Aug. 1, 1933. H. J. BOE 1,920,182

CABLE FORMING MACHINE

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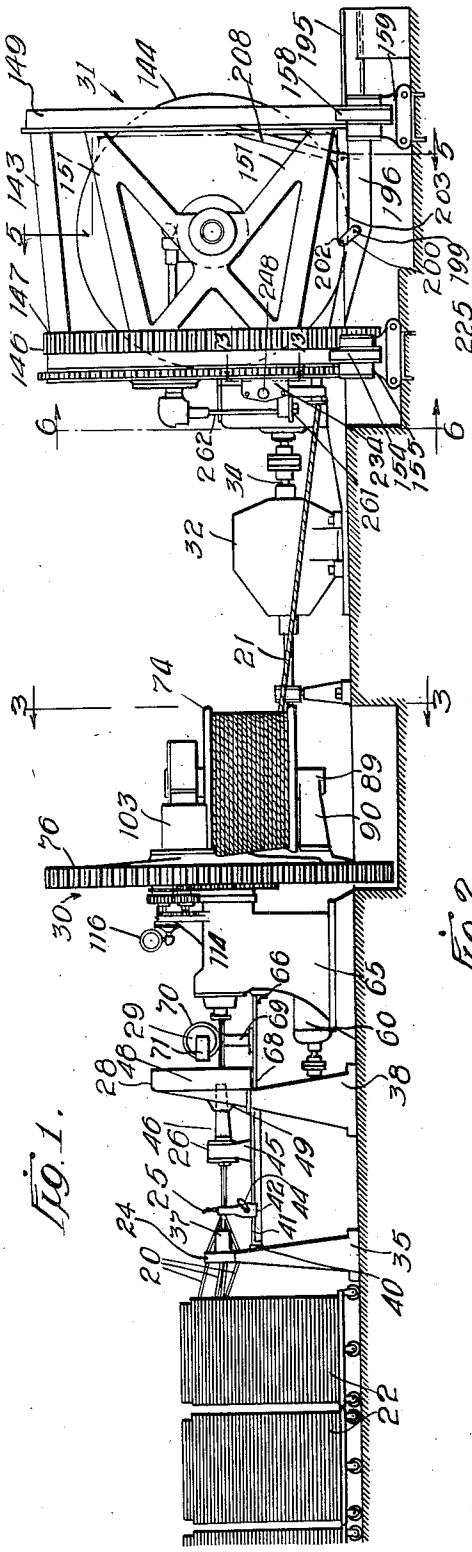


Fig. 1.

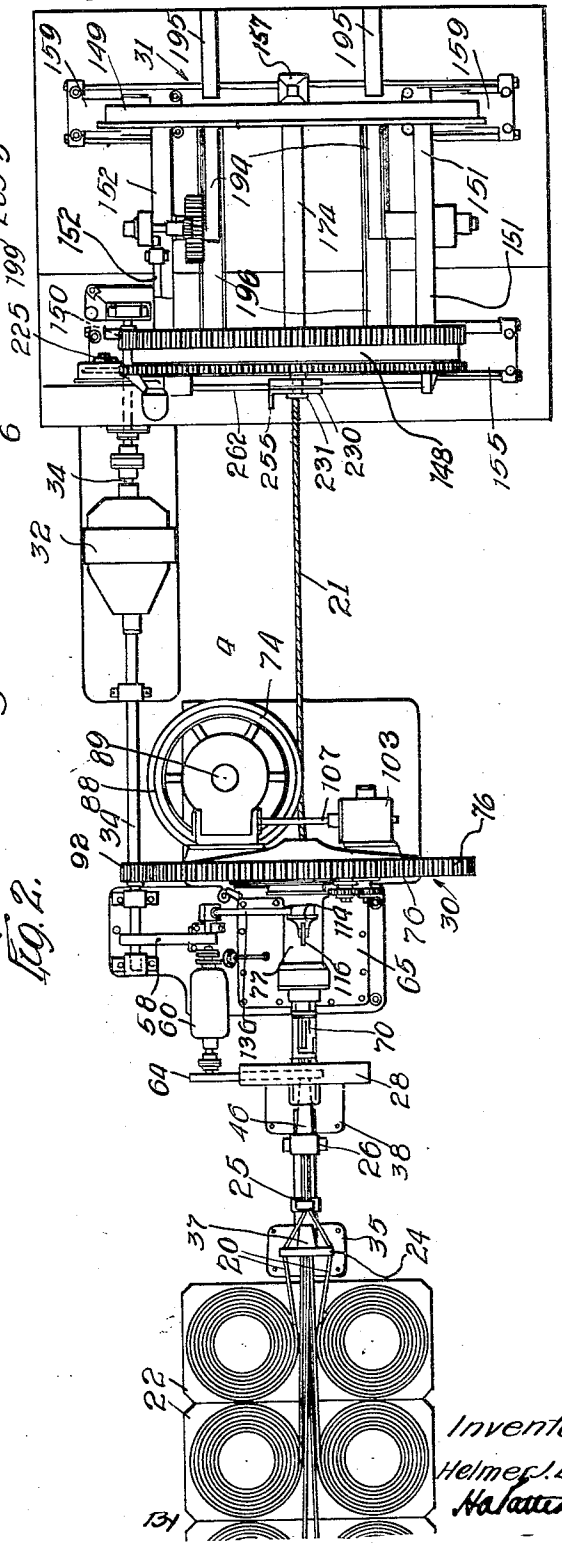


Fig. 2.

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Fig. 3.

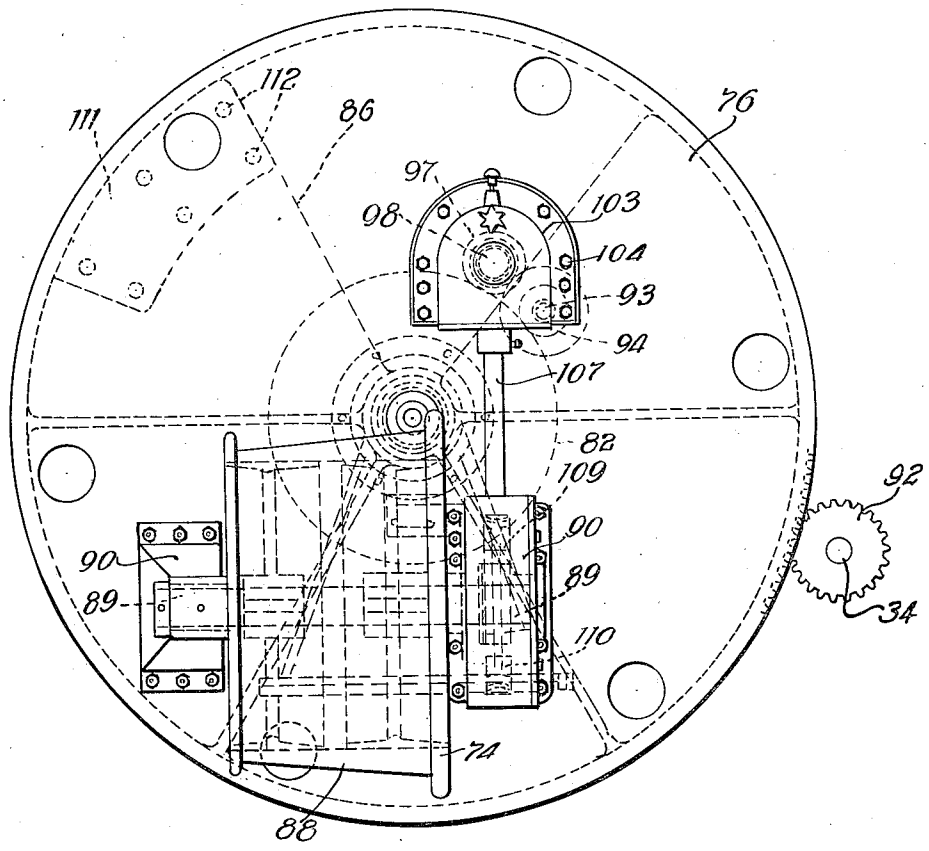
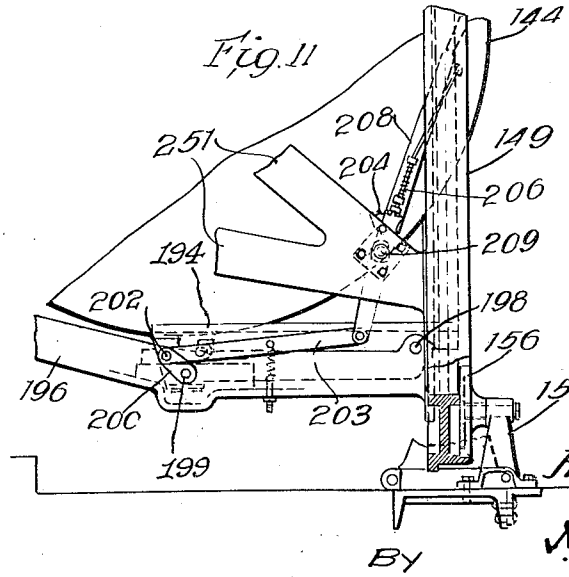


Fig. 11



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Fig. 4

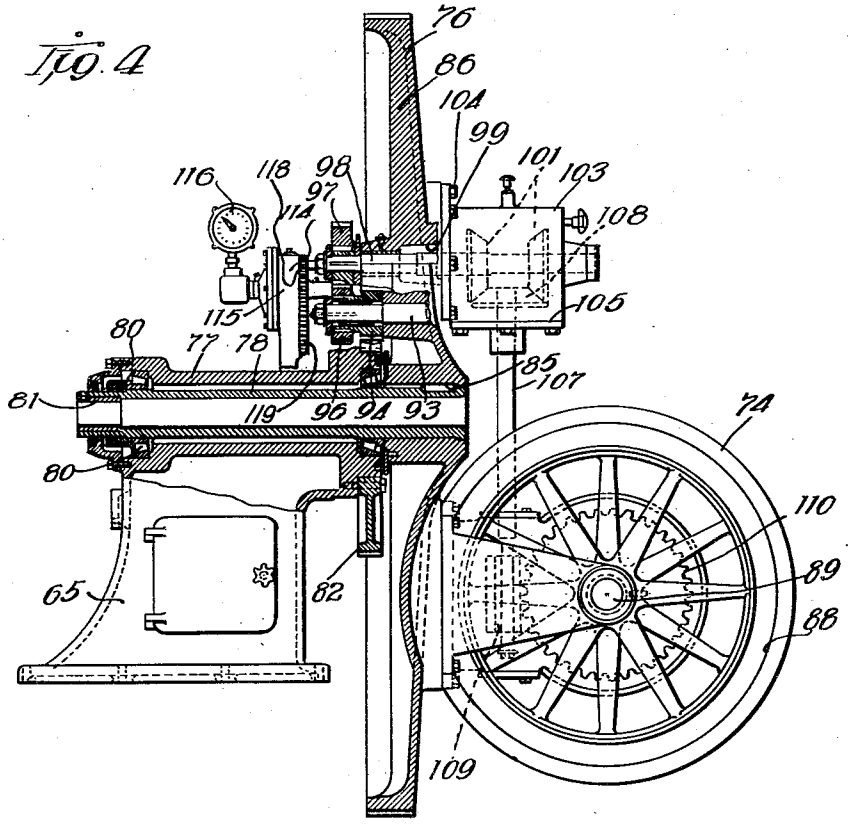


Fig. 7.

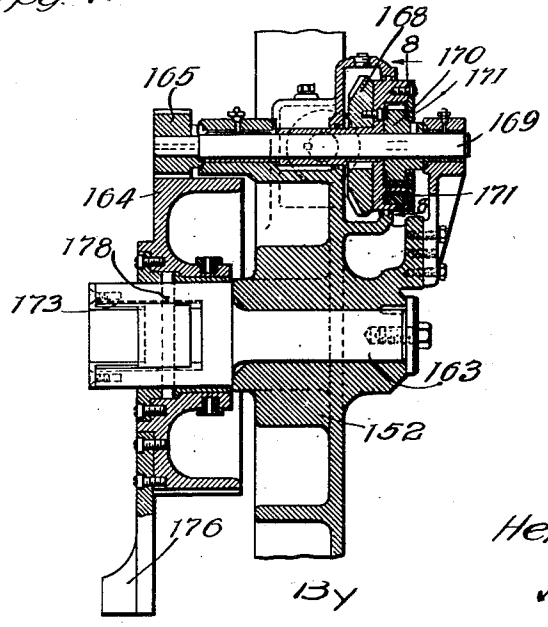
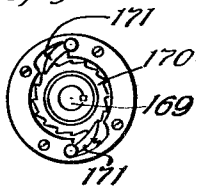


Fig. 8.



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Fig. 5

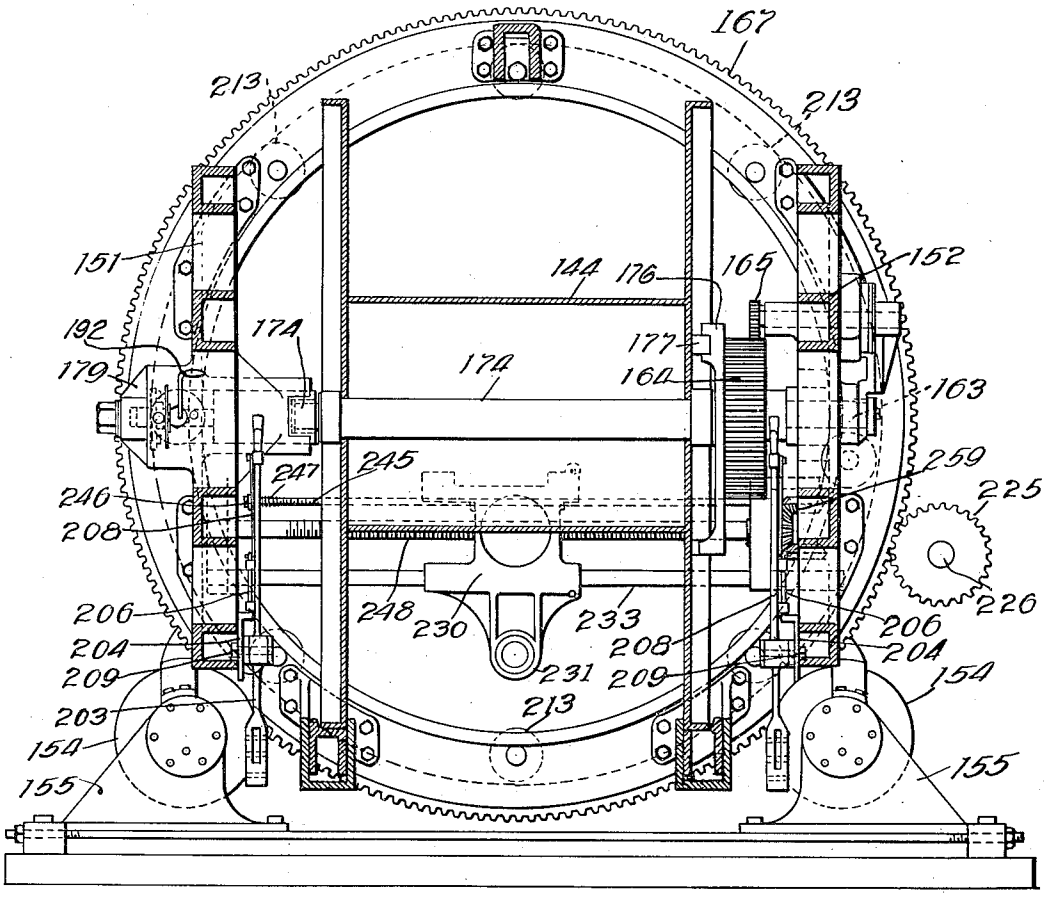
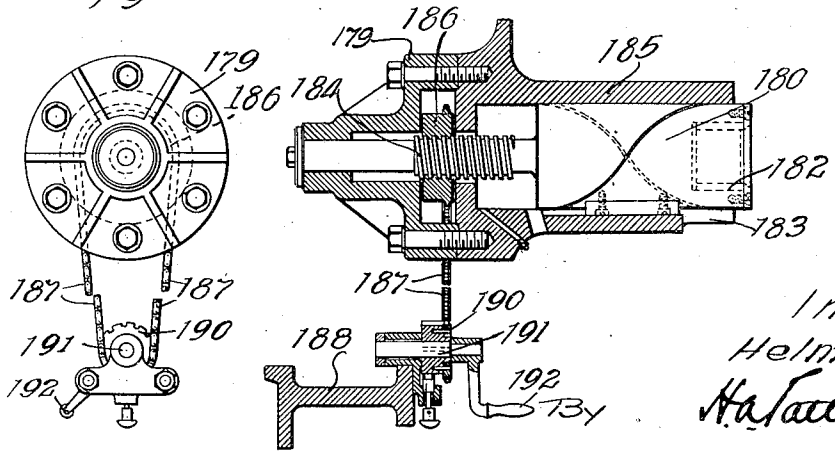


Fig. 10.

Fig. 9.



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Fig. 6.

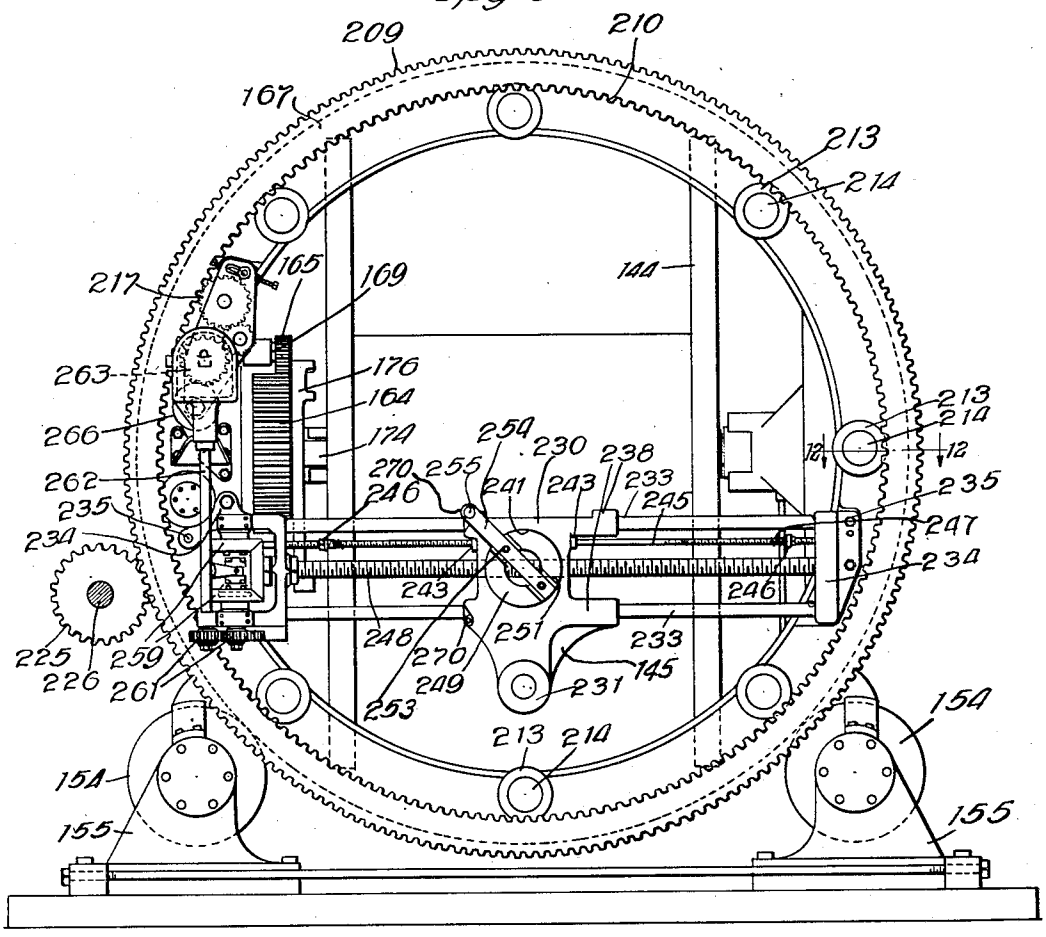


Fig. 13.

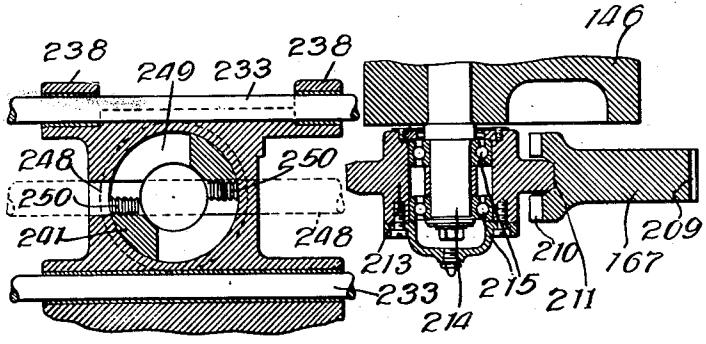
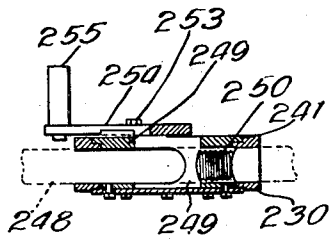


Fig. 12.

Fig. 14



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Fig. 15.

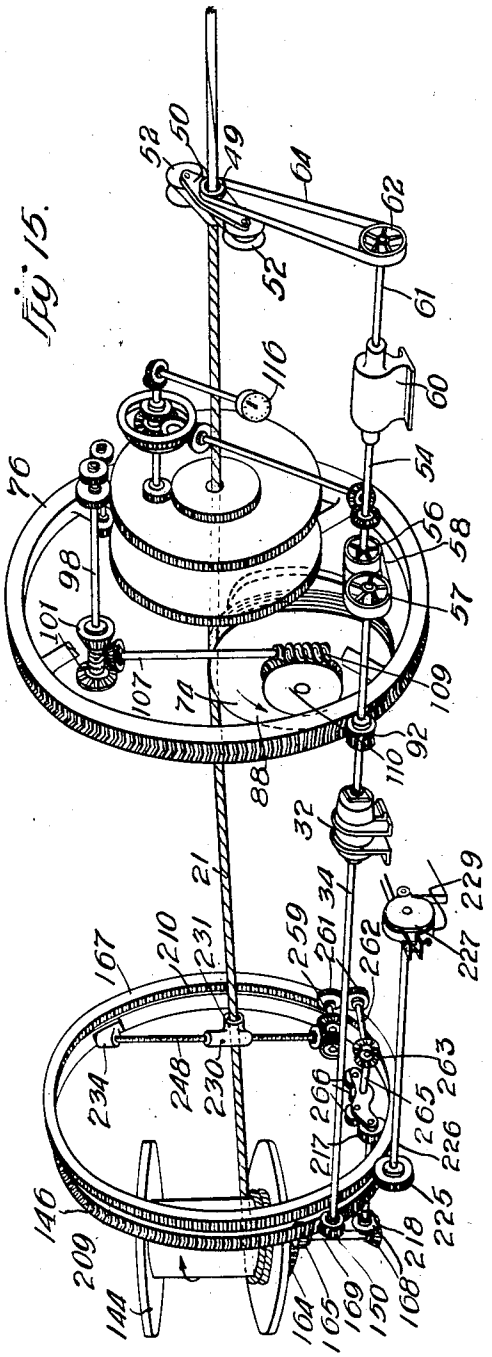
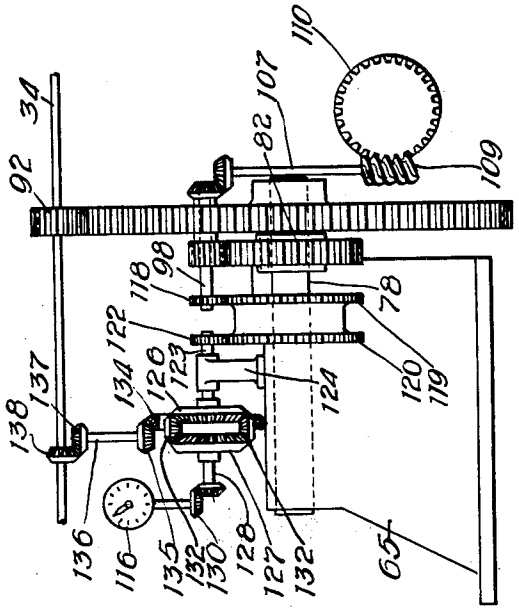


Fig. 16.



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UNITED STATES PATENT OFFICE

1,920,182

CABLE FORMING MACHINE

Helmer J. Boe, Maplewood, N. J., assignor to Western Electric Company, Incorporated, New York, N. Y., a Corporation of New York

Application September 25, 1929
Serial No. 395,031

12 Claims. (Cl. 117—35)

This invention relates to a cable forming apparatus and more particularly to an apparatus for forming cable of the type used in communicating intelligence electrically.

An object of the invention is to provide a simple and improved apparatus whereby cables of a uniform and improved construction may be produced economically and at high speeds.

The invention contemplates the provision of an apparatus for forming cables wherein a plurality of individual strands or cable units are formed together into a compact group of substantially circular cross section to form a single composite cable. A preferred embodiment of the invention comprises a stationary distributing plate and sizing bushing whereby the cable units are assembled together, a binder serving head, a capstan, and a take-up unit. A circular plate carrying the capstan is rotatable about a sleeve mounted in a pedestal portion, and the latter is provided with a stationary gear by means of which the capstan is rotated in accordance with the rotation of the circular plate. The take-up consists of a reel mounted in a revolving cradle which also carries a floating ring, a brake being provided to rotate the floating ring at a different speed from that of the cradle for the purpose of rotating the reel.

The invention will be more fully understood from the following specification, considered in connection with the accompanying drawings forming a part thereof, in which

Fig. 1 is an elevational view showing a cable forming apparatus embodying the features of the invention;

Fig. 2 is a top plan view thereof;

Fig. 3 is a section taken on the line 3—3 of Fig. 1 showing the capstan unit of the apparatus;

Fig. 4 is a side elevation of the capstan unit, being partly sectioned to show the capstan driving arrangement;

Fig. 5 is a section taken on the line 5—5 of Fig. 1, portions of the capstan loading and driving arrangements being shown in elevation for clearness;

Fig. 6 is a section taken on the line 6—6 of Fig. 1 and shows the cable distributing mechanism;

Fig. 7 is an enlarged view in section of the right hand reel support showing details of the reel drive;

Fig. 8 is a section taken on the line 8—8 of Fig. 7;

Fig. 9 is an enlarged side elevation of the left hand reel supporting mechanism shown in Fig. 5.

Fig. 10 is an enlarged view in section showing details of the left hand reel supporting mechanism;

Fig. 11 is a fragmentary enlarged view in elevation showing details of the take-up cradle shown in Fig. 1;

Fig. 12 is a section taken on the line 12—12 of Fig. 6;

Fig. 13 is an enlarged fragmentary section taken on the line 13—13 of Fig. 1 showing details of the distributor plate;

Fig. 14 is an enlarged fragmentary view in section showing details of the distributor plate shown in Fig. 13;

Fig. 15 is a diagrammatic perspective view from the rear of Fig. 1 which, taken together with Figs. 4, 5, and 6, constitutes a preferred arrangement for driving the apparatus, and

Fig. 16 is a diagrammatic view in elevation showing a preferred arrangement for driving the tachometer.

The embodiment of the invention herein illustrated and described may be employed to advantage in the manufacture of telephone cables from a plurality of electrical conductors, and more particularly for assembling in a single large cable a plurality of so-called cable units, apparatus for the production of which is disclosed and claimed in the copending application of L. O. Reichelt, Serial No. 389,386, filed Aug. 30, 1929.

Referring to the drawings, in which similar parts throughout the several views are indicated by identical reference numerals, one embodiment of the invention comprises apparatus whereby a plurality of cable units 20 (in this instance, six in number) are formed into a cable 21. The units are customarily previously stored upon individual core trucks 22 (Fig. 1) shown aligned at the left of the apparatus, and are thence drawn through a distributing plate 24, a preliminary sizing bushing 25 and a floating polisher 26. Subsequently the cable 21 passes through a binder serving head 28 and a measuring device 29, from which it is drawn by a capstan unit 30 and passed to a take-up unit 31. An electrical motor 32, of any suitable type, and an associated main shaft 34, are provided by means of which the various portions of the apparatus are actuated.

Secured to the floor or other suitable foundation is a standard 35 which supports the distributor plate 24. The distributor plate 24 is provided with a cone 37 disposed centrally with reference to the distributing plate. It should be understood that the distributor plate 24 may be of any well known type and provided with spaced apertures, through which the cable units are passed individually. The apertures are spaced with respect to each other as to predetermine the relative positions of the cable units in the finished cable. In practice, one or more of the cable units may be drawn through the cone and

thereby pressed together in order that they may form a core about which the remaining units may be twisted. A standard 38 is secured to the foundation and serves to support the serving head 28. The standard 35 is provided with a bracket 40 upon which is supported a table 41, which extends from the bracket 40 to the standard 38, to which it is secured by any suitable means (not shown). Mounted thereon adjacent to the distributor cone 37 is a support 42 for containing the preliminary sizing bushing 25. The support 42 is provided with a lever 44, and any suitable mechanism whereby the size of the bushing 25 may be varied to affect the diameter of the composite cable 21. Adjacent to the support 42 and also mounted upon the table 41 is a housing 45 for mounting the floating polisher 26. The polisher 26 is provided with a sleeve 46 which extends through the serving head 28 for the purpose of compressing and confining the cable units in their ultimate desired configuration which, it will be understood, predetermines the diameter of the finished cable. The serving head 28 consists of a protecting hood 48 and a hollow sleeve 49 (Figs. 1 and 15) which is rotatably mounted about the end of the sleeve 46. Projecting in either direction from the hollow sleeve 49 is an arm 50 which is provided at each extremity with a serving spool 52—52, which is shown with a supply of binding material, preferably paper strip, although it may be in some instances desirable to employ cotton, silk or other textile. The binder serving head 28 is driven by an auxiliary shaft 54 (Fig. 15) having at one end a pulley 56 which is connected with a pulley 57 upon an end of the main shaft 34 by means of a belt, chain or other suitable connecting means 58. The auxiliary shaft 54 operates through a suitable variable speed transmission 60 to rotate a shaft 61. The shaft 61 is provided at an extremity with a pulley 62 which is connected with the hollow sleeve 49 by a belt 64 to cause the rotation of the arm 50 and spools 52—52 about the cable 21. By this means, two strips of paper are wrapped tightly around the cable in overlapping fashion immediately upon its passage from the sleeve 46 thus insuring the maintenance of the diameter of the finished cable as predetermined by the sleeve 46.

The capstan unit 30 (Figs. 1 and 2) is supported upon a pedestal 65, having bolted or otherwise suitably attached thereto a bracket 66, which supports a table 68 extending therefrom to the serving head standard 38. A standard 69 is mounted upon the table 68 and supports the measuring device 29 in alignment with the path of the cable 21 from the serving head to the capstan unit. The measuring device includes a rotatable member 70 and a suitable indicator 71 connected thereto and suitable mechanism of any well known type for the purpose of translating the number of revolutions of the rotatable member 70 to express the number of feet of cable passing thereby.

The capstan unit 30 includes (Figs. 3 and 4) a capstan 74 which is carried by a circular supporting plate 76 having a toothed periphery. The capstan pedestal 65 is provided in the upper portion thereof with an elongated cylindrical portion or barrel 77. Mounted internally of the barrel portion is a longitudinally extending hollow sleeve 78 which is rotatably supported by roller bearings 80—80. The hollow sleeve 78 is provided at an end adjacent to the measuring device 29 with a final sizing bushing 81, the diameter of which may be readily varied by any conventional means for the purpose of supplementing the sleeve 46 in determining the ultimate desired diameter of the cable 21. The barrel portion 77 is also provided at the end adjacent to the capstan plate 76, with an external stationary gear 82. The capstan plate 76 is provided with a central aperture 85, the diameter of which corresponds to the external diameter of the sleeve 78, which it is adapted to receive and to which it is securely keyed, as shown in Fig. 4. It will thus be readily understood that in operation the capstan supporting plate 76 is rotatable with the sleeve 78 and the sizing bushing 81, with reference to the stationary cylindrical portion 77 and gear 82.

Radiating from the central aperture 85 of the capstan supporting plate 76 are a plurality of supporting veins 86, which act to give strength and balance to the capstan supporting plate. The capstan 74 is provided with a cylindrical drum 88 which is rotatable upon a transverse shaft 89 journaled in housings 90 suitably secured to the face of the capstan plate 76.

The main shaft 34 is provided with a pinion 92 (Figs. 2, 3, and 15) keyed thereto, which meshes with the toothed edge of the capstan supporting plate 76 for the purpose of rotating the capstan plate in conjunction with the rotation of the serving head 28. The capstan plate 76 is fitted with a stud shaft 93 to which is keyed a pinion 94 which meshes with the stationary gear 82 and, upon rotation of the capstan plate 76, causes a gear 96 also keyed to the shaft 93 to rotate. The gear 96 meshes with a gear 97 suitably secured to a shaft 98 which extends through and which is suitably journaled in an aperture 99 (Fig. 4) of the capstan supporting plate 76. The shaft 98 is fitted, upon that end extending through the aperture 99, with a bevel gear reversing mechanism 101. The reversing mechanism 101 is supported in a housing 103 rigidly secured upon the face of the capstan plate 76 by bolts 104, 104. The housing 103 is provided with a plate 105 having a bossed aperture through which extends a shaft 107. The shaft 107 is provided at one end with a bevel gear 108 which cooperates with the bevel gear reversing mechanism 101, and at the other end with a worm 109. The shaft 89 has keyed thereto a gear 110 which meshes with and is driven by the worm 109.

From the foregoing it may be observed that the cable 21 is drawn through the sleeve 78 and around the capstan drum 88, the periphery of which is tangential with the center line of the sleeve 78, by means of the rotation of the capstan plate. This is secured through the cooperation of gears 94, 96 and 97 with the stationary gear 82 as they are carried therearound by action of the pinion 92 upon the toothed edge of the capstan plate. The shaft 98 and bevel gear reversing mechanism 101 is actuated by gear 97, the shaft 107 and worm 109 are rotated thereby to rotate the capstan about the shaft 89, while the capstan is being simultaneously rotated bodily about an axis coinciding with the center line of the sleeve 78. By thus mounting the capstan upon the rotating circular plate 76, and driving the capstan about is own axis while it is being revolved with the plate 76, a lay or twist is introduced in the cable during its passage from the distributor plate 24 to the capstan 74. The degree of twist introduced in the cable depends upon the speed ratio of the plate 76 to the capstan 74. This ratio

may be varied in any well known manner, as for instance, by altering the respective ratios of gears 96 and 97.

It will be noted that in the arrangement shown in the drawings it is desirable to balance the capstan plate with reference to its center of rotation in order to offset the weight of the capstan and driving mechanism. This is accomplished by securing upon the face of the capstan plate near the edge thereof and at the opposite side of the center of rotation thereof from the capstan and driving apparatus a counterweight 111 (Fig. 3) consisting of a lead plate, or any other suitable load which is secured thereto by means of bolts 112, 112. By counterweighting the capstan plate in such a manner it has been found possible to safely operate the apparatus at much higher speeds than would otherwise be possible.

For the purpose of measuring the rate of speed at which the cable is formed the embodiment includes a tachometer mechanism 114 (Figs. 4 and 16) maintained in a casing 115 which is suitably secured to the barrel 77 of the capstan pedestal. The tachometer casing 115 is provided with a dial 116 for the purpose of registering the proper values. A train of gears driven from the capstan accomplishes this result and consists chiefly of a gear 118 which is keyed to an extension of the shaft 98. A gear 119 is made integral with a gear 120 and it is so mounted with respect to the sleeve 78 as to be idly rotatable therearound, and gear 119 is permitted to mesh with the gear 118. A gear 122 is keyed to a shaft 123, mounted in bearing 124, the shaft 123 having keyed thereto at its opposite extremity a bevel gear 126. The gear 126 comprises a part of a differential, the opposite side consisting of a gear 127. The gear 127 is keyed to a shaft 128 which drives the tachometer through a pair of bevel gears 130—130. In the middle part of the differential a pair of gears 132—132 are provided, which are rotatably carried by a larger gear 134. The gear 134 is driven from the main shaft 34 through a bevel gear 135, a shaft 136, and bevel gears 137 and 138. If it be now assumed that the capstan plate 76 makes one revolution with the bevel gears 137 and 138 disconnected from each other and the gear 134 locked, the tachometer would register, when the gear ratios are correct, the number of revolutions of the capstan plate, plus 1, multiplied by the ratio of gear 120 to that of gear 122, assuming that the latter and gear 118 are equal. Such a registration, however, would be a sum of the revolutions of the capstan plate and of the capstan. But it is desired that the revolutions of the latter only be indicated. It is, therefore, necessary that for each revolution of the capstan plate the tachometer be turned backwardly in amount equal to the amount it would be advanced by one revolution of the capstan. This is accomplished by means of the above described differential gearing arrangement, and the driving of the shaft 136 from the main shaft 34. When the capstan plate 76 makes one revolution the main shaft 34 will make a corresponding number of revolutions, and since the main shaft 34 is connected to the middle differential gears 132 and 134, rotation of the shaft 128 through the differential will be produced in such a direction and at such a ratio that the tachometer will register only the revolution of the capstan about its own axis, thus registering correctly.

Since the cable core is formed and twisted only during its passage from the distributor plate 24 to the capstan 74, it is completed as it passes over the latter, and subsequently requires only to be carefully handled and rapidly loaded for storage. The take-up unit 31 comprises means for accomplishing this result, and includes a rotatable cradle 143, for carrying a rotatable take-up reel 144 (shown only in Figs. 1, 5, 6, and 15). The take-up reel 144 is rotatable about its own axis at the same time as it is being revolved with the cradle and since the reel 144 is usually of a heavy type, a special reel loading and supporting arrangement (Figs. 5, 7, 8, 9, and 10) is provided whereby the reel may be readily and easily secured upon the cradle 143 and firmly held thereon during rotation, and which will also permit the ready removal of the take-up reel therefrom when loaded. The take-up reel cradle 143 includes a ring 146 having an external edge which is provided with teeth 147 and a smooth peripheral groove 148 (Figs. 1 and 2). A pinion 150 keyed to the main shaft 34 meshes with the external teeth 147 of the ring 146 to rotate the cradle 143. A ring 149 spaced from the ring 146 is connected therewith and the ensemble braced with left cross pieces 151 and right cross pieces 152. The ring 146 is mounted between and rotatably upon a pair of rollers 154, 154 which are journaled in housings 155, 155 secured to the foundation of the machine (Figs. 5 and 6).

A locking roller 156 (Fig. 11) rotatably mounted in a housing 157 suitably secured to the foundation of the machine, engages an inner surface of the ring 149 and acts to maintain the ring in close contact with a pair of rollers 158, 158 for the purpose of supporting the ring 149. The rollers 158, 158 are journaled in housings 159, 159 (Figs. 1 and 2) suitably secured to the base of the machine.

Referring to Figs. 5 and 7, and particularly to the right hand reel support, or the reel driving end, a shaft 163 has slidably and rotatably mounted thereon a gear 164, the shaft 163 being fastened in the cross piece 152. The shaft 163 is provided with a bronze lined opening 173 in which one end of a shaft 174 extending through the center of the reel (Fig. 6) is supported. After the reel is in place the gear 164 is moved forward by means of a lever or other suitable means (not shown), causing a toothed driving hub 176, carried by the gear 164 to engage the lugs 177 on the sides of the reel. The gear 164 in sliding forward takes with it a bronze shoe 178, which completely covers the opening 173, thus securely locking the reel shaft 174 therewithin.

Figs. 9 and 10 show the left hand support, which consists of a metal boss 179, mounted upon the left cross pieces 151 between the rings and diametrically opposite the right hand support. A plunger 180 is fitted into a tubular bearing 185 attached to the boss 179. The tubular bearing 185 is provided at the side thereof with a slot 183, which receives the other end of the reel shaft 174. The plunger 180 is provided at one end with a bronze lined hole 182, and at the other end with a threaded shank 184. A sprocket 186 is rotatable about the threaded shank 184 and is engaged by a chain 187. A bracket 188 is suitably secured to the framework of the cradle and supports a second sprocket 190, the sprocket being keyed to a shaft 191 and rotatable therewith by the manipulation of an associated crank 192.

Between the rings 146 and 149 at the lower side, when the axis of the reel is horizontal, are

placed (Figs. 1 and 11) two rails 194, 194 which are intended to align with two rails 195, 195, (Figs. 1 and 2) mounted in the floor or foundation of the machine. Extending from the ring 146 to ring 149 beneath each of the rails 194, 194 are a pair of stationary supporting beams 196, 196 which are provided at the front of the machine, or at that end adjacent to the ring 149, with a pivot 198 about which the rails 194 are rotatable. Approximately midway of their length the supporting beams 196, 196 are connected by a bar 199 to which is keyed a bell crank lever 200. The bell crank lever 200 is provided with a pin 202 with which is connected a link 203 comprising the means for elevating the ends of the rails 194, 194. This is accomplished by means of a pair of levers 208—208, disposed on opposite sides of the take-up cradle, which are held in position with respect to notched plates 204—204 by engagement therewith of spring plungers 206—206 mounted upon each of the levers 208—208. The levers 208 are pivotally secured to the cross pieces of the framework by pins 209. When a reel is to be placed in the machine the plunger 180 is drawn into the back of the tubular bearing 185, and the rails 194—194 brought opposite to 195—195 upon which the reel is placed. The reel is then rolled into the cradle 143 to rest upon the movable rails 194—194 and the levers 208 are then manually moved to raise the rails 194 to a height corresponding with the radius of the reel, or, in other words, until the reel shaft 174 is even with the slot 183 of the left hand reel support. The reel shaft is then moved into the bronze lined aperture 182 and the plunger 180 is advanced by operation of the sprockets 186 and 190 to contact with the reel. The gear 164 is brought in on the stationary shaft 163, exposing the bronze lined opening 173 thereof, and the reel shaft 174 is locked therein by means of the bronze shoe 178. Levers 208—208 are then moved in an opposite direction and the rails 194—194 are lowered, thus leaving the reel suspended in the cradle.

The gear 164 is driven by a pinion 165, which in turn is connected to a floating ring 167 (Figs. 5 and 15) carried by the ring 146, through bevel gears 168, 168 which are connected thereto by a shaft 169. The shaft 169 is provided with a ratchet 170, which is engageable by a pawl 171. This ratchet arrangement constitutes a one-way drive which is used to take up slack in the cable between the capstan 74 and the take-up reel. For example, when starting a cable on the take-up, the slack may be removed by turning the reel by hand in the same direction in which it is adapted to be driven.

The floating ring 167 (Figs. 6 and 12), is provided externally with teeth 209, and internally with teeth 210 and a groove 211. The groove 211 extends somewhat deeper than the root of the internal gear teeth 210 and is for the purpose of providing support for the floating ring 167 which is rotatably mounted upon the side of the cradle ring 146. To secure this purpose rollers 213 mounted upon pins 214 by roller bearings 215 are fitted. Ring 167 is now free to turn or is what is termed "floating". Meshing with the inside gear teeth 210 of the floating ring 167 is a pinion 217 (Figs. 6 and 15) which is connected by means of a shaft 218 to the bevel gears 168, 168. In this condition if the machine were started the reel cradle and the floating ring would rotate at the same speed and produce no motion of the reel driving gear 164. In order to render the reel effective to wind the finished cable the floating ring 167 must rotate slower or faster than the reel cradle. In the present embodiment the floating ring is rotated more slowly than the cradle ring 146.

To accomplish this the gear teeth 209 of the floating ring mesh with a gear 225 mounted upon a shaft 226, to the other end of which is keyed a drum 227. A braking appartus comprising spring pressed bands 229—229, which may be of any conventional type, is continuously applied to the drum 227 for the purpose of slowing its rotation and causing the gear 225 to act as a deterrent against the rotation of the floating ring 167; consequently, when there is no cable in the machine the load thus put upon the floating ring 167 will cause it to stop entirely, the pinion 217 would traverse the inside of the floating ring 167 and through operation of the bevel gears 168, 168, shaft 169 and pinion 165 would produce a high speed of the gear 164. However, when the cable is fastened to the reel, the reel and the gear 164 which drives it must decrease to accommodate the speed at which the cable is drawn through the apparatus by the capstan 74. When the gear 164 decreases from the speed caused by the stationary floating ring, the ring must increase in speed and the power to overcome the effect of the brake 229 reverts to the cable. It can thus be readily seen that the tension in the cable, as it is being wound upon the reel, depends upon the effect upon the drum 227 of the braking mechanism 229, which obviously may be varied to vary the tension in the cable.

The distributor mechanism 145 (Figs. 6 and 15) comprises a distributor plate 230 carrying in a projecting portion a bell-mouthed bushing 231 through which the cable passes. The distributor plate 230 is slidable upon guide rods 233, 233 which are secured in brackets 234, 234 suitably mounted upon the side of the ring 146 by means of a plurality of bolts 235. The distributor plate 230 is provided at four points with bearings 238, 238 which receive the guide rods 233, 233 and at the center is also provided with an aperture 241. Two apertured stop plates 243, 243 are suitably mounted upon the plate 230 at each side thereof and receive through the apertures a stop rod 245 which is slidably mounted in the side brackets 234, 234. The stop bar 245 is threaded at its ends to receive stop nuts 246, 246 and springs 247, 247. The distributor plate is moved from side to side between the stop nuts 246, 246 by means of a rotating threaded member 248 which is engaged by a one piece nut 249 (Figs. 13 and 14) having oppositely disposed threaded portions 250. The upper face of the nut is provided with a slot 251 within which is secured by bolts 253 one end of a bar 254. A spring pin 255 is mounted upon the other end of the bar 254 by manual operation of which the bar may be moved through an angle of 90 degrees for the purpose of disengaging the threaded portions of the nut from the screw 248. With this arrangement it is possible to quickly and easily vary the position of the distributor plate with reference to the screw 248 to enable the cable to be introduced at any chosen point upon the reel. The screw 248 is rotated by means of a bevel gear reversing mechanism 259 which is actuated by pressure of the distributor plate 230 as it alternately engages the nuts 246—246 to move the rod 245 from side to side. The reversing mechanism is driven through change gear 261, shaft 262 and bevel gears 263, shaft

265 and the chain of gears 266 from the pinion 217. By means of the change gears 261, the speed of the screw 248 is varied to suit the different diameters of cable that may be run on the machine. The one piece nut 249 is held in either the "off" or the "on" position by means of the bar 254, which is locked in place upon the distributor plate 230 by engagement, with a pair of spaced sockets 270—270, of the spring pin 255.

It will be understood that the above described apparatus is particularly adapted to the formation of a single cable from a plurality of individual cable units and, that although in the particular instance only six of the individual units have been employed, a greater or lesser number may be used with advantageous results. Also, although the invention had been described in connection with a certain type of apparatus, it is obviously capable of utility in various other forms, and it is therefore desired that the invention be not limited to the embodiment shown but only by the scope of the appended claims.

What is claimed is:

1. In a cable forming apparatus, means for assembling a plurality of strands into a group, a rotatable take-up reel for receiving the grouped strands, a rotatable supporting structure for the take-up reel, and a toothed ring floating on the reel supporting structure for rotating the take-up reel with respect to the reel supporting structure.

2. In a cable forming apparatus, means for assembling a plurality of strands into a group, a take-up reel for receiving the grouped strands, a rotatable cradle for supporting the take-up reel, and a toothed ring floating on the cradle for rotating the take-up reel with respect to the cradle.

3. In a cable forming apparatus, means for assembling a plurality of strands into a single group, a take-up reel for receiving the grouped strands, a rotatable cradle for carrying the take-up reel, and a toothed ring floating on and rotatable with respect to the cradle for rotating the take-up reel with respect to the cradle.

4. In a cable forming apparatus, a take-up reel, a rotatable cradle for the reel, a floating ring associated with the cradle, means for rotating the floating ring and cradle at different relative speeds, and means for rotating the reel in accordance with the difference in speeds of the cradle and the ring.

5. In a cable forming apparatus, means for assembling a plurality of strands into a group, a housing, a capstan having an axis rotatable with respect to the housing and means associated with the housing for rotating the capstan about its axis to twist the assembly of strands, and means for binding the twisted strands to form a cable.

6. In a cable forming apparatus, a plurality of strand supply reels rotatable upon stationary axes, means for grouping the strands, and means including a stationary gear, a plate, and a capstan carried by the plate and rotatable in accordance with the movement of the plate with respect to the stationary gear for twisting the strands and means for binding the twisted strands to form a cable.

7. In a cable forming apparatus, a plurality of strand supply reels rotatable upon stationary axes, means for grouping the strands, means for binding the group to form a cable, means including a stationary gear, a plate, and a capstan carried by the plate and rotatable in accordance with the movement of the plate with respect to the stationary gear, for twisting the strands as they are formed into a cable, a take-up reel for the cable, a rotatable reel supporting structure, and means carried by the reel supporting structure for rotating the take-up reel.

8. In a cable forming apparatus, a rotatable cradle, a floating ring carried by the cradle, a take-up reel, means for rotating the take-up reel in accordance with the rotation of the cradle and means for effecting the rotation of the floating ring for rotating the take-up reel with reference to the cradle.

9. In a cable forming apparatus, cable forming means, a rotatable member, a capstan carried thereby for advancing the cable through the forming means, means for rotating the member to revolve the capstan bodily around an axis of rotation, means rendered effective by the rotation of the member for driving the capstan independently of the member, and means connected with the capstan driving means and operatively responsive to the member rotating means for rendering the revolutions of the member unrecordable and registering the number of revolutions of the capstan with respect to the member.

10. In a cable forming apparatus, cable forming means, a rotatable member, a capstan carried thereby for advancing the cable through the forming means, a shaft for rotating the member to revolve the capstan bodily around an axis of rotation, means rendered effective by the member for driving the capstan independently of the member, and means controlled by the shaft and the capstan driving means for rendering the revolutions of the member unrecordable and registering the number of revolutions of the capstan with respect to the member.

11. In a cable forming apparatus, cable forming means, a rotatable member, a capstan, carried thereby for advancing the cable through the forming means, a shaft for rotating the member to revolve the capstan bodily around an axis of rotation, means rendered effective by the rotation of the member for driving the capstan independently of the member, a register connected to the capstan driving means, and means interconnecting the shaft and the register for rendering the register effective for indicating only the number of revolutions of the capstan with respect to the member.

12. In a cable forming apparatus having means grouped along a straight line to form a plurality of strands into a cable, a support rotating about the said line as an axis and carrying a capstan bodily around said line to draw the cable through the forming means and twist the same, a second support independent of the capstan support but rotating synchronously therewith about the same line as an axis and carrying a reel to receive and take up the finished cable, and a toothed ring floating on the support for rotating the reel with respect to the support.

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