No. 780,313. PATENTED JAN. 17, 1905.

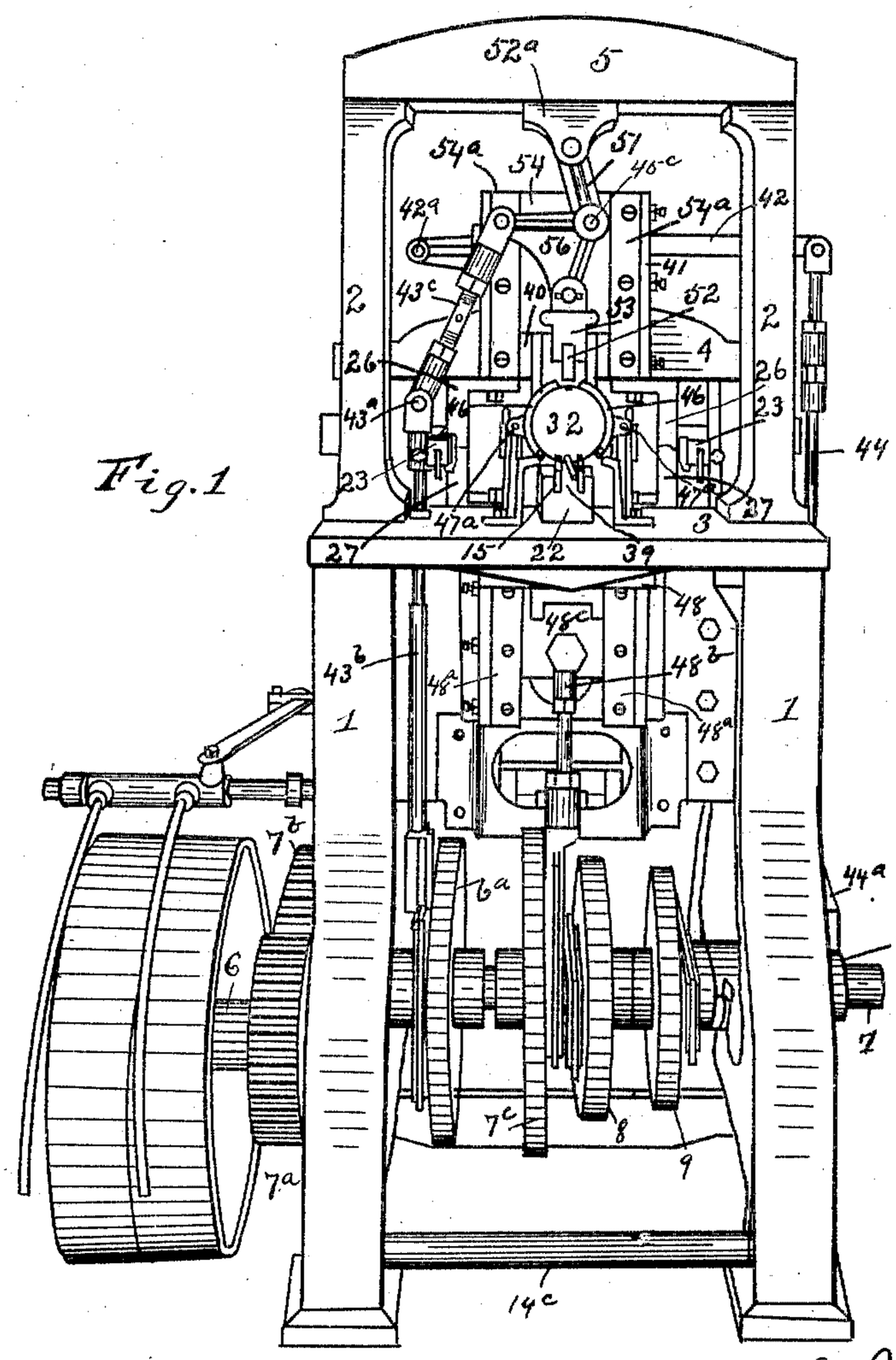
C. J. WEINMAN.

CAN BODY FORMING MACHINE.

APPLICATION FILED MAY 26, 1902.

6 SHEETS—SHEET 1.

Fig. 1



WITNESSES.
Matthew Sibley.
Carolyn M. Theobald.

C. J. Weinman,
INVENTOR.
By R. H. McCarty.
his ATTORNEY.

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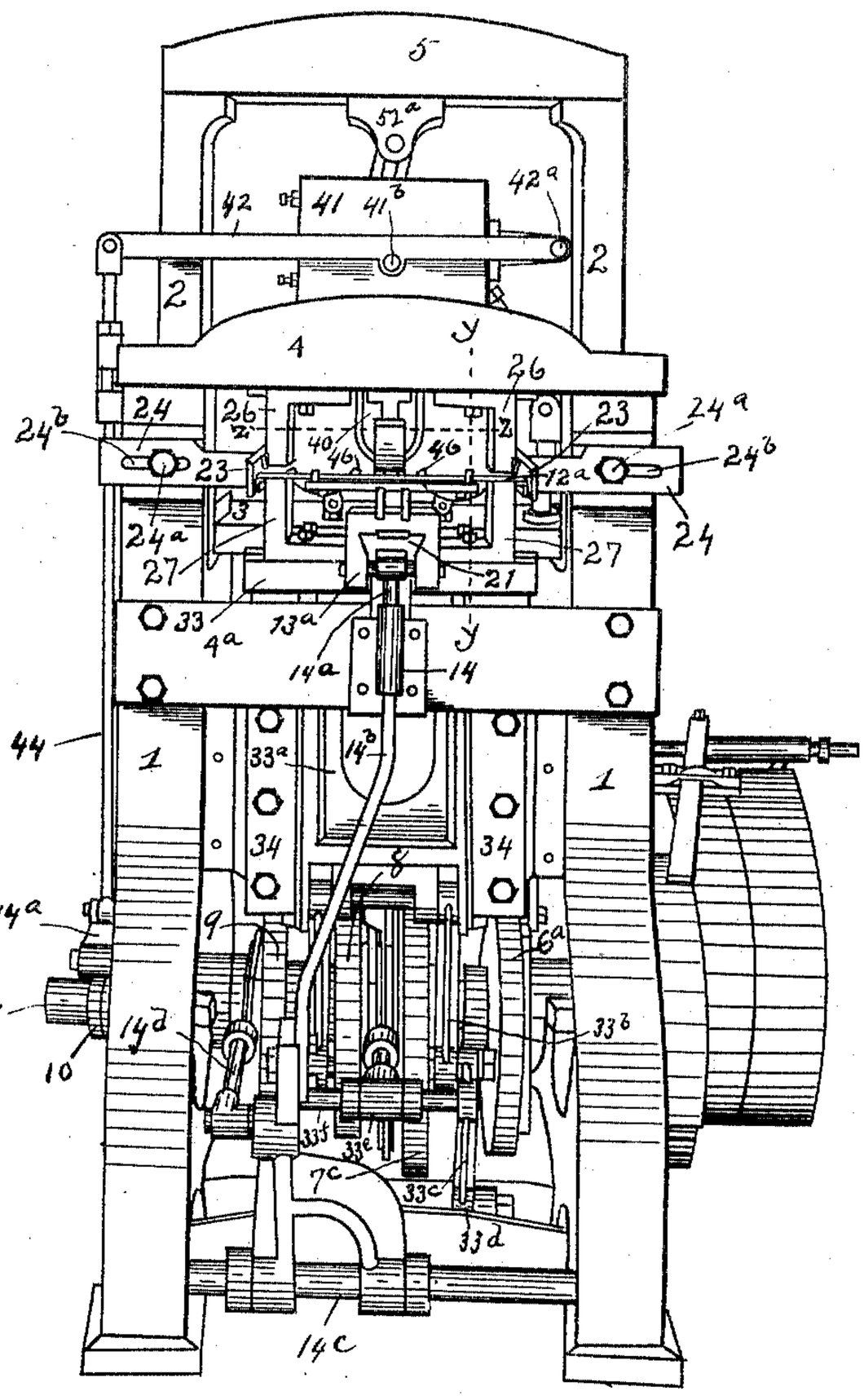

Fig. 2.

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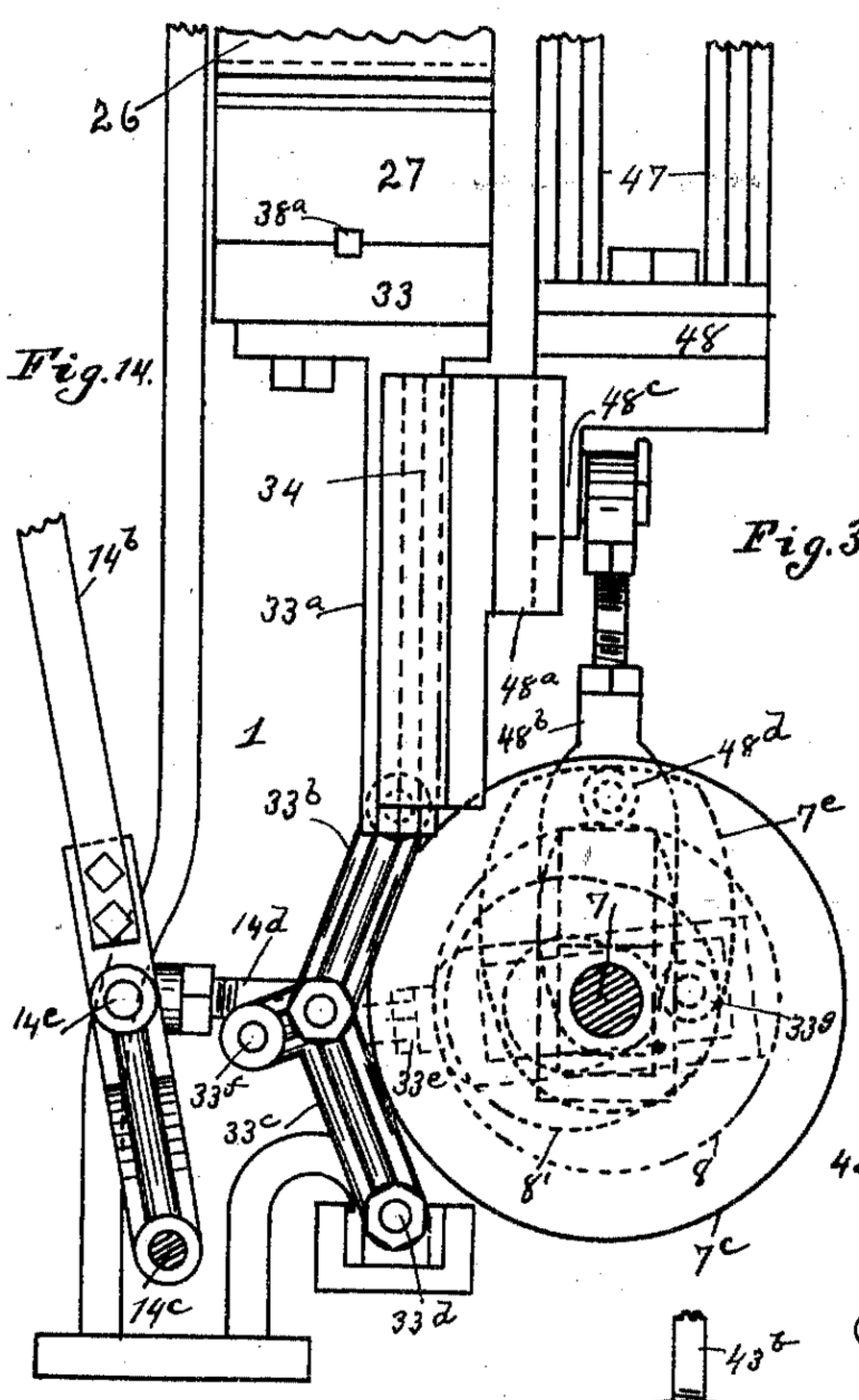

Fig. 14.

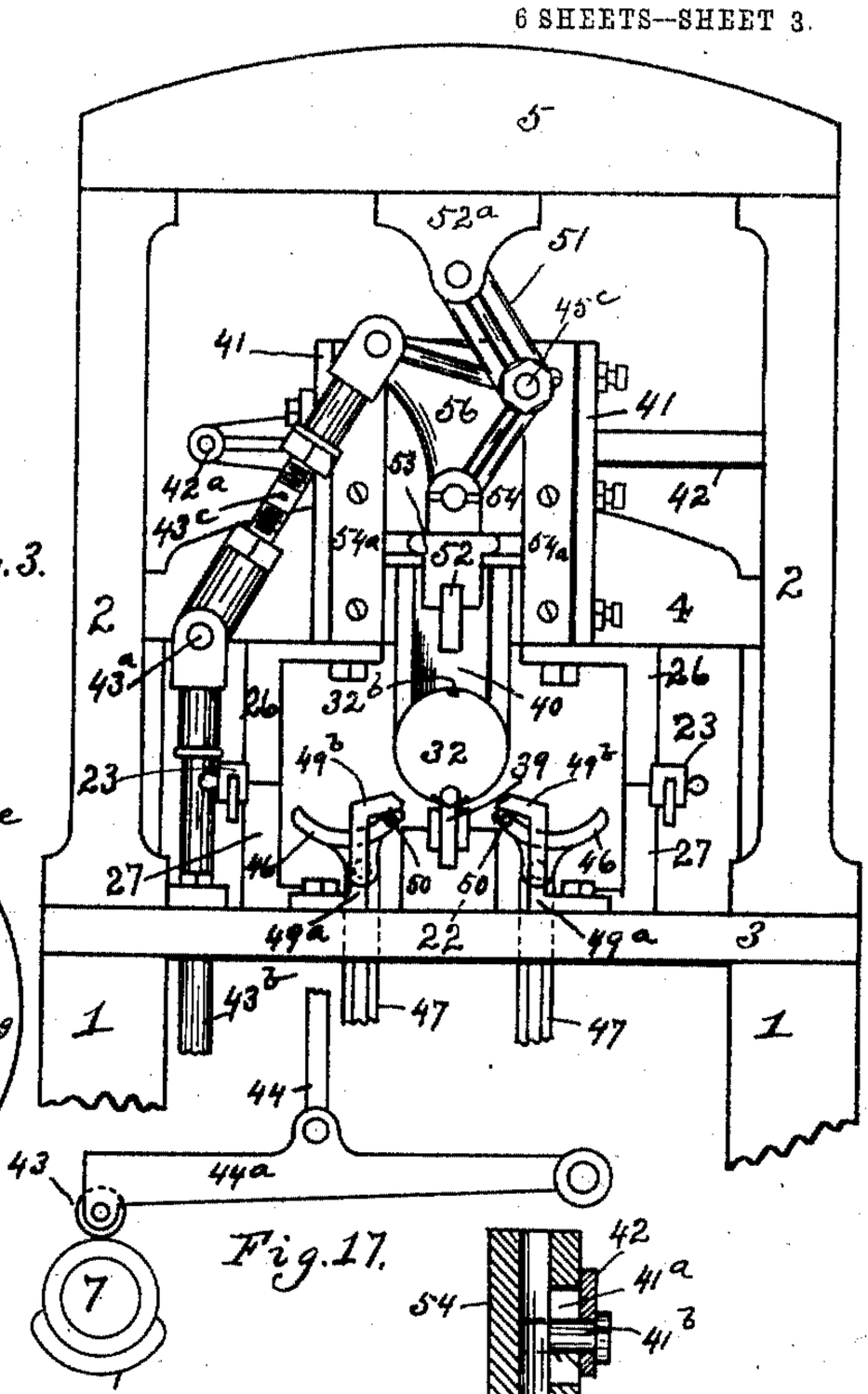

Fig. 3.

Fig. 15.

Fig. 13.

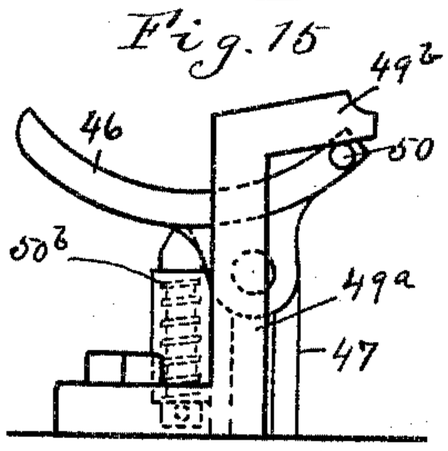

Fig. 19.

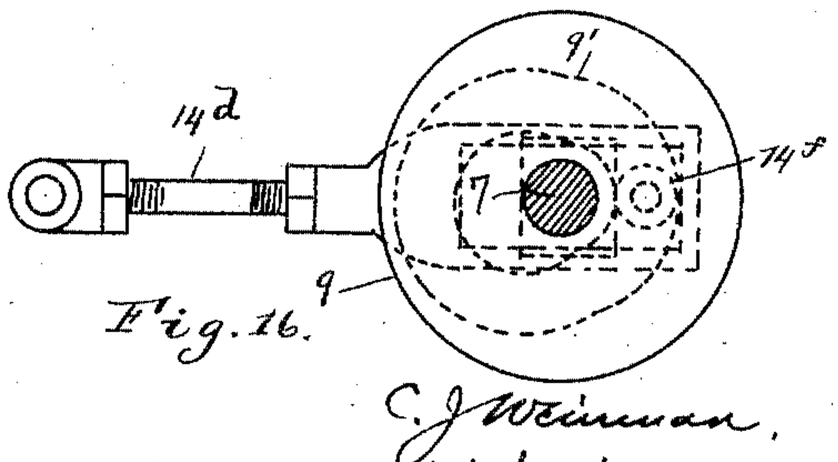

Fig. 16.

Fig. 17.

WITNESSES.
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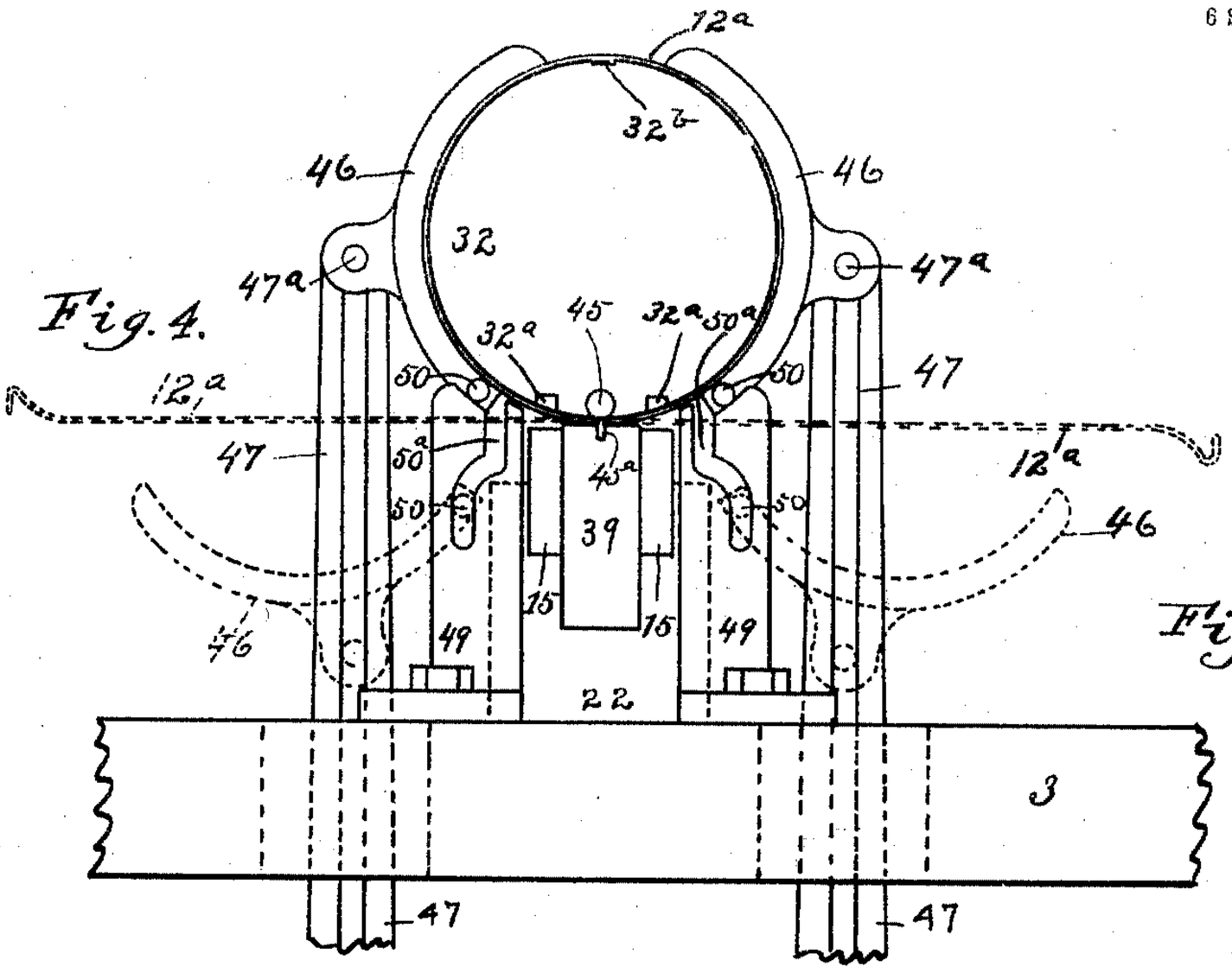

Fig. 4.

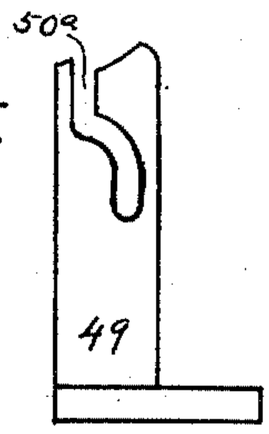

Fig. 5.

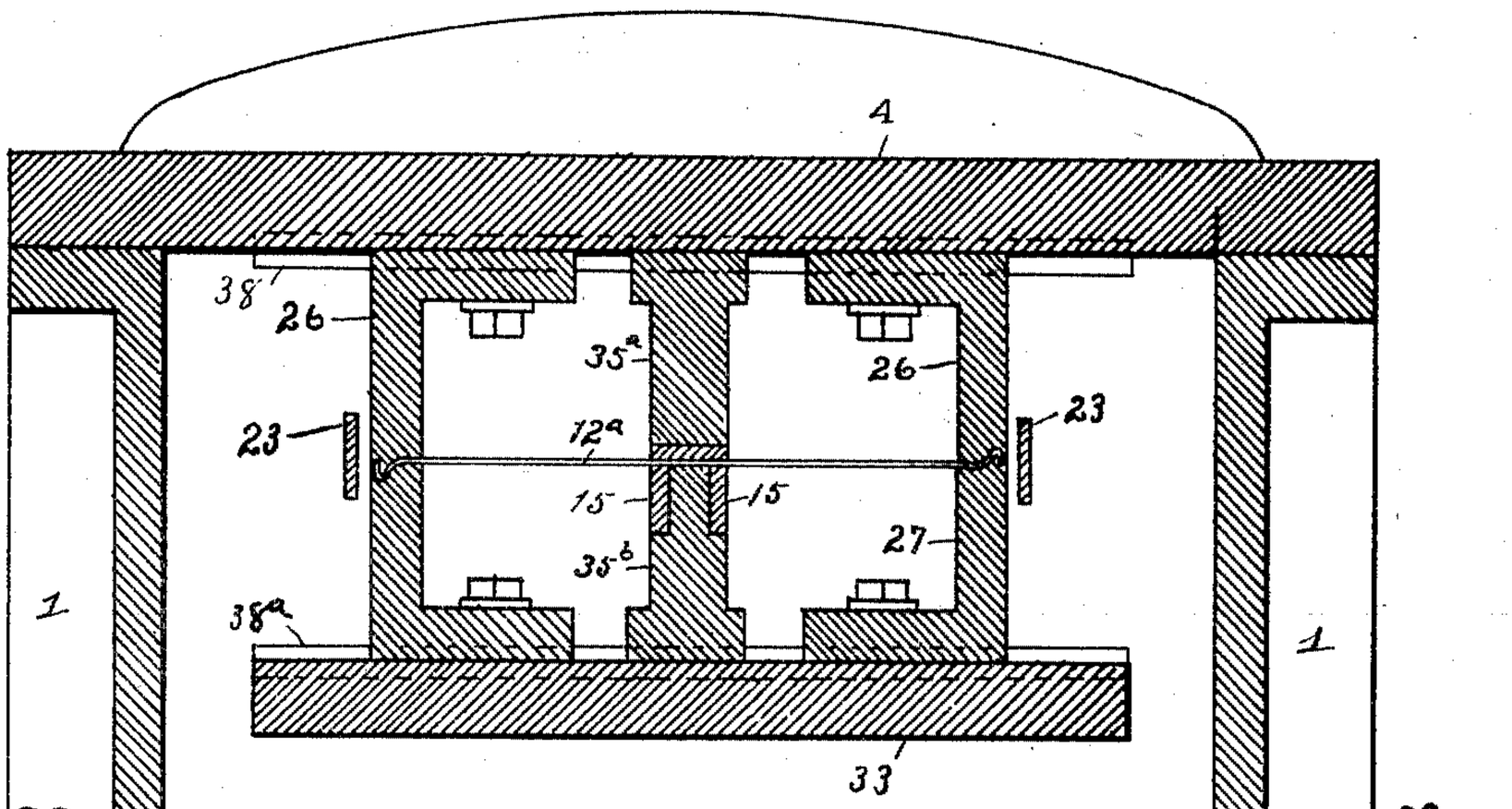

Fig. 6.

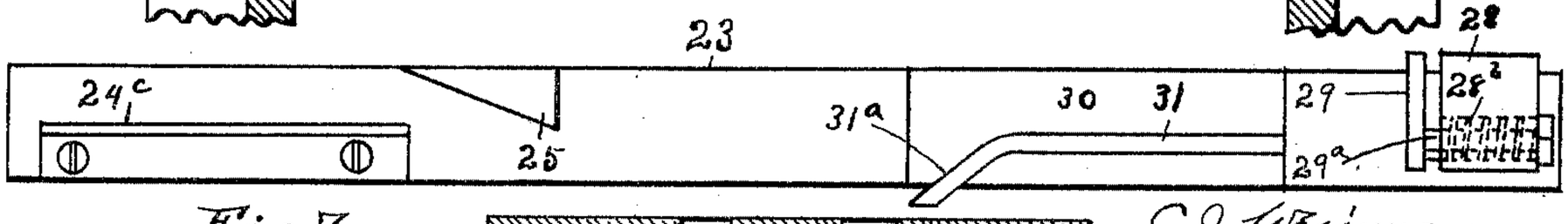

Fig. 7.

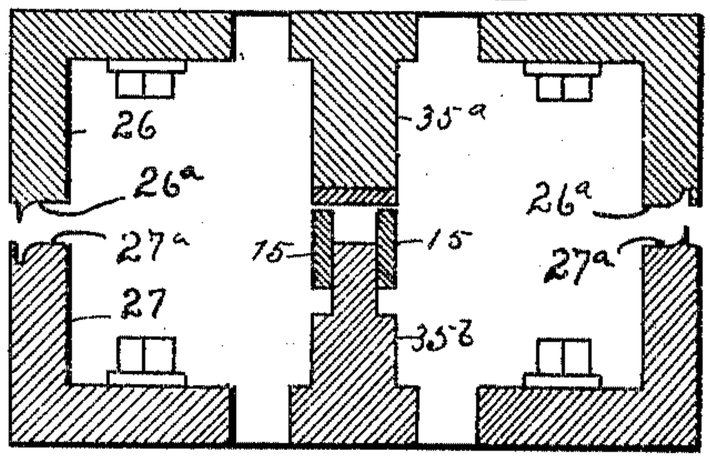

Fig. 8.

WITNESSES.
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Fig. 10.

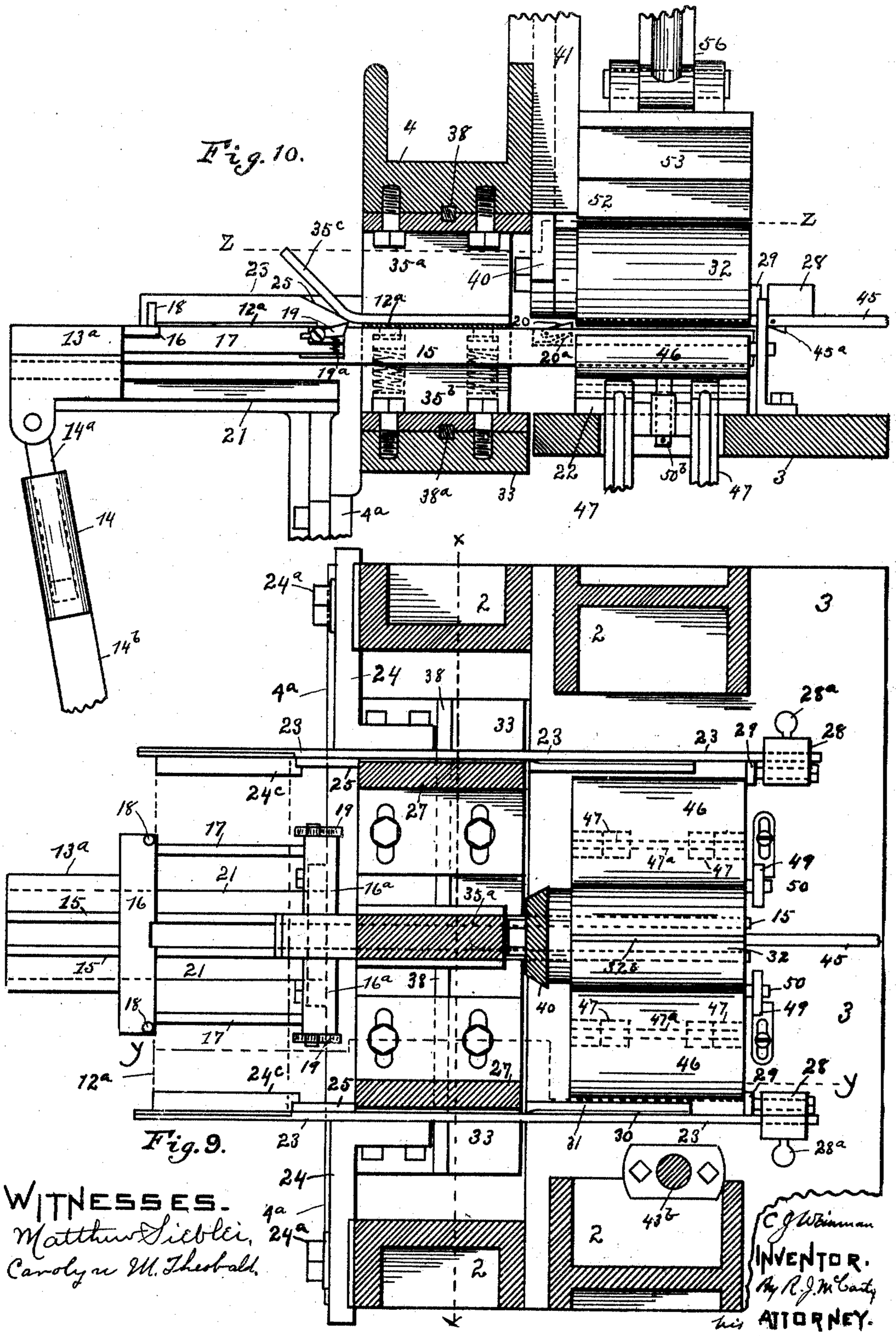

Fig. 9.

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6 SHEETS—SHEET 6.

Fig. 12.

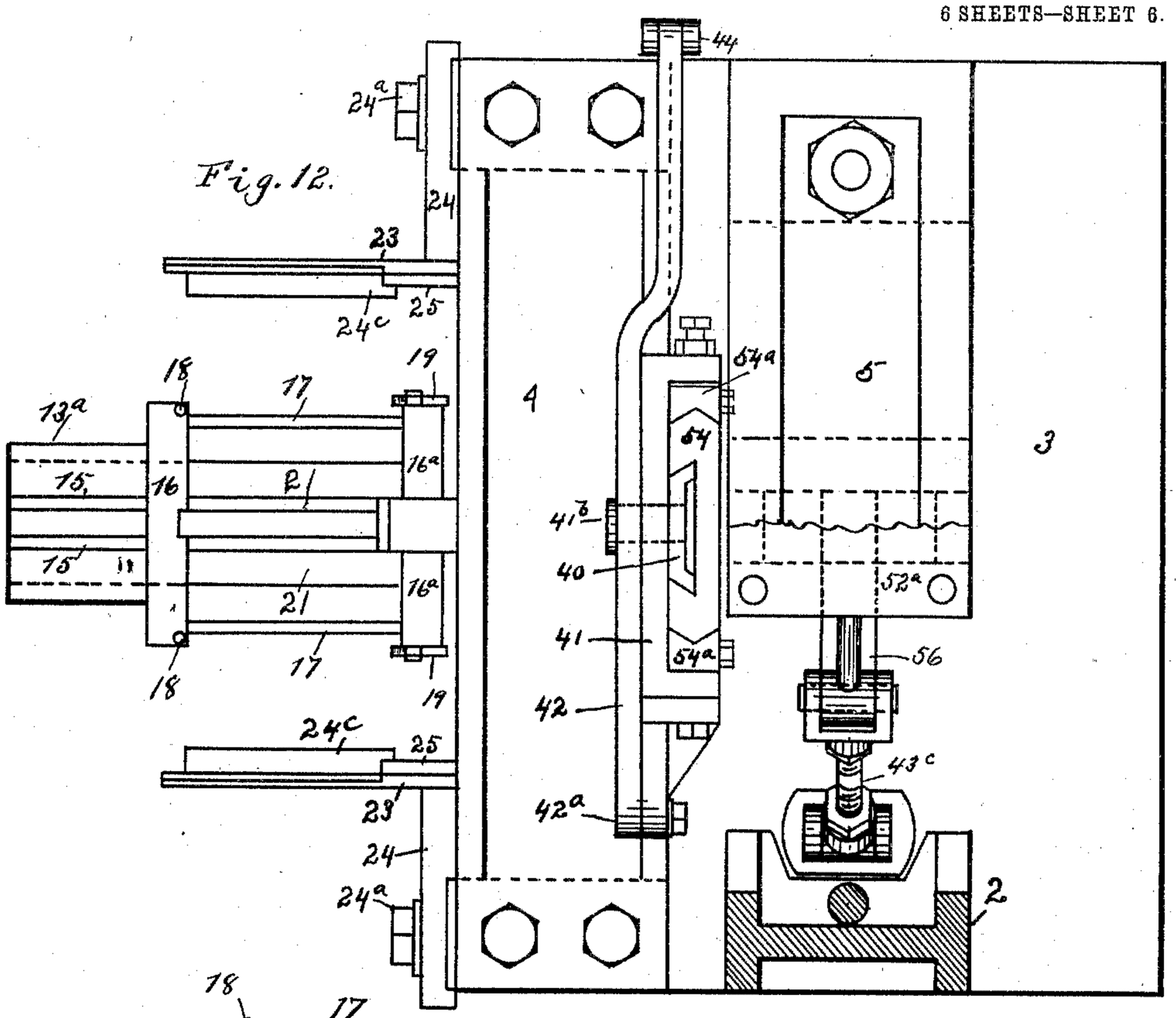

Fig. 11.

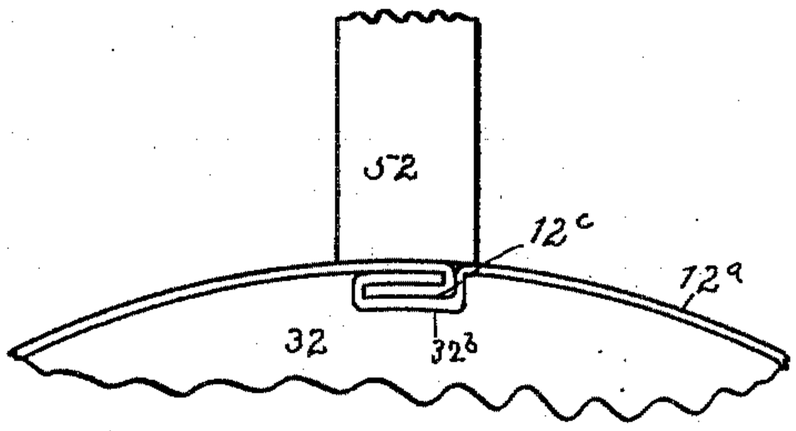

Fig. 18.

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WITNESSES.
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Carolyn M. Theobald.

No. 780,313. Patented January 17, 1905.

UNITED STATES PATENT OFFICE.

CHRISTIAN J. WEINMAN, OF DAYTON, OHIO.

CAN-BODY-FORMING MACHINE.

SPECIFICATION forming part of Letters Patent No. 780,313, dated January 17, 1905.

Application filed May 26, 1902. Serial No. 109,082.

To all whom it may concern:

Be it known that I, CHRISTIAN J. WEINMAN, a citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Can-Body-Forming Machines; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

This invention comprises a machine for making can-bodies.

The essential mechanism of the machine comprises means for feeding the blanks or sheets of tin or other metal into positions to be operated upon—namely, to the crimping mechanism, through which the ends of the blanks are suitably prepared for uniting said ends, and thence to the forming mechanism, through which said blanks are given their proper cylindrical form and the ends united, and thence from said forming mechanism. The feeding mechanism in each feeding movement simultaneously advances a blank to the crimping mechanism, moves a blank which has previously been crimped from the crimping mechanism to the forming mechanism, and moves from the forming mechanism a blank which has previously been formed into a cylindrical body.

The other essential mechanisms of the machine comprise the crimping and forming devices, all of which have their special means of operation that will be hereinafter more fully described.

Preceding a detail description of the invention, reference is made to the accompanying drawings, of which—

Figure 1 is a front elevation of the machine. Fig. 2 is a rear elevation of the same. Fig. 3 is an enlarged detail view of the crimping, forming, and clenching mechanisms. Fig. 4 is an enlarged detail view of the same, which shows some modifications as compared with that shown in Fig. 3. Fig. 5 is a detail view of one of the slotted standards used in connection with the mechanism shown in Fig. 4. Fig. 6 is an enlarged vertical sectional elevation of the crimping-dies. Fig. 7 is an enlarged detached view of one of the guides between which the blanks are conducted to the crimping and forming mechanisms. Fig. 8 is a sectional elevation through the crimping mechanism, showing the crimping-dies separated and in a position to receive a blank. Fig. 9 is a sectional plan view on the line *z z* of Fig. 10. Fig. 10 is a sectional view on the line *y y* of Fig. 9. Fig. 11 is a detail perspective view of the carriage through the means of which the blanks are fed to and carried from the crimping and forming machanisms. Fig. 12 is a top plan view with the upper cross-beam or cap 5 partly broken away. Fig. 13 is a detail view, partly in section, showing the shaper and the manner of its mounting and also the clenching device. Fig. 14 is a detail elevation of the supports for the crimping and forming mechanisms, parts being broken away, and some of the cams and connections through which said supports are operated are shown. Fig. 15 is a detail view of the cam and connections through which the clenching mechanism is operated. Fig. 16 is a detail view of the cam and connections through which the feeding mechanism is operated. Fig. 17 is a detail view of the cam and connections through which the shaper is operated to raise and lower the same. Fig. 18 is a detail view of a portion of the cylindrical shaper and the clenching-hammer, showing the manner of uniting the ends of the blank in the formation of the cylindrical body. Fig. 19 is a detail of a portion of the folding devices.

In a detail description of my invention similar reference characters indicate corresponding parts.

The framework of the machine comprises the lower side frames 1 1, upper side frames 2 2, a table 3, interposed between the upper and lower side frames, a rear shelf 4, an upper cross beam or cap 5, and a rear cross-beam 4^a.

6 designates the main power-shaft, to which power is conveyed by a belt and pulley in the usual manner, and from this shaft 6 power is transmitted to a cam-shaft 7 through suitable

spur-wheels 7^a 7^b. (See Fig. 1.) Upon the shaft 7 there are mounted a series of cams, through which the proper movements are conveyed to the various mechanisms, as hereinafter more fully described.

In a detail description of the various mechanisms I will first describe the carriage through which the blanks or sheets of tin or other metal are fed into the machine to be acted upon by the crimping mechanism and thence to be acted upon by the forming mechanism. This carriage is shown in detail in Fig. 11 of the drawings and consists of two parallel bars 15 15, which are connected by cross-bars 16 16^a 16^b, the said cross-bars being suitably braced by parallel bars 17 17.

18 18 designate two pins projecting upwardly from the bar 16.

19 19 designate two dogs pivotally supported at the ends of the bars 16^a 16^b and normally pressed upward by springs 19^a, which are mounted beneath said dogs. 20 20 designate two similar dogs pivotally mounted in openings 20^b in the bars 15 15, said dogs 20 20 being likewise pressed upwardly by springs 20^a, placed beneath said dogs. The carriage thus constructed has a horizontal reciprocating movement above the table 3 in a forward guide, consisting of a block 22, rigidly secured to the table 3, and the rearward end of said carriage is secured to a head-block 13^a, which moves upon a guide 21, which is secured at the rear of the machine to the cross-beam 4^a and is approximately on a plane with the upper surface of the guide-block 22. (See Figs. 3, 4, 10.) The reciprocating movement is imparted to said carriage through a rod 14^a, which has a pivotal connection with the head-block 13^a and projects loosely into a sleeve 14. The sleeve 14 is rigidly secured to the upper end of the operating-lever 14^b, which has its fulcrum on a brace or stay rod 14^c. (See Figs. 2, 10, and 14.) The lever 14^b is given a rocking motion from the cam 9, said cam acting upon the slotted pitman 14^d, which has a pivotal connection at 14^e with the lever 14^b and carries a roll 14^f, which rides in the cam-recess 9′, which is on the face of the cam-disk 9. (See Fig. 16.) The loose connection of the rod 14^a with the sleeve 14 is essential as a means of conveying the horizontal reciprocating movement to the carriage from the oscillating movement imparted to the lever 14^b.

23 23 are horizontally-arranged guides which are rigidly secured to supports 24 24 to the rear side of the lower frame of the machine by means of bolts 24^a, which penetrate oblong slots 24^b. Owing to these slots the guides 23 23 may be adjusted in and out horizontally to suit various sizes of blanks—that is to say, in order to produce can-bodies of different diameters these guides 23 23 may be adjusted for various lengths of blanks. 24^c designates supports on the inner sides of the guides. Upon these supports 24^c the ends of the blanks 12^a rest when they are placed in position to be moved forward by the carriage in a manner hereinafter described. (See Figs. 7 and 9.) 25 designates tapering lugs on said guides 23, which direct the forward ends of each blank downwardly to a proper position to enter the crimping devices, which devices consist of upper and lower dies 26 26 27 27 and will be hereinafter fully described. 30 designates a plate which is secured on the inner side of each of said bars 23 and projecting from each of which is an angular support 31, which receives the blanks after they have been crimped. The operation of crimping the ends of said blanks will necessarily shorten said blanks as compared to their length when they are first fed to the supports 24^c. It is therefore necessary to shorten the space between the guides 23 23 at this point, which is accomplished by means of the plates 30. The angular supports 31 have their forward ends projected downwardly, as at 31^a, in order that they may properly guide the blanks upon said supports. These supports 31 guide the blanks after they are crimped to a position under the shaper 32, as shown in broken lines in Fig. 4.

29 designates a yielding stop which is mounted on the rearward end of each of the guides 23 by means of a pin 29^a, which has an adjustable bearing 28 on said bars and is inclosed by a spring 28^b, that holds said stop normally in a position to be moved against the compressing movement of the spring. These stops 29 are adjustable by means of thumb-screws 28^a. The functions of said stops 29 are to straighten or square the blanks in a proper position relatively to the shaper 32.

The crimping mechanism hereinbefore briefly referred to is shown in Figs. 6 and 8 and consists of upper stationary dies 26 26 and an upper holding member 35^a, all of which are rigidly attached to the cross-beam 4. The crimping-surfaces 26^a of the dies 26 26 are the reverse of the crimping-surfaces 27^a in the lower dies 27 and impart to the ends of the blanks reversed crimps, as shown in Figs. 4, 6, and 8. The lower dies 27 27 are movable, as is also the lower holding member 35^b, by being mounted on the movable table 33, which is mounted on the vertically-sliding plate 33^a, which moves in guides 34 34. (See Figs. 2 and 14.) The plate 33^a is given its movement from cam 8 through toggle-levers 33^b 33^c, the latter one of which is pivoted at 33^d. The slotted pitman 33^e is connected to a part which is pivoted to the toggle-levers at 33^f, and said pitman carries a roll 33^g, which rides against a cam-surface 8′ of the cam 8. The holding members 35^a and 35^b are midway between the crimping-dies and are instrumental in holding each blank in the center as the crimping-dies act upon the ends thereof. The upper member 35^a of said holding devices has an upwardly-projected inclined guide 35^c, which directs the blanks in a proper manner between

said holding members prior to the operation of closing upon said blank. (See Fig. 10.) The crimping-dies 26 26 27 27 are adjustable along guides 38 38ª, attached to the cross-beam 4 and the table 33, respectively, (see Figs. 6, 9, and 10,) so that accurate horizontal movements are imparted to said dies in placing them for different sizes of can-bodies.

In the block 22 (which has been heretofore referred to as one of the supports and guides for the carriage) is mounted an anvil 39, upon which the shaper 32 rests when a blank is being clenched at its crimped ends. The shaper is secured to a vertical slide 40, which has a movement, by means of a dovetail connection, with a vertically-movable slide 54, the said slide 54 being inclosed at its longitudinal edges by adjustable guide-pieces 54ª, which are inclosed by an upright casing 41. (See Figs. 12 and 13.)

The casing 41, which is attached to the cross-plate 4, has an oblong opening 41ª therein, through which a pin 41ᵇ passes and has a connection with the slide 40, said pin being secured to an operating-lever 42, which has its fulcrum at 42ª. (See Figs. 3 and 13.) The lever 42 has a suitable connection with a pitman 44, connected at its lower end to a lever 44ª, which carries a roll 43 and is operated from cam 10 to impart the required movement to the lever 42 and thence to the shaper 32. (See Figs. 2, 13, and 17.) This movement of the shaper is only sufficient to allow each blank to enter below said shaper prior to the formation of a body and to again permit of the body being removed from said shaper after its formation. The lower side of the shaper 32 has two longitudinal slots 32ª extending from end to end, which provide passage-ways for the dogs 20 20 when said dogs are moved forward in the operation of the carriage and during which period the said dogs remove the finished body from the shaper. The upper side of the shaper has a longitudinal groove 32ᵇ, which will be again referred to in connection with the clenching devices. (See Fig. 4.)

45 designates a rod which is secured to the lower portion of the shaper and the function of which is to prevent the end of the can-body from moving out of a straight line when said body is being removed from the shaper by the dogs 20 20. It will be seen as the can-body is being removed from the shaper the projecting end of this rod will prevent any slight upward movement of the body. The body might have a tendency for such upward movement owing to the fact that the pressure exerted against it by the dogs 20 20 is on the lower side of said can-body. Projecting from the lower side of said rod 45 is a stop 45ª, which prevents any rearward movement of the can-body after it has been removed from the shaper. Such rearward movement might possibly be superinduced by the return movement of the carriage after the removal of a can-body from the shaper. The stop 45ª is normally in a position shown in Figs. 4 and 10 by reason of the gravity or weight thereof, said stop having a pivotal connection. As the end of the can-body in its removal from the shaper reaches this stop it elevates said stop by reason of the inclined surface of said stop; but when the body is entirely removed from the shaper it allows the stop to fall by gravity to an operative position. The blanks 12ª are moved to positions to inclose the shaper and to receive the cylindrical form by means of two folders 46 46, which lie below the shaper 32 and below the blanks as each blank is moved into position to be acted upon by the shaping or forming mechanism. The folders 46 46 are properly shaped to conform to the contour of the cylindrical shaper 32 and are pivotally connected at 47ª to two upright standards 47 47, which have a vertically-reciprocating movement in openings in the table 3. It will be seen in the several views of the drawings that the folders are pivoted near their centers to the standards, said pivotal points being slightly inward from the centers of the folders, so that the excess of weight on the outer sides of the pivots will cause the folders to spread or drop away from the shaper 32 when the standards 47 47 move down. When the said standards are elevated, the inner sides or edges of the folders being free to drop, the continued elevation of said standards will cause said folders to fit around the shaper. The inner or lower edges or sides of the folders are free from any pivotal connections. This is a very important feature of the folder mechanism, as thereby the said folders are entirely under the control of the standards 47 47 and are enabled to adjust themselves to the sides of the shaper as the said standards move up. The standards 47 47 are supported on a vertically-reciprocating slide or head 48, which is movable in guides 48ª by means of a slotted pitman 48ᵇ, which pitman has a connection with the lower projecting portion 48ᶜ of said head and receives motion from a cam-disk 7ᶜ, which has a cam-recess 7ᵉ on the face thereof, in which a roll 48ᵈ on the pitman travels. (See Fig. 14.) The folders 46 46 each have a pin 50 adjacent to its inner side or edge which projects into a cam-slot 50ª in a stationary standard 49 adjustably secured to the table 3. These pins 50 and cam-slots 50ª may be employed as a means for controlling the inner sides or edges of the folders when the standards 47 47 are moving; but their use is not indispensable for the reason that the said folders are in either direction of movement under the control of the standards—for example, when the standards are moving up to inclose the sides of the shaper 32 with the folders the said folders will be carried up until their inner sides or edges come in contact with the shaper, after

which the continued upward movement of the standards will cause said folders to inclose the shaper. In the downward movement of the standards 47 47 the folders will move down bodily with said standards. It will therefore be seen that the only essential connections with the folders are the pivotal connections 47[a] between said folders and the standards.

52 designates a hammer which unites the crimped ends of the blanks after the operation of the folders in placing said blanks around the shaper is completed. This hammer is mounted on a vertically-movable block 53 and is of a length not shorter than the shaper and of a suitable thickness to unite the crimped ends of the blank, said ends entering the longitudinal groove 32[b] in the upper side of the shaper under the force of the hammer. (See Fig. 18.)

The block 53 has a pivotal connection with the lower portion of a toggle-plate 56, which has a movable fulcrum at 45[c], due to its connection with the lower end of the depending link 51, that is pivotally connected by means of a bracket 52[a] to the upper cross-beam 5. The toggle-plate 56 receives the necessary movement to raise and lower the hammer 52 by means of an adjustable connection 43[c], which has a pivotal connection at 43[a] with a slotted pitman 43[b], said pitman receiving motion from the cam-disk 6[a]. The lower end of the pitman 43[b] carries a roll 43[d], that rides in the cam-recess 6[b] on the disk 6[a]. (See Figs. 1 and 15.) The slotted standards 49, hereinbefore referred to, are illustrated in Fig. 4 and are slight modifications of the means for directing the movements of the folders 46 46. (Shown in Figs. 1 and 3.) These latter means consist of stationary standards 49[a], which are secured to the table 3 and have their ends 49[b] projected inwardly in the path of the pivots 50 of said folders. As the folders are actuated by raising and lowering the standards 47 47 these projecting ends 49[b] act as pivot-bearings for the pins 50. The pins ride around the ends of said standards. The folders are balanced while being moved up and down by springs 50[b], which are secured to the standards 47. (See Fig. 19.)

Having described my invention in detail, I will give a brief description of its operation.

Referring to Figs. 9 and 11, in the initial operation of the machine a blank 12[a] is placed upon the supports 24[c] 24[c] when the carriage is in the outward position, in which position the pins 18 18 on said carriage engage the front edge of said blank. The carriage is moved forwardly by the mechanism shown in Fig. 14, acting upon the lever 14[b], which throws said carriage forward to a position which delivers the blank to the crimping-dies 26 26 27 27, Fig. 6. The carriage then recedes and the crimpers simultaneously operate upon the ends of said blank through their actuating mechanism. (Shown in Fig. 14.) Meanwhile the carriage has moved to its outward limit, as in Figs. 9 and 10, and receives another blank. The carriage next travels forward, removing the crimped blank from the crimping-dies by means of the dogs 19 19 to a position below the shaper 32 ready to be formed and delivers the other blank to said crimpers. The carriage again recedes, and during these operations the folders 46 46 are actuated to form the can-body by means of the operating mechanism shown in Figs. 3 and 4, also in Fig. 14. Meanwhile another blank is being crimped. The hammer 52 after the completion of the body descends upon the crimped ends and unites them into a seam 12[c], as shown in Fig. 18. When the carriage again moves forward, the dogs 20 20 engage the lower edge of the body by traveling through the grooves 32[a] and strips said body or finished product from the shaper. As the hammer 52 is descending, it makes contact with the crimped ends, and as it approaches close to the shaper the folders 46 46 recede from the sides of said shaper, thus allowing the body to bulge or move away from the sides of the shaper in order that the body may have sufficient looseness to be easily stripped from the shaper.

Having described my invention, I claim—

1. In a can-body machine, the combination of a carriage, crimping-dies to crimp blanks at their opposite ends, a shaper upon which the blanks are formed into bodies, folders between which and the shaper the blanks are delivered by said carriage from the crimping-dies, vertically-movable standards to which said folders are pivotally connected near their centers, guide-standards adapted to control the movement of the folders to and from the shaper while said folders are actuated by their supporting-standards, clenching devices to unite the crimped ends of the blanks after the completion of the folding operation, the said clenching devices engaging the united ends of the blank simultaneously with the movement of the folders away from the shaper, and guides mounted on opposite sides of the carriage upon which the blanks are placed to be moved by said carriage, the said guides having lugs and supports on their inner sides which are adapted to guide and support the blanks as said blanks are moved by the carriage, substantially as set forth.

2. In a can-body machine, the combination of a carriage, crimping-dies adapted to crimp the ends of blanks received from said carriage, a shaper adapted to give form to said blanks as they are delivered from said crimping-dies by said carriage, folders adapted to move the blanks around said shaper, means for elevating said shaper to permit of the movement of a blank therebelow, and to permit of a body being removed therefrom, a clenching-hammer adapted to descend upon the shaper to

clench the crimped ends of the blank to form the body, means on the carriage adapted to strip the bodies from the shaper simultaneously with the movement of said carriage that delivers the blanks of the crimping-dies, substantially as set forth.

3. In a can-body machine, the combination of crimping mechanism adapted to crimp the ends of blanks from which the bodies are formed, a shaper adapted to give form to the bodies, folders to move the blanks to inclose said shaper, standards to which said folders are pivoted and by which said folders are actuated, pins projecting from said folders, and standards having slots therein into which said pins are moved in the actuation of the standards to which the folders are pivoted, the said slots serving to open and close the folders through said pins substantially as set forth.

4. In a can-body machine, the combination of crimping mechanism adapted to crimp the ends of blanks, a shaper adapted to give form to the bodies made from said blanks, folders to move the blanks around said shaper, a carriage to simultaneously move the blanks to the crimping mechanism and from the crimping mechanism to the shaper and folders and from said shaper and folders when completed into bodies, standards to which the folders are pivoted and by which said folders are actuated, pins projecting from said folders, and standards having cam-slots into which said pins are movable, the said slots serving to close and open the folders, substantially as set forth.

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

CHRISTIAN J. WEINMAN.

Witnesses:
R. J. McCarty,
J. D. Clark.