No. 686,866.

Patented Nov. 19, 1901.

W. H. H. STEVENSON.

CAN MAKING MACHINE.

(Application filed May 7, 1901.)

(No Model.)

6 Sheets—Sheet 1.

Fig. 1.

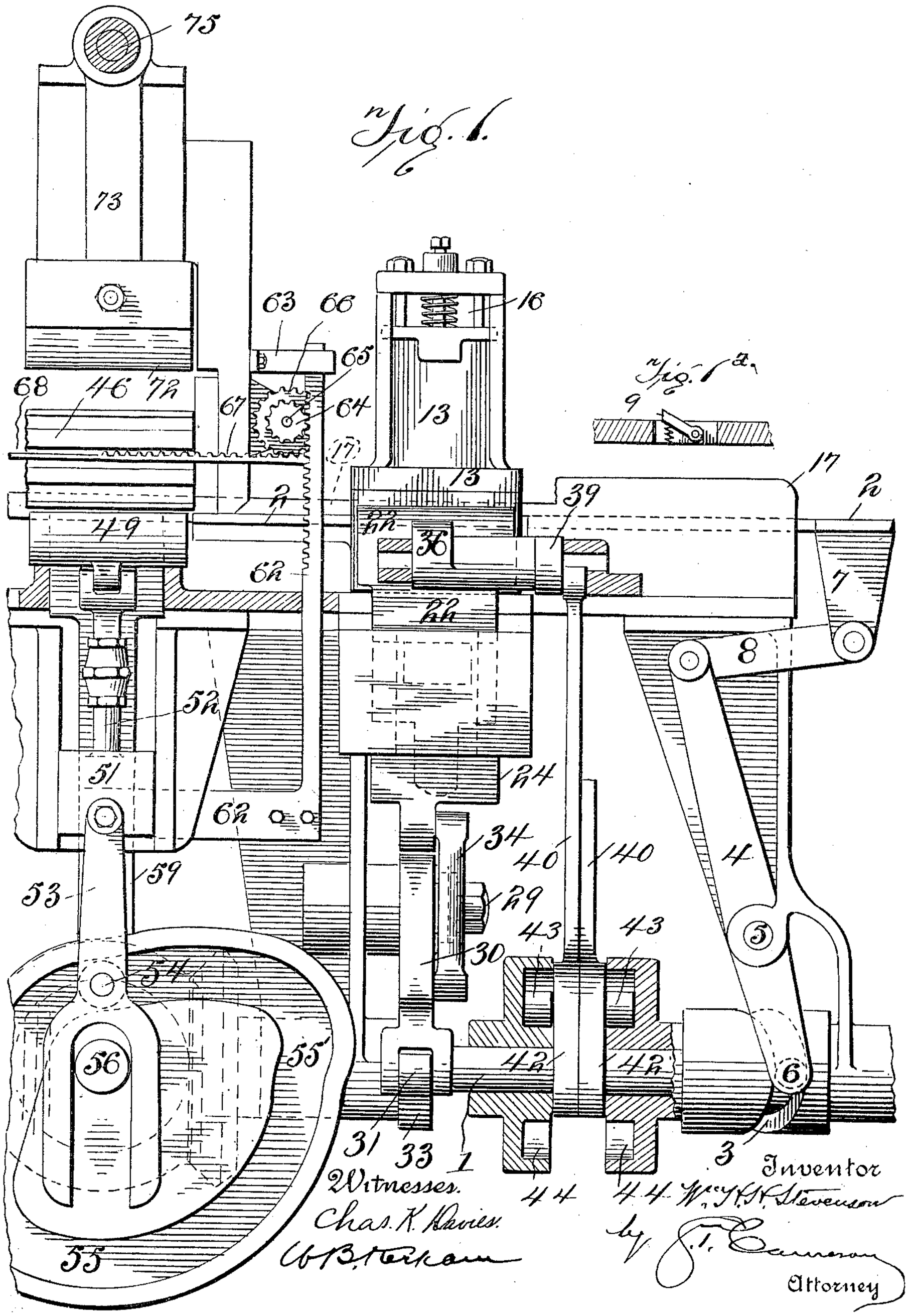

Fig. 1a.

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(No Model.) 6 Sheets—Sheet 2.

Fig. 2a.

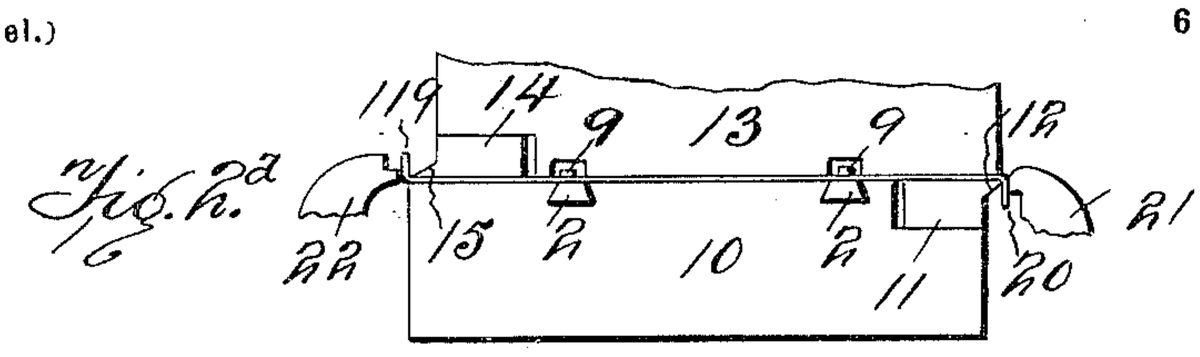
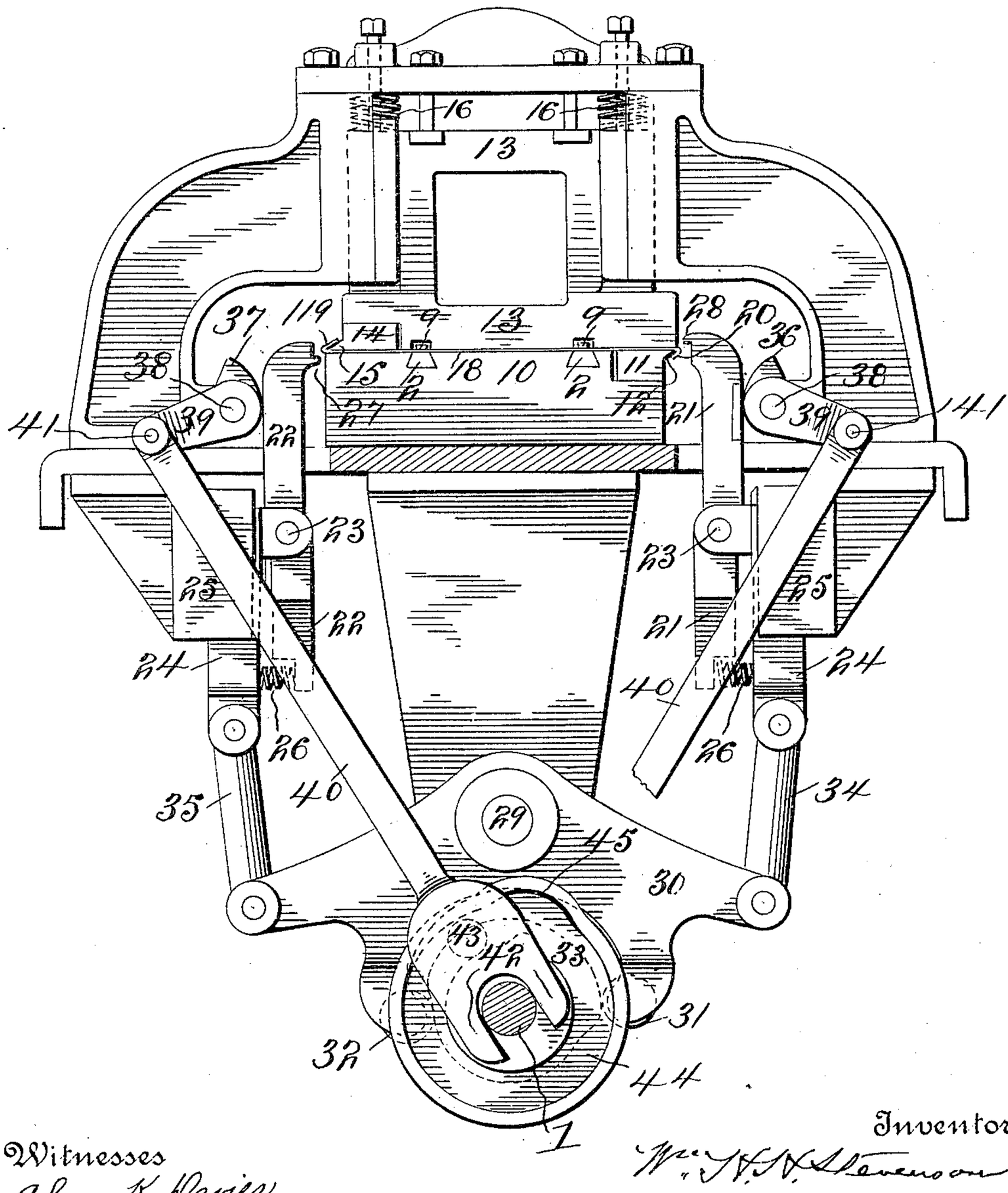


Fig. 2.



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CAN MAKING MACHINE.

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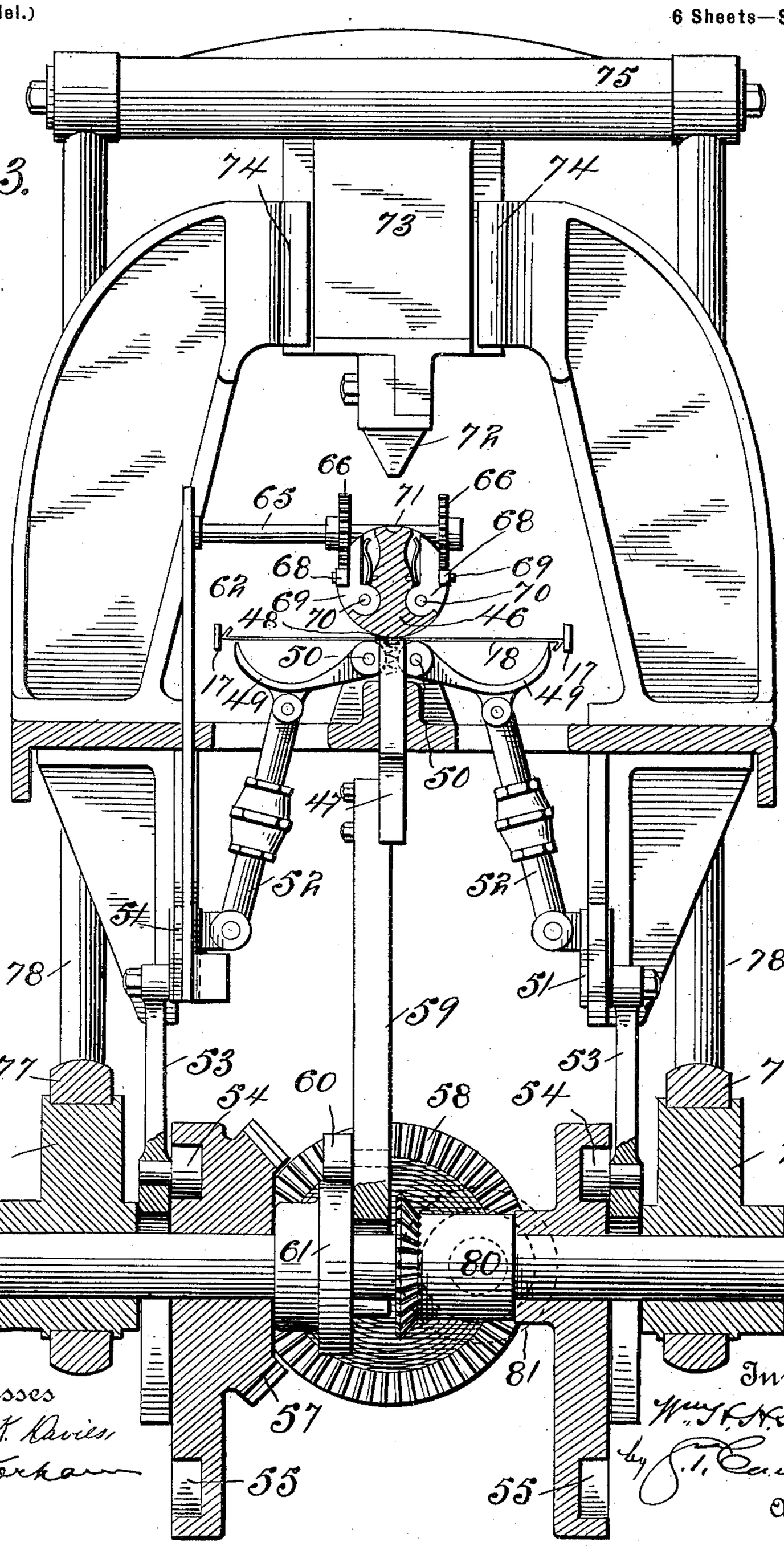
(No Model.) 6 Sheets—Sheet 3.

Fig. 3.



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(Application filed May 7, 1901.)

(No Model.) 6 Sheets—Sheet 4.

Fig. 4.

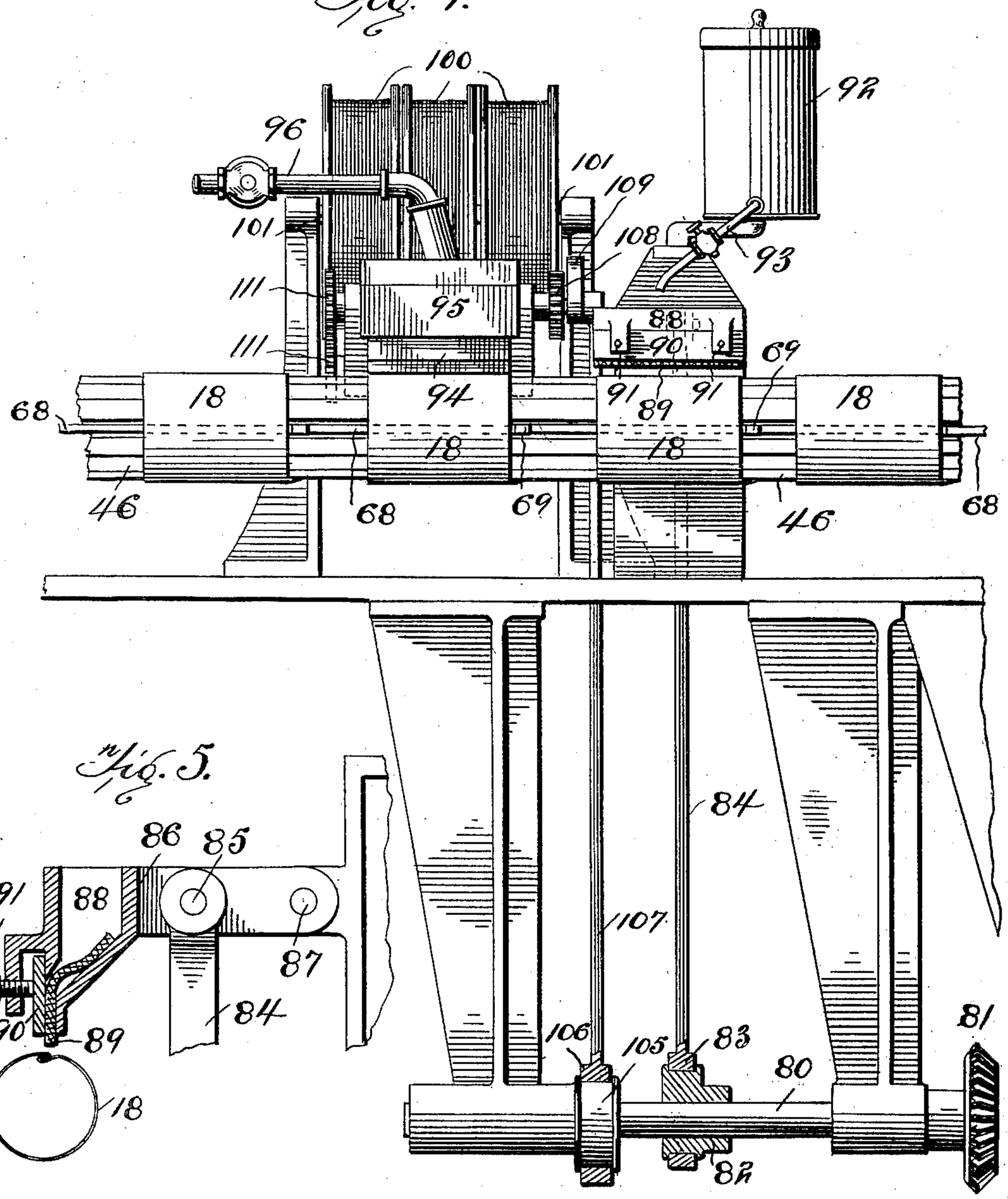

Fig. 5.

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(Application filed May 7, 1901.)

(No Model.) 6 Sheets—Sheet 5.

Fig. 8.

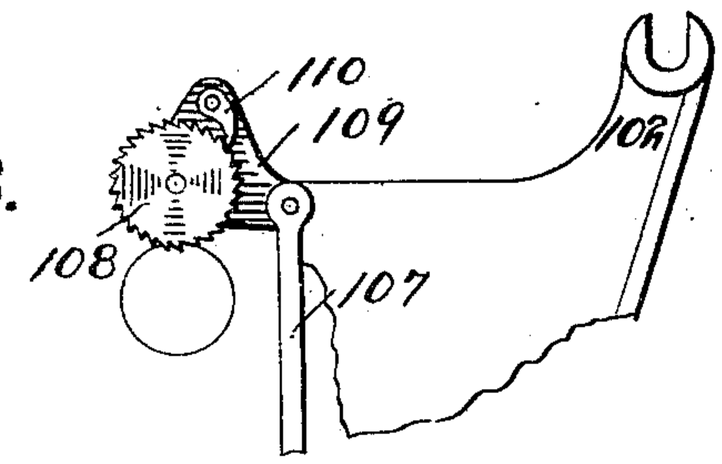


Fig. 6.

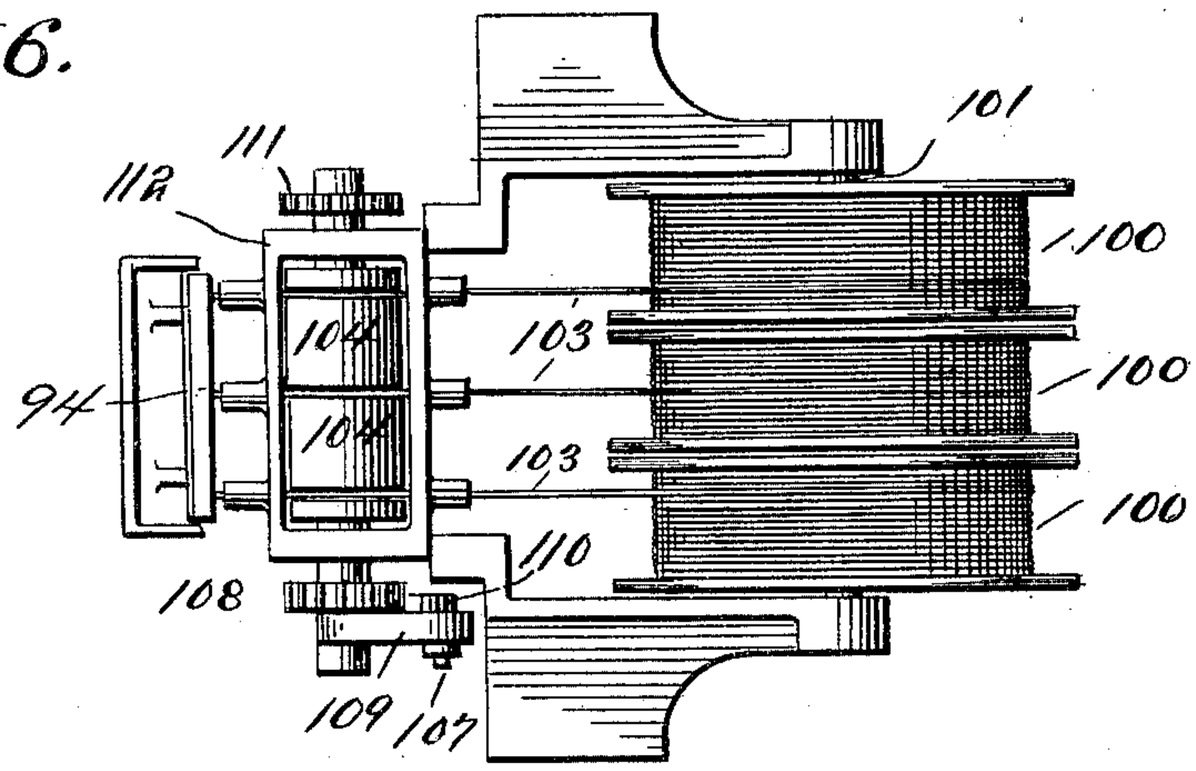


Fig. 7.

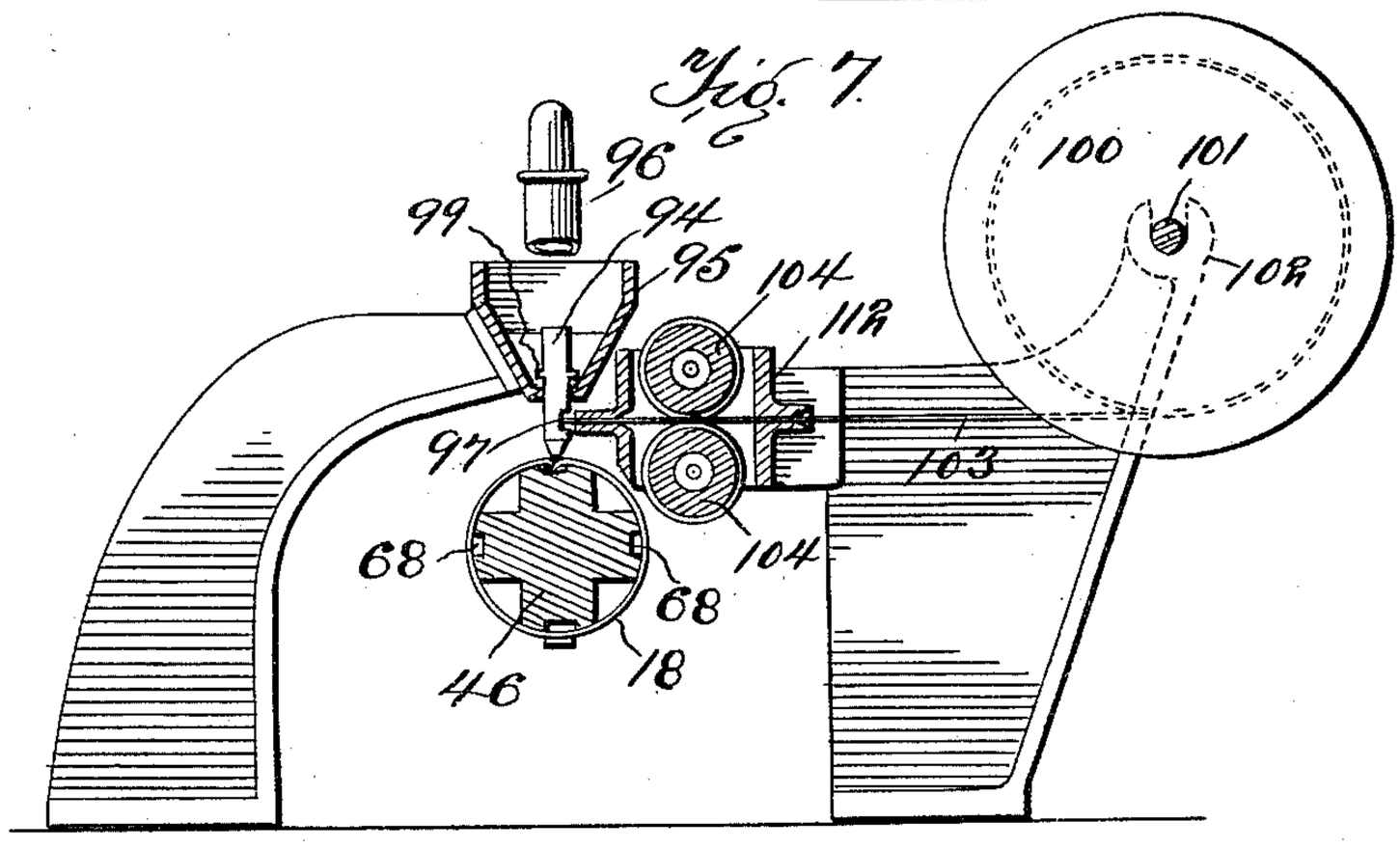
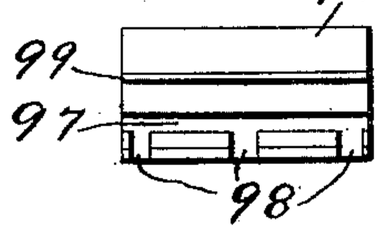


Fig. 7a.



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CAN MAKING MACHINE.

(Application filed May 7, 1901.)

(No Model.) 6 Sheets—Sheet 6.

Fig. 9.

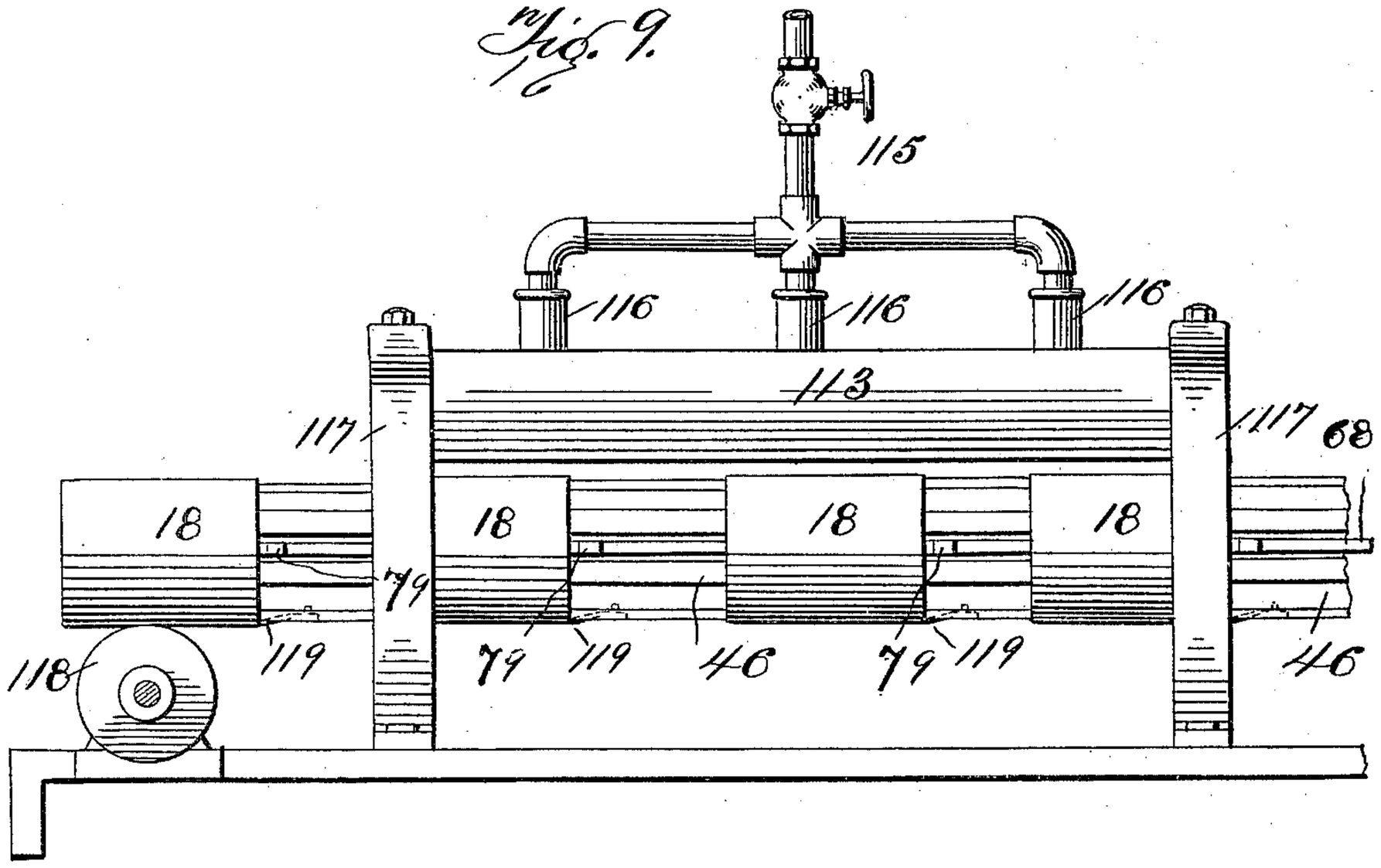
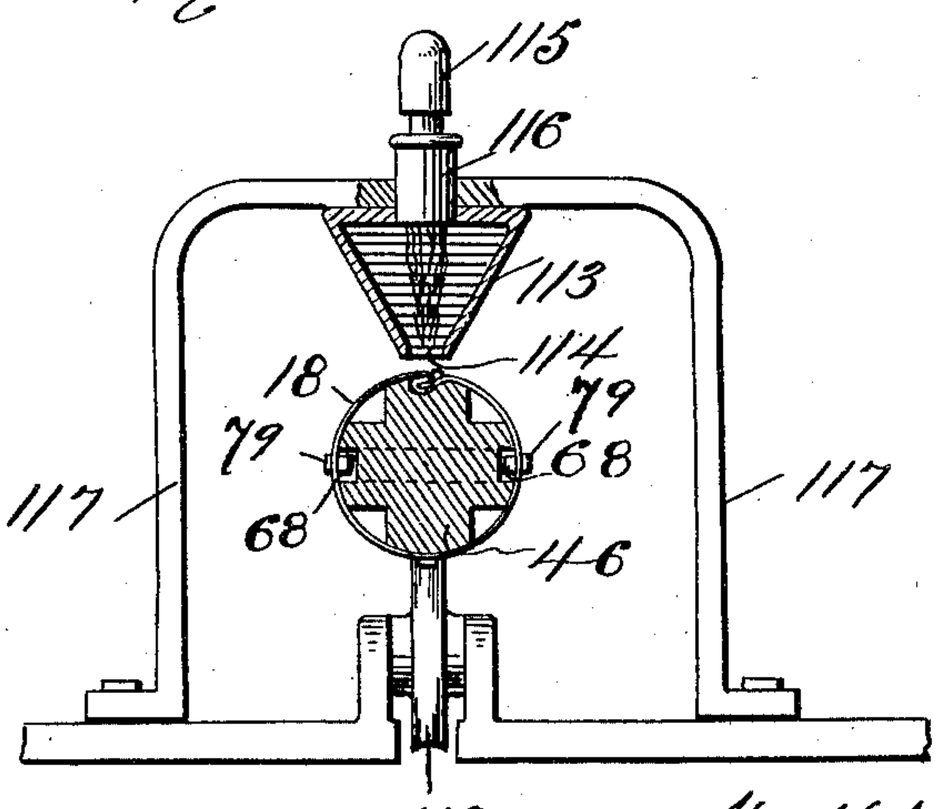


Fig. 10.



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UNITED STATES PATENT OFFICE.

WILLIAM H. H. STEVENSON, OF BALTIMORE, MARYLAND.

CAN-MAKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 686,866, dated November 19, 1901.

Application filed May 7, 1901. Serial No. 59,134. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. H. STEVENSON, a resident of Baltimore, Maryland, have invented a new and useful Improvement in Can-Making Machines, which invention is fully set forth in the following specification.

My invention relates to can-making machines.

The objects of my improvements are, first, to upset the opposite edges of a series of metal can-blanks; second, to bend the blanks into the form of the can-body and interlock the meeting upset edges; third, to apply acid to the interlocked seam; fourth, to apply solder to the same; fifth, to sweat the seam or subject it to the action of heat; sixth, to cool the same, and, finally, to discharge the can-bodies. I attain these objects in a continuous intermittently-operating machine, in which a series of blanks are constantly fed thereto and discharged as completed can-bodies. I may omit one or more steps of this process or vary the order of the same without departing from the spirit of my invention.

With these objects in view my invention consists in the following construction and combination of parts, the details of which will be first fully described and the patentable features then set forth and claimed.

Figure 1 is a side elevation and partial section of the upsetting, bending, and interlocking parts of my machine. Fig. 1ª is a detail side elevation of one of the feed-bars. Fig. 2 is a transverse section and partial elevation of the upsetting mechanism. Fig. 2ª is a fragmentary detail of the upsetting mechanism. Fig. 3 is a transverse section and partial elevation of the mechanism for bending and interlocking the blanks. Fig. 4 is a like view of the devices for applying the acid and solder. Fig. 5 is a detail transverse section of the acid-applying device. Fig. 6 is a top plan view of the means for applying the solder. Fig. 7 is a detail transverse section and elevation of the subject-matter shown in Fig. 6. Fig. 7ª is a side elevation of the soldering-iron. Fig. 8 is a detail transverse elevation relating to the mechanism illustrated in Figs. 6 and 7. Fig. 9 is a side elevation of the mechanism for sweating the can-body, involving the fifth step of the machine; and Fig. 10 is a detail transverse section and elevation of Fig. 9.

The machine is supported upon any suitable framework or bed.

1 is the main rotating shaft for giving motion to the various parts of the machine.

2 represents can-blank feed-supports, being preferably a pair of parallel horizontal bars adapted to support and feed the can-blanks intermittently and automatically forward.

3 is a spirally-grooved cam formed on the shaft 1.

4 is a link pivoted at 5 in the frame and having a pin 6 taking into the cam-groove 3.

7 is a projection uniting the feed-bars 2.

8 is a link pivoted to projection 7 and to the upper end of lever 4.

The rotation of cam 3, it will be seen, imparts a reciprocating motion to the feed-bars 2.

9 represents spring-detents formed upon both bars 2, opposite each other.

10 represents an anvil-block supported by the frame or bed having an adjustable anvil 11, with an angular toe 12 formed upon its outer edge.

13 is a complementary block located above the anvil-block 10 and provided with an adjustable anvil-section 14, having an angular toe 15 projecting from the side opposite the anvil 11. This block 13 is mounted in vertical ways and may be provided with springs 16, which may act to press the block 13 downward lightly with a pressure sufficient to hold the can-blank between the blocks 10 and 13 while its edges are being upset and at the same time yield sufficiently to allow the feed-bars operating upon the can-blank to force the blank between the anvil-blocks.

17 represents guide-pieces upon either side of the feed-bars 2 for guiding the blank between the anvil-blocks 10 and 13.

18 shows a can-blank between blocks 10 and 13 after it has had its edges 19 and 20 upset.

21 and 22 represent the die-levers, which upset the opposite edges of the blank 18. These die-levers are pivoted at 23 in vertical slides 24, which reciprocate in suitable ways 25. The lower ends of the die-levers 21 and 22 are provided with springs 26, interposed between the slides and the levers, which tend

to throw the die-faces 27 and 28 away from the anvil-blocks 10 and 13. These die-faces have a vertical and a horizontal movement.

In the frame near the shaft 1 is pivoted at 29 a lever 30, which carries, preferably, two roller-bearings 31 and 32, which engage cam 33 on its opposite sides. This cam is carried upon shaft 1, and the cam is so shaped that at each half-revolution thereof it rocks the lever 30 alternately in opposite directions.

34 and 35 are links pivoted to the lever 30 and the slides 24, through which the rocking motion of the lever 30 is communicated to the die-levers 21, thereby raising one die-face 28 and lowering the die-face 27, or vice versa.

36 and 37 are cams pivoted to the frame at 38 and provided with lever extensions 39.

40 represents links pivoted, respectively, at 41 to the cam-levers 39 and provided at their lower opposite ends with guides 42, which in this instance are guided by embracing the cam-shaft 1. The links 40 are provided with pins 43, which take into a cam-groove 44, mounted upon shaft 1. The groove 44 is cammed at but one point in its circumference in order to give a positive momentary forward throw to the cams 36 and 37 for the purpose of throwing the lever-dies 21 22 simultaneously inward.

The operation of this part of my invention is as follows and constitutes the first step thereof: The can-blank 18 is placed upon the feed-bars 2. The spring-detents 9 yield to permit the blank 18 to pass over the same, but are thrown upwardly thereafter. In the reciprocation of the bars 2 by the cam 3, lever 4, and link 8 the detents 9 engage the blank 18 and force it over and onto the anvil-block 10, the clamp-block 13 yielding sufficiently to permit this movement. The opposite edges of the blank 18 project at some distance beyond the edges of the blocks 10 and 13 and beyond the toes 12 and 15, carried thereby. The position of the die-levers 21 and 22 at this stage are as shown in Fig. 2. In the revolution of the cam 33 the die-face 28 is first moved vertically downward and the die-face 27 vertically upward. As a result of this movement the straight horizontal edges of the blank 18 are first bent at right angles to the blank, but in opposite directions. The position of the die-faces 27 and 28 at this stage of the operation are as shown in the diagram illustrated by Fig. 2ª. This initial movement of the dies is caused by the cam 33 rocking the lever 30, so as to depress the die 28 through the slide 24 and link 34 and at the same time raise the die 27 through the slide 24 and link 35. In the further rotation of the shaft 1 the cammed portions of the cam-grooves 44 engage the pins 43 of the links 40, moving the latter upwardly. The upward movement of the links 40 act to throw the cams 36 and 37 inwardly, thereby forcing the dies 27 and 28 toward the anvil-blocks 11 and 14 at the instant the die 28 drops below the edge of the toe 12 of anvil 11 and the die 27 passes above the toe 15 of the anvil 14. This simultaneous inward movement of the die-faces 27 and 28 as they move in opposite directions acts to upset the opposite edges of the blank 18 upon the respective toes of the anvils 11 and 14, as clearly shown in Fig. 2.

The next and second step in the operation of my machine consists in bending the blanks into cylindrical form and interlocking the upset edges, which are brought into proximity with each other. After the upset blanks are moved beyond the anvil-blocks 10 and 13 they pass under an elongated horn or mandrel 46 similar to those employed in can-making machines. The upset blanks 18 are moved intermittently forward by the detents 9 and between the guides 17 to the next set of operating mechanism, which is clearly shown in Fig. 3. This mechanism consists of a reciprocating supporting-block 47. This block has a spring-follower 48 located along its top, which when the blank 18 is moved over it and under the horn 46 will exert a sufficient pressure to hold the blank 18 in proper position prior to its being bent into cylindrical form and interlocked.

49 represents semicircular jaw-clamps pivoted at 50 to the frame.

51 represents sliding guides carried by the frame.

52 represents links pivoted to the guides 51 and to the jaw-clamps 49 for the purpose of operating them.

53 represents links pivoted to the guides 51 and having pins or rollers 54, which take into cam-grooves 55, mounted upon the shaft 56. The cams 55 are so shaped and timed in their action that after the jaw-clamps 49 have curved and interlocked the upset edges of the blank the reëntrant section 55′ of the cam relaxes the jaws momentarily, permitting the spring-sectors 69 to expand and interlock the can-joint. Immediately thereafter the plunger-set 72 compresses the joint and the jaw-clamps 49 again come into action. Shaft 56 is provided with a bevel-gear 57, which meshes with bevel-gear 58 on the operating-shaft 1. The supporting-block 47 is mounted on an arm 59, having a pin or roller 60, engaging the cam 61 on the shaft 56 for the purpose of imparting a short vertical reciprocating movement to the supporting-block 47.

62 is an upright rack rigidly connected to one of the slides 51 and having suitable guideways 63.

64 is a pinion mounted upon a shaft 65, suitably supported upon the frame. The shaft 65 is provided with pinions 66, which mesh with racks 67, formed on the feed-rails 68, which latter are received in suitable ways in the opposite sides of the horn or mandrel 46.

69 represents spring-pressed expansion-jaws pivoted at 70.

The horn 46 has a groove 71 formed along the top of the same for receiving the seam of the can.

The operation of the second part of my in-

vention is as follows: When the feed-rails 2 have moved the horizontal blank 18 over the supporting-block 47, the spring-follower 48 holds the blank in position between the guides 17. Upon the revolution of the shaft 56 the cam 61 operates to raise the blank-support 47 into clamping position against the horn 46, and at the same time the cam 55, through the links 53, slides 51, and links 52 raises the clamping-jaws 49, thereby causing the blank 18 to fold around the cylindrical horn 46 to such an extent that the opposite inclined upset edges of the blank overlap each other beneath the seam-set plunger 72. The setting-plunger is carried on a slide 73, working in ways 74 and mounted on a cross-head 75. This cross-head is given a reciprocating motion by means of the cams 76, eccentric-straps 77, and links 78. The cams 76 are so placed that upon the completion of the motion of the clamping-jaws 49 and the action of the expanding-sectors 69 the head 75 descends and causes the plunger-set 72 to compress the upset overlaps of the blank 18 together and securely locks the same. The upward movement of the rack 62 through the pinion and racks 67 had previously reciprocated the feed-rails 68 to the right of Fig. 1. These feed-rails 68 have spring-detents 79, which engage the can-body and move it toward the acid-applying mechanism after each operation of the can-forming mechanism. This movement of the can-body to the left takes place when the guides 51 move downwardly, and the rack 62, pinions, and rack 67 reciprocate it to the left.

The third step in the operation of my machine consists in applying acid to the seam of the can prior to soldering the same. This mechanism is operated by a counter-shaft 80, provided with a bevel-gear 81, which meshes with a corresponding bevel-gear upon the operating-shaft 1 of the shaft 56.

82 is a cam mounted on shaft 80, having a cam-strap 83 connected to a link 84, pivoted at 85 to an arm 86, linked at 87 to the frame of the machine.

88 is an acid chute or duct upon arm 86 and having its discharge end provided with a wick or sheet of fibrous material 89.

90 is a follower-plate adapted to be adjustably set against the wick 89, and 91 shows a means for securing this adjustment. By adjusting the screw 91 the degree of feeding action of the wick 89 can be varied to regulate the flow of acid.

92 represents a can containing acid located above the duct 88 and provided with a valve-conduit 93 for supplying the requisite quantity of acid to the duct. In the successive reciprocations of the feed-rails 68 the can-bodies 18 pass under the wicked duct 88 and their seams are supplied with acid.

The operation of the third set of mechanism is as follows: Simultaneously with the formation of a blank into a cylindrical body the cam 82 causes the pivoted duct 88 to be lowered momentarily and the wick 89 brought into contact with the seam, thereby supplying the necessary acid. When the clamping-jaws 49 are opened, the next can-body 18 is fed by the rails 68 beneath the duct 88. The lowering of the wick to the seam-joint may be timed, if desired, so as to take place when the can-body 18 is moving away from the wick or toward the wick or when the can-body is stationary beneath the wick.

The fourth step of my can-making machine is more particularly illustrated in Figs. 4, 6, 7, and 8 and constitutes the soldering mechanism.

94 is the soldering-iron.

95 is a heating-box of the form shown in Fig. 7.

96 is a blow-frame pipe disposed above the heating-box for deflecting heat into the same for the purpose of keeping the soldering-iron at the proper temperature. Fig. 7ª is a side elevation of the soldering-iron.

97 is a horizontal channel or groove formed along one side of the same, and 98 represents a series of vertical channels communicating with groove 97.

99 represents projections formed on the soldering-iron, which engage the walls of the heating-box 95 and normally hold the soldering-iron out of contact with the horn 46, but permit it to come in contact with the can-body 18 as it passes over the horn under the soldering-iron.

100 is a drum mounted upon a shaft 101 in bearings 102 in the frame. This carries rolls of solder-wire 103.

104 represents a pair of feed-rolls which act to intermittently feed the end of the wire from the reels into the horizontal channel 97 of the soldering-iron.

105 is a cam on shaft 80, provided with a cam-strap 106 and a link 107 for the purpose of imparting an intermittent rotary feed to the rolls 104.

108 is a ratchet-wheel formed on one of the feed-roll shafts.

109 is a link pivoted to the feed-roll shaft and to the link 107 and carrying a pawl 110.

111 is a gear upon one roll-shaft which meshes with a similar gear upon the other roll-shaft.

112 is a box-frame guide for guiding the wire 103 through the rolls 104 and at the same time support the feed-rolls.

The operation of the fourth step of my invention is as follows: Heat is applied to the box 95 through the pipe 96. A solder-wire 103 is led from each spool and passes through the box-guide 112 and projects into the channel 97. The reciprocation of the feed-bars 68, before described, has brought a can-body 18 under the soldering-iron. The temperature of the iron 94 melts the projecting ends of the solder-wires 103, and molten solder flows downwardly through the channels 98 upon and along the seam of the can-body. The feed-rolls 104 are intermittent in their action

and feed the wires into the groove 97 for each can-body 18. In the feed movements of the bars 68 the can-body 18 is passed to the left of Fig. 4, and the iron 94 acts to wipe the solder into the seam. When the can-body passes beyond the iron, the lugs 99 thereon engage the heating-box and hold the iron from contact with the horn. The iron 94 has a vertical movement, whereby when the next can-body reaches the iron the latter will rise sufficiently to allow the can-body to pass thereunder and at the same time rest upon the seam thereof. At the same time the cam 105 through its ratchet connection rotates the feed-rolls 104 and causes another section of the solder-wires 103 to project into the groove 97, whereby the solder is melted and deposited upon the seam of the next can-body while it is under the soldering-iron.

The fifth operation of my machine consists in subjecting a series of the can-bodies to a sweating or heating operation, which renders the solder more fluid and permits it to permeate the joints, thereby forming absolutely fluid-tight seams. This step of my invention is illustrated in Figs. 9 and 10.

113 is an elongated box provided with downwardly-extended opening 114 of the same length as the box. A heating-pipe 115, having branches 116, is led into the box at suitable intervals for the purpose of introducing heat and of sufficient temperature to render the solder fluid. The heating-box 113 is supported by a suitable frame 117 upon the frame.

The operation of the fifth step of my invention is as follows: The can-bodies 18 as they are intermittently moved along the horn 46 pass beneath the opening 114. The heat from the box is forced through the opening 114 onto the seams of the can-bodies and melts the solder, which permeates the seam and renders the same thoroughly fluid-tight. In the further movement of the can-bodies they pass over a roller or other support 118 and are cooled sufficiently to allow the solder to firmly set before the can-bodies are dropped off the end of the horn, which is the final step of the operation in the present application.

119 represents spring-detents which engage the can-bodies as they are moved along the horn 46 and prevent any return movement of the can-bodies.

The can-blanks are fed to the machine to the right of Fig. 1. Fig. 4 is a virtual continuation of the machine to the left of Fig. 1, and Fig. 9 is a similar continuation of the machine to the left of Fig. 4. Figs. 9, 4, and 1 placed side by side in the order stated give a general side elevation of the machine in its successive operations from right to left.

While I have in the present application shown exemplifying means for carrying out my invention, I do not wish it understood that my invention is confined to the mechanism here shown and described, because I intend to use such other mechanism for carrying out my invention as will come within the scope of the claims.

The anvil-sections 11 and 14 may be made adjustable in order to secure a perfectly operative coöperation of the dies in their movements.

What I claim is—

1. In a can-making machine the combination of a pair of anvil-blocks and means for clamping and retaining the blank in a plane against the anvil-blocks, with a pair of oppositely-disposed reciprocatory and oscillatory die-levers, means simultaneously reciprocating said levers in opposite directions and means oscillating said levers in opposite directions.

2. In a can-making machine the combination of an upper anvil-block, a lower anvil-block, means clamping a blank against said blocks while retaining it always in a plane, a pair of die-levers one adjacent to each anvil-block and mounted to reciprocate in opposite directions and to oscillate toward each other, and means imparting such movements to said die-levers.

3. In a can-making machine, the combination of an upper anvil-block, a lower anvil-block, two die-levers, one adjacent to and mounted to reciprocate past one anvil-block and one adjacent to and mounted to reciprocate past the other block, the movements of the two levers being in opposite directions, means reciprocating said die-levers, means oscillating said levers toward each other between the strokes of a reciprocation, and means clamping a blank against and with its edges adjacent to said anvil-blocks while retaining the blank in a horizontal plane.

4. In a can-making machine, the combination of oppositely-disposed anvils, a pair of oppositely-moving levers carrying die-faces, reciprocating slides in which the levers are pivoted, cams for swinging the levers, an operating-shaft, and connections between the shaft, the slides, and cams for imparting a compound movement to the die-faces.

5. In a can-making machine, the combination of a horn or mandrel, an acid or flux receptacle located above the horn, an operating-shaft, an eccentric upon the operative shaft, and a link connecting the eccentric and the acid-box, whereby the box is intermittently raised and lowered.

6. In a can-making machine, an acid-box provided with a slotted delivery-opening, a wick located in said opening, a follower-plate adapted to engage the wick and means for adjusting the follower-plate to and from the wick.

7. In a can-making machine, the combination of a horn, a heating-box located above the horn, and a soldering-iron normally supported by the heating-box out of contact with the horn, and having a yielding upward movement in the box.

8. In a can-making machine, the combination of a horn, a soldering-iron located above

the horn having a lateral channel thereon with vertical channels communicating therewith, and means for heating the soldering-iron.

9. In a can-making machine, the combination of a horn, a soldering-iron yieldingly supported above the horn and normally out of contact therewith, solder-feeding means located at one side of the iron, means for heating the iron and means for intermittently feeding the solder toward the iron.

10. In a can-making machine, the combination of a heating-box, a soldering-iron yieldingly supported thereby, a stop for regulating the downward movement of the iron, a horn disposed below the iron, and means for feeding solder to the iron.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

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