May 14, 1963 R. B. BILANE 3,089,660

ROLL FORMING MACHINE

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Fig. 1.

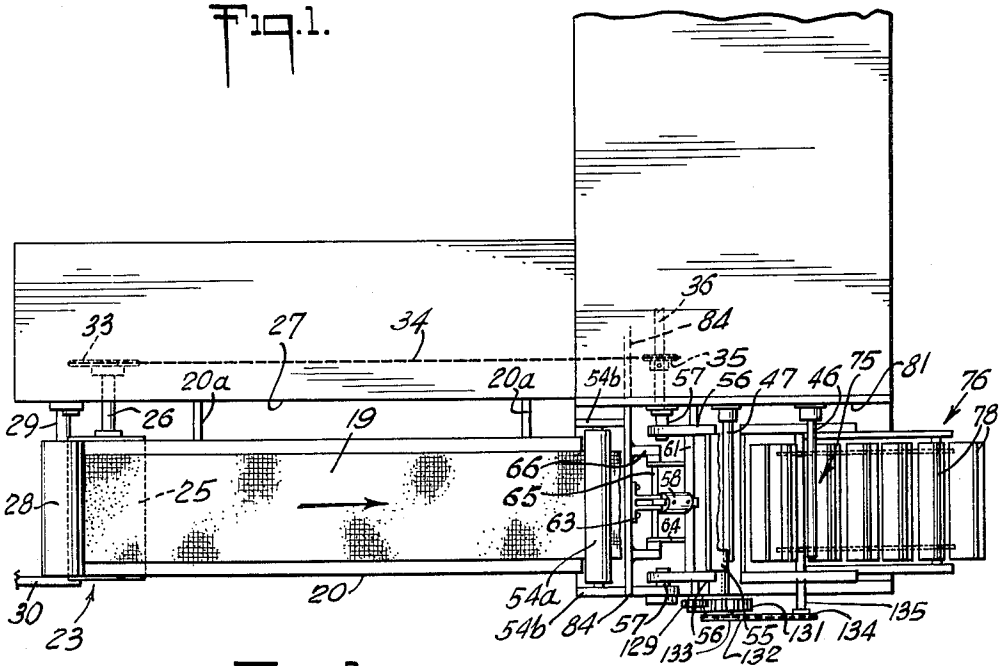
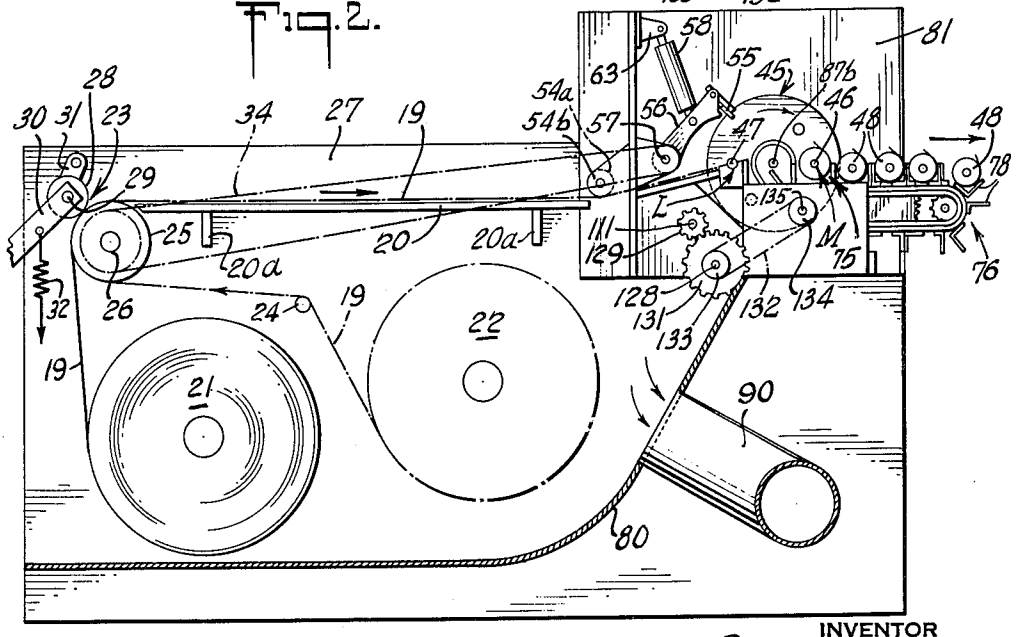


Fig. 2.



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ROLL FORMING MACHINE

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Fig. 5.

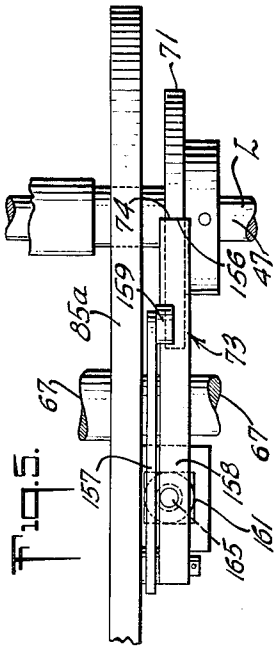


Fig. 4.

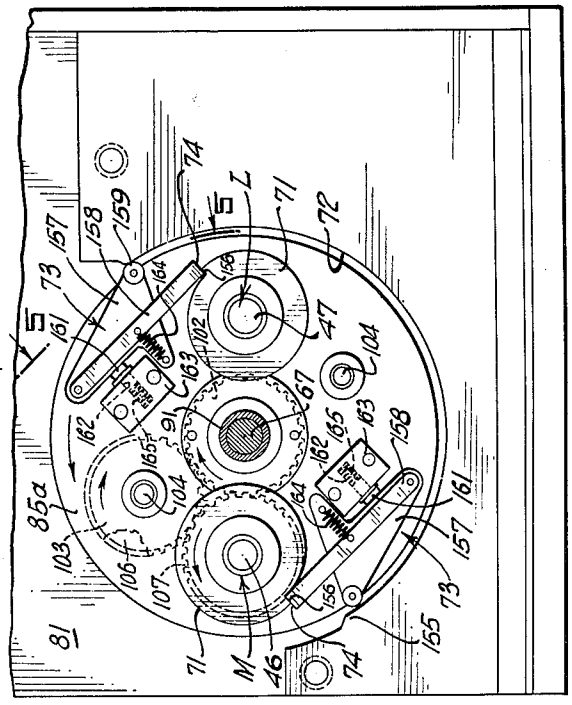
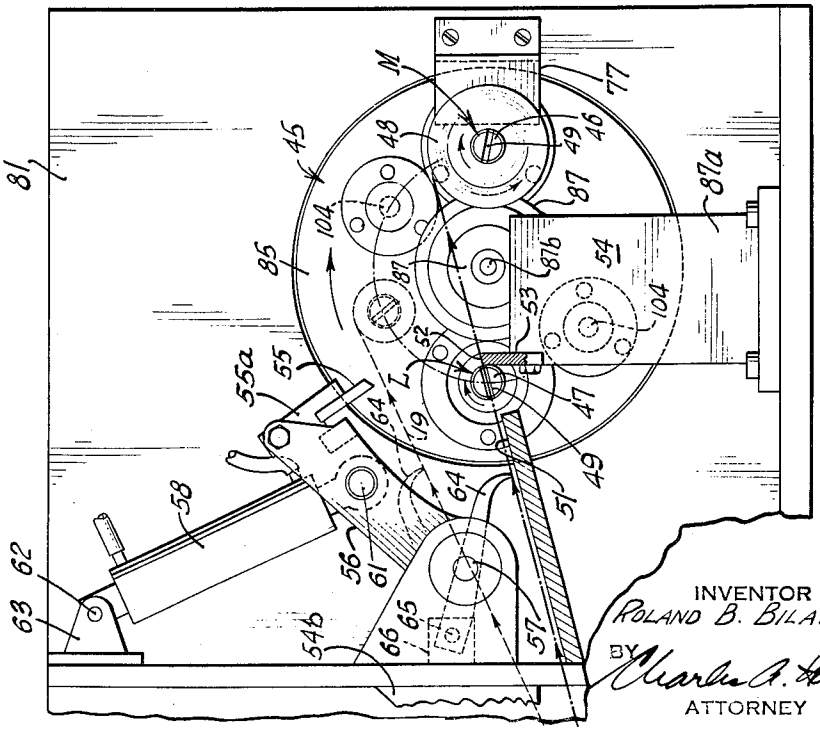


Fig. 3.



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ROLL FORMING MACHINE

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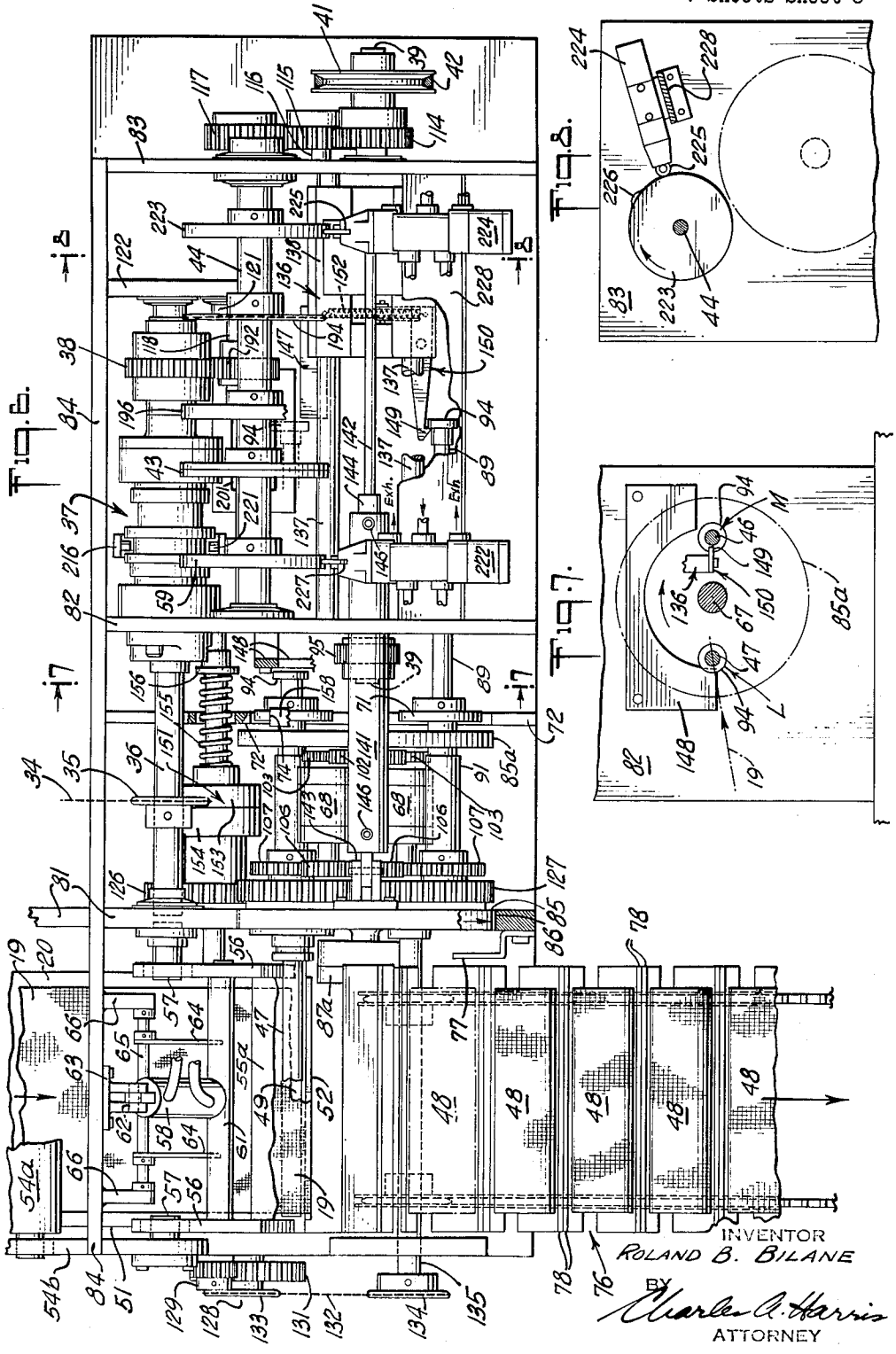


FIG. 8.

FIG. 7.

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ROLL FORMING MACHINE

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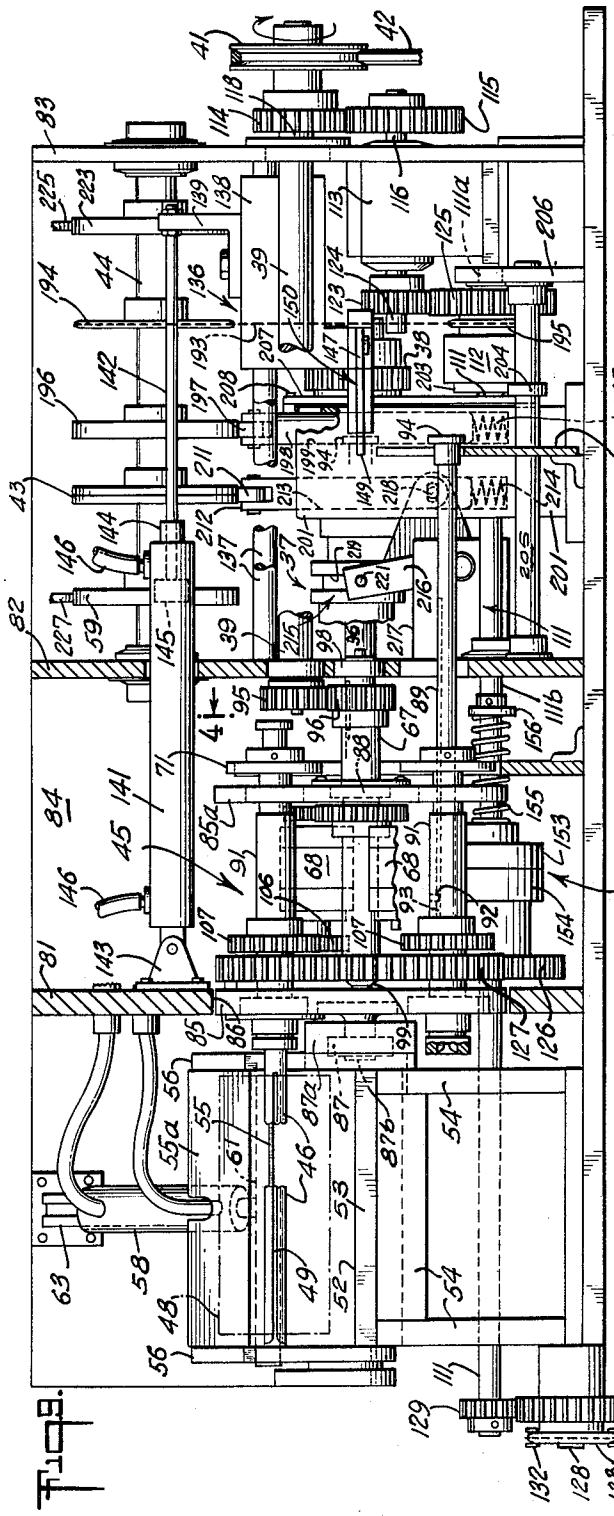


Fig. 9.

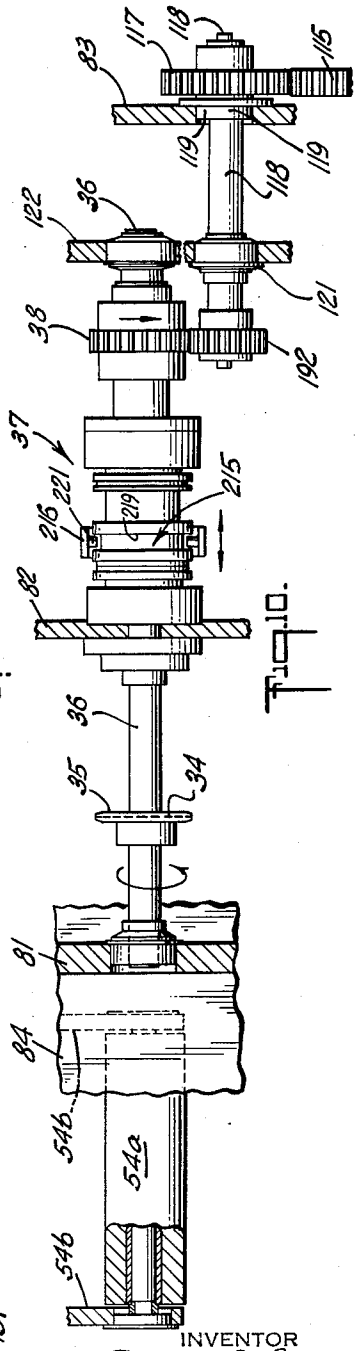


Fig. 10.

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ROLL FORMING MACHINE

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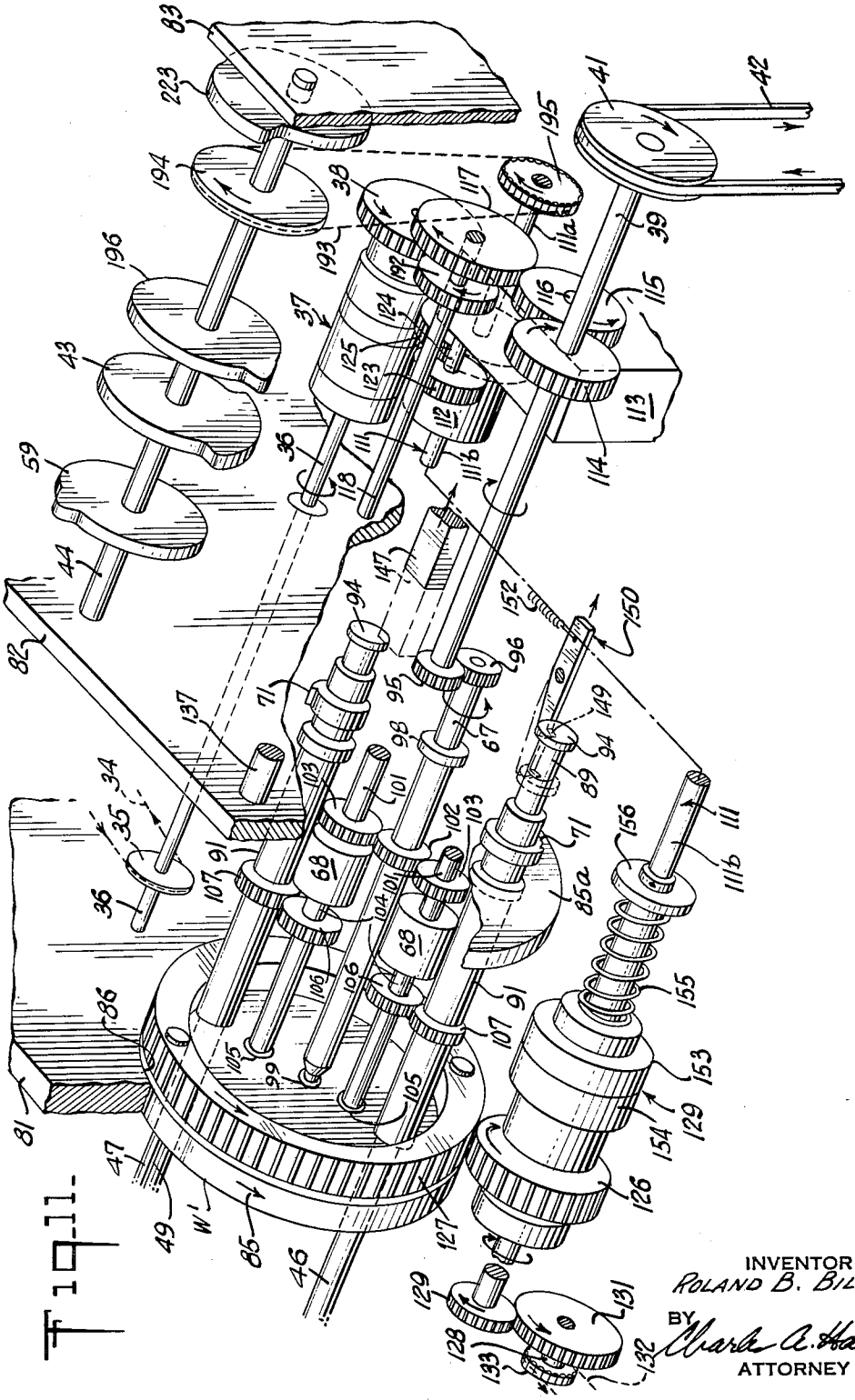


Fig. 11.

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Fig. 12.

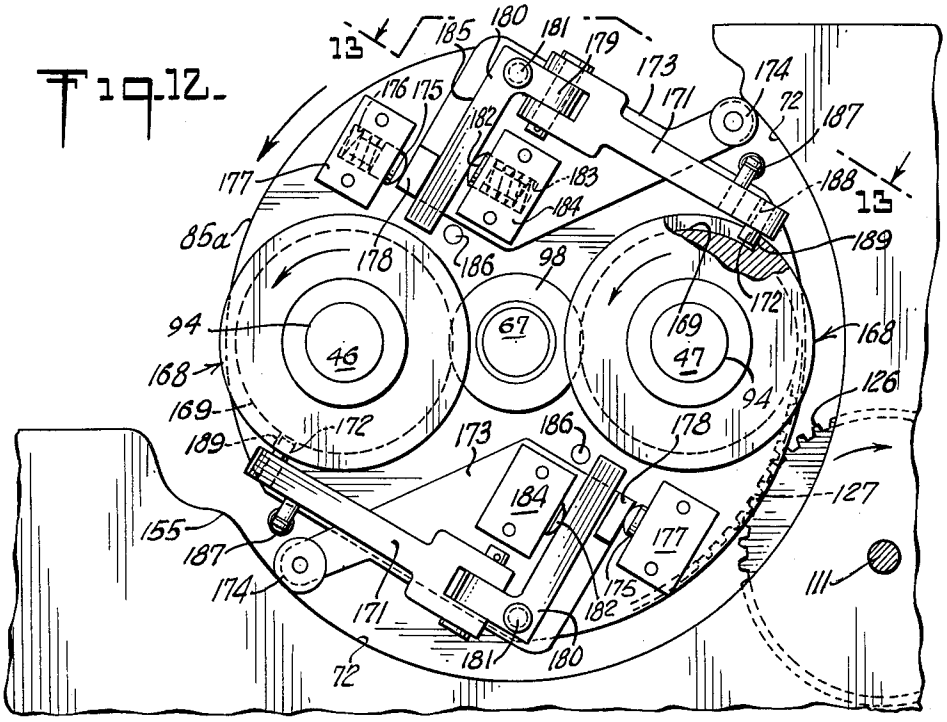


Fig. 13.

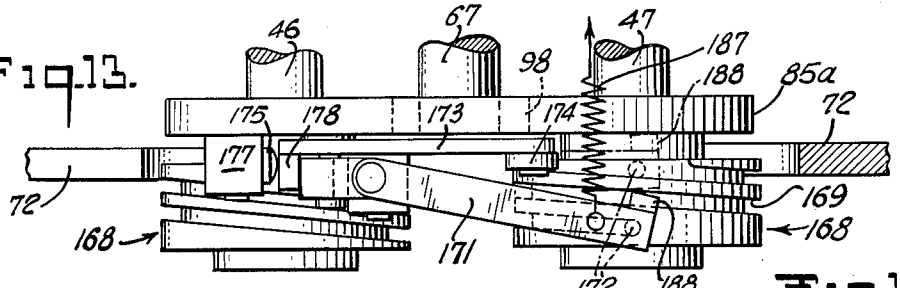


Fig. 15.

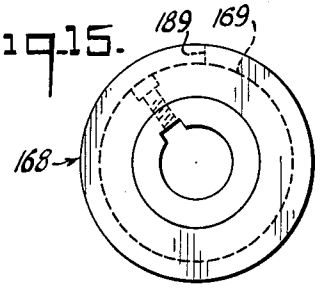


Fig. 14.

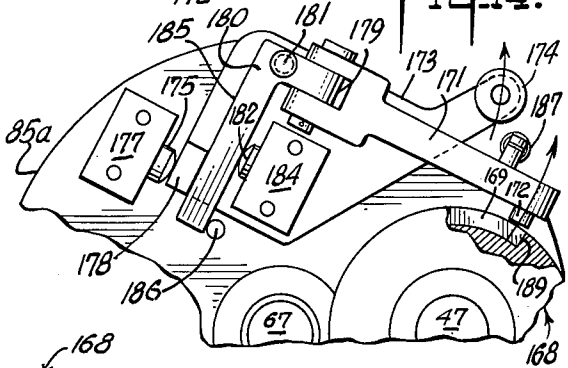
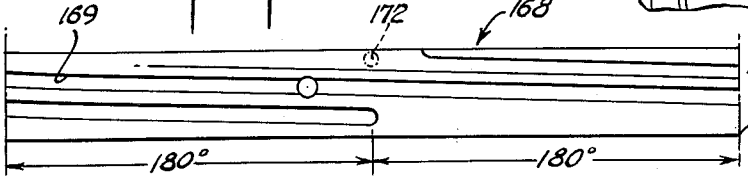


Fig. 16.



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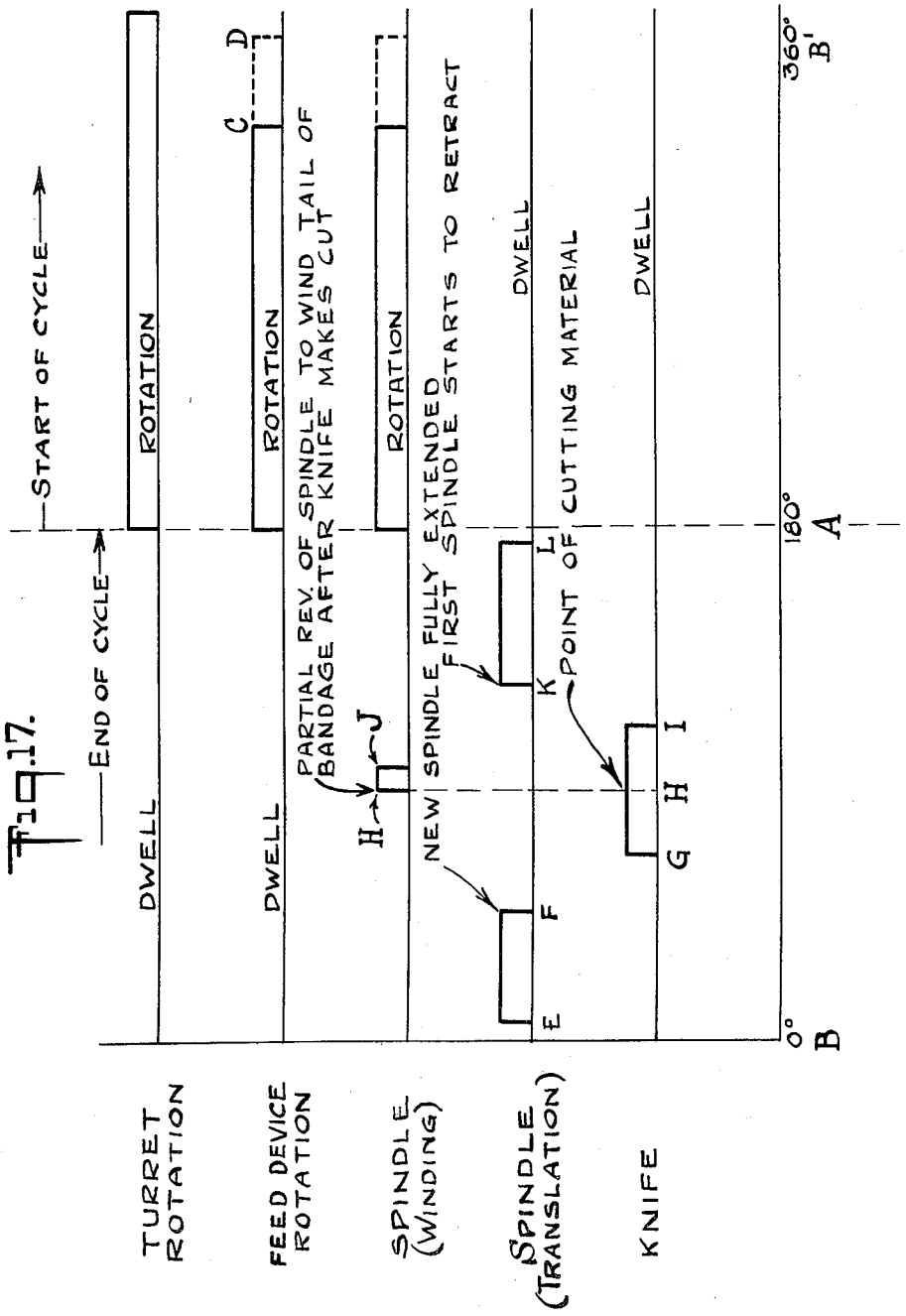


Fig. 17.

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United States Patent Office 3,089,660 Patented May 14, 1963

3,089,660

ROLL FORMING MACHINE

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Filed June 24, 1960, Ser. No. 38,620
5 Claims. (Cl. 242—56)

The present invention relates to machines for automatically winding strip material into rolls, more particularly to machines for winding a definite length of strip material upon itself to form a roll having a large number of turns.

Strip material to be wound into rolls on such machines may be divided generally into sticky strip materials and nonsticky strip materials exemplified by pressure-sensitive adhesive tapes and coated woven bandage material, respectively. Machines according to this invention are adapted to wind either sticky or nonsticky strip materials but offer particular advantages in the winding of nonsticky materials of the type described.

In the winding of strip materials onto rolls on a spindle revolving at a constant speed, the linear speed of windup is increased greatly as the diameter of the roll increases; and if the forward motion of the strip material leading up to the spindle is restrained to some extent, as normally is necessary, winding tension also is increased greatly with the diameter of the roll. Various techniques have been proposed for controlling winding tension and overcoming this problem. For instance, constant tension drives have been proposed which vary spindle speed to allow for increase in diameter as have various other techniques, all more or less complicated.

Another problem in winding strip material into rolls is in winding a definite length of material into the roll for a given number of revolutions of the spindle. For instance, in the winding of coated materials, particularly coated woven materials or similar materials which are inherently rough or uneven in structure, it often is difficult to maintain an even surface with the result that the thickness of the resulting coated strip varies along its length. In winding such materials, a given number of revolutions of the spindle may or may not result in a roll of the desired length, since variations in strip thickness vary roll diameter and therefore vary the winding circumference for a given turn of material in the roll.

The sticky or tacky nature of the above-referred-to sticky strip materials may be utilized in winding them into rolls. For instance, in the winding of pressure-sensitive adhesive tapes the pressure-sensitive side of the leading end of the tape faces a core held by a spindle and adheres thereto sufficiently that no other means is necessary for holding the tape onto the spindle when the spindle begins to rotate. With nonsticky strip materials some means must be provided for engaging the end of the strip to hold it on the spindle when the spindle begins to rotate to form a roll and to prevent displacement of the roll with respect to the spindle during winding.

The present invention contemplates an improved, completely automatic machine for winding a definite length of strip material into a roll at substantially constant winding tension. Both winding speed and the length of material wound onto the roll are positively controlled by a feeding device located ahead of the winding spindle, and the winding spindle is driven through a slip clutch having torque characteristics which are substantially constant over the whole range of slip employed during winding. The spindle preferably is driven from a continuously rotating shaft through the above-referred-to slip clutch, and the clutch is capable of 100 percent slip so that rotation of the spindle may be stopped while the shaft continues to rotate.

To assure a maximum of efficiency and a minimum of waste in a completely automatic operation, a plurality of

winding spindles are provided on a rotating turret. The rotation of the spindles and the turret and the operation of the feed device are synchronized so that as winding of the strip material upon one spindle is completed another spindle moves into position to engage that portion of the strip extending between the first spindle and the feeding device. However, the feeding device in metering the length of material into the winding spindle operates independently of the exact position of the spindle with respect to the rotation of the turret. The feeding device grips the strip and prevents its forward motion when a given length is wound upon the first spindle and at the same time holds the spindle against further rotation. Means is provided for cutting the strip extending between the stopped spindle and the feeding device at a point adjacent the new spindle. As soon as the strip is cut, the first spindle again begins to rotate, being driven from the constantly rotating shaft through the slip clutch, and continues to do so to wind the end of the strip on the roll until it is stopped by a cam device provided for this purpose.

Preferably, first and second spindles are provided, and the spindles each have a retracted and an extended position with respect to the turret and the path of the strip material. The first spindle is extended to engage the strip at a point which will be referred to as the loading position of the spindles and then moved by rotation of the turret to a second point which will be called the unloading position of the spindles. During movement of the first spindle from the loading to the unloading position, the second spindle is in its retracted position. After the first spindle reaches the unloading position, the second spindle is extended to engage that portion of the strip extending between the first spindle and the feed device. Preferably, the spindles are designed to engage the strip as they are moved from their retracted to their extended positions. A preferred form of spindle for a nonsticky material is slotted axially with the slot being open at the outer end of the spindle so that, when the turret, the spindles and the feeding device are positioned with respect to one another so that the strip extending between the first spindle and the feeding device is in line with the second spindle, the strip will fit into the slot in the second spindle as the second spindle is extended in the loading position. Means are provided for aiding in positioning the strip in line with the second spindle and supporting the strip as it is severed by the cutting device. As soon as the strip is severed, the second spindle begins to rotate rapidly, thereby completing the engagement of the strip by the spindle by winding the strip about the spindle to lock the strip in the slot. In this way the strip is automatically engaged by the spindles and wound into rolls automatically without wasting any of the strip material.

Other and further objects of the invention will be apparent from the following description and claims wherein:

FIG. 1 is a schematic plan view of a machine according to the present invention;

FIG. 2 is a schematic view partly in section and partly in elevation of the machine of FIG. 1;

FIG. 3 is an enlarged schematic view partly in section and partly in elevation of the turret and associated parts as shown in the upper right-hand corner of FIG. 2;

FIG. 4 is an enlarged view partly in section and partly in elevation taken along the line 4—4 of FIG. 9 showing another portion of the turret;

FIG. 5 is a greatly enlarged view taken along the line 5—5 of FIG. 4 showing a portion of the mechanism shown in FIG. 4;

FIG. 6 is a partially cutaway plan view of the machine of the preceding figures;

FIG. 7 is a schematic view partly in section and partly

in elevation taken along the line 7—7 of FIG. 6 and showing a portion of the mechanism which would be seen along this line;

FIG. 8 is a schematic view partly in section and partly in elevation taken along the line 8—8 of FIG. 6 and also showing a portion of the machine;

FIG. 9 is a partially cutaway side view partly in section and partly in elevation of the machine of the preceding figures;

FIG. 10 is a view partly in section and partly in elevation of a portion of the machine of FIG. 9 showing the feed shaft 36 and associated parts with the parts to the right of the intermediate wall 32 rotated approximately 90° for the sake of clarity.

FIG. 11 is a schematic isometric view of the internal operating parts of the turret and various other parts of the machine of the foregoing figures;

FIG. 12 is a greatly enlarged view partly in section and partly in elevation corresponding to FIG. 4 and showing a portion of a machine according to a somewhat different embodiment of the invention showing cam devices associated with the spindles;

FIG. 13 is a similarly enlarged view along the line 13—13 of FIG. 12;

FIG. 14 is a view of a portion of the mechanism of FIG. 12 showing a different position of one of the cam devices;

FIG. 15 is an end view of the grooved cam member carried by one of the spindles of FIG. 12;

FIG. 16 is a developed view of the grooved cam member of FIG. 15; and

FIG. 17 is a timing diagram showing the sequence of the various operations performed by machines according to the embodiments of the foregoing figures.

General Description

Referring to the drawings, there is shown a pair of supply rolls 21 and 22 rotatably mounted in a machine frame, not shown, for supplying strip material 19 wound thereon to a feeding device 23 at one side of the machine. The strip is led directly upwards from one of the rolls 21 to the feeding device and from the other of said rolls 22 around a guide bar 24 and thence to the feeding device. As shown only in FIG. 2, a hood 80 is supported from the machine frame under the rollers 21 and 22 and connected to an exhaust duct 90 which, in turn, extends to a vacuum pump, not shown, for removing dust and fly from the machine.

Referring particularly to FIGS. 1 and 2, the feeding device 23 comprises a feed roll 25 keyed to a shaft 26 which is rotatably mounted in the machine frame 27 in a fixed position with respect to the frame, and a small roll 28 mounted on a shaft 29 journaled at its ends in pivoted frame members 30 and 31 which normally are urged toward the larger feed roll 25 by a spring 32 or a similar resilient device. The surface of the small roll 28 of the feeding device preferably is knurled or roughened so that motion of the strip 19 extending through the nip between the rolls 25 and 28 normally is controlled by the nip, i.e., the strip is prevented from moving linearly with respect to the surfaces of the rolls. The feed roll 25 is driven through a sprocket 33 at the end of the shaft 26 by a drive chain 34 which is in engagement with a similar sprocket 35 fixed to the end of a feed shaft 36. The feed shaft 36 is journaled in the machine frame 27 and connected to one end of a combination brake and clutch 37, and through the brake and clutch mechanism to a drive gear 38 at the other end of the mechanism. As shown most clearly in FIG. 11, the drive gear 38 is connected through a chain of gears to a power shaft 39 which, in turn, is driven through a sheave 41 at one end thereof by a belt 42 connected to a driving motor, not shown.

The brake and clutch mechanism 37 is operated to feed the strip 19 forward in the machine, on the one hand, and hold it against forward motion, on the other, by a clutch cam 43 mounted on a cam shaft 44 journaled in the machine frame. The operation of the cam and the cam shaft to drive the feeding device and the relationship of this operation to the other operations performed in the machine of this invention will be described more fully hereinafter.

The strip is led from the feeding device over a table 20 mounted on brackets 20*a* extending from the machine frame to a rotatable turret 45 at the other side of the machine. The turret 45 is mounted for rotation in the machine frame and carries with it a first and a second spindle 46 and 47, each of which, in turn, is mounted in the turret for relative rotative movement with respect to the turret. The spindles 46 and 47 are retractable and have extended and retracted positions with respect to the turret. In their extended positions the spindles protrude from the turret at right angles to the direction of forward movement of the strip 19. The turret 45 is so located that each one of the spindles in its extended position passes across the path of the strip when the turret is rotated.

The spindles 46 and 47 have a loading position L where they first engage the strip and an unloading position M where the rolls 48 wound thereon are removed from the spindles. Each of the spindles is adapted to engage the strip and each defines an axial slot 49 for this purpose extending through the spindle lengthwise thereof to the outer end of the spindle. The slot 49, in each case, is sufficiently long to accommodate the full width of the strip 19 from edge to edge thereof without crumpling the strip when the strip is passed through the slot and of sufficient width so that the strip may be fed into and through the slot without difficulty.

After the first spindle is extended to engage the strip in the loading position L of the spindles, the second spindle is retracted in the unloading position M of the spindles and the turret 45 is rotated to move the spindles in a circular path from one position to another. The spindles remain extended and retracted, respectively, as they rotate with the turret until the second spindle 47 is in line with the portion of the strip 19 extending between the first spindle 46 and the gripping device 23. When this position has been reached, the second spindle 47 is extended so that the strip fits into the slot 49 in the second spindle.

The strip 19 extending between the first spindle 46 and the feeding device 23 passes over an inclined guide plate 51 mounted on the machine frame. The guide plate 51 terminates close to the edge of the circular path followed by the spindles 46 and 47 during rotation of the turret adjacent the point where the slot 49 in the second spindle 47 first lines up with the strip 19. An inclined anvil 52 is provided on the other side of the slot 49 in the spindle 47, in this position of the spindle, by the inclined top of a vertical plate 53 mounted on a bracket 54 bolted to the machine frame. Thus, the inclined guide plate 51 and the anvil 52 assist in positioning the strip 19 in line with the slot 49 in the second spindle 47 when it is desired to extend the second spindle to position the strip in the slot. A guide roller 54*a* is journaled in ears 54*b* extending from the machine frame in such a way as to position the strip 19 in line with the top surface of the inclined guide plate 51. The strip passes under the guide roller 54*a* and the roller 54*a* is positioned so that the planes of the top surfaces of the table 20 and the inclined guide plate 51 both are approximately tangent to the surface of the roller.

After the second spindle 47 is extended and the strip 19 is positioned in the slot 49 defined thereby, a knife 55 mounted on a knife holder 55*a* extending between cutter arms 56 is operated to cut through the strip along the edge of the anvil 52. The cutter arms 56 are pivotally mounted on stub shafts 57 extending from the machine frame and are operated by a pneumatic cylinder 58 which is controlled by a cutter cam 59 mounted on

the cam shaft 44. The cylinder 58 is pivotally attached to the cutter arms 56 at points intermediate the cutter 55 and the stub shafts 57 through a transverse bar 61 which connects the cutter arms 56. The upper end of the cylinder is pivotally supported on the machine frame by a pin 62 extending through a U-shaped bracket 63 bolted to the frame. The knife 55 is positioned on the cutting arm 56 so that it normally co-operates with the leading edge of the anvil 52 as the knife penetrates the strip 19 to sever the strip at the edge of the platform. A pair of positioning fingers 64 are pivotally mounted on a rod 65 extending between brackets 66 fastened to the machine frame in such a way that they are urged by their own weight to press the strip 19 down onto the inclined guide plate 51 when the strip is drawn out over the anvil 52. When the strip 19 lifts up off the guide plate 51 as the turret is rotated, the positioning arms 64 pivot upwardly with their tips resting on the strip, as shown in phantom in FIG. 3.

Simultaneously, after the knife 55 cuts through the strip 19, the second spindle 47 and the turret 45 begin to rotate and the feeding device 23 begins to feed the strip material to the spindle 47. The feeding device normally feeds material to the spindle at the same rate as it is wound upon the spindle, thereby assuring that the end of the strip does not pull through the slot 49 in the spindle as the spindle begins to rotate. When a slotted spindle of this type is used, the spindle normally does not become fully effective for engaging the strip 19 until it rotates to wind one or two turns upon the spindle and thereby locks the end of the strip in position in the slot 49. The above-described spindle arrangement and operation in the loading positions of the spindles is the same for both spindles 46 and 47.

When either of the spindles 46 or 47 moves in its circular path during rotation of the turret from the loading to the unloading position of the spindles, the feeding device 23 operates to advance strip material to the spindle at a constant rate. Each of the spindles is driven from a constantly rotating spindle drive shaft 67 through a separate slip clutch 68 with the result that, as the diameter of the roll of material being wound on the spindle increases, the clutch slips to compensate for the increased peripheral speed of the strip and allow for the substantially constant linear feeding motion of the strip. The clutch employed is a magnetic hysteresis clutch of the general type described in Permanent Magnets in Drag Devices and Torque Transmitting Couplings by R. J. Parker and published in the General Electric Review of September 1948, and possesses substantially constant torque characteristics over the full range of slip and therefore winds the strip under substantially constant winding tension. When a given length of strip material has been wound upon the winding spindle based upon a given number of turns of the feed roller 25 of the feeding device 23, which in turn is controlled by the clutch cam 43 mounted on the cam shaft, the brake and clutch mechanism 37 is operated to brake forward motion of the strip 19. This is done simply by applying the brake to the feed shaft 36 which in turn brakes the feed roll 25 of the feeding device 23 to grip the strip and hold it. The spindle is prevented from rotation by the strip as forward motion of the strip is prevented by the feeding device. In this way, a given length of the strip is wound upon the spindle regardless of the thickness of the strip or the size of the roll. This is particularly important when winding materials which may vary in thickness, such as relatively rough coated materials on which the coating may not be applied uniformly. The clutch cam 43 is designed to prevent forward motion of the strip and stop the spindle from rotating just before it reaches its unloading position M. The slip clutch 68 driving the spindle then slips to allow the spindle to move to the point where rotation of the turret stops in the unloading position M of the spindle.

When the knife 55 operates to sever the strip 19 just ahead of the spindle 47 at the loading position L, the spindle 46 at the unloading position M resumes rotation since it is driven through one of the slip clutches 68. However, the spindle 46 is only allowed to rotate just enough to wind up the length of strip extending between the rotating spindle and the anvil 52 at the loading position. This is accomplished in the case of both spindles 46 and 47 by cam means associated with each of the spindles. The cam means comprises a rotating cam 71 fixed to the spindle, a fixed ring cam 72, and a cam follower mechanism 73 adapted to co-operate with each of said cams to control rotation of the spindle over a portion of its travel during rotation of the turret. The ring cam 72 is designed to cause engagement of the normally rotating cam 71 with a stop 74 in the cam follower mechanism to prevent rotation of the rotating cam and the spindle connected thereto after the strip is completely wound on the spindle and during movement of the spindle from the unloading position M to the loading position L in the retracted position of the spindle.

In the unloading position of the spindles M, the freshly wound roll 48 of strip material is located in one compartment 75 of a conveyor belt 76 provided for the purpose of removing the completely wound rolls from the machine. It is in this position that the portion of the strip 19 extending between the two spindles 46 and 47 normally is wound up after the strip has been cut. After the roll 48 is completely wound, the spindle 46 in the unloading position is retracted. A stripping bracket 77 is provided at one end of the roll 48 in the unloading position of the spindles to contact the inner end of the roll and resist any tendency of the roll to follow the spindle as it is retracted from the roll. After the spindle is retracted, the conveyor 76, which is in the form of an endless chain comprising a series of spaced upright flanges 78 forming between them compartments 75 for carrying individual rolls of strip material, is caused to move forward and present an empty compartment at the unloading position. The completely wound rolls may be removed by hand from the end of the conveyor or may be allowed to drop into a receiver, not shown, provided for this purpose or conveyed to another operation.

The Turret and Spindle Assembly

The turret 45 and spindles 46 and 47 and the various parts and drives associated therewith are included in a turret and spindle assembly contained for the most part in a box-like enclosure which comprises a front wall 81, an intermediate wall 82, and a rear wall 83 connected by a side wall 84. The turret itself comprises a cylindrical front plate 85 which fits in a circular hole 86 provided in the front wall 81, a corresponding cylindrical rear plate 85*a*, a front bearing 87, and a rear bearing 88 and various shafts associated therewith. The front plate 85 of the turret is rotatably mounted in the front bearing 87 supported on the top of an upright flanged bearing standard 87*a* bolted to the machine frame through a stub shaft 87*b* fixed to the turret plate 85. The rear turret plate 85*a* is mounted on the spindle drive shaft 67 for rotation relative through the rear bearing 88 which is bolted to the plate and fitting in an opening in the plate provided for this purpose. The spindles 46 and 47 themselves and their drives also are part of the turret structure. Each of the spindles 46 and 47 comprises an elongated spindle rod 89 mounted to slide axially within a sleeve 91; and each of the sleeves 91 is rotatably mounted at each end in the front and rear plates 85 and 85*a* of the turret, respectively. The rod 89 is prevented from turning in the sleeve 91 by a pin 92 extending from the sleeve 91 and fitting in an axial groove 93 in the rod 89, as is shown best in FIG. 9. The sleeve 91 and pin 92 are mounted in a fixed position axially with respect to the turret, but the groove 93 in the spindle rod 89 is free to move axially over the pin 92 in the

sleeve to allow the spindle rod 89 to be extended and retracted. The slots 49 are located in the outer ends of the rods 89. While the spindles move in a circular path with the turret when the turret rotates, they also are free to rotate relative to the turret. Each of the spindle rods 89 also comprises a retracting flange 94 adjacent its rear end. The rotating cam 71 is mounted on the sleeve 91 ahead of the flange. The assembly also comprises a series of drive gears and shafts. As mentioned hereinbefore, the power shaft 39 is driven through the sheave 41 by a drive belt 42 connected to a driving motor, not shown. At the opposite end of the power shaft is a gear 95 which meshes with a like gear 96 at the end of the spindle drive shaft 67 which is mounted for rotation in a bearing 98 provided in the intermediate wall 82 of the turret and spindle enclosure and in a bearing 99 provided in the front plate 85 of the turret. The spindle drive shaft 67, in turn, is in driving connection with a pair of clutch input shafts 101 through a gear 102 provided on the spindle drive shaft and meshing gears 103 on each of the input shafts. The input shafts 101 each are connected to the input side of one of the magnetic slip clutches 68 for driving the first and second spindles 46 and 47, respectively. The output side of each of the clutches 68 is connected to a clutch output shaft 104, the opposite end of which is mounted for rotation in a corresponding needle bearing 105 in the front plate 85 of the turret. Each of the spindles is driven directly from one of the output shafts 104 through a pair of meshing gears 106 and 107 mounted on the clutch output shaft 104 and the spindle sleeve 91, respectively. The slip clutch input shafts 101 are connected at all times to the power shaft 39 through the spindle drive shaft 67 which is rotating constantly. Thus, the spindles also would be rotating constantly if they were not held by some means.

A main drive shaft 111 is provided for driving both the turret 45 and the conveyor 76. The drive shaft 111 has two sections, a cam section 111*a* and a drive section 111*b*. The drive section 111*b* of the shaft 111 is connected to the power shaft 39 through a single revolution clutch 112 of the type manufactured by the Hilliard Corporation of Elmira, New York, and commonly called a Hilliard single revolution clutch, and a rear reducer 113. The power shaft 39 drives the gear reducer 113 through a pair of meshing gears 114 and 115 on the power shaft and a gear reducer input shaft 116, respectively. The gear 115, in turn, meshes with a large gear 117 on an idler shaft 118 mounted in bearings 119 and 121 supported in the rear wall 83 and an additional wall 122, as shown best in FIGS. 6 and 10. The gear reducer 113 then drives the cam section 111*a* of the main drive shaft 111 through a gear 123 at the end of an output shaft 124 of the reducer and a corresponding larger gear 125 next to the single revolution clutch 112 on the main drive shaft.

The drive section 111*b* of the main drive shaft 111 drives the turret through a spur gear 126 on the drive shaft which meshes with a ring gear 127 mounted on the rear side of the front plate 85 of the turret and spindle assembly. The gear ratio between the drive shaft 111 and the ring gear 127 is approximately 1 to 2 so that one revolution of the main drive shaft rotates the turret one-half a turn. The main drive shaft 111 also drives the conveyor 76 through an intermediate stub shaft 128. A gear 129 at the end of the main drive shaft 111 meshes with a larger gear 131 on the stub shaft 128; and the stub shaft, in turn, drives the conveyor through a drive chain 132 connected to sprockets 133 and 134 on the stub shaft and one of the conveyor drive shafts 135, respectively. Between the single revolution clutch 112 and the spur gear 126 on the main drive shaft 111 there is provided an anti-jamming device 151 for allowing this portion of the shaft 111 to rotate independently of the turret if the turret jams. The device 151 consists of two halves 153 and 154 which are normally urged toward one another by a compression spring 155 acting against a collar 156 on the shaft 111. A series of spring loaded detents, not shown, are provided between the halves 153 and 154 to hold them in position so that they rotate together unless excessive torque is applied to one or the other of the halves.

Spindle Translation and Windup

The spindles 46 and 47 are translated, i.e., extending and retracted by a carriage 136 mounted on a pair of rods 137 extending between the intermediate wall 82 and the rear wall 83 of the turret and spindle enclosure. The carriage 136 which consists of a pair of hollow rectangular bars 138 and a connecting bracket 139 is mounted for slidable movement with respect to the rods and is driven forward or backward along the rods to extend or retract the spindles, respectively, by an air cylinder 141. The air cylinder 141 is connected to the carriage by a piston rod 142 bolted to the carriage bracket 139 and is fastened to the front wall 81 of the turret and spindle enclosure by a bracket 143 bolted to the wall. The rod 142 extends through an airtight sleeve 144 at one end of the cylinder and connects to a conventional piston 145 inside the cylinder, and conventional air connections 146 are provided at each end of the cylinder so that the piston 145 is driven back and forth in the cylinder by controlling the air supply.

Referring particularly to FIGS. 6 and 11 of the drawings, each spindle is extended in the loading position L of the spindles, i.e., in the spindle position nearest the top of the figures, by contact between a pusher 147 mounted on one side of the carriage 136 and the flange 94 at the end of the spindle. In other words, the carriage 136 is moved toward the front of the turret and spindle assembly by the air cylinder 141; and the pusher 147 contacts the flange 94 and, through the flange, pushes the spindle outwardly until it is fully extended. At the same time, a latch 149 extending transversely from the end of a retracting arm 151 protruding from the other side of the carriage 136 engages the flange 94 of the spindle in the unloading position of the spindles. The retracting arm 151 is pivotally mounted on the carriage 136, and the latch 149 normally is urged toward the flange 94 by a tension spring 152 secured between the opposite end of the arm 151 from the latch and the carriage 136. Just after the strip 19 is cut by the knife 55 and the portion of the strip extending between the two spindles in the unloading position M and the loading position L, respectively, is wound upon the roll 48, the carriage 136 is moved rearwardly by the air cylinder 141; and the latch remains in contact with the flange 94 at the end of the spindle to pull the spindle into its retracted position shown in FIGS. 6 and 9. As the turret begins to rotate to move the spindles in a circular path from their loading position L to their unloading position M and vice versa, it moves the flange 94 at the end of the loading spindle at position L up behind a front guide plate 148 screwed to the intermediate wall 82 as shown schematically in FIG. 7. The guide plate 148 fits behind the flange 94 to prevent the loading spindle from moving rearwardly of the turret. As shown in FIG. 7, a portion of the front guide plate 148 remains behind the flange 94 on the spindle until the spindle reaches its unloading position M, depicted at the right of FIG. 7, at which point the flange 94 on the spindle becomes free of the guide plate 148 and then is engaged by the latch 149 on the arm 151 for retraction purposes. After the unloading spindle is retracted as described above, it is held by a rear guide plate 153 supported from the machine frame which contacts the inner surface of the flange 94 at the end of the spindle as soon as the turret begins to rotate to move the spindle from the unloading position M to the loading position L and is prevented by the guide plate 153 during this period from leaving its retracted position.

As mentioned hereinbefore, each of the spindles 46 and 47 is driven from the continuously rotating spindle drive shaft 67 through a slip clutch 68 so that it also will rotate continuously unless it is prevented from doing so. However, since the characteristics of the clutches 68 are such as to allow 100 percent slip, the spindles can be held and prevented from rotating at all without interfering with the continuous rotation of the spindle drive shaft 67. As pointed out earlier in the specification, the spindles 46 and 47 first are prevented from rotating by the feeding device 23 which grips the strip material 19 being wound on the spindle and through the strip holds the spindle so that it cannot rotate. When the strip 19 is cut by the knife 55, the spindle immediately resumes rotation to wind up the length of material extending between the loading and unloading position of the spindles L and M, respectively. As shown in FIGS. 4 and 5, the spindles are prevented from rotating at this point by cam means associated with the spindle which comprises a normally rotating cam 71 fixed to the spindle sleeve 91, a fixed ring cam 72, and a cam follower mechanism 73 adapted to cooperate with each of said cams to control rotation of the spindle between the unloading and the loading position of the spindles.

The ring, or plate, cam 72 is fixed to the machine frame in an upright position between the front and intermediate walls 81 and 82 of the turret and spindle enclosure; the rotating cams 71 are located in line with the ring cam 72 on the spindles; and the cam follower mechanisms are positioned in line with the two cams and mounted on the rear plate 85*a* of the turret at approximately 180° from one another on the plate.

The cam follower mechanism is designed to operate when it reaches a rise 155 in the ring cam 72 to cause the stop 74 to move into effective position for preventing rotation of the normally rotating cam 71 as the rear plate 85*a* of the turret rotates counterclockwise as shown in FIG. 4. The rotating cam 71 is held against rotation by contact between the stop 74 and a shoulder 156 on the cam. Since the cam is mounted on the spindle 46 and the spindle is driven through the slip clutch 68, the exact position of the rotating cam 71 with respect to the stop 74 cannot be determined. Therefore, the cam 71 always rotates a portion of a turn or more, depending upon the exact cam used, until the stop comes into contact with the shoulder on the cam after rotation of the spindle commences when the strip has been cut in the unloading position of the spindle. In the embodiment of FIGS. 4–11, the rotating cam 71 is a simple helical cam fixed to the spindle. Each of the spindles 46 and 47 is fitted with such a cam and each of the cams comprises a helical surface terminating in a shoulder 156 which defines one turn of the cam helix. The cam follower mechanism comprises a cam follower arm 157 and a dog bar 158. The cam follower arm 157 and the dog bar 158 each are pivotally secured at one end to the rear plate 85*a* of the turret. The cam follower arm 157 has a cam follower roller 159 at one end thereof and oppositely to the point where it is pivotally attached to the turret. A spring-loaded positioning button 161 is located between the pivot point and the roller 159 of the cam follower arm in such a way that it normally presses the arm 157 outwardly about its pivot point. The base of the positioning button 161 fits into a cylindrical hole 162 in a block 163 secured to the face of the rear plate 85*a* of the turret. The dog bar 158 normally is urged inwardly of the cam follower roller 159 by a tension spring 164 connecting the center of the dog bar with an inwardly extending portion of the cam follower arm. The strength of the spring 165 operating on the positioning button 161 is such that the roller 159 on the cam follower arm normally is urged outwardly of the circumference of the rear turret plate 85*a* and the end of the dog bar 158 also is urged outwardly so that it will not come into contact with the shoulder 156 on the helical cam 71. When the cam follower roller comes into contact with the rise on the ring cam 72, it is guided inwardly of the turret plate 85*a* and held there against the resistance of the positioning button 161 during approximately one half of the rotative cycle of the turret. The dog bar 158 is urged inwardly into contact with the outer surface of the rotating cam 71 by virtue of the tension spring 164 connected between the innermost portion of the cam follower arm 157 and the dog bar 158. The dog bar 158 is held by the tension spring 164 against the outer surface of the rotating cam 71, and the rotating cam slides in contact with the dog bar until the shoulder 156 on the cam comes into contact with the end of the bar 158. At this point the dog bar 158 prevents the rotating cam 71 and the spindle fixed to the cam from rotating further. The various parts of the cam device of this invention are so arranged that, when the cam follower 159 first contacts the ring cam 72 to press the end of the dog bar 158 inwardly against the surface of the rotating cam 71, the end of the dog bar normally contacts the rotating cam 71 at a point far enough away from the shoulder 156 to assure that most of one turn of the strip material is wound on each roll before the rotating cam is stopped by the dog bar. After the strip material 19 extending between the loading and unloading positions of the spindles is wound upon the spindle at the unloading position M, rotation of the spindle is stopped by the dog bar 158, the roll 48 of strip material is removed from the spindle as described hereinbefore, and the spindle is retracted. The cam follower roller 159 remains in contact with the rise 155 on the ring cam 72 for approximately one-half a turn of the turret so that the spindle is prevented from rotating during the time it is moved from the unloading position M to the loading position L of the spindles 46 and 47.

Preferred cam means according to a somewhat different embodiment of the invention are shown in FIGS. 12–16. In this embodiment the ring cam 72 and the cam follower mechanisms are essentially the same as those disclosed in the embodiment of the preceding figures with some differences which will be described fully hereinafter. However, rotating cams 168 fixed to the spindles 46 and 47 take the place of the cams 71 and are somewhat different. Since, as indicated for the previous embodiment, a pair of identical cam means is provided on the rear plate 85*a* of the turret, the specific features of this embodiment will be described hereinafter with reference to only one of this pair of means, it being understood that the other is identical in construction and operation.

In FIGS. 12–16, the rotating cam defines a helical slot 169 which has a length of approximately 720°, or extends twice around the cam 168. This is shown most clearly in FIG. 13 and in FIG. 16, the latter of which is a developed view of the cam showing the slot. According to this embodiment, a pivoted dog arm 171 is provided having a pin 172 at its outer end which is adapted to drop into the slot 169 in the normally rotating cam 168 on the spindle when the dog arm 171 is moved into a particular position with respect to the slot. A cam follower arm 173 similar to that of FIGS. 4 and 5 is mounted on the rear turret plate 85*a* for pivotal movement toward and away from the ring cam 72. A cam follower roller 174 is provided at the outer extremity of the cam follower arm for contacting the ring cam 72, and a positioning button 175 is spring mounted in a cylindrical hole 176 in a block 177 bolted to the turret plate 85*a* for contacting a flanged inner portion 178 of the cam follower arm 173 and normally urging the cam follower roller 174 toward the ring cam 72. The dog arm 171 is mounted for pivotal movement of its outer end and the pin 172 thereon toward and away from the rotating cam 168 in the direction of the axis of the spindle on one leg of an L bracket 180 which, in turn, is pivotally mounted at 181 on the cam follower arm 173 for pivotal movement of the L bracket and dog arm assembly toward and away from the normally rotating cam 168 in a more or less radial direction

with respect to the spindle. A second positioning button 182, spring mounted in the same way as the first positioning button in a cylindrical hole 183 in a block 184 bolted to the cam follower arm 173, is adapted to press against one side of the other leg 185 of the L bracket so that the pin 172 at the end of the dog arm normally is urged downwardly into the slot 169 in the rotating cam 168 when it is free to fall into the slot. A pin 186 is fixed to the turret plate 85*a* to contact the leg 185 of the L bracket and thereby prevent the bracket and the entire cam follower mechanism from pivoting too far outwardly away from the rotating cam 168. A longitudinal tension spring 187 is attached to the outer end of the dog arm 171 and extends between the dog arm and adjacent turret structure in such a way that it applies tension to the end of the arm 171 and normally would pivot the arm about its opposite end to draw the pin 172 toward the rear plate 85*a* of the turret as best shown in FIG. 13. A stop 188 is provided at the end of the dog arm 171 to prevent the arm from being pulled too far by the spring 186 and position the pin 172 correctly with respect to the slot 169.

As the turret rotates and one spindle is moved from the loading position L to the unloading position M of the spindles, the cam follower roller 174 moves into contact with the rise 155 on the ring cam 72 and pivots the whole cam follower mechanism about the point 181 where the cam follower arm 173 is connected to the rear plate 85*a* of the turret. At this point the pin 172 at the end of the dog arm 171 may or may not be able to drop into the slot 169 in the normally rotating cam 168 on the spindle. However, the pin 172 is urged downwardly onto the top surface of the rotating cam 168 by the positioning button 182 spring mounted in the block in the cam follower arm 173; and the stop 188 at the end of the dog bar 171 is urged into contact with the turret plate 85*a* by the tension spring 187 so that the pin 172 is positioned axially with respect to the slot 169 in line with the open end of the slot, as shown in phantom in FIG. 13. When the open end of the slot 169 reaches the pin 172 in this position, the pin falls into the slot and travels in the slot as the cam 168 rotates until it reaches a shoulder 189 at the end of the slot 169. At this point the pin 172 will prevent the cam 168 and the spindle from rotating further. In the embodiment of FIGS. 12–16, the slot 169 extends twice around the cam and is approximately 720° long. This assures that the spindle will turn at least twice after the strip material 19 is cut and normally will rotate between two and three revolutions. Thus, it will be seen that the rotating cam 168 of FIGS. 12–16 is more suitable than the plain helical cam 71 of the earlier figures for winding up a longer length of material after the strip 19 has been cut. It also is advantageous because it assures that the spindle will turn a definite amount, i.e., two revolutions regardless of the position of the dog arm 171 with respect to the rotating cam 168 at the time the strip material is cut.

Control and Sequence of Operation

The various operations of the machine of this invention are controlled and the sequence of operation is timed through a system of gearing controlled by the cam shaft 44 which, in turn, is driven from the power shaft 39 of the machine through a chain of gears. The power shaft 39 is geared directly to a reduction gear input shaft 116 through the gears 114 and 115 on the power shaft and the input shaft, respectively. The feed shaft 36 for the feeding device is driven from the gear 115 on the reduction gear input shaft 116 through an idler shaft 118 and a gear 192 on the idler which meshes with the gear 38 on the feed shaft. The spindle drive shaft 67 is driven directly from the power shaft 39 through gears 96 and 95 on the respective shafts as described hereinbefore. The rest of the mechanism of the machine is driven from the main drive shaft 111 which, in turn, is drivably connected to the reduction gear output shaft 124 by the gears 125 and 123 on the respective shafts. The cam shaft 44 is driven directly from the cam section 111*a* of the main drive shaft 111 by a drive chain 193 which turns around sprockets 194 and 195 mounted on the cam shaft and the drive shaft, respectively.

The cam section 111*a* of the main drive shaft is driven directly from the reduction gear unit 113 through the gears 123 and 125 and is that portion of the main drive shaft which rotates continuously and drives the cam shaft 44. The cam section 111*a* of the main drive shaft is connected to the input end of the single revolution clutch and the drive section 111*b* of the shaft is connected to the output end of the single revolution clutch 37. The single revolution clutch is such that the drive section 111*b* of the shaft 111 alternately rotates one full revolution and rests for a given time period.

The single revolution clutch 37 is operated by a drive cam 196 on the cam shaft 44 through a cam follower 197 mounted at the top of a clutch plunger 198 which fits into a cylindrical bore 199 in a plunger block 201 supported from the machine frame. The plunger 198 is urged toward the drive cam 196 by a spring 202 which fits in the bottom of the bore 199 to assure that the follower 197 remains in contact with the cam 196 at all times. The single revolution clutch 112 is designed so that it causes the drive section 111*b* of the main drive shaft 111 to rotate unless the clutch is operated to prevent rotation by a cam 203 at one end of the clutch. The cam has a shoulder, not shown, which co-operates with a dog 204 fixed to a dog shaft 205 rotatably mounted at one end in a bracket 206 extending from the machine frame and at the other end in the intermediate wall 82 of the turret and spindle assembly. The inner end of the dog 204, not specifically shown in FIG. 9, is caused to lift up and down as the dog shaft 205 rotates into and out of stopping relation with the cam 203 at the end of the single revolution clutch 112 by a vertical link 207 attached at its lower end to the dog 204 and at its upper end to a pin 208 extending from the plunger 198.

The brake and clutch mechanism 37 which drives the feed shaft 36 for the feeding device is operated by a clutch cam 43 on the cam shaft 44 through a cam follower 211 mounted at the end of a plunger 212 which fits in a second cylindrical bore 213 in the plunger block 201, as shown most clearly in FIG. 9. The plunger 212 is urged upwardly toward the clutch cam 43 by a spring 214 in the bore under the plunger so that the follower 211 remains in contact with the cam 43 as the cam shaft 44 rotates. The brake and clutch mechanism 37 is operated through a shifting ring 215 on the clutch by a link 216 pivotally mounted on a bracket 127 extending from the intermediate wall 82 of the turret and spindle enclosure and connected at one end to a horizontal pin 218 extending from the plunger and at the other end to a slot, or groove, 219 in the ring. The link 216 is slotted where it is connected to the pin 218 on the plunger 212 to allow for relative lateral movement between the link and the plunger, and a horizontal extension 221 at the other end of the link 216 fits into the groove 219 in the clutch ring so that the brake and clutch mechanism 37 is operated when the extension 221 moves longitudinally with respect thereto. The brake and clutch mechanism 37, itself, may be a Maxitorq Clutch manufactured by the Carlyle Johnson Machine Company of Manchester, Connecticut.

As indicated hereinbefore, the operation of the cutter 55 is controlled by the cutter cam 59 mounted on the cam shaft 44 which, in turn, controls a pneumatic cylinder 58 which operates the cutter arms 56. The cutter cam 59 operates directly on a pneumatic cutter valve 222, shown in FIG. 6, which, in turn, operates the pneumatic cylinder 58.

The carriage 136 for extending and retracting the spindles 46 and 47 is operated by the pneumatic cylinder 141, and this cylinder is controlled by a carriage cam 223 mounted on the cam shaft 44 in very much the same fashion as the cutter cam 59 operates. The carriage cam

223 operates a similar pneumatic carriage control valve 224 which, in turn, operates the pneumatic cylinder 141 for the carriage.

FIG. 8 shows schematically how the carriage cam 223 operates the pneumatic valve 224 through a cam follower 225 at the end of the valve. When the cam follower reaches a rise 226 on the cam, the valve 224 is caused to operate to control the pneumatic cylinder 141. A similar cam follower 227 on the cutter cam valves operates in a similar fashion to follow the cutter cam 59 and control the cylinder 58 as it operates the cutter 55. The pneumatic valve 222 and 224 are mounted on a bracket 228 extending between the walls 82 and 83.

Referring particularly to FIG. 17 and all of the foregoing description and figures, it will be seen that the turret 45, the feed roll 25 and the loading spindle begin to operate simultaneously at the point A on the timing diagram. This simultaneous operation is controlled by the location of the respective rise and fall portions on the single revolution clutch drive cam 196 for turret rotation, the clutch cam 43 for feed roll rotation and the ring cam 72 and associated parts of the cam follower mechanism on the spindles 46 and 47 and the rear plate 85a of the turret for spindle rotation. The single revolution clutch 112 causes the main drive shaft 111 to rotate one revolution and turn the turret 180° as it rotates between the points A and B on the timing diagram to move the spindle at the loading position L to the unloading position M 180° away. As described in detail hereinbefore, each of the spindles 46 and 47 is driven from a continuously rotating spindle drive shaft 67 through a slip clutch 68 so that the spindle will rotate continuously unless it is held against rotation.

The feed device 23 normally is caused to begin rotating at the same time the turret 45 begins rotation by the clutch cam 43 which controls the brake and clutch mechanism 37 and continues to rotate until a given length of strip material 19 is wound upon the winding spindle.

Thus, at a point C determined by the amount of strip material which it is desired to wind into a roll, the clutch cam 43 brakes the feeding device and thereby stops the winding spindle from rotating. Preferably, the clutch cam 43 includes an adjustable lobe, not shown, so that the point at which the clutch and brake mechanism operates to stop the feeding device can be varied to suit different material lengths. This is indicated by the dotted lines at the end of the timing diagrams for the feed device and spindle, in accordance with which the winding would continue until point D. If the feeding device 23 is braked to stop spindle rotation before the winding spindle reaches the unloading position M of the spindles, point B on the timing diagram, one of the slip clutches operates to allow the spindle to move with the turret and reach the unloading position.

As indicated hereinbefore, as the extended winding spindle reaches the unloading position the retracted stationary spindle reaches the loading position of the spindles. Shortly the spindles reach the loading and unloading position of the spindles, respectively, point B on the timing diagram; the carriage cam 223 causes the carriage 136 to move forward and push the spindle in the loading position L into its extended position. The forward motion of the carriage occurs between the points E and F on the timing diagram. After the second spindle is extended and the strip 19 is positioned in the slot 49 in the spindle, the cutter cam 59 causes the cutter arms 56 to begin moving at the point G on the timing diagram and begin to swing the cutter 55 down toward the strip; and at the point H on the timing diagram the cutter severs the strip. The cutter arms 56 then continue to operate to return the cutter 55 to its former position until the point I on the timing diagram is reached. As explained above, as soon as the strip is severed, the winding spindle in the unloading position of the spindles resumes rotation (at the point H on the timing diagram) to begin winding that portion of the strip 19 extending between the spindles 46 and 47 into the roll 48. This rotative movement of the winding spindle is completed when the cam means associated with the spindle blocks further spindle rotation at point J on the timing diagram. At the point K on the timing diagram, the carriage cam 223 causes the carriage 136 to begin its rearward movement and start retracting the spindle in the unloading position. This rearward movement of the carriage and retraction of the spindle terminates at the point L on the timing diagram just before the point where turret rotation begins again to repeat the above-described cycle.

It will be seen that the machine of the foregoing embodiments is particularly adapted for winding nonsticky strip material. The alternately extended and retracted spindles are slotted in such a way as to engage the strip by extending one of the spindles to fit the strip in the slot, and engagement between the spindle and the strip is completed when the spindle is rotated rapidly to wind some turns of the strip on the spindle and lock the end of the strip in the slot. While a spindle having a positive locking device automatically operated by a cam may be used for gripping the strip in accordance with this invention, such a device would be more complicated and might cause difficulties in operation which are completely avoided with the spindle arrangement shown in the drawings.

For the purposes of the particular features of this invention which allow that portion of the strip extending between the loading and the unloading positions of the spindles to be wound into a roll after the strip is cut, the spindles need not be retractable but could be removable and replaceable by hand or loadable through an automatic magazine loading device. This might be practical when winding pressure-sensitive strip material which normally is wound upon cores, or core material, which, in turn, is carried by a spindle.

Having now described the invention in specific detail and exemplified the manner in which it may be carried into practice, it will be readily apparent to those skilled in the art that innumerable variations, modifications, applications, and extensions of the basic principles involved may be made without departing from its spirit and scope.

The invention claimed is:

1. A device for winding prescribed lengths of strip material into a roll which comprises a rotatable turret, first and second retractable spindles rotatably mounted in said turret, said spindles being spaced from one another in the direction of rotation of the turret and having retracted and extended positions, each of said spindles being slotted to receive the strip and engaging the strip upon rotation of the spindles, each of said spindles being driven from and in continuous engagement with a continuously driven slip clutch, a feeding device for gripping the strip ahead of said first spindle and controlling movement of the strip to said first spindle, means for operating said feeding device to feed the strip and rotating said turret and said first spindle simultaneously therewith after the first spindle engages said strip in the extended position of the first spindle and the retracted position of the second spindle, control means for stopping the feeding of said strip and gripping it when a given length of the strip is wound upon said first spindle, said first spindle being prevented from rotating through the gripping of said strip by the feeding device, means for stopping the rotation of said turret when the strip extending between said first spindle and said feeding device is in line with said second spindle, means for extending said second spindle to position the strip in the slot in said second spindle, means for cutting the strip at a point between said first and second spindles, said first spindle resuming rotation on the cutting of said strip due to the torque applied through the slip clutch engaged therewith, means for retracting said first spindle and means for holding said roll against axial movement

in the direction of retraction of said first spindle to allow a separation of the spindle from said roll, whereby the various parts of the device are in position for repeating the above cycle and this time winding strip material upon the second spindle.

2. A device for winding prescribed lengths of strip material into a roll which comprises a rotatable turret, first and second retractable spindles rotatably mounted in said turret, said spindles being spaced from one another in the direction of rotation of the turret and having retracted and extended positions, each of said spindles being adapted to engage the strip and being driven from and in continuous engagement with a continuously driven slip clutch, a feeding device for gripping the strip ahead of said first spindle and controlling movement of the strip to said first spindle, means for operating said feeding device to feed the strip and rotating said turret and said first spindle simultaneously therewith after the first spindle engages said strip in the extended position of the first spindle, control means for stopping the feeding of said strip and gripping it when a given length of the strip is wound upon said first spindle, said first spindle being prevented from rotating through the gripping of said strip by the feeding device, means for positioning the strip extending between said first spindle and said feeding device in line with said second spindle, means for extending said second spindle into engaging relation with the strip, means for cutting the strip at a point between said first and second spindles, said first spindle resuming rotation on the cutting of said strip due to the torque applied through the slip clutch-engaged therewith, means associated with said first spindle for stopping the rotation of said first spindle when a portion of the strip length extending between said first and second spindles is wound upon said first spindle, and means for retracting said first spindle whereby the various parts of the device are in position for repeating the above cycle and this time winding strip material upon the second spindle.

3. A device for winding prescribed lengths of strip material into a roll which comprises first and second rotatably mounted spindles, said spindles being spaced from one another in the direction of movement of the strip and being adapted to move successively into and out of engagement with said strip, each of said spindles being driven from and in continuous engagement with a continuously driven slip clutch, a feeding device for gripping the strip ahead of said first spindle and controlling movement of the strip to said first spindle, means for operating said feeding device to feed the strip and rotating said first spindle simultaneously therewith after said first spindle engages said strip to wind the strip into a roll carried by said first spindle, control means for stopping the feeding of said strip by said feeding device and gripping it by said device when a given length of the strip has passed said feeding device, said first spindle being prevented from rotating through the gripping of said strip by the feeding device, means for cutting the strip at a point between said first and second spindles after said second spindle engages the strip extending between said first spindle and said feeding device, said first spindle resuming rotation on the cutting of said strip due to the torque applied through the slip clutch engaged therewith, for completely winding the strip material upon said first spindle, the device being adapted to repeat the above cycle and wind strip material successively upon said first and second spindles.

4. A device for winding prescribed lengths of strip material into a roll which comprises first and second rotatably mounted spindles, said spindles being spaced from one another in the direction of movement of the strip and being adapted to move successively into and out of engagement with said strip, each of said spindles being driven from and in continuous engagement with a continuously driven slip clutch, a feeding device for gripping the strip ahead of said first spindle and controlling movement of the strip to said first spindle, means for operating said feeding device to feed the strip and rotating said first spindle simultaneously therewith after said first spindle engages said strip to wind the strip into a roll carried by said first spindle, control means for stopping the feeding of said strip and gripping it when a given length of the strip is wound upon said first spindle, said first spindle being prevented from rotating through the gripping of said strip by the feeding device, means for cutting the strip at a point between said first and second spindles after said second spindle engages the strip extending between said first spindle and said feeding device, said first spindle resuming rotation on the cutting of said strip, due to the torque applied through the slip clutch engaged therewith and cam means associated with said first spindle for stopping the rotation of said first spindle when a portion of the strip length extending between said first and second spindles is wound upon said first spindle, the device being adapted to repeat the above cycle and wind strip material successively upon said first and second spindles.

5. A device for winding prescribed lengths of strip material into a roll which comprises a rotatable turret, first and second spindles rotatably mounted in said turret, said spindles being spaced from one another in the direction of rotation of the turret, each of said spindles being driven from and in continuous engagement with a continuously driven slip clutch, a feeding device for gripping the strip ahead of said first spindle and controlling movement of the strip to said first spindle, means for operating said feeding device to feed the strip and rotating said turret and said first spindle simultaneously therewith after said first spindle engages said strip to wind the strip into a roll carried by said first spindle, control means for stopping the feeding of said strip by said feeding device and gripping it by said device when a given length of the strip has passed said feeding device, said first spindle being prevented from rotating through the gripping of said strip by the feeding device, means for cutting the strip at a point between said first and second spindles after said second spindle engages the strip extending between said first spindle and said feeding device, said first spindle resuming rotation on the cutting of said strip, due to the torque applied through the slip clutch engaged therewith and means associated with said first spindle for stopping the rotation of said first spindle when a portion of the strip length extending between said first and second spindles is wound upon said first spindle, the device being adapted to repeat the above cycle and wind strip material successively upon said first and second spindles.

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