S. & C. H. HOOKEY.

CAN BLANK FORMING MACHINE.

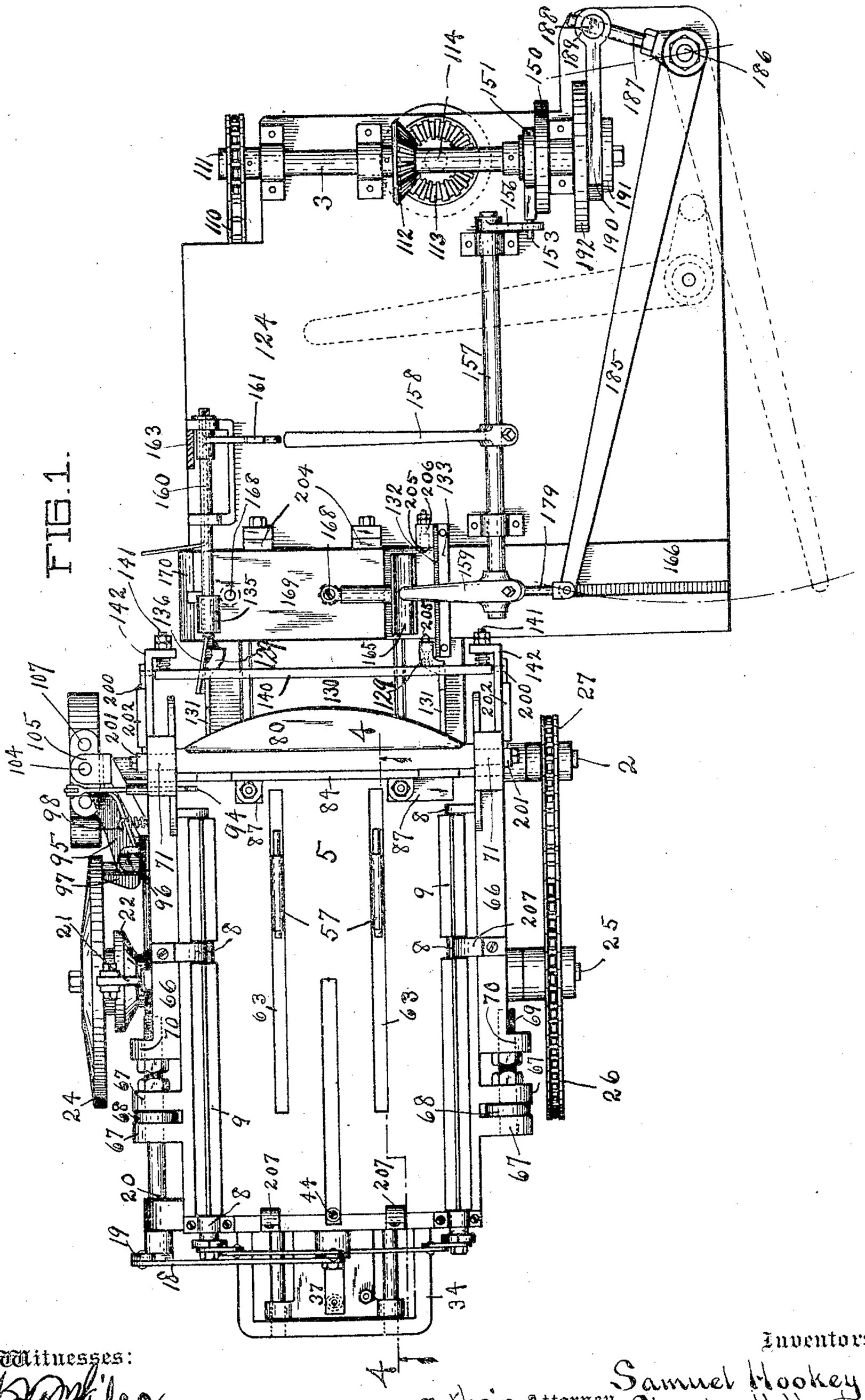
APPLICATION FILED AUG. 8, 1907.

917,296.

Patented Apr. 6, 1909.

8 SHEETS—SHEET 1.

FIG. 1.



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By their Attorney Edward N. Pagelsen

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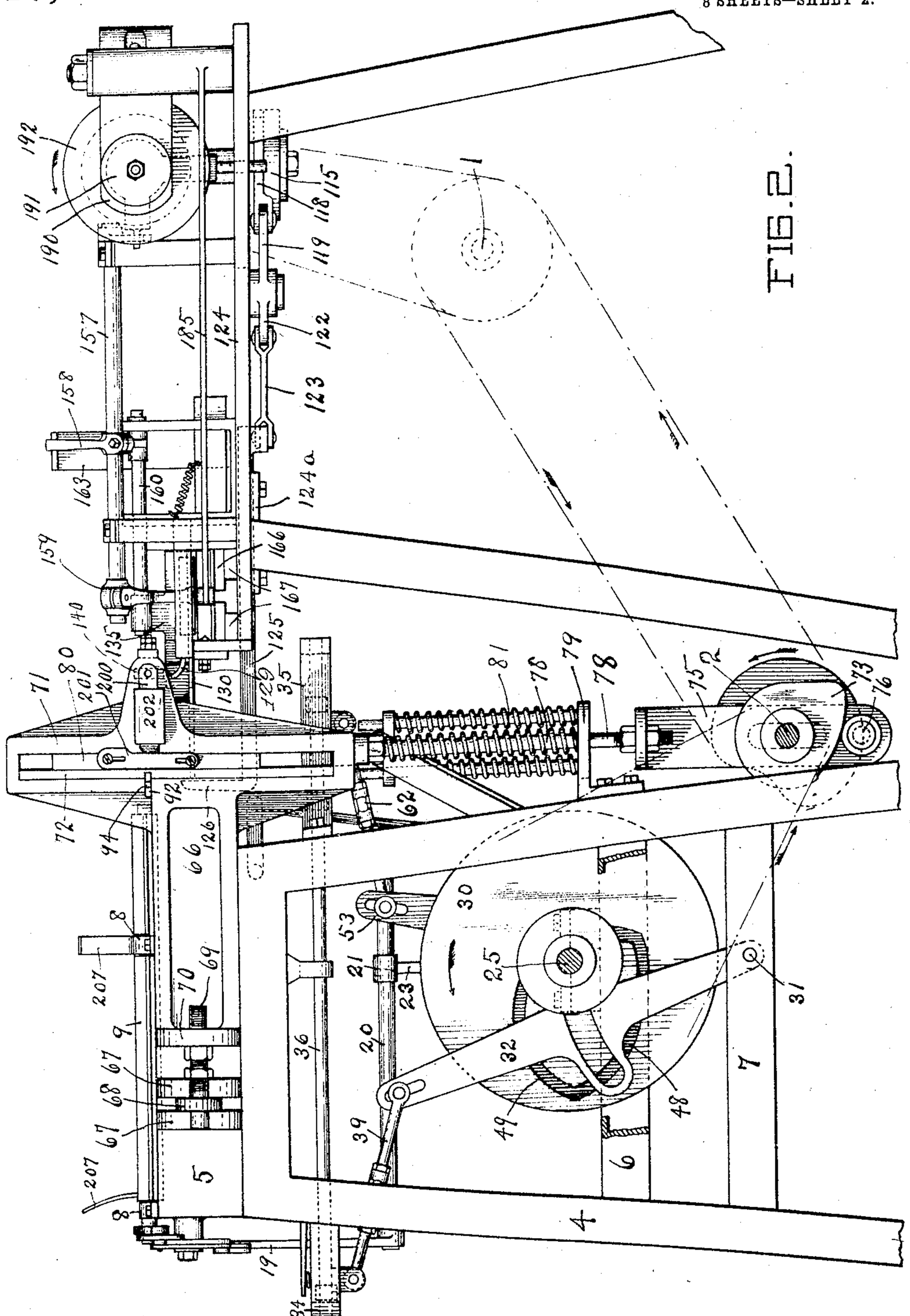

FIG. 2.

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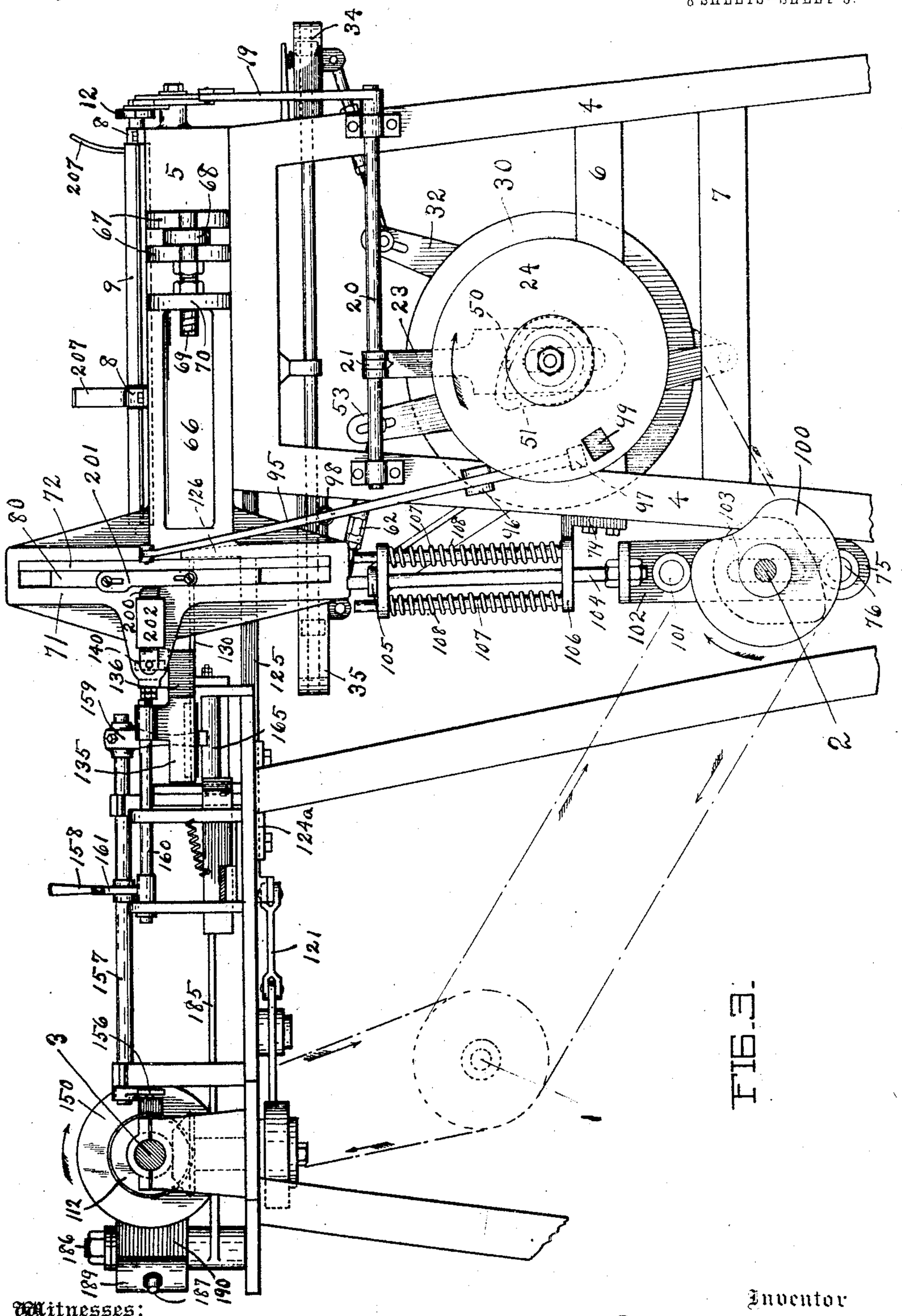

FIG. 3.

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8 SHEETS—SHEET 4.

FIG. 5.

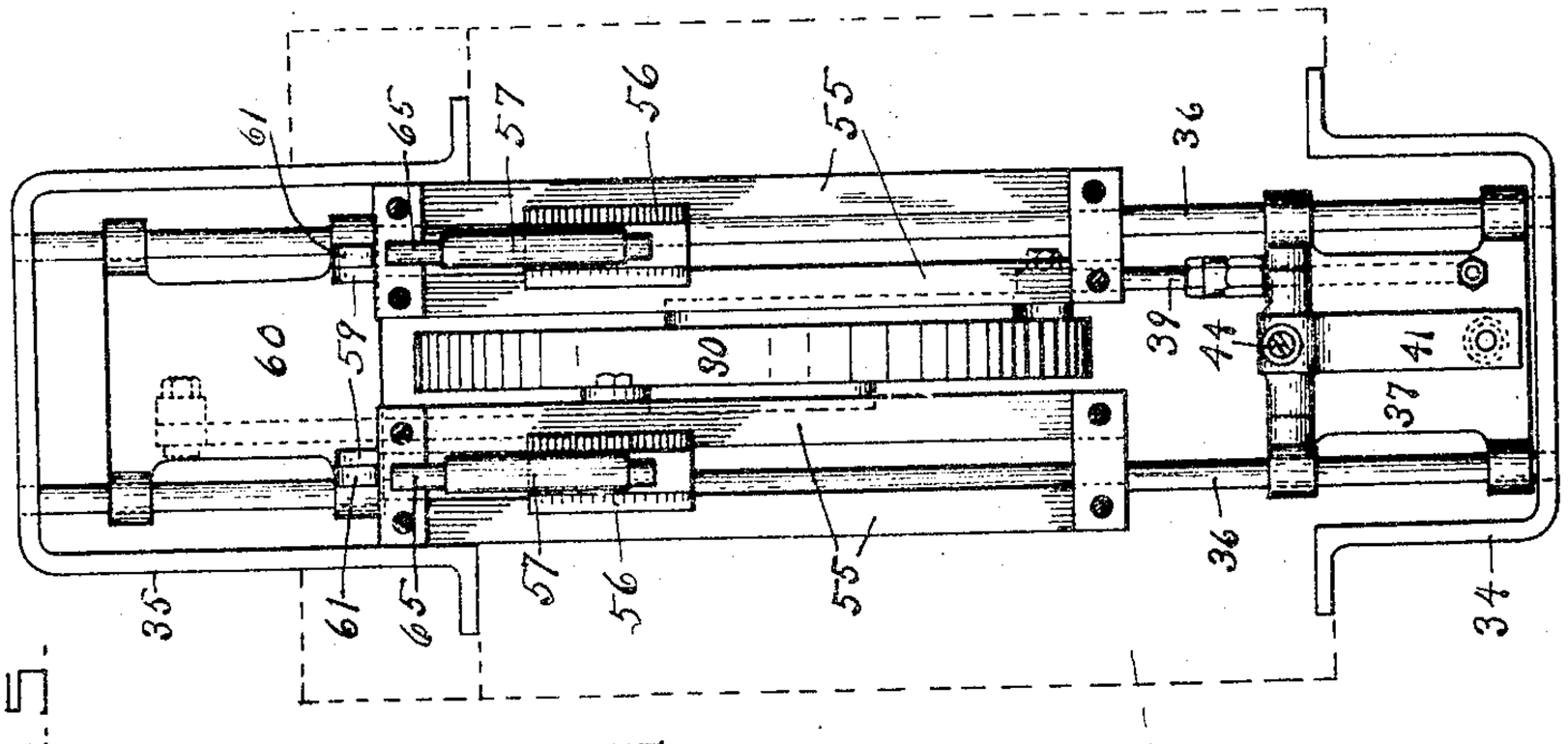
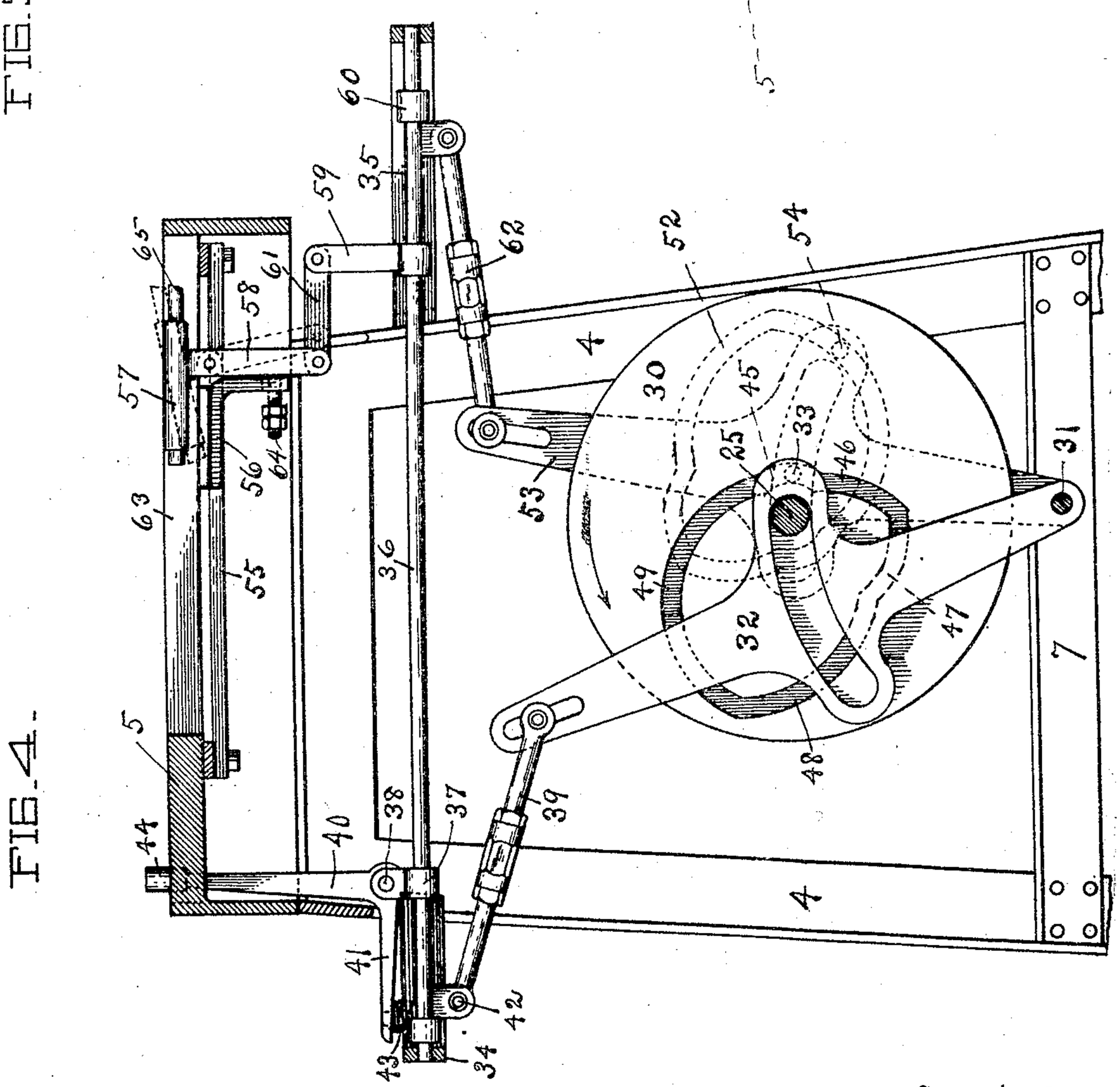


FIG. 4.



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8 SHEETS—SHEET 5.

FIG 6

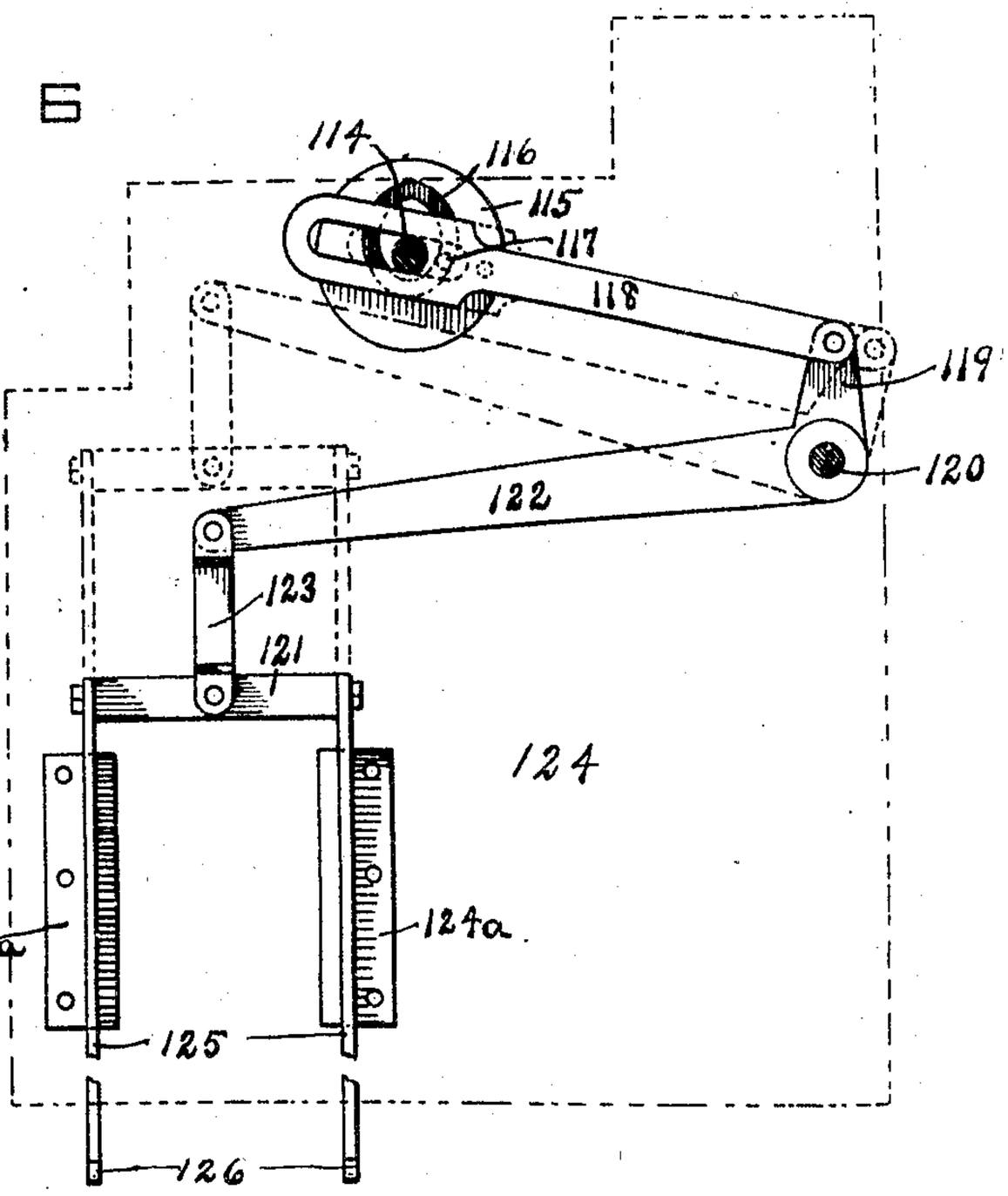


FIG. 7.

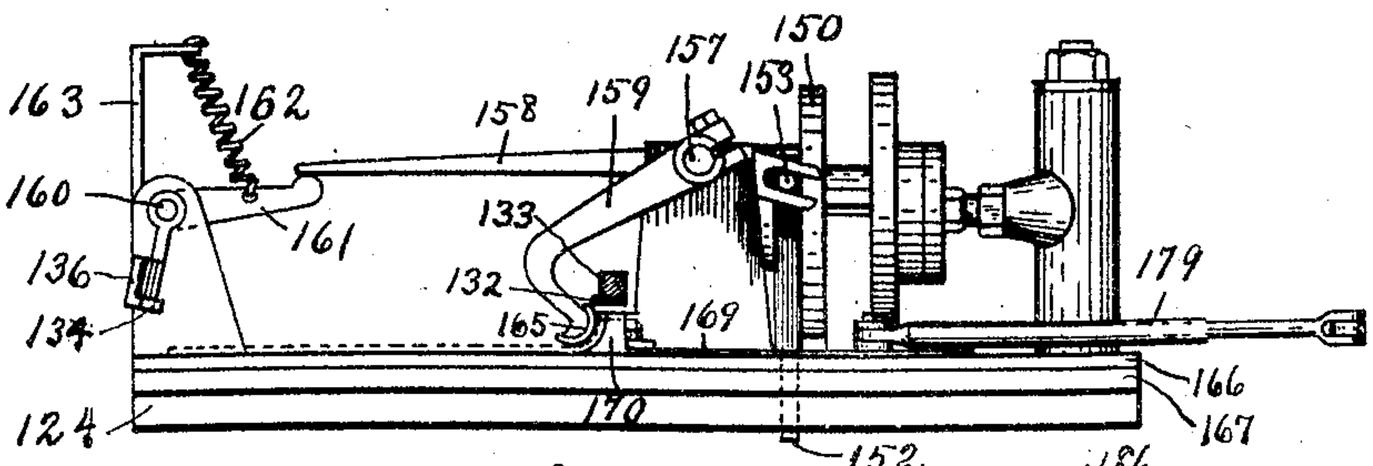
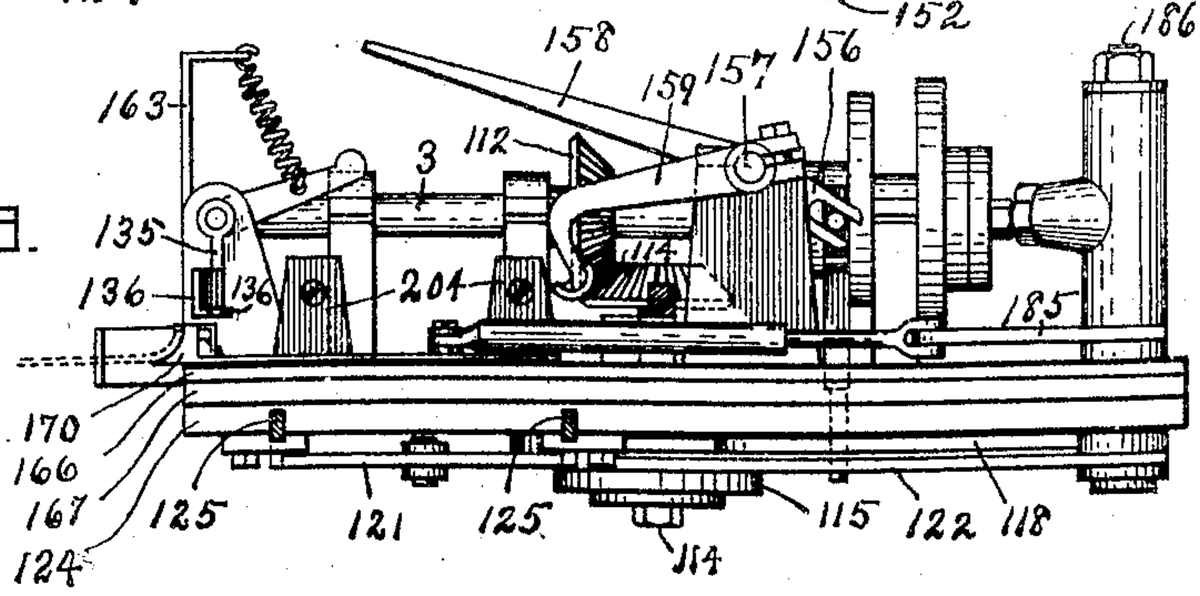


FIG. 8.



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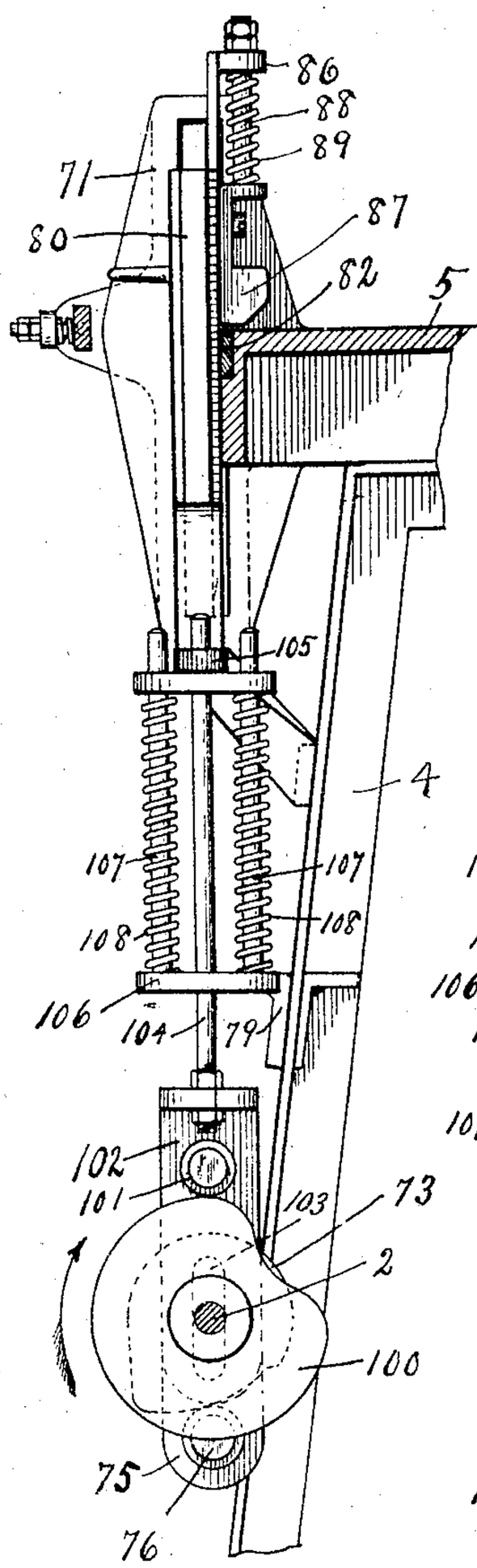

FIG. 9.

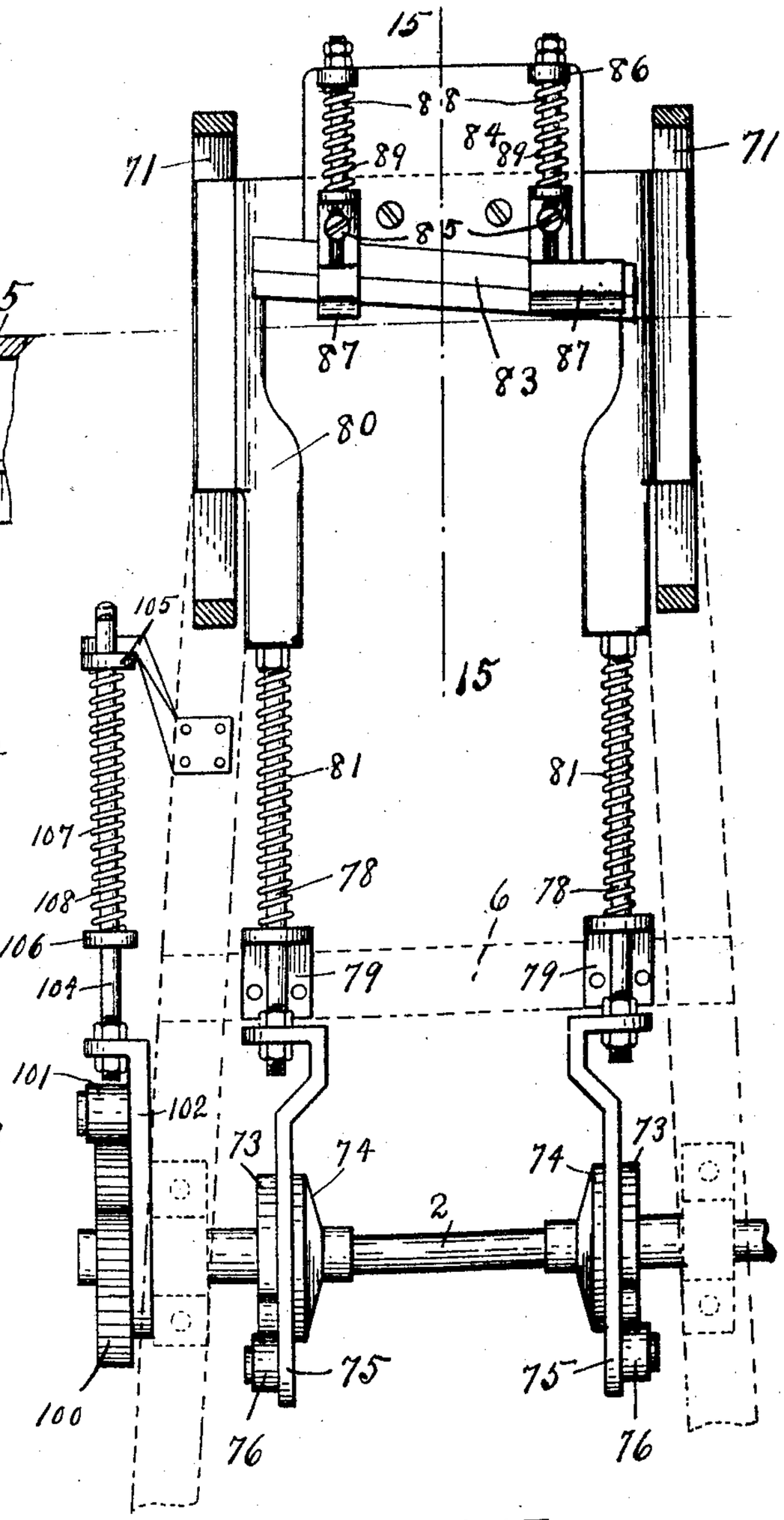

FIG. 10.

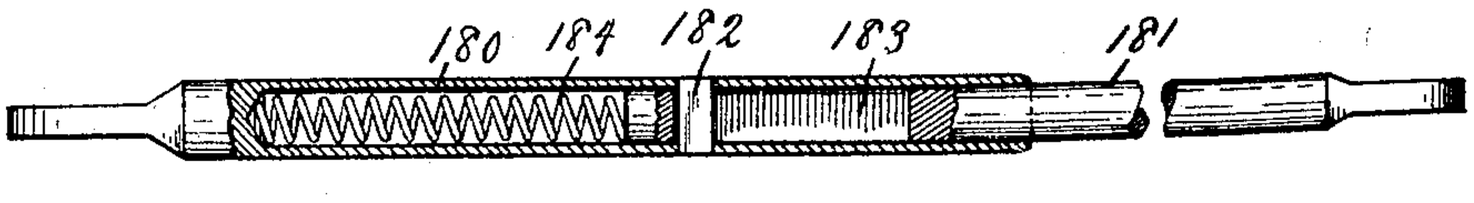

FIG. 11.

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8 SHEETS—SHEET 7.

FIG. 12.

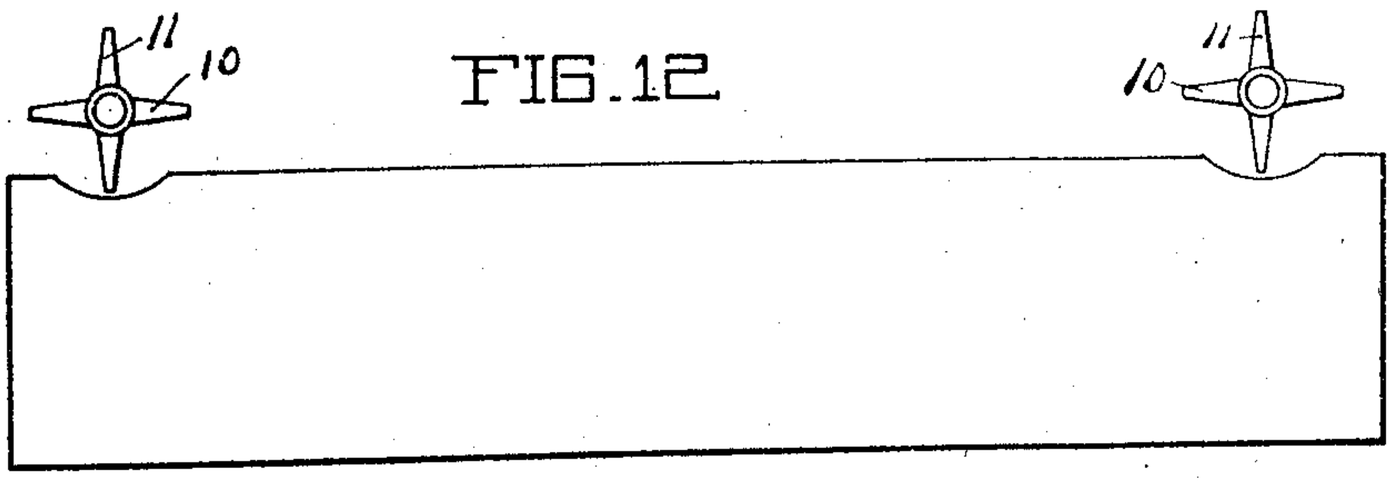


FIG. 13.

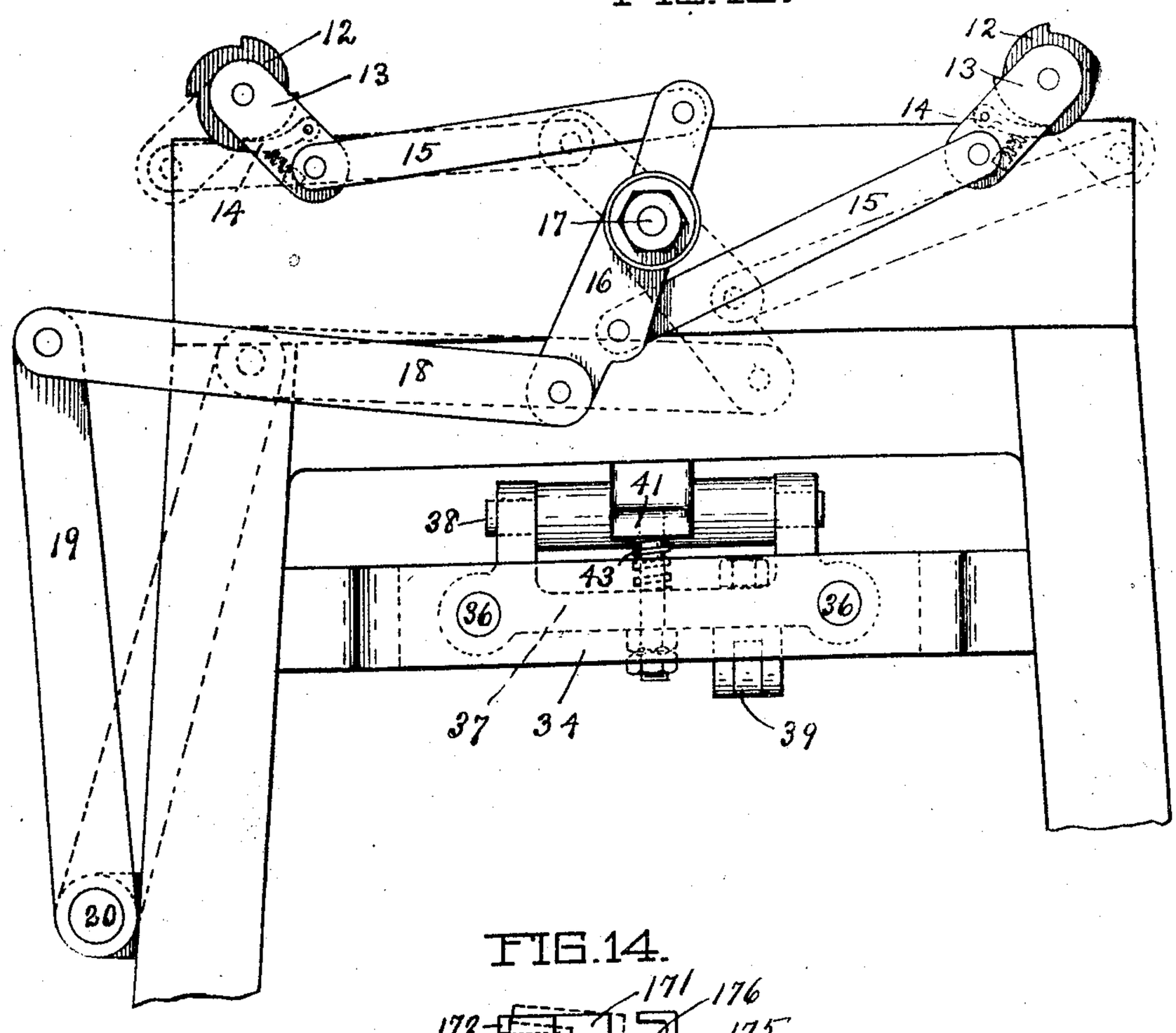
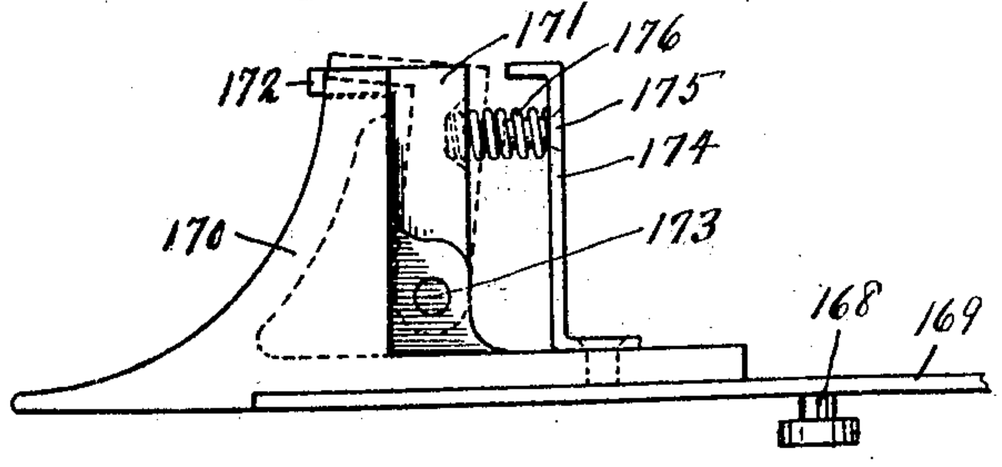


FIG. 14.



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8 SHEETS—SHEET 8.

FIG. 15.

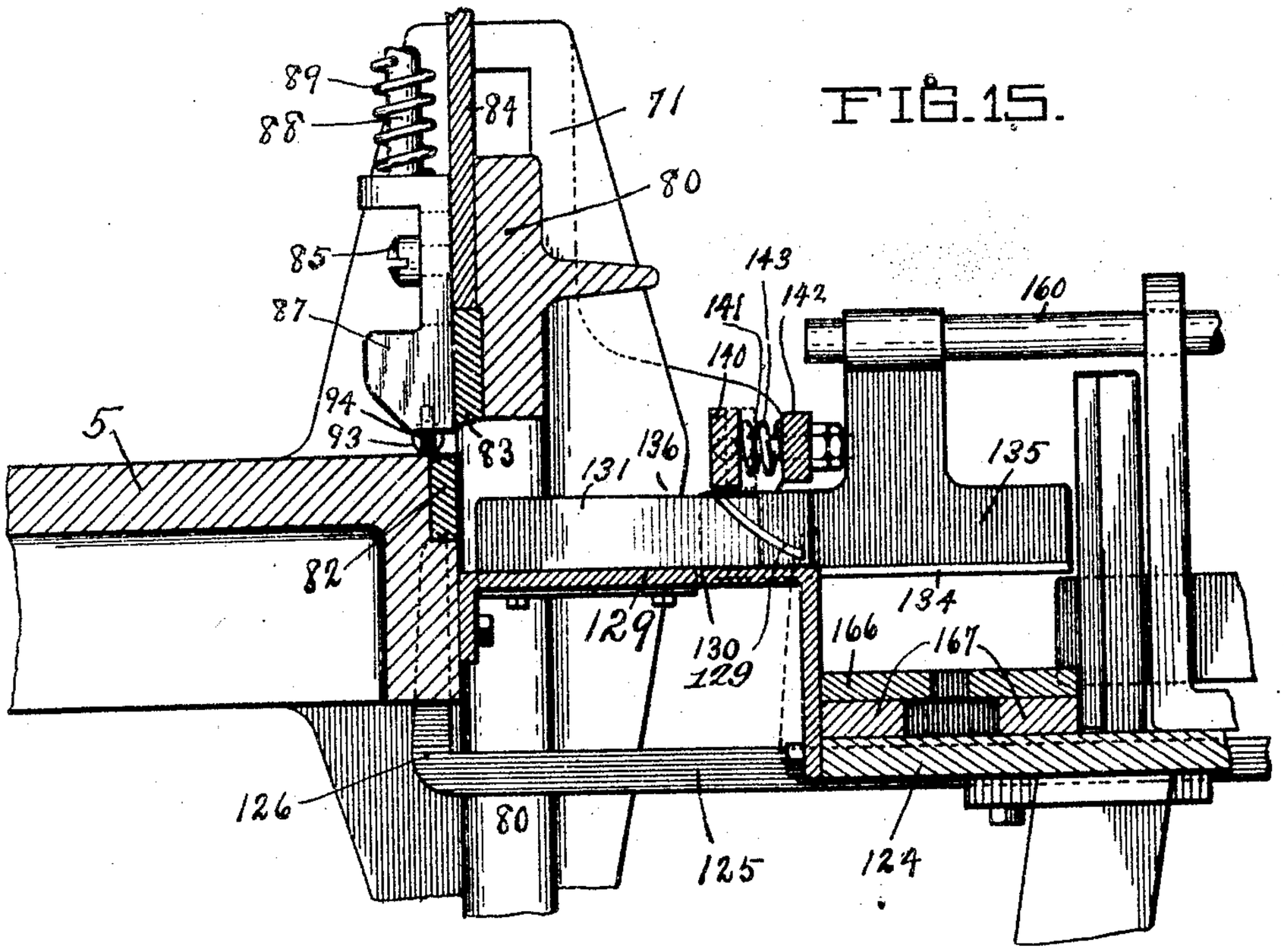


FIG. 16

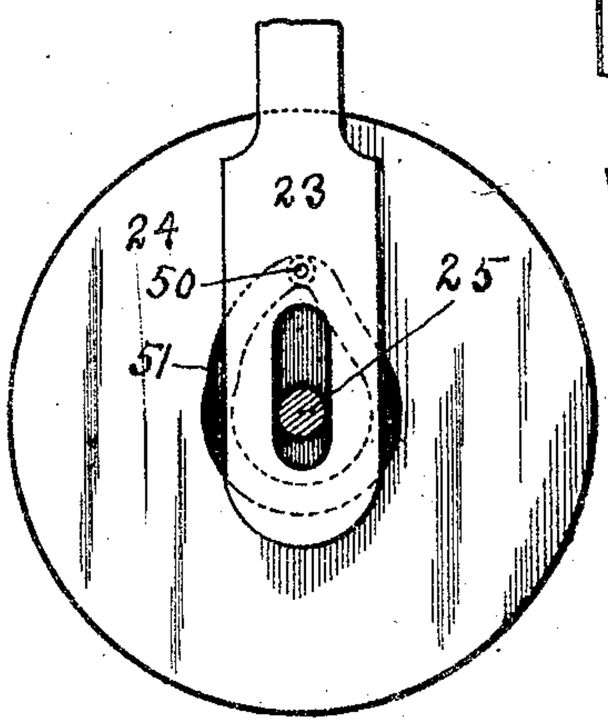


FIG. 17.

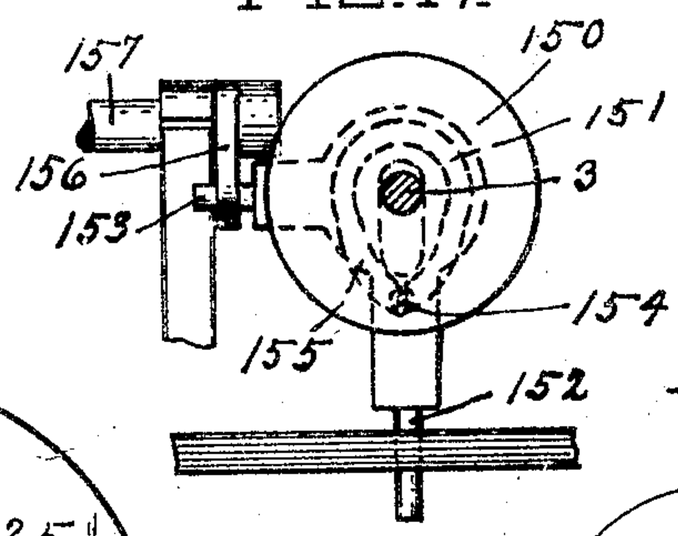
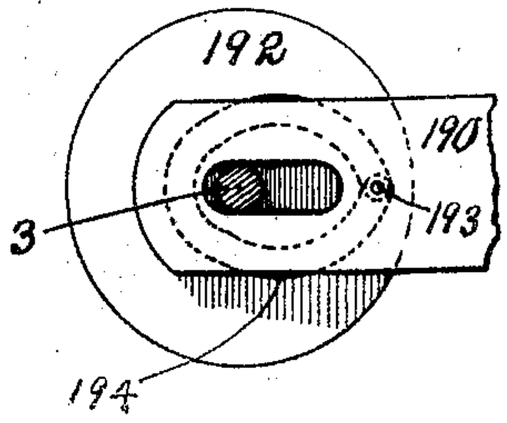


FIG. 18



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UNITED STATES PATENT OFFICE.

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CAN-BLANK-FORMING MACHINE.

No. 917,296. Specification of Letters Patent. Patented April 6, 1909.

Application filed August 8, 1907. Serial No. 387,577.

To all whom it may concern:

Be it known that we, SAMUEL HOOKEY and CHARLES H. HOOKEY, citizens of the United States, residing at Wyandotte, in the county of Wayne and State of Michigan, have invented a new and useful Can-Blank-Forming Machine, of which the following is a specification.

Our invention relates to means for cutting can blanks and bending one end of each ready for the body forming machine, and it consists in a novel shearing mechanism, a novel feed to carry the sheets of metal under the shears and the blanks from the shears to the bending mechanism, in novel mechanism for bending an end of each of the blanks, and in the novel ejecting means for the strip that remains after the blanks have been cut from the sheet.

It further consists in safety mechanism whereby the different feeding means are rendered yieldable to accommodate unequal widths and lengths, and also that in case of accident, breakage is avoided as far as possible.

It further consists of equalizing means for the shears, to prevent a sudden acceleration of the same.

It further consists in novel details of construction, fully described in the following specification and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a plan view of our can-blank forming machine. Fig. 2 is an elevation of the left side and Fig. 3 an elevation of the right side of the same. Fig. 4 is a cross section on the line 4—4 of Fig. 1. Fig. 5 a plan of the feeding mechanism for the sheets of material, the table being omitted. Fig. 6 is a view of the feeding mechanism which carries the blanks from the shears to the bending mechanism, with the table removed. Figs. 7 and 8 are views from the front of the blank bending mechanism. Figs. 9 and 10 are views from the right and front of the shears. Fig. 11 is a detail of a safety device. Fig. 12 is an explanatory diagram of the sheet grippers. Fig. 13 is a front elevation of the sheet clamps operating mechanism. Figs. 14 to 18 are details. Figs. 1, 2, 3, 6, 7, and 8 are on the same scale, Figs. 4, 5, 9, 10, 12 and 13 on another, somewhat larger, and Figs. 15 to 18 on still larger scale.

Similar reference characters refer to like parts throughout the several views.

The machine shown in the drawings is adapted to cut four can blanks from a sheet, eject the strip that remains, bend one end of the blank, and eject the same from the machine into the adjacent can body seamer.

The driving mechanism.—The main driving shaft 1 of the machine is driven in any desired manner, and from it, sprocket chains lead to the secondary drive-shafts 2 and 3. It is necessary that these connections between the main and secondary shafts shall be positive, as the parts connected to the secondary shafts have coördinate action at the same speed. Any other desirable driving means for the secondary shafts may be employed.

The sheet feeding means.—The legs 4 support a table 5, and cross bars 6 and 7. Secured to the top of the table are bearings 8 for the controllers 9. See Figs. 1 and 2. These controllers are cross-shaped in cross-section and the sheet of metal is laid by the operator upon the horizontal blades 10, (Fig. 12) by which it is supported above the feeding mechanism until the previous sheet has passed through the shears. The controllers then turn inwardly, permitting the sheet to fall to the table, while at the same time, the vertical blades 11 assume the position previously occupied by the horizontal blades 10, but being above the sheet, prevent it from rising.

Ratchet wheels 12 are secured on the rounded ends of the controllers, and the pawl carriers 13, provided with pawls 14 operate the same through ninety degrees at each cycle of the machine. Links 15 connect to the double lever 16 pivoted on the stud 17. A link 18 connects the double lever 16 to the lever arm 19 on the shaft 20. A second lever 21 on this shaft projects horizontally and depending from it is an actuating link 23, held between the cam 24 and the collar 22, both secured to the shaft 25. The link 23 carries a pin 50 which slides in the cam groove 51 in this cam, so that at each revolution of the shaft 25, that is, at each cycle of the machine, the controllers will turn through one fourth of a revolution. The shaft 25 is supported by the cross bars 6 and on its right end is secured a sprocket wheel 26 which has four times the number

of teeth of the sprocket wheel 27 on the secondary shaft 2, so that the shaft 2 revolves four times with each cycle of the machine.

On the shaft 25 is secured a disk 30 provided with a cam slot on each side. Pivoted on the shaft 31 mounted on the cross bars 7 is a slotted lever 32, which has a pin 33 that travels in the cam slot on the right side of the disk 30. Brackets 34 and 35 project from the front and rear of the legs 4 and carry guide rods 36. On the front portion of these rods a saddle 37 is slidable, and a pin 42 mounted on the lower side thereof is connected to the lever 32 by the link 39. A lever, comprising the upright arm 40, is mounted on the horizontal pin 38 carried by the saddle 37. A stiff spring 43 under the free end of the arm 41 holds the button 44 at the upper end of the arm 41 forward. The button 44 projects above the table 5 but is lower than a horizontal blade 10. When the button 44 is in the position shown in Fig. 4, and a sheet is lowered onto the table by the controllers, and the cam disk 30 revolves to the left, the pin 33 in the portion 45 of its cam slot will remain stationary. The further turning of the disk 30 brings the portion 46 of the slot to the pin, causing the button 44 to move rearward the width of one can blank. This blank is then sheared during the time the portion 47 of the cam slot passes the pin, the button 44 moving forward a short distance to relieve the blank from pressure which might otherwise cause poor shearing. This retrograde movement of the button 44 occurs immediately after the pressers 87 have engaged the sheet as hereinafter described. The next portion 48 again moves the button 44 rearward the width of one blank, and the portion 49 brings the button to starting position. The sheet has then been moved two steps by this mechanism and the pusher has returned to normal position. During the time the pusher has been returning, the sheet makes two more moves under the guidance of the following described mechanism. On the opposite side of the disk 30 is a similar lever 53, pivoted on the shaft 31, and having a pin 54 that engages in a second cam slot 52 on the opposite side of the disk 30 as indicated by dotted lines. To the bottom of the table 5 are secured two pairs of guides 55 each of which supports a cross-head 56, to which are pivoted the feeders 57. The arms 58 of the feeders connect to the vertical arms 59 on the cross-head 60 by means of links 61. A link 62 connects the upper end of the lever 53 to the cross-head 60. As the pin 54 travels in the cam slot 52, the lever 53 will have an intermittent movement corresponding to that of the lever 32, but because of the positions of the cam slots, the lever 53 will move one feeding step toward the rear while the lever 32 moves forward, and while the lever 32 is at rest, the lever 53 will move forward a short distance while awaiting the shearing of the third blank, then move rearwardly again to move the sheet its fourth step. When the sheet of metal is being fed to the shear by the button 44, it rests on the table 5. The feeders 57 must then be beneath the surface. They are therefore so formed (see Fig. 4) that when returning, the push on the lower end of the lever arms 58 depresses the rear ends of the feeders, as shown in full lines in Fig. 4, while a pull on the link 61 elevates these ends out of the slots 63 in the table 5, as indicated by dotted lines. The bolt 64 controls the amount the end can be elevated. The pins 65 forming these ends are spring held, similar to the construction shown in Fig. 11.

The shears.—Secured on each side of the table 5 are side-bars 66 of the shear frame. Lugs 67 project from the sides of the table 5 and guide the collars 68 on the screws 69 which engage the lugs 70 on these side-bars to adjust the same, and with them, the shears. The shear frames have T shaped slotted ends 71, forming guides, in which are mounted the adjustable liners 72. Secured on the shaft 2 are the cams 73 and collars 74 (Figs. 9 and 10). Shears actuating plates 75 carry rollers 76, which engage the cams, and have slots through which the shaft 2 passes, these plates each being held in vertical position by a cam and a collar 74. The upper ends of the plates are bent and to each is attached a stem 78, passing through a bracket 79 mounted on a cross bar 6 of the frame of the machine. The stems 78 are attached at their upper ends to the shear yoke 80, which is guided in the slotted ends 71 of the shear frames. Springs 81, rest on the brackets 79 to hold the shear yoke elevated. In Fig. 9 the left shear frame is removed and part of the table 5 is in cross section. The stationary shear member 82 is mounted in the end of the table 5. The blade 83 is mounted on the shear yoke 80. A plate 84 is mounted on this yoke and carries pins 85 and brackets 86. Pressers 87 are mounted on the pins 85 and carry rods 88 which are slidable through the brackets 86. Springs 89 tend to hold the pressers down. As the pressers are in advance of the shears (Fig. 10) they will contact with the metal sheet before it is reached by the shears and hold it during the shearing, which is especially necessary when the last blank is being sheared, and a narrow strip, perhaps not more than one half inch wide rests on the table 5.

The trimming ejector.—After the last blank has been sheared, there remains a narrow strip or edge of the original sheet. To remove this we provide a slot 92 in the right shear frame (Fig. 2) through which the

strip may be ejected. Through a similar slot 93 in the other frame (Fig. 15) is slidable an ejector rod 94. This rod is connected at one end to the upper end of the lever 95, mounted on the frame at 96, (Figs. 1 and 3) which lever has a beveled head 97 at its lower end, which head presses against the face of the cam 24 under pressure of the spring 98. Whenever the opening 99 registers with this head, the spring 98 will throw the rod 94 to the right and the head 97 to the left into this opening 99 and the waste strip of sheet metal in the path of the rod 94, will be ejected through the opening 92.

Shears equalizer.—Referring to Figs. 3, 9 and 10, a cam 100 will be noticed on the shaft 2, which cam is adapted to engage the roller 101 on the plate 102. This plate has a slot 103 through which the shaft 2 passes. The upper end of this plate connects to the stem 104 which passes through the bracket 105. A cross-bar 106 is secured to this stem 104 and carries the side-rods 107, which also pass through the bracket 105, and which carry the springs 108. These springs are adapted to produce considerable pressure between the roller 101 and cam 100.

It will be noticed that the cam 100 is generally concentric, having only a short depression, and that this depression is opposite the high points of the cams 73. When the cams 73 cause the shear blade 83 to reach its lowest limit, thereby putting the springs 81 under the greatest stress, roller 101 will descend, assisting in turning the shaft 2. When the rollers 76 have passed the highest points on the cams 73, the springs 81 will assist in turning the shaft 2, but will be resisted by the springs 108. The result of this balancing of the springs is great smoothness of movement.

The blank conveyer.—The shaft 3 is driven from the main shaft 1 by means of a sprocket chain 110 (Fig. 1) which runs over the sprocket wheel 111 on the shaft 3, and drives it at the same rate as the shaft 2. A miter gear 112 on the shaft 3 meshes with a similar miter gear 113 on the vertical shaft 114, which also revolve at the same rate as shafts 2 and 3. Referring now to Figs. 6 and 8, the shaft 114 carries cam disk 115 having a slot 116 in which slot the pin 117 on the link 118 is adapted to travel. The opposite end of the link connects to the arm 119 of a bell-crank-lever mounted on the pin 120, the other arm 122 of the lever connecting to the cross bar 121 by means of the link 123. Guides 124ª secured to the table 124 support the slidable hooked conveyers 125 which are connected to the cross-bar 121 at one end, and have upturned arms 126 at the other. (See Fig. 15).

Secured to the front edge of table 124 is a bracket 130 which also connects to the rear edge of the table 5. This bracket is slotted to permit the upturned arms 126 of the blank conveyers to pass across. On this bracket are secured the guides 131 which engage the ends of the blanks when they move across, keeping them in position. Flanges 129 forming portions of the guides 131 extend inwardly and rearwardly and the blank is thereby prevented from springing up when moved to the rear by the arms 126.

When the shears are cutting off a blank, the ends 126 will be at the position shown in Fig. 15. The blank falls and rests on the bracket 130. The arms 126 begin to move to the rear as soon as the shear blade 83 has reached the end of its operative movement, carrying the blank to the rear and placing it on the flange 132 of a fixed support 133, and on the flange 134 of the movable support 135. A vertical guide 136 on the front of this movable support insures a proper position for the blank.

The width of the blank is controlled by the position of the bar 140, positioned by the pins 141 carried by the brackets 142 projecting from the shear frames. Springs 143 between the bar 140 and the brackets 142 prevent injury. The springs 143 are stiffer than the springs which position the feeders 44 and 57 so that the sheets will always be of the desired width. Owing to this bar 140, the blanks will always fall properly onto the bracket 130.

It sometimes happens that the blanks hang between the bar 140 and the edge of the table 5. To prevent this, we mount the ends of the bar in slides 200 which are carried by the guides 202 secured to the brackets 142, which are slotted to permit the ends of the bar 140 to pass through. On the ends of the shear yoke 80 we secure the plate cams 201, which at each movement of the shear yoke will engage the ends of the slides 200 and force back the bar 140, permitting the blank to fall freely. The spring 143 returns the bar to normal position.

The blank bending mechanism.—It is desirable to curve one end of the can blank before it is passed to a body seaming machine. To do this we secure a cam 150 on the shaft 3, and adjacent to it mount a plate 151 (Fig. 17) having a downwardly extending guide finger 152, a laterally extending operating finger 153, and a pin 154 to travel in the cam slot 155. The finger 153 fits between the jaws at the end of the arm 156 on the shaft 157, which shaft also carries the arms 158 and 159.

Mounted in bearings at the left edge of the table 124 is a shaft 160, having an arm 161 secured thereto with its outer end in the path of the arm 158. On its forward end is mounted the movable support 135 for the can blanks. A spring 162 connects the arm

161 to the bracket 163 and normally holds the movable carrier 135 in the position shown in Fig. 8.

The outer end of the arm 159 carries a presser 165 in the form of a section of a cylinder. This is adapted to contact with one end of the blank as it lies on the flanges 132 and 134 of the supports, and press down that end against the end of the ejector. Just before the presser 165 has reached the lower end of its movement, the arm 158 engages the arm 161, swinging outward the support 135 and permitting the blank to fall onto the slotted plate 166 secured to the table 124. Guides 204 for the edges of the blank are secured to the table 124. (Figs. 1 and 8).

Between the plate 166 and the table 124 are the liners 167, the plate and liners forming the guide for the pins 168 extending down from the ejector plate 169. This plate moves from the position shown in Fig. 7 to that in Fig. 8, carrying the blank from the position indicated in dotted lines in Fig. 7 to that indicated in Fig. 8.

The left end of the ejector plate 169 is formed in the manner shown in Fig. 14. A shoe 170 is secured to the end of the plate, and pivoted to the shoe is a latch 171 having a lip 172. The latch is normally held in position by the spring 176 on the pin 175 carried by the bracket 174. Any unusual obstruction which may prevent the finished blank from being ejected will cause the blank to press back the lip 172 to the position indicated by the dotted lines, which will permit the blank to slide up along the face of the shoe.

Connected to one of the pins 168 is a link 179, consisting of a sleeve 180, a rod 181 slidable therein, a pin 182 fixed in the sleeve and passing through the slot 183 in the rod, and a stiff spring 184 to normally hold the parts in position. Any extraordinary stress will cause the link to shorten and so avoid breakage.

The right end of the link 179 is connected to the end of the arm 185 of a bell-crank-lever mounted on the pin 186, the other arm 187 being rounded and passing through a pin 188 held in a sleeve 189 at the end of a plate 190. This plate is held between the collar 191 and cam disk 192 on the shaft 3 (Fig. 1) and carries a pin 193 that engages the cam slot 194, (Fig. 18). The operation of this cam causes the arm 185 to move the ejector back and forth across the machine after each depression of the arm 159 to bend the end of the can blanks.

A blank after being curved by the presser 165 may jump back, as this presser acts very much like a hammer, and to prevent this, we provide the pointed, spring held pins 205 held in sleeves 206, which pins will project over the blanks after they are bent. The pins, being spring held, will move out of the way of the shoe 170 as it moves to eject the blank.

Operation.—The operator places a sheet of metal on the horizontal flanges 10 of the controllers. When the machine has finished shearing the previous sheet, the controllers turn and deposit the sheet on the table 5. The upwardly projecting fingers 207 are guides for the sheet. The button 44 moves two steps to the rear, each step equaling the desired width of a blank. The cross bar 140 prevents the sheet moving too far. While the sheet is making these steps and stops, the shears also perform their function, cutting off the blanks. As the shear blade 83 descends, the pressers 87 engage the sheet, which obviates the further necessity of the cross bar 140, which is accordingly moved to the rear by means of the cam plates 201, thus permitting the sheared blanks to fall freely to the bracket 130. The button 44 having moved the sheet two steps, it stops, and returns to the front end of the table. The pins 65 now engage the sheet and move it toward the rear by two steps, separated by a rest, during which rest the pins recede while the shears cut off a blank. After the second step, the feeders 57 return to normal position below the top of the table. The narrow strip remaining on the table 5 is ejected by the rod 94. From eighty to ninety blanks can be cut out each minute by this mechanism. As fast as the blanks are cut, they fall onto the bracket 130 and are carried across onto the supports 132 and 134. The lever 159 swings down, striking the right end of the blank a sharp blow with its partly-cylindrical end 165, bending the blank to the desired form. The arm 135 swings out at the same time so the blank may rest on the plate 166 and be ejected by means of the lever 185 and its connected mechanism.

Having now explained our improvements, what we claim as our invention and desire to secure by Letters Patent is:—

1. The combination of shears for sheet metal, a table on which the sheet metal may be supported, a feeding device adapted to move the sheet toward the shears, and a second feeding device adapted to move the sheet toward the shears after the first feeding device has completed its stroke and is returning to original position.

2. The combination, of shears for sheet-metal comprising stationary and movable cutters, a table on which the sheet metal may be supported, a feeding device projecting above the table and adapted to feed the sheet to the shears, and a second feeding device normally below the level of the table and adapted to project and feed the sheet after the first feeding device has ceased to act.

3. The combination with shears comprising stationary and movable cutters, of a table for supporting sheet metal, a feeding

device projecting from the same and adapted to move the sheet toward the shears by a plurality of intermittent movements, and a second feeding device normally below the table and adapted to feed the sheet a plurality of intermittent movements.

4. The combination with sheet-metal shears comprising cutters, of a table upon which said shears are mounted, a shaft mounted below said table, cams mounted on said shaft, levers operated by the said cams, and feeding devices connected to said levers, the feeding devices connected to each lever being adapted to independently move the sheet toward the shear.

5. The combination, of a table, shears mounted upon the end of the same comprising stationary and movable cutters, controllers revolubly mounted at the sides of the table and comprising revoluble fluted members, means to intermittently revolve said controllers, and feeding devices projecting through said table when in operative position for successively moving said sheet to the shears.

6. The combination of a table to support sheets of metal, shears adjustably mounted on said table and comprising a stationary cutter, a vertically movable yoke, a cutter secured thereto, pressers adjustably mounted on said yoke, and springs engaging said pressers and adapted to hold them below the lower edge of the movable cutter, whereby said pressers will engage the sheet metal and hold the same down on the table during the cutting operation.

7. The combination with a table, of shears mounted thereon, means to feed sheet-metal plates to said shears, and a spring operated rod for ejecting the waste strip remaining on said table after the shearing operations have been completed.

8. The combination of a table, sheet-metal shears mounted thereon, feeding mechanism for moving a sheet of metal two steps toward the shears and permitting a shearing operation between said steps, a second feeding mechanism for feeding the sheet two additional steps toward the shears and permitting a shearing operation between said steps, and means to operate said shears four times during the complete operations of the feeding mechanism.

9. The combination of a shaft, shears driven thereby, a second shaft driven by said first at a fraction of the speed of the first, a feeding device for moving sheet-metal plates intermittently to the shears, a second feeding device for intermittently feeding the sheet to the shears after the operation of the first feeding device has been completed, said shears operating at the end of each feeding step, and a cam secured to said second shaft for operating said feeding devices.

10. The combination of a table, a shear member secured thereto, a shaft mounted below said table, cams mounted on said shaft, a shear yoke mounted for vertical movement, a shear member secured thereto, means secured to said yoke and adapted to engage said cams whereby said cams may operate said shear yoke, springs to elevate said yoke, an auxiliary cam mounted on said shaft, a spring pressed device for engaging said cam, said auxiliary cam being so proportioned that said cam engaging device will assist the shaft in actuating said shear yoke in its operative stroke, and resist the action of said shaft on the return stroke of the shear yoke.

11. The combination of a table, a frame mounted thereon, shears mounted in the frame, a laterally movable bar slidably mounted in the frame, springs to so hold the bar as to determine the length of the article to be sheared, and means to move said bar laterally and away from the article to be sheared.

12. The combination of a table, shear frames secured thereto, a shear yoke mounted in said frames, a bar slidably mounted in said frame and normally positioned to determine the length of the articles to be sheared, and cams mounted on the yoke to force back said bar.

13. In a can blank machine, the combination of a table, shears mounted thereon, means for intermittently feeding sheets of metal to said shears, said feeding means receding during the shearing operation, a second set of feeding means to move said sheet metal in a similar intermittent manner, means to operate each set of feeding means independently of the other, and means to convey the can blanks from the shear.

14. In a can blank machine, the combination of a table, shears mounted thereon, two sets of longitudinally movable means for feeding sheets of metal to the shears, the feeding means of each set receding before the operation of the other set, means to operate each set of feeding means independently of the other, an ejector for the waste material, and means to actuate the ejector after the completion of the operation of both sets of feeding means.

15. In a can blank machine, the combination of a table, shears mounted transversely thereto, means to feed sheet-metal longitudinally of the table to said shears, means to longitudinally convey the blanks from the shears, means to bend one end of the blanks, and transversely operating means to eject the blanks from the side of the machine.

16. In a can blank machine, the combination of a table, shears mounted thereon and adapted to cut sheet-metal into can-body-blanks, a transversely movable ejector having one half of a die secured thereto, a

second half of the die mounted above the first, a conveyer to carry the blanks from the shears onto the ejector, and driving means to first operate the shears, then operate the conveyer to carry the blank between the dies, then operate the upper die to bend one end of the blank, and then operate the ejector to carry the blank out of the machine.

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

SAMUEL HOOKEY.
CHARLES H. HOOKEY

Witnesses:
JOHN F. MCINERNEY,
RICHARD E. CAHALAN.