

G. W. MAXWELL.
BOX FORMING MECHANISM.
APPLICATION FILED FEB. 21, 1910.

989,789.

Patented Apr. 18, 1911.

3 SHEETS—SHEET 1.

Fig. 1.

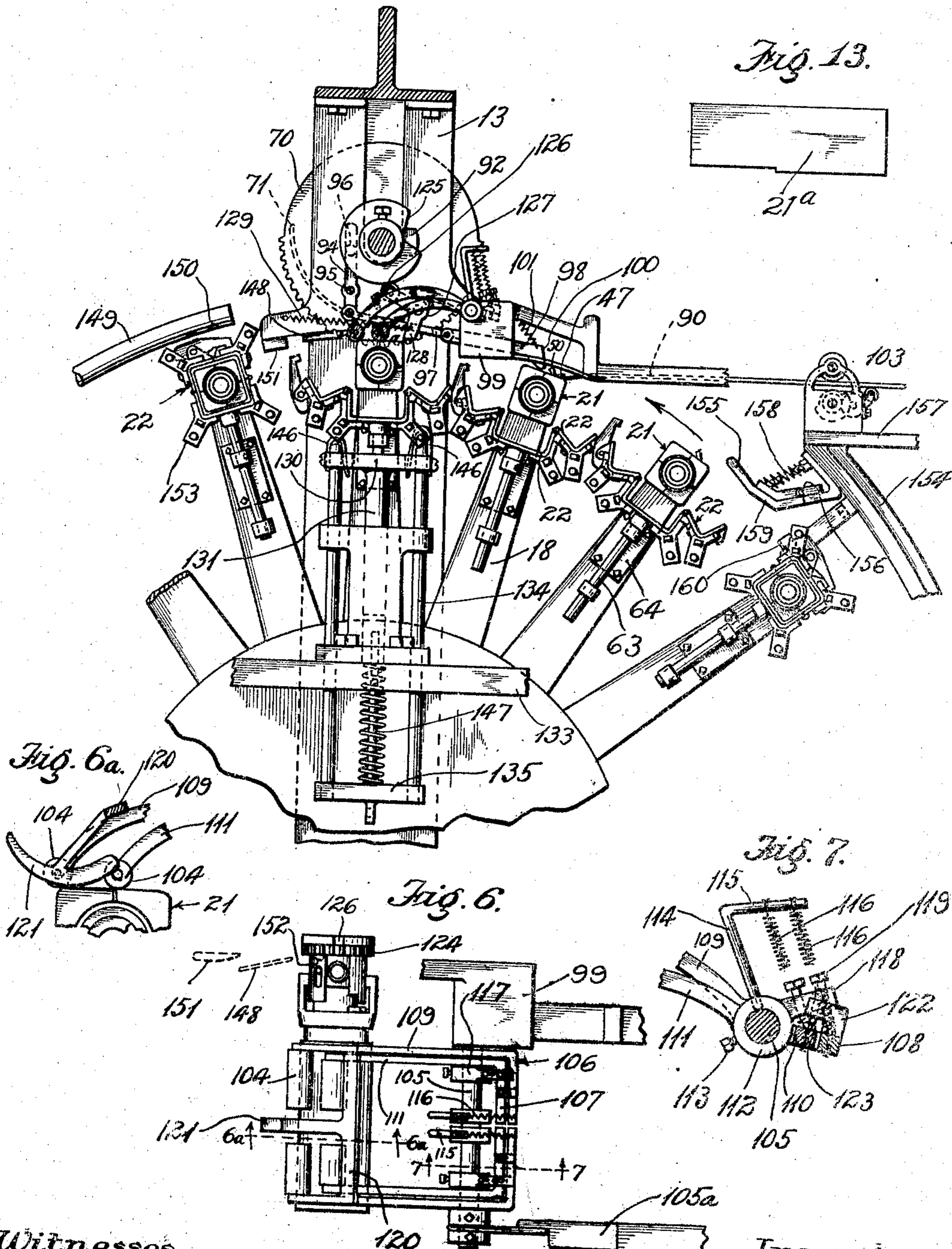


Fig. 13.

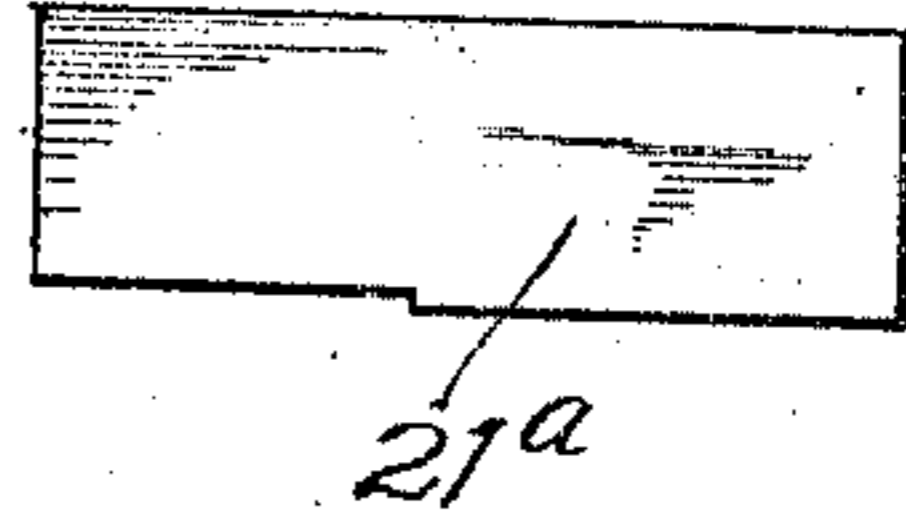


Fig. 6a.

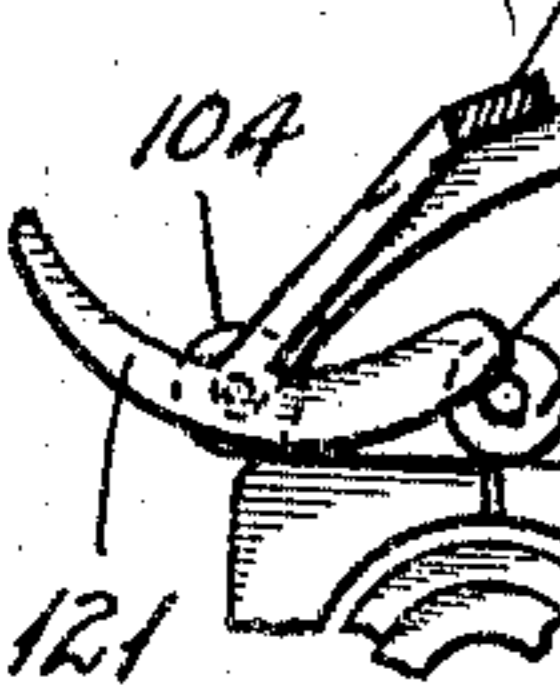


Fig. 6.

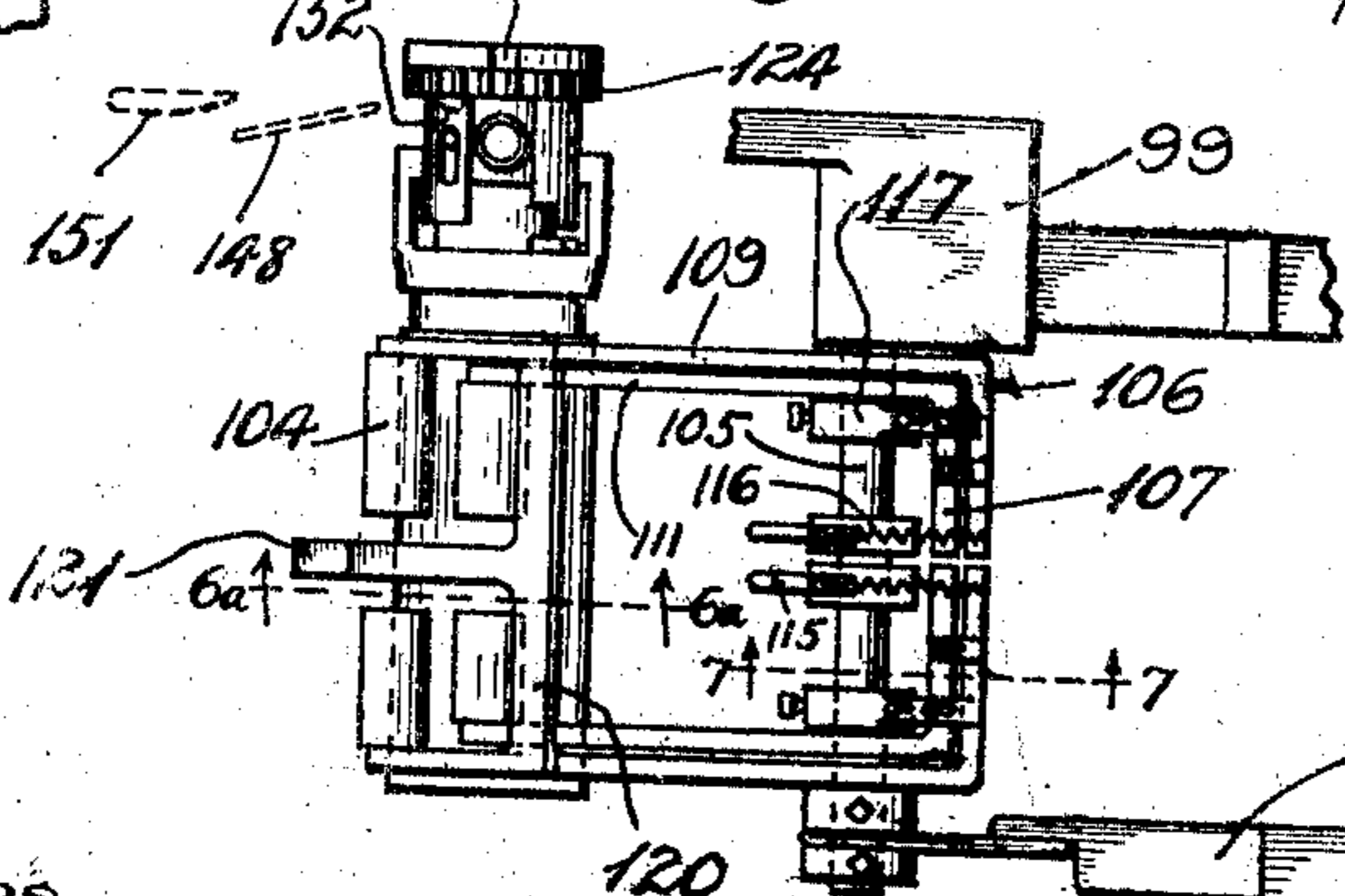
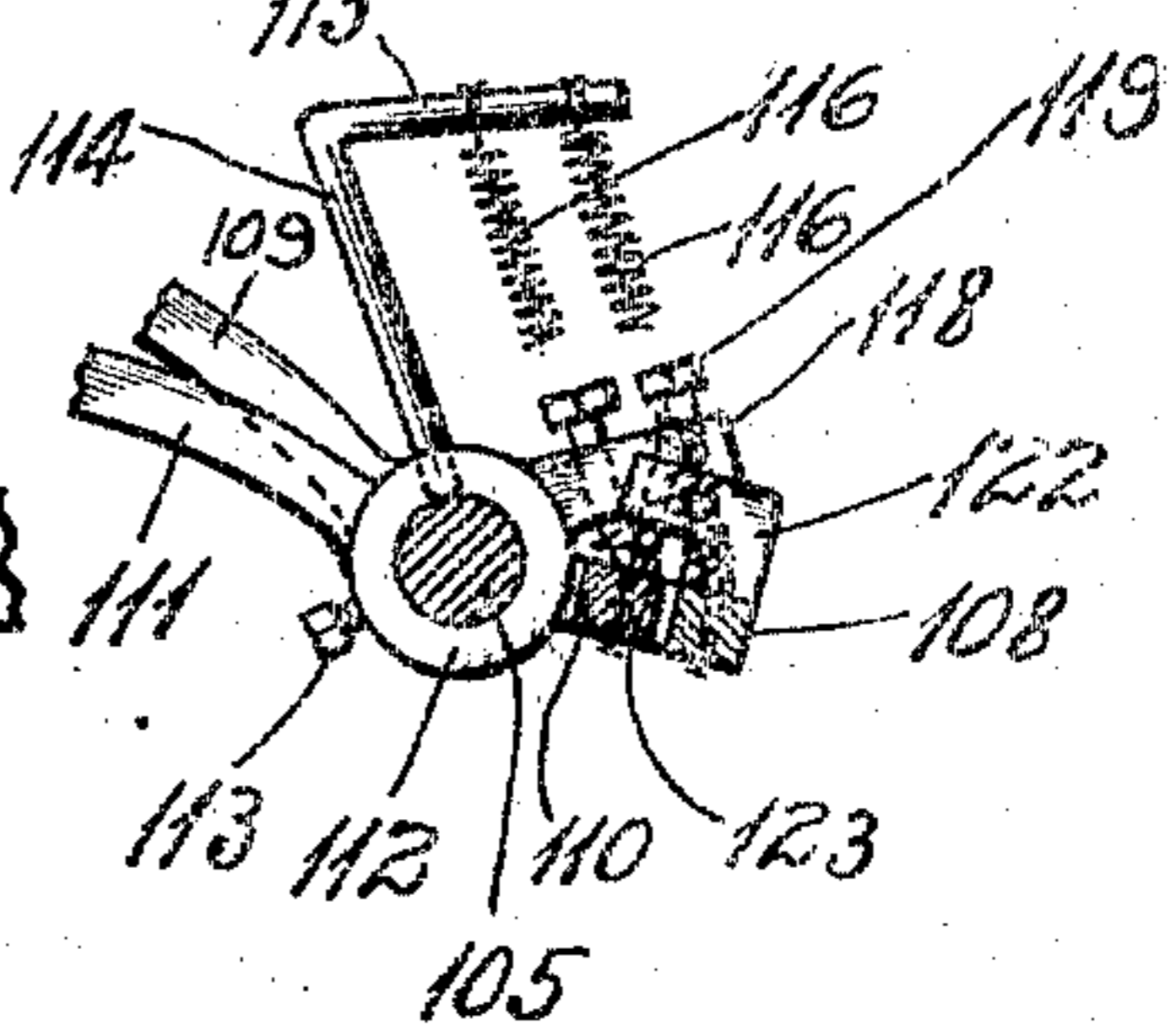


Fig. 7.



Witnesses.
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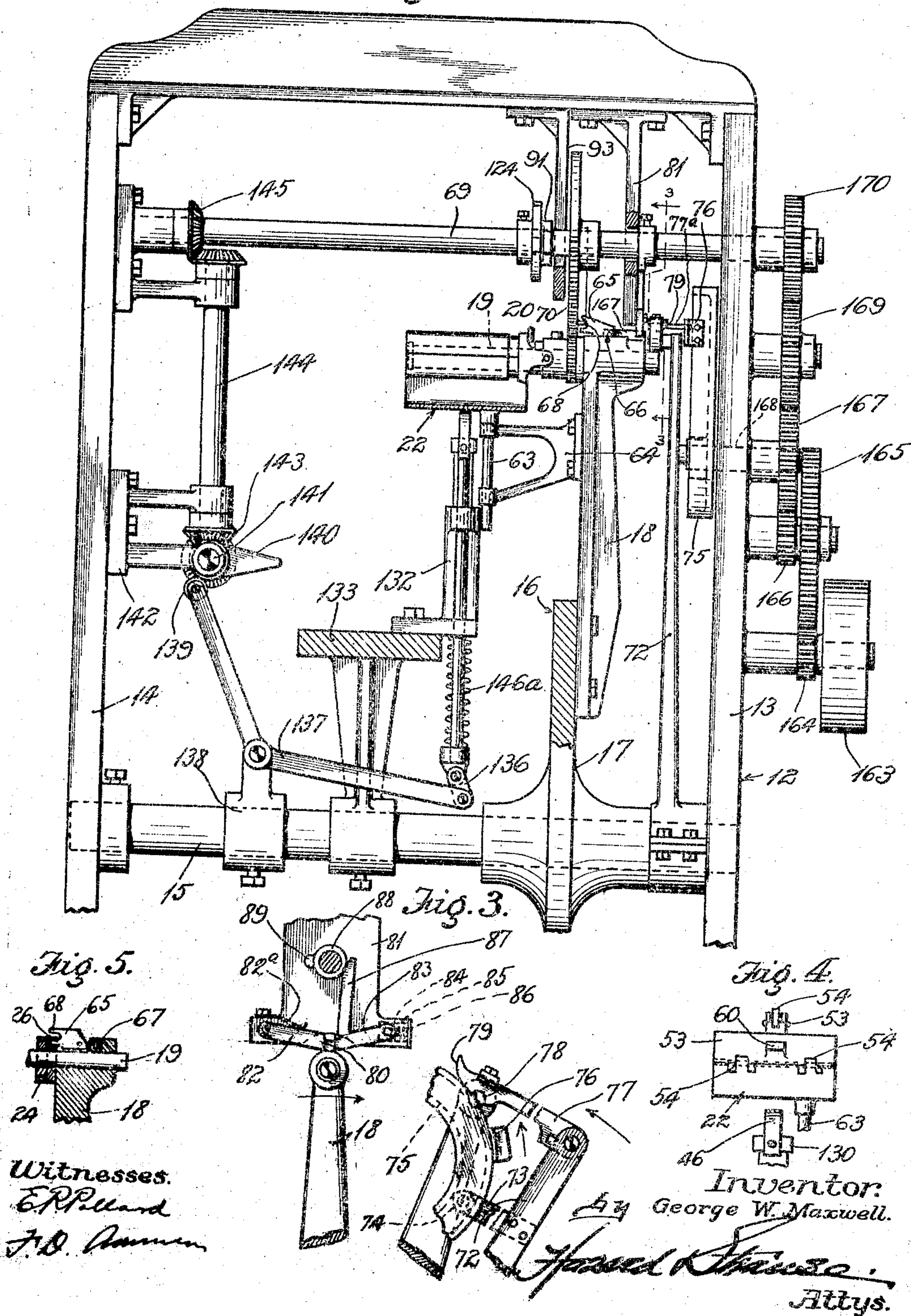
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3 SHEETS—SHEET 2.

Fig. 2.



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3 SHEETS—SHEET 3.

Fig. 8.

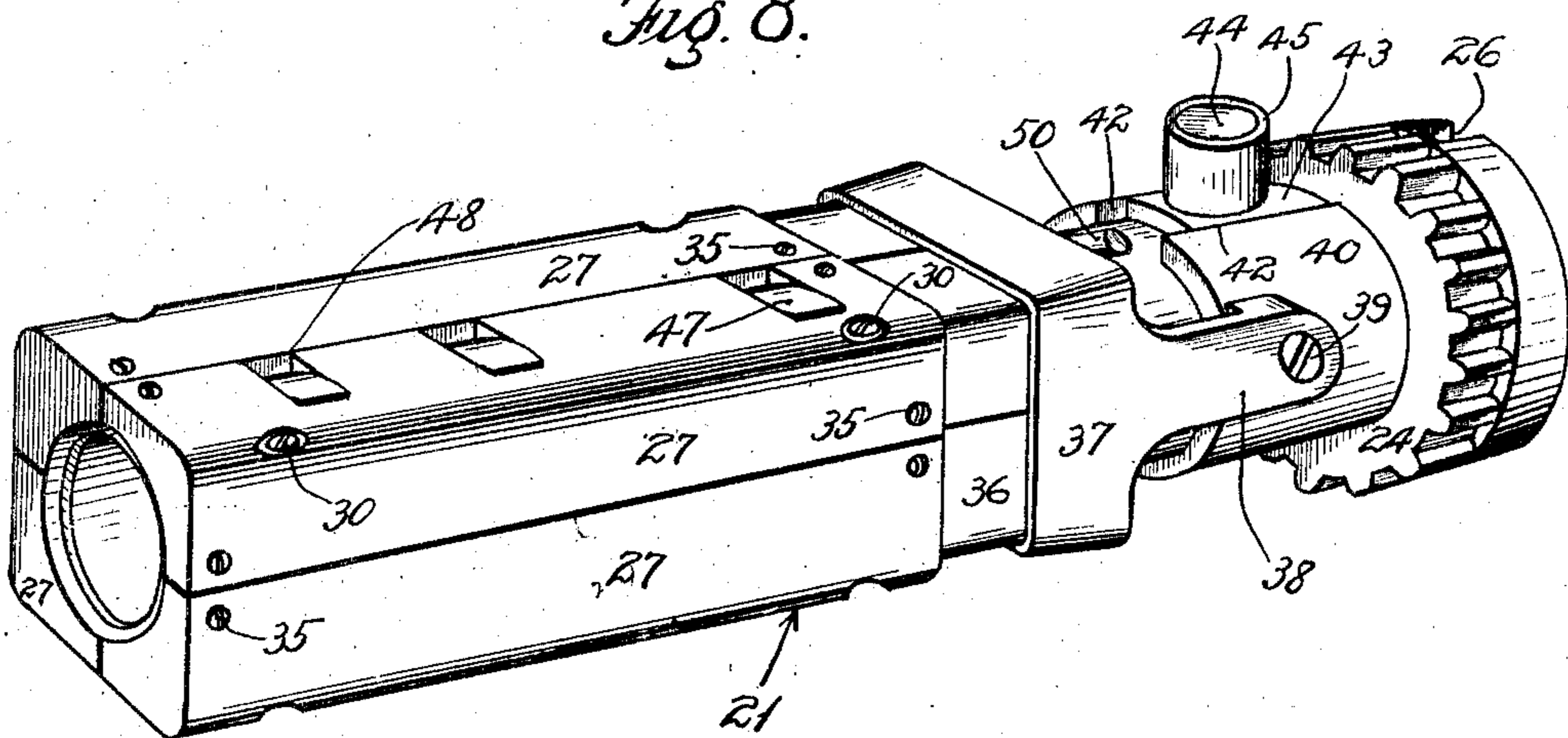


Fig. 9.

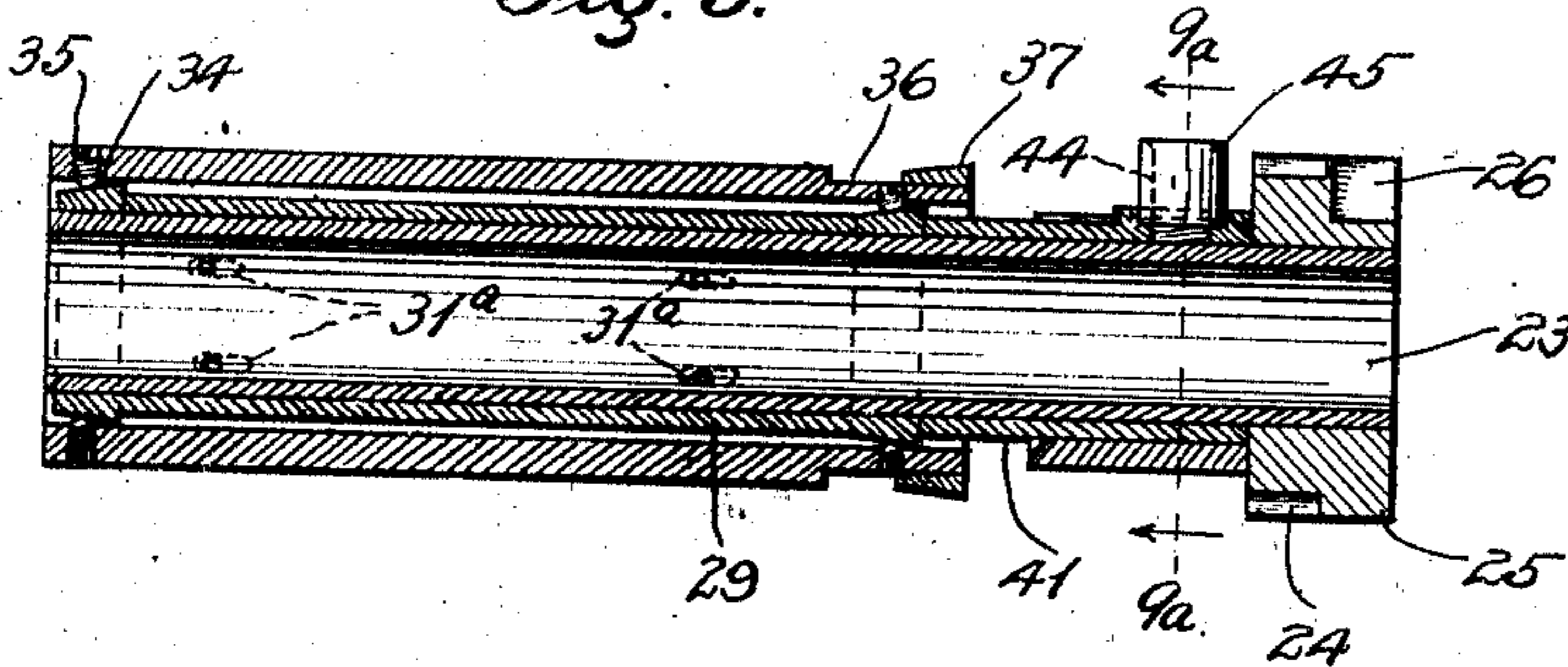


Fig. 10.

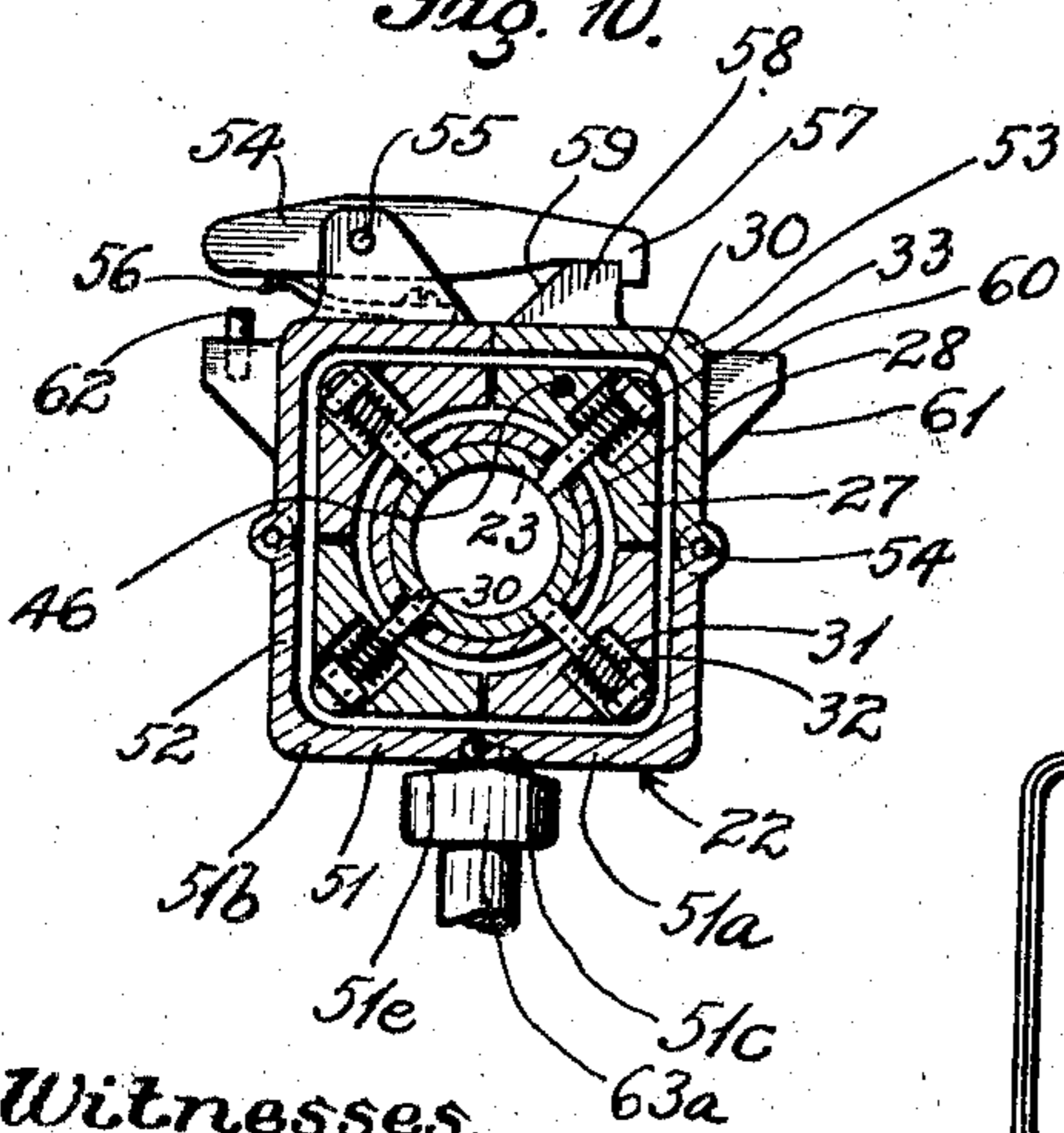


Fig. 9a.

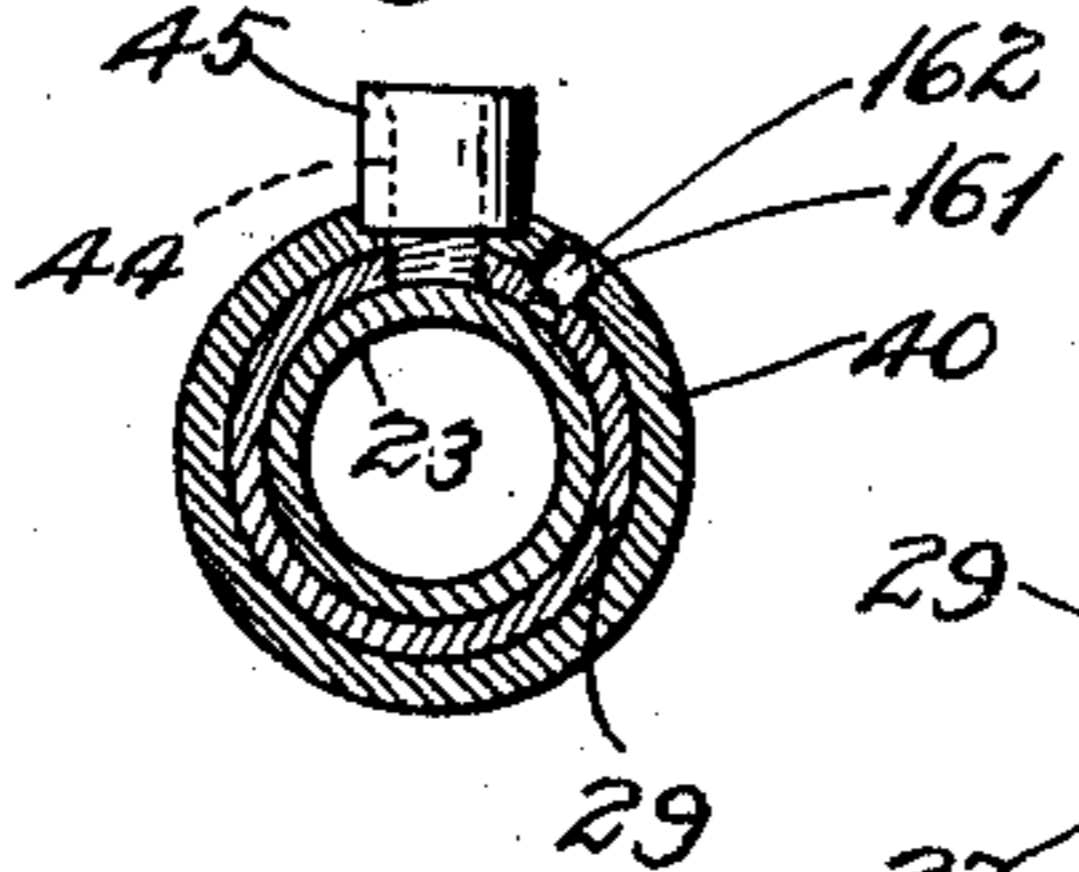


Fig. 11.

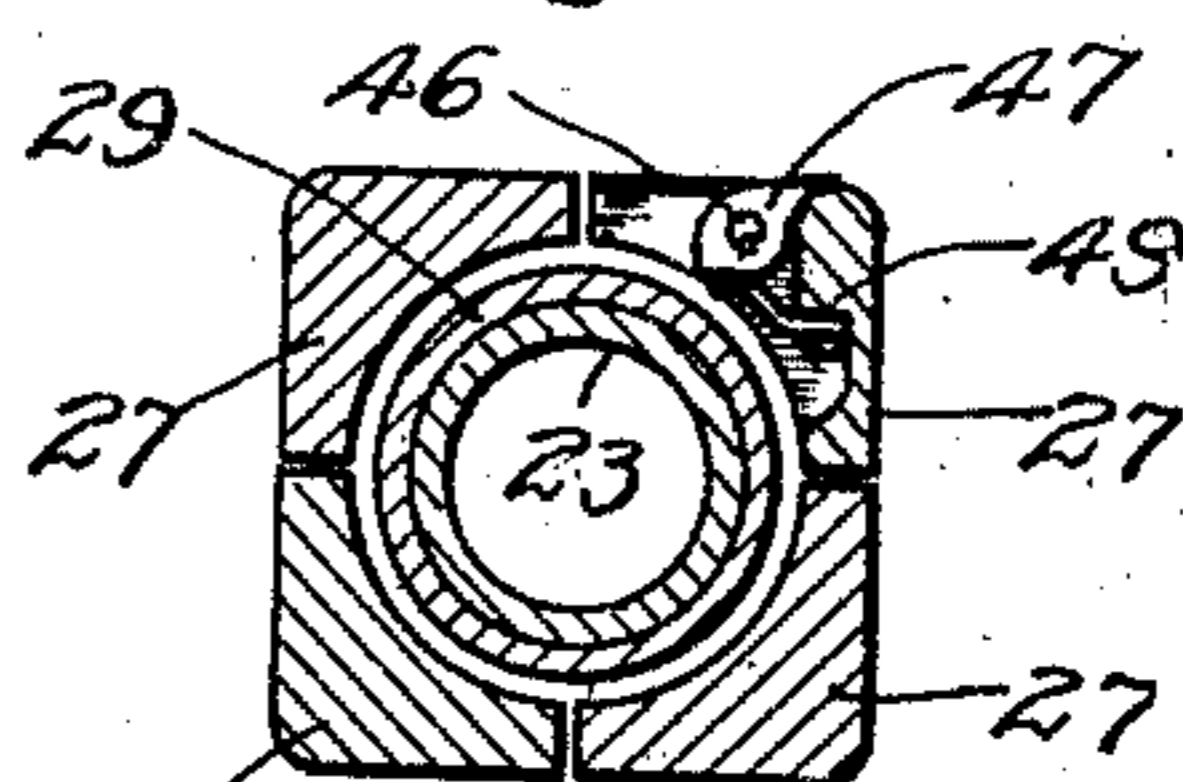
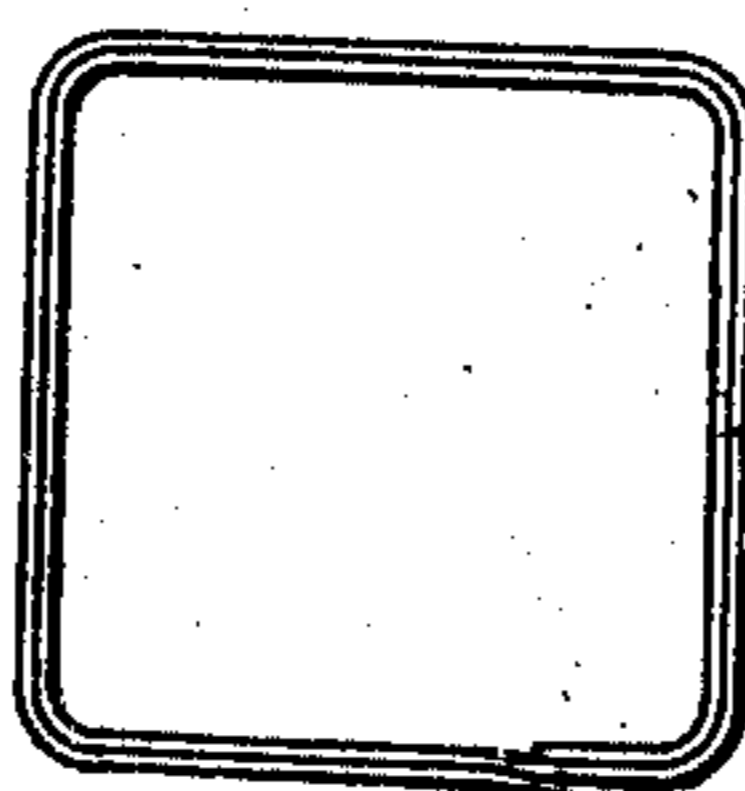


Fig. 12.



Witnesses.

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BOX-FORMING MECHANISM.

989,789.

Specification of Letters Patent.

Patented Apr. 18, 1911.

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To all whom it may concern:

Be it known that I, GEORGE W. MAXWELL, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented new and useful Improvements in Box-Forming Mechanism, of which the following is a specification.

This invention relates to mechanism for forming receptacles and particularly to machinery for forming the bodies of receptacles.

The mechanism is especially adapted for forming receptacles of paper or similar material which can be thrown away after using.

The object of the invention is to produce mechanism of this class which will operate to produce a receptacle of square or rectangular form. Receptacles of this form have many advantages over round or cylindrical receptacles for the reason that they may be packed more compactly together, and for the further reason that there is a great economy of the material employed, from the fact that there is little or no waste of material in forming the heads, when the receptacle is of square or rectangular form referred to.

The invention consists in the mechanism and in the process to be described more fully hereinafter and particularly set forth in the claims.

In the annexed drawing which fully illustrates my invention, Figure 1 is a vertical section taken through the upper portion of the machine constructed according to my invention, and illustrating the mechanism for forming the receptacle body; in this view certain parts are broken away. Fig. 2 is a partial section and elevation taken in a plane at right angles to the plane in which Fig. 1 is taken, certain parts being broken away and other parts being omitted for the sake of clearness. Fig. 3 is a vertical section taken on the line 3—3 of Fig. 2 and showing contiguous parts in elevation, and broken away in order to illustrate the means for locking the main wheel or spider during the operation of the machine. Fig. 4 is a side elevation of one of the boxes or cases which envelop the mandrels on which the receptacle bodies are formed. Fig. 5 is a longitudinal section taken through one of the arms of the spider or wheel which carries the mandrels and particularly illustrat-

ing the means for locking them against rotation. Fig. 6 is a plan showing one of the mandrels and showing the means for mounting and controlling the presser rollers which cooperate with the mandrel to produce the body of the receptacle; in this view certain cams are shown in dotted lines for controlling the operation of the former. Fig. 6^a is a section upon the line 6^a—6^a of Fig. 6 and illustrating the means for raising the presser rollers out of the way when one of the cases of the forming devices is being closed about its mandrel. Fig. 7 is a vertical section taken on the line 7—7 of Fig. 6 upon an enlarged scale and particularly illustrating details of the mechanism. Fig. 8 is a perspective showing one of the mandrels of a forming device detached from the machine. Fig. 9 is a longitudinal vertical section through the mandrel shown in Fig. 8. Fig. 9^a is a cross section on the line 9^a—9^a of Fig. 9 certain parts being omitted and further illustrating details of the construction of the mandrel. Fig. 10 is a cross section through one of the forming devices showing the expansible mandrel disposed within the case. Fig. 11 is a cross section through one of the mandrels and particularly illustrating the means for gripping the blank when it is to be rolled on the mandrel to form the receptacle body. Fig. 12 is an end elevation of a receptacle body formed by my mechanism and my process. Fig. 13 is a plan of a blank for forming a receptacle body.

Referring more particularly to the parts and especially to Figs. 1 to 7, 12 represents the frame of the machine, which comprises uprights or posts 13 and 14 disposed respectively at the right and left as shown in Fig. 2. Between these posts there is mounted a fixed axle 15, and on this axle and adjacent to the post 13 is rotatably mounted a wheel or spider 16, said wheel having a hub 17 with a plurality of radial arms 18 attached thereto. In the outer ends of the arms former spindles 19 are rigidly secured and these spindles project at both sides of each arm. On these spindles 19, I attach my forming devices 20, one of which is very clearly illustrated in Fig. 10. Each forming device comprises a mandrel 21 constructed as illustrated in Fig. 8, and cooperating with each mandrel there

is provided a case 22. Said case being in the form of a box, as illustrated in Fig. 10, each mandrel comprising an inner tube or sleeve 23 which is provided at one end with a gear wheel 24, and integral with this gear wheel a blank hub 25 is formed. On its upper side this hub is provided with a locking notch 26, the purpose of which will appear more particularly hereinafter. The body of the mandrel 21 is of rectangular or square cross section presenting flat side faces, as illustrated in Fig. 10, and it is divided longitudinally on each face so that it presents four sections 27, each section forming one of the corners of the mandrel. These sections 27 have concave inner faces 28 which enable them to fit neatly about a wedge sleeve 29, which is mounted to slide freely on the inner tube 23. The sections 27 are held in place by studs 30 which are fastened in the inner tube 23, and these studs pass outwardly through longitudinally disposed slots 31^a in the wedge sleeve 29. These slots permit a relative sliding movement of the wedge sleeve on the inner tube, and guide the sleeve on the tube as will be readily understood.

As illustrated in Fig. 10, the studs 30 are disposed at the corners of the sections or segments of the mandrel and the sections 27 are provided respectively with enlarged recesses or pockets 31, which receive springs 32 disposed around the studs. These springs thrust against the bottoms of the pockets at their inner ends and against nuts 33 at their outer ends which are applied to the studs. In this way the springs tend to force the segments 27 inwardly. In order to force the segments outwardly and expand the body of the mandrel the wedge sleeve 29 is formed with a pair of wedge collars 34 which extend continuously around the sleeve as indicated. Near the meeting edges of the segments 27 adjusting screws 35 are placed in the walls of the segments, and the tips of these screws seat against the sides of the collars 34. By reason of this arrangement the position of the segments may be nicely adjusted. At the inner end the body of each segment 27 is reduced or cut down so as to form a guide neck 36, and on this guide neck a spreader ring 37 is mounted to slide longitudinally. This spreader ring 37 is of square or rectangular form like the body of the mandrel, but it is wedge shaped in cross section. On opposite sides it is provided with handles 38, which extend longitudinally of the mandrel and these handles are attached by screws 39 to a split ring or collar 40, which slides longitudinally on the neck 41 of the mandrel adjacent the gear wheel 24. This collar 40 is cut away on its upper side so as to form a gap or guide opening between the edges 42, and in this gap there is received a guide boss 43,

which projects upwardly from the upper side of the wedge sleeve. This boss 43 fills the gap between the edges 42 and affords means for guiding the collar 40 as will be readily understood. In this boss 43 a stud 44 is fixed, and on this stud 44 is mounted a roller 45 which coöperates with the mechanism to be described hereinafter. Means are provided for sliding the collar 40 in or out so as to move the spreader 37, and means are also provided for engaging the roller 45 for operating the wedge sleeve.

Extending longitudinally in one of the sections 27 of the mandrel 21, I provide a gripper shaft 46, and this gripper shaft is provided at suitable points with grippers 47 working in recesses or pockets 48 formed in the side of this section as shown in Figs. 8 and 11. The under sides of these grippers 47 are pressed by leaf springs 49 so that the ends of the grippers are normally held against the edges of the pockets 48, as indicated in Fig. 11.

The end of the shaft 46 is bent laterally so as to form a trigger 50, which is adapted to be rotated so as to throw the grippers to their open position or to their closed position. In the mechanism to be described hereinafter means are provided for automatically operating these grippers, as indicated in Fig. 10. Coöperating with each mandrel 21 there is provided a case 22 which is in the form of a box open at both ends. The bottom 51 of the box is divided longitudinally into two sections 51^a, 51^b formed integral with the lower half portions 52 of the sides thereof. To the upper edges of the sides 52 cover sections 53 are attached by hinge joints 54. These cover sections 53 form the upper corners of the case and are adapted to meet together at their upper edges, as indicated in Fig. 10, so as to inclose the mandrel. The upper side of the case is provided with a latch 54 pivoted at 55 and pressed by a spring 56 so that the hook 57 of the latch tends to engage a latch hook 58 on the opposite section. The spring 56 is arranged to press on the tail of the latch and the inner edge of the hook 58 of the lug 59 is inclined so that the hook 57 will snap over the lug when the cover sections 53 are brought together, as will be readily understood. The latch 54 of each case is disposed at the middle of the case, as shown in Fig. 4. On the case sections 53 also at about the middle of each case, closing lugs 60 are provided, which present inclined lower edges 61, which facilitate the automatic closing of the cases in succession, as will appear more fully hereinafter. One of these lugs 60 is provided with an upwardly projecting stop pin 62, which lies under the tail of the latch 54 and limits the opening movement of the latch, as will be readily understood. The bottoms 51 of the cases 22

are provided with downwardly extending guide stems 63, to which the sections 51^a and 51^b are attached by hinges 51^c. These guide stems are mounted in guide brackets 64, which are attached to the inner sides of the arms 18, as indicated in Fig. 2. The stems have enlarged heads 63^a having beveled upper faces 51^c. When the blank is being wrapped upon the mandrel, the case of the mandrel, which is in operation, is in a depressed position as indicated in this figure.

In the operation of the machine, it should be understood that the spider or wheel 16 is advanced by a step by step movement, bringing the mandrels in position before the feeder; as each mandrel comes into position at the feeder, it receives the blank, which is to form the receptacle body, and the mandrel is then rotated so as to wrap the blank around the mandrel. The blank has been previously smeared with mucilage or a similar adhesive substance in a suitable gumming device 103. The mandrels are normally locked against rotation. For this purpose in the outer end of each arm 18, a lock or dog 65 is mounted on a pivot pin 66, and the butt end of this dog is pressed by a spring 67, which normally holds the dog 65 in the notch 26, as will be readily understood. The dog 65 is provided at its free end with a mouth or gap 68, which enables the dog to be raised so as to release the mandrel, as will be readily understood.

The mechanism for releasing the dog 65 and rotating each mandrel in succession will now be described. For this purpose, directly over the uppermost mandrel as indicated in Figs. 1 and 2, I provide a cam shaft 69, which is rotatably mounted in a horizontal position as indicated. On this cam shaft there is provided a segment 70, the teeth of which are adapted to engage the gear wheels 24 of the mandrels soon after they come into position under the shaft 69. The side of the segment 70 is provided with a cam 71, which cam at the proper time engages in the mouth 68 and raises the dog 65 in the manner indicated in Fig. 2. Shortly after the dog 65 is raised the teeth of the segment come in contact with the gear wheel 24 and rotate the mandrel through two complete revolutions. As soon as this has taken place, the cam 71 releases the dog and the dog locks the mandrel against further rotation in the position in which it is left by the segment 70.

I provide means for giving the spider 16 a step by step movement so as to bring the mandrels in coöperative relation with the segment 70. For this purpose I provide on the axle or shaft 15 a feed arm 72, which extends upwardly in an inclined position, as shown in Fig. 3. This feed arm 72 has a laterally extending bar 73, which is provided with a cam roller 74, which cam roller

runs in a groove in the cam 75. The cam 75 is provided with a trip 76 in the form of a plate, the purpose of which will appear more fully hereinafter.

The upper side of the arm 72 is provided with a link 77, which extends upwardly and the upper end of this link 77 is formed into a hook 78, which is adapted to engage the stub end of one of the spindles 19 of the mandrels. Beyond the hook 78, the end of the link is formed into an upwardly extending toe 79, the direction of rotation of the cam 75 being that indicated by the arrow. As the cam rotates the trip 76 strikes a finger 77^a projecting from the side of the link 77 and raises it so as to disengage it from the spindle 19, with which it is in engagement. The motion of the cam then rocks the arm 72 toward the left so that the link moves forwardly and inwardly until the hook 78 engages the spindle of the arm disposed adjacent and in the mid position, that is, under the shaft 69. When the hook 78 has engaged this spindle the cam 75 rocks the arm 72 back again to the position in which it is shown in Fig. 3, rotating the spider through an angle equal to the angle formed by the arms of the spider. The toe 79 assists in bringing the link 77 into engagement with the spindles of the formers, for its forward edge strikes the spindle and guides the hook onto the spindle as will be readily understood.

I provide means for locking the spider after each step by step movement. For this purpose, the outer end of each arm 18 is provided with a rib 80, which extends longitudinally with the spindle 19. Adjacent to the path of this rib I provide a bracket 81, and this bracket is provided at its lower end with a detent pawl 82, said pawl being pressed by a spring 82^a so that it is adapted to drop down onto the arm behind the rib 80 and prevent the spider from rotating in a backward direction. In this connection it should be understood that the direction of advance of the spider is that indicated by the arrow in Fig. 3. In order to lock the spider against forward movement in the position in which it is left by the link 77, the bracket 81 is provided with a stop pawl 83, the rear end of which is pivotally attached to a block 84, said block being guided in a pocket 85 formed in the lower end of the bracket and pressed by a buffer spring 86. The thrust of this buffer spring 86 is toward the rib 80.

The pawl 83 is provided with an upwardly extending arm 87 and this arm lies against the side of the cam 88, which cam is mounted rigidly on the cam shaft 69. This cam has a toe 89, which periodically engages the arm 87 rotating in the direction of the arrow in Fig. 3, and this raises the pawl 83 out of the path of the rib 80 so as to enable

the link 77 to advance the spider as will be readily understood. The pawl 83 drops into position in front of the rib 80 by gravity. The function of the spring 86 is to act as a 5 buffer to relieve the shock of the segment and it also acts so as to give a little "play" or excessive movement when the segment is arrested so as to insure that the detent pawl 82 will drop into position behind the rib, as 10 indicated in Fig. 3.

As indicated in Fig. 1, when one of the arms 18 arrives at the position next to the uppermost position, the case 22 which normally incloses the mandrel is in a depressed 15 and open position, so as to leave the mandrel exposed. At this time the grippers 47 are disposed in an open position, as indicated in Fig. 1. When the grippers are in this position the feeding mechanism, which is not 20 illustrated, delivers a blank 90 to the mandrel so that the forward edge of the blank comes into position under the grippers as shown. The mechanism then operates to close the grippers so as to secure the forward 25 edge of the blank to the mandrel before the blank is wrapped or rolled on the mandrel. For this purpose, the shaft 69 is provided with a cam 91, said cam having a toe 92 at one point on the periphery thereof. On the 30 side of a bracket 93 I provide a cam lever 94, and this cam lever is pivotally mounted at 95 and is provided with a laterally projecting pin 96, which projects against the edge of the cam 91, as indicated in Fig. 1. The 35 lower end of this cam lever 94 is provided with a link 97 and the forward end of this link is pivotally attached to a sliding dog 98, which is guided so as to slide longitudinally in a suitable bracket 99. The forward 40 end of this dog 99 is provided with a nose 100 which is adapted to engage with the trigger 50 of the gripper shaft 46 so as to rotate the shaft and close the grippers on the edge of the blank as will be readily understood. Near the forward end of this sliding 45 dog 98 a retractor spring 101 is provided, the rear end of which is secured to the upper portion of the bracket 99. After the grippers have been closed so as to secure the 50 blank to the mandrel, the link 77 is operated by the cam 75 so as to advance this mandrel into the uppermost position, that is, it advances it into position directly under the cam shaft 69. As soon as the mandrel comes 55 into this position, the cam 71 operates to release the mandrel so that it can be rotated, and the segment 70 rotates the mandrel through two revolutions.

Before the blank 90 is fed to the machine 60 it passes through a gumming device 103. As indicated most clearly in Figs. 1 and 6, I provide presser rollers 104 which cooperate with the mandrel so as to wrap the blank. In order to mount these presser rollers I 65 provide a horizontal shaft 105 which extends

outwardly from the side of the bracket 99 and on this shaft there is mounted an outside roller yoke 106 and an inside roller yoke 107. The roller yoke 106 has a divided cross bar 108 extending longitudinally with the 70 shaft 105 and this bar has integral arms 109 which extend over the mandrel and carry a pair of the rollers 104 as shown. The roller yoke 107 is similar to the yoke 106 having a cross bar 110 with arms 111, which 75 extend over the mandrel and carry a pair of the rollers 104. As indicated in Fig. 6, it will be seen that from this arrangement four rollers are provided arranged in alining 80 pairs, the pair at the left being carried by the outside yoke 106. These rollers 104 are spring pressed. For this purpose, near the middle of the bar or shaft 105 collars 112 are provided and these collars are rigidly at- 85 tached by set screws 113, and they are provided with rigid posts 114 having overhanging arms 115 respectively. Each of these arms 115 is connected by a spring 116 with one of the cross bars 108 and 110. As indicated in Fig. 6 these cross bars 108 and 110 90 are divided at their middle point so that the rollers carried by each yoke operate in a sense independently of each other, that is, they are constrained by different springs.

In order to provide stops against which 95 the springs 116 normally hold the roller yokes I provide the bar 105 with fixed collars 117, and these collars have outwardly projecting arms 118 provided with set screws 119 against which the cross bars 108 and 100 110 thrust. By adjusting these set screws 119 the elevation of the rollers may be nicely adjusted.

Attention is called to the fact that the fingers or arms 109 and 111 which carry 105 the rollers are of different lengths so that the rollers are disposed apart from each other with respect to the direction of rotation of the mandrel. This is an advantageous arrangement and greatly facilitates the bend- 110 ing of the blank at the corners of the mandrel for one pair of rollers will be pressing the side of the mandrel near the corner while the other pair of rollers will be pressing the adjacent side of the mandrel on the 115 other side of the corner. In this way the blank is folded tightly or closely to the corner.

In the operation of the machine, it should be understood that after the blank has been 120 rolled on the uppermost mandrel the case is closed about the mandrel, and in this operation it is necessary to throw the rollers 104 up out of the way of the latch of the case and out of the path of the cover sections 53 125 of the case. For this purpose, the arms 109 are connected by a cross bar 120, and this cross bar is provided at its middle point, as indicated in Fig. 6, by a downwardly extending curved trip arm 121. The function of 130

this trip arm is clearly shown in Fig. 6^a. As the latch comes up into position it strikes the lower end of this trip arm and raises the arms 109. Raising the arms 109 depresses the cross bar 108. In order to enable the cross bar 108 to depress the cross bar 110 and raise the arms 111 of the inner rollers, the cross bar 108 is provided with overhanging brackets 122, which project over the cross bar 110, and these brackets are provided with set screws 123, which engage the upper side of the cross bar 110, as shown in Fig. 7. From this arrangement it will be evident that when the bar 108 is depressed, the bar 110 will also be depressed so that all the rollers 104 will be raised simultaneously. To the outer end of the bar 105 one of the guide bars 105^a of the feed mechanism is attached as shown in Fig. 6.

As soon as the blank has been wrapped on the mandrel the grippers 47 are loosened. For this purpose, alongside of the cam 91 I provide a cam 124 which may be formed integral therewith, as indicated in Fig. 2. This cam is of substantially circular form, but is provided with a notch 125 in its periphery. On the face of this cam runs a roller 126 guided by the end of a bell crank lever 127, said bell crank lever having a lower arm 128, which is adapted to engage the trigger 50, as indicated in Fig. 1. To the lower arm 128 an actuating spring 129 is attached, the left hand end of the spring being attached to a part of the frame as indicated. At the proper moment the roller 126 passes up into the notch 125 and the spring 129 pulls the arm 128 over so as to engage the trigger 50 and rotate it to the left. This loosens the grippers as will be readily understood. When the mandrel is being rotated the presser rollers hold the blank closely against the mandrel so that a rudimentary body for the receptacle will be formed. As this rotation takes place the gum on the blank operates to stick the two layers of the receptacle together, as will be readily understood. As soon as this operation is complete, the mechanism comes into operation for closing the case around this mandrel.

Referring especially to Figs. 1 and 2 this mechanism comprises a cross head 130 which is secured to the upper end of a plunger 131 moving vertically in a guide bracket 132, which guide bracket is secured on a suitable bracket 133 fixed on the axle 15 as shown. From the ends of the cross head 130 guide stems 134 extend downwardly, and are guided through the guide bracket 132. The lower ends of these guide stems or guide arms 134 seat on the lower cross head 135, on the under side of which a link 136 is attached and this link is adapted to be operated by a lower arm of the bell crank lever 137, which is pivotally mounted on a fixed

collar 138 on the axle 15. The upper arm of this bell crank lever has a roller 139 which coöperates with a cam 140 mounted on a stub shaft 141 in a suitable bracket 142. This stub shaft 141 is driven by bevel gears 143, and through the medium of a vertical shaft 144 from the shaft 69. The shaft 144 is driven from the shaft 69 by suitable bevel gears 145. Between the lower cross head 135 and the side of the guide bracket a retractor spring 146^a is provided for forcing the cross head downwardly. As indicated in Fig. 1 the upper ends of the guide stems 134 project above the cross head 130 and they are provided with leaf springs 146 having curved noses or bows disposed upwardly and having their free ends inclined and extending downwardly and inwardly.

In the operation of the machine when the bell crank lever 137 is rocked by the cam 140 the guide stems 134 raise the cross head 130 and it strikes the bottom of the case as indicated in Fig. 2 operating to raise the case so that the bottom thereof seats against the underside of the uppermost mandrel. As the cross-head moves up the springs 146 come in contact with the closing lugs 60 of the case and fold the cover sections 53 into position over the mandrel. In this connection attention is called to the fact that the right hand spring 146 projects above the left hand spring, as shown in Fig. 1, and this arrangement is adopted to insure that the right hand cover section carrying the hook 58 will be closed first. After this comes into position the other cover section is folded over and the latch 54 closes automatically by the spring. As the case comes up into position the curved trip arm 121 is struck by the upper end of the latch and raises all of the presser rollers out of the way of the case, so as to enable the case to be closed and latched. In order to hold the spring 146^a in position, the same is mounted about a guide stem 147.

It should be understood that after the blank is wrapped on the mandrel, the mandrel is expanded by actuating the wedge sleeve 29. For this purpose, in the path of the roller 45, as the uppermost mandrel leaves its position under the shaft 69, I provide a cam 148 and the manner in which this cam engages the roller is indicated most clearly in Fig. 6. This outward sliding movement of the wedge sleeve expands the mandrel within the case and forces the sections 27 of the mandrel out into the corners of the case. This gives the receptacle body neatly formed corners and clamps the receptacle body between the mandrel and the case. After being clamped in this manner, the cases are brought into contact with a heater which may be in the form of a gas burner tube 149 having openings 150 where the gas escapes forming a flame which is directed upon the case. In this way the temperature of the

case and the mandrel is raised so that the adhesive or gum is dried while the receptacle is clamped in an angular form, this insures that the receptacle will retain this square or angular form.

In the path of the mandrel just beyond the cam 148, I provide a cam 151, as indicated in Fig. 6, and this cam is adapted to actuate the spreader 37 by engaging a notch 152 at the outer end of the collar 40. By providing this notch the cam 151 is adapted to engage the inner end of the collar although this end is at that moment abutting against the inner face of the gear wheel 24. The function of this spreader is to spread the end of the receptacle body which is to form the mouth of the receptacle so as to facilitate the inserting of the upper ends or heads of the receptacles after they are filled. In this connection it should be understood that the bottoms or lower heads of the receptacles are adapted to be inserted at the other end of the mandrel. The mechanism for this purpose is not illustrated and does not form a part of the subject matter of this patent. However, the cases 22 have been illustrated with laterally projecting crimper guides 153 at the outer ends thereof, and these crimper guides are useful in guiding the crimpers that crimp the ends of the body after the cases are closed about the mandrels and before the drying of the adhesive is complete.

As illustrated in Fig. 1, the gas tube 149 is curved. In practice this tube can be extended completely around adjacent the under side of the spider if necessary so that the heating or drying operation can be extended over a considerable time.

I provide means for opening the cases so as to permit the receptacle body to be withdrawn from the mandrel. For this purpose, the frame is provided with an extension 154 with a cam shoe 155 pivotally attached at 156 to a bracket 157. This shoe is pressed outwardly by a spring 158 and presents an inclined face 159, which lies in the path of the tails of the latches 54 as the spider rotates. In this way the latch of each case is released as it comes under the shoe and the case then falls open by gravity, and it also slides down in its supporting bracket 64 to a depressed position with respect to the mandrel above it.

On the frame extension 154 I attach a cam 160, which is adapted to engage the roller 45 so as to retract the spreader 37. As indicated in Fig. 9^a, the collar 40 is provided with a longitudinal slot 161 and a pin 162 is provided on the wedge sleeve 29 which passes upwardly into this slot, so that when the spreader 37 is retracted the pin 162 strikes the end of the slot 161 and retracts the wedge sleeve at the same time. By reason of this slot connection it is possible to advance the wedge sleeve without the

spreader's being advanced, this operation being effected by the cams 148 and 151 respectively.

The machine is driven by means of a belt pulley 163 having a pinion 164 which drives a large gear 165. This large gear 165 has a rigid pinion 166 which drives a gear wheel 167, and this gear wheel drives the aforesaid feed cam 75 through a shaft 168. The cam shaft 69 is driven through an idler gear wheel 169 meshing with the gear 167 and driving the gear wheel 170 rigid with the shaft 69.

The general mode of operation of the entire mechanism described will now be set forth. The spider 16 is given a step by step motion through the arm 72 and the link 77 actuated by the cam 75. In this way the arms 18 are brought successively into position under the cam shaft 69. The pawls 82 and 83 cooperate to lock the spider in a fixed position when it is not being advanced. As each mandrel passes under the shoe 155 the shoe strikes the latch 54 of the mandrel and releases it so that the case drops down and opens itself as indicated at the second arm from the extreme right, as viewed in Fig. 1. When the arm passes from this position to the next position to the left, that is, to the first position before coming under the shaft 69, the blank 90 is advanced by the feeding device so as to present its forward edge under the grippers 47. The sliding dog 98 is then operated automatically by the toe of the cam 91, so as to engage the trigger 50 and close the grippers on the blank. The mandrel is then advanced into position under the cam shaft, and the cam 71 releases the lock 65 so that the mandrel can be rotated by means of the segment 70. The mandrel is then given two complete turns and is released in exactly the same position from which its rotation commenced. The lock 65 then locks it again against rotation, and the cam 124 then operates to release the grippers by means of the arm 128, which strikes the trigger. Then the cross head 130 rises and closes the case about the mandrel with the blank wrapped thereabout. As the mandrel proceeds from under the cam shaft 69, the cams 148 and 151 operate respectively to expand the mandrel and advance the spreader into the mouth of the receptacle body and the case is then subjected to heat generated by the heating pipe 149. As the case is raised under the operating mandrel under the shaft 69, the latch 54 of the case strikes the member 121 and this raises all of the rollers out of the way so as to permit the case to close in the manner described. As the cross head 130 rises the springs 146 close the cover sections of the case, the right hand one, as viewed in Fig. 1, being closed first. These springs 146 strike the inclined edges 61 of the closing lugs for this purpose.

On account of the hinges 51^c and the beveled faces 51^a the bottom sections 51^a and 51^b tend to hang apart when open and this facilitates applying the cases to the mandrels.

In Fig. 13, 21^a indicates the blank from which the finished receptacle 21^b is produced, having the form shown in Fig. 12.

Having described my invention what I claim as new and desire to secure by Letters Patent is:

1. In mechanism of the class described, a mandrel having corners and having means for holding a blank of stiff material thereupon, means for wrapping a blank around the mandrel, a plurality of pivoted arms of different lengths for bending the blank at the corners of the mandrel so as to engage the side faces of the mandrel, and adapted to withdraw bodily to permit the said corners to pass.

2. In mechanism of the class described, a mandrel formed in sections, means for rotating said mandrel to wrap the blank thereupon, a case adapted to receive said mandrel with the blank wrapped thereupon, means for applying said case to said mandrel to envelop said mandrel and said blank, and means for expanding said mandrel within said case.

3. In mechanism of the class described, a mandrel having means for securing a blank thereto, means for rotating said mandrel to wrap the blank thereabout, a case adapted to envelop said mandrel and the blank wrapped thereabout, means for applying said case to said mandrel after the blank is wrapped thereupon, means for applying an adhesive to the blank before advancing the same to said mandrel, and means for expanding said mandrel within said case.

4. In mechanism of the class described, a mandrel having means for securing a blank thereto, means for rotating said mandrel to wrap the blank thereabout, a case adapted to envelop said mandrel and the blank wrapped thereabout, means for applying said case to said mandrel after the blank is wrapped thereupon, means for applying an adhesive to the blank before advancing the same to said mandrel, means for expanding said mandrel within said case, and means for drying the adhesive after said blank is wrapped, to dry the same.

5. In mechanism of the class described in combination, a mandrel having means for securing a blank thereto, means for rotating said mandrel to wrap said blank thereabout, resilient presser devices for holding the blank on said mandrel when being rotated, means for withdrawing said presser devices, a case, and means for applying said case to said mandrel after said blank is wrapped thereabout.

6. In mechanism of the class described in

combination, a mandrel, means for rotating the same to wrap the blank thereabout, presser rollers for holding the blank on said mandrel when being wrapped thereupon, a case adapted to be applied to said mandrel and having movable cover sections adapted to come together to close said case about said mandrel, and means for withdrawing said presser rollers to permit said cover sections to come together about said mandrel.

7. In mechanism of the class described in combination, a mandrel, grippers mounted on said mandrel adapted to clamp the edge of the blank, means for opening said grippers to receive said blank, means for closing said grippers to hold the blank, means for rotating said mandrel to wrap the blank thereabout, a case adapted to be applied to said mandrel after said blank is wrapped thereupon, said mandrel being formed in sections, means for expanding said mandrel within said case, and means for releasing said grippers from the wrapped blank.

8. In mechanism of the class described, a mandrel, means for wrapping a blank thereabout to form a receptacle body, a spreader slidably mounted on said mandrel, and means for advancing said spreader into the mouth of said receptacle body to expand the same.

9. In mechanism of the class described, a wheel, a plurality of mandrels rotatably mounted in said wheel, means for advancing said wheel with a step by step movement to bring said mandrels respectively into their operative position, a member for normally locking said mandrels positively against rotation, means unconnected with the mandrel to actuate said member and release said locking means at said operative position, and means for rotating said mandrels when unlocked to wrap a blank thereupon.

10. In mechanism of the class described, a wheel, a plurality of mandrels rotatably mounted thereupon, grippers carried by said mandrels adapted to receive the edge of a blank, automatic means for actuating said grippers to clamp the blank, means for advancing said wheel with a step by step movement to bring said mandrels successively into their operative position, means for normally locking said mandrels against rotation, means for releasing said mandrels so that they may rotate, means for rotating said mandrels when in their operative position to wrap the blank thereabout, means for releasing said grippers after the blanks are wrapped on said mandrels, and means for impressing the form of the mandrel on the blank after the same is wrapped thereabout.

11. In mechanism of the class described, a wheel, a plurality of mandrels mounted thereupon, grippers carried by said mandrels adapted to receive the edge of a blank,

automatic means for actuating said grippers to clamp the blank, means for advancing said wheel with a step by step movement to bring said mandrels into their operative position, means for wrapping the blank around each mandrel when in its operative position to form a receptacle body, means for releasing said grippers after said blanks are wrapped on said mandrels, and means for impressing the form of the mandrels on the blank after the same is wrapped thereabout.

12. In mechanism of the class described, a wheel, a plurality of mandrels rotatably mounted thereupon, grippers carried by said mandrels adapted to receive the edge of a blank, automatic means for actuating said grippers to clamp the blank, means for advancing said wheel with a step by step movement to bring said mandrels successively into their operative position, means for normally locking said mandrels against rotation, means for releasing said mandrels so that they may rotate, means for rotating said mandrels when in their operative position to wrap the blank thereabout, means for releasing said grippers after the blanks are wrapped on said mandrels, means for impressing the form of the mandrel on the blank after the same is wrapped thereabout, and a spreader ring slidably mounted on said mandrel and adapted to spread the mouth of the wrapped blank.

13. In mechanism of the class described, a wheel, a mandrel rotatably mounted in said wheel, a case mounted on said wheel and adjacent to said mandrel and having hinged cover sections adapted to close over said mandrel, said case being arranged to expose said mandrel when open, means for wrapping a blank about said mandrel, means for advancing said case to envelop said mandrel and the wrapped blank thereabout, said case being of angular form, said mandrel being formed in sections and having means for pressing the wrapped blank into the corners of said case.

14. In mechanism of the class described, a wheel, a rotatable mandrel mounted therein, means for wrapping the blank thereabout, a case, means for applying said case to envelop said mandrel after the blank is wrapped thereabout, means for expanding said mandrel within said case, means for applying an adhesive substance to said blank before wrapping the same on said mandrel, means for heating said case to dry said adhesive substance, said case having a latch, and means for releasing said latch to permit said case to be withdrawn from said mandrel.

15. A mandrel of the class described having a body of substantially rectangular form and composed of a plurality of corner sections, means disposed within said body for

forcing said corner sections diagonally outwardly, to expand said mandrel in all directions, and a case adapted to envelop said mandrel.

16. A mandrel having a body with flat side faces, said body being of substantially rectangular form in cross section and being divided on said flat faces longitudinally so as to form a plurality of corner sections, an inner member, means for attaching said corner sections to said inner member, and means for expanding said mandrel by forcing said sections diagonally outwardly to expand said mandrel in all directions.

17. A mandrel having a body of substantially rectangular cross section having flat side faces, said body being divided longitudinally so as to form corner sections, an inner member, fastening devices applied at said corners for securing the sections of said body to said inner member, a case of substantially rectangular cross section adapted to envelop said body, and means for expanding said body to force the corners thereof into the corners of said case.

18. A mandrel having a body of substantially rectangular cross section having corners and divided longitudinally so as to form sections corresponding to said corners, an inner member, means for attaching said sections to said inner member, a sliding sleeve mounted on said inner member and affording means for forcing said sections outwardly to expand said body.

19. A mandrel having a body adapted to have a blank wrapped thereabout and a case divided longitudinally to form sections, said sections being jointed together, means for opening said case, and means for applying said case to said mandrel.

20. A mandrel adapted to have a blank wrapped thereabout, a case having a bottom divided longitudinally to form bottom sections, a member supporting said bottom sections and having a hinged connection thereto, said member affording means for supporting said bottom sections in a depressed position and tending to separate from each other, said bottom sections having sides formed integral therewith, cover sections attached to said sides, and means for applying and closing said case about said mandrel after the blank is wrapped thereabout.

21. A mandrel having a body of substantially rectangular cross section having corners and divided longitudinally so as to form sections corresponding to said corners, an inner member, means for attaching said sections to said inner member, a sliding sleeve mounted on said inner member and affording means for forcing said sections outwardly to expand said body, and means carried by one of said sections for securing a blank thereto.

22. A mandrel having a body of substantially rectangular cross section having corners and divided longitudinally so as to form sections corresponding to said corners,
5 an inner member, means for attaching said sections to said inner member, a sliding sleeve mounted on said inner member and affording means for forcing said sections outwardly to expand said body, said mandrel being adapted to have a blank wrapped
10 thereupon to form a receptacle body, and means mounted on said mandrel for expanding the mouth of said receptacle body.
23. In mechanism of the class described,
15 a mandrel, means for wrapping a blank

about said mandrel to form a receptacle body, a case formed in sections, means for applying said case to said mandrel after the blank is wrapped thereabout, a latch carried by said case for holding same closed, 20 and automatic means for releasing said latch to open the case.

In witness that I claim the foregoing I have hereunto subscribed my name this 12th day of February, 1910.

GEORGE W. MAXWELL.

Witnesses:

EDMUND A. STRAUSE,
ETHEL COLEMAN.