

Feb. 15, 1927.

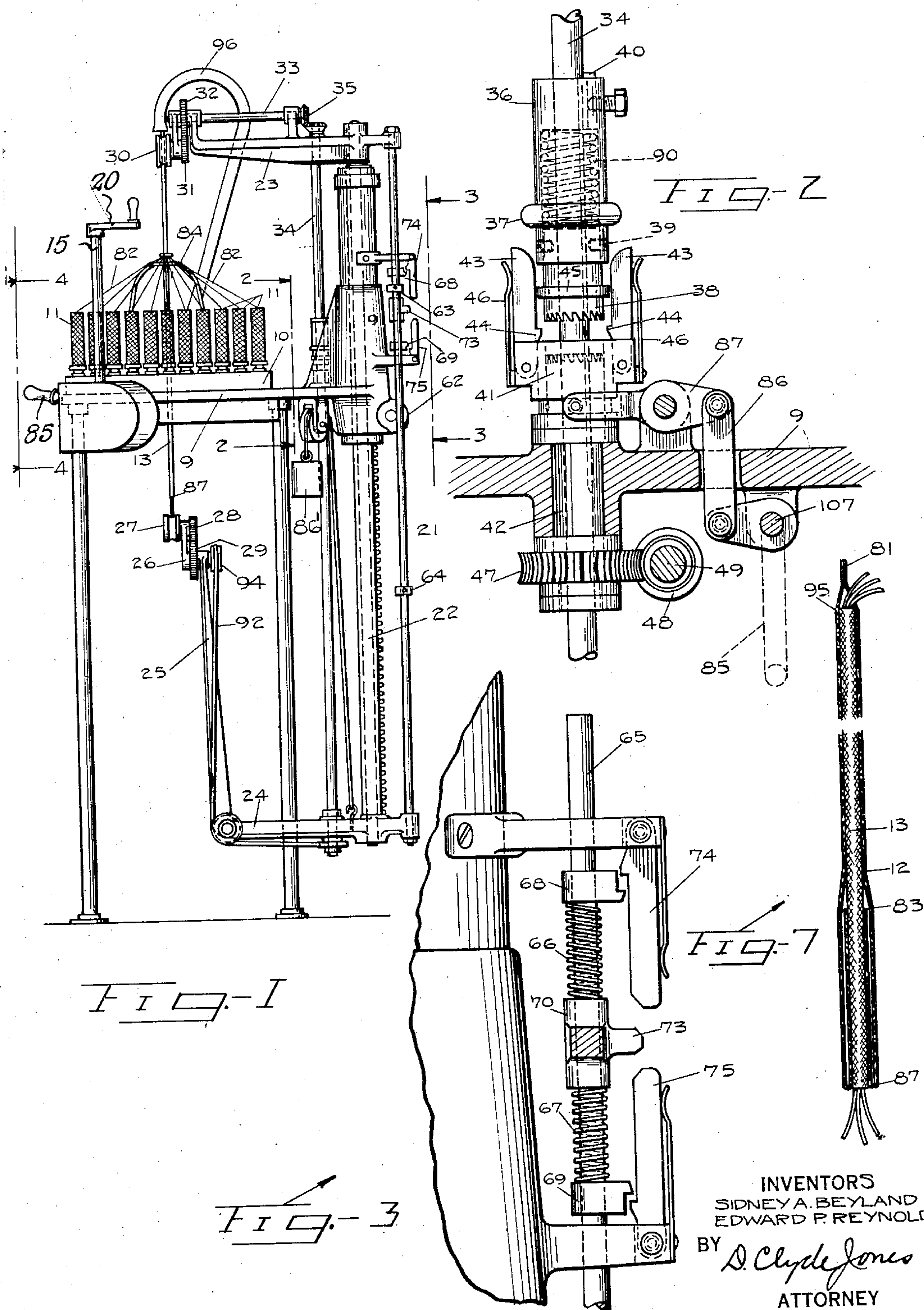
S. A. BEYLAND ET AL

1,617,983

METHOD AND APPARATUS FOR BRAIDING REENFORCED CORDS

Filed Jan. 5, 1925

2 Sheets-Sheet 1



INVENTORS
 SIDNEY A. BEYLAND
 EDWARD P. REYNOLDS
 BY *D. Clyde Jones*
 ATTORNEY

Feb. 15, 1927.

S. A. BEYLAND ET AL

1,617,983

METHOD AND APPARATUS FOR BRAIDING REENFORCED CORDS

Filed Jan. 5, 1925

2 Sheets-Sheet 2

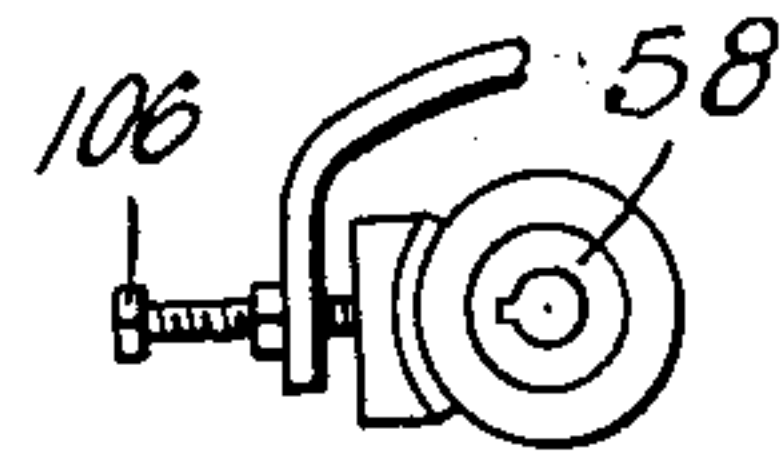
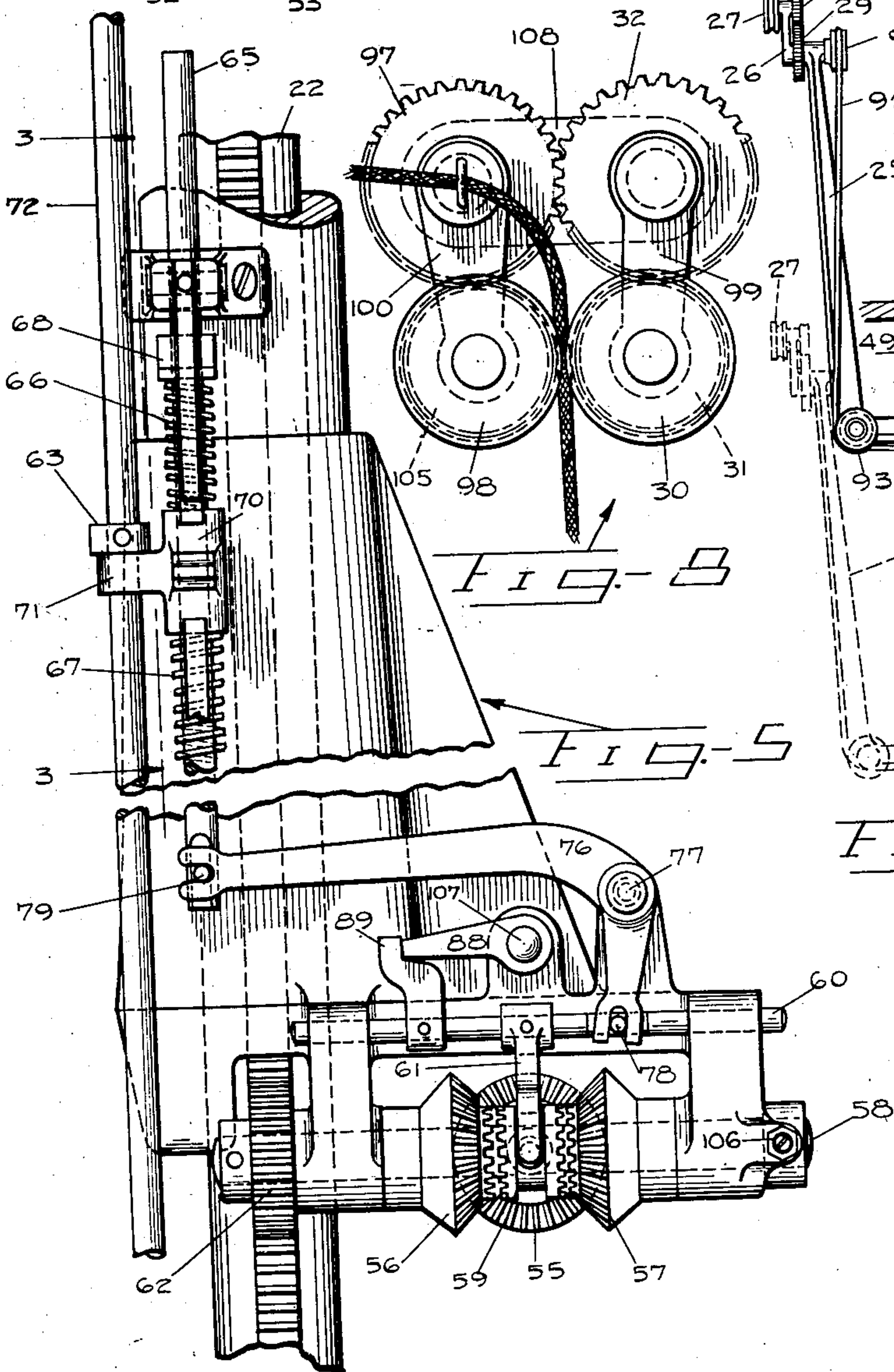
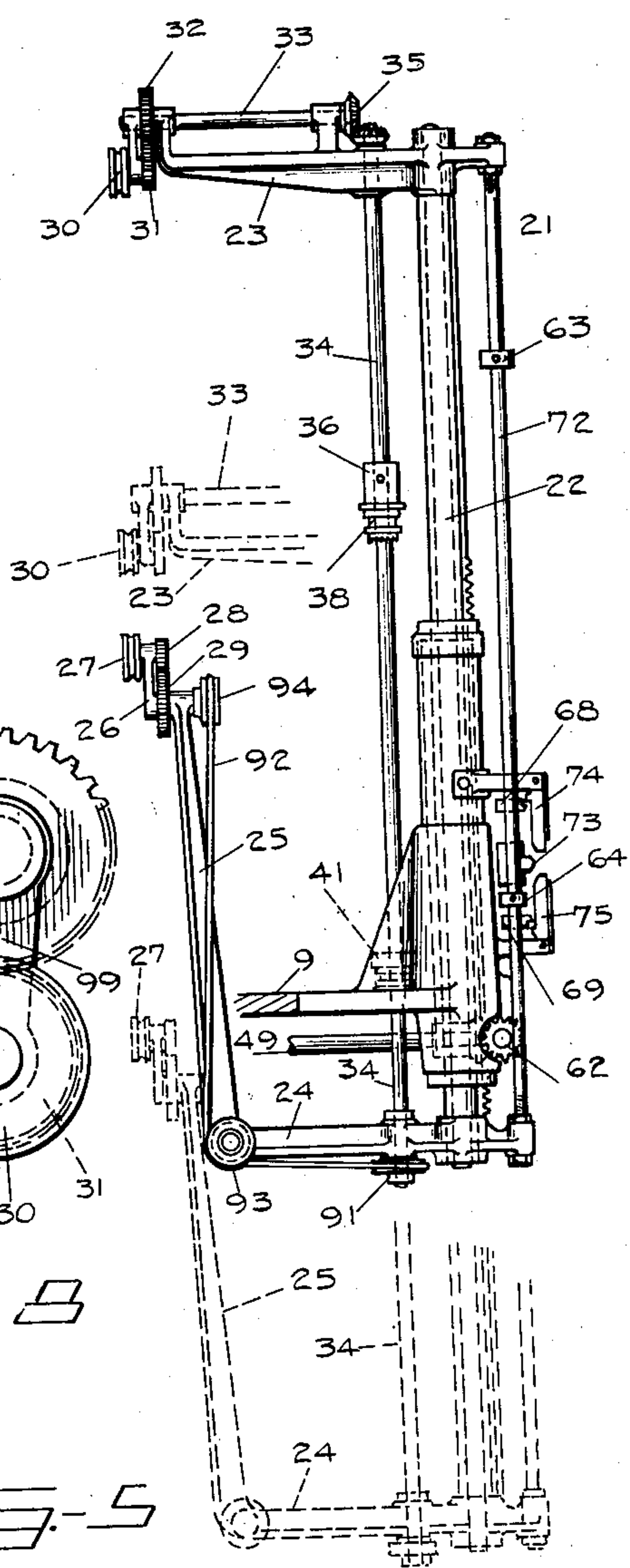
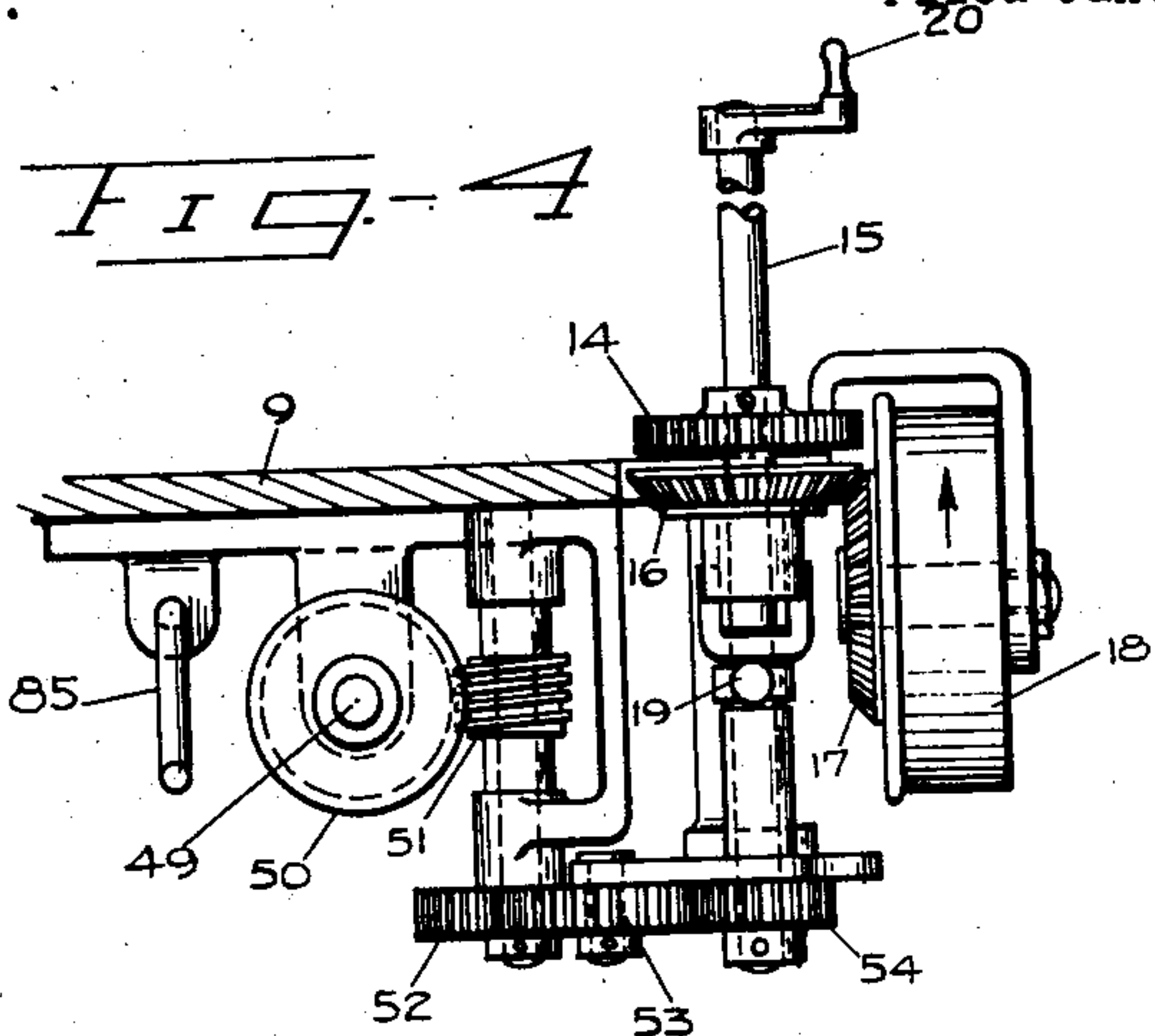


Fig. 9.

INVENTORS

SIDNEY A. BEYLAND
EDWARD P. REYNOLDS

BY *D. Clyde Jones.*

ATTORNEY

Patented Feb. 15, 1927.

1,617,983

UNITED STATES PATENT OFFICE.

SIDNEY A. BEYLAND AND EDWARD P. REYNOLDS, OF ROCHESTER, NEW YORK, ASSIGNORS TO THE STROMBERG-CARLSON TELEPHONE MANUFACTURING COMPANY, OF ROCHESTER, NEW YORK, A CORPORATION OF NEW YORK.

METHOD AND APPARATUS FOR BRAIDING REENFORCED CORDS.

Application filed January 5, 1925. Serial No. 624.

This invention relates to braiding machines of the type employed to braid an outer covering on cords or electrical conductors.

In former braiding machines employed for braiding reenforced covering on electrical conductors, especially those known as switch board cords, it was customary to move a cord by means of a take-up device in one direction through the braider while a reenforced braided covering was being applied thereto, then the braider was stopped and the operator reversed the cord end for end through one hundred eighty degrees so that when the braider was again started the take-up device moved the cord through the braider while an outer covering of braid was applied over the whole length of the cord including its reenforced portion. The stopping of the braider and the manual reversal of the cord greatly increased the labor costs and in addition the braided covering at the point of reversal presented an uneven contour even when a long-experienced skilled operator was employed.

It has been proposed to employ a take-up device in connection with the braider, arranged so that the cord is moved in one direction to apply the reenforced cover and then the operator manually reversed the take-up device while the braider was stopped, so that the cord was moved in the opposite direction through the braider to apply the outer covering without the end-for-end reversal of the cord. This arrangement while it was greatly superior to the first method, required close attention on the part of the operator, so that the outer braid would begin at the proper point required in service.

The present invention has for its purpose, the provision of a braiding machine and take-up device wherein a switch board cord may have a reenforced braided covering applied thereto automatically from the time when the cord is inserted in the machine until the covering is completely applied.

In the drawings Fig. 1 represents a side elevation of a braiding machine with the present invention incorporated therein; Fig. 2 is an enlarged detail view of a clutch and associated mechanism indicated between the arrows 2—2 of Fig. 1; Fig. 3 is an enlarged side view of the stop mechanism shown between the arrows 3—3 of Fig. 1; Fig. 4 is a

detail view taken between the arrows 4—4 of Fig. 1, showing how a source of power is connected to the braiding machine; Fig. 5 is an enlarged rear view of the stop mechanism of Fig. 3 and reversing clutch mechanism associated therewith; Fig. 6 is a side view of a take-up frame which grips a cord and controls its several movements through the braiding machine; Fig. 7 is a sectional view of a switch-board cord to show its reenforcing and outer covering; and Fig. 8 is a front view of a pair of cord-gripping rolls and their driving means; Fig. 9 is a detail of a brake mechanism.

Referring especially to Fig. 1, there is shown a braiding machine known in the art as a "New England butt braider" with the present arrangement incorporated therein but it will be understood that this invention is not limited to any particular type of braiding machine.

In the braiding machine shown, there is provided a circular plate 10 supported on base 9 in any suitable manner. About the border of the plate there are provided two sinuous grooves intersecting each other at regular intervals so that supports carrying spools or cops of thread 11 when driven half in one direction and half in the other direction in these grooves, move progressively in an in-and-out movement to form a braided covering 12 on a cord 13. The means for driving the spool supports, consists of a series of gears (not shown, but known in the art) and a gear 14 mounted on a vertical shaft 15, carrying a bevel gear 16 which meshes with a second bevel gear 17 fixed on a pulley 18 to which an initial source of power is applied. Clutch 19 permits the source of power to be connected or disconnected at the will of the operator while handle 20 permits the operator to operate the braiding machine manually to remove braid from the cord for any purpose.

While braid is being applied to a cord, it is necessary for the cord to be moved through the braiding machine in a uniform predetermined movement in order that the threads forming the braid will not be too far apart in case the cord is moved too fast and in order that the threads will not pile up on each other in case the cord is moved too slowly or not in a uniform progressive movement. For the purpose of controlling this

progressive movement of the cord a U-shape frame generally designated 21, is provided. This frame includes a vertical member 22 having a rack formed thereon and two horizontal arms 23 and 24.

The arm 23 terminates in a member 108 provided with bearings in one of which shaft 33 rotates. A second short shaft rotatably mounted in the second bearing, has secured to it a gear 97 driven from gear 32 mounted on shaft 33. Depending arms 99 and 100 are movably supported on these shafts respectively, so that said arms may be separated by overcoming the tension of a spring (not shown). The arm 99 has a bearing in which a shaft carrying grooved rubber roll 30 and gear 31 meshing with gear 32, rotates. Similarly arm 100 has a bearing, rotatably supporting a shaft carrying grooved rubber roll 98 and gear 105 meshing with gear 97. The previously mentioned shaft 33 may be driven from vertical shaft 34 through bevel gears 35.

The arm 24 of the frame has an integral upright portion 25 provided with bearings similar to those in member 108 in which shafts, one carrying pulley 94 and gear 29 and the other carrying a second gear (not shown) meshing with gear 29, are mounted. These mentioned shafts rotatably support upstanding arms 26 each provided with a bearing for a stub-shaft. These stub-shafts have mounted thereon a pair of grooved rubber rolls 27 and a pair of gears 28 meshing with gears 29. Only a side view of the lower pair of grooved rubber rolls 27 and their actuating mechanism is shown but it will be understood that they are substantially similar to those shown in Fig. 8.

The shaft 34 previously mentioned carries an adjustable hollow collar 36 provided with a shoulder 37. Within this collar there is mounted a toothed clutch element 38 mounted for limited vertical but not rotary movement on shaft 34 under control of a set screw 39 engaging a feather 40. A spring 90 surrounding the shaft 34 within the collar 36 normally forces element 38 into its lowest position. A second element 41 is mounted for vertical but not rotary movement on a hollow shaft 42 rotatable in base 9 on the shaft 34. It will be noted that the upper end of shaft 42 is notched to engage clutch element 38. Element 41 supports latches 43 provided with projections 44 to engage a shoulder 45 on element 38. It will be noted that springs 46 normally force the latches 43 against shoulder 45 but when shoulder 37 descends until it engages a certain portion of these latches, projections 44 are disengaged from shoulder 45 for a purpose to be described.

The hollow shaft 42 is constantly driven by a gear 47 actuated from a worm 48 carried on shaft 49. This shaft as shown in

Fig. 4 derives its power from a gear 50 driven from a second worm 51 in turn driven through a train of change gears 52, 53 and 54. The gear 54 is driven by means of clutch 19 from shaft 15 which is operated from the initial source of power 18 through bevel gears 16 and 17. Shaft 49 which terminates at the rear of the machine, carries a bevel gear 55 shown in Fig. 5, arranged to engage bevel gears 56 and 57 loosely mounted on shaft 58. These gears at their inner surface are provided with teeth arranged to engage a toothed clutch element 59 slidably mounted on but arranged to rotate with shaft 58. A rod 60 slidably supported in the base 9, and operated by stop mechanism to be described, is provided with a lug 89 and carries an arm 61 which moves clutch element 59 to the right or to the left to connect either gear 57 or gear 56 to shaft 58. This reversing clutch mechanism is well known and need not be further described.

The left hand end of shaft 58 is provided with a pinion 62, and when rotated serves to elevate or lower the frame 21 depending on its direction of rotation, while the right hand end of this shaft is engaged by brake mechanism 106, which with counterbalance 86' holds frame 21 in any position in which it is stopped. Frame 21 has a vertical rod 72 on which there are adjustably mounted stops 63 and 64. A rod 65 is supported for limited upward or downward movement under the control of springs 66 and 67 and associated mechanism in base 9. Notched lugs 68 and 69 secured to rod 65 limit the movement of springs 66 and 67 in one direction and collar 70 loosely mounted on rod 65 between springs 66 and 67, is provided with an apertured lug 71 through which rod 72 moves. The collar 70 is provided with a projection 73 to disengage the tensioned latches 74 and 75 from the notches in lugs 68 and 69 depending on the direction of movement of the frame 21. A crank arm 76 pivoted on base 9 at point 77, has one of its ends forked to engage a pin 78 on rod 60 and has its other end forked to engage a pin 79 on rod 65.

The operation of the device will now be described. When a cord is to be braided, all mechanism is in the position shown in Fig. 1, that is, with frame 21 in its lowest position, with clutch element 38 of Fig. 2 in engagement with notched portion of shaft 42, and with clutch element 59 of Fig. 5 in neutral position, having pawl 88 against stop 89. At the time when the stay cord 81 of the previous cord was completed, a hollow tube of braid formed from threads 82 remained to hold these threads together. An unbraided cord is now inserted through the thread guide ring 84 and is stretched between and gripped by the pair of grooved rolls 27 and the pair of rolls 98 and 30, so

that point 83 of the cord is positioned at the apex of the cone of threads 82. The operator now turns crank 85 and temporarily holds it in this position to pull link 86 downward by means of rod 107 connected to the crank 85, so that lever 87 elevates element 41 of Fig. 2, which in turn elevates element 38. The pawl 88 carried by rod 107 is disengaged from stop 89 by the turning of the crank. While clutch element 59 has been held in neutral position by pawl 88, spring 67 has been under compression so that when the pawl is disengaged, this spring lowers rod 65, which through crank 76 moves clutch element 59 to engage the notches in the face of bevel gear 57, so that shaft 58 and pinion 62 are in position to elevate frame 21.

The operator thereupon throws clutch 19 (Fig. 4) so that the braiding machine and its attached mechanism begin operation. Spool carriers 11 revolve as has been described to apply braid to cord 13. The hollow tube of braid remaining from stay cord 81 of the previous cord is now trimmed off from the present cord. During this portion of the braiding operation, rotating pinion 62 engages the rack on the rear of the frame 21 and elevates the frame with the lower pair of rolls 27 and upper pair of rolls 98 and 30 locked to grip the cord 13 so that properly spaced braid is formed. This step in the operation continues with cord entering guide 96 until a reenforcing braided covering is applied to a predetermined point 87 on the cord, at which time spring 66 has been placed under compression by projection 71 on collar 70 engaging stop 64 whereupon latch 74 disengages the projection on member 68, which in turn permits spring 66 to force rod 65 upward rapidly. This movement is communicated through crank 76 to rod 60 and the arm 61 carried thereby, which thereupon causes clutch member 59 to engage the notches on the face of bevel gear 56.

The braiding machine continues its braiding operation without interruption, but the last described reversal of the clutch causes pinion 62 to rotate in the opposite direction so that frame 21 now lowers the cord 13 while the outer covering is applied to it. When this outer covering is applied to point 83, frame 21 is in position so that stop 63 engages the projection 71 on collar 70 which then places spring 67 under compression and then causes latch 75 to disengage the notch on member 69. At this time spring 67 rapidly forces rod 65 upward which in turn communicates its movement through crank 76 and rod 60 to arm 61. This arm moves clutch member 59 into neutral position where it is held by pawl 88 engaging stop 89. While this operation of the clutch has been taking place, collar 36 has descended carrying element 38 so that shoulder 45

engages projections 44 to place spring 90 under compression. Then shoulder 37 spreads latches 43 so that shoulder 45 is no longer held by projections 44 with the result that the clutch element 38 descends until it engages the notched portion of shaft 42. It will be remembered that this last-named element is constantly rotating so that it now transmits its motion to shaft 34, and this in turn drives shaft 33 through bevel gears 35. Shaft 33 actuates gears 31, 32, 97 and 105 to drive the grooved rolls 30 and 98. The lower end of the shaft 34 has a pulley which drives belt 92 over guide pulleys to actuate pulley 94 which in turn rotates grooved rolls 27 through the mechanism of gears 28, 29 and others similar to those shown in Fig. 8.

It should be mentioned that when frame 21 stops its downward movement, both pairs of grooved rolls immediately start rotating to continue the movement of the cord without interruption through the braiding machine.

When the outer covering has been applied to point 95, the operator pulls the conductor through the threads and a hollow stay cord 81 is braided. When slightly more than the proper length of stay cord is braided the machine is stopped and the stay cord is cut to length leaving a short piece to hold threads 82 together.

The braiding machine is now in readiness to repeat the operation in applying braid to another cord since the parts are in position as shown in Fig. 1, which is the position that it was in when the description of its operation was begun.

What we claim is:

1. In combination with a braiding machine for applying a braided covering to a cord, a support having two sets of gripping means for holding a cord, means for moving said support in one direction and then in another direction, and means for moving said sets of gripping means independently of said support.

2. In combination with a braiding machine, a support provided with rolls, means for bodily moving said support and take-up rolls with respect to said braiding machine, and means for rotating said take-up rolls.

3. In combination with a braiding machine, a U-shaped frame provided with a pair of rolls at each of its ends, means for moving said frame in two directions with respect to said braiding machine, and means for rotating said pairs of rolls.

4. In combination with a braiding machine, a frame having a vertical portion and two spaced horizontal arms, a rack formed on said vertical portion, a pair of gripping rolls mounted on the free end of each of said horizontal arms, a pinion engaging said rack, driving means, clutch

mechanism whereby said driving means may move said frame by means of said rack and pinion, first in one direction and then in another, and means for controlling said clutch to limit the movements of said frame to a predetermined amount.

5. In combination with a braiding machine, a frame having a vertical portion and two spaced horizontal arms, a rack formed on said vertical portion, a pair of gripping rolls mounted on the free end of each of said horizontal arms, a pinion engaging said rack, driving means, clutch mechanism whereby said driving means may move said frame by means of said rack and pinion, first in one direction and then in another, means for controlling said clutch to limit the movements of said frame to a predetermined amount, and means effective at the conclusion of the movements of said frame for rotating said pairs of rolls.

6. In combination with a braiding machine, a frame having a vertical portion and two spaced horizontal arms, one of said horizontal arms being at one side of and the other horizontal arm being at the other side of said braiding machine, a rack formed on said vertical portion, a pair of gripping rolls mounted on the free end of each of said horizontal arms, a pinion engaging said rack, driving means, clutch mechanism whereby said driving means may move said frame by means of said rack and pinion,

first in one direction and then in another, and means for controlling said clutch to limit the movements of said frame to a predetermined amount.

7. A stage in the manufacture of a cord, which consists in applying a continuous braided covering from an intermediate point on said cord to one end thereof and from said end to the other end of the cord without interruption of the braiding operation during the stage.

8. A stage in the manufacture of a cord, which consists in applying to said cord a continuous braided covering from an intermediate point to one end of said cord and from said end to the other end of said cord formed of one layer folded back on another layer without interruption of the braiding operation during the application of the two layers.

9. In a device of the class described, a machine for applying braid to a cord, means for causing said machine to apply one braided covering from an intermediate point on said cord to one end thereof, and automatic means including said first means for causing said machine to apply a second covering continuous with the first from said end of the cord to the other end.

In testimony whereof we affix our signatures.

SIDNEY A. BEYLAND.
EDWARD P. REYNOLDS.