No. 721,010. PATENTED FEB. 17, 1903.

N. E. BROWN.

JOINTING AND BLANK FORMING MACHINE.

APPLICATION FILED MAR. 4, 1902.

NO MODEL. 5 SHEETS—SHEET 1.

FIG. 1.

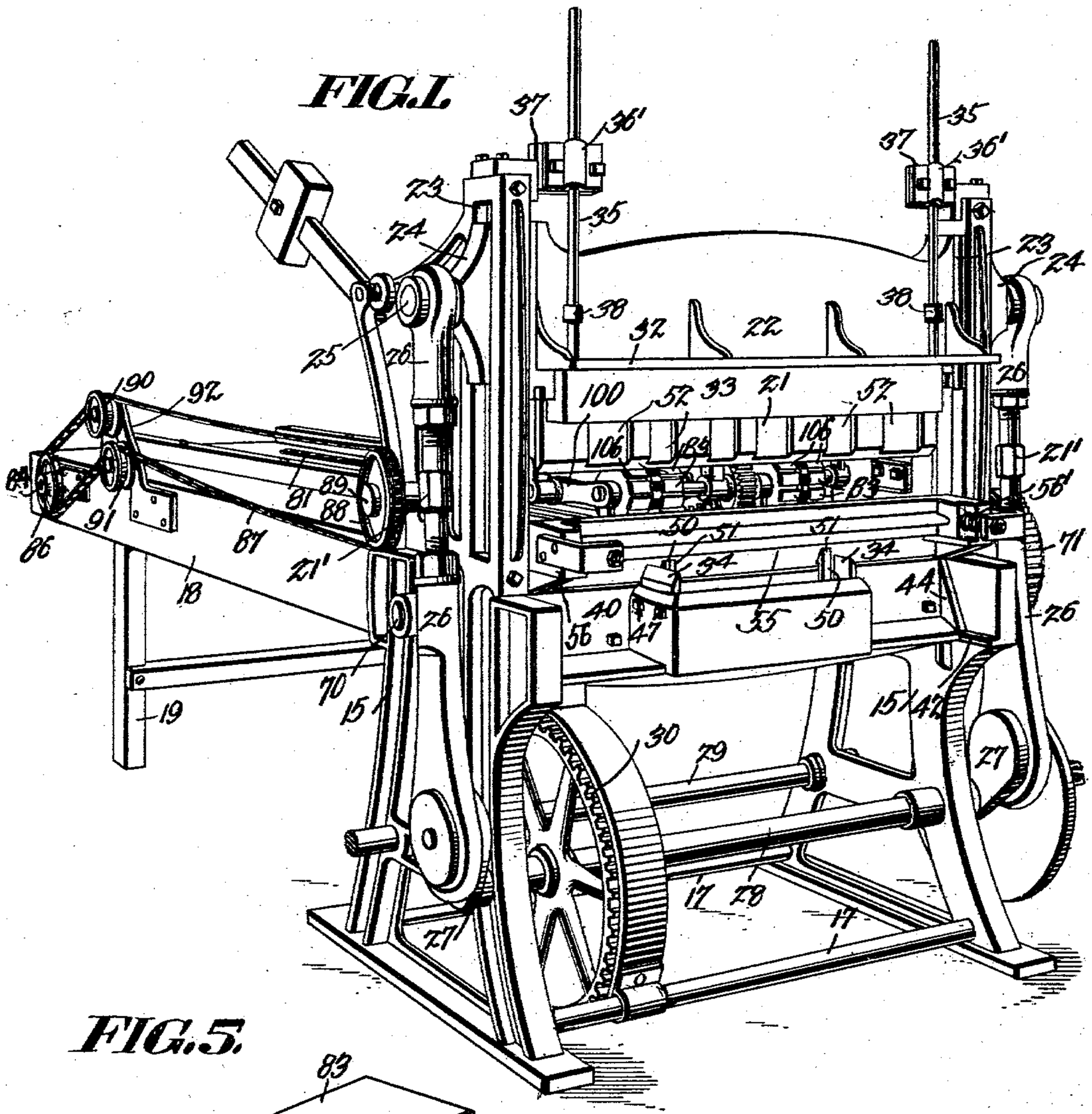


FIG. 5.

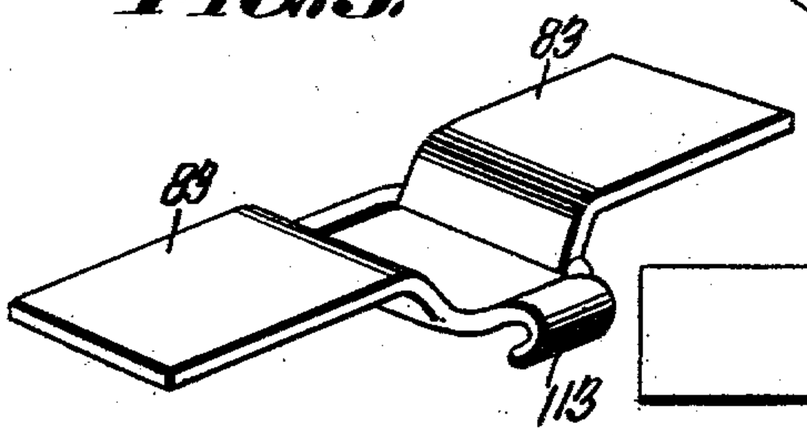
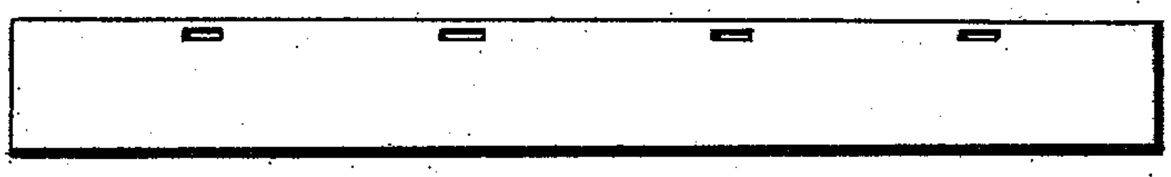


FIG. 18.



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NO MODEL. 5 SHEETS—SHEET 2.

FIG. 2.

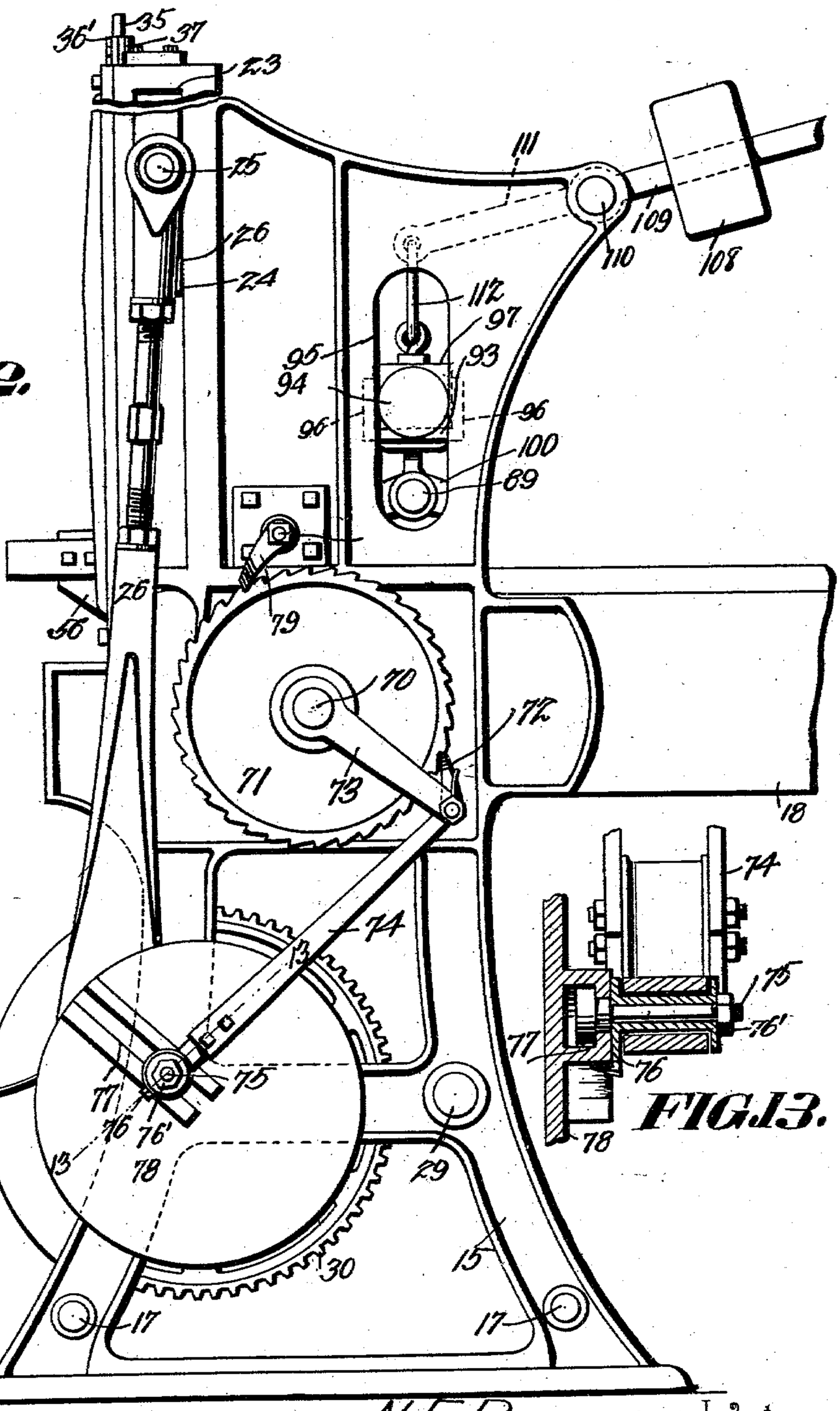

FIG. 13.

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No. 721,010. PATENTED FEB. 17, 1903.

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APPLICATION FILED MAR. 4, 1902.

NO MODEL. 5 SHEETS—SHEET 3.

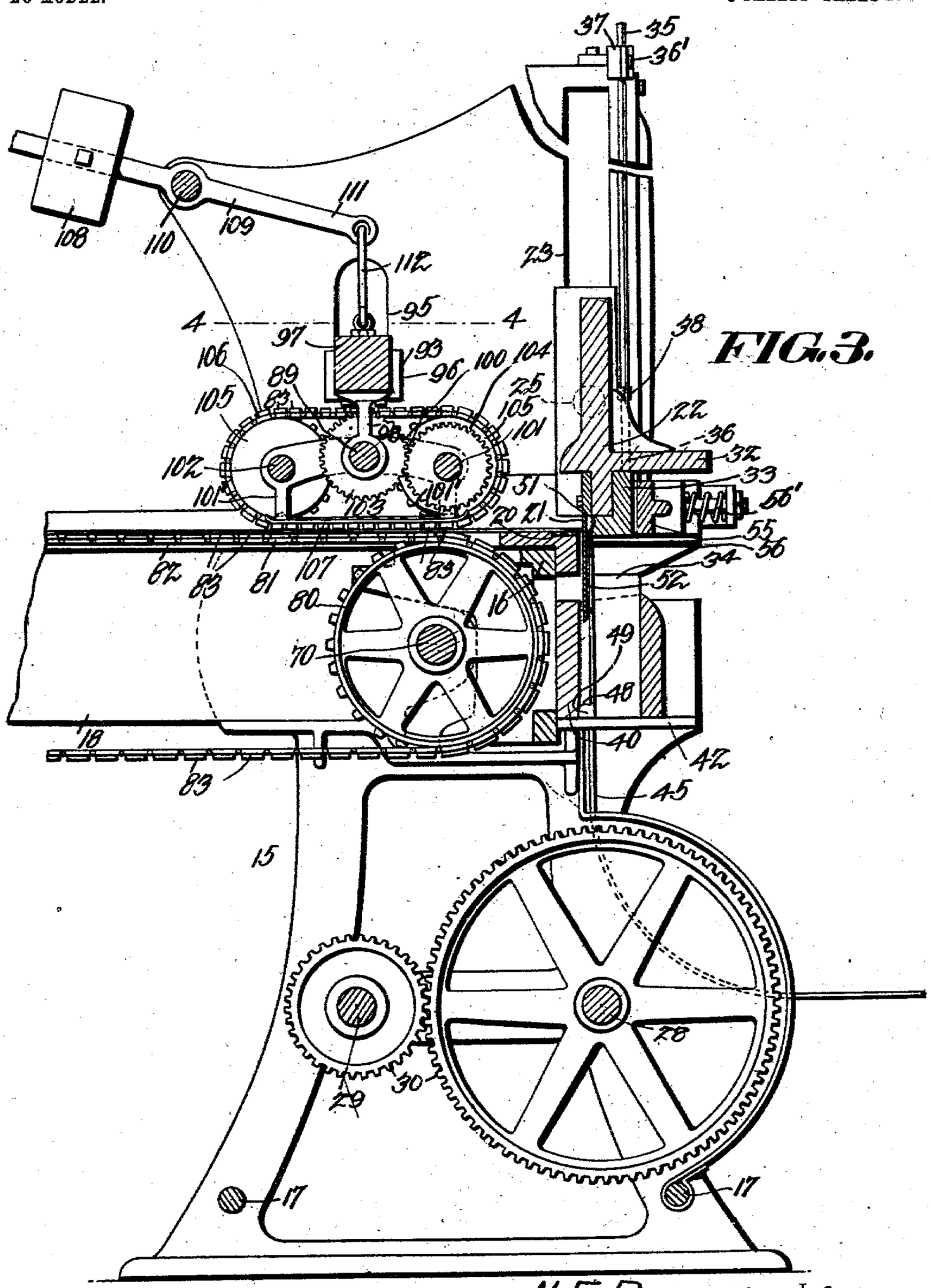

FIG. 3.

Witnesses
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NO MODEL. 5 SHEETS—SHEET 4.

FIG. 4.

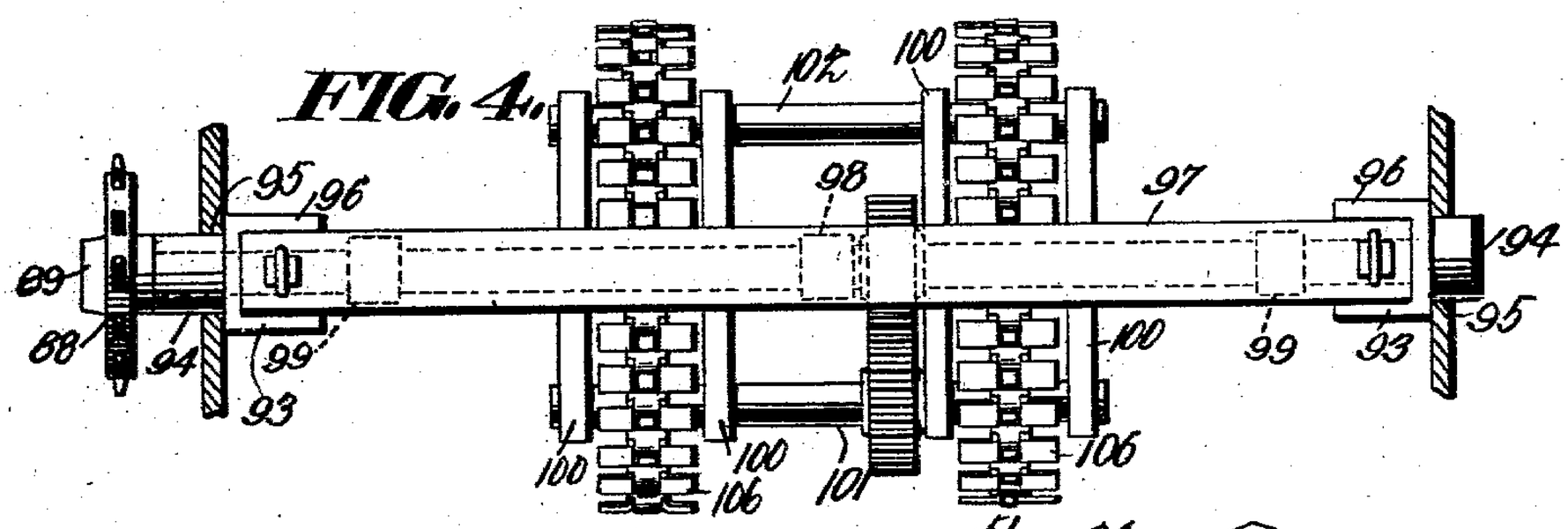

FIG. 8.

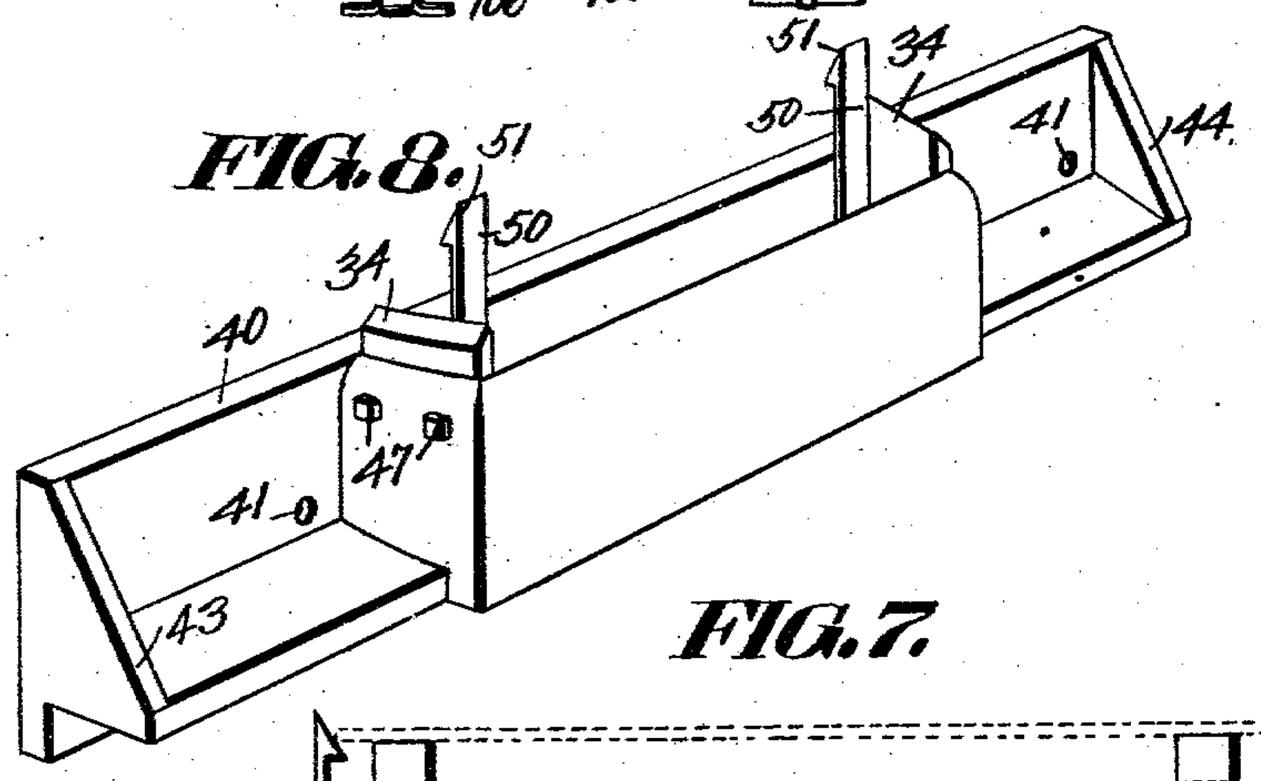

FIG. 7.

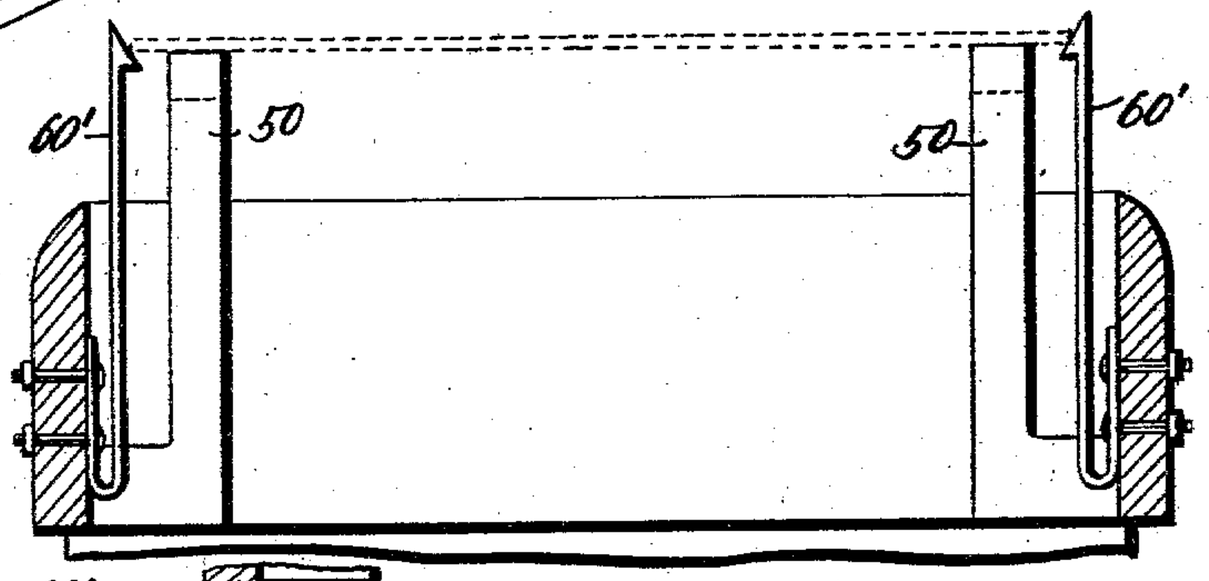

FIG. 6.

Witnesses
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JOINTING AND BLANK FORMING MACHINE.

APPLICATION FILED MAR. 4, 1902.

NO MODEL. 5 SHEETS—SHEET 5.

FIG. 10.

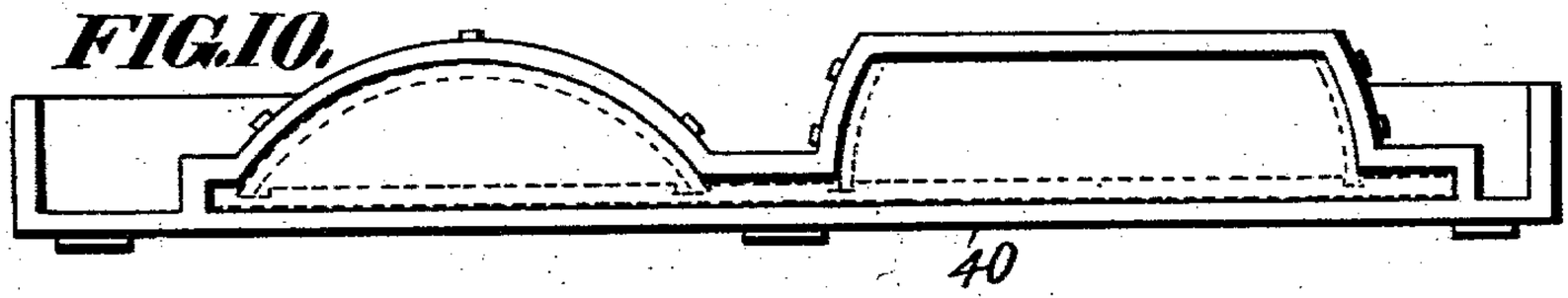


FIG. 9.

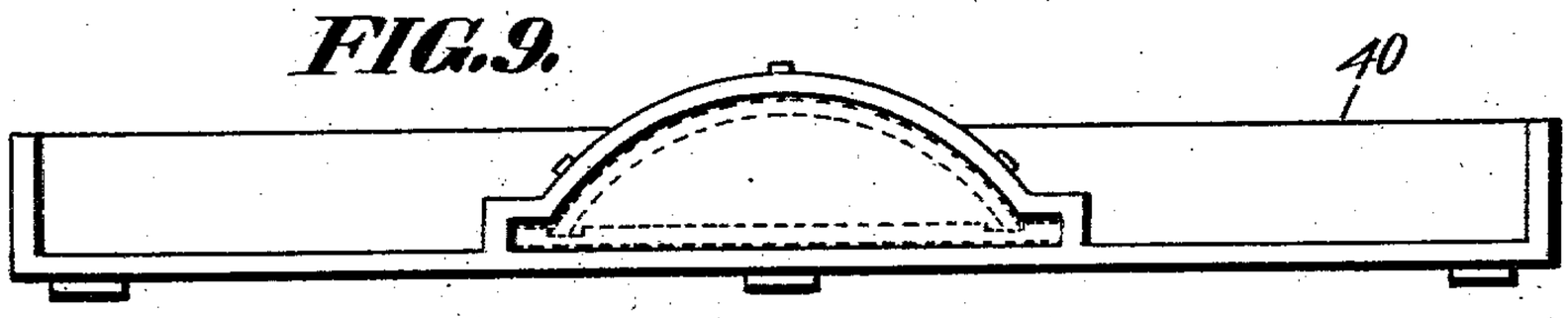


FIG. 12.

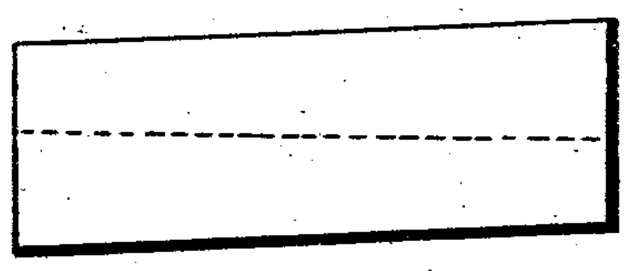


FIG. 11.

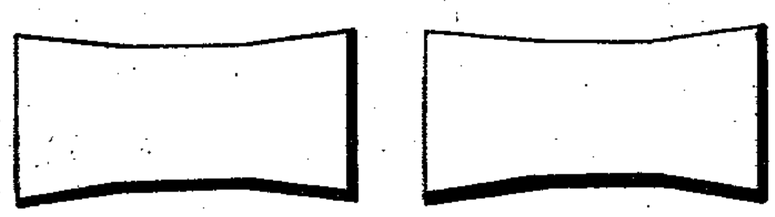


FIG. 14.

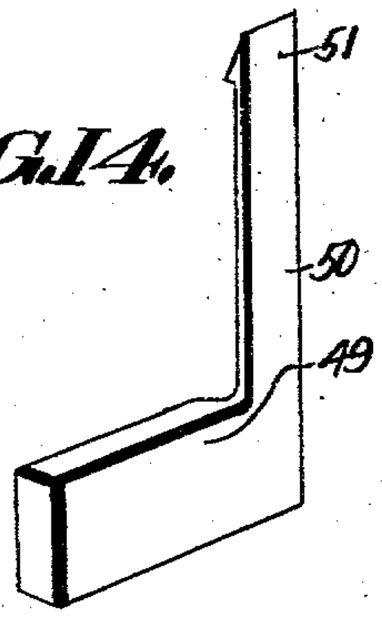


FIG. 15.

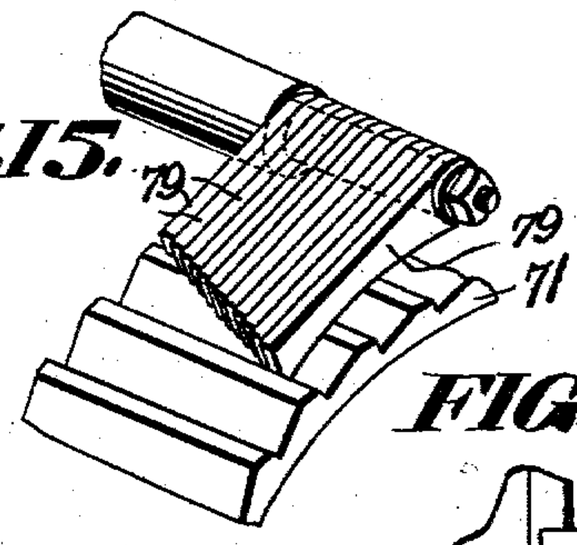
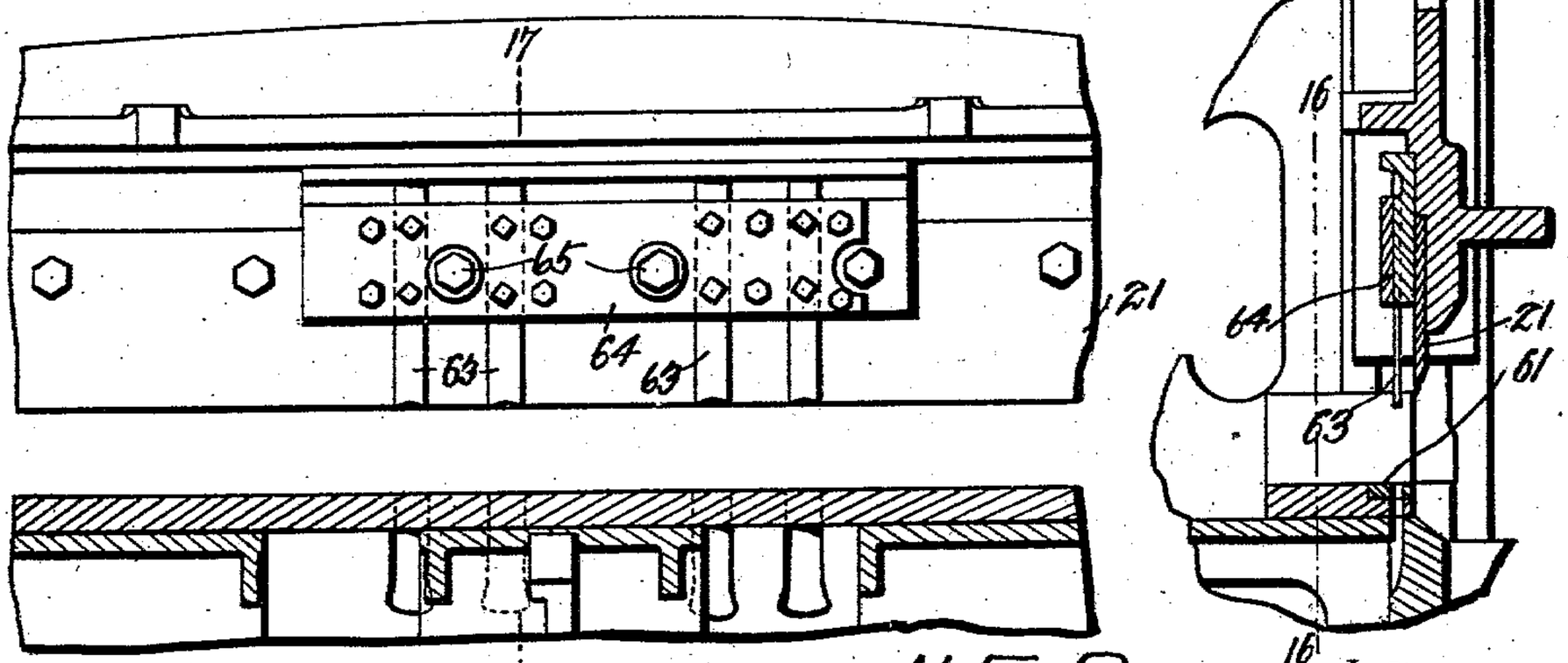


FIG. 17.

FIG. 16.



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UNITED STATES PATENT OFFICE.

NORMAN E. BROWN, OF ST. JOSEPH, MICHIGAN, ASSIGNOR TO THE ST. JOSEPH IRON WORKS, OF ST. JOSEPH, MICHIGAN, A CORPORATION OF MICHIGAN.

JOINTING AND BLANK-FORMING MACHINE.

SPECIFICATION forming part of Letters Patent No. 721,010, dated February 17, 1903.

Application filed March 4, 1902. Serial No. 96,680. (No model.)

To all whom it may concern:

Be it known that I, NORMAN E. BROWN, a citizen of the United States, residing at St. Joseph, in the county of Berrien and State of Michigan, have invented a new and useful Jointing and Blank-Forming Machine, of which the following is a specification.

My invention relates to certain improvements in jointing-machines, and has for its principal object to provide an improved mechanism for the manufacture of blanks for the formation of wooden baskets, boxes, and the like, although it may be employed without any change of structure whatever for the cutting of blanks from sheets of pasteboard, metal, or other material.

A further object of the invention is to construct a machine which will automatically cut from a sheet of stock a blank of the required size and after cutting force the blank through a forming-die of any desired shape and size for the production of blanks for different purposes.

A further object of the invention is to so construct the machine that its cutting-knives and dies may be interchanged for the production of blanks of any shape and size.

A still further object of the invention is to so construct and arrange the cutting-knives and dies as to form sharp smooth edges at the cut points of the blanks.

A still further object is to so arrange the preliminary and the die-cutting mechanisms that the actions will be successive and that the mechanism of one may act in the nature of a stripper for the other.

A still further object of the invention is to provide an improved form of automatic feeding mechanism which will automatically adjust itself to stock of varying character.

A still further object is to provide a feeding mechanism of the endless-chain type in which the feed members will present a practically unbroken surface for contact with the stock.

A still further object is to provide an improved form of mechanism for adjusting the feed in accordance with the size of the blank to be formed.

With these and other objects in view the invention consists in the novel construction and combination of parts hereinafter described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims.

In the drawings, Figure 1 is a perspective view of a jointing and blank-forming machine constructed in accordance with my invention. Fig. 2 is an elevation of one end of the machine. Fig. 3 is a transverse sectional elevation through the center of the machine. Fig. 4 is a sectional plan view of a portion of the same on the line 4 4 of Fig. 3. Fig. 5 is a detail perspective view of one of the links of the feed-chain. Fig. 6 is a detail sectional view of a portion of the apparatus, illustrating the arrangement of the parts for the cutting of special blanks. Fig. 7 is a longitudinal sectional elevation through one of the die-boxes. Fig. 8 is a detail perspective view of a die-box. Figs. 9 and 10 are diagrams illustrating special forms of die-boxes. Figs. 11 and 12 illustrate further forms of blanks which may be cut by the apparatus. Fig. 13 is a detail sectional view, on an enlarged scale, on the line 13 13 of Fig. 2. Figs. 14 and 15 illustrate details of construction. Fig. 16 is a sectional view of a modified form of mechanism on the line 16 16 of Fig. 17. Fig. 17 is a similar view on the line 17 17 of Fig. 16. Fig. 18 is a view of a blank formed by the apparatus.

Similar numerals of reference are employed to designate corresponding parts throughout the several figures of the drawings.

The principal operating parts of the machine are supported on a framework comprising opposite side members 15, united by a transversely-disposed frame member 16 and connecting-bars 17. The frame member 16, which constitutes the forward end of the bed, is in the form of a channel-bar and serves as a support for one end of a wooden or other flat bed 18, which may be of any desired length, its rear end and intermediate portions being supported on suitable standards 19. At the end of the feed-bed is a stationary cutting-bar 20, which may be of any desired contour, the bar being removable, so that another of different shape may be readily

placed in position. With this bar coöperates a vertically-reciprocating knife 21, carried by the transversely-disposed beam 22, adapted to guiding-slots 23, formed in the opposite side frames 15, the knife being bolted in place in order that it may be readily removed and replaced by another of different size and shape. The guiding-blocks 24 of the beam 22, which project somewhat beyond the lines of the frame, are provided with pins or studs 25, which are connected by adjustable bars or pitmen 26 to cranks 27 on a shaft 28, adapted to suitable bearings in the lower front portion of the machine. The shaft is driven in any suitable manner—as, for instance, from a main driver 29, connected to the shaft 28 by intervening gearing 30. The knife makes one complete reciprocation at each rotation of the shaft 28, and the adjusting-bolts 21′, which connect the sections 26, permit of the adjustment of the position of the knife to increase or decrease its distance from the top of the bed at the beginning of a stroke, or the arrangement may be such that one side or end of the knife will be a trifle lower than the other in order to produce a shear cut. This adjustment, while it does not affect the length of stroke of the knife, enables the operator to adjust the initial position of the knife and determines the position at the end of the cutting stroke, this latter adjustment effecting to some extent a difference in the operation of the die-cutting portion of the mechanism, as more fully described hereinafter.

The cross-beam 22 is provided with a horizontal flange 32, to which is fitted a block 33 of wood or other material suitable for contact with the edges of vertically-disposed cutting-knives 34, which form a die. The block or beam 33 is shaped to conform to the cross-beam and its flange and on the downward movement of said cross-beam is engaged and forced into contact with the die-knives, its function being to force the blanks previously severed from the stock by the knife 21 into contact with said die-knives. The block is supported by a pair of rods 35, extending vertically through guiding-openings 36 in the flange 32, the upper ends of said rods being held in friction-boxes 36′, carried by brackets 37 at the top of the side frames. These boxes are lined with leather or other suitable material for frictional contact with the vertical rod, so that the latter may support the beam in position during an independent movement of the beam 22. On the rods are secured collars 38, the collars being disposed at some distance above the top of the flange when the cutting-block is in engagement with the beam, as illustrated in Fig. 1. This construction permits of an upward movement of the main cutting-knife and beam independent of the cutting-block, the latter remaining in the fully-depressed position and in contact with the blanks until as the upward travel of the beam continues the upper surface of the frame 22 engages the collars 38 and elevates the cutter-block against the resistance offered by the friction-boxes on the rods 35, thus permitting the cutter-block to act in the nature of a stripper for the main cutting-knife and prevent the displacement of a blank cut by said knife from the stock.

The die-boxes, which vary in form in accordance with the contour of the blank to be formed, are all of the same general construction and are readily interchangeable. The detail construction of one of these boxes is illustrated in Fig. 8. Each die-box comprises a metallic frame having a vertical flange 40, provided with suitable openings 41 for the passage of threaded bolts by which the frame may be secured to the transverse frame member 16. The opposite ends of the box rest on horizontal ribs or flanges 42, projecting inwardly from laterally-extended portions of each of the side frames 15, so that the die-box may be placed in position on and supported by the ribs or flanges and then secured in position by the bolts. The flange 40, together with side and end walls 43 and 44, forms the body of the die, the box being of any desired contour and open at both top and bottom, so that the cut blanks may freely pass through the same to a delivery bed or apron 45. The end walls of the die may be square, angular, curved, or such other form as may be required for the formation of a blank of any particular contour, and to each end wall is secured a knife 34, having its cutting edge uppermost and adapted for contact with the lower face of the cutter-block. The knives are supported in position by bolts 47, so that they may be readily removed and sharpened. The die-box may be of any shape, and in Figs. 9, 10, 11 I have shown a number of forms for the cutting of blanks of particular shape, and in some cases where the width of the slot will permit two or more die-boxes may be arranged side by side for the cutting of a number of blanks at each operation.

In the bottom of each of the die-boxes is formed a groove 48 for the reception of a spring-shank 49, the outer end of the shank supporting or being formed integral with a spring-finger 50, which extends vertically above the upper edge of the die-knives, one of such springs being arranged at each end of the die-box at a point adjacent to the cutting-knife. The top of each spring is on a level with the stationary cutting-blade 20 of the bed, and its inner face, facing the bed, is provided with an inclined or cam-shaped head 51, the lower portion of which is pressed by the inherent elasticity of the spring into contact with the vertical face of said bed. In the rear face of the cutting-knife is formed a series of grooves or notches 52 of a depth about equal to the greatest thickness of the head 51 of the springs, so that on the downward movement of the knife the springs may enter the grooves and be wholly confined within the same during such further downward

movement as may be imparted to the knife. The head 51 of the spring is inclined in the same direction as the beveled rear face of the cutting edge of the knife; but the angle of one is less than that of the other, so that the extreme upper end of the spring will always be in a vertical plane to the rear of the cutting edge and will make contact with the beveled edge of the knife in advance of such downward movement of the blade as would be necessary to bring its cutting edge into direct contact with the head of the spring. In other words, the beveled rear face of the blade will engage with and move the spring rearwardly and prevent any direct contact between the cutting edge and said spring. During the downward movement of the knife the spring serves as a support for that portion of the stock projected beyond the stationary blade 20 and prevents the movable blade from tilting or otherwise moving the cut portion of the stock, and thus disturbing its position and adjustment with respect to the cutting-dies by which it is to be subsequently acted upon. The grooves 52 in the rear face of the vertically-movable cutting-blade are sufficiently numerous to enable the blade to coact with springs carried by a large number of die-boxes of different size without necessitating the insertion of another cutting-blade. The additional grooves also serve to permit the entrance thereinto of the side edges of the die-knives 46, and thus enable the knives to act with better effect on the blanks and produce a clean straight cut without the formation of ragged or splintered corners. In the operation of this portion of the mechanism the stock, in the form of a veneer or a strip or sheet of strawboard or other material, is fed past the edge of the stationary blade 20 to an extent sufficient to form a blank of the required size. This projected portion of the stock rests upon the spring-fingers 50 and is partially supported thereby, the main portion of the blank, however, being supported by previously-cut blanks which extend from the discharge table or apron up through the die-box to a point about level with the table. On the descent of the beam 22 the blade 21 coacts with the blade 20 and cuts the projected portion of the stock, continued movement of the blade causing its inclined or beveled rear face to push the projected portions outwardly, while any tilting movement of the cut stock is prevented by the support afforded by the tops of the springs. The limit of outward movement of the blank is governed by a guard 55, which extends transversely of the machine and is supported on brackets 56 at the opposite side frames, said guard having slotted end members through which a bolt or bolts may be passed to permit its adjustment to a greater or less extent from the edge of the cutting-blade and the locking of the guard in its adjusted position. The guard is pressed toward the stock by springs 56′, which will yield in case of necessity. As the downward movement of the knife continues the springs 51 enter the slots 52 in the rear face of the knife, and the blank then rests in the space between the rear face of the knife and the adjacent face of the guard 55. By this time the lower side of the flange 32 has engaged with the cutter-block 33 and causes a depression of the latter into contact with the blanks, forcing the same or one of them past the die-blades and into the die-box proper. As the inner edge of each of the die-blades is disposed in one of the grooves of the preliminary cutting-knife, a clean sharp cut will be effected, avoiding any tearing or splintering of the wood at the corners. The downward movement of the preliminary knife and the cutter-block is the same at all times, or it may be governed by the thickness of the stock, it being desirable that a sufficient amount of cut blanks may be disposed in and above the die-box to afford a support for the projected portions of the stock to be cut. The effective movement of the cutter-block will therefore be equal to or but slightly greater than the thickness of a blank, and this may be governed by suitable adjustment of the connecting-bars 26, which transmit power to the beam 22. On the starting of the upstroke of the knife the cutter-block will retain its position in contact with the top blank, owing to the friction of the boxes 36 on the rods 35, which support said cutter-block, and the latter will not be moved until the upper surface of the flange 32 comes into contact with the collars 38 on the rods 36 and elevates said cutter-block. This operation results in the employment of the cutter-block as a stripper for the preliminary cutting-knife and prevents the latter from disturbing the position of the cut blanks in the die-blocks. The construction of the discharge-table 45 is such that a sufficient number of blanks will be retained thereon to support the vertical column of blanks which extend through the die-box, one or more blanks being discharged from the end of the table at each depression of the knife and cutter-block and the weight of the blanks on the horizontal portion of the table being sufficient to hold the vertical column against any downward movement to an extent greater than the operative movement of the cutter-block. In connection with this part of the machine I may employ a die-box or die-cutter for the formation of two separate blanks, each of the same or of different shape, as illustrated in Figs. 6 and 7. In this case the machine is intended for the formation of blanks of uniform shape and size and of the contour illustrated in Fig. 12. In this case the preliminary cutting-knives are arranged at an angle to the line of the stock and cut therefrom at each operation a section sufficient for the formation of two complete blanks, this section being afterward divided into two by an angularly-disposed cutting-blade on the outer wall of the die-box. In such cases it is

desirable to employ a separate discharge-table for that portion of the blanks which are discharged outside the die-box, a convenient form of table being that illustrated in Fig. 6, wherein two curved arms 60 are extended from the box and afford a separate support for the outer blanks, the inner blanks, or those which pass through the die-box, being discharged onto the table 45 in the usual manner. In the formation of these blanks where end knives are not used the die-boxes are provided with end springs 60', having enlarged heads, which are arranged in a line with the feed-table and serve to support the stock as it is fed therefrom. These heads are hook-like in form to engage with the blanks when the latter are depressed by the cutter-bar.

In the formation of blanks for some purposes it is necessary to perforate or make incisions or slots of various character in the blanks, and in the present machine this is provided for by placing in the place of the stationary cutting-blade 20 a blade 61, the edge of which coacts, as before, with the preliminary cutting-blade 21 and the body of the blade being provided with perforations or openings forming female dies adapted for the reception of male dies 63, which are carried by a plate 64, bolted to the rear of the beam 22, the male dies being confined in place by the plate and suitable securing-bolts 65 being provided in order to adjust them. A blank of the character shown in Fig. 18 may be formed by a machine of this character, such a blank being particularly adapted for the manufacture of octagonal berry-boxes, although the dies may be of any shape or of any size for the formation of notches or incisions or perforations in the blanks to permit of the entrance of portions of the same or of other interlocking blanks in the formation of boxes or devices of any other character.

The mechanism for feeding the stock to the preliminary cutting-knife is preferably in the form of endless chains, the number of which varies with the width of the machine. In the present case I have illustrated two upper and two lower feed-chains, between which the stock passes and by which it is intermittently moved past the stationary cutting-blade.

Extending transversely of the frame of the machine and adapted to suitable bearings therein is a shaft 70, having at one end, at a point outside of the frame, a ratchet-wheel 71, with which engages a series of pawls 72 of different length, carried by a frame 73, hung on the shaft 70 and held against the ratchet-wheel by a rubber spring, said frame being connected by a rod 74 to a stud 75, the head of which is adapted to a T-shaped slot 77, extending radially of a disk 78, which is secured to one of the crank-pins 27 and has a center of rotation coincident with that of the shaft 28. The edge portions of the bars which form the groove 77 are provided with designating-marks forming a scale, whereby the position of the slide 76 may be accurately adjusted, said slide being locked in any desired position by the nut 76' when so adjusted. The construction is such that as the shaft 28 rotates the disk 78 will also be rotated and will impart, through the stud 75, the rod 74, and frame 73, a movement to the pawls 72 to an extent sufficient to revolve the ratchet-wheel one or more teeth at each operation. Great delicacy of adjustment is secured by arranging the series of pawls one in advance of the other to extend over the space of a single tooth, so that one pawl will at all times be in position to engage said tooth. Any backward movement of the ratchet-wheel is prevented by a series of locking-pawls 79 of the same character.

On the shaft 70 are secured a pair of sprocket-wheels 80, over each of which passes a link belt 81, the upper run of which is guided in a slot 82, extending longitudinally of the table, each link of the chain being provided with side wings 83, which project slightly above the level of the table for contact with the under surface of the stock. At the rear end of the machine or the terminal of the table is a shaft 84, having sprocket-wheels 85 for the reception of the link belts 81, and at a point outside the line of the bed said shaft is provided with a sprocket-wheel 86, which is connected by a link belt 87 of any ordinary type to a sprocket-wheel 88 on the end of a shaft 89, extending transversely of the machine at a point above the feed-table. As the shaft 89 has a free vertical movement, there would be a tendency on the part of the link belt 87 to induce a rotative movement of the sprocket-wheel 88 and shaft 89 when such vertical movement occurs, and in order to avoid this the link belt is led over idlers 90 91, carried by a bracket 92 on the side of the bed and situated, respectively, above and below the normal horizontal plane of the shaft 89, so that vertical play of the latter will not tend to induce any rotative movement. The shaft 89 is carried at its opposite ends in bearing-blocks 93, the hub portions 94 of which extend through vertical guiding-slots 95 in the side frames to permit of free vertical movement of said shaft, while longitudinal play is prevented by the contact of the inner flange portions of the bearing-boxes with the inner walls of the side frames. The boxes are provided with flanges 96, to which is bolted a beam 97, extending transversely of the machine and parallel with the shaft 89, the two being connected at a central point by a hanger 98, secured to the beam and forming a bearing for the central portion of the shaft. At a point to each side of the central hanger are additional hangers 99, of similar character, they being separated a distance slightly greater than the distance between the feed-chains. On the shaft 89, at points adjacent to the hangers 99, are swiveled two bars or frames 100, having forwardly and rearwardly

extending arms, each provided with a bearing for front and rear shafts 101 and 102, respectively, the two shafts and the frames or arms 100 forming a rectangular frame or support pivotally mounted upon the shaft 89. On the shaft 89 is a gear-wheel 103, and a similar gear 104 is disposed on the front shaft and intermeshes with the gear 102, the latter receiving its motion through the link belt 87, sprocket-wheel 88, and shaft 89.

On each of the shafts 101 and 102 is secured a pair of sprocket-wheels 105, front and rear wheels of alining pairs being connected by link belts 106, of a construction similar to those employed for the lower feed, the wings of the upper chain resting on the stock and being pressed against the same by their own weight in addition to the weight of the three shafts, the sprocket and gear wheels, and the beam 97, the construction permitting of the free vertical movement of the frame and its feeding-chains in accordance with the thickness of the stock and permitting also of the swinging movement of the frame on shaft 89 to allow the feed to accommodate itself to irregularities in the stock. To prevent any sagging of the lower run of the upper feed-belts the arms 101′ are provided with depending hangers 107, having slotted lower ends for the reception of portions of the small feed-belts, thus preventing any movement of the belts except in a straight line between the peripheries of the sprocket-wheels by which they are carried. In some cases, especially where the width of the machine is very great and the stock is capable of offering but little resistance, the weight of the upper feed-belts and their carrying-frame may injure the stock, and to guard against this the weight, or a portion of the same, may be counterbalanced by a weight 108, adjustably secured on a lever 109, the latter in turn being secured to a transverse shaft 110, having arms 111, connected by links 112 to the opposite ends of the beam 97 or the shaft 89.

In feeding material of the class on which this machine is principally designed to operate it is desirable that the feeding-belts present a practically unbroken surface for contact with the stock, and to this end I employ a link belt of the character more clearly shown in Fig. 5, each side of the link being provided with a rectangular wing 83, which projects slightly above the surface of said link. With links constructed in the usual manner it would be impossible to form the wings of a length nearly equal to the length of the links owing to the position which such links must assume with respect to each other when being united or separated. To overcome this difficulty, the hook 113 of the link is bent downwardly, so that in assembling and disassembling the links they may be bent together in a direction opposite to the contact surface of the wings. This enables me to form a feed-belt having, to all intents and purposes, a continuous and unbroken surface for contact with the stock.

The machine is intended principally for forming blanks for the manufacture of basket-covers, basket-bottoms, staves, and for the manufacture of blanks for berry-boxes and like purposes, although it may, of course, be used in the manufacture of pasteboard boxes or blanks of metal or any other material or for the formation of blanks or of sheets for any purpose, with such modifications as may be necessary in the shape or conformation of the knives or dies.

While the construction herein described is the preferred form of the device it is obvious that various changes in the form, proportions, size, and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of my invention.

Having thus described my invention, what I claim is—

1. In a device of the class specified, a cutting-knife having an inclined rear face and adapted to effect a primary cut and to force the severed material to the rear of the knife, a secondary cutting device located in a plane below the primary knife, and a combined stripper and cutter bar serving as a stripper for the first knife and as a feeding device for forcing the severed material into contact with said secondary cutting device.

2. In a device of the class specified, a primary cutting-knife having an inclined rear face adapted to force the severed material to the rear, means for reciprocating the knife, a secondary cutting-knife, and means operable by the movement of the first knife for forcing the cut material into contact with the second knife.

3. In a device of the class specified, a primary cutting-knife having an inclined rear face and adapted to force the severed material to the rear, means for reciprocating the knife, a secondary stationary knife, and means operable by the movement of the primary knife for forcing the cut or severed material into contact with the secondary knife.

4. In a device of the class specified, a cutting-knife having an inclined rear face and adapted to force the severed material to the rear, means for reciprocating the knife, and means for holding the severed material in place during the inoperative movement of the knife.

5. In a device of the class specified, a cutting-knife having an inclined rear face and adapted to force the severed material to the rear, means for reciprocating the knife, a secondary stationary knife, and means for holding the material severed by the first knife at a point to the rear of the plane of vertical movement of said knife and for forcing such material into contact with the secondary knife.

6. In a device of the class specified, a re-

ciprocating knife adapted to successively sever strips of a predetermined size and to force such strips to the rear face of the knife, and means entirely disconnected from the severing device for supporting said strips during the cutting operation.

7. In a device of the class specified, a cutting-knife having a groove in its rear face, and a supporting-finger for the severed material adapted to enter such groove immediately after the cutting operation.

8. In a device of the class specified, a blade having its lower edge beveled to form an inner cutting edge, said blade having a grooved rear face, and a supporting-finger for the cut material adapted to enter said groove.

9. In a device of the class specified, a cutting-knife having a grooved rear face, and a spring supporting-finger adapted to enter such groove immediately after the cutting operation.

10. In a device of the class specified, a blade having its lower edge beveled to form a cutting edge, there being grooves in the rear face of said blade, and spring-fingers for supporting the cut material, said fingers having inclined upper portions adapted for engagement with the beveled edge of the knife and to enter said grooves after the cutting operation.

11. In a device of the class specified, a blade having a grooved rear face, and spring-fingers adapted to support the cut material, said fingers being of a thickness less than the depth of the grooves.

12. In a device of the class specified, a blade having its lower edge beveled to form an inner cutting edge and provided with a plurality of grooves in its rear face, a plurality of supporting-fingers adapted to be engaged by the beveled edge of the blade and directed into such grooves, said supporting-fingers having inclined upper portions and being of a thickness less than the depth of said grooves.

13. In a device of the class specified, a cutting-knife having a grooved rear face, and blank supporting and guiding fingers adapted to enter said grooves immediately after the cutting operation.

14. In a device of the class specified, a feed bed or table, a blank-supporting finger independent of the cutting devices having its upper end in the plane of the surface of the table, and a cutting-knife having grooves for the reception of said supporting-finger.

15. In a device of the class specified, stock-feeding devices, a blank supporting and guiding finger independent of the cutting devices having its upper end on a level with such feeding devices, and a knife having a grooved rear face for the reception of such fingers.

16. In a device of the class specified, stock-feeding devices, a cutting-blade and a supporting device independent of the cutters for holding the material being cut, said supporting device being disposed to the rear of the knife and having its upper surface in alinement with the feeding devices.

17. In a device of the class specified, stock-feeding devices, a cutting-blade having its lower edge beveled to form a cutting edge, the rear face of said knife being grooved, and a plurality of spring-fingers having at their upper ends inclined faces adapted to be engaged by the beveled edge of the knife and directed thereby into the said grooves, said fingers having their upper surfaces in alinement with the said feeding devices.

18. In a device of the class specified, stock-feeding devices, a primary cutting-knife, means for reciprocating the same, stock guiding and supporting fingers arranged to the rear of the knife and serving to guide the blanks, and to support the same during the cutting operation, a secondary stationary knife, and a reciprocatory block operable by the movement of the primary knife, said block acting as a stripper for the primary knife and serving to force the cut blanks into contact with the secondary knife.

19. In a device of the class specified, a primary cutting-knife for severing blank-sections of predetermined size and for moving the same to the rear of the knife, a finishing-die, and means for forcing the blank-sections through said finishing-die.

20. In a device of the class specified, a primary cutting-knife for severing blank-sections of predetermined size and for moving the same to the rear of the knife, a finishing-die, and means operable in part by the movement of the primary cutting-knife for forcing the blank-sections through the finishing-die.

21. In a device of the class specified, a primary cutting-knife for severing blank-sections of predetermined size and for moving the same to the rear of the knife, a finishing die and a cutter-block having an operative movement during the latter portion of each movement of the primary cutting-knife and serving as a stripper for the primary knife and acting also to force the blank-sections through the finishing-die.

22. In a device of the class specified, a stationary cutting-knife, a primary cutting-knife coöperating therewith to sever blank-sections of predetermined size and for moving the same to the rear of the knife, a finishing-die having stationary cutters arranged in a plane below the stationary knife, and a cutter-bar movable with the primary knife and serving on the downward movement thereof to force the previously-cut blank-sections through the finishing-die.

23. In a device of the class specified, a stationary knife, a primary cutting-knife coöperating therewith to sever unfinished blanks and to move the same to the rear, means supporting and reciprocating the primary cutting-knife, a cutter-block carried by said supporting and reciprocating means, a stationary finishing-die arranged below the stationary

cutting-knife, whereby at each downward movement of the knife supporting and reciprocating means a blank-section will be severed by the primary knife and thence forced to the rear, and a previously-severed blank-section will be forced by the cutter-block through the finishing-die.

24. In a device of the class specified, a primary cutting-knife, a finishing-die arranged below said knife, a discharge-bed adapted to support a column of finished blanks within the die, and the unfinished blanks above said die, and means for simultaneously severing an unfinished blank and for forcing an unfinished blank into said finishing-die.

25. In a device of the class specified, a finishing-die, a discharge-bed arranged to support a column of finished blanks within the die and unfinished blanks above the die, and means for simultaneously cutting an unfinished blank and for forcing a similar blank into the finishing-die.

26. In a device of the class specified, a finishing-die, a discharge-bed arranged below the same and having one portion arranged in a substantially horizontal plane and a curved portion extending up to a point under the die, said bed being adapted to hold a continuous row or column of finished blanks and the weight or quantity of blanks on the horizontal portion of the bed serving to support a column of finished blanks within the die and unfinished blanks above said die, and means for simultaneously cutting an unfinished blank, for forcing a similar blank into the finishing-die and for discharging a finished blank from the end of the bed.

27. In a device of the class specified, a primary cutting-knife having a grooved rear face and adapted to sever and to move an unfinished blank to the rear, a finishing-die arranged below said knife, said finishing-die having stationary knives adapted to partially enter said grooves, and means for reciprocating the primary knife and for forcing the material cut thereby through the finishing-die.

28. In a device of the class specified, a finishing-die having a stationary knife, a reciprocatory primary knife adapted to sever the material and to force the same to the rear, said knife having a grooved rear face for the reception of a portion of the stationary knife, and a cutter-block operable by the movement of the primary knife for forcing the material severed by said primary knife into contact with said stationary die-knife.

29. In a device of the class specified, a primary cutter comprising a blade having its lower edge beveled to form a front cutting-edge and said beveled edge serving to force the severed stock to the rear face of said blade, said blade having a grooved rear face, stock-supporting fingers adapted to enter said grooves on the downward movement of the knife and to support the stock during the preliminary cutting operation, a finishing-die arranged below the primary cutter and having a stationary knife a portion of which is adapted to enter one of said grooves, and a cutter-block movable with the primary knife and adapted to force the severed stock into contact with the die-knife.

30. In a device of the class specified, the combination with a knife-supporting beam and means for reciprocating the same, of a removable knife, a feed-bed having a removable cutting-blade adapted to coact with the knife, a secondary knife arranged below the removable knife, a cutter-bar, and means for operating the same in connection with the removable knife, said cutter-bar acting as a stripper for the removable knife and serving also to force the material severed by said knife into contact with the secondary knife.

31. In a device of the class specified, the combination with a preliminary cutter-blade adapted to cut the stock and to force the same to the rear, of a supporting-frame, and interchangeable finishing-dies adapted to be clamped to said frame.

32. In a device of the class specified, a knife-supporting beam, a primary cutting-knife carried thereby, a stripper-bar, rods carrying said stripper and extending through the knife-supporting beam, friction holding-clamps engaging with said rods, and collars carried by said rods for engagement by the knife-beam in one direction of movement, substantially as specified.

33. In a device of the class specified, a knife-supporting beam, a cutting-knife carried thereby, a stripper-bar arranged to the rear of the knife and adapted to be engaged by the beam on its downward movement, a supporting-frame, friction-clamps carried thereby, supporting-rods carried by the stripper-bar and extending through said clamps, and collars disposed on said rods for engagement by the beam on the upward movement thereof, substantially as specified.

34. In a device of the class specified, a supporting-frame, adjustable friction-clamps carried by said frame, a knife-supporting beam, a knife carried thereby, a stripper-block arranged to the rear of the knife and under the beam, rods connected to said beam and extending through the friction-clamps, and collars arranged on said rods at points above said beam, substantially as specified.

35. In a device of the class specified, a feeding device, a cutting-knife adapted to sever unfinished blanks from material fed by said feeding device and to move such material to the rear of the knife-blade, an adjustable guard for limiting the extent of movement of said blanks, and means for positively forcing the unfinished blanks to a point below the guard after the severing operation.

36. In a device of the class specified, a feeding device, a cutting-knife adapted to sever unfinished blanks from material fed by the feeding device, a spring-held guard for limiting the movement of such unfinished blanks,

and means for positively forcing the unfinished blanks to a point below the guard after the severing operation, substantially as specified.

37. In a device of the class specified, a stationary cutting-knife, a movable cutting-knife, a feeding device comprising upper and lower movable members, means for positively driving both members at the same speed, the lower member being arranged in the same horizontal plane with the cutting edge of the stationary knife and forming a fixed support for material to be fed, and the upper member having a free vertical movement to accommodate material of varying thickness.

38. In a device of the class specified, a stationary cutting-knife, a movable cutting-knife, a feeding device comprising a lower feed-chain having its upper face in the horizontal plane of the cutting edge of said stationary knife, an upper feed-chain, means for positively driving both chains at the same speed, one of such chains being freely movable toward and from the other to accommodate varying thickness in the material passing between them.

39. In a device of the class specified, upper and lower feed-chains, means for positively driving both chains at the same speed, a supporting device for the upper feed-chain, and means for partially counterbalancing the weight of such supporting device.

40. In a device of the class specified, an endless chain adapted to rest on the material to be fed, a vertically-movable frame having free tilting movement, and sprocket-wheels journaled in said frame and supporting said chain.

41. In a device of the class specified, an endless chain adapted to rest on the material to be fed, a frame having as elements three parallel shafts of which the central shaft forms a fulcrum-point for the frame, and sprocket-wheels carried by the outer shafts and serving to support said chain.

42. In a device of the class specified, a frame having a free vertical and oscillatory movement, sprocket-wheels carried by said frame, and an endless chain carried by said sprocket-wheels and resting on the material to be fed.

43. In a device of the class specified, a vertically-movable frame, shaft-hangers forming elements of said frame, a driven shaft mounted in the shaft-hangers, arms pivoted on said shaft, auxiliary shafts carried by said arms at points on opposite sides of the driven shaft, sprocket-wheels mounted on said shaft, a chain carried by the sprocket-wheels and resting on the material to be fed, and means for imparting motion from the driven shaft to one of said sprocket-wheel shafts.

44. In a device of the class specified, a feeding device comprising a vertically-movable frame, an adjustable counterbalance-weight therefor, a driven shaft carried by the frame, arms pivotally mounted on said driven shaft, auxiliary shafts carried by said arms, sprocket-wheels disposed on said auxiliary shaft, and a feed-chain carried by the sprocket-wheels and resting on the material to be fed.

45. In a device of the class specified, a feeding device comprising a freely-movable frame, shafts journaled therein, sprocket-wheels carried by the shaft, an endless chain formed of a series of links having laterally-projecting wings for contact with the material to be fed, and guiding devices carried by the frame and adapted for contact with the inner surfaces of said wings.

46. In a device of the class specified, a feed-chain formed of a series of connected links, each having laterally-projecting wings, the mouths of the socket portions of each link being located on that side of the link opposite the wings.

47. In a device of the class specified, a feeding mechanism comprising upper and lower chains, means for imparting a positive intermittent movement to both of such chains, and means for adjusting the degree of movement.

48. In a device of the class specified, a feeding mechanism comprising upper and lower endless-chain feeds, means for imparting motion to the lower chain, a sprocket-wheel forming an element of the lower feed member, a driving-sprocket forming an element of the upper feed member, a link belt extending between the two sprockets, and idlers forming chain-guides said idlers being disposed respectively above and below the plane of the driving-sprocket for engagement with the upper and lower runs of said chain.

49. In a device of the class specified, a feeding device comprising an endless chain, a ratchet-wheel operatively connected thereto, a frame having a pivotal axis coincident with the center of rotation of the ratchet-wheel, a pawl carried by said frame and engaging the ratchet-wheel, a revoluble driving-shaft, a crank-disk thereon, a pair of parallel radially-disposed ribs having undercut or recessed walls disposed on said crank-disk, there being an indicating-scale marked on one of said ribs, a pivot-bolt having an enlarged head held in the undercut portions of the ribs and having a threaded outer end, a sleeve carried by said bolt and provided with a hand or pointer carried by the sleeve and extending over the indicating-scale, a clamping-nut adapted to the threaded portion of the bolt and serving to hold the sleeve in adjusted position, and a pitman formed of two longitudinally-adjusted sections connecting the sleeve to the pivoted pawl-carrying frame.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

NORMAN E. BROWN.

Witnesses:
J. H. JOCHUNE, Jr.,
FRANK S. APPLEMAN.