No. 897,337. PATENTED SEPT. 1, 1908

F. W. BALLARD.

CAN CRIMPING AND SOLDERING MACHINE.

APPLICATION FILED JULY 24, 1905.

7 SHEETS—SHEET 1.

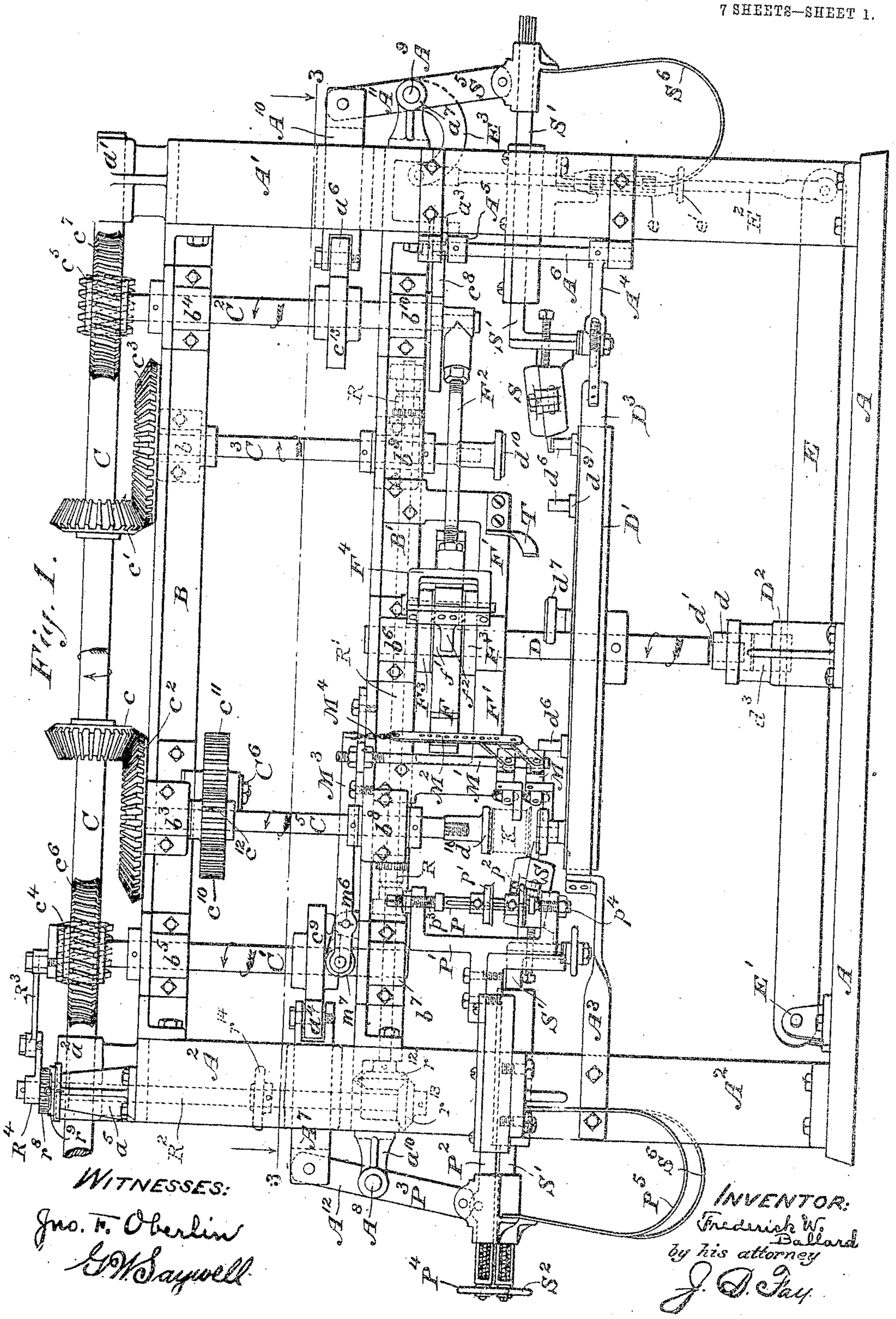


Fig. 1.

WITNESSES:

Jno. F. Oberlin

G. W. Saywell

INVENTOR:

Frederick W. Ballard

by his attorney

J. D. Fay

No. 897,337. PATENTED SEPT. 1, 1908.

F. W. BALLARD.

CAN CRIMPING AND SOLDERING MACHINE.

APPLICATION FILED JULY 24, 1905.

7 SHEETS—SHEET 2.

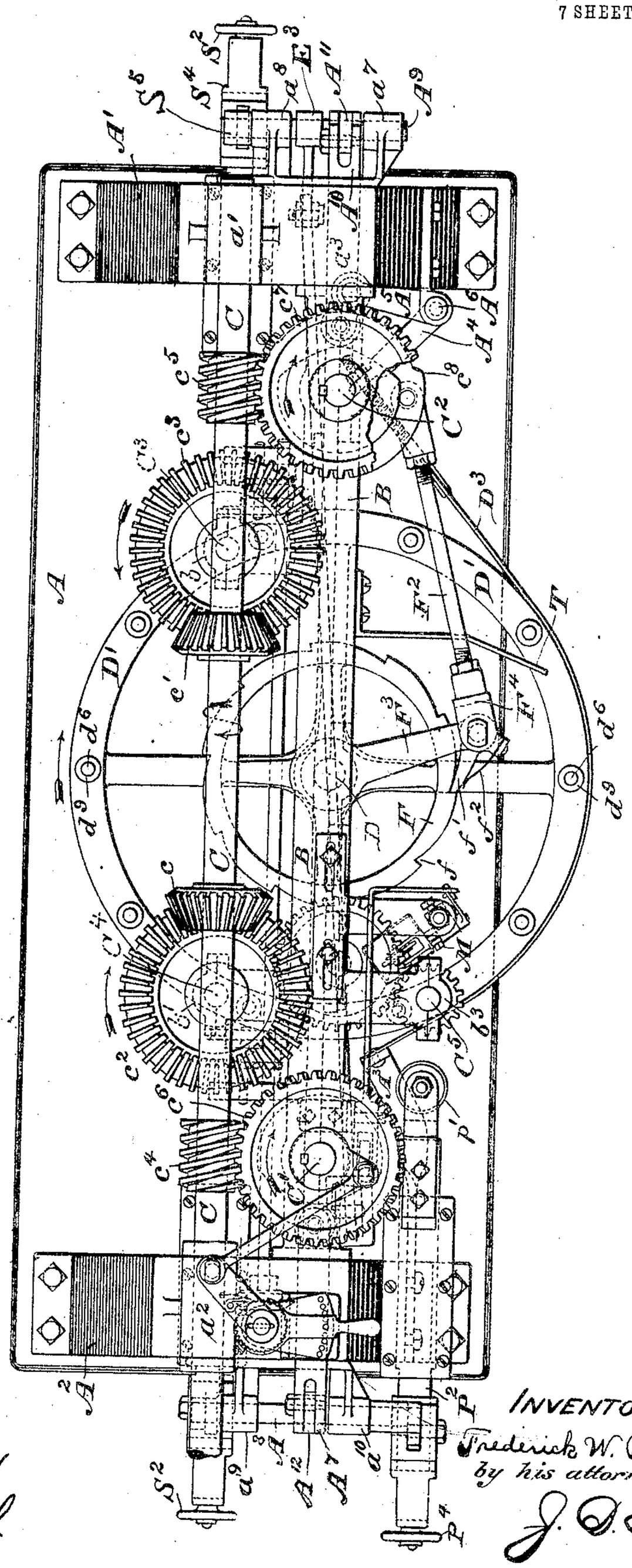


Fig. 2.

WITNESSES:

Jno. F. Oberlin

G. W. Saywell

INVENTOR:

Frederick W. Ballard

by his attorney

J. D. Fay

No. 897,337. PATENTED SEPT. 1, 1908.

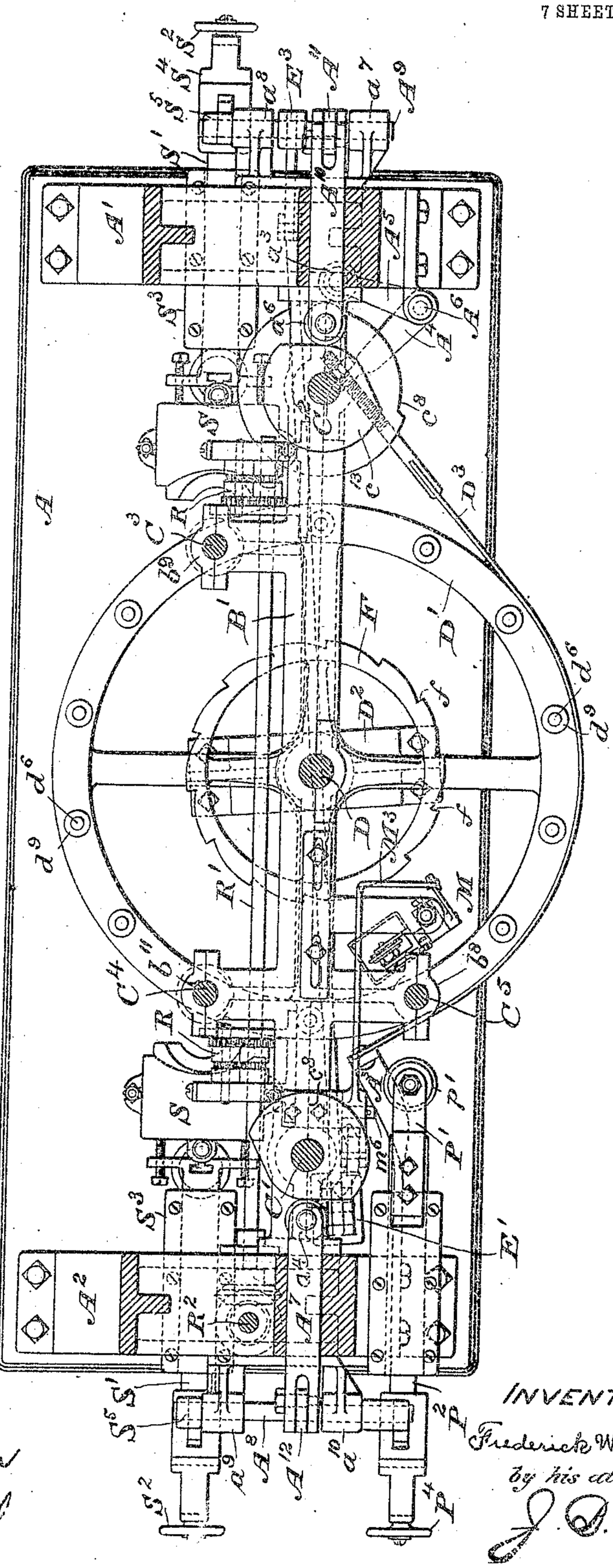
F. W. BALLARD.

CAN CRIMPING AND SOLDERING MACHINE.

APPLICATION FILED JULY 24, 1905.

7 SHEETS—SHEET 3.

Fig. 3.



WITNESSES:

Jno. F. Oberlin

E. F. Saywell

INVENTOR:

Frederick W. Ballard.

by his attorney

J. D. Fay

No. 897,337. PATENTED SEPT. 1, 1908.

F. W. BALLARD.

CAN CRIMPING AND SOLDERING MACHINE.

APPLICATION FILED JULY 24, 1905.

7 SHEETS—SHEET 4.

Fig. 5.

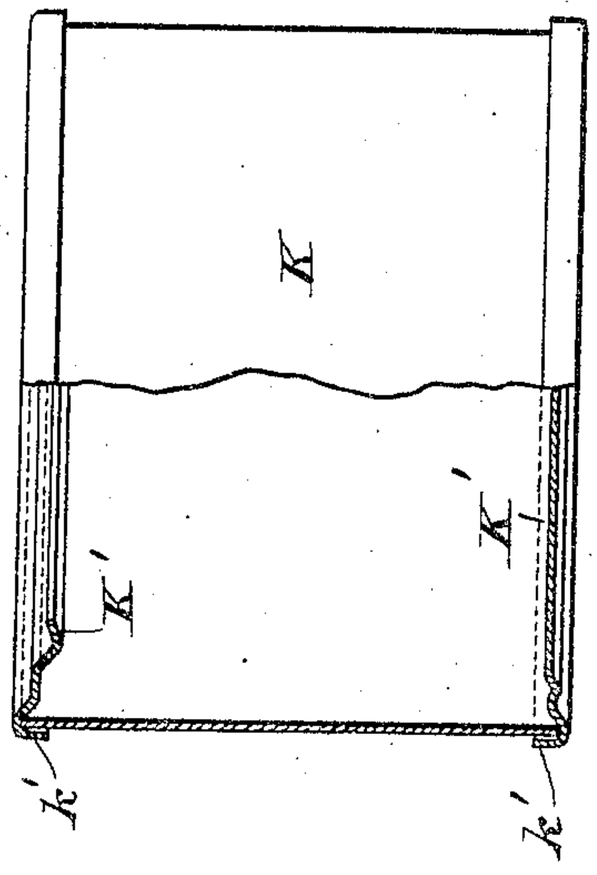


Fig. 6.

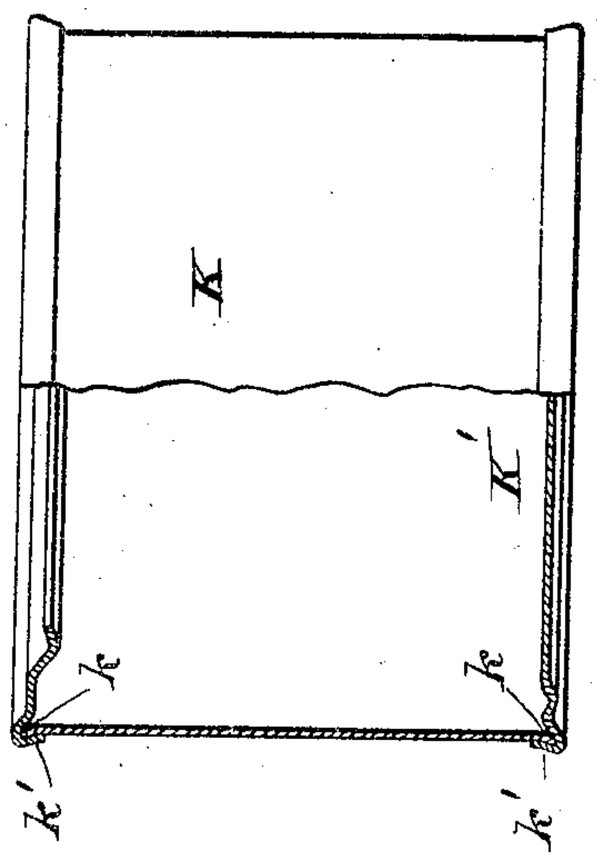
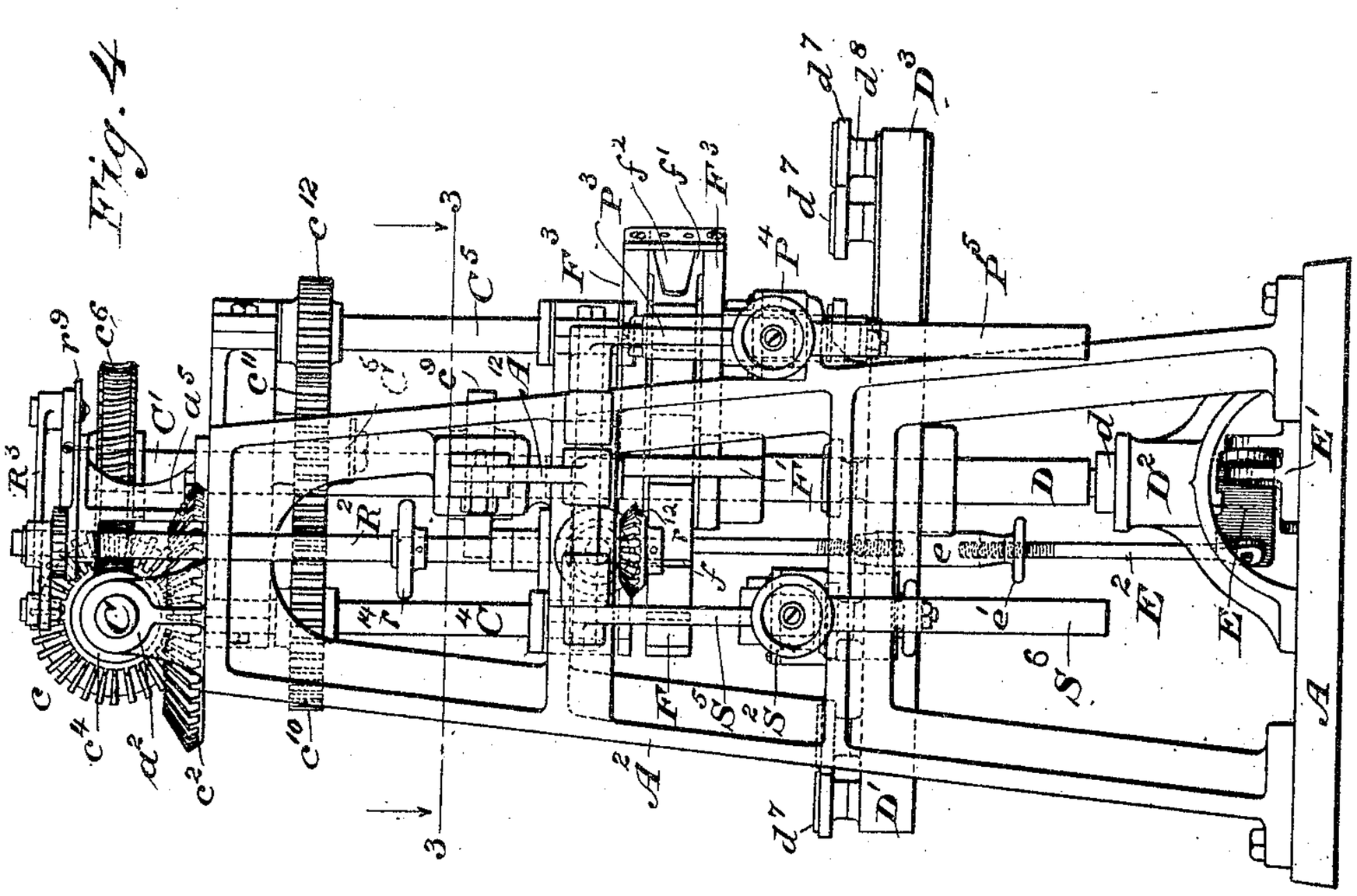


Fig. 4



WITNESSES:

Jno. T. Oberlin

G. W. Saywell

INVENTOR:

Frederick W. Ballard

by his attorney

J. D. Fay

No. 897,337. PATENTED SEPT. 1, 1908

F. W. BALLARD.

CAN CRIMPING AND SOLDERING MACHINE.

APPLICATION FILED JULY 24, 1905.

7 SHEETS—SHEET 5.

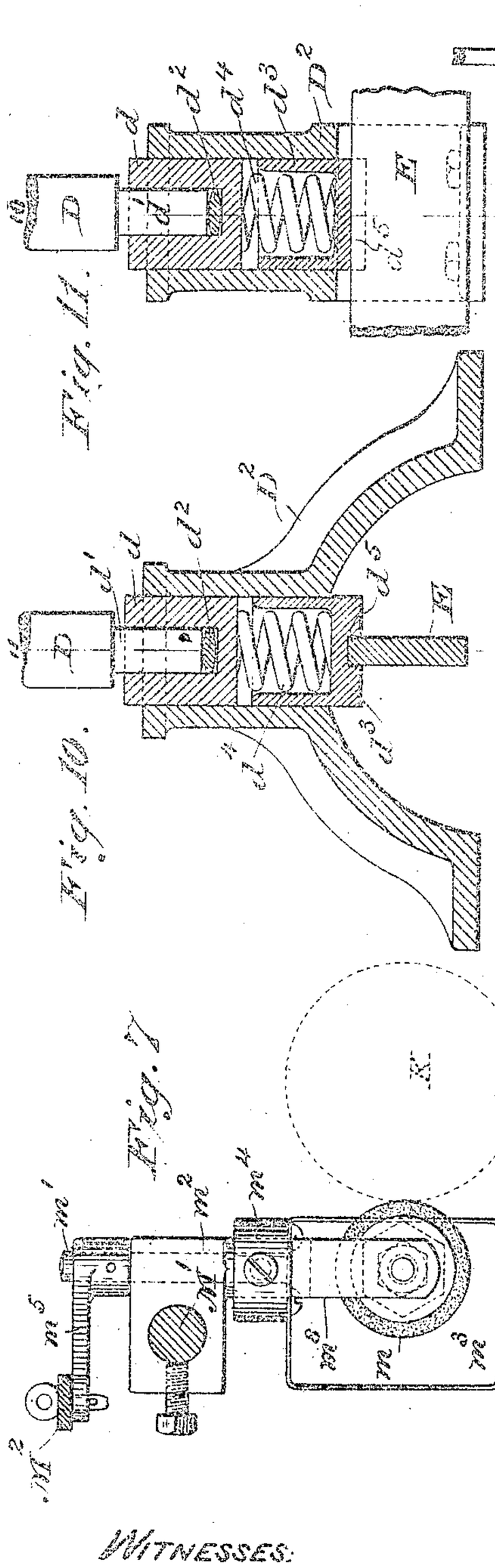


Fig. 11.

Fig. 10.

Fig. 7.

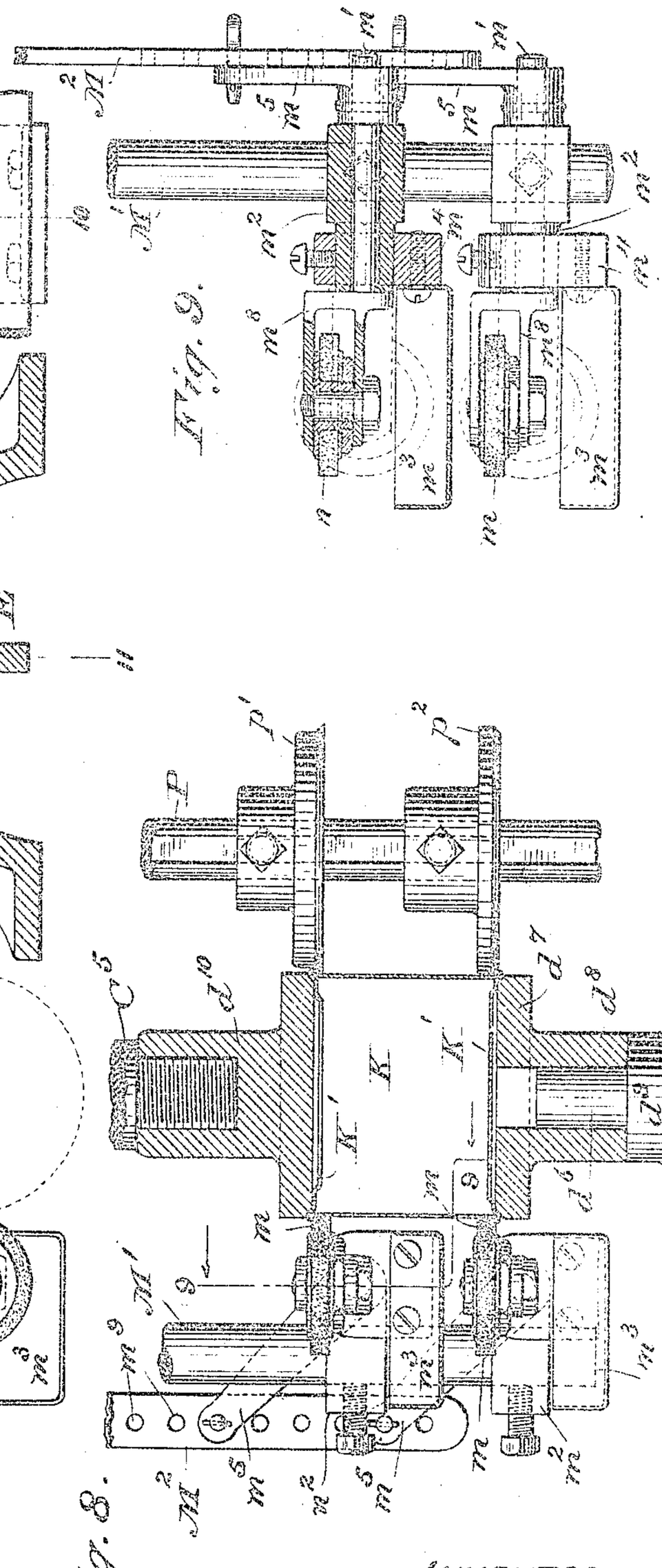


Fig. 9.

Fig. 8.

WITNESSES:

Jno. F. Oberlin

E. W. Sayrell

INVENTOR:

Frederick W. Ballard

by his attorney

J. A. Fay

No. 897,337. PATENTED SEPT. 1, 1908.

F. W. BALLARD.

CAN CRIMPING AND SOLDERING MACHINE.

APPLICATION FILED JULY 24, 1905.

7 SHEETS—SHEET 6.

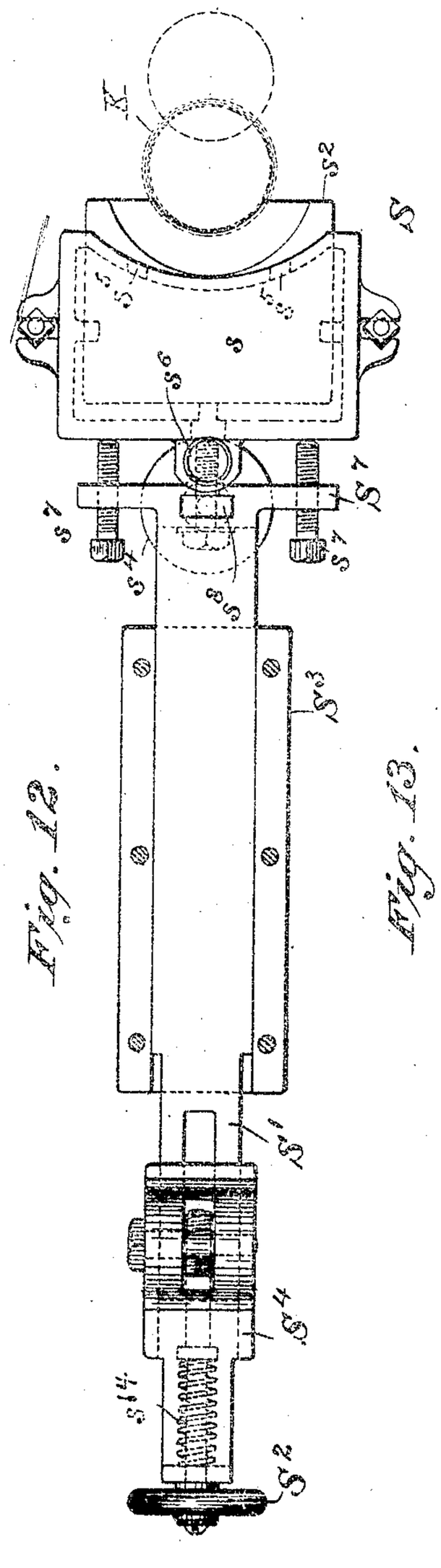


Fig. 12.

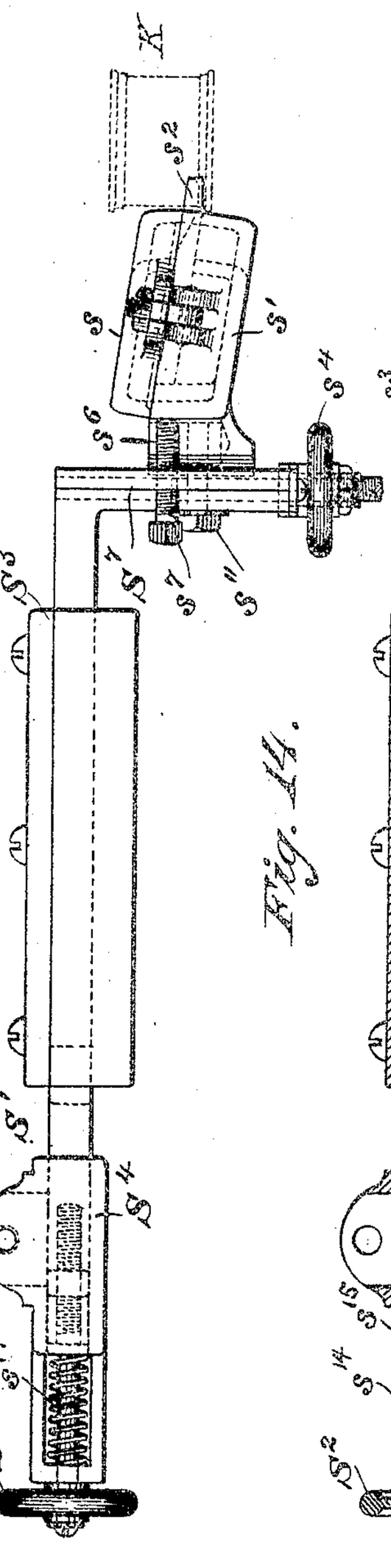


Fig. 13.

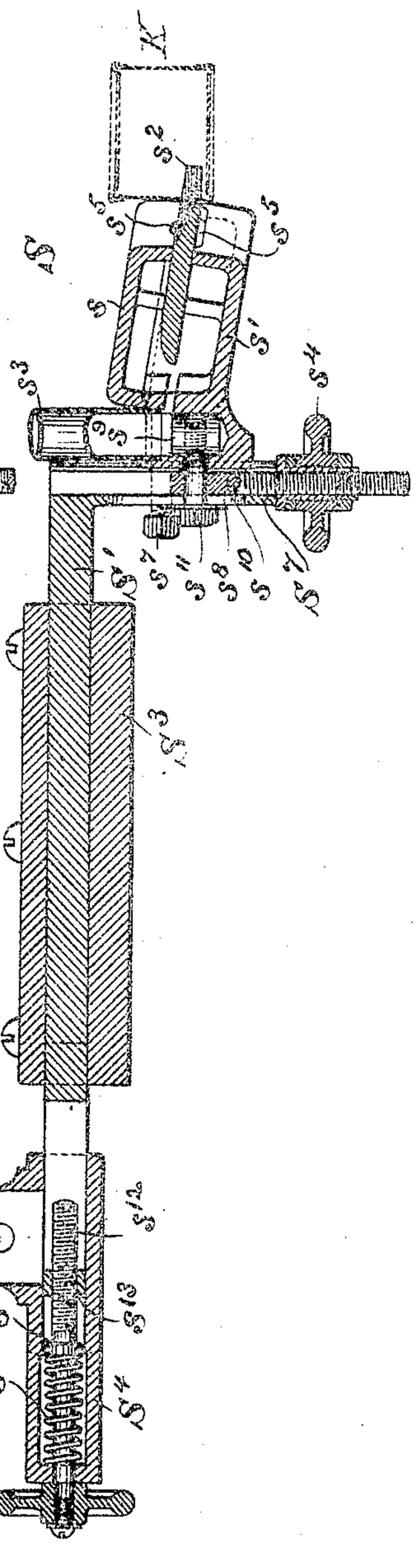


Fig. 14.

WITNESSES:

Jno. F. Oberlin

G. H. Saywell

INVENTOR:

Frederick W. Ballard

by his attorney

J. D. Fay

No. 897,337. PATENTED SEPT. 1, 1908.

F. W. BALLARD.

CAN CRIMPING AND SOLDERING MACHINE.

APPLICATION FILED JULY 24, 1905.

7 SHEETS—SHEET 7.

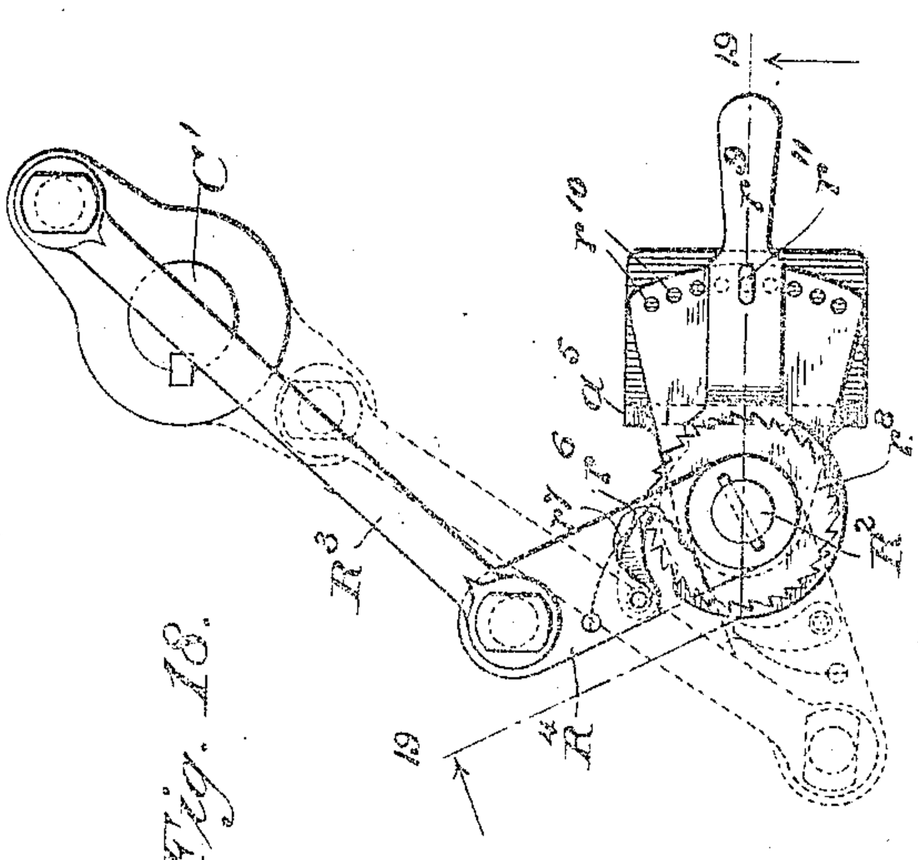


Fig. 18.

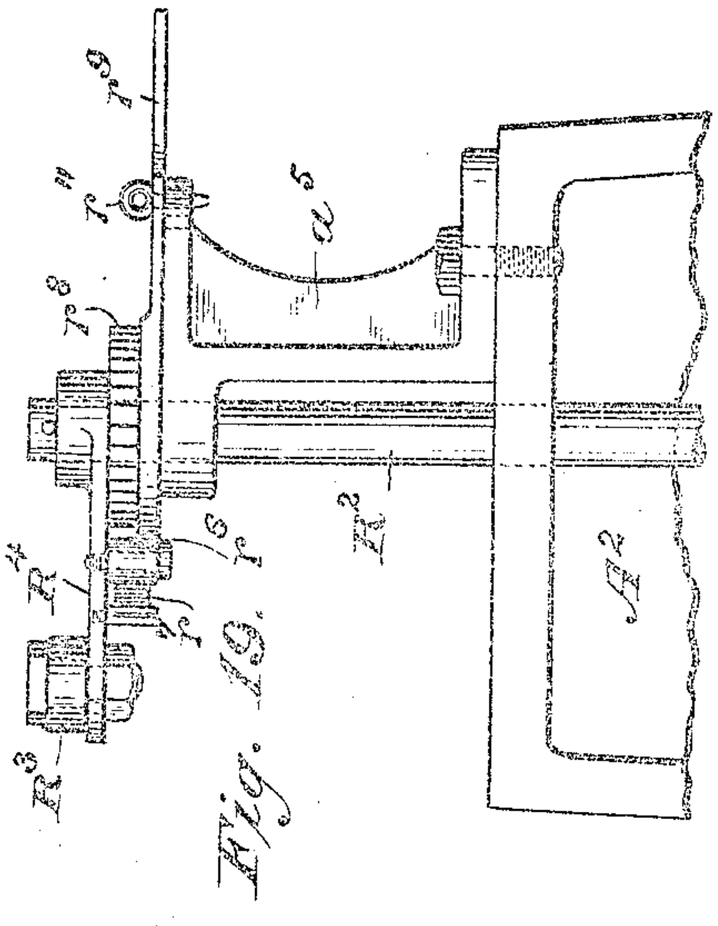


Fig. 19.

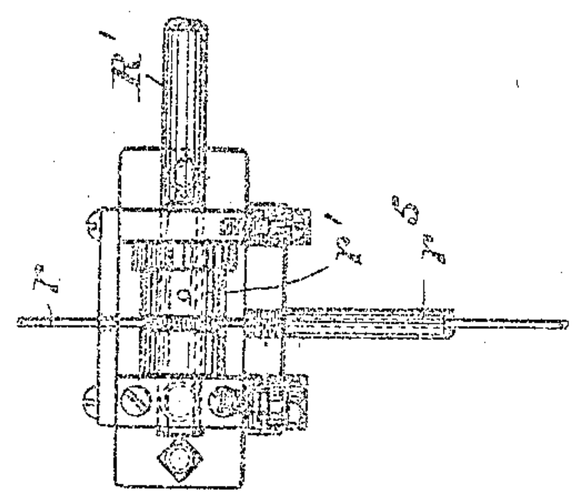


Fig. 17.

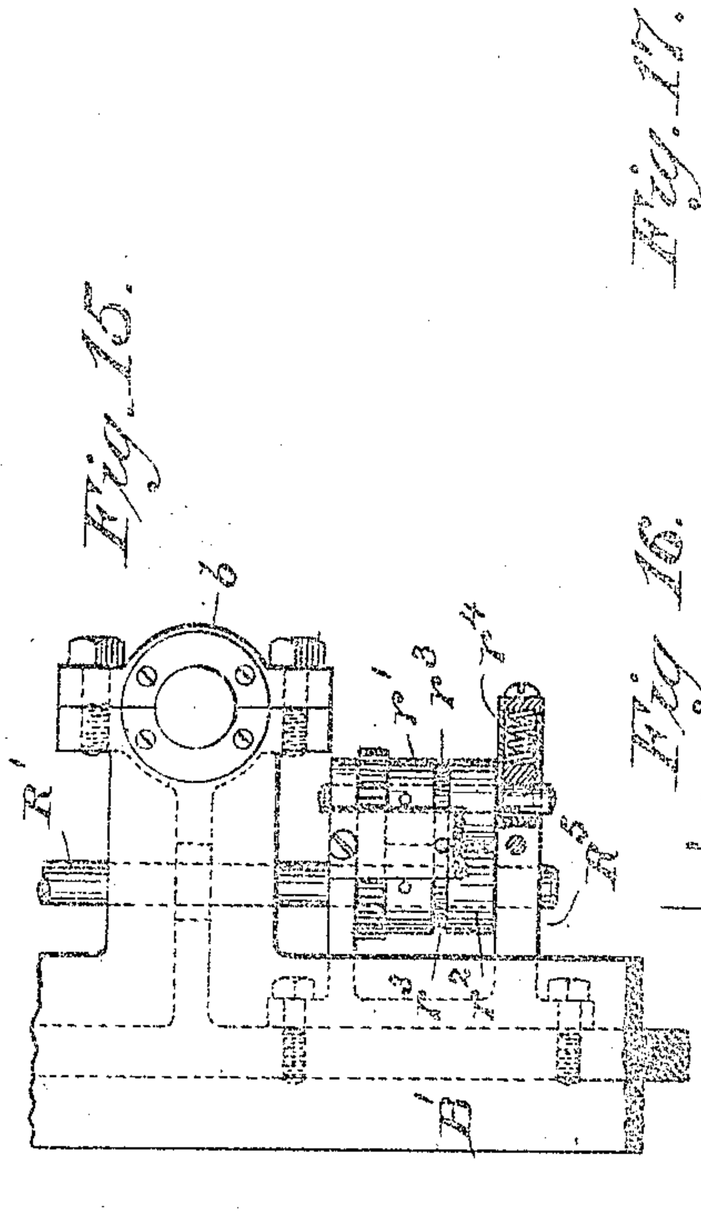


Fig. 15.

Fig. 16.

WITNESSES:

Jno. F. Oberlin

L. M. Haywell

INVENTOR:

Frederick W. Ballard

by his attorney

J. D. Fay

UNITED STATES PATENT OFFICE.

FREDERICK W. BALLARD, OF CLEVELAND, OHIO, ASSIGNOR TO THE SHERWIN-WILLIAMS COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

CAN CRIMPING AND SOLDERING MACHINE.

No. 897,337. Specification of Letters Patent. Patented Sept. 1, 1908.

Application filed July 24, 1905. Serial No. 270,898.

To all whom it may concern:

Be it known that I, FREDERICK W. BALLARD, a citizen of the United States, and resident of Cleveland, county of Cuyahoga, and State of Ohio, have invented a new and useful Improvement in Can Crimping and Soldering Machines, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

My invention relates to improvements in machines designed to crimp the ends upon the cylindrical parts of tin cans and solder such ends thereto, the object being to provide a machine that will perform both operations within itself in an expeditious and effective manner.

A further object is to provide a machine that will be readily adjustable, *i. e.* that can be quickly adapted to crimp and solder the ends upon any desired size of can within the maximum limit of the particular machine. This last-named object has heretofore been only imperfectly realized although it is quite important, inasmuch as it makes possible the economical production of particular sizes of cans in small quantities as the need therefor may arise.

To the accomplishment of the above ends my invention consists of the combination, arrangement and structure of the various parts hereinafter described and fully set forth in the claims.

The annexed drawings and the following description set forth in detail certain mechanism embodying the invention, such disclosed means constituting but one of the various mechanical forms in which the principle of the invention may be used.

In said annexed drawings: Figure 1 represents a front elevation of my improved can crimping and soldering machine. Fig. 2 is a plan view of the same. Fig. 3 represents a transverse horizontal cross-section of the machine as cut by a plane passing through the line 3—3, Figs. 1 and 4. Fig. 4 represents an end view of the machine, as seen from the left of Figs. 1 and 2. Figs. 5 and 6 represent, partly in cross-section and partly in elevation, a can such as the machine is adapted to operate upon; Fig. 5 showing the parts of the can in their assembled condition just previous to passing through the can crimping device, while Fig. 6 shows the can after it has been there operated upon. Figs. 7, 8 and 9 represent upon an enlarged scale various views of the fluxing device forming a feature of the machine; in said Fig. 7 is presented a plan view of such device when in its operative position, the can upon which it is operating being shown in dotted outline; in Fig. 8 the device is presented in similar operative position as viewed from the side, a can with the can-gripping device being shown in cross-section, while on the opposite side is shown the can-crimping device which, as will later appear, is designed to operate in conjunction with the fluxing device; and in Fig. 9 the same device is shown as cut by a plane perpendicular to the plane of the drawing and passing through the line 9—9, Fig. 8. Fig. 10 represents a vertical longitudinal cross-section of the step and journal block which supports the rotary-carrier spindle. Fig. 11 represents a vertical transverse cross-section of the same. Figs. 12, 13 and 14 are respectively a plan view, a side elevation, and a vertical longitudinal cross-section of the improved form of soldering tool employed in the machine together with the actuating mechanism therefor. The position of the can being soldered is indicated in each case in dotted lines. Figs. 15, 16 and 17 are detail views of the solder feeding rolls with certain of the accessories thereto. Figs. 18 and 19 are detail views of the device designed to actuate such solder feeding rolls.

The principal elements of my machine are a series of devices respectively designed to perform the operations of crimping the ends on the can, applying flux to the joint between the can end and body, and then soldering such joint. A carrier advances the cans in succession into position to be operated upon by each of these devices, alternately moving them forward one stage, and then gripping and rotating those stationed before the above devices. Coincidently with such gripping and rotating of certain of the cans, the several devices are simultaneously advanced to operate upon them, and are then retracted pending the advance of other cans. These various operative parts and devices composing the machine are mounted in a suitable frame consisting of two upright standards A^1 A^2 resting upon a bed plate A, and two longitudinal parallel members or cross-bars B, B^1 secured at their ends to said

standards. All such parts and devices are actuated by a main drive shaft C, longitudinally disposed across the top of the frame and turning in bearings a^1 a^2, on the top of the standards A^1 A^2 respectively. Such main shaft may be connected to be driven by any suitable means as by a drive pulley or gear at either end. Various secondary spindles C^1, C^2, C^3, C^4, and C^5 vertically supported in cross-bars B, B^1, or in arms projecting laterally therefrom are connected, as will hereinafter appear, to communicate the motion of main shaft C to the various mechanisms of the machine. As shown, Figs. 1, 2 and 3, spindle C^1 turns in bearings b^5 b^7 and is operated by worm gear wheels c^4 c^6; spindle C^2 turns in bearings b^4 b^{10} and is operated by worm gear wheels c^5, c^7; spindle C^3 turns in bearings b, b^9, and is operated by bevel gear wheels c^1 c^3; spindle C^4 turns in bearings b^1 b^{11} and is operated by bevel gear wheels c c^2; and spindle C^5 turns in bearings b^3 b^8, and is operated by the gear wheel c^{10} on spindle C^4 which transmits its motion, by means of idle wheel c^{11} on spindle C^6 to wheel c^{12} on said spindle C^5. Suitable collars, not designated, prevent vertical movement of the above described spindles.

Centrally disposed relatively to the frame of the machine is a vertical shaft D, Fig. 1, journaled in a block d which is mounted in an arched step D^2, and supported laterally at its upper end in bearing b^6 on cross bar B^1. The toe d^1 of the shaft D that fits into journal block d is reduced in diameter, Figs. 10 and 11, and turns upon a lenticular bearing d^2 of hardened steel. The journal block d is vertically movable in a bore in the step D^2 being yieldingly supported on a spring d^4 held in a cup d^3 similarly movable in the same bore. A lighter bar E, Fig. 1, pivotally secured at one end E^1 to bed plate A lies transversely across such bed plate and passes through the arch of step D^2 directly beneath cup d^3 being prevented from slipping away from the cup by a groove d^5 in the lower end of said cup. Upon raising the free end of bar E it is evident that cup d^3, and thereby shaft D will be also raised. Such raising of lighter bar E is intermittently effected by means of lifting rod E^2 which joins the free end of the bar to a lever arm E^3 on rock shaft A^9. Rock shaft A^9, Figs. 1 and 3, turns in bearings a^7 a^8 and is actuated to raise and lower rod E^2 by cam c^{13} on spindle C^2 bearing against a roller a^6 mounted on one end of a sliding bar A^{10}, the other end of which is connected with shaft A^9 by lever arm A^{11}. The rock shaft A^9 also serves to reciprocate one of the soldering devices as will be shown later. A turn-buckle e, adapted to be secured by a lock-nut e^1, affords a ready means of lengthening or shortening rod E whereby the height to which spindle D is raised may be adjusted.

A spider, Figs. 2 and 3, secured to shaft D at a suitable distance above bed-plate A supports a circular carrier frame D^1 on which the cans are borne into position to be operated upon by the various mechanisms of the machine and then away to be discharged for any further step in the process of their manufacture. The cans are supported upon disks d^7, Figs. 1, 4 and 8, which are removably mounted upon short vertical spindles d^6 disposed at equal distances around the circumference of the carrier frame D^1. The number of such spindles and disks may be varied according to the size of the machine and the maximum size of can to be operated upon. A set of disks is provided for each size of can, of suitable diameter and such length of boss d^8 as will raise the can high enough to be gripped by the can-gripping device described later. To change from one size of can to another, differing only in height and not in diameter, the disks employed for the lower can may be raised for use with the shorter can by inserting suitable washers beween offset d^9 on the spindle and boss d^8 of the disk.

The shaft D with carrier frame D^1 is adapted to be intermittently rotated by means of a ratchet device, Figs. 1 and 2. This device comprises a ratchet wheel F feathered upon the upper end of the shaft D and supported in a hanger F^1 depending from cross bar B^1, and a pawl f^1 pivotally mounted in a frame F^4 held by two radial arms F^3 F^3 at a fixed distance from the ratchet wheel. Pawl f^1 is held against the ratchet wheel by a spring f^2 so as to successively engage notches f which are equal in number to the can supporting disks upon carrier frame D^1, and is actuated to rotate such ratchet wheel and connected carrier a distance equal to the distance between successive notches and disks by means of rod F^2, one end of which is attached to frame F^4, and the other eccentrically pivoted on the face of disk c^8 secured to the lower end of vertical shaft C^2.

In order to avoid vibration of the carrier frame as well as to prevent it from being rotated too far under the impulse of the ratchet device, a suitable brake is provided. A preferable form of such brake is shown in Figs. 1 and 2 and consists of a broad strap or band D^3, attached at one end to a fixed arm A^3 projecting from a standard A^2 and at the other to a lever arm A^4 mounted on a rock shaft A^6. Intermediately of these points of attachment it bears against a portion of the periphery of the carrier D^1. A second lever arm A^5, mounted on rock shaft A^6, and operated by the cam edge of disk c^8 bearing against a roller a^3 at such lever arm's extremity, actuates lever arm A^4 to alternately tighten and loosen the band D^3 against carrier D^1. Such loosening of the band is timed to occur at the beginning of the intermittent

rotation of the spider, and such tightening just as such rotation should cease.

By means of the mechanism above described, it is evident that a can upon the carrier frame successively occupies a number of positions of rest equal to the number of disks on such carrier. The devices designed to crimp the ends on the can, to apply flux thereto, and then to solder them, I accordingly dispose so as to operate upon the can as it occupies certain of these positions. I have found it advantageous, for reasons that will appear, to position the crimping and fluxing devices to operate upon a can at the same station, and to employ two separate soldering devices each adapted to solder one end only of a can at a time, that end being the lower one, and the distance between the two devices being sufficient to allow an operative to invert the can after one end has been soldered and before the second device is reached in the course of the carrier's rotation. The advantage gained by soldering both ends on the can in the downward position, is that a tight joint is thereby more generally assured since when molten solder is applied to the upper end of a can, the tendency is for it to flow, not into the joint as it should, but away. Accordingly can-gripping means are provided at three stations, or positions of rest, of a can in its progress through the machine, where the three different steps just described are performed, viz. crimping and fluxing, soldering one end and soldering the other end. Such can-gripping means, Figs. 1 and 8, comprise simply disks, d^{10}, removably secured to the lower ends of vertical spindles C^3, C^4 and C^5. These upper disks, just as the lower disks d^7 on which the cans rest, are adapted to be readily removed and exchanged to suit the size of can being operated upon. Upon the carrier being rotated to one of its positions of rest, and then raised by means of lighter bar E, the three cans occupying stations beneath spindles C^3, C^4 and C^5 will be firmly clamped between lower disks d^7 and upper disks d^{10}, and at the same time rotated by the spindles which, as before indicated, are continuously driven by shaft C. While thus held and rotated the crimping, fluxing and soldering devices are actuated to perform their proper operations.

The crimping device comprises two disks p^1 p^2; Fig. 8, adjustably mounted upon a vertical spindle P which is rotatably held in frame P^1 between set screws p^3 p^4. Frame P^1 is secured to the end of a reciprocating bar P^2, Figs. 1 and 3, adapted to be actuated inwardly, toward the carrier frame by lever arm P^3 mounted on rock shaft A^8, and outwardly by a spring P^5. Rock shaft A^8 turns in bearings a^9 a^{10} and is actuated by means of cam c^9 bearing against roller a^4 mounted at one end of sliding bar A^7, the other end of which is connected with such shaft A^8 by means of a second lever arm A^{12}. A third lever arm S^5 disposed similarly to lever arm P^3 serves to reciprocate one of the soldering devices, as will be described later. The bar P^2 may be lengthened and shortened to accommodate the crimping disks to cans of different diameters by means of a hand wheel P^4, the manner in which such hand wheel operates being fully shown elsewhere in connection with the description of the soldering devices. While the use of such crimping disks in machines of this character is old, applicant desires to point out certain structural features of his disks whereby he obtains a more effective joint. It will be observed, Fig. 6, that a distinct outward flare *k* has been given the end edges of the cylindrical portion of the can K, and that this flared portion is firmly clamped between the bent over edges k^1 of the can ends. This obviously superior joint is produced by forming the can ends with the bent over edge *k* higher than the central portion K^1, Fig. 5, and providing the can-gripping disks with a groove around their outer edge into which such raised portion just fits, the can-crimping disks being provided with a projecting ridge conforming with such groove. The application of the crimping disks, therefore, not merely turns the bent over edge of the can end against the side of the can, but, Fig. 8, presses together such bent over edge so as to firmly clamp the edge of the can side, which latter is given an outward flare.

The flux-applying device M is disposed so as to operate upon a can at the same time that the crimping device is operating thereon. It consists, Figs. 7, 8 and 9, of two rolls, *m m*, of felt or similar fibrous material, each secured to a suitable hub whereby it is rotatably mounted in the bifurcated end m^8 of rock shaft m^1. The rock shaft m^1 is mounted in the sleeve m^2 which in turn is adjustably secured on a vertical rod M^1. A lever arm m^5 attached to the end of shaft m^1 that projects beyond the sleeve is actuated by a reciprocating bar M^2 to rock such shaft m^1, the reciprocations of such bar M^2 being effected by means of a lever M^3, Fig. 1, pivoted at m^6 and provided at one end with a roller m^7 bearing against the lower cam face of disk c^9 mounted on shaft C^1, and attached at the other end to bar M^2 through the medium of a short chain M^4. The bifurcated end m^8 of the rock shaft m^1 is eccentrically mounted on the latter, so that upon the shaft being partially rotated, assuming the rolls to be in the vertical position shown in Fig. 1, such rolls will not only be turned to occupy a horizontal position, but will be simultaneously raised and thrust forward toward the can being operated upon. Acid cups m^3 m^3 are secured to the sleeves m^2 m^2 in such a position that the rolls dip therein in their vertical position and swing entirely free thereof when in the horizontal position. By sliding

the sleeves m^2 m^2 vertically along the rod M^1, the rolls may be positioned to operate upon any height of can, while lateral adjustment to accommodate them to cans of different diameters is secured by swinging such sleeves on the same rod, M^1. A series of holes m^9 in bar M^2 permits the vertical adjustment of the lever arms m^5 to correspond to different positions of the sleeves m^2 on rod M^1.

The cam c^9 is adjusted to actuate the acid rolls to approach the can just after the crimping action of the crimping disk has begun, and they are withdrawn at the same time as the crimping disks. The purpose of the chain M^4 is to give perfect flexibility to the connection between bar M^2 and lever M^3, also to permit the acid rolls to be returned to their normal vertical position by the weight of bar M^2 and lever arms m^5, slowly and without disturbing the contents of the acid cups.

The soldering devices S, Figs. 1 and 3, as has been indicated, are two in number, comprising practically independent, yet conjointly operated soldering tools and sets of soldering wire feed rolls. As these parts are the same in both devices, it is not necessary that I describe the structure of more than one *e. g.* the one shown on the right in Figs. 1 and 3. The soldering tool comprises a combustion chamber or fire box S attached to the end of a sliding bar S^1 lying in a slideway formed by plates S^3 and adapted to be actuated inwardly toward the carrier by a lever arm S^5, Fig. 1, mounted on rock shaft A^9, as already described, and outwardly by a spring S^6. Lever arm S^5 is not pivoted directly to bar S′ but to sleeve S^4, Figs. 12, 13 and 14, fitted on the end thereof. This sleeve is secured to the bar by means of bolt S^{12}, the outer end of which projects through the end of the sleeve and has mounted upon it a hand wheel S^2, while the other end is externally screw-threaded to fit the internally screw-threaded bore s^{13} in the end of the bar. A helical spring s^{14} lying between the sleeve and an offset s^{15} on the bolt makes the connection a yielding one. By rotating the hand-wheel, the reciprocating apparatus is shortened or lengthened as desired in order to properly position the soldering tool for different diameters of cans. As was stated in connection with the description of the vertical shaft D the rock-shaft A^9 also serves to reciprocate this shaft and the carrier-frame thereto attached. An important function of the helical spring d^4, which forms an element of the step in which such shaft D is mounted, appears in connection with this double operation performed by rock-shaft A^9; for by means of such spring the can beneath the gripping disk corresponding to this particular soldering device, is raised sufficiently in advance of the forward movement of such soldering device to avoid the displacement of the can thereby. I am thus enabled to dispense with the extra cam, slide bar, and levers, or similar mechanism, that would be required to give a slightly retarded motion to the soldering device.

The fire-box S is preferably composed of two readily separable portions, s s', forming a hollow box of substantially the shape shown in the figures last referred to above. Removably secured between these two portions is the soldering iron s^2 which projects in front of the box and has a concave outer edge, the curvature of the edge in any particular iron being designed to fit the convex curvature of the can with which the tool is to be used. By having the members s s' readily separable, one soldering iron is easily changed for another upon changing from one size of can to another. A pipe, s^3, fitted into the bore s^6 in the rear of the fire box admits a properly proportioned mixture of gas and air which is ignited within the box, the products of the combustion escaping in front by openings s^5 above and below the soldering iron, which is thus easily maintained at the necessary temperature.

To provide an adjustable means of securing the fire box S to the reciprocating bar, the end of the latter is provided with a downwardly projecting face s^7 provided with a vertical recessed slot s^8 in which slides a block s^{10} adapted to be positioned therein by means of a hand wheel s^4. A threaded bolt s^{11} passes through such block and a transverse slot in the back of the fire box S and screws into a cylindrical plug s^9 fitted into the bottom of bore s^6 in such fire box. The fire box is thus in effect pivoted on the plug s^9, being held laterally in any desired position on its pivotal axis by means of set screws s^7 s^7; while by means of hand wheel s^4 any vertical position necessary to bring the soldering iron s^2 exactly into proper position on the can is attainable.

Two sets of solder feeding devices R, R, corresponding to the two soldering stations, are provided, Figs. 1 and 3, whereby solder wire r is fed to the soldering irons when the latter are in contact with the cans. The reels from which the wire is unwound are not indicated; they may be secured in brackets or hangers about the machine where most convenient. From such reels the wire is led between grooved rolls r^1 r^2 mounted in a bracket R^5 on cross bar B^1, Figs. 15, 16 and 17, and thence downwardly into close proximity to the outer curved edge of the soldering iron by the adjustable guiding tube r^5.

A helical spring r^4 positioned as shown is adapted to compress the wire between the rolls sufficiently to cause it to be readily fed forward without slipping even though it be of varying diameter as is frequently the case.

Rotation of the rolls is effected by means of a horizontal shaft R^1, mounted alongside

cross bar B^1, on which one of the rolls, r^2, is mounted, and a vertical shaft R^2 mounted in the end standard A^2 and connected with shaft R^1 by means of bevel gears r^{12} r^{13}. Shaft R^2 is intermittently rotated a variable amount by means of a ratchet device mounted on the top of standard A^2, Figs. 18 and 19. The upper end of the shaft turns in a bearing formed in a bracket a^5, and is provided with a ratchet wheel r^8; while a lever arm R^4 having one end rotatably secured to the end of the shaft and bearing a pawl r^6 is actuated by a bar R^3 eccentrically connected to the upper end of shaft C^1, to rotate such ratchet wheel. A spring r^7 tends to hold such pawl r^6 in engagement with the ratchet wheel, the point at which the engagement takes place and the consequent amount of rotation imparted to the ratchet wheel being a matter of regulation by means of the throw-off r^9. This throw-off is adapted to be held in different positions by means of a series of holes r^{10} in the top of bracket a^5, and a pin r^{11} in such throw-off designed to engage the holes. Thus by means of this ratchet device and shafts, R^2 R^1, the rolls may be rotated to feed the exact amount of solder wire required to solder the end of the particular can in process of manufacture, and this, moreover, coincidently with the contact of the heated soldering iron with the can.

Having thus described in detail the various mechanisms entering into my machine and the separate processes performed by each, it only remains to point out how these processes are correlated in the operation of the machine as a whole. An operative assembles the parts of the cans, viz. the cylindrical portion and the two end portions, as shown in Fig. 5 and places such assembled can on one of the disks on the carrier frame in the front of the machine, Fig. 1. The intermittent rotation of such carrier bears the cans to the crimping and fluxing station and in succession thereafter to the first and second soldering stations. Intermediately of the two soldering stations, which are on the rear side of the machine as viewed in Fig. 1, another operative inverts the cans preparatory to their passing the second soldering station, for the reason already explained. During the periods of cessation from rotation of the carrier frame, the lighter bar E is actuated to raise it so that the three cans occupying the three stations referred to are pressed against the upper rotating disks d^{10}. While thus held, the crimping disks, the flux rolls, and the two soldering irons are simultaneously advanced, the solder wire feeding rolls providing in connection with the latter the requisite amount of solder. As the completed cans again pass forward to the front of the machine, a throw-off of any approved design shown simply as a projecting arm, T, Figs. 1 and 2, discharges the cans into a conveyer or receptacle as desired. The operation of the machine is thus seen to be quite simple, but more noteworthy is the high degree of adjustability realized in its various parts. Thus to change the machine for operation upon a different size of can it is merely necessary to mount the proper size of disks on the various disk carrying spindles, fit the corresponding soldering irons in the soldering devices, adjust vertically the crimping disks and acid rolls and regulate by means of the convenient hand wheels the extent of the reciprocating movement of such soldering and crimping devices.

Having thus described my invention in detail, that which I particularly point out and distinctly claim is:

1. In a machine of the character described, the combination of end standards; cross-bars joining the same; a rotatable carrier-frame mounted on a vertical axis beneath said cross-bars and intermediately of said standards; spaced disks rotatably mounted around said carrier frame; and vertical shafts mounted in said cross-bars and bearing disks on their lower ends adapted to coöperate with the disks on said carrier frame to grip and rotate cans placed thereon.

2. In a machine of the character described, the combination of end standards; cross-bars joining the same; a carrier frame mounted on a vertical axis beneath said cross-bars and intermediately of said standards, spaced disks rotatably mounted around said carrier frame; vertical shafts mounted in said cross-bars and bearing disks on their lower ends adapted to coöperate with the disks on said carrier frame to grip and rotate cans placed thereon; and reciprocable members, bearing devices respectively designed to operate upon cans thus held and rotated, mounted in said standards.

3. In a machine of the character described, the combination of end standards; cross-bars joining said standards; a horizontal drive shaft having its ends mounted in the tops of said standards; a step located intermediately of said standards; a vertical spindle having its lower end mounted in said step and its upper end in the lowermost of said cross-bars; a carrier frame borne by said spindle; uniformly spaced disks rotatably mounted around said carrier frame; and a plurality of vertical shafts mounted in said cross-bars and bearing disks on their lower ends adapted to coöperate with the disks on said carrier frame, to grip and rotate cans placed thereon, said frame-bearing spindle and vertical shafts being respectively operatively connected with said drive shaft.

4. In a machine of the character described, the combination of end standards; cross-bars joining said standards; a horizontal drive shaft having its ends mounted in the tops of said standards; a step located inter-

mediately of said standards; a vertical spindle having its lower end mounted in said step and its upper end in the lowermost of said cross-bars; a carrier frame borne by said spindle; uniformly spaced disks rotatably mounted around said carrier frame; means adapted to periodically rotate, and means adapted to raise, said spindle and attached carrier frame; a plurality of vertical shafts mounted in said cross-bars and bearing disks on their lower ends adapted to coöperate with the disks on said carrier frame to grip and rotate cans placed thereon when said carrier frame is thus raised; and reciprocable members, bearing devices respectively designed to operate upon cans thus held and rotated, mounted in said standards; said frame-bearing spindle, vertical shafts, and reciprocable members being respectively operatively connected with said horizontal drive shaft.

5. In a machine of the character described, the combination of end standards; cross-bars joining the same; a rotatable carrier frame mounted on a vertical axis beneath said cross-bars and intermediately of said standards; spaced disks rotatably mounted around said carrier frame; vertical shafts mounted in said cross-bars and bearing disks on their lower ends adapted to coöperate with the disks on said carrier frame to grip and rotate cans placed thereon; three reciprocatory bars mounted in said end standards at different corners of the machine; and can-crimping mechanism and two soldering devices mounted on said bars, respectively, taken in order in the direction of rotation of said carrier frame, the two bars bearing the soldering devices being on the same side of the machine.

6. In a machine of the character described, the combination of a vertical spindle, a carrier frame mounted thereon, means for intermittently rotating said spindle, a lighter bar adapted to vertically reciprocate said spindle, and braking means comprising a flexible band bearing against a portion of the periphery of said carrier frame and means for alternately tightening and loosening said band.

7. In a machine of the character described, the combination of a rotatable carrier frame mounted on a vertical axis, means for intermittently progressively rotating said frame, such means comprising a ratchet wheel and a reciprocatory pawl coöperating therewith, a brake band bearing against a portion of the periphery of said frame, said band being normally loose, and means adapted to tighten said band just before the conclusion of the operative stroke of said pawl.

8. In a machine of the character described, a reciprocatory can-gripping device, and a reciprocatory soldering device, and common actuating means therefor, said can-gripping device comprising a yielding member whereby said device is caused to operate in advance of said soldering device.

9. In a machine of the character described, the combination with soldering means comprising a soldering iron and a fire-box for heating the same, of can-gripping and rotating means comprising a carrier frame, disks rotatively mounted around said frame, a rotating disk above said carrier frame, means for advancing said carrier frame to successively position cans placed on the disks mounted thereon beneath such rotating disk, and means for raising said carrier frame when such can is so positioned to hold such can against said disk.

10. In a machine of the character described, the combination with a reciprocatory bar, a soldering iron attached to one end of said bar and means adapted to heat said iron; of means adapted to actuate said bar, such means having an adjustable resilient connection with the other end of the same.

11. In a machine of the character described, the combination with a reciprocatory bar, a soldering iron attached to one end of said bar, and means adapted to heat said iron; of means adapted to actuate said bar, such means including a sleeve resiliently mounted upon the other end of said bar, means for adjusting the position of said sleeve upon said bar, and a rock arm connected with said sleeve.

12. In a machine of the character described, the combination with a reciprocatory bar, a soldering iron attached to one end of said bar and means adapted to heat said iron; of means adapted to actuate said bar, such means including a sleeve mounted upon the other end of said bar and having its own outer end closed, a bolt passing through such outer end of said sleeve and screw-threaded in the end of said bar, said bolt being provided with an offset, a helical spring interposed between said offset and the closed end of said sleeve, and a rock-arm connected with said sleeve.

13. In a machine of the character described, the combination with a horizontally reciprocable member; of soldering means supported thereby, such means comprising a hollow fire-box pivotally mounted upon one end of said member on a vertical axis, means for raising and lowering said box, means for securing the same in various angular positions about its pivotal axis, and a soldering iron removably mounted in said fire box and partially projecting therefrom.

14. In a machine of the character described, the combination with a horizontally reciprocable bar, of soldering means supported thereby, such means comprising a hollow fire-box composed of two separable portions, and a soldering iron removably mounted in said fire-box and partially projecting therefrom, said fire-box being pivotally mounted upon one end of said supporting member on a

vertical axis so as to be adjustable longitudinally along, and angularly about, such axis, and the projecting portion of said soldering iron being formed with a concave outer edge to conform with the shape of can being operated upon.

15. In a machine of the character described, the combination of a horizontally reciprocable bar; means adapted to periodically actuate the same, such means having an adjustable connection therewith; a soldering iron pivotally mounted upon one end of said bar upon a vertical axis; means adapted to raise and lower said iron; and means adapted to angularly position the same about such axis.

16. In a machine of the character described, the combination of a horizontally reciprocable bar; means adapted to periodically reciprocate the same; such means having an adjustable connection therewith; and soldering means supported by said bar, such means comprising a fire-box pivotally mounted upon said bar on a vertical axis so as to be adjustable longitudinally along, and angularly about, such axis; and a soldering iron removably mounted in said fire-box.

17. In a machine of the character described, a fluxing device comprising an acid cup, a roller, and means adapted to alternately dip said roller into said cup and position the same to contact with the can to be soldered.

18. In a machine of the character described, a fluxing device comprising an acid cup, a rock-shaft adjacent thereto, and a roller mounted on the end of said shaft on a transverse axis, said roller being adapted when vertically disposed to dip into said cup.

19. In a machine of the character described, a fluxing device comprising an acid cup, a rock-shaft adjacent thereto, and a roller mounted on said shaft on an axis at substantially a right angle thereto, said roller being adapted when vertically disposed to dip into said cup.

20. In a machine of the character described, a fluxing device comprising an acid cup, a rock-shaft projecting over said cup, and a roller mounted on said shaft on an axis transverse to and eccentric of the axis of said shaft, whereby said roller in one position of said shaft is dipped in said cup.

21. In a machine of the character described, the combination with means for gripping and rotating cans, of a fluxing device comprising an acid cup, a rock-shaft mounted so as to be adjustable relatively to said can-gripping means, said shaft projecting over said cup, a roller mounted on the end of said shaft on an axis transverse to and eccentric of the axis of said shaft, and means adapted to actuate said shaft to alternately dip said roller in said cup and position the same to contact with the can to be soldered.

22. In a machine of the character described, the combination with means for gripping and rotating cans, of a fluxing device comprising rock shafts mounted so as to be adjustable vertically and horizontally relatively to said can-gripping means, rollers eccentrically mounted at the end of said shafts and adapted to rotate on axes at right angles thereto, means to actuate said shafts to turn said rollers alternately in a vertical and horizontal position, and acid cups into which said rollers dip when in such vertical position.

Signed by me this 7th day of July, 1905.

FREDERICK W. BALLARD.

Attested by—

JNO. F. OBERLIN,

G. W. SAYWELL.