

Nov. 26, 1935.

J. BRUDER ET AL

2,022,184

PLAITING MECHANISM

Filed Sept. 8, 1933

4 Sheets-Sheet 2

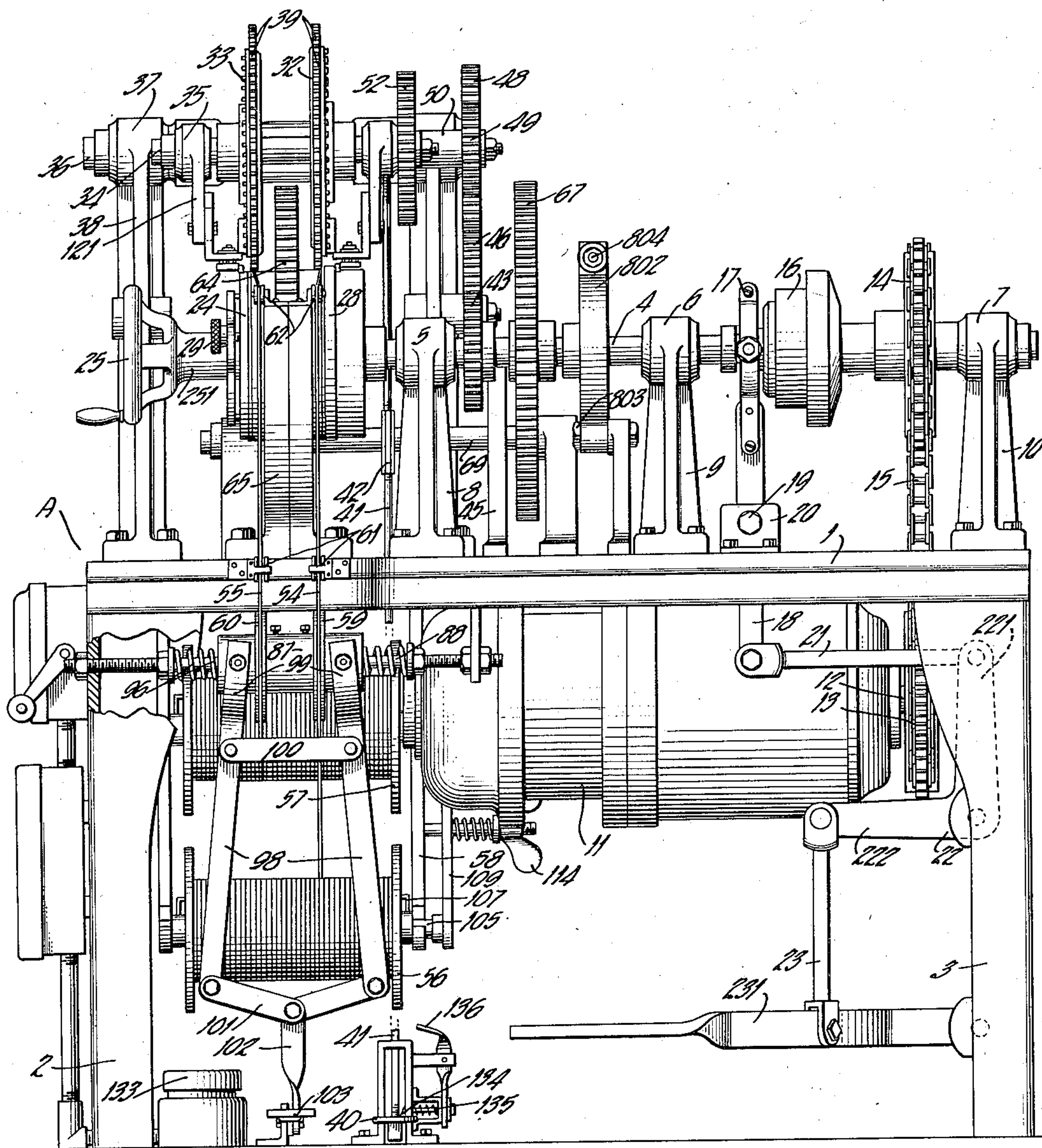


FIG. 2

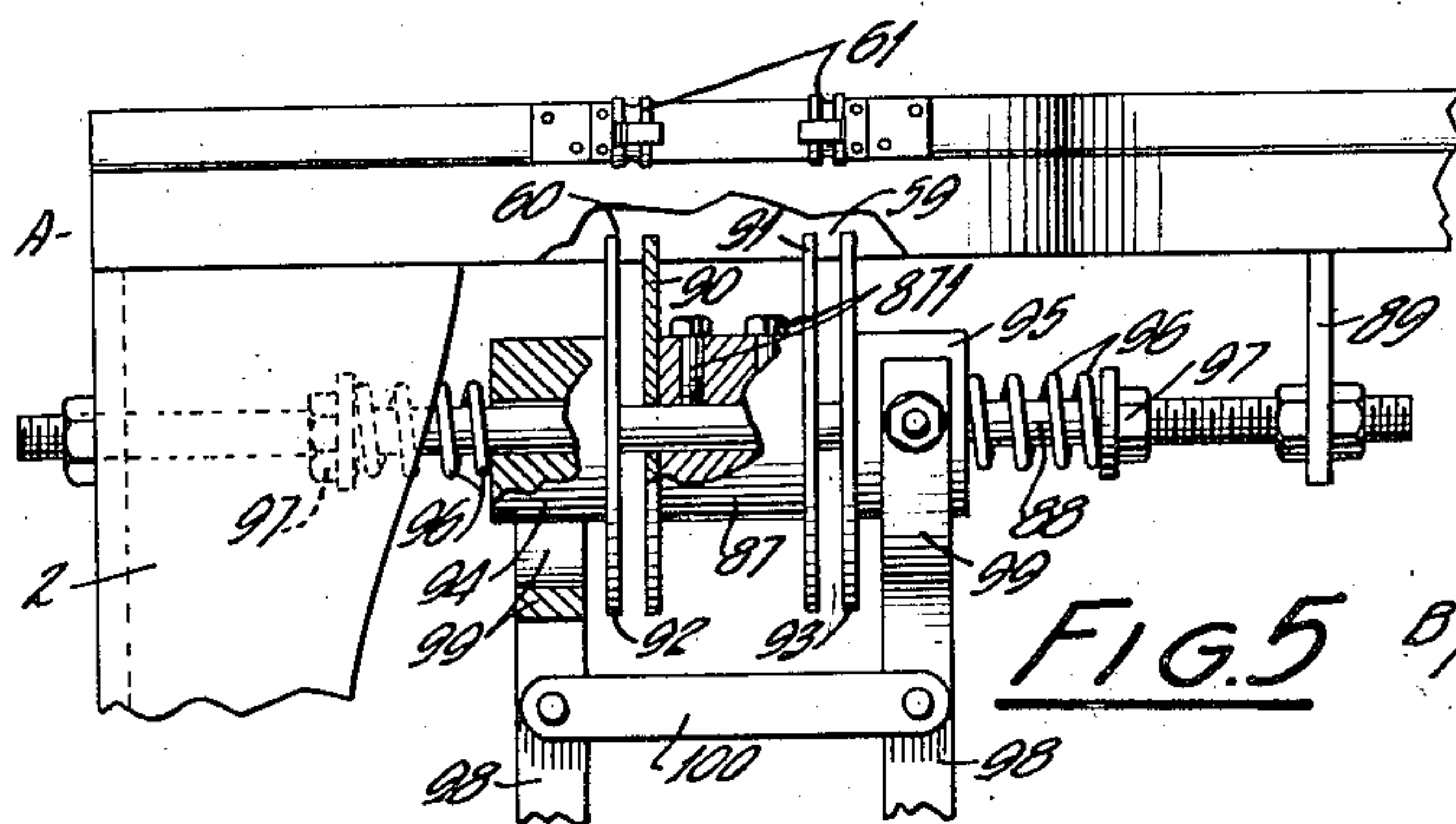


FIG. 5

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4 Sheets-Sheet 3

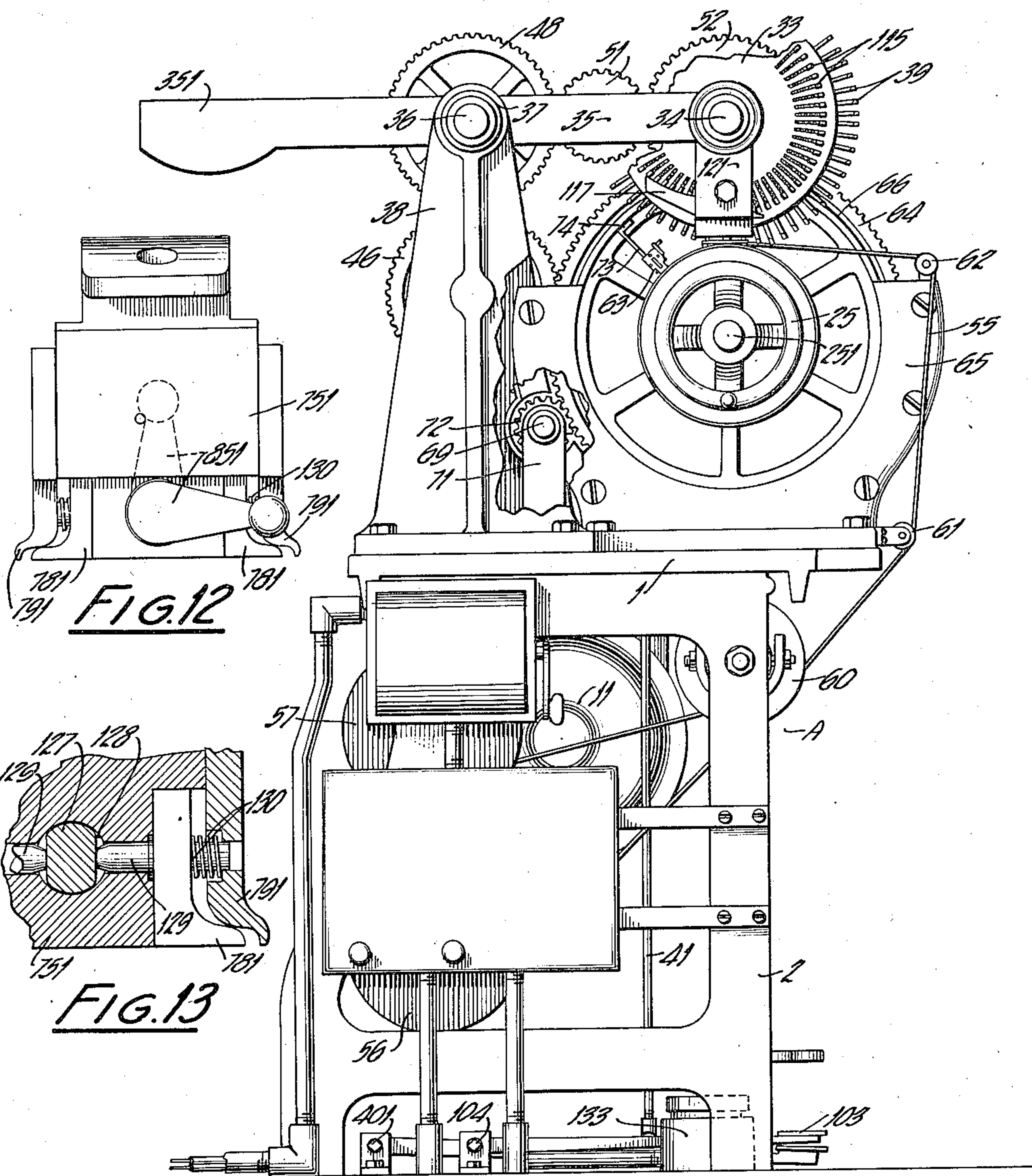


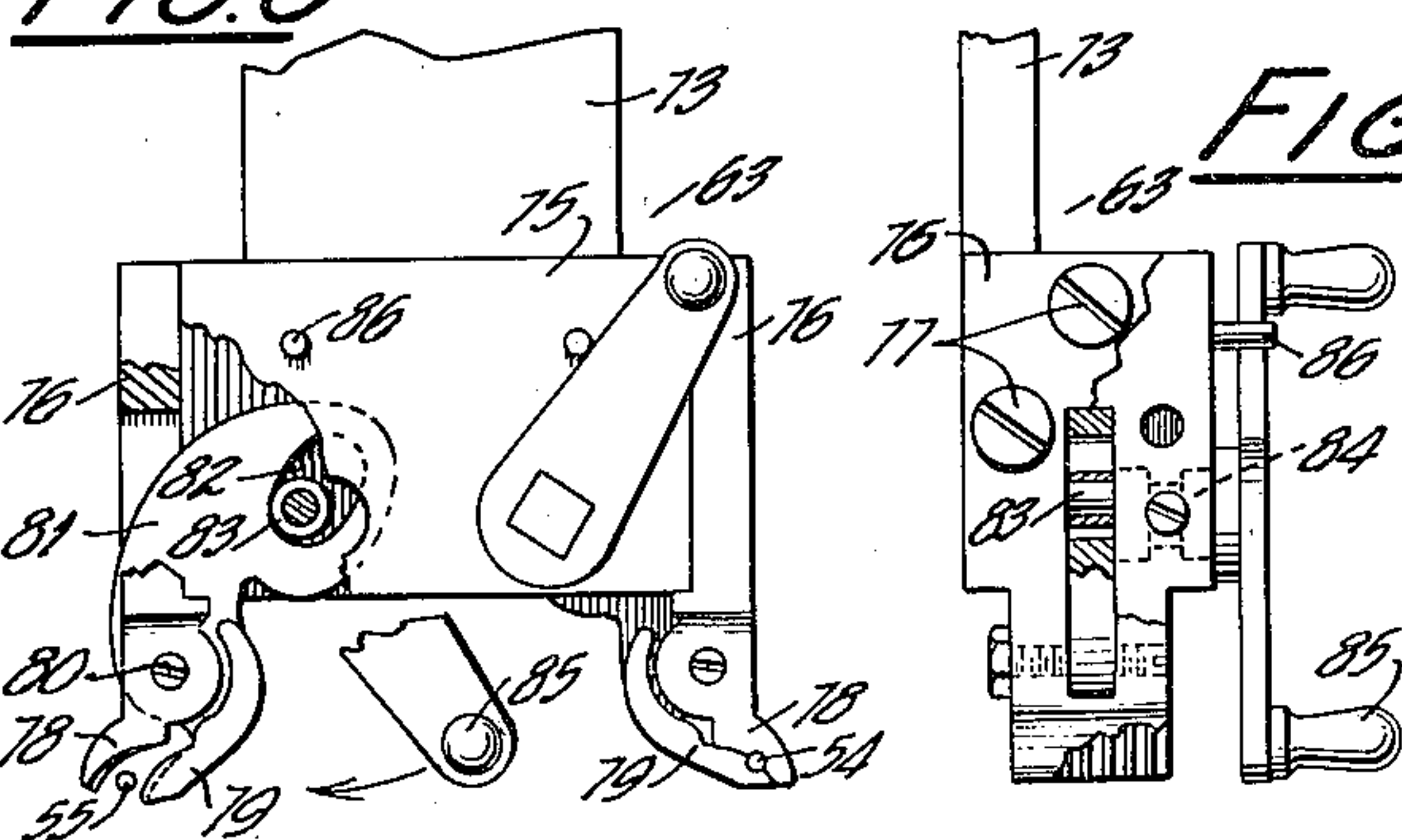
FIG. 12

FIG. 13

FIG. 6

FIG. 3

FIG. 7



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4 Sheets-Sheet 4

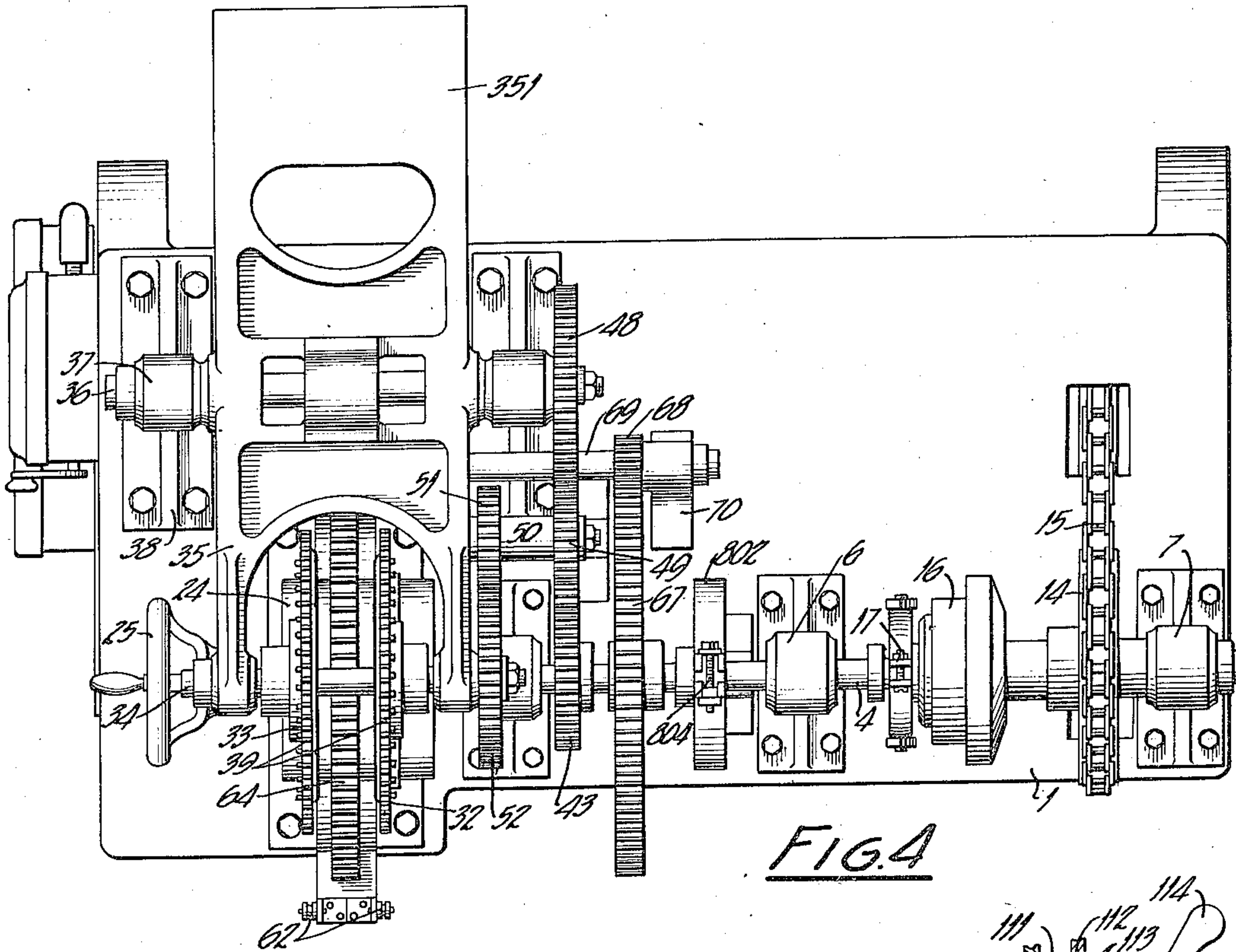


FIG. 4

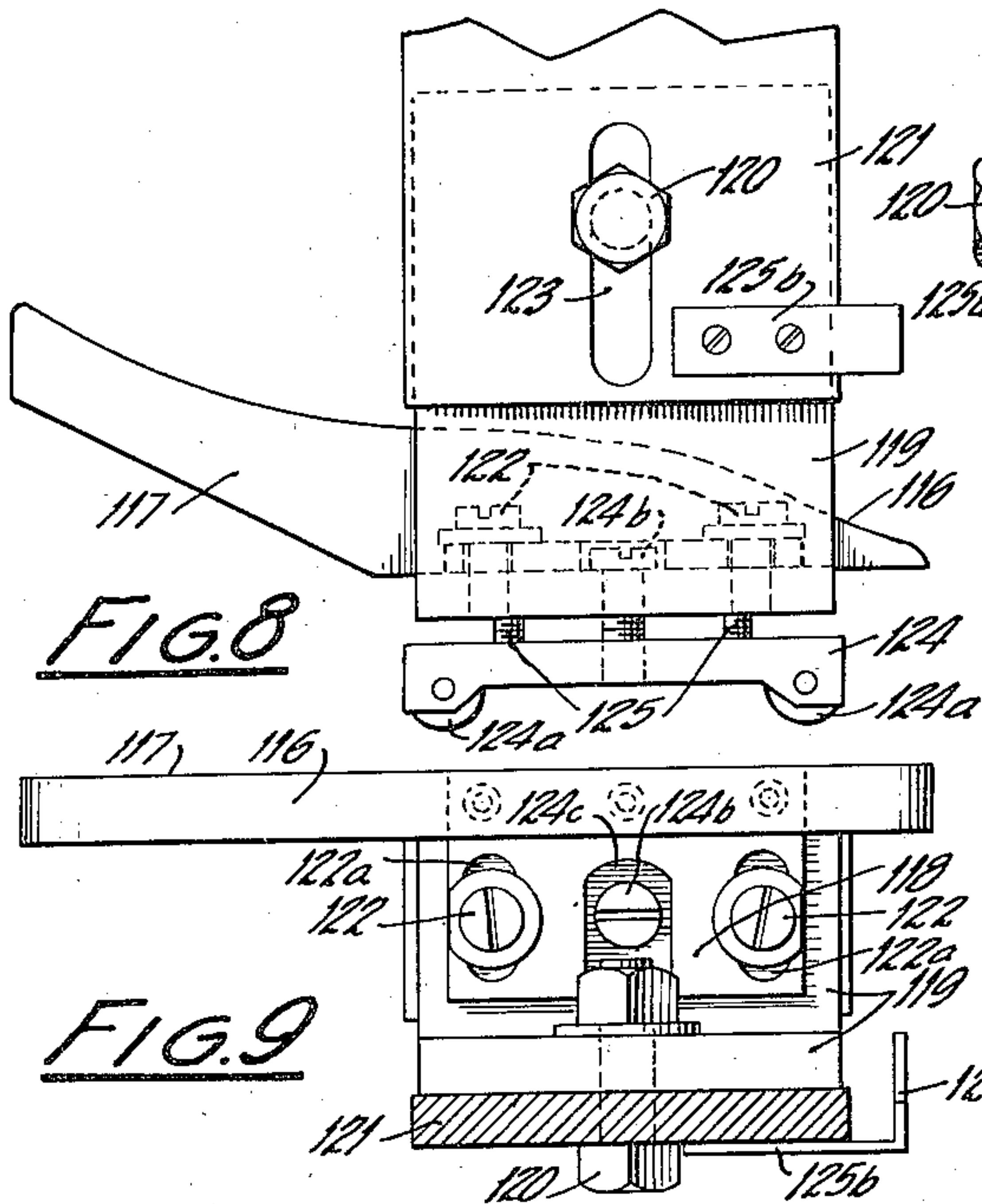


FIG. 8

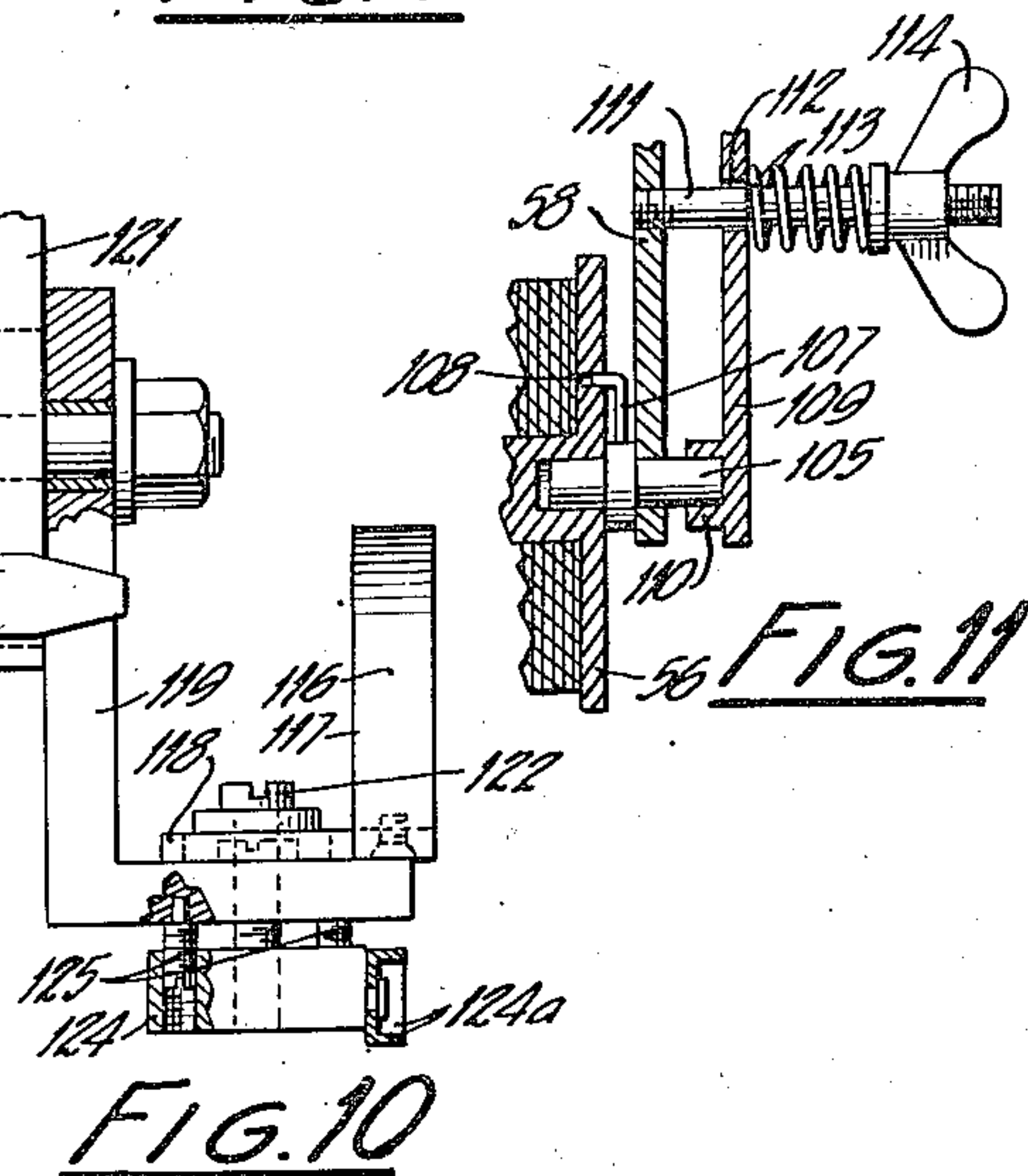


FIG. 10

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2,022,184

PLAITING MECHANISM

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Application September 8, 1933, Serial No. 688,633

15 Claims. (Cl. 69—1)

Our invention relates to improvements in plaiting mechanism of the general character illustrated in Patent No. 1,282,360 issued to Charles Atherton on or about October 22, 1918, and while not limited thereto is particularly useful in the manufacture of bellows for gas meters. A bellows comprises two metallic rings connected by a flexible web of suitable material, preferably leather.

The device of the Atherton patent above referred to and that of the present application each comprises an expansible chuck arranged to detachably engage and rotate two bellows rings and to hold a flexible bellows tube on said rings. Each of the devices also comprises two rotary plaiting elements each of which comprises a peripheral series of radially reciprocable blades which are normally forced outwardly but which successively engage the web of said tube when rotated in contact therewith, so as to corrugate and gather the opposite ends of said web into a circumferential series of plaits, thus reducing the circumference of the web to fit said rings. Means are also provided for wrapping binding cords around the reduced flexible ends of said tube.

In the mechanism of the patent above referred to, the plaiting elements are vertically reciprocable in a frame, the supports for which form obstructions adjacent the space where the ends of the cords are located thereby making it difficult for the operator to manipulate the same. One of the objects of our present invention is the provision of a tiltable member for supporting the plaiting elements pivotally mounted at the rear of the main drive shaft and the supports for which present no obstruction to the hands of the operator in tying the cords around the flexible web and in the manipulation of the parts associated with the chuck.

In the patent above referred to, cam members are provided for retracting the plaiting blades during the plaiting or puckering of the web, the one fixed and the other movable with respect to the frame on which they are mounted. In the device illustrated in that patent, the cam members as well as the plaiting elements are mounted upon a vertically reciprocable frame on which is also mounted a carriage provided with rollers engaging the chuck so that the cam member may readily be designed always to occupy the correct position with respect to the plaiting blades.

A further object of our invention is the provision of a cam member generally similar to the cam member or cam members illustrated in said patent for retracting the blades and which is

mounted upon the tilting frame and is self-positioning with respect to the chuck and the blades.

A further specific object of our invention is the provision of means for creating tension on the binding cords as they are wound around the flexible web, together with means whereby the tension on said cords may readily be released.

A still further object is to position the cord supply and the cord tensioning and guiding means so that the cords do not pass through the line of vision of the operator as he watches the plaiting of the web and do not present any obstruction to the hands of the operator in starting or finishing the winding operation.

Other novel features of our invention will appear in the specification and will be more particularly pointed out in the claims.

Our invention will best be understood by reference to the accompanying drawings in which is illustrated a preferred embodiment thereof and in which—

Fig. 1 is a perspective view of a machine embodying our invention;

Fig. 2 is a somewhat diagrammatic front elevation thereof;

Fig. 3 is an end view;

Fig. 4 is a plan view;

Fig. 5 is a front view, partially broken away, of the cord tensioning device;

Fig. 6 is a front view, partially broken away, of one form of mechanism for gripping the cords;

Fig. 7 is a side view, partially broken away, of Fig. 6;

Fig. 8 is a side view of the cam member for retracting the plaiting blades from the web and maintaining the same retracted after they have left the region of the chuck;

Fig. 9 is a plan view of Fig. 8;

Fig. 10 is a front view, partially broken away, of Fig. 8;

Fig. 11 is a fragmentary sectional view illustrating the means for producing friction on a cord storing spool;

Fig. 12 is a front view of a modified form of cord gripping mechanism;

Fig. 13 is a fragmentary vertical sectional view through Fig. 12; and

Fig. 14 is a sectional view through a bellows formed by the machine.

Like reference characters indicate like parts throughout the drawings.

Referring to the drawings, A indicates generally the frame of the machine comprising a table 1 mounted on legs or standards 2 and 3 at the opposite ends thereof. The main drive shaft 4 has

its bearings at 5, 6 and 7 on standards 8, 9 and 10 extending upwardly from the table. In the embodiment of our invention illustrated, the shaft 4 is driven by an electric motor 11 which may conveniently be mounted underneath the table 1. On a shaft 12 which is driven by the motor 11 through suitable reduction gearing (not illustrated) is mounted a sprocket wheel 13, which drives a sprocket wheel 14 mounted on the shaft 4 by means of a chain 15.

A clutch member 16 interposed in the shaft 4 is actuated by a yoke 17 on the upper end of a lever 18, pivoted at 19 on a bracket member 20, secured to the table 1. The lower end of the lever 18 is connected by a link 21 to one arm 221 of a bell crank 22, the other arm 222 of which is connected by a link 23 to a foot lever 231.

Mounted on the shaft 4 is a chuck indicated generally at 24, which may be expanded or contracted and comprising two sections 241 and 242, substantially semicircular in cross section as indicated in Fig. 1. When the two sections of the chuck are brought together, the circumference of the chuck is, of course, smaller than when the chuck is expanded. The mechanism for expanding and contracting the chuck may be the same as that illustrated in said Patent, 1,282,360. In order to avoid confusion the parts have not been completely illustrated herein, and reference may be had to said patent for further details of such mechanism. Briefly a conical wedge not illustrated engages the inner surfaces of the two sections 241 and 242 of the chuck and when the wedge is moved axially by a hand wheel 25 mounted on the shaft 251, the wedge is either advanced or retracted as desired. Spring means, not illustrated, are provided which tend normally to collapse the chuck. When the wedge is advanced, the chuck is expanded against the action of the springs and when it is retracted the springs contract the chuck. The rings 26 and 27 which form a part of the bellows, as best shown in Fig. 14 are adapted to be received and secured on the chuck. One of the rings 27 is first passed over the handwheel 25 and slipped on to the collapsed chuck until it engages flange 28. The chuck is provided with two spaced peripherally arranged series of stop lugs which may be projected outwardly beyond the surface of the chuck or retracted to a position where they are flush with the surface thereof by mechanism which may also be the same as that illustrated in the said Atherton patent, and which are not here illustrated. This mechanism is manually actuated by a small knurled knob 29 passing through a slot 30 in a retaining ring 31, as best shown in Fig. 1. When the first ring has been placed against the flange 28, the handle or knob 29 is operated to project the stop lugs outwardly. The inner series of peripherally arranged lugs engage the ring 27 and retain the same in position against the flange 28 and the outer peripherally arranged series of lugs form stops for the other ring 26 which is similarly positioned by slipping it over the handwheel and on to the chuck. The chuck is then expanded by rotating the handwheel 25, thereby securing the rings to the chuck. A flexible web, usually of leather, the ends of which are suitably sewed or otherwise secured together and having a considerably greater diameter than that of the chuck or rings is then placed over the rings 26 and 27.

In order to reduce the diameter of the two ends of the flexible web which forms the tubular member in the completed bellows and make it conform

to the diameter of the rings to which it is secured, the two ends of the web are plaited. The plaiting is carried out by two plaiting discs or elements 32 and 33 which are mounted on a shaft 34, which is in turn mounted in one end of a tiltable frame 35, pivoted on a shaft 36 having its bearings at 37 on standards 38.

The plaiting elements 32 and 33 are each provided with radially movable plaiting blades 39 which are preferably of the same character as those illustrated in the said Patent 1,282,360, and to which reference may be made for fuller details. The blades are normally projected outwardly by suitable springs, (not illustrated).

The frame 35 which carries the plaiting elements is overbalanced by a counterweight 351 which normally holds the plaiting elements in up-tilted position. These elements are moved downwardly by a foot lever 40 pivoted at 401 to the floor. The lever 40 is connected by a link 41 to the frame as indicated in Figs. 1 and 2. The link 41 is preferably provided with a turn buckle 42, by which the extent of the downward movement of the front end of frame 35 may be adjusted.

The plaiting elements 32 and 33 are rotated by the drive shaft 4, preferably through a series of gears including a gear 43 mounted on said shaft. The gear 43 meshes with a gear 44, mounted on a shaft having its bearings in the standard 45. The gear 44 in turn meshes with a gear 46, mounted on a shaft 47 and gear 46 meshes with a gear 48, mounted on the shaft 36, which forms the pivot for the frame 35. The gear 48 meshes with a gear 49 mounted on a stub shaft 50 mounted on the frame 35 on which is also mounted gear 51, meshing with a gear 52 which is mounted on the shaft 34. As the frame 35 is tilted, therefore, the gear 49 makes a planetary movement about the gear 48.

When the plaiting elements 32 and 33 are lowered to the position illustrated in Fig. 1, the blades first engage the web at their maximum radial extent and in such inclined relation with the peripheries of the rings as to include a greater circumferential length of the web between the points of adjacent blades than they do as they approach the point where they are normal to the common tangent plane of the chuck and plaiting element. The result is that as the plaiting elements are rotated, the ends of the web are plaited or corrugated to an extent sufficient to reduce the diameter of the web to that of the rings 26 and 27.

In order to secure the tubular bellows web upon the said rings as the web is plaited, binding cords 54 and 55 are wrapped around it in registry with the respective rings 26 and 27. The cords, 54 and 55, are stored on spools 56 and 57 respectively which may conveniently be mounted beneath the table 1, in brackets 58. From the spools the two binding cords pass upwardly through two tensioning devices indicated at 59 and 60 and thence over idler pulleys 61 and 62 to a cord-gripping device indicated generally at 63 in Figs. 1 and 3 and in detail in Figs. 6 and 7. By directing the cords 54 and 55 to the guide members 62, and leading the cords to the guide members from points outside of the space above and in front of the portions of the cords extending from the guide members to the web, a free space is provided above and in front of the portions of the cords extending from the guide members to the web thereby affording the operator access to the said portions of the cords and to the web itself for manually complet-

ing the plaiting operation in the described manner and for tying the ends of the cords when the winding operation has been completed.

In the embodiment of our invention illustrated, the cord-gripping device 63 is rotated by an open annular gear 64 surrounding the chuck 24 and guided by a housing 65 formed of two sections and provided with a groove of the same character as that illustrated in the said Atherton patent in which is received a dove-tail shaped flange 66. The annular gear 64 is driven by a gear 67 mounted on the shaft 4. The gear 67 meshes with a pinion 68 mounted on a shaft 69 having its bearings in standards 70 and 71. A pinion 72 mounted on the shaft 69 meshes with the annular gear 64. The gear 67 is preferably of the same diameter as the open gear 64 and the pinions 68 and 72 are also of the same diameter so that the annular open gear 64 is driven in timed relation to the shaft 4 and preferably has the same speed as the shaft and the chuck mounted thereon.

In order instantly to stop the turning movement of said chuck and cord gripping mechanism when the pedal lever 231 is released, we provide the shaft 4 with a drum 801 as best illustrated in Fig. 1, which is engaged by opposed substantially semicircular straps 802 pivoted on a stud 803 on the standard 9, said straps being arranged to engage said drum frictionally with any desired degree of pressure determined by the adjustment of the bolt 804.

The cord gripping device 63 is mounted on a support 73, the outer end of which is provided with a flange 74, as best shown in Fig. 3, the outer surface of the flange conforming to the inner surface of the annular gear 64 to which it is bolted or otherwise secured. The device, as best shown in Figs. 6 and 7, comprises a head 75 to the ends of which are secured plates 76 as by screws 77. Each cord gripping element comprises a stationary jaw 78 which is preferably formed integral with the plate 76, and a cooperating movable jaw 79 pivoted at 80. The movable jaw 79 is provided with an extension, preferably in the form of a plate 81, which is provided with a slot 82 as best shown in Fig. 6. A roller 83 eccentrically mounted on a shaft 84 and actuated by a suitable handle 85 is received in the slot 82, which is so formed that when the handle 85 occupies the position indicated in Fig. 6, the gripping jaws 78 and 79 are open to permit the operator to insert one of the cords. When the handle 85 is rotated in the direction of the arrow in Fig. 6 against a stop pin 86, the roller 83 moves the plate 81 to the right, as viewed in Fig. 6, and brings the movable jaw 79 into cord gripping engagement with the fixed jaw 78. Both of the cord gripping elements are or may be the same and the description of one, will suffice for both.

Referring to Fig. 5 which best illustrates the cord tensioning device, 87 is a center hub secured to a fixed shaft 88, as by studs 871, one end of the shaft 88 being conveniently mounted in a standard 89, while the opposite end thereof may be mounted in the frame. Friction discs 90 and 91 are loosely mounted on the shaft 88 adjacent to the hub 87 and cooperating with flanges 92 and 93, which are also loosely mounted on the shaft 88 adjacent to hubs 94 and 95 on the shaft 88. The hub 94 is forced to the right and the hub 95 to the left, as viewed in Fig. 5 by springs 96 which surround the shaft and are interposed between the ends of the respective hubs and adjusting nuts 97 received on threaded portions of the shaft 88. The respective binding

cords 54 and 55 pass between the flanges 91 and 93 and the flanges 90 and 92 forming the cord tensioning devices 59 and 60 respectively, and the tension created on the cords may readily be adjusted by adjustment of the springs 96.

The device embodying our invention provides novel means for releasing the tension on the binding cords. The tension releasing device comprises levers 98, shown in Figs. 1 and 2, provided at their upper ends with yokes 99, which engage the hubs 94 and 95, and are pivotally connected at intermediate portions to a link 100. The lower ends of the levers are pivotally connected to angularly disposed arms 101, the ends of which are pivotally connected together as indicated in Fig. 1, the pivotal connection being joined by a link 102 to a pedal lever 103 which is pivoted as at 104 to a standard mounted on the floor. When the operator desires to release the tension on the cords, the lever 103 is depressed and the links 101 move the lower ends of the levers 98 toward each other and separate the upper ends, thus moving the flanges 92 and 93 away from the flanges 90 and 91.

In Fig. 11, we have illustrated a device for varying the tension on the cord storage spools 56 and 57. One end of the spool is mounted on a stub shaft 105 having its bearing in the brackets 58. In the embodiment illustrated the spool is connected to the shaft 105 by a pin 107, the bent end of which is received in an opening 108 in the end flange of the spool. The outer end of the shaft 105 and the end of a similar shaft for the spool 57 are received in openings in bosses 110 formed on a plate 109. Stem 111 is secured to the standard 58 and passes through an opening 112 in the plate 109. A spring 113 is interposed between a winged nut 114, which is received on the threaded end of the stem 111, and the plate 112. The tension on the spring 113 may be varied by turning the nut and the friction produced between the ends of the stub shaft 105 and the plate 109 may be correspondingly varied. The plate 109 is preferably common to both spools so that the resistance to the turning of each may be simultaneously varied.

As it is desirable to withdraw the plaiting blades 39 from the flexible tube 53 as they complete the plaiting operation, we provide each of the plaiting elements with a blade retracting mechanism of the character illustrated in Figs. 1, 2, 3, 8, 9 and 10. As the blades are successively brought into plaiting engagement with the webs, laterally extending lugs 115 on the blades (see Fig. 1) are brought into engagement with the cam surface 116 on a cam member 117 which lifts them from their fully projected positions while the plaiting operation is being carried out and which maintains them in their retracted position when the plaiting operation has been completed and until they are past the region of the web. The cam member 117 is mounted on a supporting member 118 which is, in turn, mounted on a member 119 pivotally connected as at 120 to an arm 121 which is preferably integral with the frame 35 as best shown in Fig. 1. The support 118 for the cam member 117 is preferably laterally adjustable by means of bolts 122 passing through slots in the member 118 and received in tapped openings in the member 119, the heads of the bolts preferably engaging washers which in turn engage the member 118. By loosening the bolts 122 the cam member 117 may be adjusted laterally with respect to the arm 119 on which it is supported.

A carriage 124 is adjustably supported by the member 119. Spaced screws 125 are received in tapped openings in the carriage 124 as best indicated in Fig. 10, the upper ends of the screws or studs 125 being unthreaded and received in recesses in the horizontal portion of the supporting member 119. The carriage 124 is supported by a bolt 124b, the head of which is received in a slot 124c in the member 118 and which engages the horizontal portion of the supporting member 119. The lower end of the bolt 124b is received in a tapped opening in the carriage 124. The carriage 124 is provided with rollers 124a which engage the chuck when the carriage and associated parts are lowered. The carriage 124 may be adjusted relatively to the parts on which it is supported and the cam member 116 by first loosening the bolt 124b, then adjusting the spaced studs 125 and again bringing the head of the bolt 124b against its seat. Such adjustment compensates for variations in thickness of the web.

The member 119 is pivotally supported on the arm 121 by means of a bolt 120 which forms a pivotal connection between the two, the bolt preferably passing through a slot 123 formed in the arm 121 which furnishes relative vertical movement between the two. A stop 125a is preferably provided at the front of the support for the cam to prevent the swinging of the support past the center line of the chuck and thereby prevent the proper positioning of the cam member. The stop 125a may conveniently be formed by bending the end of a strip or blade 125b which may be suitably secured to the arm 121. When the tilting frame 35 is lowered, the rollers 124a of the carriage 124 engage the chuck, and the cam member 117 is brought into proper position to lift the plaiting blades from the web as the plaits or puckers are being formed therein and to maintain the blades out of engagement with the plaits as they have been formed avoiding puncturing and otherwise injuring the web.

In Figs. 12 and 13 we have illustrated a modified form of the cord gripping device in which both sets of gripping jaws are actuated by a single handle. In this form of our invention, the movable jaws 781 are secured on and actuated by pins 129. A shaft 127 which is received in an opening 128 in the head 751 is provided with flattened portions forming cam surfaces which are designed to control the operation of the movable jaws. Obviously a cam may be secured to the shaft 127 or a cam surface fabricated integrally therewith as above indicated. Springs 130 are imposed between the movable jaws 781 and the fixed jaws 791 and serve to hold the inner ends of the pins 129 against the cam surfaces of the shaft 127. A suitable operating handle 851 is secured to the shaft 127 whereby its cam surface may be rotated to force the pins 129 outwardly, thereby simultaneously closing the gripping jaws of the device. Obviously, when the handle 851 is rotated in a reverse direction, the springs 130 force the pins 129 and the movable jaws 781 secured thereto inwardly thereby opening the jaws an amount sufficient to permit the insertion of cords therebetween.

The motor 11 is preferably connected to the shaft 12 on which the sprocket wheel 13 is mounted through a reduction gearing so that normally the shaft 4 is rotated at a comparatively low rate of speed. A device 133, preferably in the form of a switch mechanism operable by the foot of an operator, permits a dual speed operation of the motor, in other words, the shaft 4 may be

driven at will, either at a comparatively low rate of speed or at a higher rate. We have found in practice that speeds of approximately 13 R. P. M. and 63 R. P. M. preferably constitute the above-described comparatively low and high rates of speed respectively.

The operation of the device is as follows: The operator first puts the machine in operation by closing a switch which energizes the motor and causes it to rotate at low speed. He then slips the ring 27 over the handwheel 25 and over the chuck until it abuts against the flange 28 and actuates the stop lugs, the peripheral series of which adjacent the ring 27 retains the same in position and the other peripheral series form a stop for the second ring 26, which the operator then similarly slips over the handle 25 and over the chuck against the outer stops. Sections 241 and 242 of the chuck are at this time contracted to a smaller diameter than the rings, and the cord gripping mechanism is positioned over the chuck. The chuck jaws 241 and 242 are then expanded to hold both of the bellows rings by turning the knob or handwheel 25. The bellows tube 53, which is shown in completed form in Fig. 14 is then slipped over the handwheel 25 and hangs festoon fashion upon the rings 26 and 27 encircling the chuck, the lower portion thereof hanging below the chuck within the opening formed between the chuck and the annular gear 64 and the support 65 therefor. It will, of course, be understood that a guide for the bellows tube similar to that shown in the patent above referred to, may be used, for directing the web to the correct position. The free ends of both of the cords 54 and 55, which extend beyond the tension devices 59 and 60, are drawn rearwardly by the operator between the stationary jaws 78 and the movable jaws 79 of the cord gripping device. The cords are then clamped by turning the respective handles 85, or in case of the modification illustrated in Figs. 12 and 13, by turning the single handle 851. The pedal 40 is then depressed to tilt the frame 35 and lower the plaiting elements into operative engagement with the web, the pedal 231 is depressed to close the clutch 16, and the plaiting discs together with the annular gear 64 which carries the cord gripping mechanism and the chuck with the bellows thereon, are simultaneously rotated at the same comparatively low speed. The chuck and the bellows are rotated anti-clockwise as viewed in Fig. 1, approximately 330°, whereupon the pedal 231 is released to stop the rotation of the chuck and of the cord gripping mechanism. The machine is thus stopped at this stage because as the chuck has been thus turned and the bellows tube 53 plaited and bound by the cord wrapped thereon, there is likely to be a slack bight of the tube near or in the region where the plaiter blades 39 first engage the leather, and such bight of the tube is conveniently drawn forward and plaited under the cord by clawed tools manipulated by both hands of the operator. While the chuck and the cord clamping device are thus stationary, the free ends of the cords 54 and 55 extending rearwardly from the cord clamping jaws are then manually turned outwardly by the respective hands of the operator to a position parallel with the axis of the chuck so that during the successive revolutions of the chuck the ends may be brought down on the bellows tube by the succeeding convolutions of the cord. Pedal 231 is again depressed to close the clutch and turn the chuck to complete its first revolution.

The pedal lever 40, when depressed, is held in its depressed position by a latch 134, which is normally retained in the position illustrated in Fig. 1 by a spring 135. The operator now releases the pedal lever 40 by releasing the latch 134 by means of a foot lever 136 and the counterweight 351 tilts the frame 35 counter-clockwise, as viewed in Fig. 3, and lifts the plaiting elements away from the web.

10 The control device 133 is then depressed by the operator and the motor 11 which is controlled thereby is operated at a comparatively high speed and the chuck, together with the cord gripping device, is permitted to turn any desired number of revolutions. In practice, we find that three additional wrappings of the cord are sufficient so that there are altogether four convolutions of the binding cord 54 and 55 around the web. The pedal 231 is thereupon released to stop the rotation of the chuck, together with the cord gripping mechanism in its original vertical radial position with respect to the chuck. Upon the completion of the desired number of revolutions of the chuck and when the desired number of wrappings of the binding cord have been made around the web, the ends of the cord are tied in the same manner as described in the patent above referred to. After the cords have been severed, the handle 29 is turned in a direction appropriate to withdraw the stops from the rings 26 and 27, the chuck is contracted by turning the handle 25 and the bellows is withdrawn from the chuck and over the handle 25, as in the patent above referred to, thus completing a single cycle.

35 While we have described our invention in its preferred embodiment, it is to be understood that the words which we have used are words of description rather than of limitation and that the drawings are merely illustrative. Hence, changes within the purview of the appended claims may be made without departing from the true scope and spirit of our invention in its broader aspects.

What we claim is:

45 1. In a plaiting device, of the character described, the combination with a chuck of a drive shaft on which said chuck is mounted, means whereby a ring may be secured in a pre-determined position on said chuck, a rotatable plaiting element adapted to register with said ring and engage and plait a flexible web receivable on said ring, a pivotally mounted member on which said element is supported, means whereby said member may be tilted, and means for driving said element in timed relation to said shaft.

50 2. In a plaiting device, of the character described, the combination with a chuck, of a drive shaft on which said chuck is mounted, means whereby two rings may be secured on said chuck in a pre-determined spaced relation, rotatable plaiting elements adapted to register with said rings and engage and plait a flexible web receivable thereon, a pivotally mounted member on which said elements are supported, means whereby said member may be tilted, and means for driving said plaiting elements in timed relation to said shaft.

70 3. In a plaiting device, of the character described, the combination with a chuck, of a drive shaft on which said chuck is mounted, means whereby two rings may be secured on said chuck in a pre-determined spaced relation, rotatable plaiting elements adapted to register with said rings and engage and plait a flexible web receivable thereon, a counterweighted pivotally mounted frame on which said elements are supported,

means whereby said frame may be tilted, and means for driving said elements from said shaft.

4. In a plaiting device, of the character described, the combination with a chuck, of a drive shaft on which said chuck is mounted, means whereby two rings may be secured on said chuck in a pre-determined spaced relation, rotatable plaiting elements adapted to register with said rings and engage and plait a flexible web receivable thereon, a counterweighted pivotally mounted frame on which said elements are supported, manually operated means for tilting said frame, and means for driving said elements in timed relation to said shaft.

5. In a plaiting device, of the character described, the combination with a chuck, of a drive shaft on which said chuck is mounted, means whereby two rings may be secured on said chuck in a pre-determined spaced relation, rotatable plaiting elements adapted to register with said rings and engage and plait a flexible web receivable thereon, an open annular rim, means for rotating the same, means carried by said rim for winding cords around the ends of said flexible web and around said rings thereby binding the ends of said web to the respective rings; a substantially free space being provided on each side of said rim thereby affording free access for both hands of the operator to the respective ends of the web, a pivotally mounted member on which said elements are supported, means whereby said member may be tilted, and means for driving said plaiting elements in timed relation to said shaft.

6. In a plaiting device of the character described, the combination with a chuck, of a first drive shaft on which said chuck is mounted, means whereby a ring may be secured in a pre-determined position on said chuck, a pivotally mounted member, a second shaft mounted thereon, a plaiting element mounted on said second shaft and adapted to register with said ring and plait a flexible web receivable thereon, a driving element mounted on said second shaft, means whereby said member may be tilted, and means for rotating said driving element from said first drive shaft in timed relation thereto.

7. In a plaiting device of the character described the combination with a chuck, of a first drive shaft on which said chuck is mounted, means whereby a ring may be secured in a pre-determined position on said chuck, a pivotally mounted member, a second shaft mounted thereon, a plaiting element mounted on said second shaft and adapted to register with said ring and plait a flexible web receivable thereon, a driving gear mounted on said second shaft and connections between said drive shaft and said driving gear for driving said driving gear in timed relation to said drive shaft.

8. In a plaiting device, of the character described, the combination with a chuck of a drive shaft on which said chuck is mounted, means whereby a ring may be secured in a pre-determined position on said chuck, a rotatable plaiting element adapted to register with said ring and engage a flexible web receivable thereon said element being provided with a peripherally arranged series of radially movable plaiting blades, means for normally forcing said blades outwardly, a pivotally mounted first member on which said element is mounted, means for tilting said member, a cam member pivotally mounted on said first member and provided with means engageable with said chuck for positioning said

cam member with respect to the associated plaiting element, said cam member being provided with a cam surface engageable with said blades for retracting the same, means for tilting said member, and means for driving said element in timed relation to said drive shaft.

9. In a plaiting device, of the character described, the combination with a chuck of a drive shaft on which said chuck is mounted, means whereby a ring may be secured in a predetermined position on said chuck, a rotatable plaiting element adapted to register with said ring and engage a flexible web receivable thereon, said element being provided with a peripherally arranged series of radially movable plaiting blades, means for normally forcing said blades outwardly, a pivotally mounted first member on which said element is mounted, means for tilting said member, a cam member pivotally mounted on said first member and provided with means engageable with said chuck for positioning said cam member with respect to the associated plaiting element, said cam member being provided with a cam surface engageable with said blades for retracting the same, means whereby said cam member may be adjusted towards and away from said chuck, means for tilting said member, and means for driving said element in timed relation to said drive shaft.

10. In a plaiting device, of the character described, the combination with a chuck of a drive shaft on which said chuck is mounted, means whereby a ring may be secured in a predetermined position on said chuck, a second shaft, a counter-weighted tiltable member mounted thereon, a third shaft mounted on said member, a rotatable plaiting element mounted on said third shaft and adapted to register with said ring and engage a flexible web receivable thereon, a driven element mounted on said third shaft, a driving element mounted on said second shaft, means whereby said driven element may be actuated by said first driving element, means whereby said member may be tilted and means comprising said driving element and said driven element for actuating said plaiting element in timed relation to said drive shaft.

11. In a plaiting device, of the character described, the combination with a chuck of a drive shaft on which said chuck is mounted, means whereby a ring may be secured in a predetermined position on said chuck, a rotatable plaiting element adapted to register with said ring and engage a flexible web receivable thereon, said element being provided with a peripherally arranged series of radially movable plaiting blades, provided with laterally extending lugs, means for normally advancing said blades outwardly, a pivotally mounted first member on which said element is mounted, means for tilting said member, a cam member pivotally mounted on said first member and provided with means engageable with said chuck for centering said cam member, and provided with a cam surface engageable with said lugs for retracting said blades, means whereby said first member may be tilted, and

means for driving said element in timed relation to said drive shaft.

12. In a plaiting mechanism of the character described, the combination with a chuck, of a first drive shaft on which said chuck is mounted, means whereby a ring may be secured in a predetermined position on said chuck, an annular driving member surrounding said chuck, means for maintaining said member concentric to said chuck, a plaiting element adapted to register with said ring, means for driving said element in timed relation to said shaft, means secured to the said driving member for winding a cord around a flexible web receivable on said ring, and a pivotally mounted member on which said plaiting element is rotatably supported and mounted on a support at the rear of said shaft whereby a free space is provided at the sides of said plaiting element and ready access is afforded to the operator for the manipulation of the cord.

13. In a plaiting mechanism of the character described, the combination with a chuck of a first shaft on which said chuck is mounted, means whereby two rings may be secured on said chuck in a predetermined spaced relation, an annular driving member surrounding said chuck, means for maintaining said driving member concentric to said chuck, plaiting elements adapted to register with said rings, means for driving said elements in timed relation to said shaft, means secured to said driving member for winding cords around the respective ends of a flexible web receivable on said rings, and a member carrying said plaiting elements pivotally mounted at the rear of said shaft; whereby free spaces at the sides of said plaiting elements are provided affording ready access to the operator for the manipulation of the cords.

14. In a plaiting device of the character described, the combination with a chuck, of a drive shaft on which said chuck is mounted, means whereby two rings may be secured on said chuck in a predetermined spaced relation and on which a flexible web may be received, means for plaiting said web, and a device for winding respective cords around the ends of said flexible web, said device comprising gripping means for engaging the respective cords, and a common manually operated member for actuating said gripping means.

15. In a plaiting device of the character described, the combination with a chuck, of a drive shaft on which said chuck is mounted, means whereby two rings may be secured on said chuck in a predetermined spaced relation and on which a flexible web may be received, means for plaiting said web, and a device for winding respective cords around the ends of said flexible web, said device comprising separate gripping means for the respective cords and a cam member, means whereby the said cam member may be operated, and means actuated by said cam member for simultaneously operating said gripping means.

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