

Sept. 20, 1960

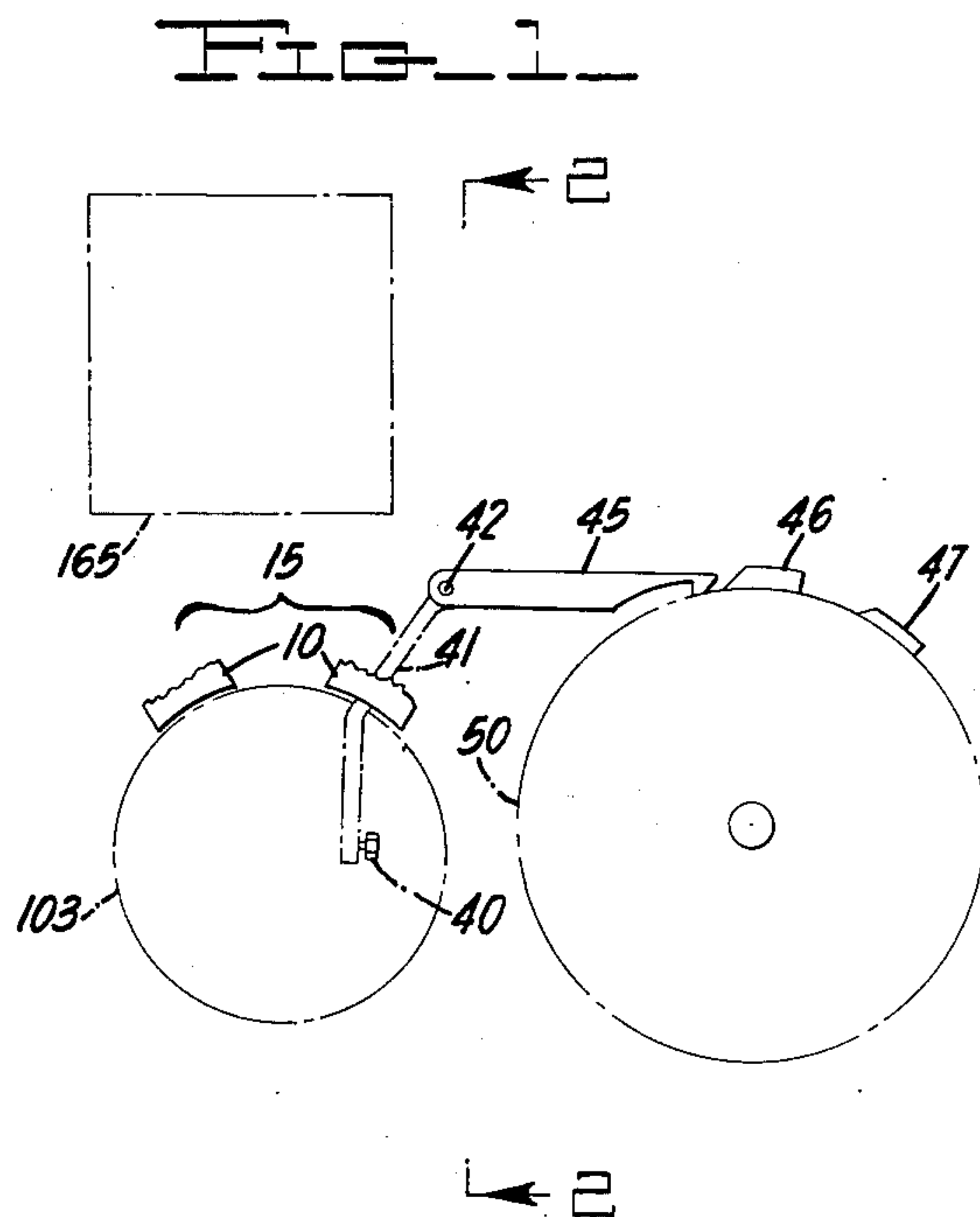
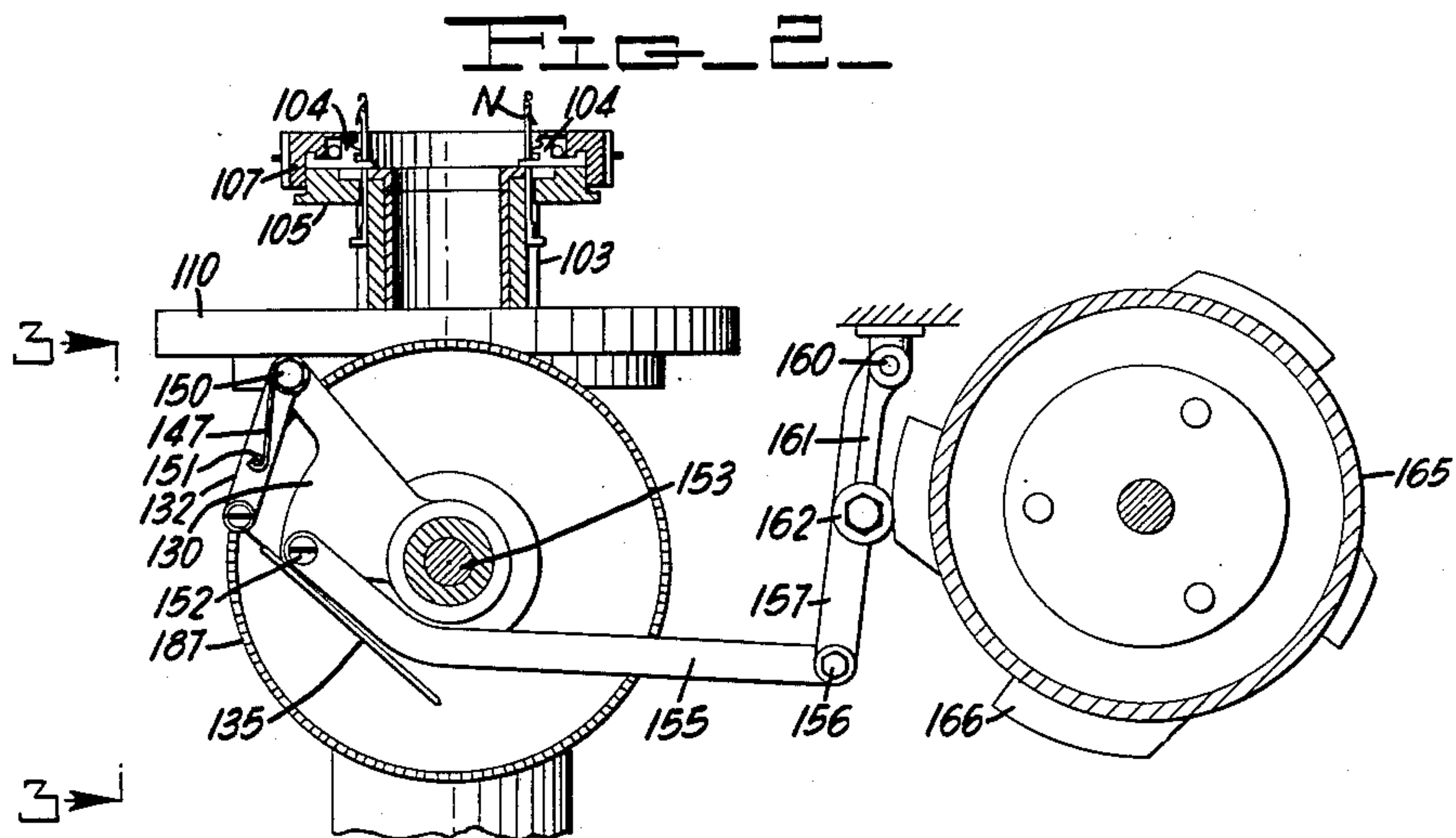
H. E. CRAWFORD

2,953,004

CIRCULAR KNITTING MACHINE

Filed May 1, 1958

4 Sheets-Sheet 1



INVENTOR.  
Herman E. Crawford  
BY *Earl H. Olson*

Sept. 20, 1960

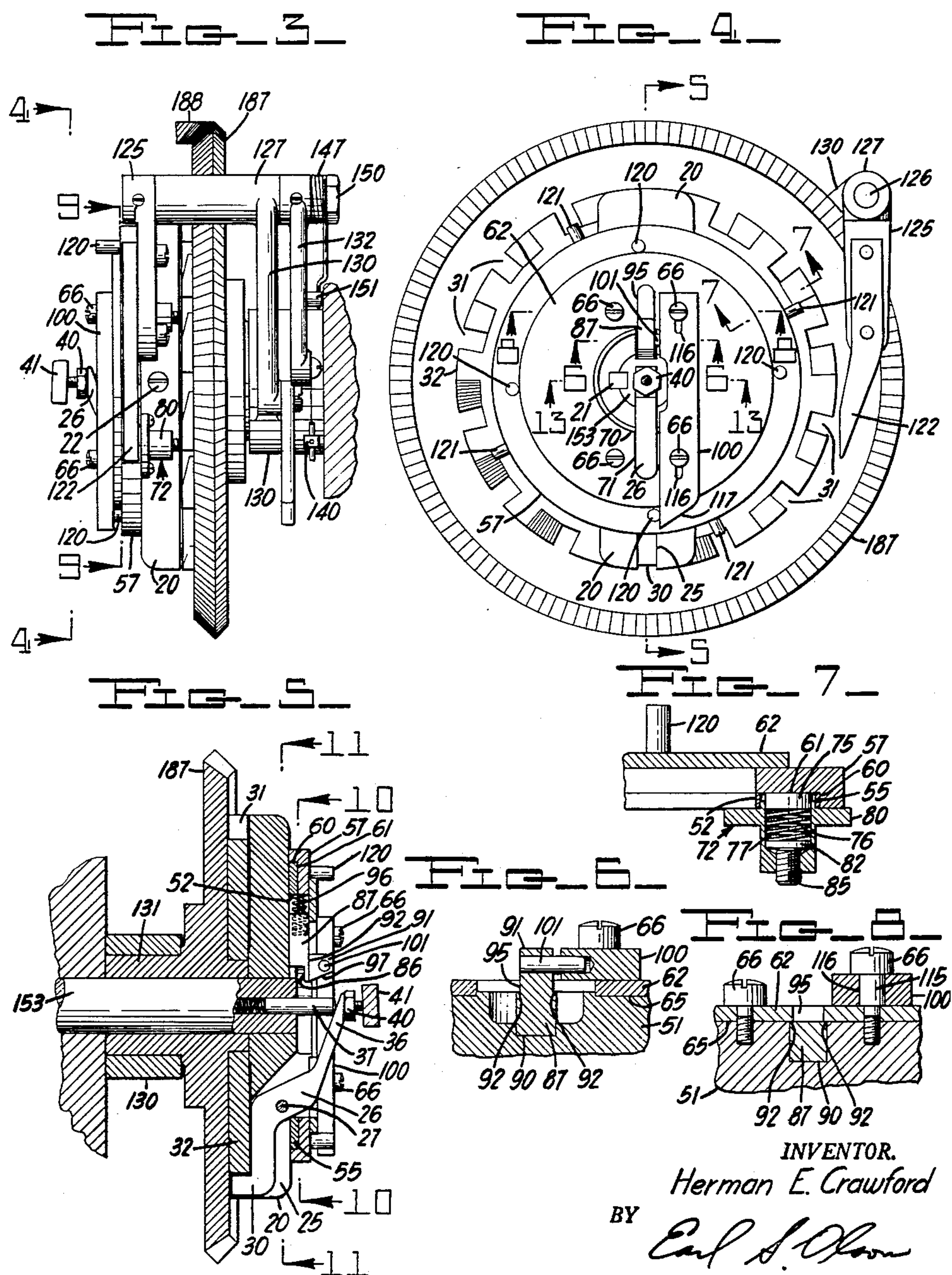
H. E. CRAWFORD

2,953,004

CIRCULAR KNITTING MACHINE

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4 Sheets-Sheet 2



INVENTOR.  
Herman E. Crawford  
BY *Carl S. Olson*



Sept. 20, 1960

H. E. CRAWFORD

2,953,004

CIRCULAR KNITTING MACHINE

Filed May 1, 1958

4 Sheets-Sheet 3

FIG. 9

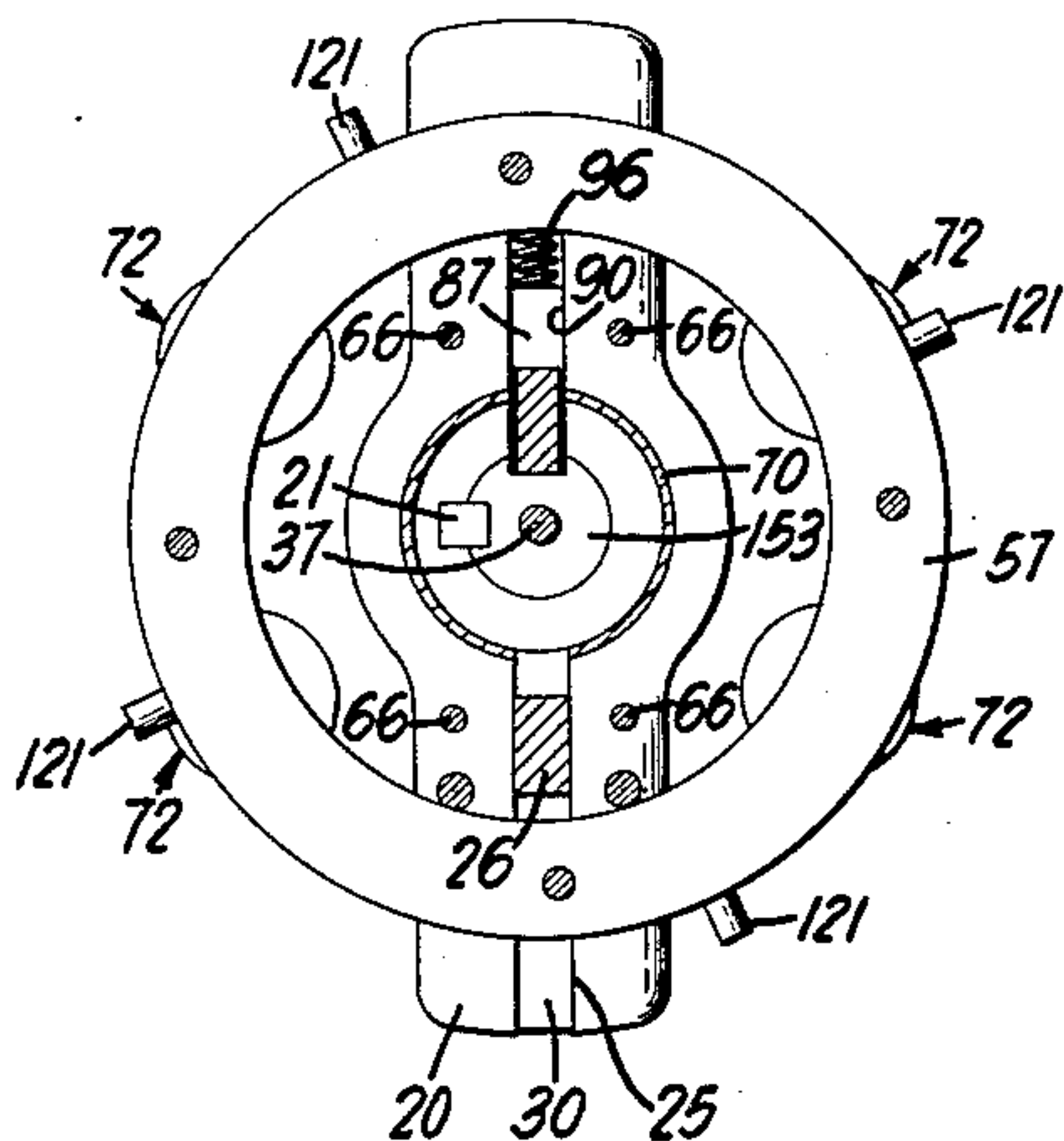


FIG. 10

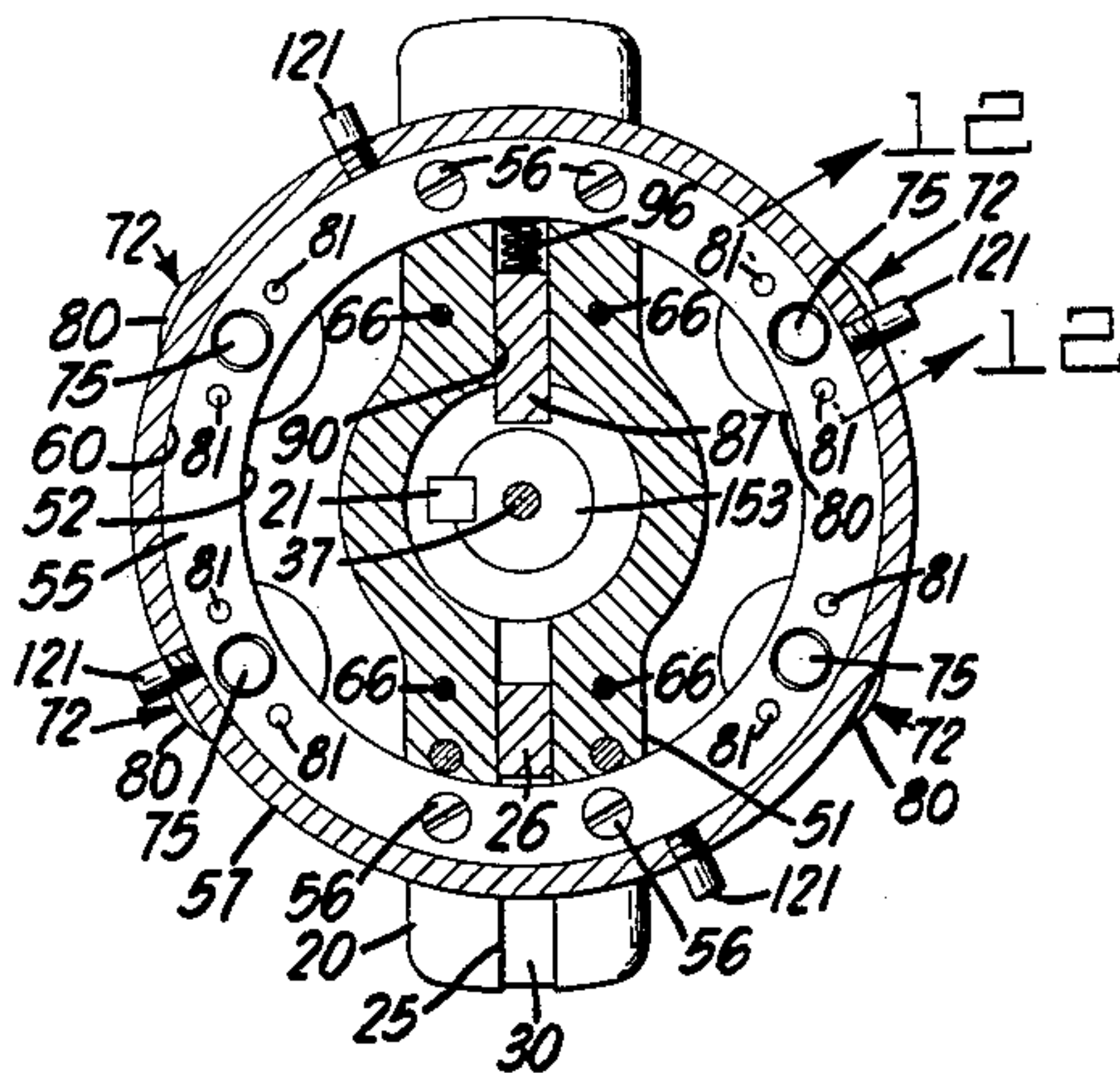


FIG. 11

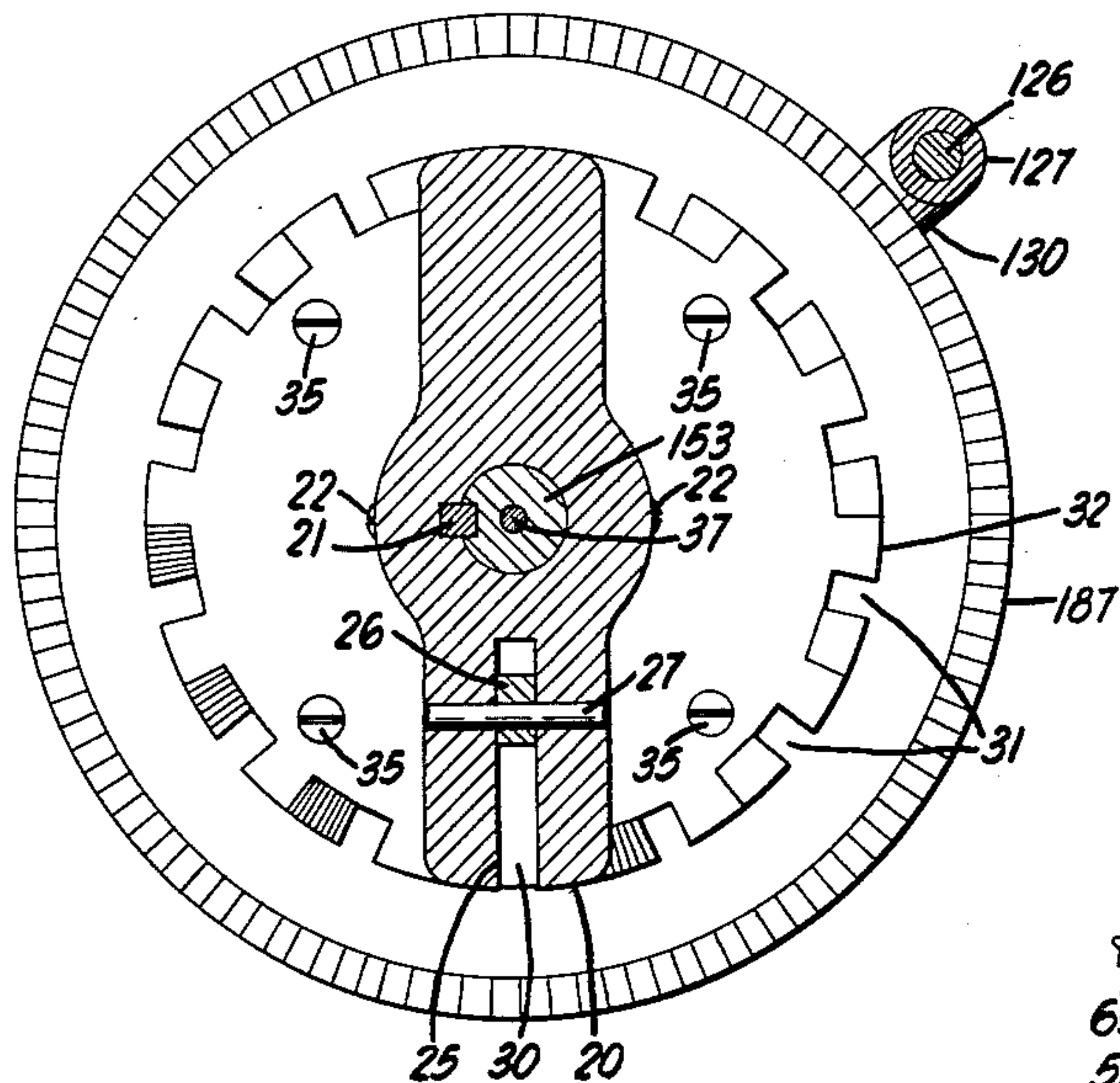


FIG. 12

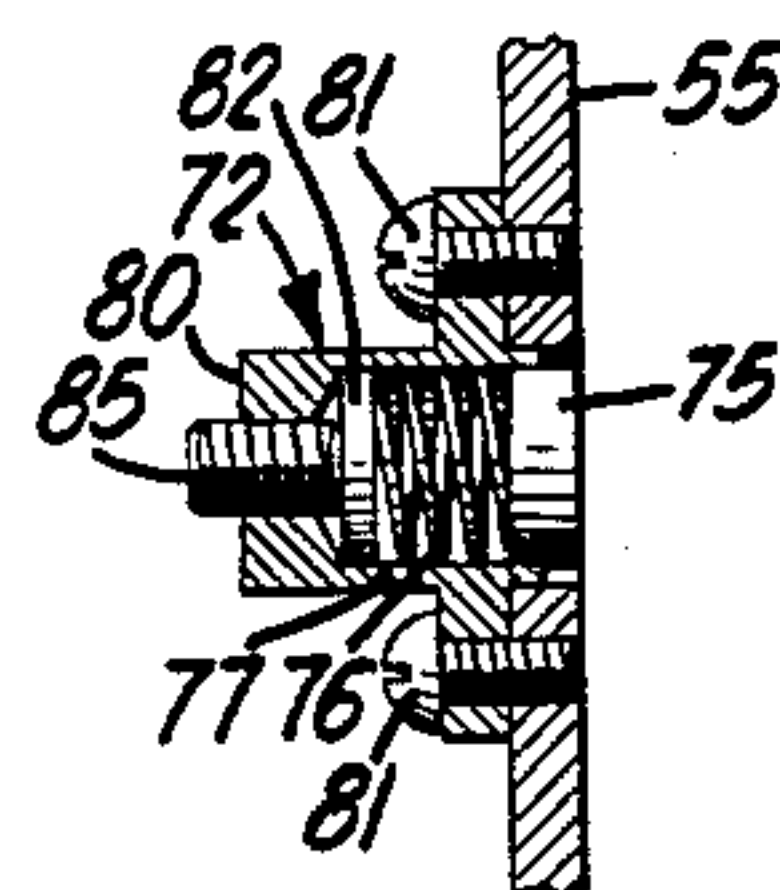
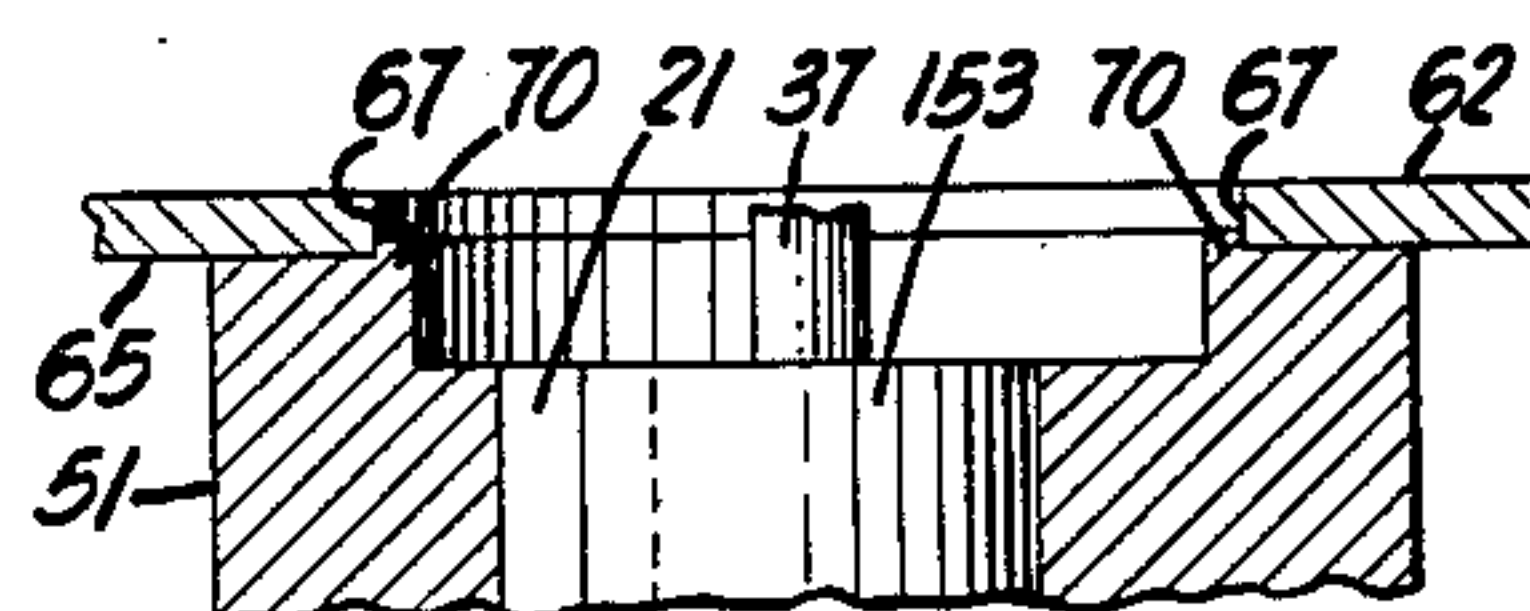


FIG. 13



INVENTOR.

Herman E. Crawford

BY

Carl S. Olson

Sept. 20, 1960

H. E. CRAWFORD

2,953,004

CIRCULAR KNITTING MACHINE

Filed May 1, 1958

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FIG. 14

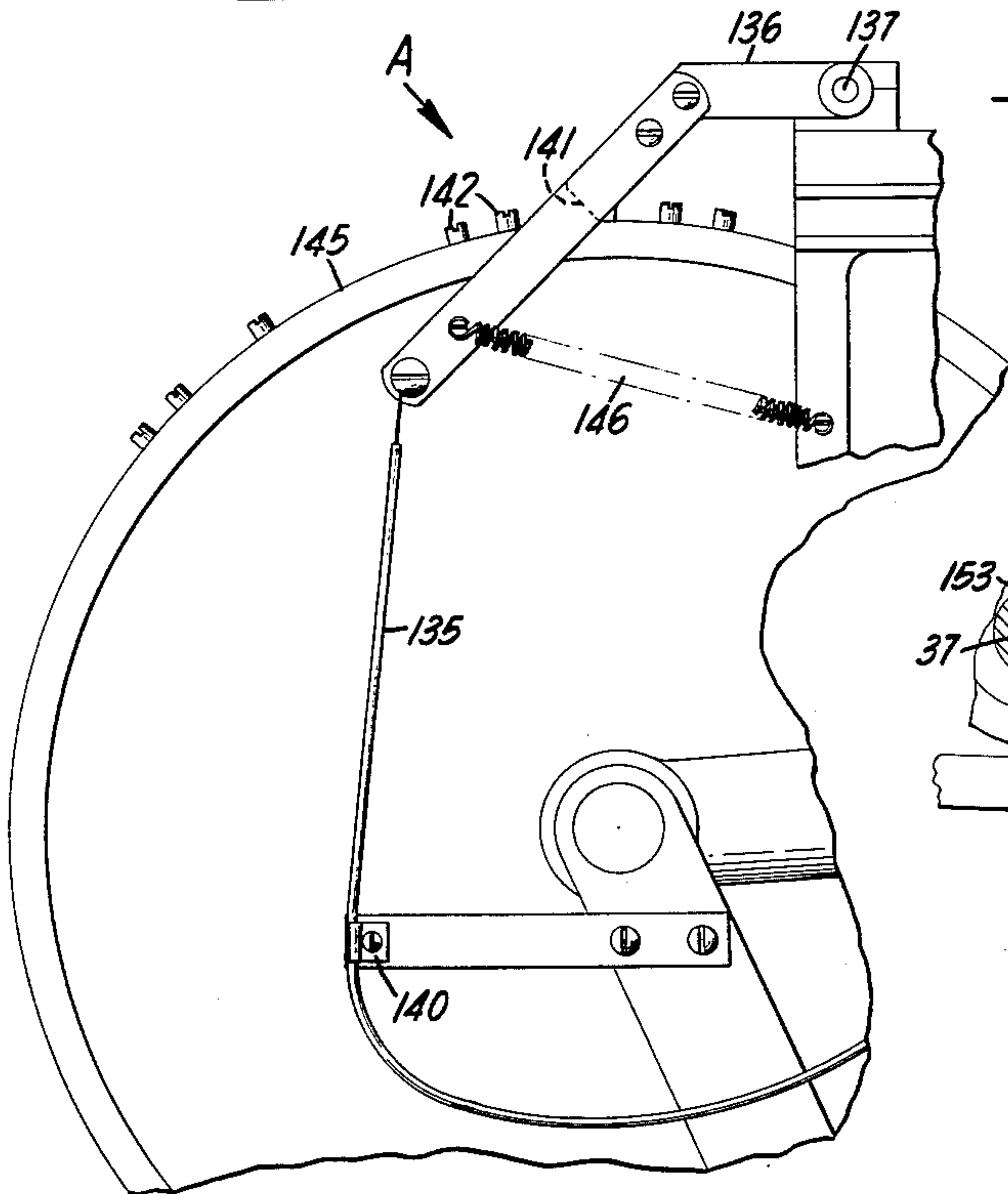


FIG. 15

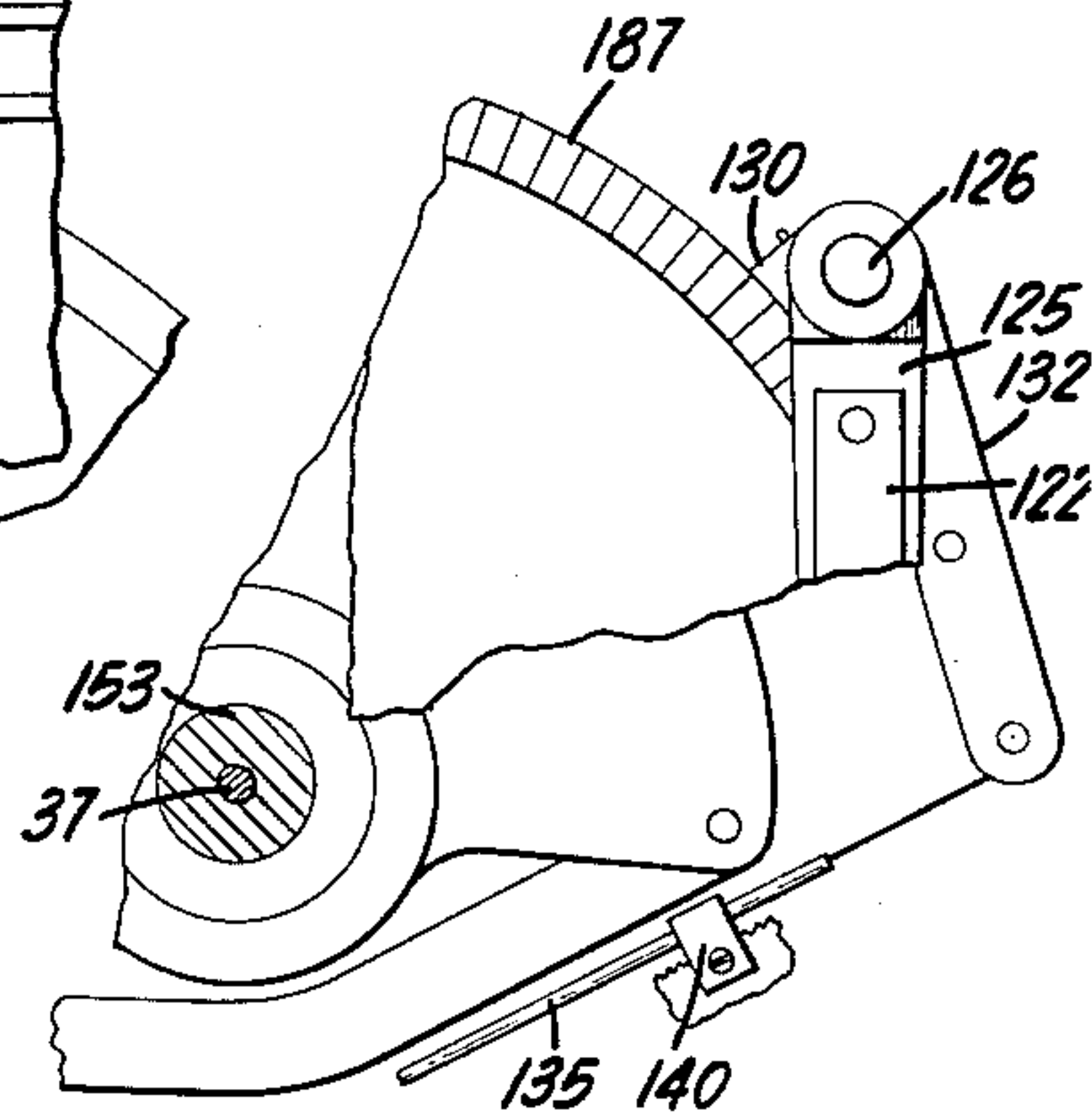


FIG. 16

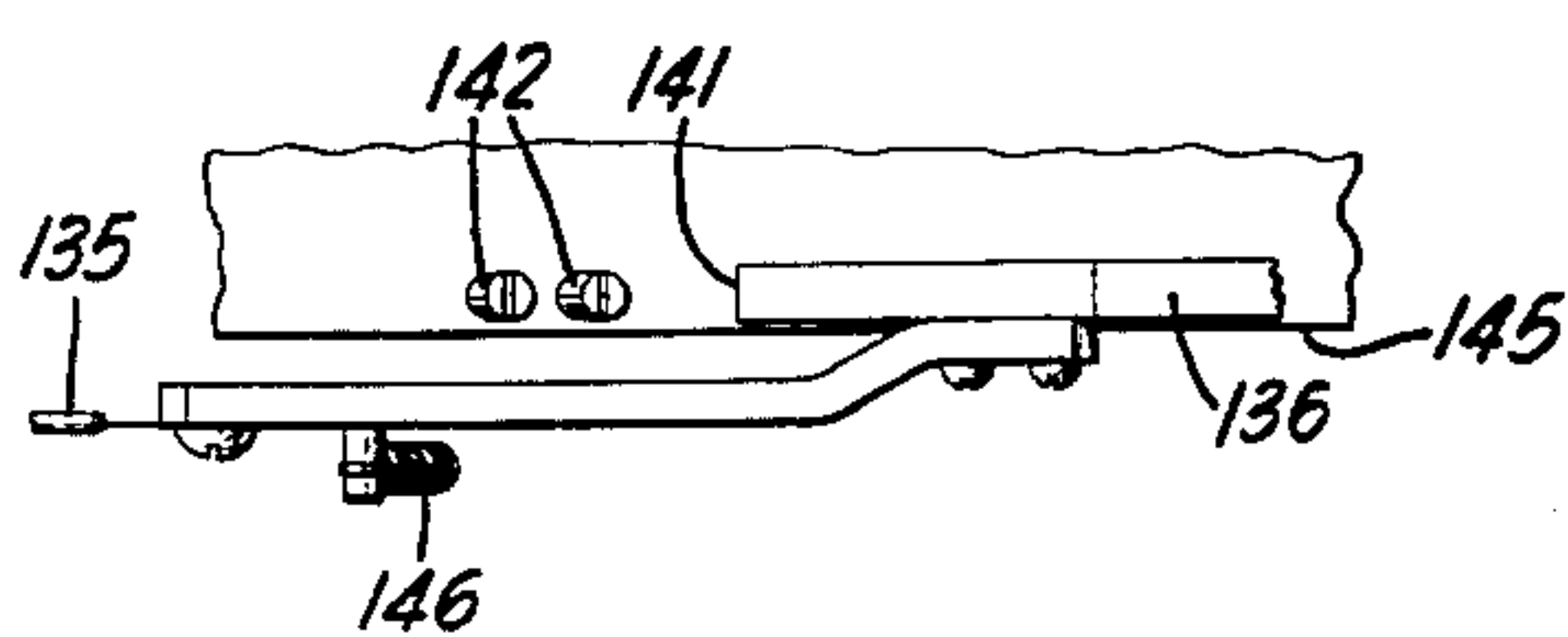


FIG. 17

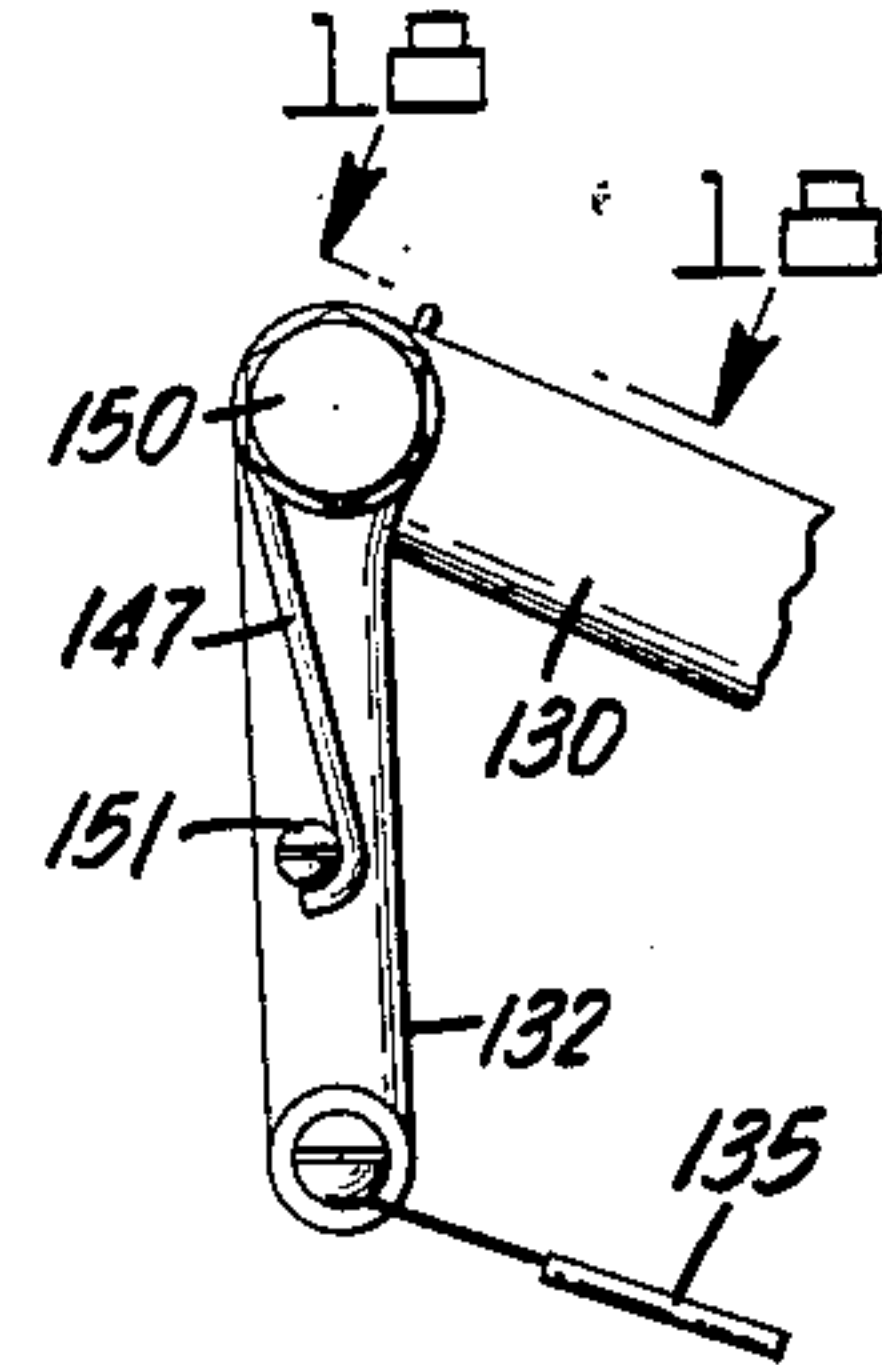
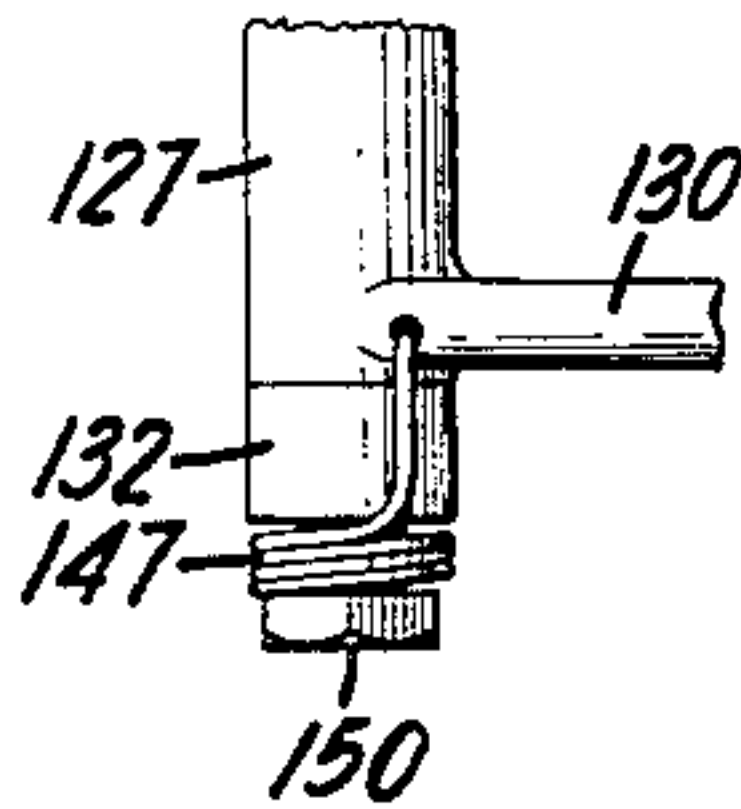


FIG. 18



INVENTOR.  
Herman E. Crawford  
BY *Carl A. Olson*



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2,953,004

## CIRCULAR KNITTING MACHINE

Herman E. Crawford, Kernersville, N.C., assignor to The H. E. Crawford Company, Incorporated, Kernersville, N.C., a corporation of North Carolina

Filed May 1, 1958, Ser. No. 732,369

11 Claims. (Cl. 66—48)

This invention relates to improvements in circular knitting machines of the type shown in my Patent No. 2,757,526, issued August 7, 1956, and more particularly to means for shogging the needle cylinder to change the center of reciprocating movements thereof in forming argyle and like patterned designs in tubular stocking fabrics.

In circular knitting machines as shown in my aforesaid patent, in order to form spaced design patterns in stockings, means are provided to shog the needle cylinder to change the center of its reciprocating movement by disengaging the needle cylinder from the reciprocating means at the completion of one pattern area and re-engaging the reciprocating means to the needle cylinder at a point corresponding to the center of another of the pattern areas. As shown in said patent, the mechanism is adapted to make only a limited number of shogging movements of the needle cylinder and at symmetrically spaced points about the needle cylinder to form the pattern areas only in symmetrically spaced relation around the stocking. The more complex design patterns and particularly those in which the pattern areas are spaced in unsymmetrical relation around the stocking, could not be produced, with the result that the machine of said patent found only limited use.

It is therefore an object of the invention to provide means in a circular knitting machine for overcoming the above and other objections and for the formation of unsymmetrically spaced patterned areas in tubular fabrics such as stockings and the like.

Another object of the invention is the provision of means in a circular knitting machine for shogging the needle cylinder to change the center of reciprocation of the needle cylinder in forming patterned areas in unsymmetrical relation in stockings or like tubular fabrics.

A further object of the invention is the provision of means in a circular knitting machine for shogging the needle cylinder to change the center of reciprocation of the needle cylinder and means to control the shogging means to effect the formation of patterned areas in stockings in either symmetrical or unsymmetrical relation with respect to each other.

With these and other objects in view, which will become apparent from the following detailed description of the illustrative and practical embodiment of the invention shown in the accompanying drawings, the invention comprises the novel elements, features of construction and combination of parts in cooperative relationship as hereinafter more particularly pointed out in the claims.

In the drawings:

Figure 1 is a top plan view diagrammatically showing the needle cylinder and associated knitting means together with certain of the pattern mechanism for operating the needle cylinder shogging mechanism;

Fig. 2 is a view looking in the direction of the arrows 2—2 on Fig. 1 showing the needle cylinder of the machine and certain of the mechanism for controlling a shogging mechanism for the needle cylinder according to

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the instant invention, parts being shown in cross section and other parts being shown in elevation;

Fig. 3 is a view on an enlarged scale of needle cylinder shogging mechanism according to the instant invention taken in the direction of the arrows 3—3 on Fig. 2;

Fig. 4 is an end elevational view taken in the direction of the arrows 4—4 of Fig. 3;

Fig. 5 is a cross-sectional view taken along the line 5—5 of Fig. 4;

Fig. 6 is a cross-sectional view on an enlarged scale taken on the line 6—6 of Fig. 4;

Fig. 7 is a cross-sectional view on an enlarged scale taken substantially on the line 7—7 of Fig. 4;

Fig. 8 is a view partly in elevation and partly in cross section taken on the line 8—8 of Fig. 4;

Fig. 9 is a cross-sectional view taken along the line 9—9 of Fig. 3;

Fig. 10 is a cross-sectional view taken along the line 10—10 of Fig. 5;

Fig. 11 is a view taken along the line 11—11 of Fig. 5, parts being shown in cross section and others being shown in elevation;

Fig. 12 is a cross-sectional view on an enlarged scale taken along the line 12—12 of Fig. 10;

Fig. 13 is a cross-sectional view on an enlarged scale taken substantially along the line 13—13 of Fig. 4;

Fig. 14 is a detail view of certain of the pattern control mechanism for the shogging mechanism;

Fig. 15 is a view similar to a portion of the mechanism of Fig. 4 with parts broken away and showing the means operated by the pattern control mechanism of Fig. 14;

Fig. 16 is a view of a portion of the mechanism of Fig. 14 as seen looking in the direction of the arrow A on Fig. 14;

Fig. 17 is a detailed view of a portion of the mechanism of Fig. 3 and as seen from the right of Fig. 3; and

Fig. 18 is a plan view of the mechanism of Fig. 17.

Referring to Figs. 1 and 2 of the drawings there is shown portions of a circular knitting machine of the type for forming colored patterned areas in tubular fabrics such as stockings. The machine, except for the improved shogging mechanism, is preferably that described in said Patent 2,757,526 to which reference may be made and includes a circular series of needles N which are mounted for sliding movement in slots in a needle cylinder 103 in a common manner. Yarns are fed to the needles N which are operated by knitting cams indicated diagrammatically at 10 to form the yarns into knitted fabric at a knitting station indicated generally at 15, the cams being carried on a bed plate 110 which forms a part of the framework of the machine. Cooperating with the needles N in forming the yarns into loops are sinkers 104 which are mounted in a sinker head 105 and operated by suitable cams carried in a sinker cap 107. Both rotary and reciprocatory movements are transmitted to the needle cylinder 103, needles N and sinkers 104 by mechanism including a shaft 153, driven in either reciprocating or rotary motion under pattern control as shown and described in my aforesaid patent, said shaft having a bevel gear 187 meshing with a bevel gear, a part of which is shown at 188 in Fig. 3, secured to the needle cylinder in the usual manner. The machine is also provided with clutch mechanism associated with the main drive shaft 153 and bevel gear 187 for shogging the drive shaft relatively to the needle cylinder 103 to cause different selected groups of needles to move equi-distant past the knitting cams to form the colored patterned areas.

The shogging means, according to the instant invention includes a shogging disk 20 which is similar to the shogging disk 945 of said Patent 2,757,526 and which is secured to one end of the main drive shaft 153 by means of a key 21 (Fig. 11) and set screws one of which is



shown at 22 (Fig. 3). The shogging disk 20 is provided with a notch or slot 25 for a locking finger or latch 26, the latch being mounted for oscillating movement in the notch by means of a pin 27 secured in the shogging disk (Figs. 5 and 11). The latch 26 is provided with a nose portion 30 for engagement in notches 31 in a locking disk 32 which is secured to the gear 187 by screws 35 (Fig. 11). In the instant arrangement the locking disk 32 is provided with fourteen notches 31 although it is to be understood the disk may have more than or fewer than fourteen notches. With the nose portion 30 of the latch 26 engaged in one of the notches 31 in the locking disk 32, the gear 187 is moved with the shaft 153 during both rotary and reciprocating movements of the shaft. The latch 26 is provided with a tail portion 36 which extends outwardly through the notch 25 in the shogging disk 20 and then inwardly toward the shaft 153 to be engaged by a spring pressed pin 37, the spring pressed pin tending to turn the latch clockwise to maintain the nose portion 30 in engagement with one of the notches 31 in the locking disk 32.

To produce a shogging movement between the shogging disk 20 and the locking disk 32, which in turn is transmitted to the needle cylinder 103, means is provided to disengage the latch from one of the notches 31 and to re-engage the latch with another of the notches in the disk 32. For this purpose the tail portion 36 is engaged by a headed screw or bolt 40 adjustably carried in the free end portion of a crank arm 41 secured to a vertical shaft 42, the screw, crank arm and shaft being the same as parts 1021, 1022 and 1025 of said Patent 2,757,526. The shaft is mounted for oscillating movement in the machine and has secured thereto a control finger 45 which is adapted to be engaged and operated by one or more high and low cams such as shown at 46 and 47, respectively (Fig. 1), the high and low cams being mounted in a row in the desired sequence around the periphery of a pattern drum 50 mounted for rotative movement on a portion of the machine frame. Both the high and low cams 46 and 47 move the latch 26 to disengage the nose portion 30 from the notches 31 in the locking disk 32, the greater movement of the latch by the high cam, however, being utilized for another purpose as hereinafter set forth. The pattern drum 50 has a pawl and ratchet wheel mechanism (not shown) associated therewith for indexing the pattern drum step by step in timed relation to the operation of the machine in a manner set forth in said patent.

When the drive shaft 153 is to be shogged to a different position relative to the needle cylinder 103 to change the machine operation from rotary to reciprocating movement to form a pattern area or to shog the needle cylinder from one patterned area to another, the nose portion 30 of the latch 26 is disengaged from a notch 31 in the locking disk 32 and then selectively re-engaged with another of the notches corresponding to the center of the next area to be formed. For this purpose the shogging disk 20 has a projecting hub portion 51 having its outer ends shaped to fit within a bore or opening 52 in a ring member 55 which is secured to the outer end portions of the shogging disk by screws 56 (Fig. 10). A cap member 57, also having a bore fitting the outer ends of the hub portion 51 of the shogging disk 20, is recessed at 60 to receive the ring member 55, with the outer face of the ring member engaging an inner face 61 of the cap member. The cap member 57 is retained in engagement with the ring member 55 by a retaining plate 62 which is secured to an outer face 65 of the hub portion 51 by screws 66 (Figs. 4 and 8). The retaining plate 62 is provided with a bore or circular opening 67 which is adapted to fit over a circular projection 70 formed on the hub portion 51 (Figs. 4 and 13) to center the retaining plate in relation to the cap member 57. The retaining plate 62 is also provided with a slot 71 which is aligned with the notch 25 in the shogging disk 20 to

clear the tail portion 36 of the latch 26 (Figs. 4 and 5).

Normally the cap member 57 is adapted to be moved with the ring member 55 and shogging disk 20 during rotary and reciprocating movements of the shaft 153. For this purpose, the ring member 55 is provided with friction devices 72 each of which includes a friction disk 75 of fiber or like material which is biased by a spring 76 against the face 61 of the cap member 57. The disk 75 and spring 76 are carried in a bore 77 in a retaining bracket 80 which is secured to the inner face of the ring member 55 by screws 81 (Figs. 7, 10 and 12). The spring 76 is adapted to be adjustably compressed between the disk 75 and a disk 82 also carried in the bore 77 by an adjusting screw 85 threadably carried in the retaining bracket 80 to vary the extent of the frictional force applied by the disk 75 against the cap member 57.

During disengagement of the nose portion 30 of the latch 26 from the locking disk 32 by a high cam 46, the tail portion 36 of the latch is moved to such extent as to be engaged beneath an overhanging surface 86 of a latch member 87 (Fig. 5). The latch member 87 is slidably mounted in a notch or slot 90 formed in the hub portion 51 of the shogging disk 20 in alignment with the slot 25 (Figs. 6, 9 and 10). As shown in Fig. 6, the latch member 87 has an outwardly projecting portion 91 the sides of which are offset inwardly in relation to the body of the latch member to form shoulders 92. The portion 91 of the latch member 87 extends outwardly through a slot 95 formed in the retaining plate 62, the portion 91 and slot 95 being of substantially the same width so that portions of the retaining plate overlie the shoulders 92 to thereby maintain the latch member in the slot 90. A spring 96 disposed in the slot 90 between the inner bores of the ring member 55 and cap member 57 and the latch member 87 normally biases the latch inwardly toward the center of the shaft 153. During movement of the tail portion 36 of the latch 26 by the crank arm 41 as above set forth, the tail portion engages an inclined front edge 97 of the latch member 87 to move the latch member outwardly from the shaft 153 against the action of the spring 96. When the tail portion 36 reaches the level of the overhanging surface 86 the spring 96 moves the surface 86 inwardly over the tail portion to hold the latch 26 disengaged from the notches 31 in the locking disk 32.

In order to release the latch 26 for engagement with another notch 31 in the locking disk 32 corresponding to a newly selected shogged position of the shogging disk in relation to the needle cylinder 103, the latch member 87 must be moved to release the tail portion 36 of the latch 26. For this purpose the portion 91 of the latch member 87 is connected to a releasing member 100 by means of a pin 101 extending into openings drilled or otherwise formed in the portion 91 of the latch member and the releasing member (Fig. 6). The releasing member 100 lies parallel to and is guided for sliding movement along the outer face of retaining plate 62 with the latch 26 by shouldered portions 115 of the right hand screws 66, the shouldered portions extending through slots 116 formed in the releasing member. The releasing member 100 has a tapered front edge 117 which is adapted to lie in the path of a series of pins 120 carried in spaced relation in and projecting outwardly from the outer face of the cap member 57 (Figs. 3 and 4). As will be obvious from the foregoing, the cap member 57, ring member 55, retaining plate 62 and the releasing member 100 are all adapted to normally rotate with the shogging disk 20. When, however, the movement of the cap member 57 is arrested, as hereinafter set forth, the front edge 117 of the releasing member 100 is moved with the shogging disk to engage one of the pins 120 and move the releasing member and latch member 87 to release the tail portion 36 of the latch 26. With the crank arm 41 moved to inactive position which occurs when the cam 46 on the pattern drum is moved out of engage-



ment with the control finger 45, the latch 26 is turned clockwise by the pin 37, as viewed in Fig. 5, to re-engage the nose portion 30 of the latch in another notch 31 in the locking disk 32.

For arresting the movement of the cap member 57, the outer periphery of the cap member is provided with outwardly extending pins 121 which are equal in number to the pins 120 and spaced in advance, in the counterclockwise direction as viewed in Fig. 4, of the pins 120. Cooperating with the pins 121 is a finger or pawl 122 which is carried on a lever 125 secured to one end of a shaft or pin 126. The pin 126 is pivotally mounted in a hub portion 127 at the free end of a lever 130 which is in turn mounted for pivotal movement on a hub portion 131 of the bevel gear 187 (Fig. 5). The lever 125 and pawl 122 are normally positioned, as in Fig. 4, out of the path of the pins 121 on the cap member 57 and are moved into the path of the pins 121 when the movement of the cap member is to be arrested. For so moving the pawl 122, the pin 126 has fixed thereto a link 132 having its free end connected to one end of a Bowden wire 135, as shown in Figs. 15 and 17. The other end of the Bowden wire 135 is connected to the free end of a lever 136 which is secured to a pin 137 mounted for pivotal movement in a part of the machine frame (Fig. 14). Clips 140, secured to fixed parts of the machine, support the Bowden wire between the link 132 and lever 136. The lever 136 is provided with a follower portion 141 for engagement with a row of pins 142 on a pin drum 145 (Figs. 14 and 16). A spring 146 connected between the machine frame and the free end of the lever 136 biases the lever toward the drum 145. A torsion type coil spring 147, surrounding the pin 126 between the link 132 and a head portion 150 of the pin 126, has its opposite end portions engaging the lever 130 and a pin 151 in the link 132, respectively, (Figs. 3, 17 and 18) to bias the pawl lever 125 to the position of Fig. 4 when no pin 142 is beneath lever 136. The drum 145 is advanced step by step in timed relation to the operation of the machine to move the pins 142 into engagement with the lever 136, the drum advancing means preferably being pawl and ratchet means similar to that shown for advancing the pattern chain 265 in said Patent 2,757,526.

In order to further increase the range of positions to which the needle cylinder may be shogged in selecting the center of reciprocation in forming design patterns in the fabric the lever 130 is adapted to be moved clockwise to different selected positions, from its position in Fig. 4, before the pawl 122 is moved to engage a pin 121 to arrest the movement of the cap member 57. For this purpose, the lever 130 is pivotally connected by a stud or bolt 152 to one end of a link 155 the other end of which is pivotally connected by a stud 156 to the free end of a lever 157 (Fig. 2). The lever 157 is fixed to a shaft 160 which is supported for rotative movement in a fixed part of the machine. The shaft 160 also has a lever 161 fixed thereto which carries a roller type follower 162 for engagement with a row of cams 166 of different heights on a pattern drum 165 which is the same as drum 390 in said Patent 2,727,526. In Figs. 2 and 4, the lever 130 and pawl 122 are shown positioned by a high cam 166 but the lever and pawl may be moved to different selected positions by cams 166 of different heights, both the number of cams and height thereof being determined by the positions to which the needle cylinder is to be shogged.

In forming a tubular stocking fabric having patterned areas in the leg portion, following knitting of the last course of the top portion of the stocking, which is knitted with the needle cylinder 103 rotating in the counterclockwise direction, the machine is conditioned for reciprocatory knitting and a high cam 46 is moved beneath the control finger 45 to turn the crank arm 41 counterclockwise as viewed in Fig. 1 to disengage the locking finger 26 from the locking disk 32 and to move the tail

portion 36 to the position in which it is held by the latch member 87. This action is timed to stop the movement of the needle cylinder with the center of the group of needles selected to form the first of the patterned areas positioned at a point diametrically opposite to the knitting station 15. Also at this time all of the needles N which are not in the selected group are raised to inactive position. The shaft 153 and shogging disk 20 are then reciprocated idly in the clockwise direction and a movement of the pattern drum 165 advances a cam 166 beneath the follower 162 to move the lever 130 to its selected position. During the next reciprocating movement of the shaft 153, which is in a counterclockwise direction, a pin 142 is moved beneath the lever 136 to turn the pawl 122 clockwise (Fig. 4) into the path of the pins 121 on the cap member 57 to arrest the movement of the cap member. As the shaft 153 and shogging disk 20 continue to move counterclockwise, the cam 46 is moved from engagement with the finger 45 and the crank arm 41 is moved from engagement with the locking finger 26. Upon continued movement of the locking disk 20, the tapered front edge 117 of the releasing member 100 engages the next pin 120 on the cap member 57 in its path to move the latch member 87 from its latching engagement with the tail portion 36 of the locking finger 26 thereby permitting the locking finger to engage the next notch 31 in the locking disk 32. The notch 31 engaged by the locking finger 26 corresponds to the center of the selected group of needles which are thereupon carried equi-distant through the knitting cams during subsequent reciprocations of the needle cylinder.

For each subsequent selection of the shogged position of the needle cylinder 103, the locking finger 26 is disengaged from a notch 31 in the locking disk 32 when the selected group of groups of needles is opposite to the knitting station, the pawl lever 130 is positioned by a cam on the pattern drum 165, the pawl 122 is selectively moved to arrest the movement of the cap member 57 by a pin 142 on the drum 145, and the crank arm 41 is moved to inactive position with respect to the locking finger 26 by the pattern drum 50. The locking finger is then re-engaged in a notch 31 in the locking disk 32 as herebefore set forth to carry the newly selected needles equi-distant through the knitting cams.

When a pattern area is to be formed at a point in the stocking diametrically opposite to the previously formed pattern area the shogging control mechanism comprising the latch member 87 and associated control may be bypassed and the shogging directly controlled by pattern drum 50. In this case a low cam 47 is provided on drum 50, which when moved beneath the control finger 45, rotates the locking finger 26 on its pivot 27 sufficiently to remove its nose portion 30 from the notch 31 in which it had been engaged but not sufficiently to cause the tail portion 36 to be engaged and held by the latch member 87. Hence in this instance latch member 87 and its controls are not used. The racking of drum 50 is timed so that when the shogging disk 20 has moved substantially 180 degrees, the low cam 47 is moved from engagement with the finger 45 and the nose of the locking finger 26 is permitted to engage the next notch 31 in the locking disk 32 which is 180 degrees from the notch previously engaged by the locking finger.

It is to be understood that the operation of the various pattern drums is so correlated with the operation of the machine that the mechanism associated with each pattern drum accurately functions at the correct time to shog the shogging disk 20 relative to the locking disk 32 to select each new center of reciprocation of the needle cylinder 103 in forming the patterned areas and the heel and toe portions of the stocking. Further, the needles N are divided into groups equal in number to the number of notches 31 in the locking disk 32 and each group is provided with long, intermediate and short butt needles which are selectively operated on to move the needles



between inactive and active positions in the same manner and by the same means set forth in said Patent 2,757,526.

It will be understood that the improvements shown and described, by which the above results are obtained, can be changed and modified in various ways without departing from the invention herein disclosed and hereinafter claimed.

I claim:

1. In a circular knitting machine having a needle cylinder, vertically movable needles in said cylinder, a knitting station, driving means for imparting rotary and reciprocatory movements to said cylinder, and means for shogging said driving means relatively to said needle cylinder to cause different groups of needles to move equi-distant past said knitting station including a member movable with said driving means, a locking finger on said member for connecting said driving means to said needle cylinder, and means for disconnecting said locking finger from said needle cylinder, in combination with means on said member for holding said locking finger in disconnected position, and means for selectively releasing said locking finger from said holding means to permit said locking finger to reconnect said driving means to said needle cylinder.

2. In a circular knitting machine having a needle cylinder, vertically movable needles in said cylinder, a knitting station, driving means for imparting rotary and reciprocatory movements to said cylinder, and means for shogging said driving means relatively to said cylinder to cause different groups of needles to move equi-distant past said knitting station including a member movable with said driving means, a locking finger on said member for connecting said driving means to said needle cylinder, and means for disconnecting said locking finger from said needle cylinder, in combination with means on said member for holding said locking finger in disconnected position, means for releasing said locking finger from said holding means, and means for selectively operating said releasing means.

3. In a circular knitting machine having a needle cylinder, vertically movable needles in said cylinder, a knitting station, driving means for imparting rotary and reciprocatory movements to said cylinder, and means for shogging said driving means relatively to said needle cylinder to cause different selected groups of needles to move equi-distant past said knitting station including a member movable with said driving means, a locking finger on said member for connecting said driving means to said needle cylinder, and means for disconnecting said locking finger from said needle cylinder, in combination with means on said member for holding said locking finger in disconnected position, means for moving said holding means to release said locking finger to permit said locking finger to reconnect said driving means to said needle cylinder, and pattern controlled means for selectively operating said moving means.

4. In a circular knitting machine having a needle cylinder, vertically movable needles in said cylinder, a knitting station, driving means for imparting rotary and reciprocatory movements to said cylinder, and means for shogging said driving means relatively to said needle cylinder to cause different groups of needles to move equi-distant past said knitting station including a member movable with said driving means, a locking finger on said member for connecting said driving means to said needle cylinder, and means for disconnecting said locking finger from said needle cylinder, in combination with means for selectively disconnecting and re-connecting said driving means to said needle cylinder including means on said member for holding said locking finger in disconnected position, a selecting means having frictional engagement with said member to move therewith, means for arresting said selecting means to permit movement of said member relative to said selecting means, and means on said selecting means for operating said holding means

to release said locking finger to re-connect said driving means to said needle cylinder.

5. In a circular knitting machine having a needle cylinder, vertically movable needles in said cylinder, a knitting station, driving means for imparting rotary and reciprocatory movements to said needle cylinder, and means for shogging said driving means relatively to said needle cylinder to carry different selected groups of needles equi-distant past said knitting station during reciprocatory movements of said needle cylinder, said shogging means including a member carried by and rotatable with said driving means, a locking finger on said member for connecting said driving means to said needle cylinder, means for disconnecting said locking finger from said needle cylinder, means on said member for holding said locking finger in disconnected position, means frictionally connected to said member, means for arresting said frictionally connected means to permit said member to move relatively to said frictionally connected means, and means on said frictionally connected means for operating said holding means to release said locking finger to re-connect said driving means to said needle cylinder.

6. In a circular knitting machine having a needle cylinder, vertically movable needles in said cylinder, a knitting station, driving means for imparting rotary and reciprocatory movements to said needle cylinder, and means for shogging said driving means relatively to said needle cylinder to carry selected groups of needles equi-distant past said knitting station, said shogging means including a shogging disk carried by and rotatable with said driving means, a locking finger on said shogging disk for connecting said locking finger to said needle cylinder, means for disconnecting said locking finger from said needle cylinder, means on said shogging disk for holding said locking finger in disconnected position, a member having frictional engagement with said shogging disk for movement therewith, means for arresting said member to permit said shogging disk to move relatively to said member, and means operated by the relative movement between said shogging disk and said member to move said holding means to release said locking finger to re-connect said driving means to said needle cylinder.

7. In a circular knitting machine having a needle cylinder, vertically movable needles in said needle cylinder, a knitting station, driving means for imparting rotary and reciprocatory movements to said needle cylinder, and means for shogging said driving means relatively to said needle cylinder to carry different selected groups of needles equi-distant past said knitting station, said shogging means including a member carried by and rotatable with said driving means, a locking finger on said member for connecting said driving means to said needle cylinder, means for disconnecting said locking finger from said needle cylinder, means on said member for holding said locking finger in disconnected position, means for operating said holding means to release said locking finger to re-connect said driving means to said needle cylinder, and control means for selectively actuating said operating means.

8. In a circular knitting machine having a needle cylinder, vertically movable needles in said needle cylinder, a knitting station, driving means for imparting rotary and reciprocatory movements to said needle cylinder, means for connecting said driving means to said needle cylinder, and means for disconnecting said connecting means from said needle cylinder and for re-engaging said connecting means to said cylinder at a plurality of different points around said cylinder to carry different groups of needles equi-distant past said knitting station including means for moving said connecting means to disconnected position, means on said member for holding said connecting means in disconnected position, and means for selectively operating said holding means to release said connecting means to re-connect said driving means to said needle cylinder.



9. In a circular knitting machine having a needle cylinder, vertically movable needles in said cylinder, a knitting station, driving means for imparting rotary and reciprocatory movements to said needle cylinder, and means for shogging said driving means relative to said needle cylinder, to carry different selected groups of needles equidistant past said knitting station, said shogging means including a member secured to and movable with said driving means, a locking finger on said member for connecting said driving means to said needle cylinder, means for disconnecting said locking finger from said needle cylinder, means for holding said locking finger in disconnected position, means carried by said member for releasing said locking finger from said holding means, and means for selectively operating said releasing means to permit said locking finger to re-connect said driving means and said needle cylinder.

10. In a circular knitting machine having a needle cylinder, vertically movable needles in said cylinder, a knitting station, driving means for imparting rotary and reciprocatory movements to said needle cylinder, and means for shogging said driving means relatively to said needle cylinder to carry different selected groups of needles equidistant past said knitting station, said shogging means including a shogging disk carried by and movable with said driving means, a locking finger on said shogging disk for connecting said driving means to said needle cylinder, means for disconnecting said locking finger from said needle cylinder, means for holding said locking finger in disconnected position, means frictionally connected to said shogging disk for movement therewith, an arresting member, means for moving said arresting member to arrest said frictionally connected means to permit said shogging disk to move relatively thereto, and means on said frictionally connected means acting

when said frictionally connected means is in arrested position to move said holding means to release said locking finger for movement to re-connect said driving means to said needle cylinder.

11. In a circular knitting machine having a needle cylinder, vertically movable needles in said cylinder, a knitting station, driving means for imparting rotary and reciprocatory movements to said needle cylinder, and means for shogging said driving means relative to said needle cylinder to carry different selected groups of needles equidistant past said knitting station, said shogging means including a shogging disk carried by and movable with said driving means, a locking finger on said shogging disk for connecting said driving means to said needle cylinder, means for holding said locking finger in disconnected position, a member frictionally engaged to said shogging disk for movement therewith, an arresting member, a support on which said arresting member is pivotally carried, means for moving said arresting member to arrest said member to permit said shogging disk to move relative thereto, means for changing the position of said support to cause said arresting member to arrest said member in different positions, and means on said member acting when said member is in arrested position to release said locking finger from said holding means to permit said locking finger to re-connect said driving means to said needle cylinder.

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