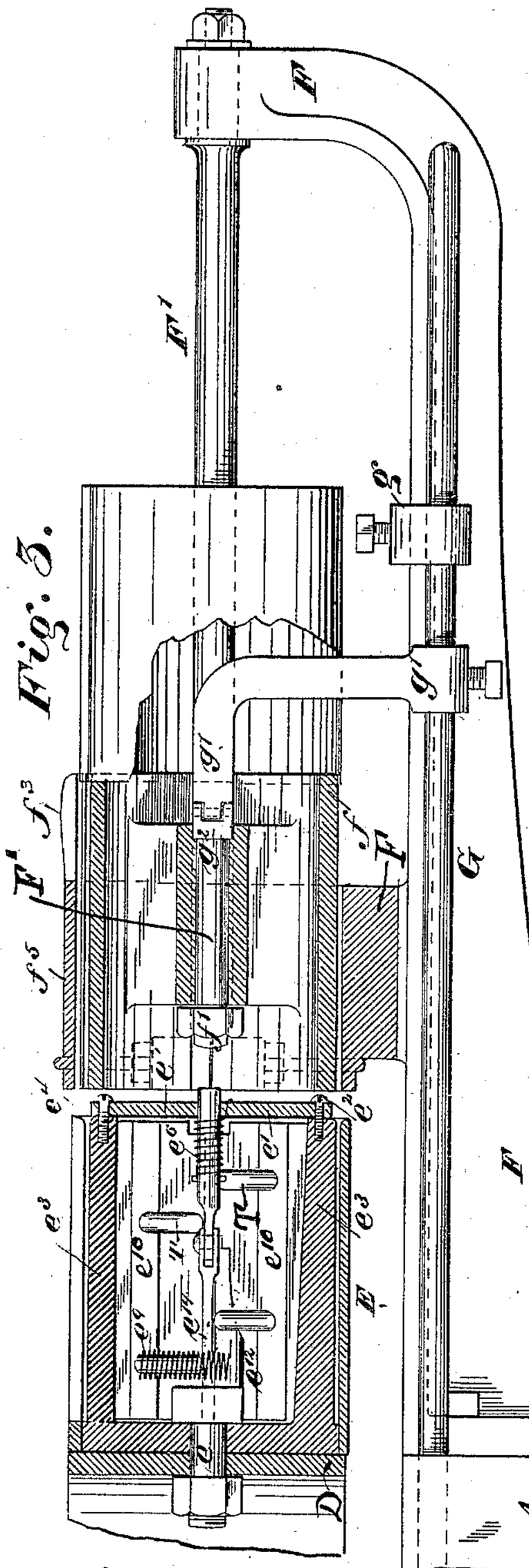
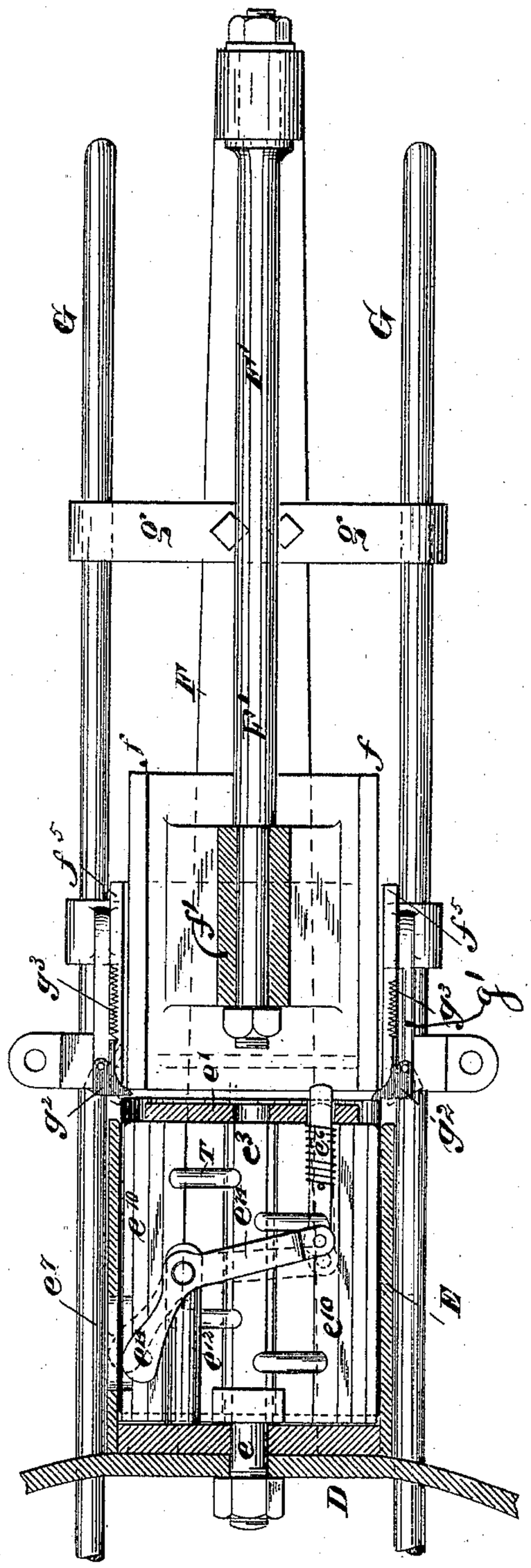


Fig. 4.



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MACHINE FOR SOLDERING THE LONGITUDINAL SEAMS OF SHEET METAL CANS.

No. 344,856. Patented July 6, 1886.

Fig. 7.

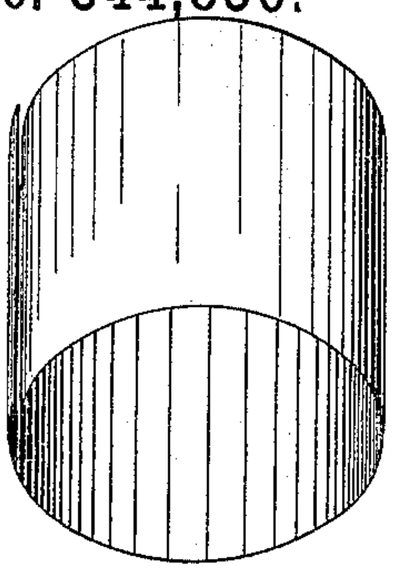


Fig. 9.

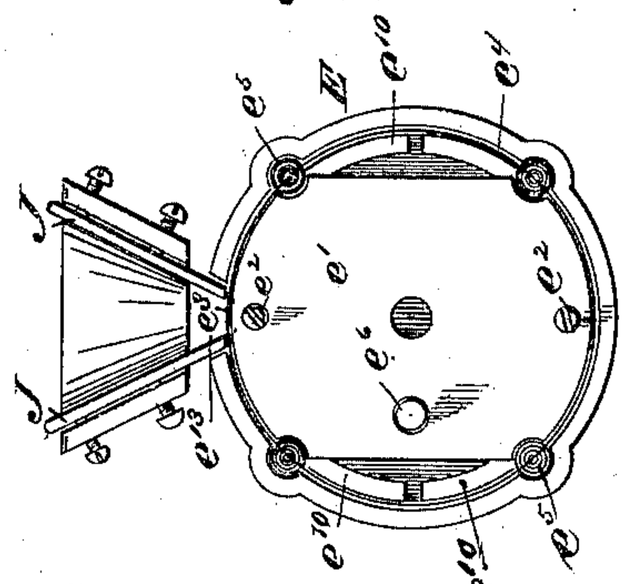


Fig. 6.

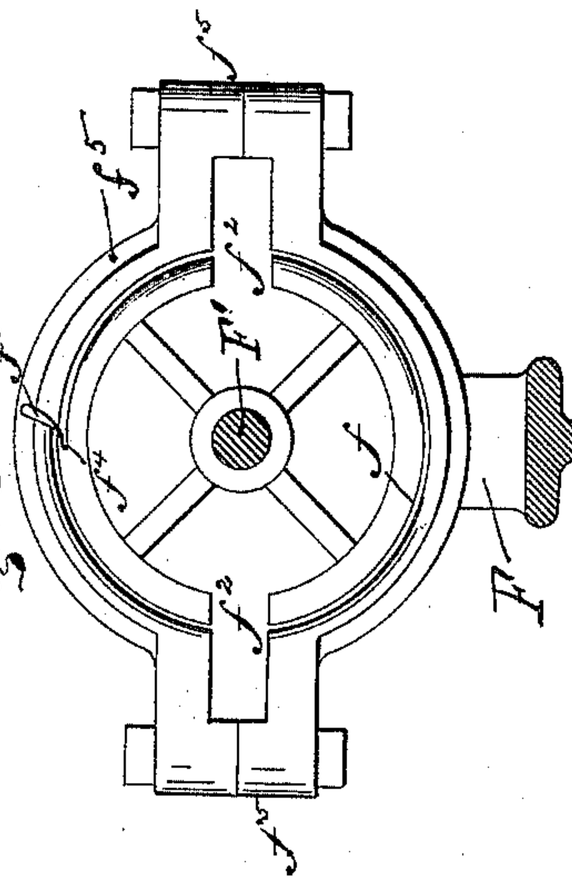


Fig. 5.

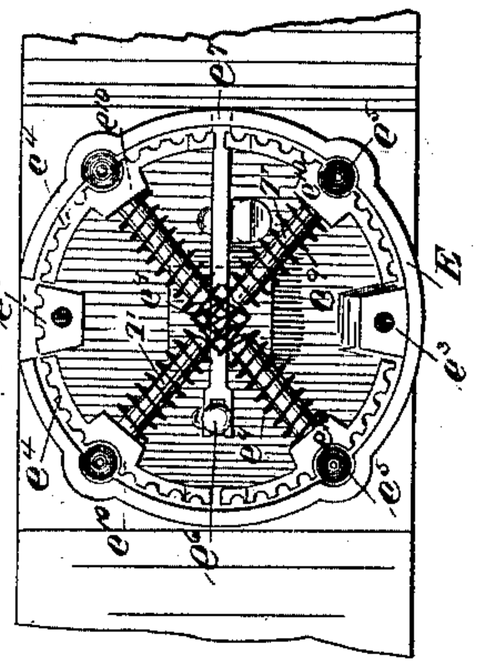
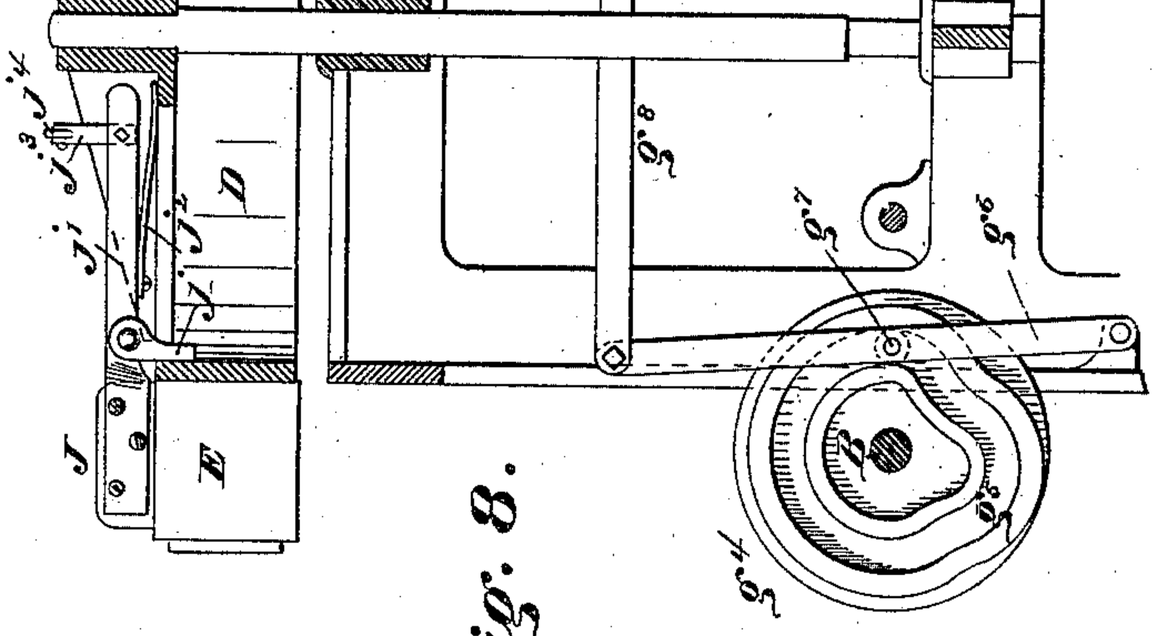


Fig. 8.



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(No Model.) 7 Sheets—Sheet 5.

G. T. PILLINGS.

MACHINE FOR SOLDERING THE LONGITUDINAL SEAMS OF SHEET METAL CANS.

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Fig: 11.

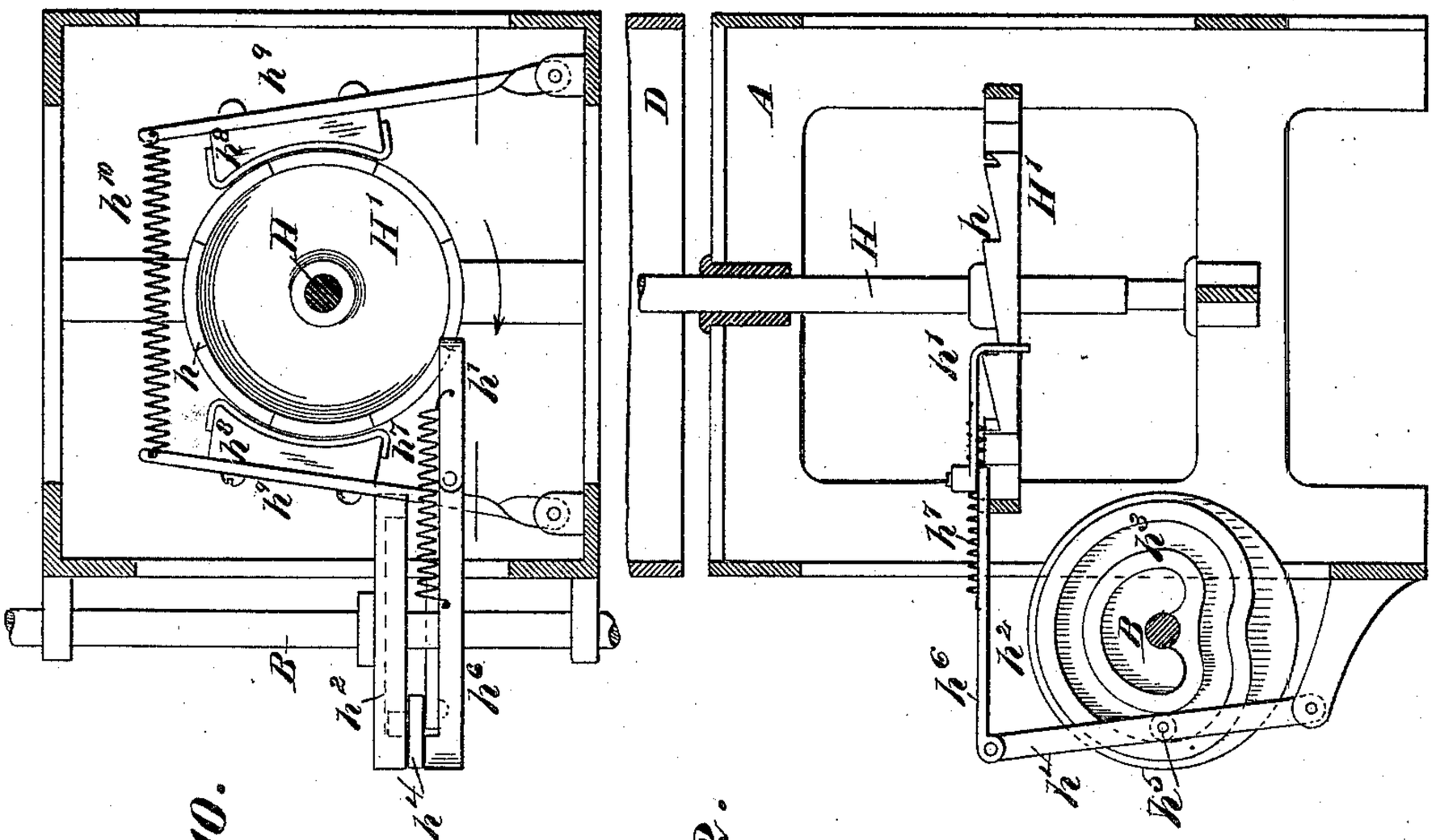
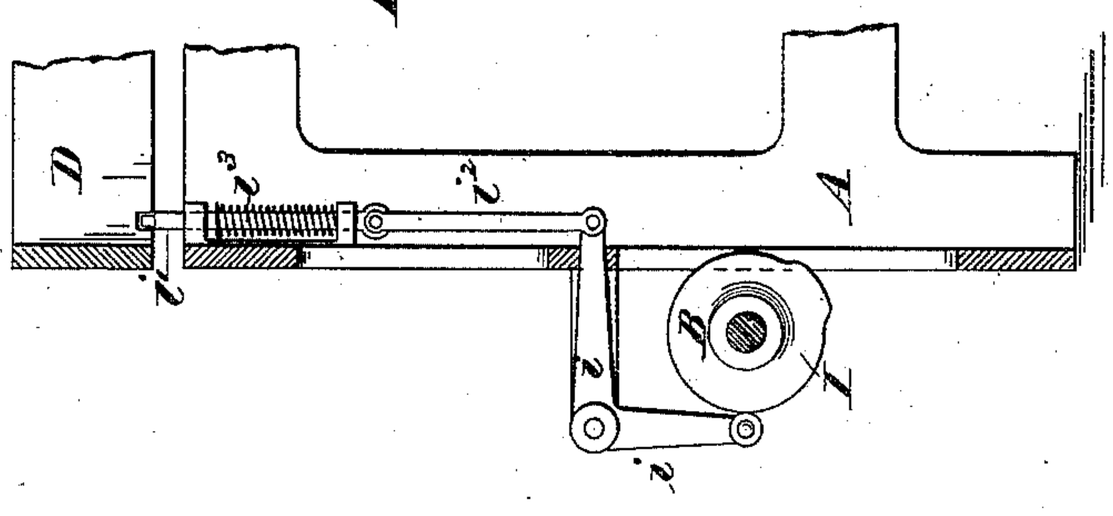


Fig: 10.

Fig: 12.



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(No Model.) 7 Sheets—Sheet 6.

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MACHINE FOR SOLDERING THE LONGITUDINAL SEAMS OF SHEET METAL CANS.

No. 344,856. Patented July 6, 1886.

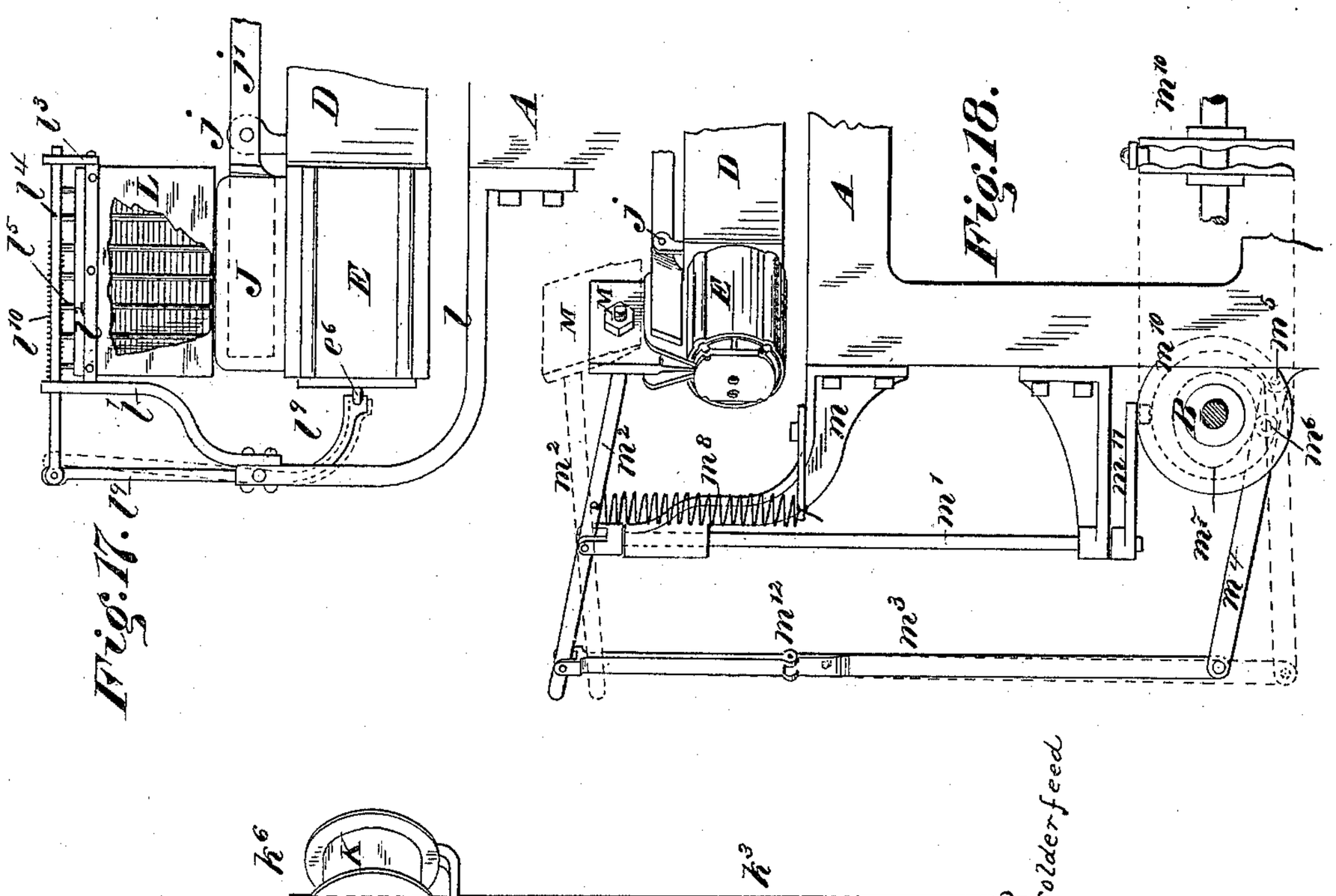

Fig. 11.

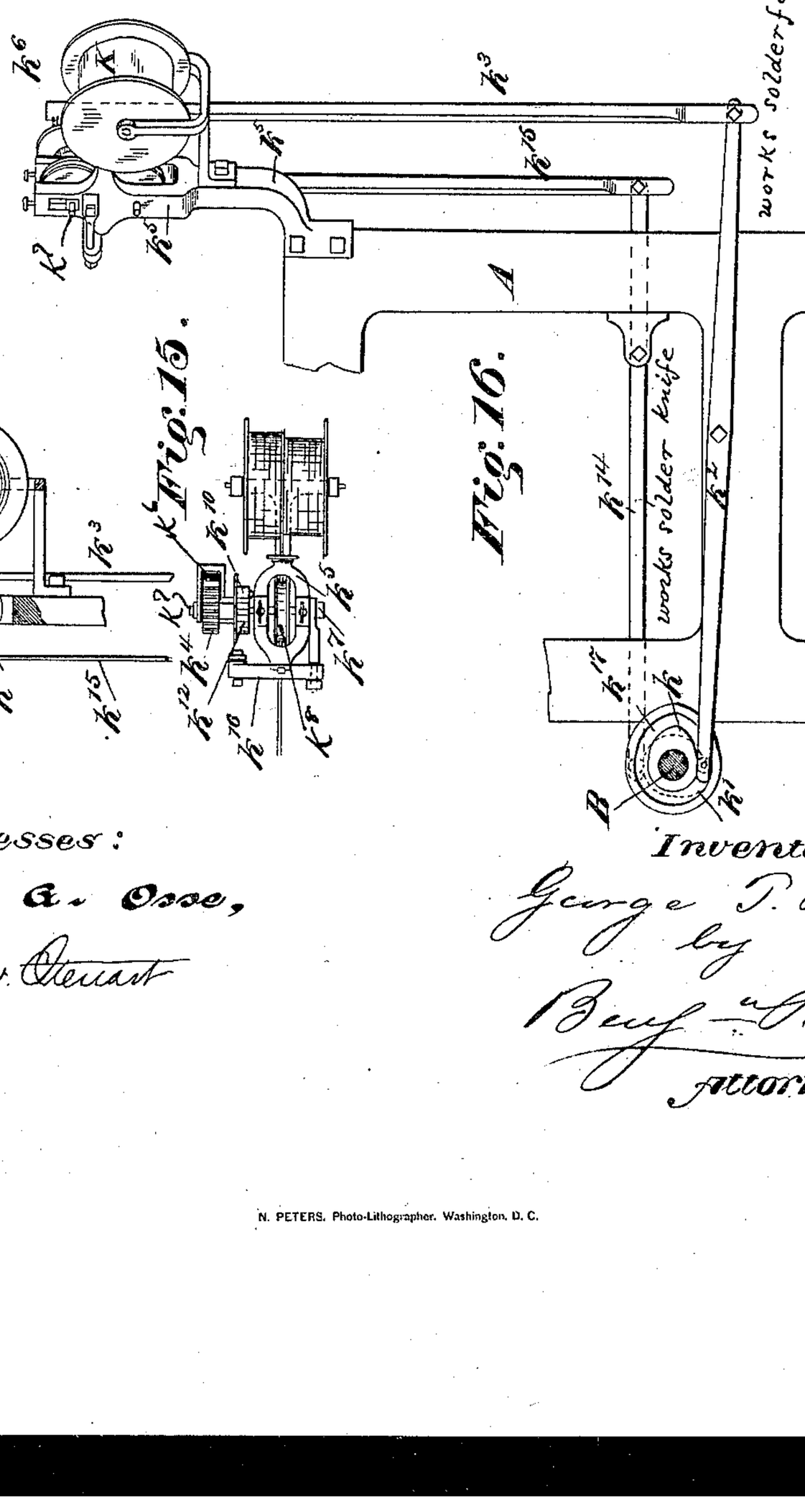

Fig. 14.

Fig. 13.

Fig. 15.

Fig. 16.

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(No Model.) 7 Sheets—Sheet 7.

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MACHINE FOR SOLDERING THE LONGITUDINAL SEAMS OF SHEET METAL CANS.

No. 344,856. Patented July 6, 1886.

Fig. 20.

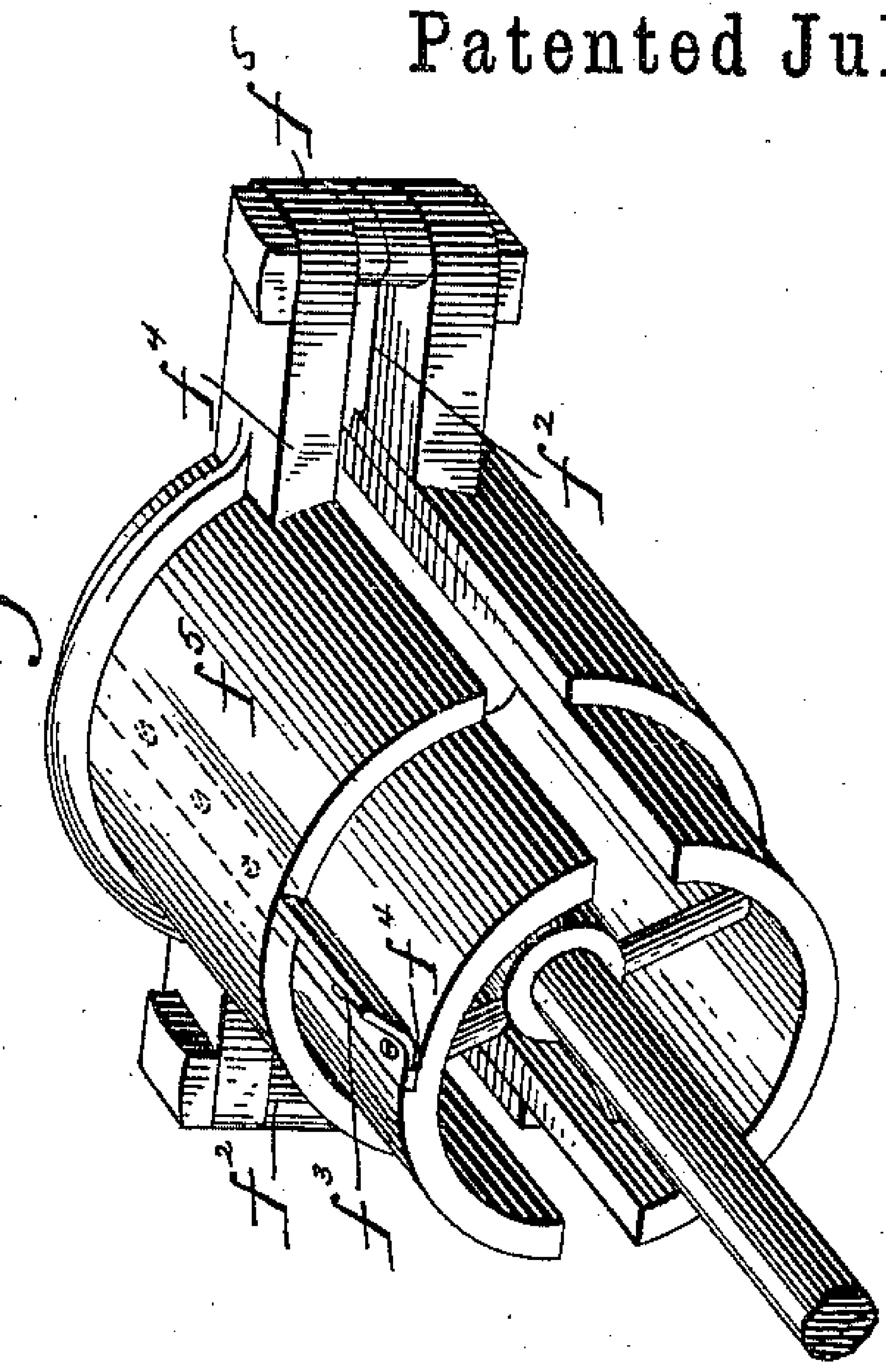
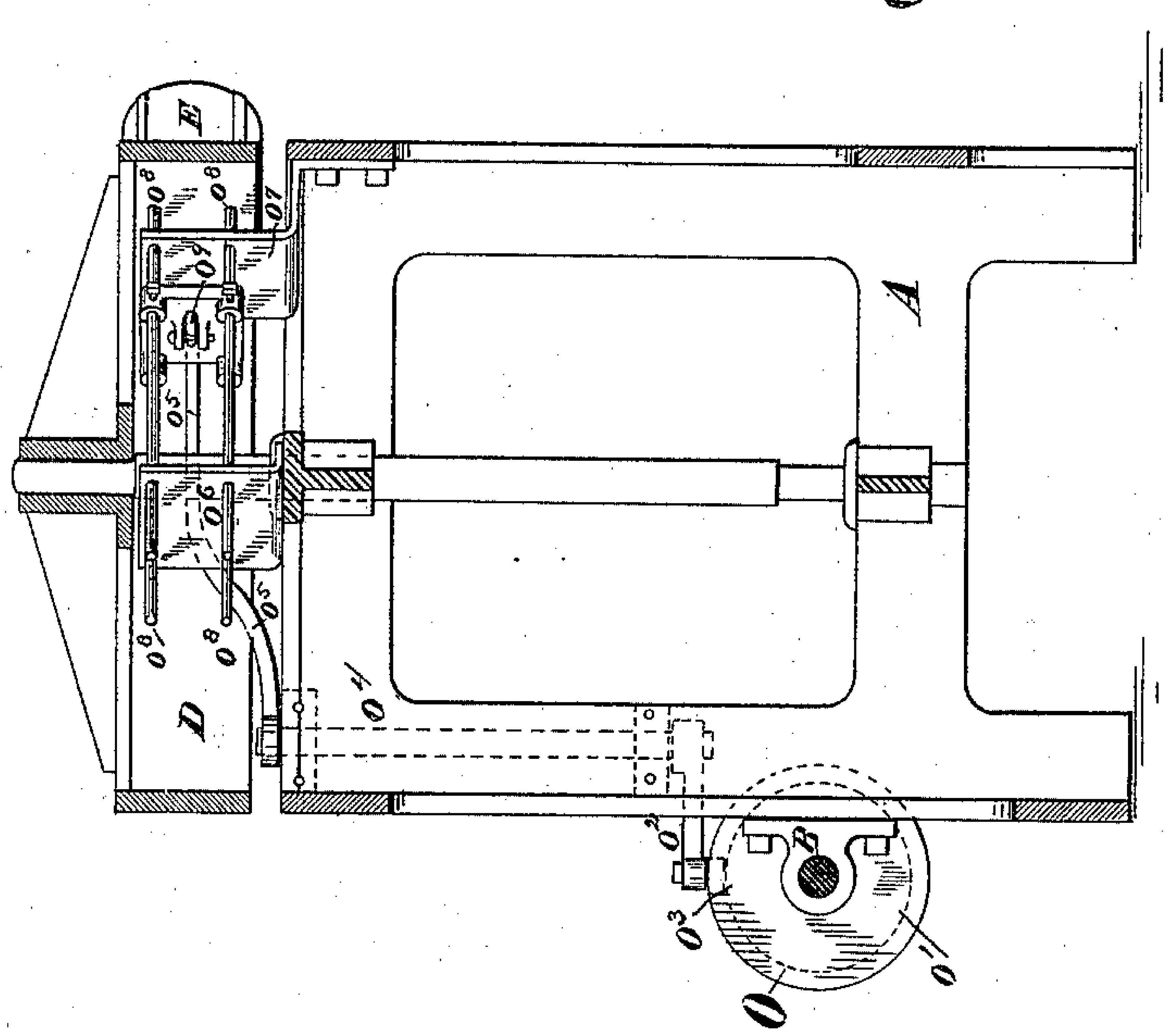


Fig. 19.



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N. PETERS. Photo-Lithographer. Washington, D. C.

UNITED STATES PATENT OFFICE.

GEORGE T. PILLINGS, OF BALTIMORE, MARYLAND, ASSIGNOR TO R. TYNES SMITH AND WILLIAM A. WICKS, OF SAME PLACE.

MACHINE FOR SOLDERING THE LONGITUDINAL SEAMS OF SHEET-METAL CANS.

SPECIFICATION forming part of Letters Patent No. 344,856, dated July 6, 1886.

Application filed October 30, 1885. Serial No. 181,393. (No model.)

To all whom it may concern:

Be it known that I, GEORGE T. PILLINGS, of the city of Baltimore, and State of Maryland, have invented a new and Improved Machine for Soldering the Longitudinal Seams of the Bodies of Metallic Cans, of which the following is a full and clear description.

The accompanying drawings illustrate the construction of the machine, of which Figure 1 is a top or plan view of the machine; Fig. 2, a side elevation of the same; Fig. 3, a view, partly in section, of a can entering the cylinder in which it is held during the operation of soldering the seam, showing also the mandrel upon which the body is formed; Fig. 4, a sectional top view of the cylinder with the can-body in place, and showing the pin thrust out by the can-body, which operates the lever connected with the resin-box for distributing resin upon the seam; Fig. 5, a front end view of the cylinder with the face-plate *e'* omitted, which gages and holds the can-body, and showing, also, the devices which hold the can-body to the inner circumference of the cylinder; Fig. 6, a cross-section of the mandrel, which is located in front of the cylinder which gages the can-body to proper size, and which is intended to so guide said body that it shall enter the gaging-cylinder, one edge overlapping the other, and also fixes the position of the seam with reference to the soldering-block, also showing the open slots at each side, into which the pushers enter to drive the can-body into the gaging-cylinder, and also the slot in the mandrel into which one of the edges of the can-body enters to form a proper lap of these edges; Fig. 7, a perspective view of a can-body with the ends lapped. Fig. 8 is a sectional side view of part of the machine, showing the mechanism by which the pushers are operated, and also showing the knives which rest upon the can-body on each side of the seam, with their pivoted levers, the uprights at the ends of the levers provided with rollers; Fig. 9, a front end view of one of the cylinders with the can in place and the knives resting upon the can-body at each side of the seam; Fig. 10, a top or plan view of the mechanism by which the upright central shaft is driven and given an intermittent rotary motion; Fig. 11, a vertical sectional side view of the same; Fig. 12, a view of the pin which enters the notch in the main rotating wheel or carriage and holds the wheel during the soldering operation, showing, also, the mechanism by which the pin is worked; Fig. 13, a central section of the solder-reel, feeding-rollers, and knife for cutting off the solder; Fig. 14, a view of the pawl and ratchet which is regulated to give intermittent movement to the solder-reel and run out the required length of solder wire; Fig. 15, a top view of the solder-feeding apparatus, showing, also, the solder-reel; Fig. 16, a view of the mechanism which works the reel and knife; Fig. 17, a view of the device for distributing resin on the seam, with part of the resin-box broken away so as to show the pins or spindles inside which operate to let out the resin or other flux and close it off; Fig. 18, a view of the soldering-block in position as when at work, the dotted lines showing the block raised to allow the machine to move. This figure also shows the mechanism for giving the soldering-block a lateral movement and for lifting it up. Fig. 19, a view of the rods which push the can-body out after the seam is soldered and the mechanism for working the rods. Fig. 20 is a view of the mandrel about which the blanks are bent.

A represents the frame of the machine, in a suitable part of which is journaled the shaft B. This shaft receives its motion by means of suitable gearing from the shaft C, which latter shaft is provided with a pulley or pulleys, C'.

Upon the shaft B are arranged the cams which impart movement to many of the working devices of the machine, the details of which are illustrated in the drawings.

D is a revolving carriage, circular in form, or polygonal, and having as many sides as there are cylinders. The apparatus need not be limited to that number, and would work as well with a smaller number. These cylinders hold the can-body upon which the longitudinal seam is to be soldered, and revolve with the carriage D.

The arrow shown in Fig. 1 gives the direction in which the carriage with its cylinders revolves.

The construction of these cylinders will be first described as illustrated in Figs. 3, 4, 5, and 9. Looking first at Fig. 3, it will be seen that one end of the cylinder is closed and provided with an aperture, through which the bolt *e* passes, and also through the face of the carriage D, to bolt the cylinder tightly to the carriage. The other end of the cylinder is provided with the plate *e'*, Fig. 9, secured by the screws e^2 to the longitudinal arms e^3 within the cylinder. These arms e^3 project through the cylinder, and are securely fastened to the hub thereof, or to that part of the cylinder next to the table D, and the upper one, running directly beneath the slot in the cylinder, forms a rest upon which the lapped ends or edges of the can-body lie, and support said edges while the knives or soldering-irons are in contact therewith. The plate *e'* does not extend entirely over the end of the cylinder, but leaves exposed the annular opening, into which the can-body is thrust, (marked in the drawings e^4,) and also the holes or apertures e^5, through which the rods pass which push out the can-body after it is soldered. Within the cylinder are arranged the spring-pressure plates e^{10}, which are made in the form of segments of a circle. Between these pressers and the inner circumference of the cylinder the can-body is held and pressed against the walls of the cylinder, the diameter of which is of a size to suit the required diameter of the can. Each of these pressers is provided with a socket, into which the end of one of the rods T enters. These rods are surrounded each by a spiral spring, e^9, each end of which presses against the presser-plates on opposite sides of the cylinder, and serve to hold the pressers with sufficient power against the can-body to force it against the inner walls of the gage-cylinder and hold it firmly in place. The edges of the pressers are slightly chamfered at e^4, so as to allow the can-body to find its way when thrust into the cylinder.

Before the can-bodies are thrust into the cylinder they are formed into cylindrical shape. Their edges are properly lapped by mechanism which I will now describe by reference to Figs. 3, 4, 6, and 8.

Secured to a suitable part of the frame A of the machine I have placed the bracket F, which is turned up at its outer end, as shown in Fig. 3, and is bored so as to receive the end of a stout rod, F', which passes through the end of the bracket and is securely bolted thereto. The other end of this rod passes into the mandrel *f* and nearly through the same, and is bolted tightly to the hub of the mandrel, as shown at *f'*, Figs. 3 and 4. The frame of the mandrel is divided into two parts, as shown at the openings f^2, Fig. 6, to give room for the pushers to work, which thrust the can forward into the cylinder; and the frame f^5 of the mandrel is provided with the projecting rib or flange f^3 and the slot f^4, as shown in Fig. 6. The rib f^3 runs along the mandrel longitudinally until it stops at the frame f^5, but the slot f^4 continues and runs beyond the rib upon the surface of the mandrel. When the can-body is placed around the rod F' and pushed forward upon the mandrel, with one edge against the projecting flange f^3 and the other in the slot f^4, the body is formed and the edges lapped, as shown in Fig. 7. Surrounding this mandrel is the frame f^5, which extends somewhat more than half-way longitudinally over the mandrel, as shown in Figs. 3 and 4. It is formed in two halves and bolted together, as shown in Fig. 6, leaving the openings for the pushers opposite to the openings in the mandrel, as shown at f^2. The lower half of this frame is supported by and secured to the bracket F. When properly constructed, there should be just sufficient space between the frame and the mandrel to permit the can-body to pass easily.

Fig. 3 represents a can-body, *x*, just entering upon the mandrel. When the can is placed upon the mandrel, it is thrust into the cylinder by mechanism which I will now explain. The rods or slides G G pass through any suitable part of the frame of the machine and through the cross-piece *g*, which guides and steadies the rods in their backward and forward movement. These rods carry the brackets *g'*, to which are attached the pushers g^2. Upon referring to Fig. 4 it will be seen that the pushers are pivoted to the bracket *g'*; that those ends of the pushers which face the cylinders are plane surfaces, and that the other end of each pusher is attached to a spring, g^3, which exerts its force to pull the pivoted pusher inwardly. The inner pointed ends of the pushers are rounded off or beveled, so that the forward edge of the can-body, in passing over the mandrel, strikes against these beveled inner surfaces, and as it proceeds throws the pushers out of its way until the rear edge of the can-body passes, when the pushers, acted upon by the springs g^3, drop behind the can-body in position to thrust the can forward when required. Upon the shaft B is placed the wheel g^4, provided with the cam-groove g^5. This cam-groove operates the levers connected with the pushers. Viewing Fig. 8, this mechanism will be fully shown. The upright lever g^6 is pivoted at its lower end to a suitable part of the frame of the machine. This lever is provided with the roller g^7, which runs in the cam-groove g^5. The upper end of the lever g^6 is pivoted to the bar g^8. The upright lever g^9 is pivoted at its lower end to a suitable bracket upon the frame, and is perforated, as shown at g^{10}, to secure a pin or bolt which passes through one of these holes, according to the amount of travel required, and also through the end of the bar g^8, by which the levers g^6 and g^9 are connected. Another arm, g^{11}, pivoted to the upper end of the lever g^9, running backwardly and curved upwardly, is connected with the slide-rods G. It will be seen that as the wheel g^4 revolves, and the roller g^7 runs in that portion of the cam-groove which is concentric with the circumference of the wheel,

the levers are stationary. This occurs while the operator is placing the can-body on the mandrel and shoving it forward until the pushers drop behind its rear edge. When the eccentric portion of the groove reaches the roller g^7, the movement is first slightly backward, in order that the pushers may be securely set behind the can, then quickly forward, thrusting the can-body over the mandrel and into the cylinder.

Fig. 4 shows the can-body in place and the pushers at the end of their forward stroke. When the can-body is thus in place, the carriage D turns until the cylinder comes in position to receive the solder, when it is stopped, then turns again and is stopped to receive the resin on the seam, then turned again and stopped to receive the rubbing of the soldering-block, and finally turned and stopped again to allow the can to be thrust out of the cylinder and dropped into a chute or basket. As these movements are necessary to the working of the machine, I will explain the mechanism by which they are effected. The turning mechanism is shown in Figs. 2, 10, and 11. The revolving carriage D, which carries the cylinders, is keyed or otherwise secured to the central upright shaft, H. This shaft has its bearings in the cross-pieces of the frame, and is provided with the wheel H′, which is secured to the shaft. This wheel is provided with notches or ratchets, corresponding in number with the cylinders or stoppages made by the carriage D. These notches are marked h. Into these notches works a pawl, h', which is forked at the end and straddles the rim of the wheel H′, so as to be kept in place as it moves over the rim. The movement of this pawl is backward and forward, and also outward and inward, as its motion is directed by the circular form of the wheel.

The backward and forward movements are imparted by the following mechanism: Upon the shaft B is placed the wheel h^2, which revolves with the shaft and is provided with the cam-groove h^3. The lever h^4, pivoted at its lower end to a suitable bracket on the frame, carries the roller h^5, which runs in the cam-groove, and is pivoted at its upper end to the bar h^6, which bar is connected with the pawl h'. The position shown in Fig. 11 represents the pawl at its farthest stroke in pulling the shaft H around, and the roller h^5 just ready to enter the eccentric part of the groove and push the pawl forward on the wheel H′ until it falls into the next notch when the roller reaches that part of the cam-groove nearest to the center of the wheel. It then pulls the wheel back until it reaches that part of the cam-groove which is concentric with the circumference of the wheel and remains at rest until it reaches the position shown in the figure. While the shaft H is thus at rest, the can is put into the cylinder, the solder is cut off and laid upon the seam, the resin is dropped, and the soldering-iron works back and forth until the pawl clutches another notch and gives another turn to the shaft and cylinders. The arm h^6 is pivotally connected with the pawl-arm h', so as to allow the pawl to move outwardly and inwardly. A spring, h^7, one end of which is attached to each arm, exerts its force inwardly, so that as the wheel is turned the pawl-arm is made to conform to the circular course of the wheel. When it goes out again, the spring yields and the forked end of the pawl is guided by the rim of the wheel.

Upon the periphery of the wheel H′ are placed the brakes h^8, which are attached to the levers h^9, which are pivoted suitably to a cross-piece of the frame of the machine, and their outer ends are connected by the spring h^{10}, Fig. 10. This spring exerts a gentle pressure upon the brakes, which imparts a steady motion to the shaft and prevents its being thrown too far when pulled by the pawl. When the stoppages in the carriage D occur, the carriage is fixed and held in position by the following device and mechanism, illustrated in Fig. 12. The cam I on the shaft B gives movement to the bell-crank lever i. The other arm of this lever is connected to the pin i' by the bar i^2. When the cam I strikes the end of the bell-crank, it draws out the pin and holds it out while the carriage is turning. The spring i^3 is arranged to throw the pin into a notch in the carriage D when the carriage is stopped, to hold it firmly in place until it is ready to move again. The can-holding cylinders are slotted lengthwise at the top, as shown at e^{13}, Fig. 9, in order that the longitudinal seam to be soldered may be exposed throughout its length, to give room for the knives J J, which enter the slot and rest upon the can-body on each side of the seam, to hold them together during the soldering operation. Between these knives the solder and resin are dropped upon the exposed seam, and the soldering-block enters and rubs and melts the solder upon the seam while held by them. About midway between the spokes of the revolving carriage D a number of forked projections or brackets are bolted upon the inner surface of the rim of the carriage. These brackets are marked j. In the fork of these brackets are pivoted the levers j', one end of which is forked, and the knives J are attached to them, one to each prong of the fork. These knives slope obliquely and rest upon the can-body, one on each side of the seam. A spring, j^2, Fig. 8, one end of which is secured to the inner arm of the lever j' and the other resting upon a flange on the hub of the revolving carriage D, exerts its force to press the knives firmly upon the can-body. These levers and knives are carried around by the carriage D, and the knives are at all times in contact with the body of the can until the seam is soldered and the can is ready to be pushed out of the cylinder. At this stage the knives are lifted from the body, for the reason that the resin used in soldering may possibly have stuck the knives

and body together, and it is desirable to have the can move out with as little resistance or friction as possible.

The mechanism for lifting the knives is very simple. To the inner end of the arms j' I have placed the upright projection j^3, Fig. 8, the upper ends of which are provided with the small roller j^4, The bent or curved arm j^5, Figs. 1 and 2, secured at one end to a suitable part of the frame-work, projects over the top of the machine, and is curved and adjusted so that the rollers j^4 will escape contact with it until the can is ready to be thrust out. At this time the rollers strike on the under part of the arm at the curved part, (marked j^6,) and as the carriage revolves the knives are lifted and held in that position until the can-body is thrust out of the cylinders. When the can is in place and the knives resting upon it, the carriage D turns until the cylinder stops in front of the solder-reel. This reel is marked K in the drawings. Here a piece of wire-solder of given length is fed out, cut off, and dropped upon the can-body along the seam. This is done by mechanism which I will describe. I will refer chiefly to Figs. 1, 2, 13, 14, 15, and 16. Upon the shaft B is arranged a wheel with two cams, k and k'. The cam k gives movement to the lever which reels off the solder, and the cam k' gives movement to the mechanism which cuts it off. The lever k^2 is pivoted about midway to a cross-piece of the frame-work. At one end it carries a roller, which works in the cam-groove k^{17}. At the other end it is attached to the rod k^3, which, at its upper end, is provided with a rack, k^6, which meshes with the pinion k^4. k^5 is the support or bracket which sustains the reel pulleys, pinions, &c., and is attached to the frame A of the machine. The spindle k^7 is suitably journaled in the frame k^5, and carries the feed-sheave k^8. A sleeve carrying the pinion k^4 and the pawl-plate k^9, with its pawl k^{10}, is slipped over the spindle k^7. A milled wheel, k^{11}, is journaled in the frame or bracket k^5 below the milled wheel k^8. Between these wheels the solder wire runs from the reel. The ratchet k^{12} is carried by the spindle k^7. Viewing Figs. 13 and 16 it will be seen that when the apex of the cam-groove k^{17} is in contact with the roller on the end of the lever k^2, the rack k^6 turns the pawl-plate k^9 without turning the spindle k^7. When the apex of the cam-groove has passed beyond the roller, the rack is brought down, turning the spindle and pulleys, and runs off from the reel the required length of solder wire, as shown at k^{13}, Fig. 13. The cam-groove k' operates the knife which cuts off the solder through the lever k^{14} and rod k^{15}, the latter of which is attached to the knife-frame k^{16}. Thus when the solder wire is rolled off to the required length it projects over the seam of the can-body, when the knife cuts it off it drops upon the seam and it remains there until melted by the soldering-block. From the solder-reel the cylinder proceeds with the can and stops under the resin-box, (marked L in the drawings.) The resin drops from this box upon the seam of the can. To a suitable part of the frame A I attach a bracket or support, l, Fig. 17. This support curves upwardly, and is secured to the bar l'; or both may be made in one piece, if desired. From the bar l' project the lateral pieces l^2, from which the resin-box L is suspended. An upright, l^3, projecting from the cross-piece l^2 and the upper end of the bar l', is perforated, so as to receive and guide the rod l^4. From this rod project downwardly the pins l^5, and reach to the bottom of the resin-box, which is perforated with holes, one hole for each pin, and the pins normally cover the holes. The box L is filled with pulverized resin or other flux, which is prevented from falling through the holes by the pins when at rest. When the can reaches the proper position, the rod l^4 is slid forward, uncovering the holes in the box, while each pin pushes forward a portion of the resin, which keeps it stirred up, prevents it from becoming compact, and allows a portion of the resin to fall through the holes upon the seam of the can. It is desirable that this resin should not fall upon the pressers or the knives or cylinders when a can-body is not on the cylinder, and in case a cylinder should pass under the resin-box without a can-body, the apparatus for distributing the resin should not work. For this reason I have arranged mechanism for working the pins and distributing the solder by means of the can-body itself, so that the resin will only fall when the can-body is in place to receive it. The arrangement and mechanism for accomplishing this purpose will be fully understood by reference to Figs. 3, 4, and 17. Upon a suitable bar, e^{12}, projecting from and attached to the rear of the cylinder E, is pivoted the lever e^{14}, one end of which is attached to the pin e^6, which projects into a hole in the end plate, e', as shown in Figs. 3, 4, 9, and 17. The other end works in a slot, e^7, in the side of the cylinder, when the pin l^6 is withdrawn. The dotted lines of Fig. 4 show the extent of the movement of the pin-lever. When a can is thrust into the cylinder, the forward edge strikes against the end of the lever e^{14} and throws the pin out, as shown by the plain lines in Fig. 4. Pivoted to the bracket l, Fig. 17, is the lever l^9. The upper end of this lever is connected with the rod l^4, which carries the pins l^5. The lower end is arranged so that the pin e^6 will strike it when it projects, and thus give movement to the pin-rod l^4, which distributes the resin through the holes in the bottom of the box. When the pin e^6 has passed the end of the lever, the spring l^{10} draws back the rod l^4, covering the holes in the resin-box and preventing further escape of the resin. When the pin e^6 is withdrawn, the end of the cylinder passes the lever l^9 without touching. Thus it will be seen that resin will only drop from the holes when a can-body is in place to

receive it. The cylinder next proceeds to the soldering-block, which is lifted up to allow it to pass, and stops so that the block may be lowered down and vibrated upon the seam. The mechanism for accomplishing this purpose may be understood by referring to Figs. 1, 2, and 18. A standard or bracket, *m*, attached to the frame A, supports the upright-rod *m'*. The upper end of this rod is forked and journaled to serve as a fulcrum for the lever m^2. One end of this lever carries the soldering-block M. The other end is pivoted to the upright-bar m^3. This bar is pivoted, at m^{12}, to yield to the vibration of the lever m^2. Its lower end is attached to the lever m^4, the other end of which is properly pivoted to the frame A at m^5, and carries a roller, m^6, which runs in a cam-groove, m^7, formed on a wheel upon the shaft B, and shown in dotted lines in Fig. 18. When the apex of this groove is in contact with the roller m^6 upon the lever m^4, the soldering-block M is lifted out of the way of the knives J, as shown in dotted lines, Fig. 18, and when it passes the roller the block drops down upon the seam, as shown by the full lines in that figure, and is held firmly against the seam by the spring m^8, one end of which is attached to the lever m^2 and the other to a bracket, *m*. Fig. 18 also shows the method by which the soldering-block is rubbed upon the seam. Upon the shaft B a cam-wheel provided with a cam-groove (marked m^{10}) receives a roller attached to the end of the lever m^{11}, the other end of which is fixed to the end of the upright fulcrum-rod *m'*. As the wheel moves, a vibratory motion is given to the rod *m'*, lever m^2, and soldering-iron M, which rubs back and forward upon the solder to distribute it and make a smooth seam. This block is heated by a burner, Figs. 1 and 2, (marked N,) which is supplied with fuel through the pipe N', and plays a flame upon the block while at work.

I have marked in numerals on the drawings, Fig. 1, the positions of the cylinder, to denote the stages through which the can passes during the operation of the machine. At 1 the can is adjusted in the cylinder. At 2 the solder is unreeled, cut off, and dropped upon the seam. At 3 it is supplied with resin. At 4 the solder is melted and rubbed into the seam. The block is then lifted to allow the can to pass and held lifted until the cylinder at No. 3 passes to No. 4. The can passes *seriatim* from No. 4 to 5, 6 and 7, and is allowed to cool off in these stages. At No. 7 the knives are lifted, as already described, to prepare the can to be pushed off, which is done at the last stage of the process, No. 8.

The mechanism for pushing the can out is shown in Figs. 1 and 19. The shaft B carries the wheel *o*, which is formed on two parts, so as to make the cam groove or surface *o'*. (See Fig. 1.) The arm o^2 is provided with the roller o^3, and is connected at the other end with the rod o^4, Fig. 19. To the upper end of this rod is attached the lever o^5. To a suitable part of the frame of the machine are secured the brackets o^6 and o^7, which are perforated to secure and guide the rods o^8. These rods are connected together by the plate o^9, which holds them in position, so that they may work together. The lever o^5 is connected by a link, o^{10}, to the plate o^9, so that when the lever is moved the rods also move. The forward end of these rods are thrust forward at the proper time through perforations in the rim of the carriage D and into the cylinder E, so as to strike the rear edge of the can-body, provision being made for this purpose in the cylinder, as shown at e^5, Figs. 5 and 9. As the wheel O is revolved the cam-groove, acting upon the rods through the levers o^2 and o^5, pushes the can out of the cylinder and allows it to fall into the chute or basket R.

It will be seen, then, that the machine presents a series of mechanisms acting and co-operating with each other to hold the can, lap the edge, gage its size, retain them in place and position, provide and place the solder upon the seam, supply it with resin, solder it with a block, keep the same heated, allow the can to cool off, and finally discharge it.

The mode and method of operation has been fully described in detail; and my invention consists in certain novel and useful movements and combinations more fully set forth in the claims hereto appended.

What I claim is—

1. The gaging-cylinder E, in combination with the pressers e^{10}, rods T, and springs e^9, arranged and operating together to gage the can-body and hold it in contact with the inner walls of the cylinder.

2. The gaging-cylinder E, provided with the slot e^{13} at the top, in combination with the support e^3, means for pressing the can-body against the inner walls of the cylinder, the soldering-block M, and means for operating the block.

3. The mandrel *f*, provided with the projecting rib f^3, and the slot f^4, for lapping the edges of the can-body.

4. The gaging-cylinder E, in combination with the ribbed and slotted mandrel *f*.

5. The gaging-cylinder E, in combination with the forming-mandrel *f* and mechanism for pushing the can-body from the mandrel into the cylinder.

6. The gaging-cylinder E, in combination with the mandrel *f* and rotating table D.

7. The mandrel *f*, provided with the openings f^2, in combination with the pushers g^2, arranged and operating substantially as shown.

8. The gaging-cylinder E, provided with the slot e^{13}, in combination with the knives J and means for pressing the can-body against the inner walls of the cylinder.

9. The gaging-cylinder E, provided with the slot e^{13}, in combination with the knives J and means for holding the knives upon the can-body and lifting them off, and means for

pressing the can-body against the inner walls of the cylinder.

10. The pin e^6, located within the cylinder E, in combination with means for pushing the pin outward, operated by the can-body.

11. The combination of the gaging-cylinder E, provided with the slot e^7, the lever e^{14}, pivoted within the cylinder, the pin e^6, and spring e^{15}, operating as set forth.

12. The mandrel f, in combination with the frame f^5, constructed with the openings in the frame to correspond with the openings f^2 in the mandrel, in combination with the cylinder E and pushers g^2.

13. The pushers g^2, in combination with the spring g^3 and mechanism for thrusting them forward and drawing them back, the cylinder E, and mandrel f.

14. The knives J and knife-arms j', in combination with the cam-lever j^5, provided with the cam projection j^6, and the revolving table D.

15. The flux-box L, provided with perforations in the bottom, in combination with means for opening and closing the perforations, arranged to be operated by the can-body in the cylinder.

16. The flux-box L, provided with perforations at its bottom, in combination with the pins l^5, rod l^4, spring l^{10}, lever l^9, pin e^6, and revolving table D.

17. The combination of the soldering-block M, cams m^7 and m^{10}, levers m^4 and m^{11}, uprights m^3 m', the latter pivoted at m^{12}, the lever m^2, fulcrumed as shown, and the burner N, as set forth.

18. A machine for soldering the longitudinal seam of tin cans, having in combination a mandrel upon which the can-bodies are placed, and the edges lapped, a gaging-cylinder to receive the can from the mandrel, pushers for transferring the can-body from the mandrel to the cylinder, knives for holding the seam-edges together, an automatic solder-supplying device, a soldering-tool for rubbing the solder into the seam, an ejector to push out the cans, and mechanism for producing simultaneous and successive movements of the parts, as described and set forth.

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