No. 828,024. PATENTED AUG. 7, 1906.

J. ELDRIDGE.

CAN BODY FORMING MACHINE.

APPLICATION FILED JAN. 10, 1905.

6 SHEETS—SHEET 1.

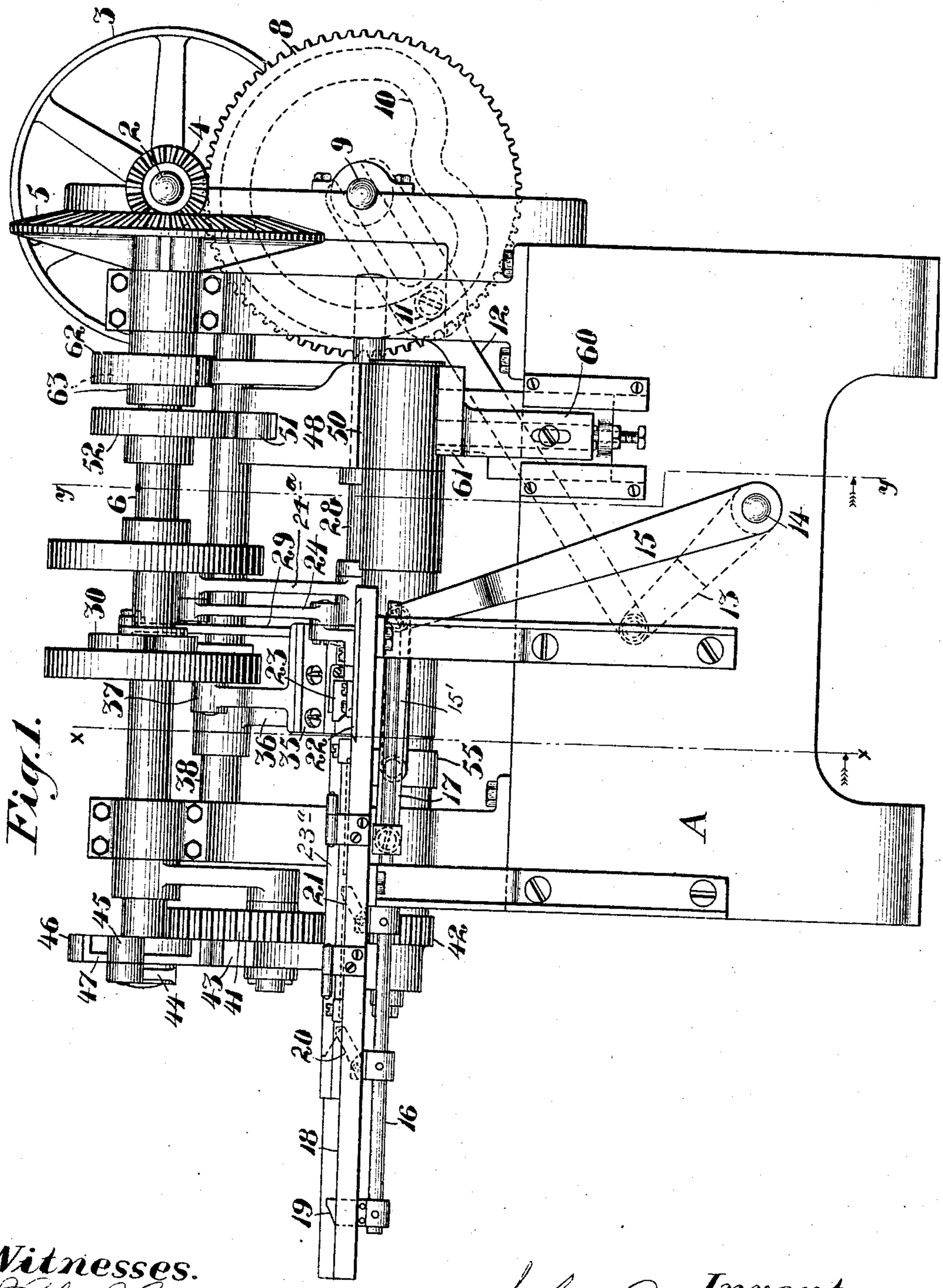

Fig. 1.

Witnesses.
F. C. Fliedner
L. L. Dunn

Inventor;
John Eldridge
By Geo. H. Strong.
Atty

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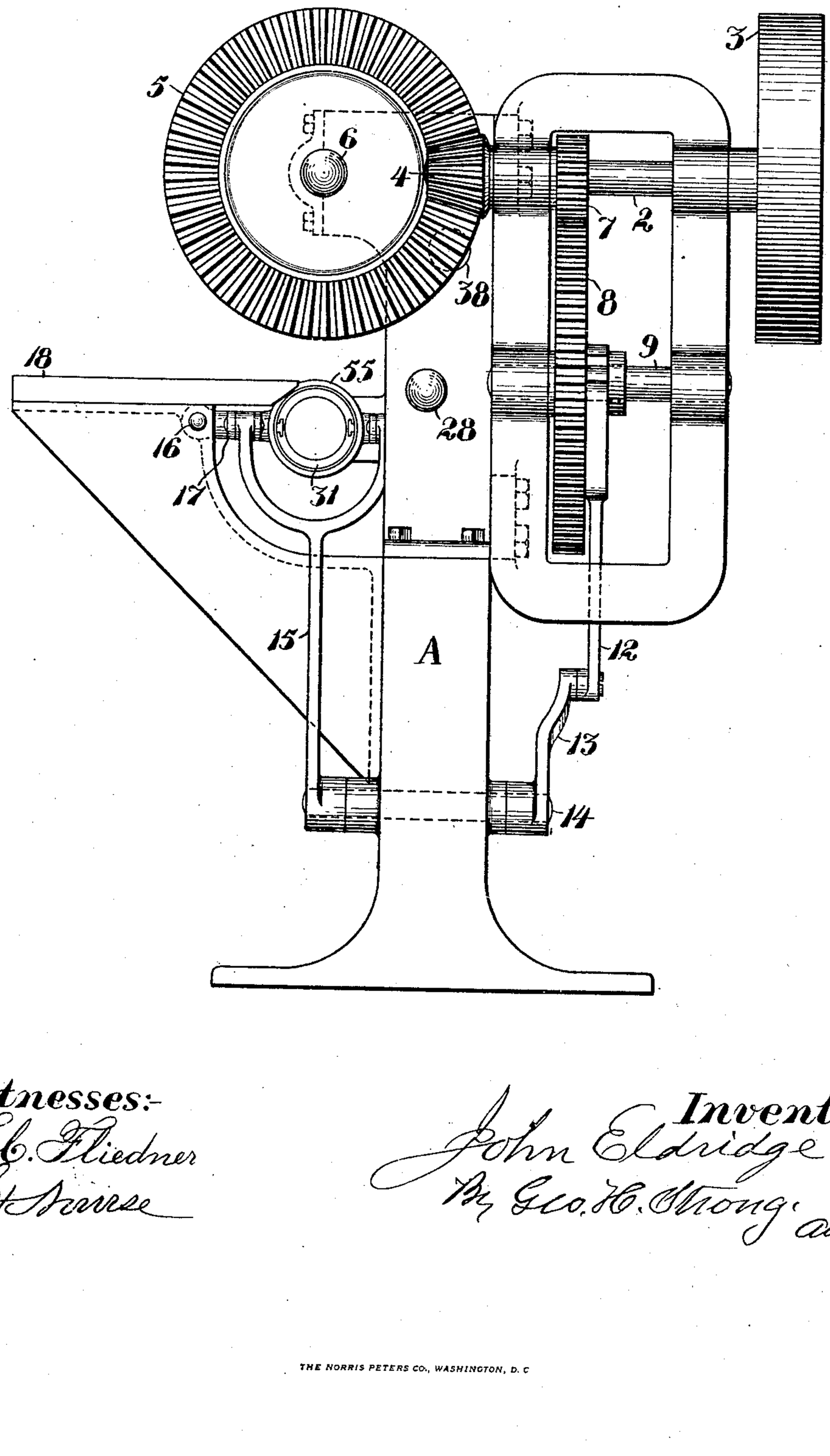
6 SHEETS—SHEET 2.

Fig. 2.



Witnesses:-
F. C. Fliedner
J. B. Morse

Inventor:
John Eldridge
By Geo. H. Strong, Atty

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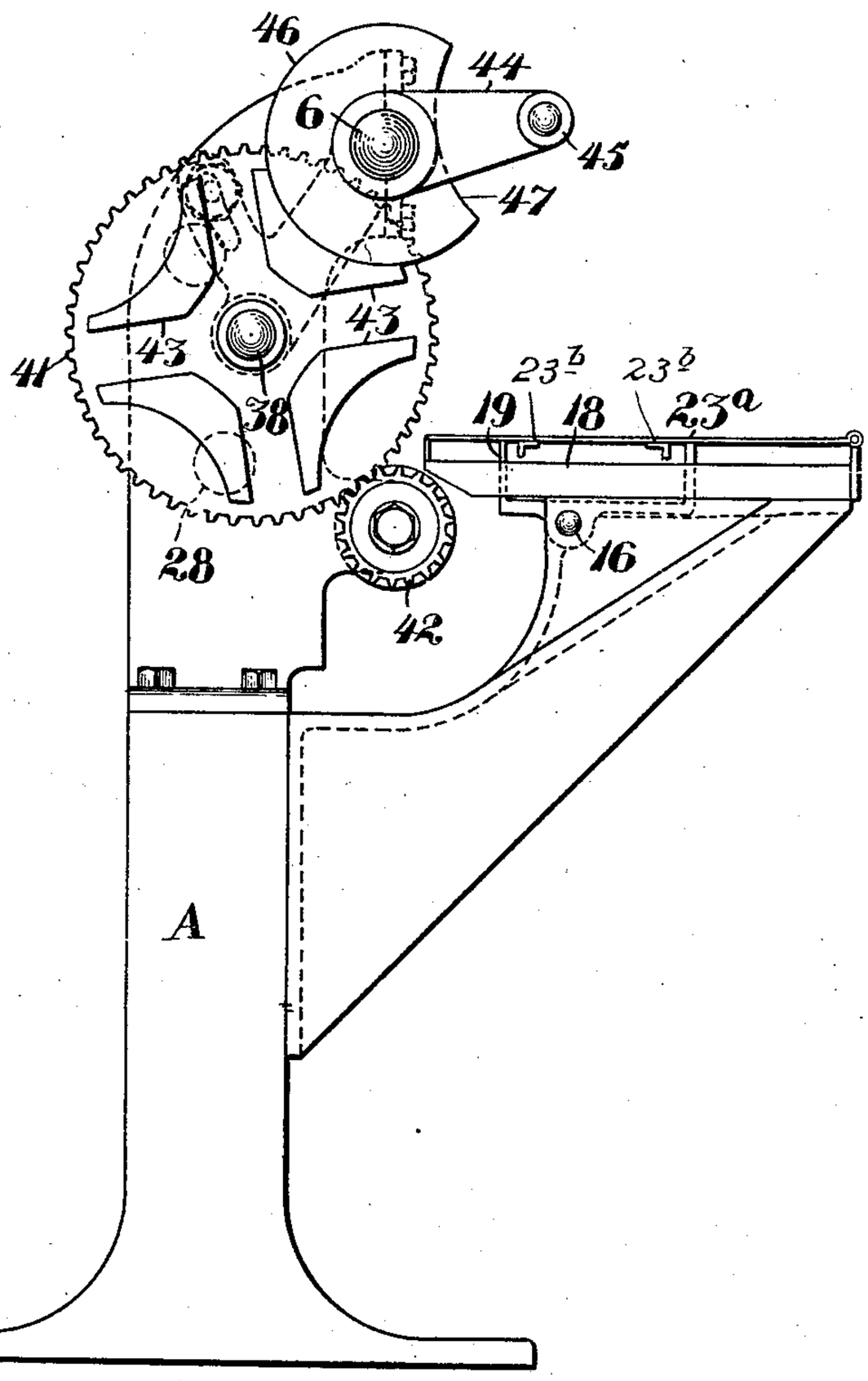
6 SHEETS—SHEET 3.

Fig. 3.



Witnesses:-
F. C. Fliedner
J. Stuart

Inventor;
John Eldridge
By Geo. H. Strong Atty

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J. ELDRIDGE.

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6 SHEETS—SHEET 4.

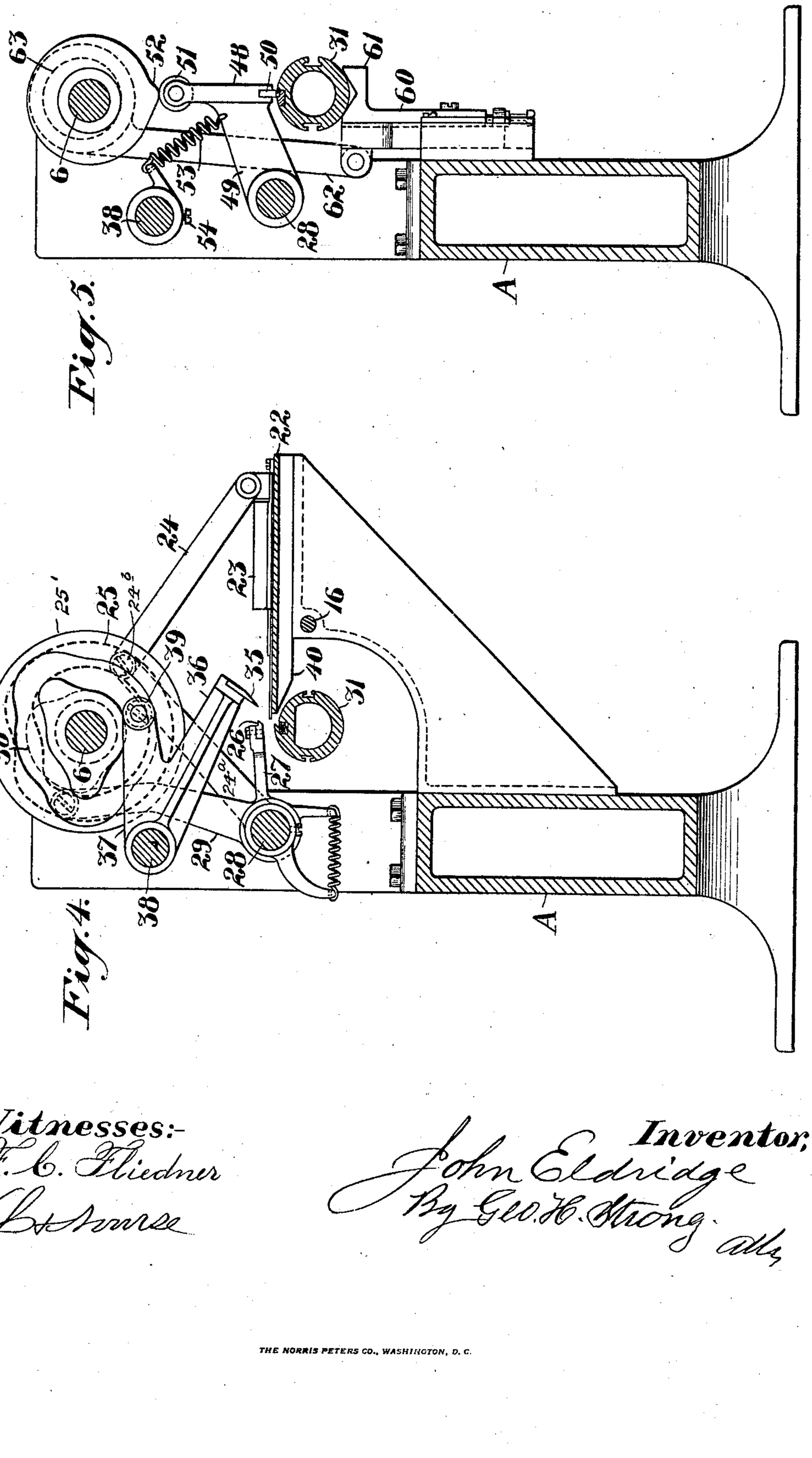

Fig. 5.

Fig. 4.

Witnesses:-
F. C. Fliedner
J. Thorse

Inventor;
John Eldridge
By Geo. H. Strong. Atty

No. 828,024. PATENTED AUG. 7, 1906.

J. ELDRIDGE.

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6 SHEETS—SHEET 5.

Fig. 8.

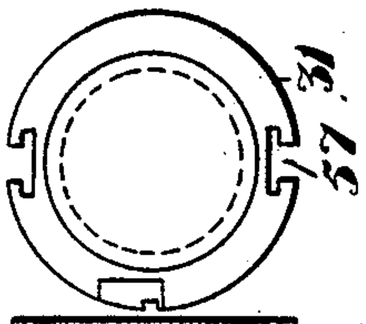


Fig. 6.

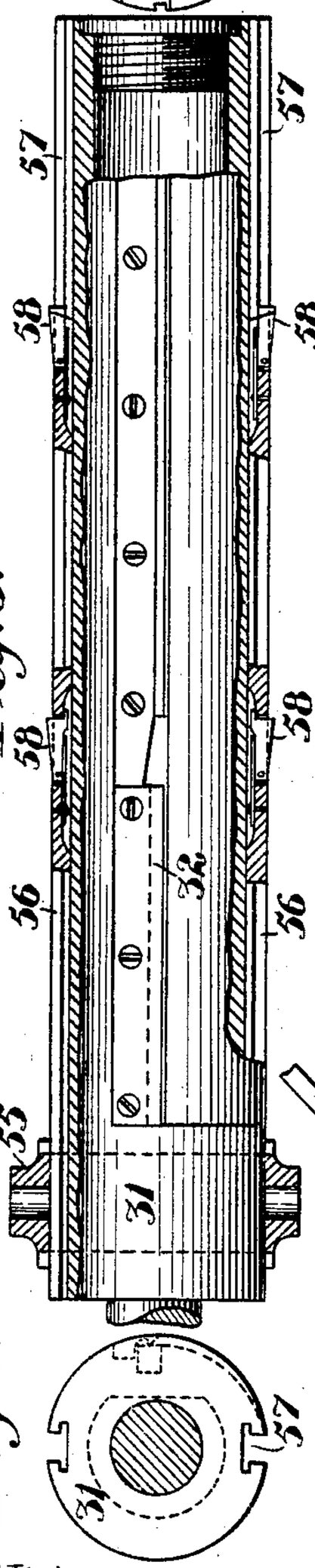


Fig. 7.

Fig. 11.

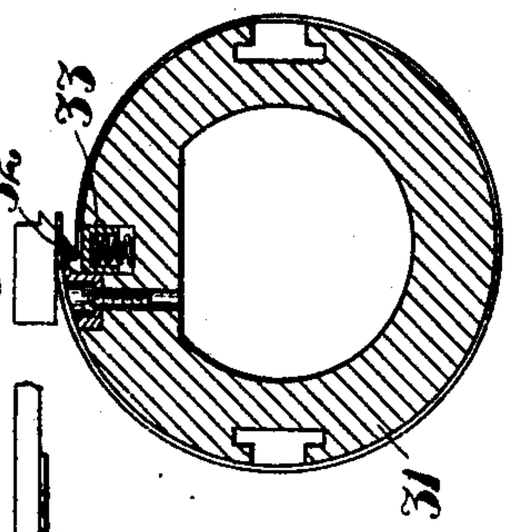


Fig. 14.

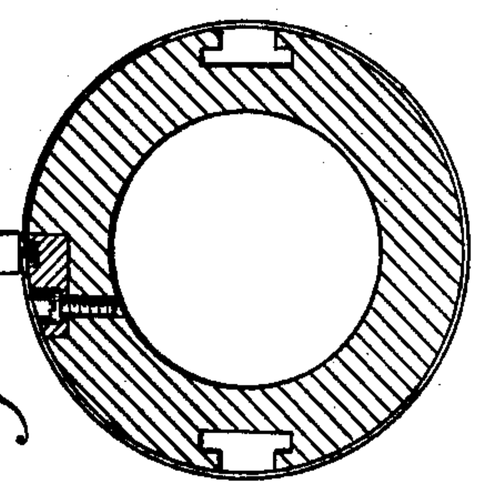


Fig. 10.

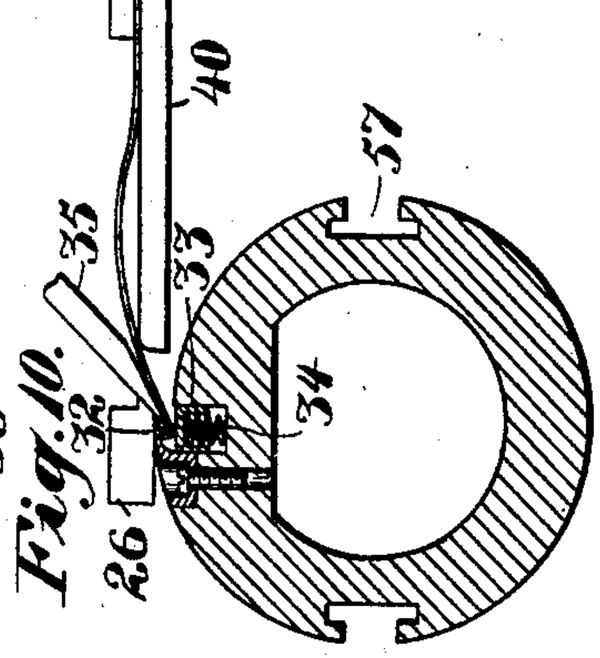


Fig. 15.

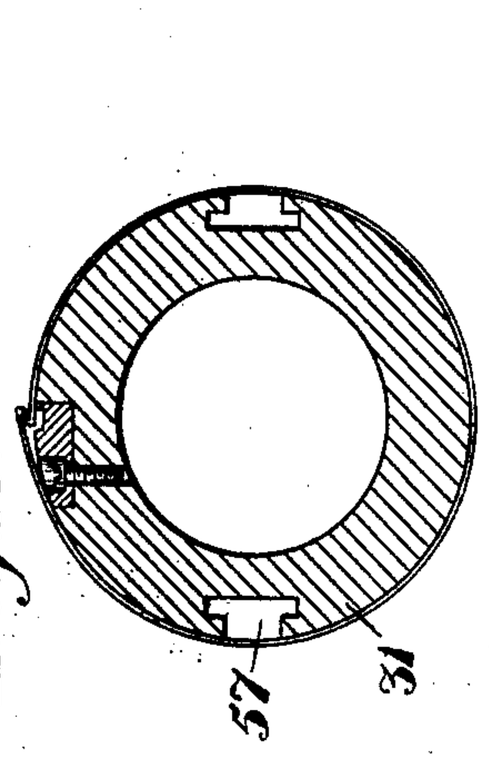


Fig. 9.

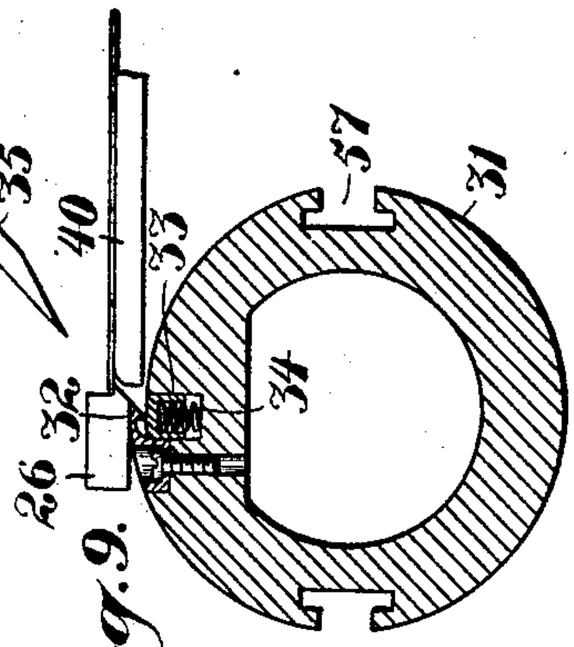
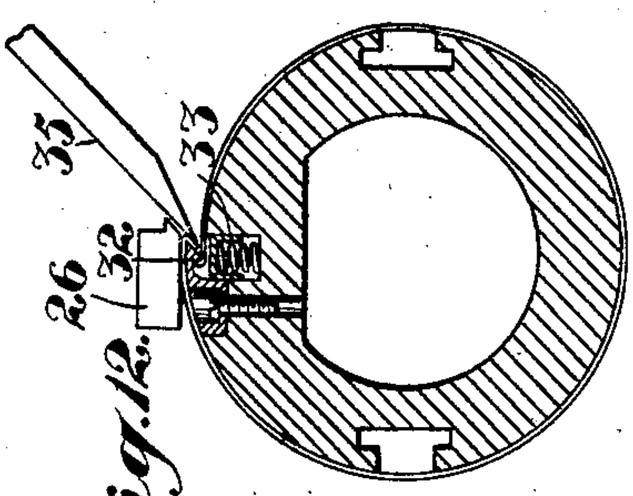


Fig. 12.



Witnesses:-
F. C. Fliedner
[illegible]

Inventor;
John Eldridge
By Geo. H. Strong. Atty

No. 828,024. PATENTED AUG. 7, 1906.

J. ELDRIDGE.

CAN BODY FORMING MACHINE.

APPLICATION FILED JAN. 10, 1905.

6 SHEETS—SHEET 6.

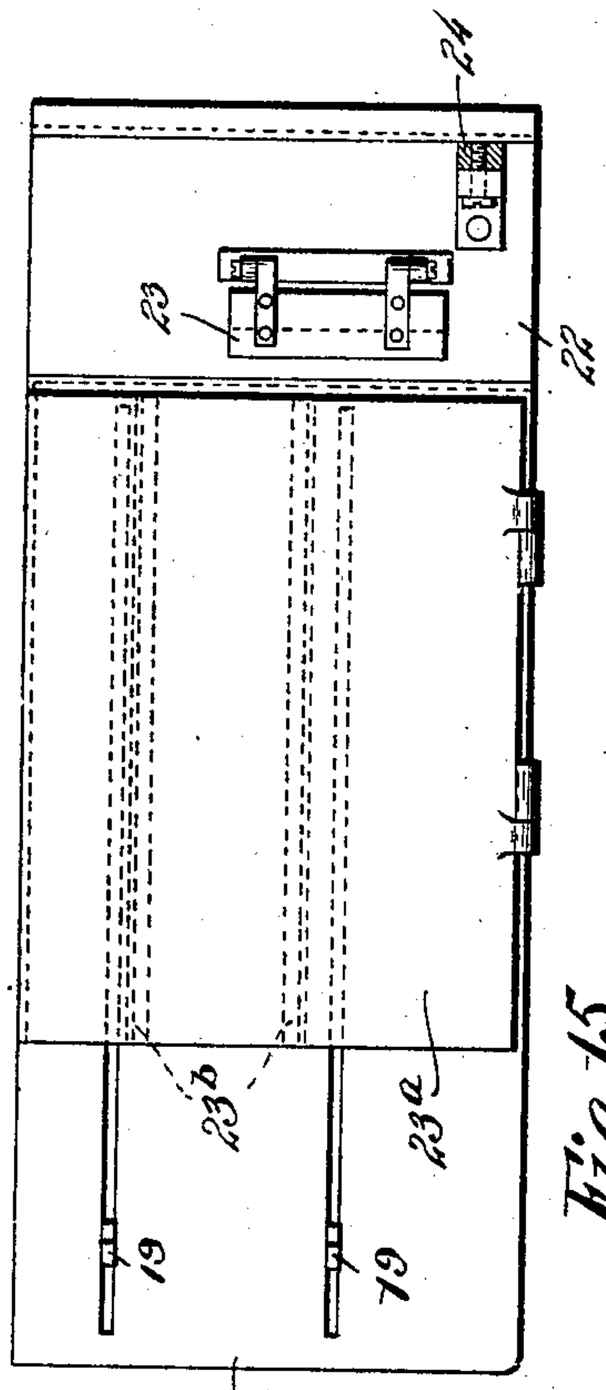


Fig. 15.

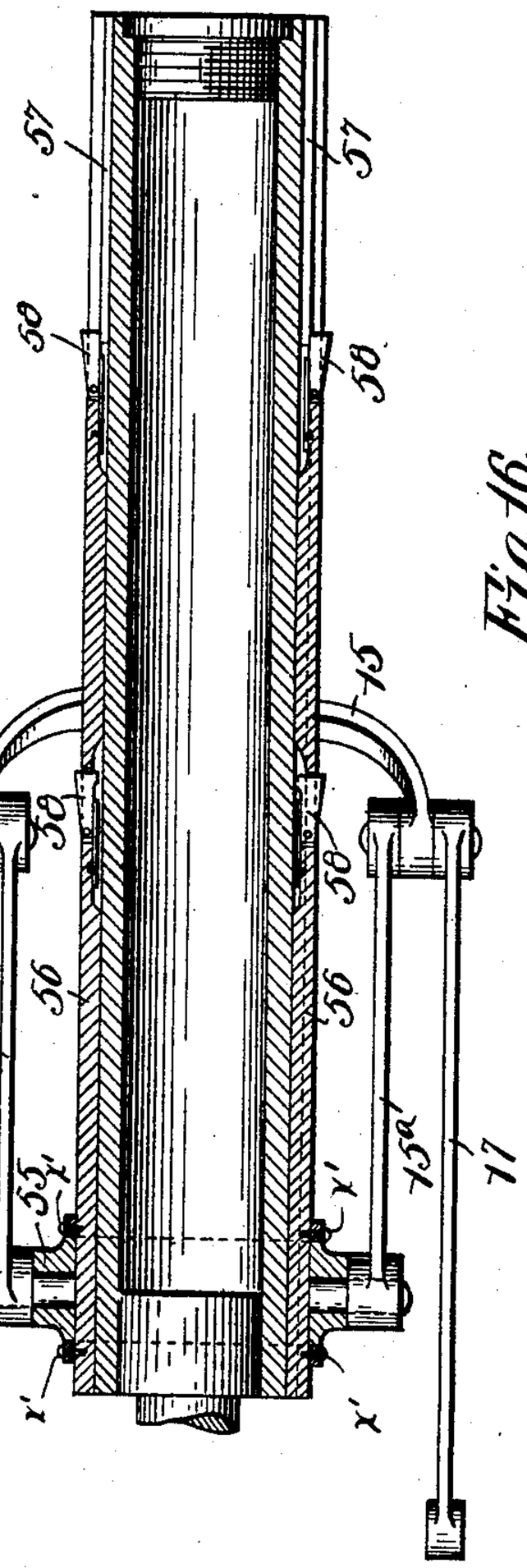


Fig. 16.

Witnesses
L. Armstrong
C. W. Fowler

Inventor
John Eldridge
By Geo. H. Strong
his Attorney

UNITED STATES PATENT OFFICE.

JOHN ELDRIDGE, OF ASTORIA, OREGON.

CAN-BODY-FORMING MACHINE.

No. 828,024. Specification of Letters Patent. Patented Aug. 7, 1906.

Application filed January 10, 1905. Serial No. 240,432.

To all whom it may concern:

Be it known that I, JOHN ELDRIDGE, a citizen of the United States, residing at Astoria, in the county of Clatsop and State of Oregon, have invented new and useful Improvements in Can-Body-Forming Machines, of which the following is a specification.

My invention relates to an apparatus especially designed for the manufacture of can-bodies from sheet metal.

My invention comprises a combination of parts and mechanism whereby the sheets of metal are successively delivered to the apparatus, are formed into cylindrical bodies with a longitudinal interlocking seam, and are thence discharged from the end of the mandrel.

It also comprises details of construction which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 is a front elevation of the machine. Fig. 2 is a view taken from the right end. Fig. 3 is a view of the left end of the machine. Fig. 4 is a section taken through *x x* of Fig. 1. Fig. 5 is a view through *y y* of Fig. 1. Fig. 6 is an enlarged sectional view of the rotatable mandrel or former. Figs. 7 and 8 are respectively views of the left and right end. Figs. 9, 10, 11, 12, 13, 14 are transverse sections showing the successive steps in the formation of the body. Fig. 15 is a plan view of the table. Fig. 16 is a sectional detail of the mandrel and its associated parts.

As shown in the drawings, A is a frame having a suitable base by which it is supported, this frame being so constructed as to carry the mechanism to be hereinafter described. Journaled transversely of this frame is a shaft 2, to which power is applied through the medium of a pulley 3 or an equivalent transmitting device. Upon the opposite end of this shaft is a beveled pinion 4, and this pinion engages with a beveled gear-wheel 5, mounted upon a shaft 6, which is journaled longitudinally upon the upper part of the frame and serves to give motion to certain cams and mechanism by which the operation of forming the can-body is completed.

7 is a spur-pinion mounted upon the shaft 2. This engages with a spur-gear 8, mounted upon a transverse shaft 9, journaled in a frame below the shaft 2. In the face of this spur-gear 8 is formed a cam-groove, (shown in dotted lines at 10, Fig. 1,) and this cam-groove engages a pin 11, which is fixed to a pitman 12. The end of the pitman is slotted, so that it slides and is guided upon the shaft 9. The other end of the pitman connects with a rocker-arm 13, mounted upon a shaft 14, journaled transversely of the lower part of the frame, and upon the opposite end of this shaft is a lever 15, having a forked upper end which is connected with a reciprocating carrier-bar 16 by a link, as at 17.

The sheets of metal from which the can-body is to be formed are placed upon a table 18, and the bar 16 carries an upwardly-projecting arm or spur 19, which is adapted to engage the sheet of metal and advance it along the table in the line of movement of the bar 16.

The construction of the cam 10 and the rocker-arms 13 and 15 is such that a comparatively short reciprocating movement of the parts is produced. Thus the movement of the spur 19 is sufficient to advance the sheet of metal so far that when the carrier is again returned the hinged spring-pressed arm 20, which is movable beneath the sheet, will be carried just behind the edge of the sheet, and its spring will raise it so that the next advance of the bar 16 will cause the arm 20 to engage the sheet and again move it forward, this arm 20 being connected with and movable by the bar 16. The next backward movement in like manner causes the spring-pressed arm 21 to be retracted just behind the edge of the sheet, this in like manner being moved by the bar 16, and the sheet is finally advanced upon the table 22 beneath a weight 23, which prevents the blank from being lifted or disarranged while its leading edge is being presented to the folding mechanism. This hinged block or plate is shown in Fig. 4. The sheet is now in position to be advanced transversely to its former movement and so that its front edge will be delivered to the folding mechanism.

At the left-hand portion of the machine, as shown in Figs. 1 and 3, is arranged a hinged block or plate 23^a, provided with angle-irons 23^b, which are designed for the purpose of resting upon the sheet of tin and holding it down upon the table 18, while the reciprocating lug 19 advances the sheet and carries it beneath the plate or weight 23, which latter continues to hold the sheet down while it is being moved at right angles with its former movement and presented to the mandrel and seam-forming devices. This

advance is effected by means of a pitman or arm 24, which is supported by an arm 24ª, pivotally mounted on the shaft 28, and connected with arm 24 by a pin 24ᵇ, traveling in a groove 25 in the cam-disk 25′, fixed upon the shaft 6, as shown in Fig. 4. As the supporting-arm 24ª can only oscillate upon the shaft 28, it will be manifest that the cam 25, acting upon the pin at the junction of the arms 24 24ª, will cause a knee-lever movement which will advance the metal sheet with its edge against the gage-plate 26 and in readiness for the next step of the operation.

26 is a gage against which the advance edge of the sheet is caused to abut, and in this position it is in readiness to receive a sheet for the first folding operation. This gage is carried upon the arm 27, projecting from a sleeve upon the shaft or support 28 and from which sleeve an arm 29 extends up and has a roller or pin operating on a cam 30. This cam is mounted upon the shaft 6 and revoluble therewith.

It will be seen that the revolutions of the shaft will cause the various cams and cam-grooves to be revolved, as is usual in such structures, and these are so disposed that the gage 26 will be depressed, so that the front edge of the sheet advanced by the cam 25 will contact with the gage at the proper time.

Beneath the gage 26 is a horn or mandrel 31. This horn is substantially cylindrical for the greater portion of its periphery; but it has a portion formed on a curvature which carries it inside of that portion of the periphery to which it is contiguous, and this provides for the formation of an inturned hook, as shown at 32, this hook being of a length substantially equal to that of the sheet from which the can-body is to be formed. Beneath this hook is a chamber within which is a bar 33, which is normally held up by a spring 34, so as to be flush with the cut-away portion of the mandrel and substantially in contact with the hook 32.

The hook-forming device consists of a blade 35, which is carried upon the end of a lever-arm 36. In conjunction with this arm is another arm 37, forming a fork from the first-named arm, and the junction of the two arms is pivoted or fulcrumed upon the shaft, as at 38. The arm 37 carries at its outer end a pin or roller 39, and this pin or roller travels in a cam-groove within a disk, which disk is carried by the shaft 6. The cam-groove is of such a character that the arm 36, with the hook-forming blade 35, will be reciprocated to and from the former. The angle of movement of the blade 35 is such that when the sheet of metal has been advanced so as to rest upon the ledge of the gage 26, as shown in Fig. 9, this forming-blade will be advanced between the gage 32 and the support 40, upon which the sheet of metal rests, and will thus press the edge of the sheet downwardly beneath the correspondingly-inclined edge of the gage 26 and will thus bend the sheet, forming a hook along its edge corresponding with the projecting lip of the gage 26. This hook is pressed into the space beneath the hook 32 and the horn or former, and while being thus introduced the bar or plate 33 will compress the spring 34, being itself depressed into the channel, in which it lies so as to allow the edge of the sheet to pass beneath the hook 32, as plainly shown in Fig. 10. The horn remains stationary during this portion of the operation, and after the turned edge of the sheet of metal has been engaged with the hook 32 the spring 34, pressing against the bar or plate 33, maintains the edge of the sheet in engagement with the hook 32.

The mechanism by which the mandrel or former is rotated, with the intermittent stops, is shown in Fig. 3. It consists of a spur-wheel 41, engaging a pinion 42 upon the end of the mandrel or former and having radially-disposed channels 43. An arm 44, carried by the main shaft 6, has a roller-stud 45 fixed to its outer end, and this stud coöperates with the grooves 43 when by revolution it enters these grooves, so as to turn the wheel one-quarter of a revolution at every complete operation of the principal shaft. The disk 46, also carried by the shaft 6, has its periphery curved to fit corresponding concaved curves in the arms, between which the slits 43 are made, so that these arms and connected parts remain stationary during the greater part of the revolution of the disk 46. When the pin or spur 45 enters a groove or channel 43, the cut-away portion 47 of the disk 46 coincides with the periphery of the turnable channel portion, and thus leaves this part to be rotated by the action of the pin 45, as before described.

When the first-folded edge of the metal sheet has been engaged with the hook 32, as shown in Fig. 10, the movement of the revolving apparatus just previously described will occur and a rotation of the mandrel will take place, the proportion of the spur-wheel 41 and the pinion 42 being such as to effect such rotation. This rotation wraps the metal sheet around the mandrel, and its free edge is just projected over the raised hook portion 32, as shown in Fig. 11. The projecting edge is just sufficient to provide material for a second fold in the edge of the sheet, and this is effected by the return movement of the folding-blade 35, as plainly shown in Fig. 12. The two edges of the sheet of metal being thus reversely turned are in condition to be interlocked, and this is effected by the next movement of the longitudinally-reciprocating devices, which act to slide the sheet along the mandrel.

The slot or channel in the mandrel containing the bar or plate 33 and the spring 34 is continued, but becomes more shallow, so

that this sliding movement of the partially-formed can-body carries it beyond these parts and in line with a reciprocating plunger 48. This plunger is carried upon the end of an oscillating arm 49, mounted upon the shaft or support 28 and having a suitable pressing-die in the lower end, as shown at 50.

The upper end of the arm 48 may carry an antifrictional roller 51, and this is adapted to be engaged by a cam 52, carried by the main shaft 6 and revolved therewith, so that at the proper interval the cam acts to force the plunger down against the interlocked edges of the can-body blank. The parts are shown in Fig. 13 in position for this movement.

The shallow channel in the mandrel being sufficient for the formation of the interlocked seam, as is plainly shown in Fig. 14, in which the plunger is represented as having been depressed and the seam formed within the channel.

In order to support the mandrel and form a rigid bearing against the pressure of the seam-closing plunger, I have shown a vertically-movable slide 60, having a projection 61 so formed that the mandrel may rest upon it when the slide 60 is raised. This slide has a rod or pitman 62 connecting it with a cam or eccentric 63, carried by the main shaft 6, as shown at 63, and the eccentric is so fixed upon the shaft that just at the instant when the cam 52 is acting to force the plunger 48 down upon the seam the slide 60 will be raised and the support 61 brought into contact with the lower part of the mandrel, thus forming a solid support for the seam-closing operation. The next longitudinal reciprocating movement of the forked lever 15 with its connecting-links 15^a moves the ring 55 upon the mandrel. The bars 56 being slidable upon the mandrel and connected with the ring 55 by the projection or studs x', it will be seen that when the bars move forward the spring-fingers 58 will engage the cans which are on the mandrel and advance them step by step until they are pushed off the mandrel. The plunger is raised after pressing the seam by the spring 53. Then the finished can-body is pushed off the mandrel, as previously described.

The tension of the spring may be regulated by turning this sleeve upon the shaft and fixing it by a set-screw, as at 54.

55 is a ring slidably mounted upon the mandrel and movable thereon, the length of the stroke being sufficient to move the sheets clear of the folding-blade to a position in advance of the intermediate spring-fingers 58. The next forward movement of the ring and bars will move the can-body under the compressor-tool and subsequently the spring-fingers 58 at the end of the bars move the finished can-body from the mandrel.

The mandrel is provided with narrow bars 56, slidable in grooves or channels, as at 57, formed in the sides of the mandrel, as shown in Figs. 7, 9, 10, 11, 12, 13, and 14. The middle and ends of the bars have hinged spring-pressed fingers 58, and the outer ends of these fingers are pressed outwardly by the springs sufficiently so that when they have been drawn behind the edges of a completed body they will rise sufficiently to engage with the rear edge of this body, and the next forward movement will cause them to impel it along the mandrel. The springs are sufficiently yielding, so that when again drawn back these fingers will compress into the bar, and thus be drawn back within the tubular can-body.

The forked lever 15, with its connections for feeding the metal blanks forward and under operation on the mandrel, has a short reciprocating movement which prevents any serious wear, and thereby protects the mechanism against lost motion which a long stroke would be liable to develop.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a can-body-forming machine, an intermittently-rotatable mandrel having a longitudinal groove upon one side, and a hook overhanging said channel, means for advancing metal sheets with the edge substantially in line above the channel, an oscillating gage-plate, means for depressing it to arrest the edge of the sheet said means consisting of a revoluble cam, a lever, upon the fulcrumed end of which the gage-plate is carried, and the other end of which engages the cam, and a reciprocating blade by which said edge is folded and depressed into the channel.

2. In a can-body-forming machine, an intermittently-rotatable mandrel having a longitudinal channel upon one side and a hook-shaped edge overhanging said channel, a gage-plate having its forward edge substantially in line with the edge of the hook, means for advancing metal sheets to contact with the gage-plate above its inclined edge, a reciprocating blade movable substantially in the line of the incline and adapted to press the sheet into the channel and simultaneously turn its edge, and a spring-pressed bar or plate located in the channel, said plate acting to hold the turned edge of the sheet in engagement with the mandrel-hook.

3. In a can-body-forming machine, an intermittently-rotatable mandrel having a longitudinal groove formed in one side and a hook-shaped edge overhanging said channel, a gage-plate having a shoulder at the front and an inclined face below the shoulder corresponding with the incline of the front edge of the mandrel-hook, a table or support, means for advancing metallic sheets over said table with the front edges in contact with the gage-plate above the shoulder, a folding-blade, means by which it is reciprocated sub-

stantially in line with the inclined edge of the gage-plate and the mandrel-hook and between said plate and the table or support, a bar or plate located in the channel of the mandrel and a spring by which said plate is forced outwardly to maintain the turned edge of the sheet in engagement with the mandrel-hook.

4. In a can-body-forming machine, an intermittently-rotatable mandrel having a longitudinal channel in one side and a hook overhanging said channel, a table upon which sheets of metal are received, means for advancing said sheets intermittently with the front edges parallel with and above the channel of the mandrel, a gage-plate, a fulcrumed arm by which said plate is carried and a cam by which said gage-plate is alternately depressed to arrest the edge of the metal sheet and raise it after said edge has been turned or folded.

5. In a can-body-forming machine, an intermittently-rotating mandrel having a longitudinal channel formed in one side, and a hook overhanging said channel, a table substantially tangent to the upper side of the mandrel, a guided slidable carrier movable upon said table, a revoluble shaft, a cam carried by said shaft, connections between said cam and the carrier, means for placing metal sheets in front of the carrier, a gage-plate located above the channel in the mandrel and having a shoulder against which the front edges of the plate are arrested and a blade and means whereby said blade is reciprocated to turn the edge of the sheet and engage it with the mandrel-hook.

6. In a can-body-forming machine, an intermittently-rotatable mandrel having a longitudinal groove or channel, and a hook overhanging said channel, a table, a carrier whereby sheets of metal are advanced with relation to the mandrel, a gage and folding mechanism by which the edges of the sheets are turned and engaged with the mandrel-hook, and means for supplying metal sheets in front of the reciprocating carrier.

7. In a can-body-forming machine, a revoluble body-forming mandrel, a table and a carrier movable transversely to present edges of the sheets to the mandrel and hook-forming mechanism, a longitudinally-slidable carrier, spring-pressed bars connected therewith, a table upon which the metal sheets are placed through which table the bars project so as to engage the rear edges of the sheets and advance them by successive intermittent movements.

8. In a can-body-forming machine, an intermittently-rotatable mandrel having a longitudinal channel and a hook overhanging said channel, mechanism operatable in unison with said mandrel to turn the edges of metal sheets, a table upon which said sheets are deposited, a carrier and mechanism by which the carrier is moved to advance the sheets and present their edges to be folded and engaged with the mandrel-hook and a hinged weighted block connected with the carrier and beneath which the sheet is maintained with its edge parallel with the mandrel and folding mechanism.

9. In a can-body-forming machine, an intermittently-revoluble mandrel having a longitudinal channel upon one side, a table, a carrier by which metal sheets are advanced transversely above the mandrel, a movable gage, mechanism by which it is presented to arrest the forward movement of the sheets, a folding-blade, means by which it is moved to turn the front edge of the metal sheet, a second table in line with the first-named table, said second table having dogs and a reciprocating carrier by which they are movable at right angles with the carrier of the first-named table, springs yielding to allow the dogs to be depressed below sheets of metal, said springs raising the ends of the dogs to engage the rear edges of the sheets upon the return movement of the carrier, and to deliver said sheets successively from the longitudinal to the transverse table.

10. In a can-body-forming machine, an intermittently-rotatable mandrel having a longitudinal channel upon one side and a hook overhanging said channel, means for presenting metal sheets with their edges above said channel, an arresting gage-plate and mechanism by which the edge of the sheet is turned and caused to engage with the mandrel-hook, mechanism by which the mandrel is rotated and the metal sheet turned around the mandrel with its remaining edge projecting over the mandrel-hook, means by which the gage-plate is depressed into contact with the edge of the sheet so that a second reciprocation of the hook-forming blade will fold the projecting edge beneath the mandrel-hook, said means consisting of a fulcrumed, cam-actuated oscillating lever by which the gage-plate is carried.

11. A can-body-forming machine having in combination, an intermittently-revoluble channeled mandrel having a hook overhanging the channel, mechanism by which sheets of metal are presented to the mandrel, and interlocking hooks successively formed upon the front and rear edges, with the sheet coiled around the mandrel, means by which the can-bodies thus formed are advanced longitudinally upon the mandrel, an anvil having a shallow channel in line with the hook-forming channel of the mandrel, an upwardly-movable plunger by which the interlocked edges of the sheet are compressed and the seam completed, a vertically-movable slide having a projection which lies below the mandrel substantially in line with the plunger and forming a support for the mandrel and a rigid bearing against the pressure of the plunger,

and a rod or pitman connecting with the slide, and a main operating-shaft having an eccentric to which the rod or pitman is connected.

12. A can-body-forming machine having in combination, an intermittently-revoluble mandrel having a longitudinal channel and a hook overhanging said channel, a table, means for presenting the edges of sheets above said channel, a reciprocating blade by which the front edge of the sheet is turned and engaged with the mandrel-hook, mechanism by which the mandrel is revolved and the sheet wrapped around it and a second hook formed upon the rear edge and engaged with the mandrel-hook, mechanism by which the body thus formed is advanced along the mandrel, a channeled anvil in the mandrel in line with the hook-forming channel, a plunger above the mandrel adapted to compress the interlocked seams against the anvil, a main shaft having an eccentric or cam, a rod or pitman suspended from the eccentric, a slidable member below the mandrel substantially in line with the plunger, said slide being connected to the rod or pitman and having a projection at its upper end adapted to fit against and support the mandrel against the pressure of the plunger, said eccentric adapted to operate the rod or pitman to cause the slide to move into contact with the bottom of the mandrel simultaneously with the compressing movement of the plunger.

13. In a can-body-forming machine, a rotatable mandrel means for feeding sheets of metal tangentially to said mandrel, a folding device coöperating with the mandrel to bend the edges of the sheet to interlock, and spring-actuated means preventing the disengagement of the interlocked edges.

14. In a can-body-forming machine a rotatable mandrel, means for feeding sheets of metal tangentially to said mandrel, a folding device coöperating with the mandrel to bend the edges of the sheet to interlock, and a spring-pressed bar acting to maintain the engagement of said edges.

15. In a can-body-forming machine, a rotatable mandrel, means for feeding sheets of metal tangentially to said mandrel, a folding device coöperating with said mandrel to bend the front and rear edges of the sheet successively, means including a spring-pressed bar by which the front edge is maintained in engagement with the mandrel while the latter is rotated to form the cylinder and bring the rear edge into position for bending, said holding means also acting to maintain the interlocked edges of the sheet in engagement.

16. In a can-body-forming machine, an intermittently-rotatable mandrel having a longitudinal channel and a hook overhanging said channel, means for feeding sheets of metal to said mandrel, a folding device coöperating with the mandrel to form hook members successively upon the front and rear edges of the sheet, a spring-pressed plate located within the mandrel-channel, yielding to allow each edge to be formed and acting to automatically engage and interlock the completed folds.

17. In a can-body-forming machine, a longitudinally-channeled intermittently-rotatable horn and a hook overhanging said channel, a spring-pressed plate located within the channel and normally pressed outward to substantially contact with the hook, a reciprocating blade coöperating with the hook to fold the edges of the sheet successively and to retract the plate to allow the folds to engage with the hook and with each other.

18. In a can-body-forming machine, an intermittently-rotatable mandrel having a longitudinal channel, a hook overhanging the first portion of said channel, and a spring-pressed plate located within the channel, means for feeding sheet-metal plates tangentially to the mandrel, means coöperating with the mandrel and plate to successively fold and interlock the front and rear edges of the plate, means by which the cylinder thus formed is advanced along the mandrel, an anvil located in a continuation of the channel beyond the interlocking devices, and a plunger coöperating with said anvil to close the seam.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

JOHN ELDRIDGE.

Witnesses:
G. C. FULTON,
F. L. BISHOP.