No. 818,110. PATENTED APR. 17, 1906.

J. H. McELROY.

CAN MAKING MACHINERY.

APPLICATION FILED NOV. 10, 1903.

7 SHEETS—SHEET 1.

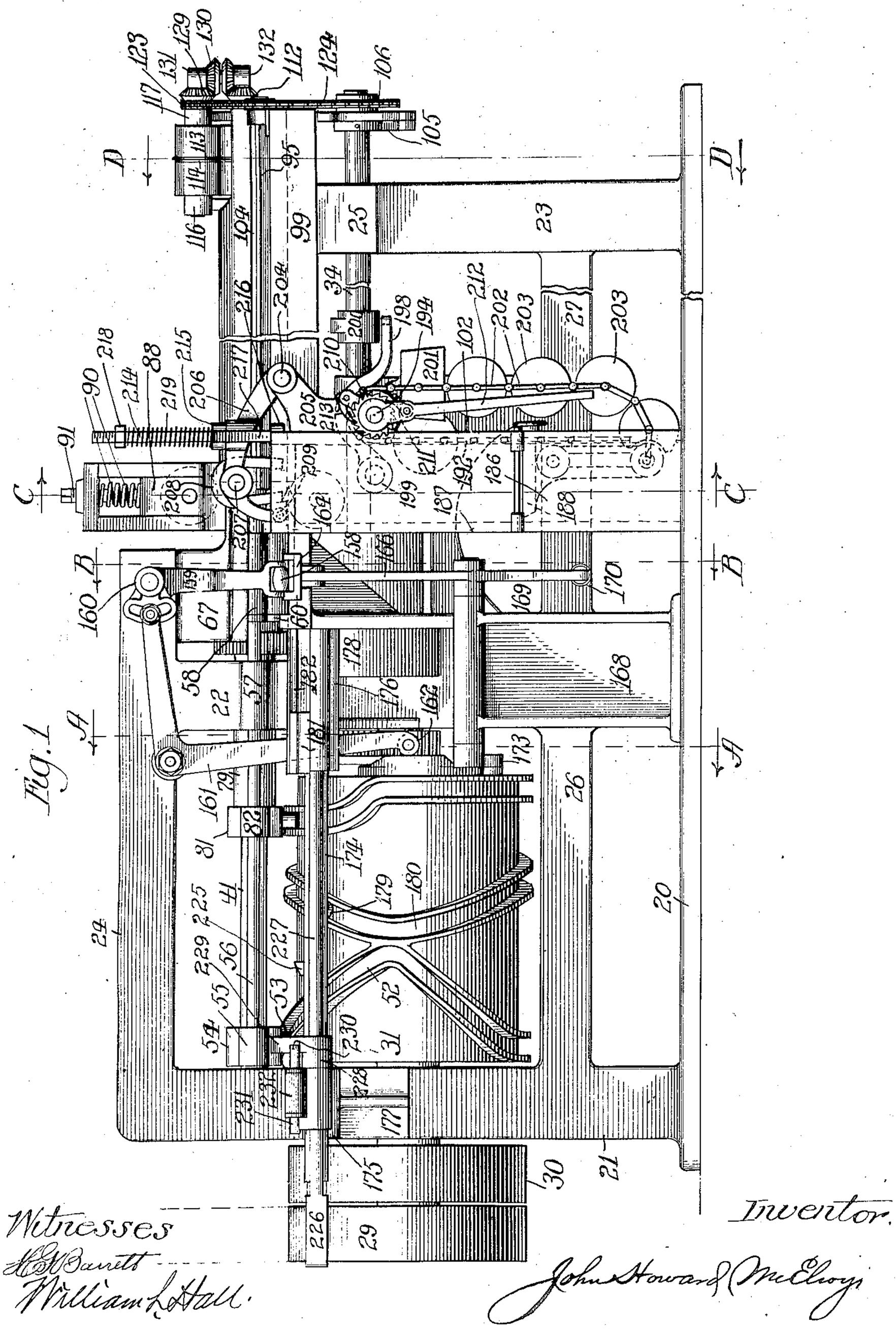

Fig. 1.

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7 SHEETS—SHEET 2.

Fig. 2

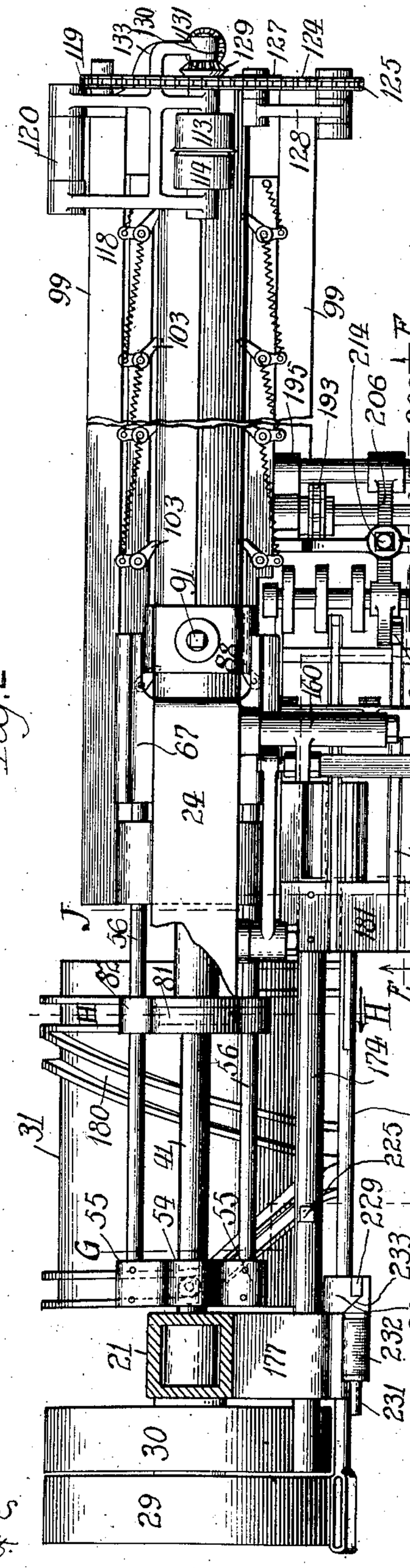


Fig. 16

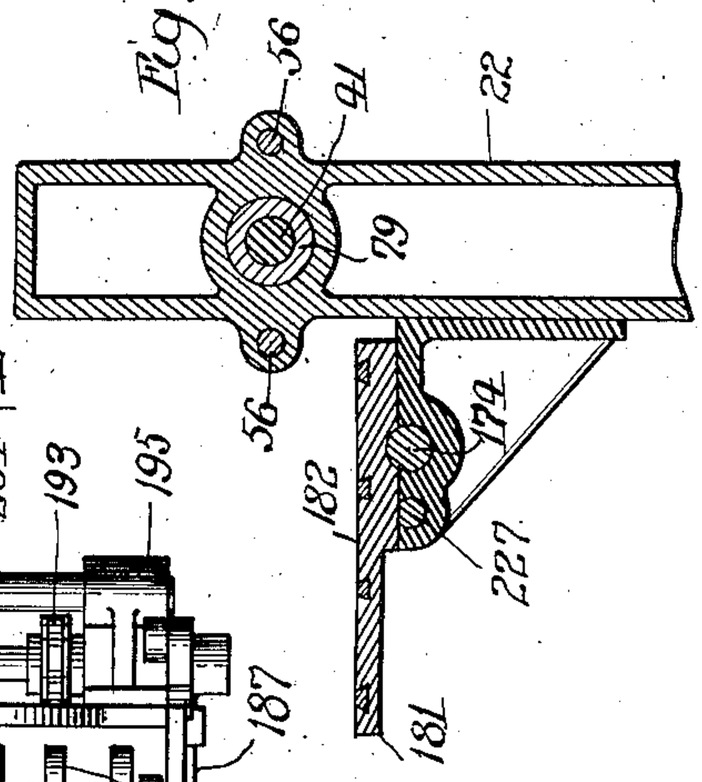


Fig. 15

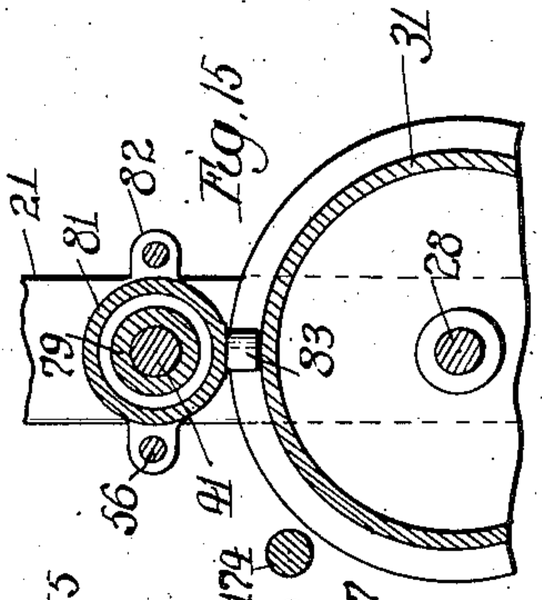
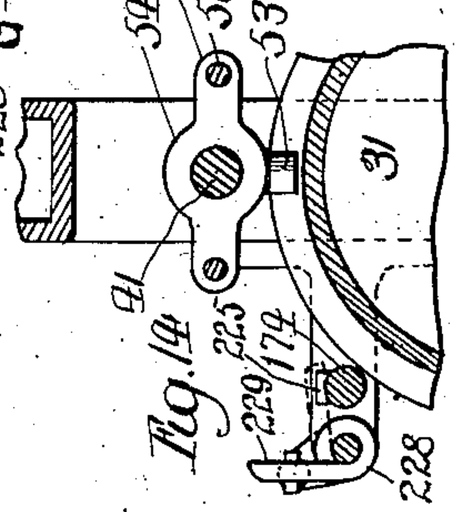


Fig. 14



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7 SHEETS—SHEET 3.

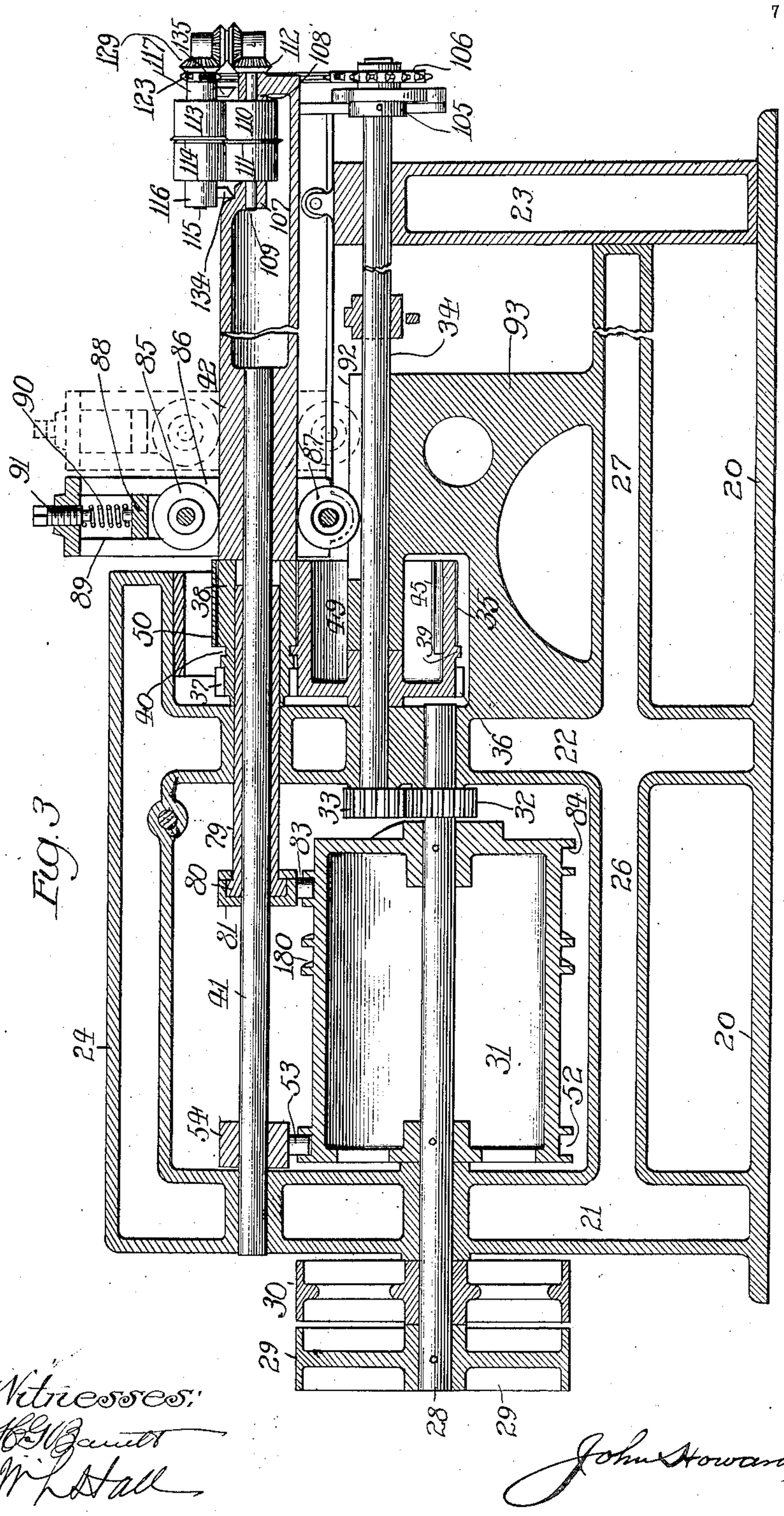

Fig. 3

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7 SHEETS—SHEET 4.

Fig. 6

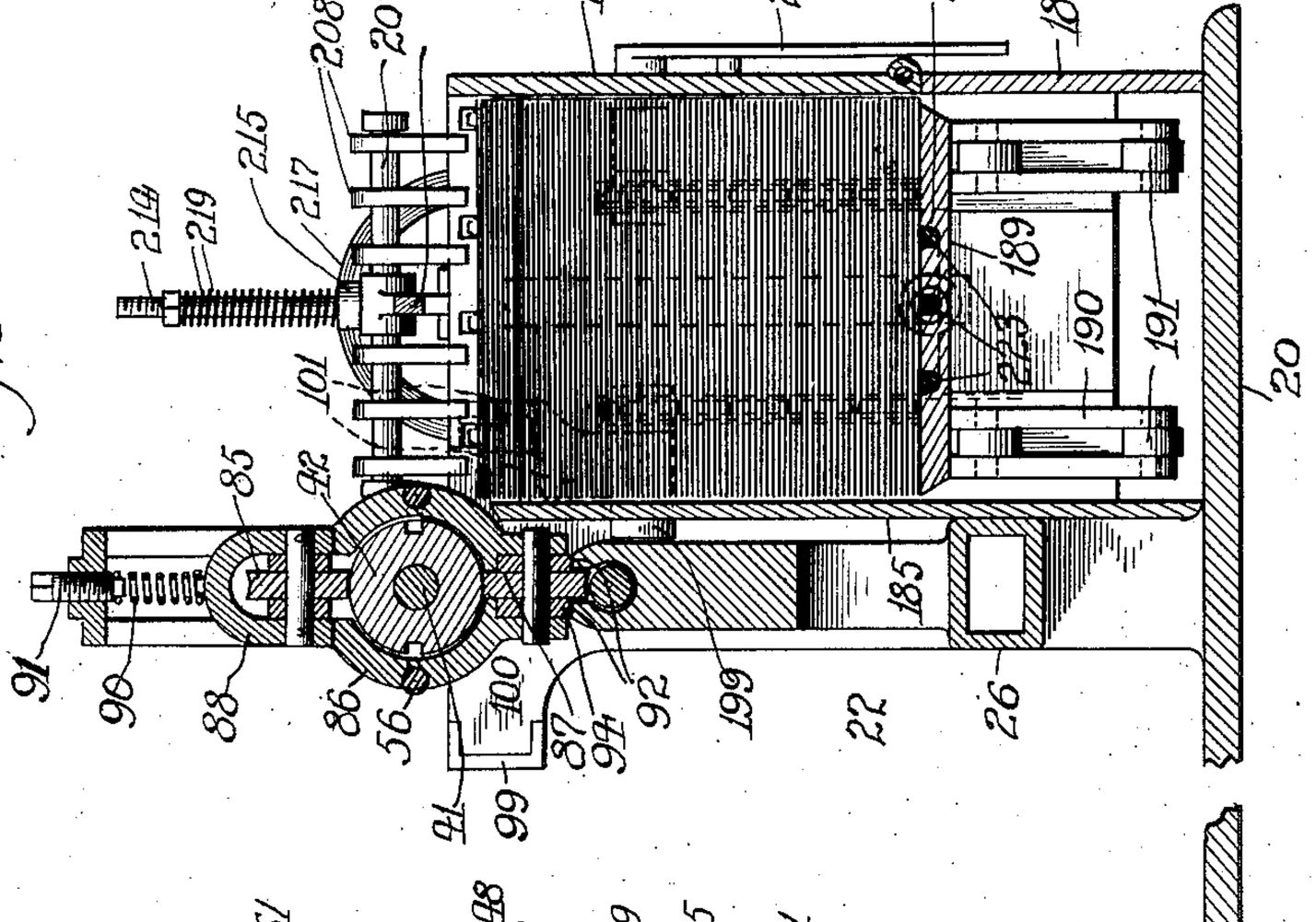


Fig. 5

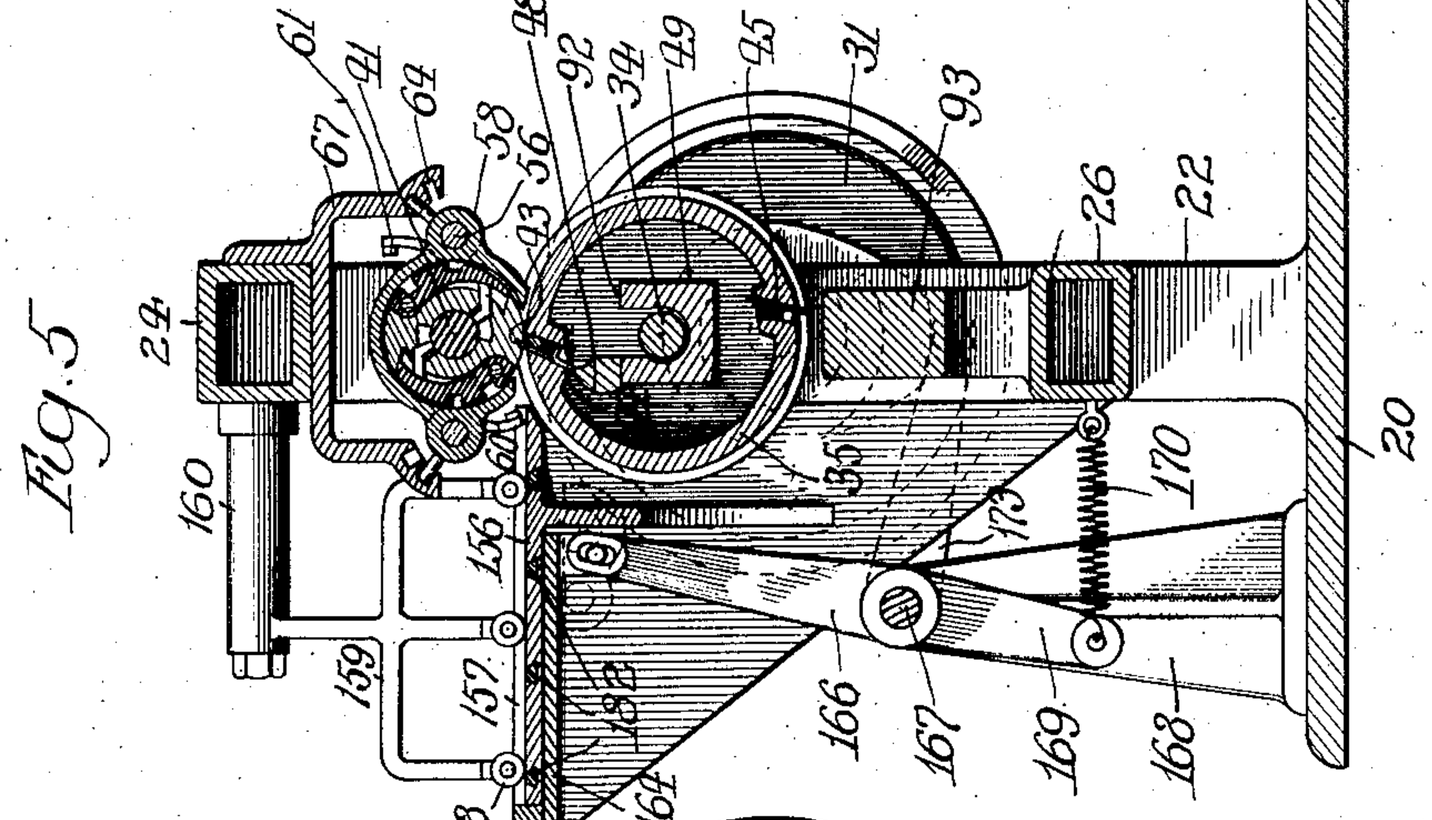
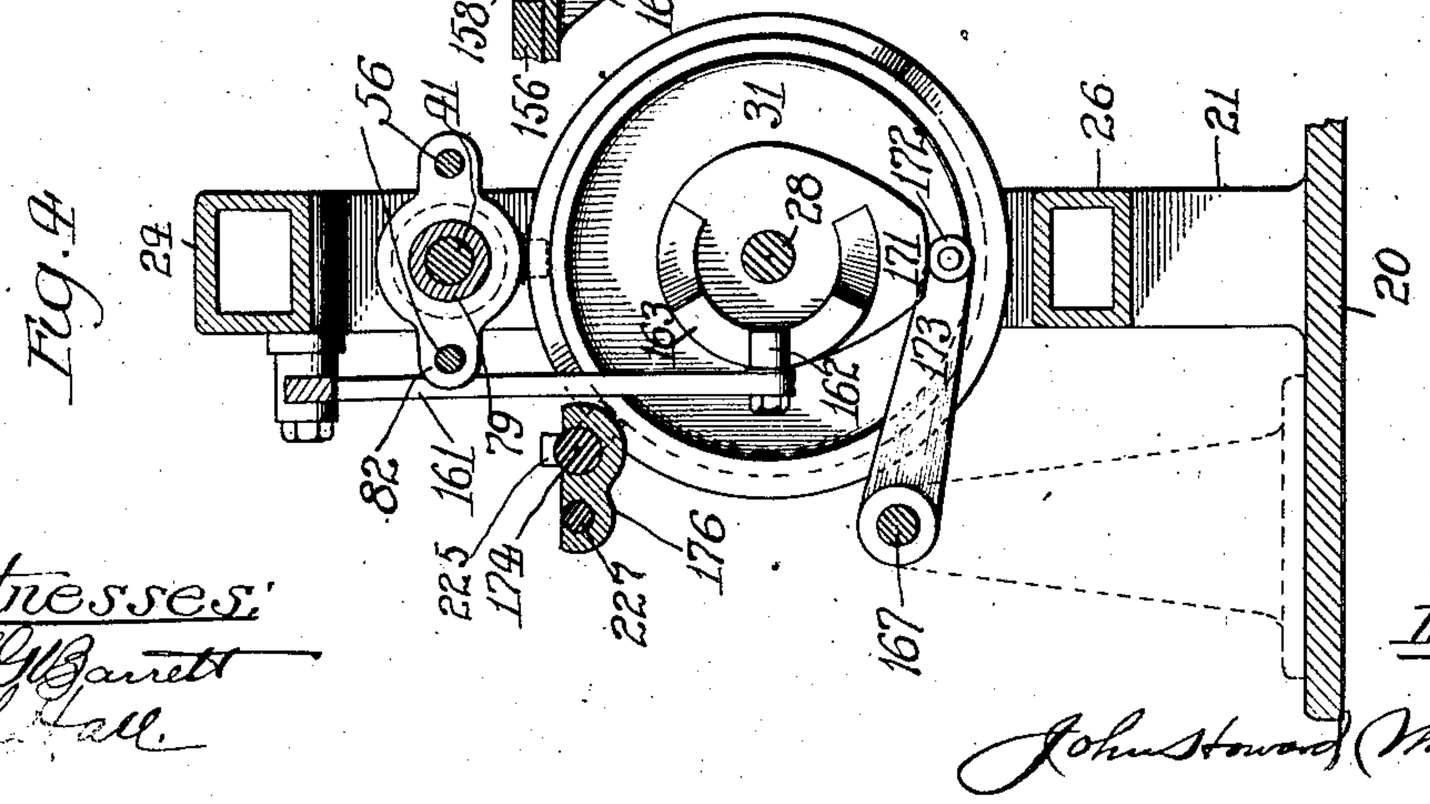


Fig. 4



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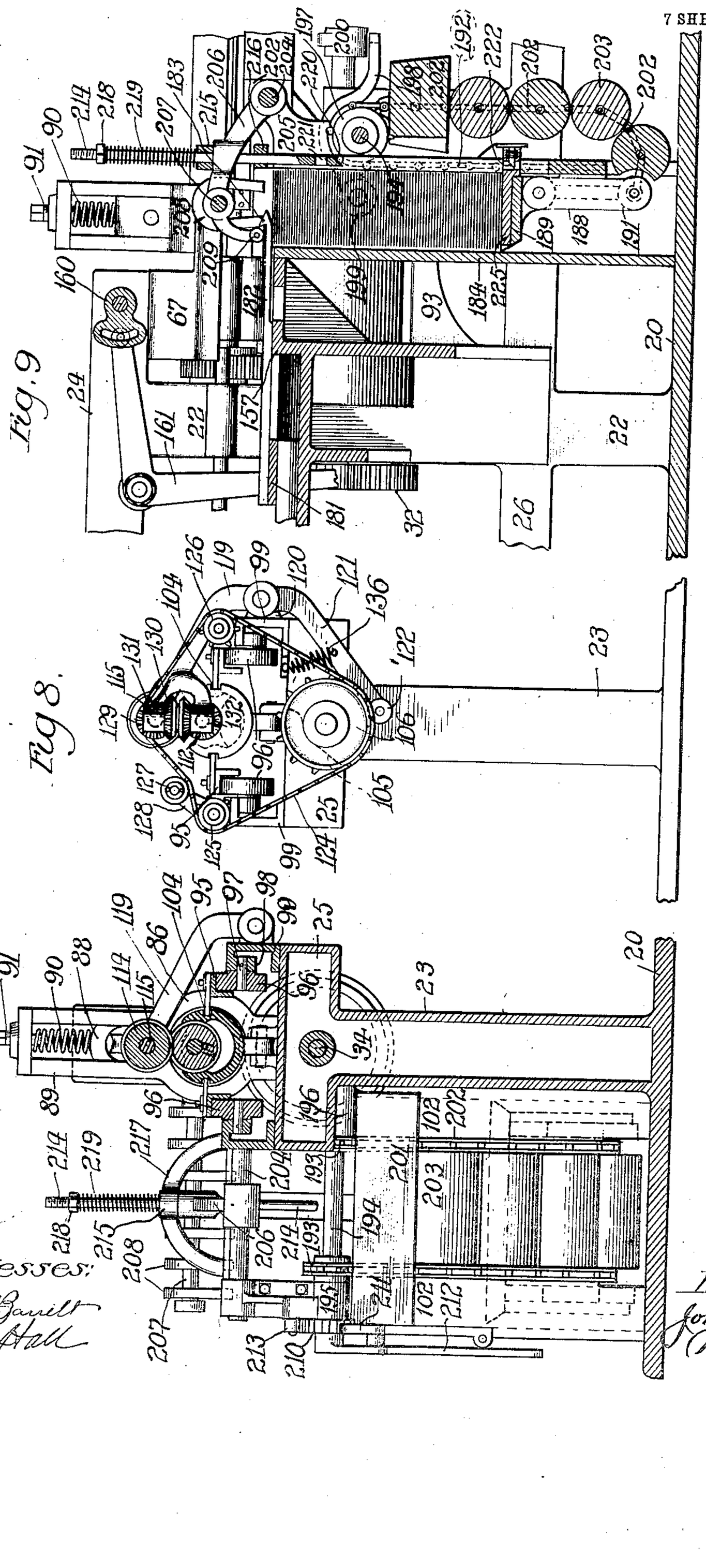
7 SHEETS—SHEET 5.



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7 SHEETS—SHEET 6.

Fig. 11

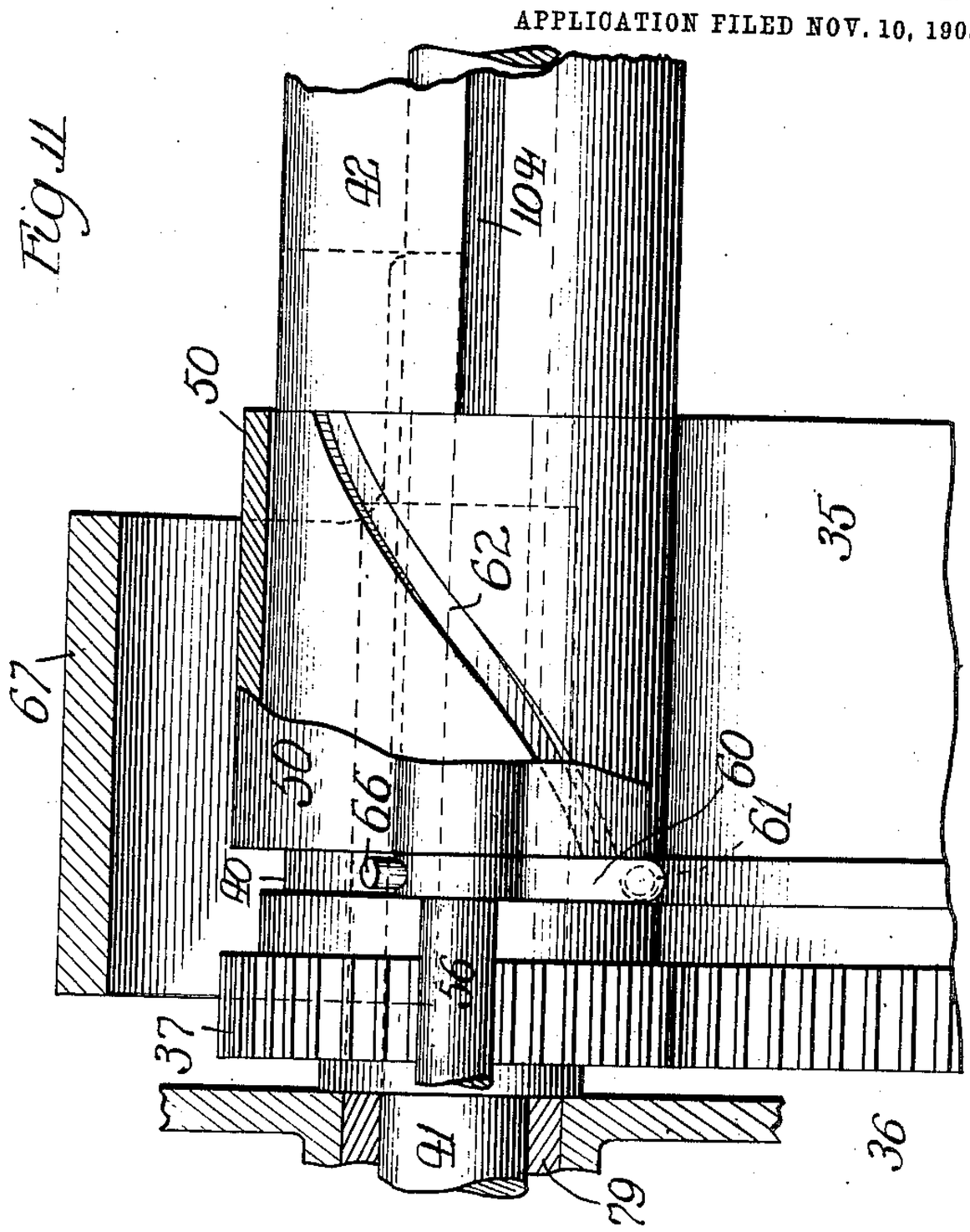


Fig. 12

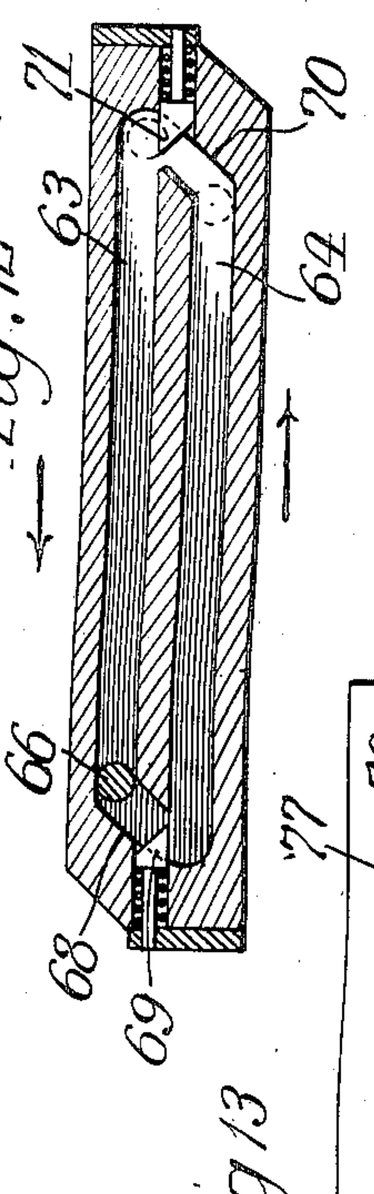


Fig. 13

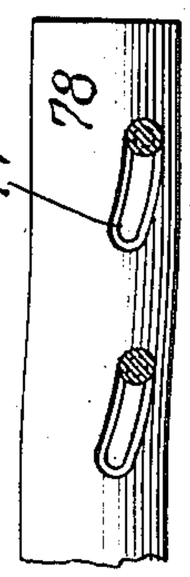
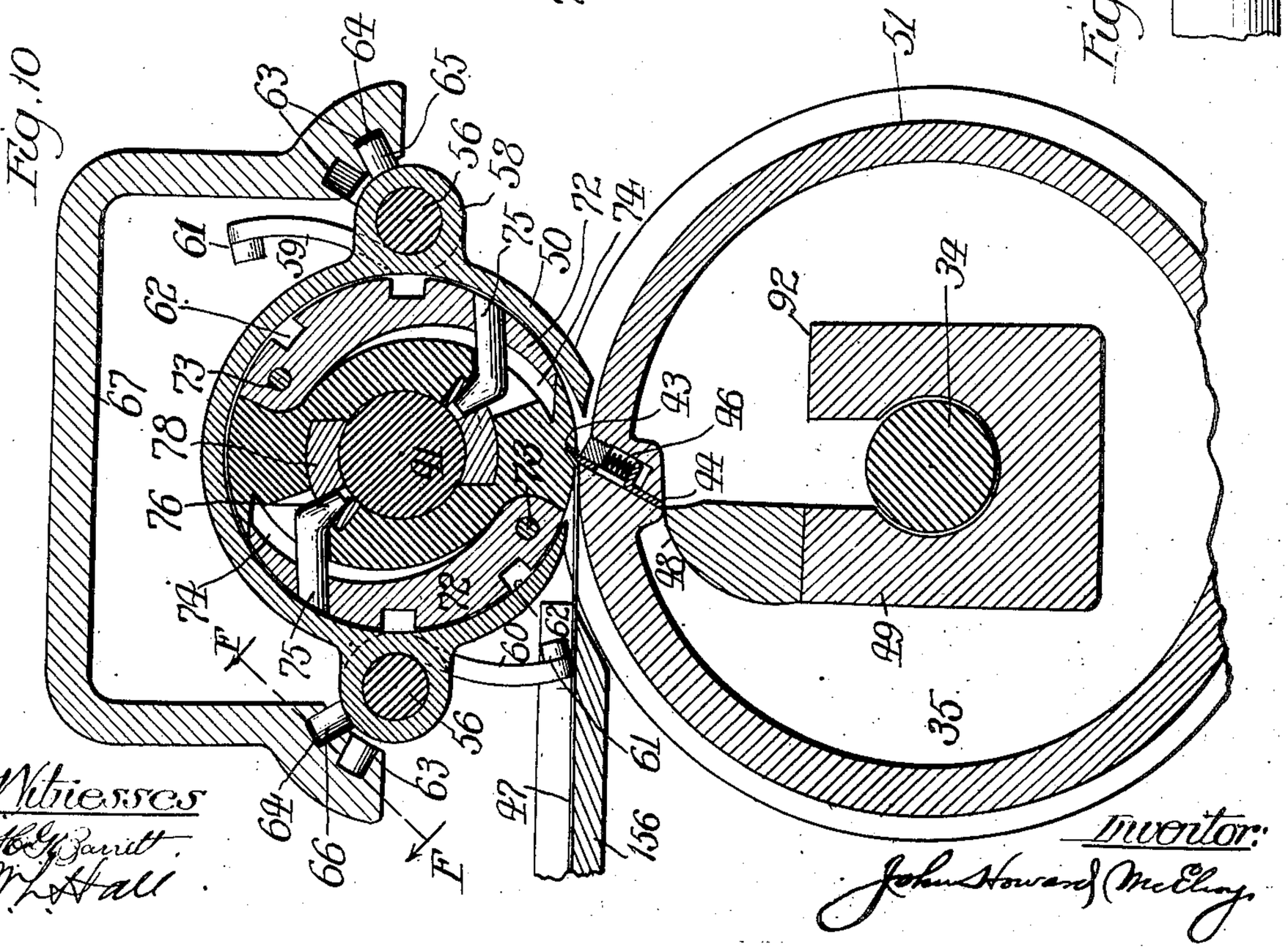


Fig. 10



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7 SHEETS—SHEET 7.

Fig. 19

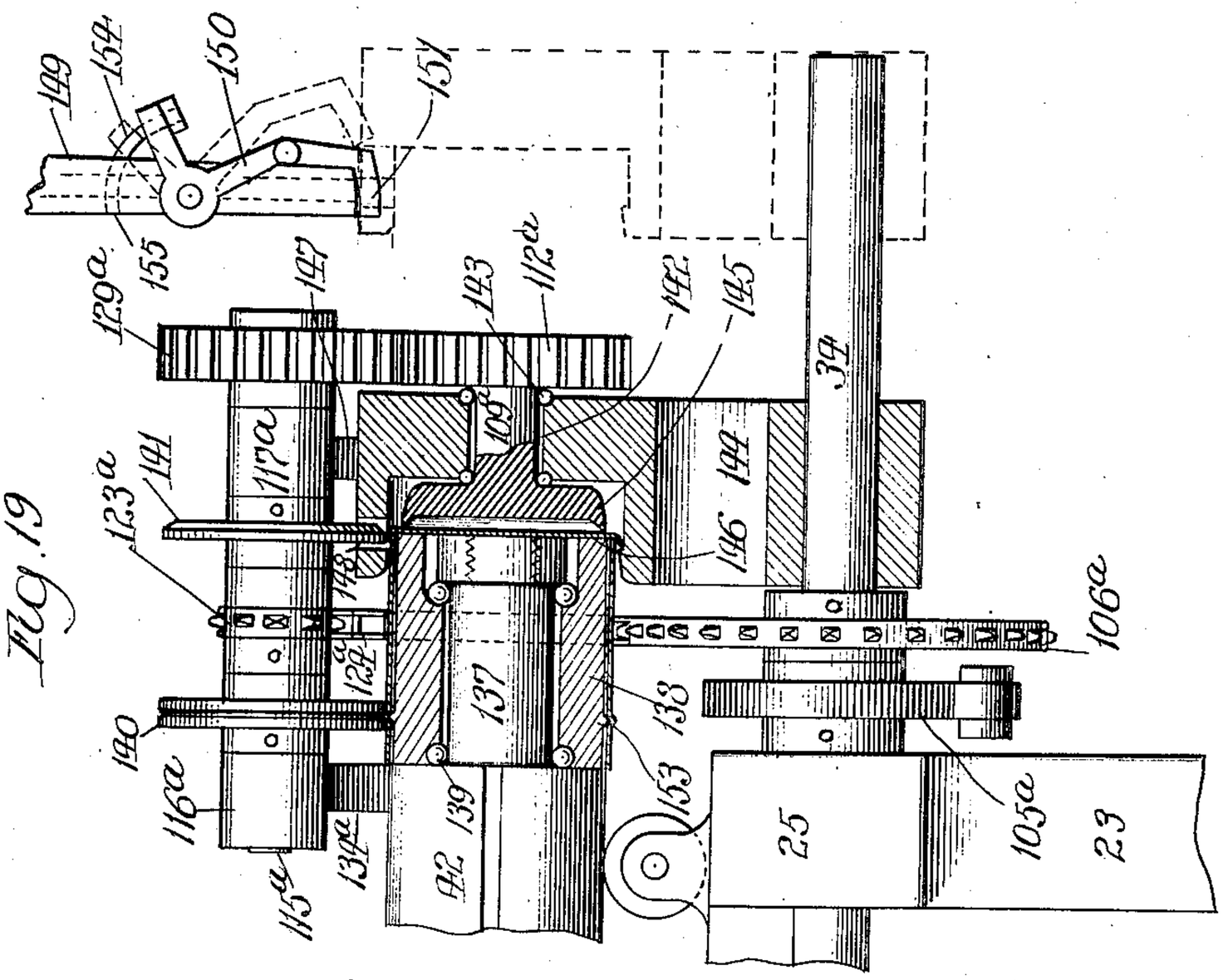


Fig. 18

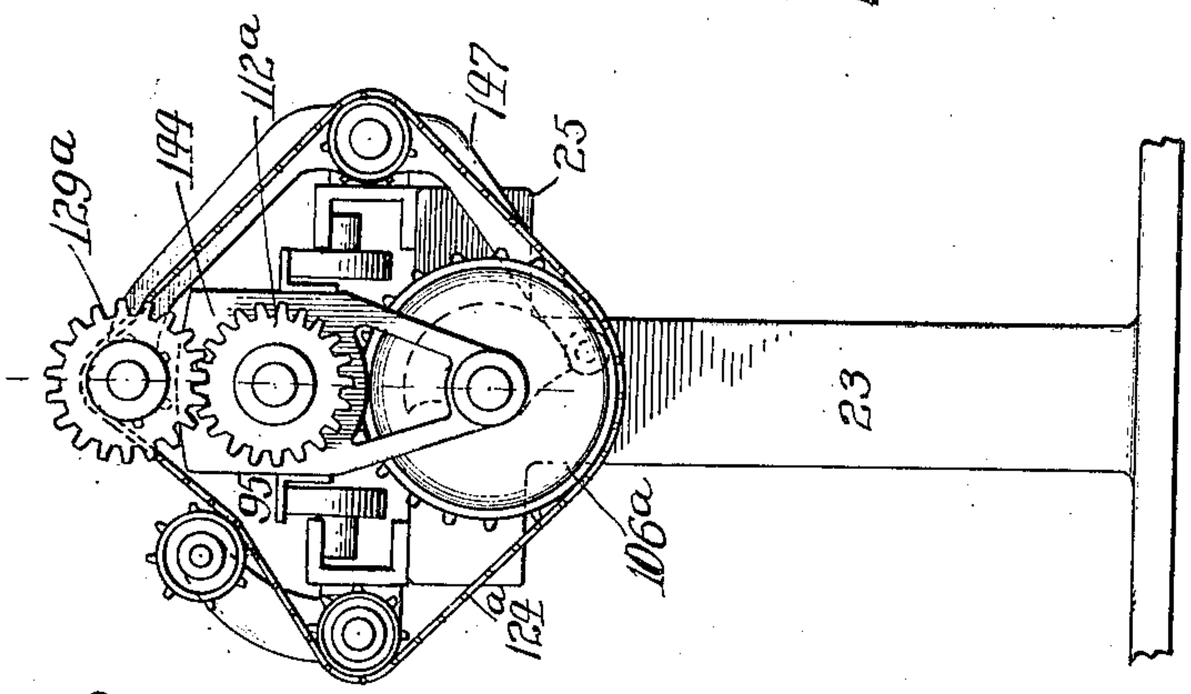
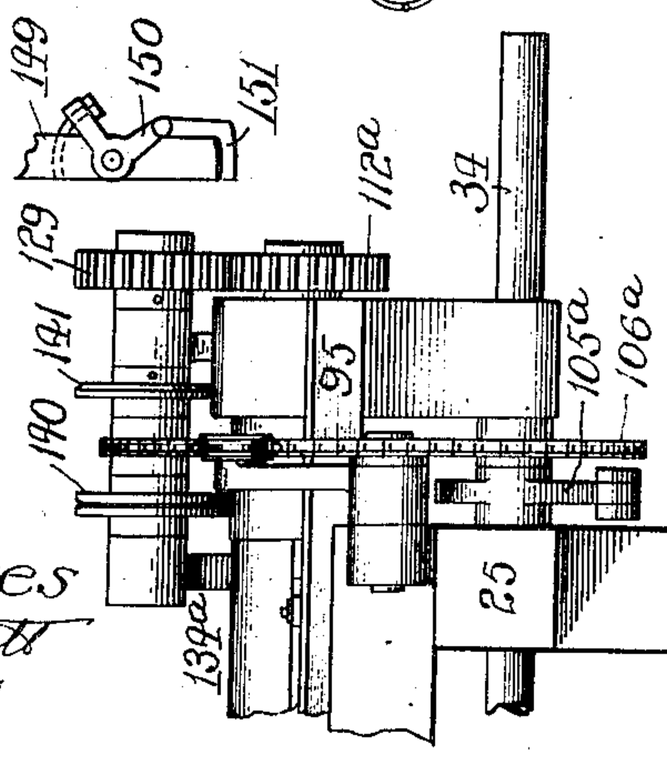


Fig. 17



Witnesses
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UNITED STATES PATENT OFFICE.

JOHN HOWARD McELROY, OF CHICAGO, ILLINOIS.

CAN-MAKING MACHINERY.

No. 818,110. Specification of Letters Patent. Patented April 17, 1906.

Application filed November 10, 1903. Serial No. 180,589.

To all whom it may concern:

Be it known that I, JOHN HOWARD McELROY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Can-Making Machinery, of which the following is a specification.

My invention is concerned primarily with certain improvements in a can-body machine of the type shown in my application, Serial No. 101,838, filed April 7, 1902, which are designed to increase its efficiency.

My invention is further concerned with a novel automatic feed which can be applied to any machine feeding similar blanks.

My invention further consists in a novel attachment which may be used to increase the output of the machine by making the bodies originally in multiple lengths and automatically cutting them into single can lengths before they are discharged from the machine.

My invention is finally concerned with a novel attachment by which the bottoms of baking-powder and similar cans may be attached to the body and the bead placed therein before it is discharged from the machine.

To illustrate my invention, I annex hereto seven sheets of drawings, in which the same reference characters are used to designate identical parts in all the figures, of which—

Figure 1 is a side elevation. Fig. 2 is a top plan view. Fig. 3 is a central vertical longitudinal section. Fig. 4 is a vertical section on the line A A of Fig. 1. Fig. 5 is a vertical section on the line B B of Fig. 1. Fig. 6 is a vertical section on the line C C of Fig. 1. Fig. 7 is a vertical section on the line D D of Fig. 1. Fig. 8 is an end view. Fig. 9 is a vertical section on the line E E of Fig. 2. Fig. 10 is an enlarged view of a portion of Fig. 5. Fig. 11 is a side elevation of a portion of the mechanism shown in Fig. 10. Fig. 12 is a detail view in section on the line F F of Fig. 10. Fig. 13 is a detail view of a portion of the mandrel-expanding slide. Fig. 14, Sheet 2, is a detail in section on the line G G of Fig. 2. Fig. 15 is a detail in section on the line H H of Fig. 2. Fig. 16 is a detail in section on the line J J of Fig. 2. Fig. 17, Sheet 7, is a side elevation of the discharge end of the machine, showing the attachment for putting on the bottom and beading the bodies of baking-powder cans. Fig. 18 is an end elevation of the same; and Fig. 19 is an enlarged detail of the same, partly in section.

For a framework to support the various elements, I preferably employ a base-piece 20, from which project upward the three standards 21, 22, and 23. The standards 21 and 22 extend higher than the standard 23 and are connected at the top by the longitudinal piece 24, which extends some distance beyond the standard 22. The standard 23 is provided at its head with a cross-piece 25, making the complete standard of a general T shape. The three standards may be connected by the longitudinal pieces 26 and 27.

Journaled in suitable bearings in the standards 21 and 22 is the horizontal driving-shaft 28, which carries the belt-pulley 29, rigidly secured thereto, and the loose pulley 30. The shaft 28 has secured thereon between its bearings the barrel 31, which I preferably employ as a support for the various actuating-cams with which the machine is provided, and immediately adjacent the inner bearing is secured the gear-pinion 32, which meshes with a similar gear-pinion 33, located above it and rigidly secured on the inner end of the shaft 34, which is journaled in suitable bearings formed in the standards 22 and 23.

Secured to the shaft 34 between the standards 22 and 23, and preferably immediately adjacent the standard 22, is the cylinder 35, which has the gear 36 on its end meshing with the gear-pinion 37 secured on the end of the mandrel 38, the gear 36 being twice as large as the gear 37, so that the mandrel 38 is rotated twice for each rotation of the driving-shaft 28 and the cylinder 35, the arrangement and operation of the mandrel and cylinder being the same as that illustrated in the modification of my aforesaid application, where the cylinder is supplied with a pair of tucking blades coöperating with the groove in the mandrel instead of the single one shown in the principal form. The cylinder 35 is provided with the annular flange 39, which cooperates with the correspondingly located and sized groove 40 in the mandrel to insure the two being kept in the proper relative position, the mandrel being journaled ultimately upon the rod or stationary shaft 41, which is secured in the standards 21 and 22 and which projects a considerable distance beyond the standard 22 and furnishes the support for the inner end of the horn 42, which is secured

thereto. As best seen in Figs. 5 and 10, the mandrel 38 is provided with the straight seaming-groove 43, with which coöperate alternately the sliding tucking-blades 44 and 45, mounted in the cylinder 35 and normally held inward therein by the helically-coiled expanding springs 46, suitably interposed between the blades and the cylinder.

The operation of forming the can may be stated briefly to be that a blank 47 is fed into the proper position to be gripped by the tucking-blade 44 and the groove 43, the tucking-blade being forced out at the proper time by the contact of its inner edge with the cam-surface 48, suitably supported on the portion 49 of the framework which extends into the body of the cylinder, which is open at one end, as best shown in Fig. 3. At the time the can is being formed the mandrel is surrounded by the shell 50, which extends as far around it as is possible without interfering with the passage of the cylinder and tucking-blades and is so close to the periphery of the mandrel as to prevent any possibility of the hook formed on the edge of the blank from springing out and escaping from the groove in which it is formed. As the rotation of the mandrel is continued the blank is wound snugly around it, and its other end at the end of the complete rotation overlaps the groove 43, already containing the hook formed on the other end, far enough so that as it in its turn is engaged by the tucking-blade 45 the seam will be completed in the manner described in the aforesaid application. At the end of the formation of the can the surface 51 of the cylinder which then passes beneath the mandrel during its next complete rotation is reduced so that it does not press against the can, and it is free to be shoved off of the mandrel during this second rotation onto the horn 42 by the mechanism to be described.

The discharge mechanism is controlled by the cam-groove 52, formed on the barrel 31, and which, through the medium of the anti-friction-roller 53, with which it coöperates, shoves the cross-head 54 forward and back during a portion of the second rotation of the mandrel, the forward movement serving to shove the can off. The cross-head 54 slides on the rod 41 and has projecting from the sides thereof the ears 55, in which are secured the rods 56, which extend through the horizontal bearings 57, secured to or formed integral with the sides of the standard 22. Toward the inner ends of these rods 56 are secured the cylindrical ears 58, which support and may be formed integral with the mutilated cylindrical shell 50, previously referred to. Immediately adjacent the shell 50 are pivoted the fingers 59 and 60, the fingers being preferably curved on the same arc as the shell 50 and being preferably provided with antifriction-rollers 61, which form the surface and engage the edge of the can and force it off of the mandrel. During the formation of the can on the mandrel the rollers 61 rest in the groove 40, formed in the surface of the mandrel, which is provided with a pair of helical grooves 62, which are of the proper pitch and properly located so that as the discharge apparatus starts forward the adjacent ends of the grooves are directly opposite the rollers 61, which enter therein and continue therein during their forward movement, the parts being properly timed for this purpose. At the end of the discharge movement of the mechanism the fingers are moved so as to swing the rollers out of the grooves, this arrangement being necessary in a machine where the mandrel rotates continuously, as in the form shown. The mechanism for effecting this result preferably consists of a pair of guiding-grooves 63 and 64, which receive the pins or antifriction-rollers 65 and 66, which project upward and outward from the hubs of the fingers 59 and 60. These grooves 63 and 64 are conveniently formed in the lower horizontal portions of a casting 67, which may be secured to the under surface of the forward extension of the piece 24 of the framework. The grooves 63 are properly located relative to the fingers so as to cause the rollers 61 to be in the plane of the grooves 62 when the pins 65 and 66 are in the grooves 63. At the end of the outward or discharge movement the pins 65 and 66 strike the inclined surfaces 68, which force them into the line of the groove 64, and their possible return into said groove as they start to move in the opposite direction is prevented by the spring-pressed latches 69, having the beveled faces, by contacting with which the pins shove them back until they are passed, after which they spring in and prevent the return of the pins into that groove. As the discharge mechanism is drawn back the pins 65 and 66 are in the grooves 64, and the fingers are held out of engagement with the mandrel, and at the end of their return movement a similar cam-surface 70 forces them back into the groove 63 against the resistance of a similar spring-latch 71. By the mechanism described it will be apparent that as the fingers move back and forth they are properly controlled for the purpose described.

In order to facilitate the discharge of the cans from the mandrel by lessening the friction, I may provide means for contracting the mandrel so as to reduce its effective area in cross-section while the discharge occurs; but it will be apparent that this mechanism must be arranged so that the mandrel will have its full cylindrical surface while the can-body is being formed thereon. For this purpose I form a considerable portion of the surface of the mandrel by the pair of similar wings 72, which are suitably pivoted to the body of the mandrel at 73 and are formed so that when they are expanded the outline of the mandrel

is a perfect cylinder, but the recesses 74 in the body of the mandrel in which the wings swing are of such size and shape as to permit the wings to swing inward, as clearly shown in Fig. 10. To cause the wings to swing inward at the proper time, I secure therein the fingers 75, the tips 76 of which extend into the cam-grooves 77, formed in the expanding members 78, which slide in correspondingly-shaped channels formed in the body of the mandrel and rotate with the same about the rod 41 as a bearing. The slides 78 project forward from and are extensions of the sleeve 79, which extends backward through the bearing in the standard 22 and terminates in a collar 80, which is embraced so as to be moved therewith by the cross-head 81, which has the ears 82, through which pass the rods 56, by which the cross-head is guided. The cross-head is moved outward to contract the mandrel just before the discharge movement occurs, and immediately after it is moved in the opposite direction, its movement being controlled by the antifriction roller or lug 83, extending downward therefrom into the cam-groove 84, formed on the surface of the barrel 31. To press the seam thus formed, I employ the novel mechanism best shown in Figs. 1, 3, and 6 and which consists, essentially, of a spring-pressed roller 85, mounted in the carriage 86, of the shape in cross-section shown in Fig. 6, and secured to the inner ends of the rods 56, with which it is moved back and forth at each operation of the machine. As it is moved outward it does not come in contact with a can-body; but during its return movement it almost immediately contacts with the can-body which has just been discharged and presses the seam thereof against the horn 42 as strongly as may be desired. It will be noted that the roller is so close to the shell 50, which moves simultaneously therewith, that the can-body is seized by the roller before it has had a chance to escape from the shell sufficiently to allow the seam to open. In order to balance the carriage and to prevent the pressure on the horn from tending to displace it and the rod 41, I oppose to the roller 85 a similar roller 87, which, however, is not spring-pressed, but is journaled in stationary bearings in the carriage, while the roller 85 is journaled in bearings formed in a yoke 88, which is free to slide in the ways 89, formed in the sides of the carriage. A heavy coiled expanding spring 90 is interposed between the top of the yoke 88 and the set-screw 91 in the top of the carriage, by which the tension of the spring is regulated. To further support the end of the horn and prevent any possibility of bending the rod 41, which would disarrange the position of the mandrel, I provide a pair of tracks 92, formed upon the portion 93 of the frame, and I journal upon the bottom of the carriage the rollers 94, which travel on the ways 92. To carry the can-bodies thus formed with their seams pressed along the horn 42, which may be provided with the customary fluxing and soldering attachments, if that kind of cans is to be made, I secure to the sides of the carriage 86 a pair of bars 95, which may be conveniently formed of strips of angle-iron and which virtually constitute extensions of the rods 56. At their outer ends and at intermediate points, if the horn is very long, I locate one or more pairs of rollers 96, upon which the angle-bars 95 are supported. These rollers are conveniently supported by the pins 97, secured in the ears 98, formed or secured in the channel-bars 99, which are supported at their outer ends on the cross-piece 25 of the standard 23, and one of them is supported at its inner end from a bracket 100, extending out from the side of the standard 22. The other one is supported at its inner end on a bracket 101, projecting outward from the side 102 of the blank-feeding mechanism, to be described. The bars 95 have suitably located on their upper surfaces the yielding spring-pressed pawls 103, the noses of which travel in the channels 104, formed in the sides of the horn 42 and serve to advance the cans along the horn in the manner well known in this class of devices. The fit of the cans on the horn is snug enough to prevent their moving backward from the friction of the pawls 103, as their springs are weak. The can-bodies thus formed may be, if desired, fluxed and soldered on the horn and then discharged therefrom without any further operation. I contemplate, however, increasing the capacity of the machine by making the can-bodies of a double or triple length and providing mechanism at the end of the horn for cutting them into single lengths. For this purpose I provide the mechanism best shown in Figs. 1, 2, 3, 7, and 8, where it will be seen that the shaft 34 is extended beyond its bearing in the standard 23 and has on its outer end the cam-disk 105 and sprocket-wheel 106. Journaled in bearings 107 and 108, formed on the outer end of the horn 42, is the shaft 109, which carries the cylinder 110, which is provided with one or more cutting-disks 111, depending on how many parts the single cylnder is to be cut into. A bevel-gear pinion 112 is secured to the outer end of the shaft 109, and coöperating with the cylinder 110 and shearing-disk 111 is a similar cylinder 113 and shearing-disk 114, which are mounted upon the shaft 115, journaled in the bearings 116 and 117, formed on the ends of the arms 118 and 119 of a frame which is pivoted in a bearing 120, secured on the side of one of the channel-bars 99. This frame has an arm 121 (best shown in Fig. 8) extending downward beneath the shaft 34 and provided with an antifriction-roller 122, which coöperates with the cam 105. Secured on the shaft 115 outside of

the bearing 117 is a small sprocket-wheel 123, which is driven from the sprocket-wheel 106 by means of the sprocket-chain 124, which is guided and positioned by the sprocket-wheel 125 and 126, suitably mounted on bearings supported by the channel-bars 99. A chain-tightener 127, mounted upon the arm 128, serves to keep the chain taut during the operation of the apparatus and to permit of the frame being swung up to separate the rollers when the can is being discharged. Adjacent the sprocket-wheel 123 is the bevel-gear pinion 129, which meshes with the double-faced sprocket-wheel 130, which is journaled in bearings 131 and 132, supported from the arm 133, extending from the cylinder-supporting frame.

Projecting downward from the under surface of the bearings 116 and 117 is a pair of cam-fingers 134 and 135, which serve to accurately position the last can which has been delivered prior to the engagement of the cutting-disks with the tin. The operative face of the cam 105 is abrupt, so that the cutting-disks are brought together with sufficient force to sever the can at the point of contact, and as the disks are rotated in unison through the mechanism described their continued rotation serves to cut the can-cylinder into the two or more lengths provided for. When the cutting is completed, the frame carrying the cylinder 113 is swung up under the stress of the strong coiled contractile spring 136, connecting one of the channel-bars 99 and the arm 121, thus permitting the discharge of the severed sections, the double bevel-gear 130 and its bearing 132 being raised out of the way of the sections, which are discharged the same as if they were a single can-body.

In case it is desired to use the machine for manufacturing baking-powder and similar cans, in which the bottom is merely crimped on and not soldered and the can-body is provided with a bead, I add the mechanism illustrated in Figs. 17, 18, and 19, where it will be seen that the horn 42 terminates in a reduced portion 137, upon which is journaled a cylinder 138, slightly smaller in diameter than the horn and preferably having the roller-bearings 139, so that it may rotate with perfect freedom. In this construction the cam-disk 105^a and the sprocket-wheel 106^a are secured on the end of the shaft 34 and are similar to the cam-disk 105 and sprocket-wheel 106, except as they are necessarily modified for the purpose of the present mechanism. Similar bearings 116^a and 117^a, carried by similar arms 118^a and 119^a, have the shaft 115^a journaled therein and provided with the beading-roller 140 and the crimping-roller 141, the shaft having further secured thereon the sprocket-wheel 123^a, connected with the sprocket-wheel 106^a by the sprocket-chain 124^a. On the outer end of the shaft a gear-pinion 129^a is secured and when the frame is lowered meshes with a gear-pinion 112^a, which is secured on the end of the short shaft 109^a, journaled in a bearing 142, preferably formed with the antifriction-rollers 143, formed in the carriage 144, which is secured to and moves with the outer ends of the angle-iron bars 95. The inner end of the shaft 109^a is provided with the chuck 145, suitably shaped to engage the can-bottom 146, which is dropped into the hood 147, forming the upper portion of the carriage 144, through the aperture 148 in the upper surface thereof. The supply of can-bottoms is furnished by the chute 149, whose interior dimensions are of the proper size to permit a single line of can-bottoms to occupy it, the bottom of the chute being normally closed by the gravity-detent 150, having the ledge 151 normally standing beneath the bottom thereof, but adapted to be contacted by the end of the carriage as it is moved back to the dotted-line position of Fig. 19 and swung back so as to permit of a single can-bottom being dropped through the aperture 148 into the hood. The lip 152 of the hood is sufficient to prevent the uncrimped bottom from escaping, and as the carriage 144 is moved back to the full-line position the bottom is properly pushed onto the can body on the cylinder 138 prior to the descent of the frame. As the frame descends however, the crimping-roller 141, rotating rapidly and coöperating with the rotating can body and bottom, serves to crimp the latter into position, and at the same time the beading-roller 140, coöperating with the beading-flange 153, serves to form the bead in the manner customary with this class of devices. When the detent 151 is swung into the dotted-line position, the pair of prongs 154, penetrating oppositely-located apertures 155 in the chute 149, serve to prevent the descent of another can-bottom until the carriage is retracted. It will be observed that the extended end of the rod 34 serves as a guide for the movement of the carriage 144.

To feed the blanks to the machine, I preferably employ the feeding apparatus best shown in Figs. 1, 2, 4 to 7, and 9. The blanks are received on a feed-table 156, having a guiding ledge or flange 157, against which the blanks are carried and positioned by the rollers 158, carried by the forked lever 159, having the hub 160, by which it is journaled on the frame, and provided with the arm 161, having a bearing-surface, preferably an antifriction-roller 162, engaging with the cam 163, formed or secured on the end of the barrel 31. When the blank placed on the table 156 has been shoved against the ledge 157 by the mechanism described, the slide-bar 164, having the adjustable abutment 165 at its end, is swung inward by the movement of its lever 166, which is mounted on the shaft 167, mounted to rock in a bearing formed in the pedestal 168, and provided with the arm 169,

through which the spring 170 acts to return the slide 164 to its outward position after it has been moved inward by the action of the cam 171, coöperating with the antifriction-roller 172 on the arm 173, secured to the shaft 167. The feeding mechanism thus far described, which is not automatic, is the same as that shown in my aforesaid application, Serial No. 101,838.

To deliver the blanks one by one automatically to the table 156, I provide the sliding rod or bar 174, which is mounted to slide in the bearings 175 and 176, supported by the brackets 177 and 178, secured on the standards 21 and 22, respectively. The rod 174 is provided with the projection, preferably an antifriction-roller, 179, which, coöperating with the cam-groove 180 on the barrel 31, serves to reciprocate the bar 174 once at each operation of the machine. The bar 174 has secured on its inner end the cross-head 181, which has the plurality of elongated fingers 182 secured thereto, extending through apertures in the ledge 157 and sliding in correspondingly-shaped, preferably dovetailed, channels formed in the surface of the table 156. Their outer ends are provided with the hooks 183, which engage and draw the blanks one by one onto the table as they are delivered to the fingers by the mechanism to be described.

Referring now especially to Figs. 6, 7, and 9, the blank-holder is of a generally rectangular shape and formed by the front wall 102, rear wall 184, the inner side wall 185, and outer side wall 186, a portion of which is in the form of a door 187, which can be swung down in reloading the holder. The blanks are supported upon a carriage 188, having the horizontal cross-piece 189 and the pairs of elongated downwardly-projecting ears 190, between which are journaled the pairs of antifriction-rollers 191, which rest against the edges of the wall 102 as the carriage moves up and down in the holder. To automatically raise the blanks without the employment of any mechanical actuating mechanism, I provide a counterbalance mechanism, which consists of a pair of sprocket-chains 192, which are secured at one end to the carriage and which extend up over a pair of sprocket-wheels 193, secured on the shaft 194, journaled in the bearings 195 and 196, projecting forward from brackets secured on the front wall 102. Secured to the end of the shaft 194 immediately adjacent the inner wall 185 is the friction-disk 197, with which coöperates the friction or brake lever 198, pivoted at 199 to a stud on the wall 185 or to the portion 93 of the frame. The free end of the lever 198 is turned inward and stands in the plane of the cam 200, secured on the shaft 34 and shaped and located so as to force the lever 198 down on the disk 197 with sufficient force to prevent any movement of the blank during a certain period of the operation of the machine. Secured to the other ends of the chains 192 is the weight 201, which in the form of mechanism shown is equal in weight to one-half of the weight of the blanks when the apparatus is completely loaded. Secured to another pair of chains 202, which are connected at their upper ends to the weight 201 and at their other ends to the carriage 188, is another set of weights 203, preferably in the form of heavy metal cylinders, whose combined wieghts are equal to the weight of the weight 201, the total combined weights opposed to the blanks being equal to their weight and sufficient more to overcome the inertia of the apparatus and slightly overbalance the same, so that the blanks always tend to rise. As the blanks are taken off it will be apparent that their weight decreases, and if the ordinary construction of a counterbalance were employed, as the supply of blanks diminished they would become very much overbalanced and the upward pressure would become too great, and for this reason I employ an automatic compensating arrangement, as shown, which compensates for the loss of the blanks by swinging a portion of the weight, that of the weights 203, from one side of the balance to the other, so that the pressure tending to raise the blanks is kept substantially uniform no matter what number of them are removed. The overbalanced mechanism shown serves to press the blanks upward and against the under surface of the fingers 182, when they are over the pile, and when they are withdrawn from the pile the cam 200, acting on the arm 198 and friction-disk 197, prevents the further upward movement of the supply of blanks, which is thus regulated automatically. Any desired form or separating mechanism to disengage the topmost blank from the others may be employed in connection with the mechanism thus shown for keeping the blanks at the proper level; but I preferably employ the extremely-simple mechanism shown, where a supporting-rod or rock-shaft 204 is mounted in bearings formed in the brackets 205 and has pivoted thereon the supporting-arm 206, which carries the bar 207, extending over the tops of the blanks and which supports the lifters, which may be of any desired form, pneumatic or magnetic, and which may consist of the permanent horseshoe-magnets 208 shown. The arm 206 extends downward and at its free end is provided with the antifriction-roller 209, which preferably rests on the central one of the fingers 182. As the fingers reach their innermost position the roller 209, which has been raised by the hook of the finger, upon which it rests, drops and permits the lifters to drop upon the uppermost blank, which adheres thereto. As the fingers return the hook raises the antifriction-roller

209 in advance of its passing beneath the blank, which is thereby raised above the plane of its nose, and as the hooks continue inward they pass beneath the blank and eventually beyond it, after which it drops down on the tops of the fingers, where it remains and is pulled off of the lifters as the fingers are drawn toward the table 156 to deposit the blank thereon.

To facilitate the raising of the weights 201 and 203 when the apparatus is to be recharged, I secure on the end of the shaft 194 a ratchet-wheel 210, with which a detent-pawl 211 may be thrown into engagement when it is to be used. A lever 212 is hung on the end of the shaft and has the spring-pressed pawl 213 thereon, which can be swung into engagement with the ratchet-wheel, and by the use of the lever the necessary power can be applied to the shaft 194 to rotate it to raise the weights, lower the carriage, and permit a fresh supply of blanks being placed thereon.

As similar devices have been constructed, no provision has been made for supplying blanks to the machine as it is being recharged, and for this purpose I provide what may be called an "auxiliary feed," which consists of a rod 214, adapted to slide through vertical bearings 215 and 216, supported by the yoke 217, secured to or forming a continuation of the front wall 102 of the blank-chamber. Interposed between an adjustable nut 218 on the top of the rod 214 and the bearing 215 is the helically-coiled expanding-spring 219, which tends to hold the rod 214 upward. The lower end of the rod 214, as seen in Fig. 9, has the beveled face 220 and the recess 221, the beveled face and recess being adapted to cam aside and receive the end of the spring-pressed latch 222, secured in the end of the three-forked supporting-piece 223, the forks of which rest in the U-shaped apertures 224, formed in the upper surface of the plate 189. The operation of this auxiliary feed will be readily apparent. When the supply of blanks is nearly exhausted, the parts being in the position shown in Fig. 9, the attendant presses down the rod 214 against the resistance of its spring until it engages with and fastens itself to the supporting-fingers 223, the tension of the spring being adjusted, so that it holds the remaining blanks pressed upward with about the same force as the regular mechanism. The remaining blanks being thus supported, it will be apparent that the attendant can now proceed to the recharging of the machine without interfering at all with the operation thereof.

When the supply of blanks is exhausted, if the attendant should be away from the machine it is desirable to stop it and preferably to sound an alarm, and for the purpose of stopping it I employ the mechanism best shown in Figs. 1, 2, 4, and 14, where it will be seen that I mount to slide in the bearings 175 and 176, which support the slide 174, a parallel sliding rod or bar 225, the outer end of which terminates in the slotted yoke 226, which embraces the belt, which in operation is on the fixed wheel 29. Secured on the rod 174 is the lug 227, whose inward face is vertical, while its outward face is inclined. Mounted on the rod 225 is the latch 228, whose vertical arm 229 in its operative position rests against the end 230 of the core 231 of a solenoid 232, which is supported on the bracket 175. The reduced end 230 is immediately adjacent an inclined surface 233, which, as the solenoid is energized and the core drawn inward, serves to tilt the latch 229 over to the dotted-line position of Fig. 14, where it is engaged by the lug 227 when the rod 174 comes back, and which engagement serves to carry the rod 225 inward with the rod 174 as it returns, thus drawing the belt from the fast to the loose pulley, and thus stopping the machine. The solenoid 232 is of course in an electric circuit which is closed when the last blank is exhausted conveniently by a mechanism such as is shown in my Patent No. 793,212, dated June 27, 1905.

While I have shown and described my invention as embodied in a structure in which a tucking-blade movable in a cylinder is employed, I do not desire the claims to be interpreted as limited to a movable tucking-blade, as I contemplate employing a stationary one. Furthermore, while I have shown and described a cylindrical mandrel, it will be obvious that a truncated conical one might be employed, in which case the coöperating cylinder would also be of a truncated conical form or the mandrel might be square, rectangular, elliptical, or oval or other irregular shape in cross-section, and straight or pyramidal, as desired, in which case the coöperating face of the cylinder would be quadrilobate, elliptical, with its major axis transverse to the major axis of the mandrel, or in general of a shape such that the surfaces of the mandrel and cylinder will be engaged (except for the thickness of the blank) during the forming rotation of the mandrel. Consequently when I mention a cylinder in the claims as coöperating with the mandrel it will be understood that I do not desire to be limited to a true cylinder, but only to a surface of the necessary shape to coöperate in the manner described with the mandrel.

While I have shown and described my improvements and inventions in the form which I at present consider best adapted to carry out their purposes, it will be understood that they are capable of modifications, and that I do not desire to be limited in the interpretation of the following claims except as may be necessitated by the state of the prior art.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a can-body machine, the combination with the bearing-rod, of the grooved mandrel mounted to rotate on one end thereof and having the gear secured thereto, the coöperating cylinder carrying the tucking-blade and having the gear meshing with the first gear, a shaft parallel to the bearing-rod, and carrying a cam, discharge mechanism coöperating with the mandrel, guided by the bearing-rod, and operated by the cam, and gear connections between the shaft and the cylinder.

2. In a can-body machine, the combination with the mandrel having the straight and helical grooves therein and the coöperating cylinder having the tucking-blade cooperating with the straight groove, of means for rotating the mandrel and cylinder in unison, discharge mechanism consisting of a finger adapted to be moved forward in the helical groove, and means for moving said finger forward in the proper time and for moving it out of the plane of the groove as it is returned.

3. In a can-body machine, the combination with the mandrel having the straight and helical grooves therein and the coöperating cylinder having the tucking-blade coöperating with the straight groove, of means for rotating the mandrel and cylinder in unison, discharge mechanism consisting of a finger adapted to be moved forward in the helical groove, means for moving said finger forward in the proper time and for moving it out of the plane of the groove as it is returned, and a roller journaled on the end of the finger and forming the contact-surface.

4. In a can-body machine, the combination with the mandrel having the groove therein and the cylinder having the tucking-blade coöperating with the groove, of discharge mechanism coöperating with the mandrel, and means for diminishing the effective cross-sectional area of the mandrel while the discharge mechanism is operating.

5. In a locked-seam can-body machine, the combination with the rotatable mandrel about which the can-body is formed by the rotation thereof, of the hook-forming mechanism coöperating therewith to engage the ends of the blank about the mandrel, blank-feeding mechanism for feeding the blank in lines first parallel and then transverse to the axis of the horn, and means for rotating said mandrel and operating said mechanisms in the proper sequence and synchronism.

6. In a locked-seam can-body machine, the combination with the rotatable mandrel about which the can-body is formed by the rotation thereof, of the hook-forming mechanism coöperating therewith to engage the ends of the blank about the mandrel, seam-pressing mechanism, blank-feeding mechanism for feeding the blank in lines first parallel and then transverse to the axis of the horn, and means for rotating said mandrel and operating said mechanisms in the proper sequence and synchronism.

7. In a locked-seam can-body machine, the combination with a rotatable mandrel about which the can-body is formed by the rotation thereof, of a hook-forming mechanism coöperating therewith to engage the ends of the blank about the mandrel, seam-pressing mechanism coöperating with the can on an extension of the mandrel, blank-feeding mechanism for feeding the blank in lines first parallel and then transverse to the axis of the horn, body-feeding mechanism for moving the body from the mandrel proper to the extension, and means for rotating said mandrel and operating said mechanisms in the proper sequence and synchronism.

8. In a locked-seam can-body machine, the combination with the rotatable grooved mandrel about which the can-body is formed by the rotation thereof, of the hook-forming mechanism coöperating therewith to engage the ends of the blank about the mandrel in the groove thereof, blank-feeding mechanism for feeding the blank in lines first parallel and then transverse to the axis of the horn, and means for rotating said mandrel and operating said mechanisms in the proper sequence and synchronism.

9. In a can-body machine, the combination with the mandrel upon which the can-body is formed, of discharge mechanism cooperating therewith, a stationary horn upon which the body is discharged, a cross-head carrying oppositely-disposed rollers adapted to engage the seam and press it against the horn, a rigid way upon which the cross-head travels, and antifriction-rollers between the way and cross-head.

10. In a can-body machine, the combination with the mandrel having a groove therein and the cylinder having the tucking-blade coöperating with the groove, of discharge mechanism coöperating with the mandrel, and a shell coöperating with the mandrel and preventing the escape of the blank edges from the groove.

11. In a can-body machine, the combination with the mandrel upon which the seam is formed, of discharge mechanism coöperating therewith, a shell coöperating with the mandrel and moving with the discharge mechanism, and a seam-pressing member connected with the shell and adapted to be drawn over the seam after it is discharged from the mandrel and before it entirely escapes from the shell.

12. In a can-body machine, the combination with the forming and seaming mechanism, of the automatic blank-feeding apparatus, and means for automatically stopping the machine when the supply of blanks is exhausted.

13. In a can-body machine, the combination with the forming and seaming mechanism, of the automatic blank-feeding apparatus, and means for automatically stopping the machine when the supply of blanks is exhausted, consisting of a belt-shifter and mechanism for engaging it with a reciprocating part of the machine when the last blank is fed in.

14. In a can-body machine, the combination with the forming and seaming mechanism, of the automatic blank-feeding apparatus, and means for automatically stopping the machine when the supply of blanks is exhausted, consisting of a belt-shifter, and mechanism for engaging it with a reciprocating part of the machine when the last blank is fed in, consisting of a clutch member, and a circuit containing a magnet energized by the discharge of the last blank and the armature of which operates the clutch member.

15. In a can-body machine, the combination with the forming and seaming mechanism operating automatically at intervals, of mechanism for automatically feeding the uncut cylinders to a cutting means between the operations of the forming and seaming mechanism, and cutting means connected therewith for automatically cutting the cylinder formed thereby into a plurality of shorter cylinders.

16. In a can-body machine, the combination with the forming and seaming mechanism, of means connected therewith for automatically cutting the cylinder formed thereby into a plurality of shorter cylinders, said means consisting of pairs of shearing-disks between which the cylinders are fed one by one, and mechanism for rotating the disks.

17. In a can-body machine, the combination with the forming and seaming mechanism, of means connected therewith for automatically cutting the cylinder formed thereby into a plurality of shorter cylinders, said means consisting of pairs of shearing-disks between which the cylinders are fed one by one, and mechanism for bringing the disks together and subsequently rotating them.

18. In a can-body machine, the combination with the forming and seaming mechanism, of means connected therewith for automatically cutting the cylinder formed thereby into a plurality of shorter cylinders, said means consisting of pairs of shearing-disks between which the cylinders are fed one by one, and mechanism for accurately positioning the cylinder, bringing the disks together, and subsequently rotating them.

19. In a can-body machine, the combination with the forming and seaming mechanism, of a rotatable cylinder upon which the can-body is finally delivered, and can-head applying and crimping mechanism to apply and crimp the head upon the can-body.

20. In a can-body machine, the combination with the forming and seaming mechanism, of means for simultaneously applying and crimping a head to the body and for beading the body.

21. In a can-body machine, the combination with the forming and seaming mechanism, of a rotatable cylinder upon which the can-body is finally delivered, and means for simultaneously applying and crimping a head to the body and for beading the body while on said cylinder.

22. In an automatic blank-feed apparatus, the combination with means for carrying off the blanks from the pile, of a counterbalance-weight to raise the blanks to the operating-level, said weight being arranged to automatically compensate for the diminishing weight of the pile of blanks counterbalanced thereby.

23. In an automatic blank-feed apparatus, the combination with means for carrying off the blanks from the pile, of a counterbalance-weight to raise the blanks to the operating-level, said weight being arranged to automatically compensate for the diminishing weight of the pile of blanks counterbalanced thereby, and consisting of a plurality of weights connected to the blank-support in two places and adapted to swing one by one from a position where they operate against the blank-support to where they operate with it.

24. In an automatic blank-feed apparatus, the combination with means for carrying off the blanks from the pile against which the blanks press when it is above the pile, of a counterbalance-weight to raise the blanks to the operating-level, said weight being arranged to automatically compensate for the diminishing weight of the pile of blanks counterbalanced thereby, and brake mechanism for preventing the weight from raising the blanks when the delivery mechanism is not above the pile.

25. In an automatic blank-feed apparatus, the combination with means for maintaining the blanks at a certain level, of an auxiliary mechanism for the same purpose which is adapted to operate upon some of the lowermost blanks while the pile is being replenished.

26. In an automatic blank-feed apparatus, the combination with the means for maintaining the blanks at a certain level, of a moving member adapted to carry the separated blanks away one by one, and lifters adapted to rest upon the uppermost blanks and to be raised by the moving member just before it comes into position to carry away a lifted blank.

27. In a can-body machine, the combination with a mandrel having a groove therein, and the cylinder having the tucking-blade coöperating with the groove, of discharge mechanism coöperating with the mandrel, and means for diminishing the effective cross-sectional area of the mandrel while the dis-

charge mechanism is operating, said means consisting of a retractable surface piece on the mandrel, a slide rotating with said mandrel, connections between the slide and the surface piece to retract the surface piece as the slide is moved longitudinally, and means for reciprocating said slide longitudinally at the proper intervals.

28. In a can-body machine, the combination with a mandrel having a groove therein, and the cylinder having the tucking-blade coöperating wth the groove, of discharge mechanism coöperating with the mandrel, and means for diminishing the effective cross-sectional area of the mandrel while the discharge mechanism is operating, said means consisting of a retractable surface piece on the mandrel having pins projecting inwardly therefrom, a slide rotating with said mandrel and having cam-slots therein with which the pins coöperate to retract the surface piece as the slide is moved longitudinally, and means for reciprocating said slide longitudinally at the proper intervals.

29. In a can-body machine, the combination with the forming and seaming mechanism, of a rotatable cylinder upon which the can-body is finally delivered, and a can-head applying and crimping mechanism to apply and crimp the head upon the can-body, said mechanism consisting of a reciprocating holder adapted to receive a can-head and to apply it to the can-body upon the cylinder, a chuck mounted to rotate in the holder, a crimping-roller adapted to be applied to the edge of the can-head when on the can, and means for rotating the chuck and the roller.

30. In a can-body machine, the combination with the forming and seaming mechanism, of a rotatable cylinder upon which the can-body is finally delivered, and a can-head applying and crimping mechanism to apply and crimp the head upon the can-body, said mechanism consisting of a reciprocating holder adapted to receive a can-head and to apply it to the can-body upon the cylinder, a chuck mounted to rotate in the holder and having a gear-pinion on its outer end, a shaft having a crimping-roller secured thereto, adapted to be applied to the edge of the can-head when on the can, a gear-pinion on said shaft adapted to engage with the pinion on the chuck, and means for rotating the shaft and moving it to bring the pinions into engagement.

31. In a can-body machine, the combination with the forming and seaming mechanism, of a rotatable cylinder upon which the can-body is finally delivered, and a can-head applying and crimping mechanism to apply and crimp the head upon the can-body, said mechanism consisting of a reciprocating holder adapted to receive a can-head and to apply it to the can-body upon the cylinder, a chuck mounted to rotate in the holder and having a gear-pinion on its outer end, a swinging frame having a shaft mounted therein, a crimping-roller secured to said shaft and adapted to be applied to the edge of the can-head when on the can, a pinion on said shaft adapted to mesh with the pinion on the chuck, and means for swinging the frame to engage the pinions and for rotating the shaft.

32. In a can-body machine, the combination with the forming and seaming mechanism, of a rotatable cylinder upon which the can-body is finally delivered, and a can-head applying and crimping mechanism to apply and crimp the head upon the can-body, said mechanism consisting of a reciprocating holder adapted to receive a can-head and to apply it to the can-body upon the cylinder, a chuck mounted to rotate in the holder, a crimping-roller adapted to be applied to the edge of the can-head when on the can, means for rotating the chuck and the roller, and mechanism for automatically delivering can-heads one by one to said holder.

33. In a can-body machine, the combination with the forming and seaming mechanism, of a rotatable cylinder upon which the can-body is finally delivered, and a can-head applying and crimping mechanism to apply and crimp the head upon the can-body, said mechanism consisting of a reciprocating holder adapted to receive a can-head and to apply it to the can-body upon the cylinder, a chuck mounted to rotate in the holder, a crimping-roller adapted to be applied to the edge of the can-head when on the can, means for rotating the chuck and the roller, and mechanism for automatically delivering can-heads one by one to said holder, consisting of a chute adapted to receive a single row of can-heads, and a swinging escapement coöperating therewith and operated by the holder to deliver them thereto as it is moved away from the cylinder.

34. In a can-body machine, the combination with the forming and seaming mechanism, of a horn upon which the cylinder formed thereby is delivered, a shearing-disk rotating in the horn, another disk coöperating therewith and separated therefrom as the can-body is fed over the disk in the horn, and mechanism for bringing the disks into contact and rotating them for the purpose described.

35. In a can-body machine, the combination with the forming and seaming mechanism, of a horn upon which the cylinder formed thereby is delivered, a shearing-disk mounted to rotate in said horn, a movable frame in which a second shearing-disk to cooperate with the first is mounted to rotate, a shaft in said frame upon which its shearing-disk is secured, gearing between said disks

adapted to be engaged when they are brought together and driven by said shaft, and means for moving the frame and rotating the shaft.

36. In a can-body machine, the combination with the forming and seaming mechanism, of a horn upon which the cylinder formed thereby is delivered, a shaft mounted to rotate in said horn and carrying a shearing-disk and a gear-pinion, a swinging frame carrying another shaft having secured thereon a coöperating shearing-disk and coöperating pinions, cam-surfaces on said frame for accurately positioning the cylinder with reference to the disks, means for rotating the shaft in the frame, and means for moving the frame to bring the gearing into mesh and the disks into operation.

37. In a can-body machine, the combination with the forming and seaming mechanism, of a rotatable cylinder upon which the can-body is finally delivered, a beading-flange on said cylinder, and can-head applying and crimping mechanism to apply and crimp the head upon the can-body, said mechanism consisting of a reciprocating holder adapted to receive a can-head and to apply it to the can-body upon the cylinder, a chuck mounted to rotate in the holder, a pinion secured to the chuck, a movable frame carrying a shaft having a crimping-roller secured thereto adapted to be applied to the edge of the can-head when on the can, a beading-roller adapted to coöperate with the beading-flange, a pinion adapted to engage with the pinion on the chuck, means for rotating the shaft, and means for moving the frame to bring the coöperating elements into engagement, substantially as described.

38. In a can-body machine, the combination with the mandrel having the hook-forming groove and the discharge-groove therein, and the coöperating cylinder having the tucking-blade coöperating with the hook-forming groove, of means for rotating the mandrel and cylinder in unison, discharge mechanism consisting of a finger adapted to be moved forward in the discharge-groove, and means for moving said finger forward in the proper time, and for moving it out of the plane of the groove as it is returned, said means consisting of a lug on said finger cooperating with a pair of stationary grooves in one of which it advances and in the other of which it returns.

39. In a can-body machine, the combination with the mandrel having the hook-forming groove and the discharge-groove therein, and the coöperating cylinder having the tucking-blade coöperating with the hook-forming groove, of means for rotating the mandrel and cylinder in unison, discharge mechanism consisting of a finger adapted to be moved forward in the discharge-groove, and means for moving said finger forward in the proper time, and for moving it out of the plane of the groove as it is returned, said means consisting of a lug on said finger cooperating with a pair of stationary grooves, in one of which it advances and in the other of which it returns, and switch mechanism at the ends of the grooves.

40. In a can-body machine, the combination with the mandrel having the hook-forming groove and the discharge-groove therein, and the coöperating cylinder having the tucking-blade coöperating with the hook-forming groove, of means for rotating the mandrel and cylinder in unison, discharge mechanism consisting of a finger adapted to be moved forward in the discharge-groove, and means for moving said finger forward in the proper time, and for moving it out of the plane of the groove as it is returned, said means consisting of a lug on said finger cooperating with a pair of stationary grooves, in one of which it advances and in the other of which it returns, and switch mechanism at the ends of the grooves consisting of spring-pressed plungers at the ends of the grooves adapted to close the connecting-passages and to be cammed away by the lug as it moves in one direction.

41. In an automatic blank-feed apparatus, the combination with a blank-holder, of a lifter for separating the blanks one by one, means for translating each lifted blank laterally as it is separated, and mechanism for then giving it a longitudinal motion for the final feed.

42. In an automatic blank-feed apparatus, the combination with a holder for a plurality of blanks, of a lifter for separating the blanks one by one, a holder for a single blank parallel to the main holder, means for translating each lifted blank laterally as it is separated to carry it from over the main holder to the single-blank holder, and mechanism for giving it a motion longitudinally of the single-blank holder for the final feed.

43. In an automatic blank-feed apparatus, the combination with a holder for a plurality of blanks, of a lifter for separating the blanks one by one, a holder for a single blank parallel to the main holder, a pair of hooks moving transversely of the main holder for engaging an edge of the separated blank and carrying it to the single-blank holder, and mechanism for giving the blank in the single holder a movement longitudinally thereof.

44. In an automatic blank-feed apparatus, the combination with a holder for a plurality of blanks, of a lifter for separating the blanks one by one, a holder for a single blank parallel to the main holder, a pair of hooks moving transversely of the main holder for engaging an edge of the separated blank and carrying it to the single-blank holder, and mechanism for giving the blank in the single holder a movement longitudinally thereof, comprising a slide reciprocating longitudinally of the

holder and engaging the blank on its forward movement.

45. In an automatic blank-feed apparatus, the combination with means for carrying off the blanks from the pile against which the blanks press when they are above the pile, of a counterbalance-weight to raise the blanks to the operating-level, and brake mechanism for preventing the weight from raising the blanks when the delivery mechanism is not above the pile.

46. In an automatic blank-feed apparatus, the combination with means for translating the separated blanks from the pile, of a counterbalance-weight to raise the blanks to the operating-level, said weight being arranged to automatically compensate for the diminishing weight of the pile of blanks counterbalanced thereby, and brake mechanism for preventing the weight from raising the blanks at certain intervals.

47. In an automatic blank-feed apparatus, the combination with means for carrying the blanks one by one from off the top of the pile, of a counterbalance-weight to raise the blanks to the operating-level, and brake mechanism for preventing the weight from raising the blanks at certain intervals.

48. In an automatic blank-feed apparatus, the combination with means for carrying off the blanks one by one from the top of the pile, of a shaft, sprocket-wheels on said shaft, a brake-disk on said shaft, a blank-support, sprocket-chains connecting said blank-support and said shaft, a weight connected with said shaft and adapted to raise the blanks on the support, and means to press on the brake-disk released at intervals.

49. In an automatic blank-feed apparatus, the combination with means for carrying off the blanks one by one from the top of the pile, of a shaft, sprocket-wheels on said shaft, a brake-disk on said shaft, a blank-support, sprocket-chains connecting said blank-support and said shaft, a weight connected with said shaft and adapted to raise the blanks on the support, a lever bearing on the brake-disk, and a cam to force the lever against the disk at intervals.

50. In an automatic blank-feed apparatus, the combination with means for maintaining the blanks at a certain level, of an auxiliary mechanism for the same purpose, which is adapted to operate upon some of the lowermost blanks while the pile is being replenished, said mechanism consisting of a lifting-fork, and a spring adapted to coöperate therewith.

51. In an automatic blank-feed apparatus, the combination with means for maintaining the blanks at a certain level, of an auxiliary mechanism for the same purpose, which is adapted to operate upon some of the lowermost blanks while the pile is being replenished, said mechanism consisting of horizontal arms adapted to take in channels in the top of the main support, a support for said arms, a lifting-spring, and means for connecting said support operatively with said lifting-spring.

52. In a can-body machine, the combination with the mandrel upon which the can-body is formed, of discharge mechanism for the body formed thereon, and a cover for the seam moving with the discharge mechanism to prevent the seam being disengaged as the body is moved.

53. In a can-body machine, the combination with the mandrel upon which the can-body is formed, of discharge mechanism for the body formed thereon, a cover for the seam moving with the discharge mechanism to prevent the seam being disengaged as the body is moved, and a seam-pressing member adapted to engage the seam as it is released on the return of the cover.

54. In a locked-seam can-body machine, the combination with a rotatable grooved mandrel about which the can-body is formed by the rotation thereof, of hook-forming mechanism coöperating therewith to engage the ends of the blank about the mandrel in the groove thereof, seam-pressing mechanism, blank-feeding mechanism for feeding the blank in lines first parallel and then transverse to the axis of the horn, and means for rotating said mandrel and operating said mechanisms in the proper sequence and synchronism.

55. In a locked-seam can-body machine, the combination with the rotatable grooved mandrel about which the can-body is formed by the rotation thereof, of the hook-forming mechanism coöperating therewith to engage the ends of the blank about the mandrel in the groove thereof, seam-pressing mechanism coöperating with the can on an extension of the mandrel, blank-feeding mechanism for feeding the blank in lines first parallel and then transverse to the axis of the horn, body-feeding mechanism for moving the body from the mandrel proper to the extension, and means for rotating said mandrel and operating said mechanisms in the proper sequence and synchronism.

56. In a locked-seam can-body machine, the combination with the rotatable mandrel about which the can-body is formed by the rotation thereof, of the hook-forming mechanism coöperating therewith to engage the ends of the blank about the mandrel, feeding mechanism for moving the blank parallel to the axis of the horn, a gage against which the side of the blank is fed, feeding mechanism for then moving the blank transversely to the axis of the horn a fixed distance, and means for rotating said mandrel and operating said mechanisms in the proper sequence and synchronism.

57. In a locked-seam can-body machine,

the combination with the rotatable mandrel about which the can-body is formed by the rotation thereof, of the hook-forming mechanism coöperating therewith to engage the ends of the blank about the mandrel, seam-pressing mechanism coöperating with the can on the extension of the mandrel, feeding mechanism for moving the blank parallel to the axis of the horn, a gage against which the side of the blank is fed, feeding mechanism for then moving the blank transversely to the axis of the horn a fixed distance, feeding mechanism for moving the can-body from the mandrel proper to the extension, and means for rotating said mandrel and operating said mechanisms in the proper sequence and synchronism.

58. In a locked-seam can-body machine, the combination with the rotatable grooved mandrel about which the can-body is formed by the rotation thereof, of the hook-forming mechanism coöperating therewith to engage the ends of the blank about the mandrel in the groove thereof, seam-pressing mechanism, feeding mechanism for moving the blank parallel to the axis of the horn, a gage against which the side of the blank is fed, feeding mechanism for then moving the blank transversely to the axis of the horn a fixed distance, and means for rotating said mandrel and operating said mechanisms in the proper sequence and synchronism.

59. In a locked-seam can-body machine, the combination with the rotatable grooved mandrel about which the can-body is formed by the rotation thereof, of the hook-forming mechanism coöperating therewith to engage the ends of the blank about the mandrel in the groove thereof, seam-pressing mechanism coöperating with the can on an extension of the mandrel, feeding mechanism for moving the blank parallel to the axis of the horn, a gage against which the side of the blank is fed, means for then feeding the blank transversely to the axis of the horn a fixed distance, feeding mechanism for moving the body from the mandrel proper to the extension, and means for rotating said mandrel and operating said mechanisms in the proper sequence and synchronism.

In witness whereof I have hereunto set my hand this 4th day of November, 1903.

JOHN HOWARD McELROY.

Witnesses:

S. E. HIBBEN,

AMELIA WILLIAMS.