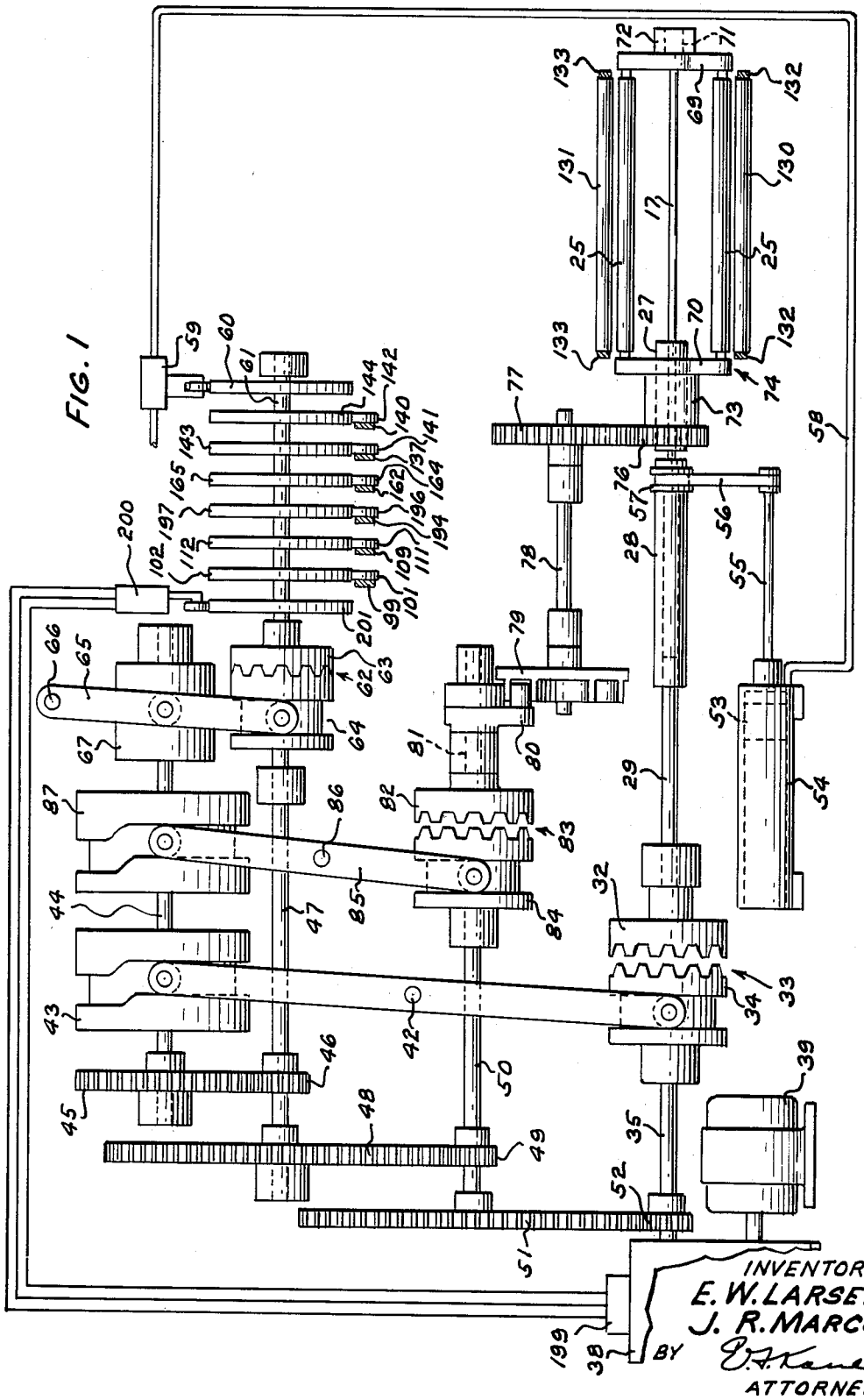
April 3, 1956 E. W. LARSEN ET AL 2,740,592

CONDENSER WINDING MACHINE

Filed Jan. 9, 1952 4 Sheets-Sheet 1

FIG. 1



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CONDENSER WINDING MACHINE

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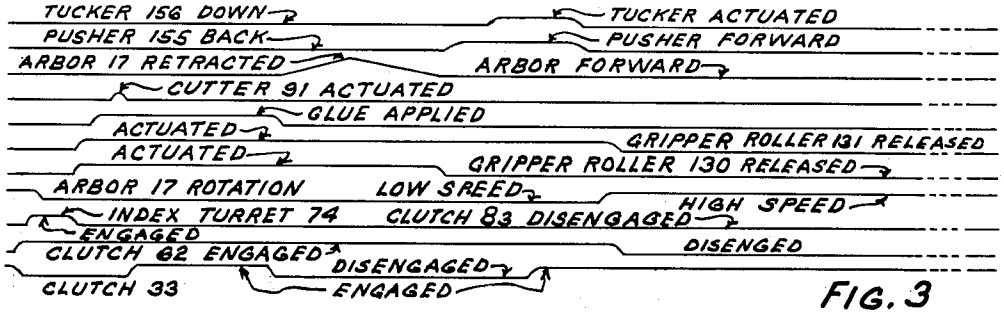


FIG. 3

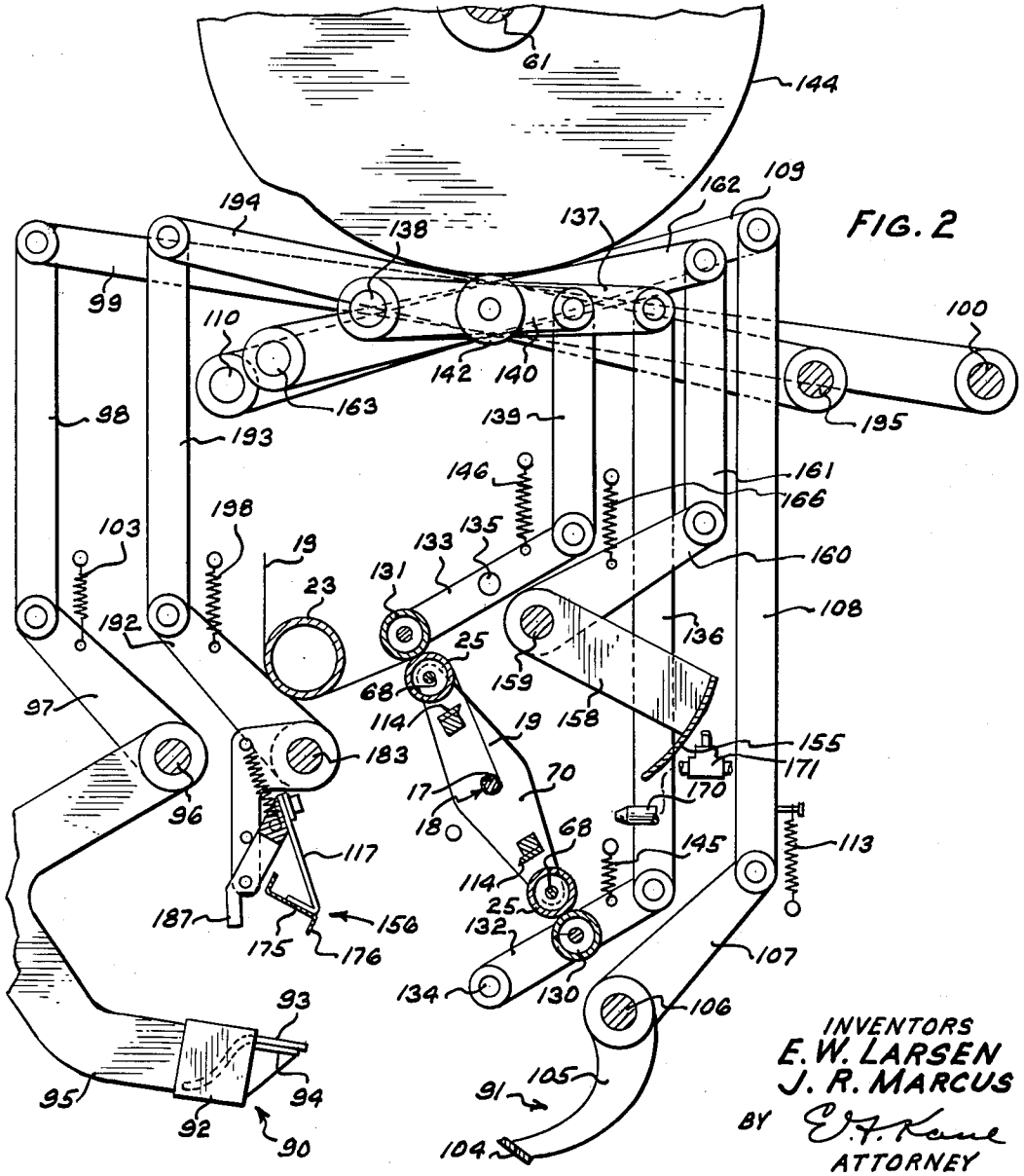


FIG. 2

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CONDENSER WINDING MACHINE

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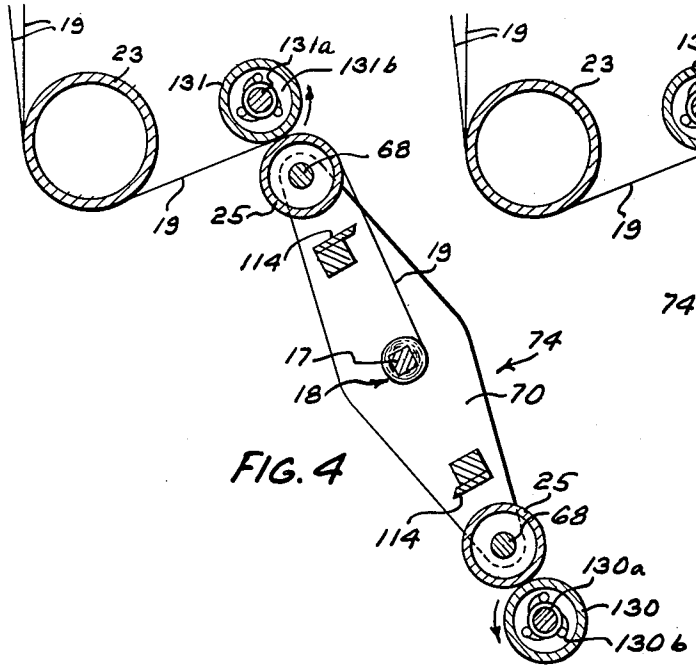


FIG. 4

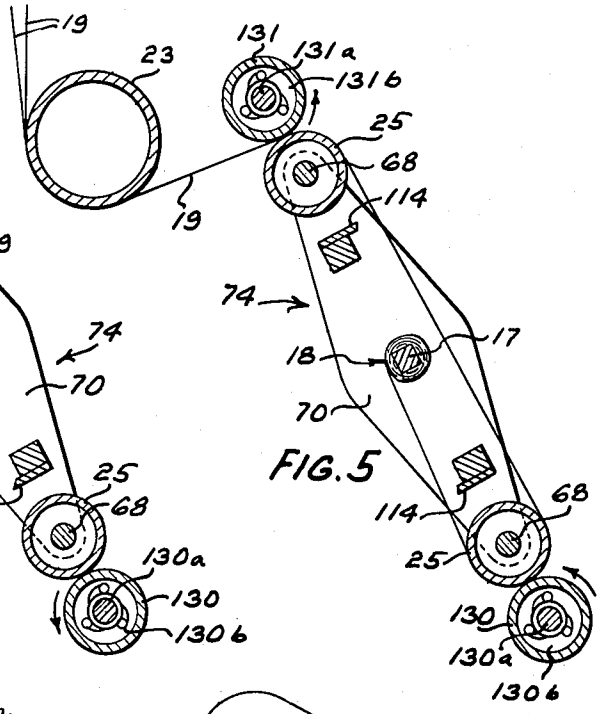


FIG. 5

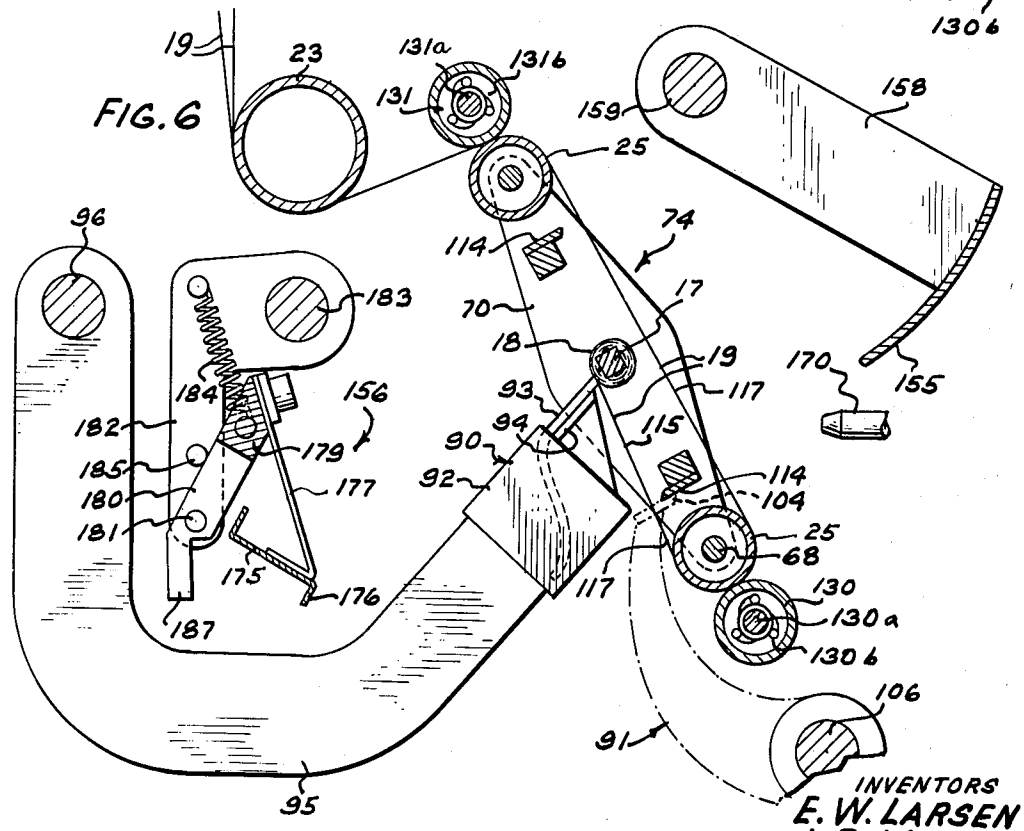


FIG. 6

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CONDENSER WINDING MACHINE

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FIG. 7

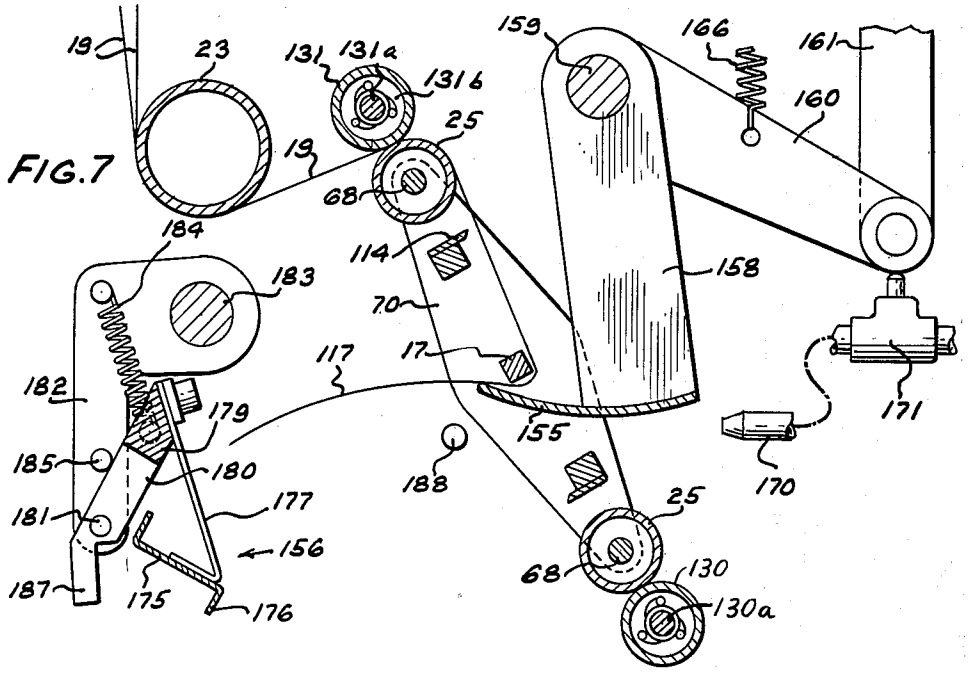


FIG. 8

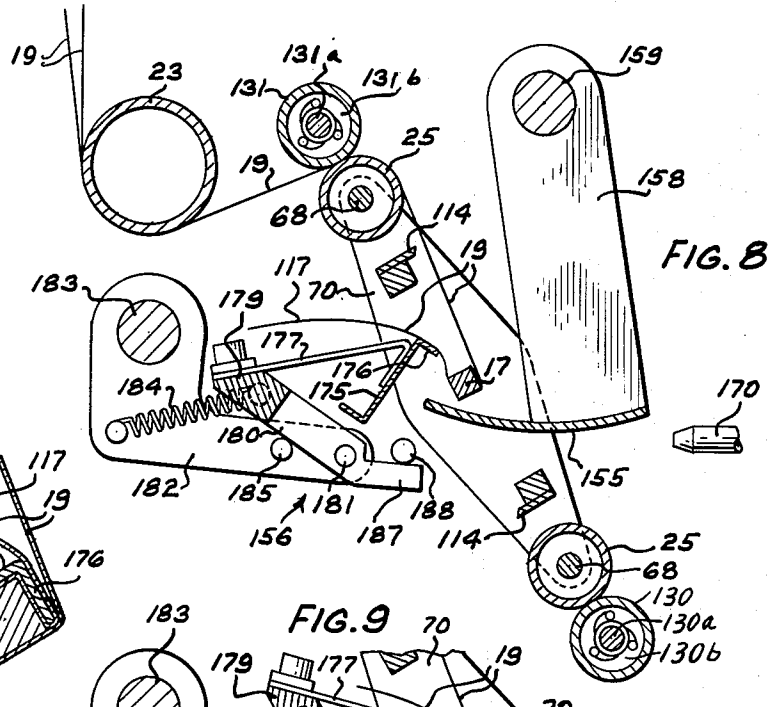


FIG. 10

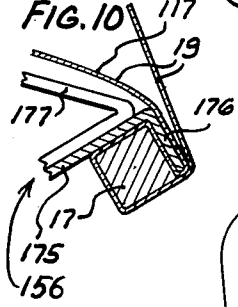
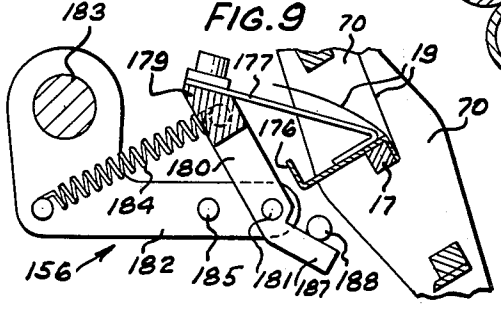


FIG. 9



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United States Patent Office 2,740,592 Patented Apr. 3, 1956

2,740,592

CONDENSER WINDING MACHINE

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Application January 9, 1952, Serial No. 265,612

21 Claims. (Cl. 242—56)

This invention relates to condenser winding machines and more particularly to a single spindle machine for automatically winding successive condensers from webs of metallized dielectric.

It is an object of the present invention to provide an improved apparatus for winding condensers.

In accordance with one embodiment of the invention a rotatable and axially reciprocable mandrel on which strips of metallized dielectric are to be wound into a condenser, is positioned midway between a pair of guide rollers which are supported for revolution about the mandrel and are indexible through 180° on completion of the winding of successive condensers. The two strips of metallized dielectric are drawn from supply rolls to form a composite web which is advanced over a stationary roller and one of the guide rollers and is wound onto the mandrel, and after a predetermined length of the web has been wound onto the mandrel to form the condenser, the guide rollers are indexed through 180° to position the web leading from the condenser in a predetermined relation to a web cutting device, an adhesive applicator, and a web positioning and tucking device. Adhesive is applied to the outer surface of the condenser to prevent the unwinding thereof, and the web is cut to position the end of the web supply in the path of the web positioning element. On completion of the winding of the condenser, the arbor is axially reciprocated to eject the condenser, the web positioning element is actuated to move the end of the web supply against the mandrel and support the end of the web in the path of the tucking device which is actuated to wrap the end of the web around the mandrel to secure the end of the web supply thereto after which the mandrel is rotated to again wind a predetermined length of the web thereon as part of another cycle of operation.

Other objects and advantages of the invention will become apparent by reference to the following detailed description thereof and the accompanying drawings illustrating a preferred embodiment thereof, in which

Fig. 1 is a diagrammatic side elevational view of the condenser winding apparatus;

Fig. 2 is a diagrammatic, vertical, cross-sectional view of the apparatus;

Fig. 3 is a cam chart showing the sequence of the operation of the apparatus;

Figs. 4–9 are enlarged diagrammatic views showing the condensers being wound on the mandrel of the apparatus and the elements cooperating therewith in a series of changed positions during a cycle of operation; and

Fig. 10 is in enlarged detailed sectional view showing the tucker element wrapping the end of the web around the mandrel.

Referring to the drawings the apparatus comprises a mandrel, arbor, or spindle 17 of rectangular cross-section on which the condenser 18 is to be wound. The condenser may be formed from separate strips of dielectric and metal foil interleaved and wound together, but

is shown here as being formed from a pair of strips of metallized dielectric 19, i. e. strips of dielectric, on one face of which has been deposited a film of vaporized metal. The strips 19, Figs. 2 and 4, are drawn from a pair of supply rolls (not shown) and form a composite web which passes around a stationary guide roller 23 and one roller of a pair of web guide rollers 25 as the web is wound on the mandrel 17. The mandrel 17 is supported in a hollow shaft 27 (Fig. 1) for rotary and reciprocatory movement and is secured to one end of a sleeve 28 which telescopingly engages and is splined to a shaft 29 for rotation therewith and for axial movement relative thereto. The shaft 29 is fixed to one element 32 of a clutch 33, the other element 34 of which is splined to a drive shaft 35. The drive shaft 35 is driven from a variable speed transmission unit 38, which in turn is driven from a motor 39. The clutch element 34 is shiftable on the shaft 35 to connect or disconnect the drive between the shaft 35 and the shaft 29 by a shifting lever 41 which is fulcrumed at 42 and actuated by a barrel cam 43 mounted on a cam shaft 44. The cam shaft 44 is driven through a pair of gears 45—46, the latter of which is fixed to a shaft 47. A gear 48 also fixed to the shaft 47, meshes with a gear 49 on a countershaft 50 which also has fixed thereto a gear 51 which in turn is driven from a gear 52 on the drive shaft 35. Thus, the starting and stopping of rotation of the mandrel 17 is effected by the actuation of the clutch 33 by the cam 43.

The mandrel 17 is adapted to be reciprocated to cause the ejection or release of the wound condenser as the mandrel is withdrawn therefrom. The reciprocation of the mandrel is accomplished by the operation of a pneumatic actuator which comprises a piston 53 reciprocable in an air cylinder 54 and having a piston rod 55 on which is fixed a shifter fork 56 which in turn engages a shifting collar 57 on the sleeve 28. The piston is spring actuated in one direction and air actuated in the opposite direction by compressed air admitted to the cylinder through a pipeline 58 under control of a valve 59. The valve 59 is actuated to and from open and closed positions to effect the reciprocation of the arbor by a cam 60 which is fixed to the cam shaft 61, coaxially aligned with the shaft 47 and driven therefrom through a clutch 62. One element 63 of the clutch is fixed to the shaft 61 and the other element 64 of the clutch is splined to the shaft 47 and is shiftable into and out of engagement with the element 63 by a lever 65 fulcrumed at 66 and actuated by the barrel cam 67 on the cam shaft 44.

The guide rollers 25 are rotatably supported on shafts 68 which are secured at their ends to the ends of cross-arms 69 and 70. The cross-arm 69 is rotatably supported by a stub shaft 71 journaled in a bearing 72 and the cross-arm 70 is fixed to the hollow shaft 27 which is mounted in a bearing 73 for rotation and against axial movement. The cross-arms 69 and 70, connected together by the shafts 68, form a rectangular frame or turret 74 therewith which is rotatable about the axis of the arbor 17.

Mechanism is provided for indexing the rollers 25 and the frame 74 through 180° comprising a gear 76 which is fixed to the hollow shaft 27 and meshes with a gear 77 secured to a shaft 78. The shaft 78 is suitably mounted for rotation and has fixed thereto a four-station Geneva disc 79 which cooperates with and is intermittently actuated by a Geneva lever 80 carried by a shaft 81. The shaft 81 has fixed thereto an element 82 of a clutch 83, the movable element 84 of which is splined to the shaft 50. The movable clutch element 84 is adapted to be shifted into and out of engagement with the element 82 by a lever 85 fulcrumed at 86 and actuated by a barrel cam 87 fixed to the cam shaft 44.

After the winding of the web 19 onto the mandrel 17

has been started and a predetermined length of the web has been wound thereon, the clutch 33 is actuated to disengage the drive to the arbor 17 and the clutch 83 is actuated to cause the rotation of the Geneva lever 80 through one revolution and cause the turret 74 and the rollers 25 to be indexed through 180° to move the web 19 on the rollers 25 from the position shown in Fig. 4 to that shown in Fig. 5. The web 19 (Fig. 5) extending from the condenser 18 on the arbor 17 is now in condition to be severed and glued or otherwise adhered to the condenser and to accomplish this, a gluing device or adhesive applicator 90, and a cutter device 91 are provided (Figs. 2 and 6).

The gluing device 90 comprises an elongated box or receptacle 92 for containing a supply of glue, adhesive, dielectric solvent, or the like, into which one end of a feed wick 93 is placed. The other portion of the wick 93 extends outwardly from the container 92 and is supported on a platform 94. The glue receptacle is carried by a pair of irregularly shaped arms 95 which are fixed to a shaft 96 suitably journalled for rocking movement. An arm 97 fixed to the shaft 96 is pivotally connected to a link 98, which is connected to one end of a lever 99. Pivotally supported at 100, the lever 99 has a cam follower 101 which engages a cam 102 fixed to the cam shaft 61. The glue receptacle 92 is movable under control of the cam 102 and a spring 103 from a normal position shown in Fig. 2 to an operative position shown in Fig. 6 where the end of the wick 93 engages the supply web 19 and the outer portion of the condenser 18 on the mandrel 17. While the gluing device is held in its operative position the cutter 91 is actuated to sever the web 19.

The cutter device 91 (Fig. 2) comprises a cutting blade 104 fixed to a pair of arms 105 which are secured to a shaft 106 suitably journalled for rocking movement. An arm 107 fixed to the shaft 106, is pivotally connected to a link 108 which is also pivotally connected to a lever 109. The lever 109 is pivotally supported at 110 and has a cam follower 111 which engages a cam 112 fixed to the cam shaft 61. The cam 112 actuates the cutter 104 in one direction and a spring 113 (Fig. 2) serves to return the cutter in the opposite direction. In response to the actuation of the cutter device 91 from its normal position shown in Fig. 2 to the position indicated in dotted lines in Fig. 6, the cutter blade 104 cooperates with one of a pair of cutter blades 114—114 mounted on the arms 69 and 70 of the turret to sever the supply web 19 at a point in spaced relation to the mandrel 17 to form a loose end 115 of the condenser web 19 and a loose end 117 of the web supply. After the web 19 has been severed the mandrel 17 is rotated slowly to wind the end 115 of the web 19 onto the condenser while the wick 93 of the gluing device 90 is in engagement with the condenser. Thus, as the end 115 of the web 19 is wound onto the condenser adhesive is applied thereto and serves to adhere the end 115 of the web to the condenser.

During the cutting of the web 19 after a condenser has been wound and during the ejection of the condenser it is desirable to hold the portion of the web extending between the guide rollers 25 against movement to prevent the displacement thereof or damage thereto. To accomplish this a pair of gripper rollers 130 and 131 are provided to grip the web against the guide rollers 25. The gripper rollers 130 and 131 (Figs. 2, 4, 5, and 6) are rotatably supported on shafts 130*a* and 131*a* which are carried by pairs of lever arms 132 and 133, respectively, for rocking movement toward and away from the guide rolls 25. One way clutches 130*b* and 131*b* mount the rollers 130 and 131 on the shafts 130*a* and 131*a*, respectively, for rotation in one direction only as indicated by the arrows in Figs. 4 and 5 whereby when the gripper rollers 130 and 131 are pressed against the rollers 25 they serve to hold the web 19 against movement tending to retract the web while permitting movement of the web in a forward direction.

The arms 132 and 133 are fixed to rock shafts 134 and 135, respectively, suitably supported for oscillating movement. One of the pair of arms 132 extends beyond the roller 130 and is connected to one end of a link 136, the other end of which link 136 is connected to a lever 137 pivotally connected for rocking movement about a fulcrum 138. In like manner one of the arms 133 extends beyond the rock shaft 135 and is connected on one end of a link 139, which, at its other end is connected to a lever 140 pivotally supported on the fulcrum 138. The levers 137 and 140 have cam followers 141 and 142, respectively (Figs. 1 and 2), which engage cams 143 and 144 fixed to the cam shaft 61. The cams 143 and 144 act to separate the gripper rollers 130 and 131 from the guide rolls 25 in timed relation to the actuation of the other elements, and springs 145 and 146 serve to move the rollers 130 and 131, respectively, in the opposite direction against the rollers 25.

After the web 19 has been severed and the condenser has been completely wound, glued, and ejected from the apparatus and the mandrel returned to its operative position, the lower gripper roll 130 is separated from the turret guide roll 25 to release the lower end portion of the web 19 while the upper gripper roller 131 remains in engagement with the other guide roller 25 to clamp the web against it. The apparatus is now in a position to initiate the winding of another condenser and a mechanism is provided for wrapping the end of the web supply around the arbor to secure the web thereto.

A web positioning element or pusher 155 is mounted for movement to engage the loose end 117 of the web 19 at a point between the mandrel 17 and the lower guide roll 25 and move it into the path of a web wrapping or tucking device 156, which picks up the end 117 of the web and tucks it around the mandrel to secure the end of the web to the mandrel, after which the mandrel is slowly rotated to begin the winding operation. The pusher element 155 is carried by a pair of arms 158 which are fixed to a rock shaft 159 suitably journalled for oscillation. The shaft 159 has fixed thereto an arm 160 (Fig. 2) which is pivotally connected to a link 161 which in turn is connected to one end of a lever 162 mounted for oscillating movement about a pivot 163. The lever 162 carries a follower 164, which engages a cam 165 on the cam shaft 61 for actuating the pusher 155 in one direction and a spring 166 serves to return the pusher.

When the strips of metallized dielectric are made from material which is sufficiently heavy or stiff, the pusher 155 in its forward position will support the free end 117 of the composite web 19 in the path of the tucker device 156 as shown in Fig. 7. When the strips of metallized dielectric are used which are relatively light and thin so that they will not, by their own rigidity, be supported in the position shown in Fig. 7, jets of air from one or more air nozzles 170 are provided to aid in carrying the free end 117 of the composite web 19 into the position shown in Fig. 7. The flow of air through the nozzle 170 is controlled by a valve 171 actuated by the arm 160 near the end of its downward stroke. When the air jets are not required to supplement the action of the pusher blade 155, the supply of air to the nozzles may be manually shut off. If desired the air jets may be used in lieu of the pusher element 155 to support the end of the web 19 in the position indicated in Fig. 7.

The tucker device 156 comprises a thin plate 175 which has a flange 176 bent at right angles thereto. The plate 175 is yieldably supported on one end of a plurality of flat leaf springs 177 which are secured at their other ends to a bar 179. The bar 179 has a pair of arms 180 extending therefrom, which are pivotally connected by pins 181 to a pair of levers 182 fixed to a rock shaft 183. Springs 184 stress the members 179 and 180 and the member 175 carried thereby for rotation in a counter-

clockwise direction about the pins 181, which movement is arrested by a pair of stop pins 185 on the levers 182. The arms 180 of the member 179 are spaced apart a distance sufficient to straddle the arms 69 and 70 of the turret 74 and the ends 187 of the arms 180 extend beyond the pivots 181 and are adapted to engage stationary stop elements 188 during the tucking operation as the tucker device 156 is moved from its normal position shown in Fig. 2 to its operative position shown in Fig. 9. The tucker 156 is actuated by mechanism including an arm 192 (Fig. 2) fixed to the shaft 183 and connected to a link 193, which is connected to a cam lever 194 oscillatable about a pivot 195 and having a follower 196 engageable with a cam 197 on the cam shaft 61. A spring 198 (Fig. 2) serves to return the tucker 156. After the pusher element 155 has been advanced to the position shown in Fig. 7 to direct the loose end 117 of the web 19 into the path of the members 175 and 176 of the tucker, the cam 197 serves to rock the shaft 183 and rotate the tucker device 156 in a counter-clockwise direction to cause the member 176 and the springs 177 to engage the free end 117 of the web 19 and carry it upwardly around the mandrel 17. When the tucker has advanced to the position shown in Fig. 8, the extension 187 of the arms 180 will engage stops 188 and as the levers 182 continue their turning movement in a counter-clockwise direction, the member 179 and the members 175, 176, and 177 carried thereby will be rotated in a clockwise direction about the pins 181 and the flange member 176 will be moved over and around the mandrel 17 and will serve to wrap a portion of the end 117 of the web around the mandrel and tuck a portion of the web between the mandrel and the portion of the web 19 extending between the mandrel 17 and the upper guide roller 25 to secure the loose end 117 of the supply web to the mandrel as indicated in Figs. 9 and 10. At this point the mandrel is actuated to rotate slowly to begin the winding of the condenser and after a few turns of the web have been wound on the mandrel the tucker device 156 is returned to its normal position.

After the pusher 155 and the tucker device 156 have been retracted the rotation of the mandrel is shifted from low to high speed which continues until a predetermined length of the web 19 has been wound thereon after which the clutch 33 is actuated to disconnect the mandrel drive and stop the mandrel. The mandrel is driven at low or high speed from the variable speed transmission 38 which is shifted to and from high and low speeds by any suitable electrical actuating device 199 (Fig. 1) under control of a switch 200, which is actuated from one position to another by a cam 201 on the cam shaft 61. In each cycle of operation the barrel cam 43 actuates the clutch 33 and controls the starting and stopping of the rotation of the mandrel 17, the barrel cam 87 controls the actuation of the clutch 83 to effect one revolution of the Geneva arm 80 and the indexing of the turret 84 and the guide rollers 25 through 180°, and the barrel cam 67 controls the actuation of the clutch 62 and the rotation of the cam shaft 61 and the cams thereon through one revolution, and during the rotation of the cam shaft 61 the cams thereon control the shifting of the speed of rotation of the mandrel 17 to and from high and low, and the actuation of the adhesive applicator 90, the cutter device 91, the condenser ejector device 53, 54, the gripper rollers 130 and 131, the pusher element 155, and the tucker 156, in timed relation to each other. The sequence of operation of the various elements of the apparatus is indicated diagrammatically in the cam chart (Fig. 3).

To review the operation of the device, we shall assume that the web 19 has been wrapped around the mandrel 17 and the rotation of the mandrel has been shifted into high speed, and after a predetermined length of the web 19 has been wound on the mandrel (Fig. 4) it is stopped by the disengagement of the clutch 33, and rotation of the cam shaft 61 is started by the engagement of the clutch 62. The turret is indexed through 180° from the position shown in Fig. 4 to that shown in Fig. 5 in response to actuation of the clutch 83, after which gripper rollers 130 and 131 are actuated to grip the web 19 against the rollers 25, the adhesive applicator 90 is actuated to engage the condenser 18 on the mandrel and the web extending therefrom to apply an adhesive thereto, and while the applicator 90 is held in engagement with the condenser, the web leading from the condenser is severed by the actuation of the cutter device 91. The mandrel 17 is then started rotating at a slow speed to wind up the loose end of the web onto the condenser and cause adhesive to be applied thereto as it is being wound to adhere the end of the web to the condenser after which the mandrel is stopped. The adhesive applicator 90 is then returned to its normal position and the mandrel 17 is retracted to cause the withdrawal of the mandrel from the condenser and the release and ejection of the condenser from the apparatus after which the mandrel is returned to its normal position. The lower gripper roller 130 is separated from the lower guide roll 25 to free the end portion of the web 19 while the upper gripper roller 131 remains actuated to grip the web against the upper guide roller 25. The pusher element 155 and the air jets are actuated to carry the free end of the web 19 against the mandrel 17 and into the path of the tucker device 156, which is then actuated to pick up the end portion of the web and wrap it around the mandrel, after which rotation of the mandrel is started at low speed to wind several turns of the web onto the mandrel and initiate the winding operation, the pusher 155 and the tucker 156 are returned to their normal inoperative positions and the rotation of the mandrel is shifted into high speed and continues at high speed until, as previously stated, a predetermined length of the web 19 has been wound thereon, at which time the mandrel is stopped and the sequence of operation is repeated.

It is to be understood that the above-described arrangements are simply illustrative of the application of the principles of this invention. Numerous other arrangements may be readily devised by those skilled in the art which will embody the principles of the invention and fall within the spirit and scope thereof.

What is claimed is:

1. A condenser winding machine comprising a rotatable arbor for winding a composite web to form condensers, means for guiding said web from a supply thereof onto said arbor, means for forming a loop in said web after the condenser has been wound on the arbor to dispose a portion of the web adjacent the arbor and in a position to be severed from the condenser and wrapped around the arbor, cutting means engageable with the loop formed in said web for severing said web, means for ejecting the condenser from said arbor, tucking means movable through a predetermined path to engage the end of said web from said supply and partially wrap it around said arbor to secure said web to said arbor, positioning means movable through a predetermined path to partially wrap the end portion of the web around said arbor and to support the end portion of the web in the path of movement of said tucking means, and drive means for actuating said cutter means, said ejecting means, said web positioning means, said tucking means, and to rotate said arbor in timed relation to each other.

2. A condenser winding machine comprising a rotatable arbor for winding a composite web to form a condenser, means for guiding said web from a supply thereof onto said arbor, means for forming a loop in said web after the condenser has been wound on the arbor to dispose a portion of the web adjacent the arbor and in a position to be severed from the condenser and wrapped around the arbor, cutting means engageable with the loop formed in said web for severing said web, means to eject said condenser from said arbor, tucking means movable through a predetermined path to engage the end of said web from said supply and partially wrap it around said

arbor to secure said web to said arbor, positioning means movable through a predetermined path to partially wrap the end portion of the web around said arbor and to support the end portion of the web in the path of movement of said tucking means, means for applying adhesive to said condenser to adhere the trailing end of said web thereto, and drive means for rotating said arbor and for actuating said cutter means, said adhesive applying means, said ejecting means, said web positioning means, and said tucking means in a predetermined timed relation to each other.

3. A condenser winding machine comprising a rotatable arbor for winding a composite web to form condensers, said arbor being axially reciprocable to cause the ejection of the condenser therefrom, means for guiding said web from a supply thereof onto said arbor, means for forming a loop in said web after the condenser has been wound on the arbor to dispose a portion of the web adjacent the arbor and in a position to be severed from the condenser and wrapped around the arbor, cutting means including a cutter element engageable with said loop for severing said web, wrapping means movable through a predetermined path to engage the end of said web and wrap it partially around the arbor to secure the end of said web to said arbor, positioning means movable through a predetermined path to partially wrap the end portion of the web around said arbor and to support the end portion of said web in the path of movement of said wrapping means, gripping means for holding said web while said web is being acted on by said cutting means, said positioning means, and said wrapping means, and drive means for rotating said arbor, reciprocating said arbor and for actuating said cutter means, said web positioning means, said wrapping means, and said gripping means in timed relation to each other.

4. A condenser winding machine comprising an arbor, means mounting said arbor for rotation and for axial reciprocation, means for rotating said arbor for winding a composite web thereon from a supply to form a condenser, means for forming a loop in said web after the condenser has been wound around the arbor to dispose a portion of the web adjacent the arbor and in a position to be severed from the condenser and wrapped around the arbor, cutting means for severing said web at the loop therein, means for applying adhesive to said condenser to adhere the end of said web thereto, means for axially reciprocating said arbor to eject said condenser, wrapping means movable through a predetermined path to engage the end of said web from said supply and wrap it partially around the arbor to secure the end of said web to said arbor, positioning means movable through a predetermined path to wrap the web partially around the arbor and to support the end portion of the web in a path of movement of the wrapping means, gripping means for holding said web against retracting movement while said web is being acted on by said cutting means, said positioning means, and said wrapping means, and drive means for actuating said cutting means, said web positioning means, said wrapping means, said adhesive applying means, and said gripping means in timed relation to each other and to the actuation of said arbor.

5. A condenser winding machine comprising a mandrel, means mounting said mandrel for rotary and for axial movement, means for rotating said mandrel for winding a composite web thereon from a web supply to form a condenser, means for forming a loop in said web after the condenser has been wound around the arbor to dispose a portion of the web adjacent the arbor and in a position to be severed from the condenser and wrapped around the arbor, cutting means for severing said web at a predetermined point in the loop thereof after said condenser has been wound, means for applying adhesive to said condenser to adhere the severed end of said condenser web to said condenser, means for axially reciprocating said mandrel to effect the ejection of said condenser, positioning means engageable with the severed end portion of the web supply operable to move the web into engagement with and partially around said mandrel and to support the end portion of the web in a predetermined position extending transversely from said mandrel, wrapping means movable through a predetermined path to engage the end of said web supported by said positioning means to wrap said web partially around the mandrel to secure the end of the web to said mandrel, gripping means for holding said web against retracting movement while said web is being acted on by said cutting means, said positioning means, and said wrapping means, and means for effecting the actuation of the several means in a predetermined sequence.

6. In a condenser winding machine, the combination of a rotatable arbor for winding a composite web into a condenser, a pair of movable guide rollers, supporting means rotatable about the axis of said arbor for supporting said rollers in parallel, diametrically opposite and spaced relation to said arbor and for rotation about the axis of said arbor, stationary guide means for guiding said web from a supply onto one of said guide rollers whereby said web is guided over said one roller onto said arbor during the winding of said condenser, means for cutting said web to sever the condenser being wound, means for indexing said supporting means through a predetermined distance to move a portion of said web into a position to be severed and to render said cutting means operative to sever a condenser on said arbor from the web supply whereby when said web is cut the end of the web supply is disposed in close proximity to said arbor and in a position to be wrapped therearound, gripping means cooperating with one of said rollers for holding the web during the cutting of said web, means for rotating said arbor, means for actuating said cutting means, and means for actuating said gripping means.

7. In a condenser winding machine, the combination of a rotatable and axially reciprocable arbor for winding a composite web into a condenser, a pair of movable guide rollers, supporting means rotatable about the axis of said arbor for supporting said rollers in parallel, diametrically opposite and spaced relation to said arbor and for rotation about the axis of said arbor, guide means for guiding said web from a supply onto one of said guide rollers whereby said web is guided over said one roller onto said arbor during the winding of said condenser, means for cutting said web to sever the condenser being wound, means for indexing said roller supporting means through one half revolution to move a portion of said web into a position to be severed and to render said cutting means operative to sever the condenser on said arbor from the web supply whereby when said web is cut the end of the web supply is disposed in close proximity to said arbor and in a position to be wrapped therearound, gripping means cooperating with one of said rollers for holding the web thereagainst during the cutting of said web, means for rotating said arbor, means for actuating said cutting means, means for actuating said gripping means, and means for reciprocating said arbor to eject the condenser therefrom.

8. In a condenser winding machine, a rotatable arbor for winding a composite web thereon, a pair of guide rollers, a roller support rotatable about the axis of the arbor for supporting the rollers parallel to and in diametrically opposed and spaced relation to said arbor, means for rotating the arbor to draw said web over one of said rollers and wind it on said arbor, cutting means for cutting the web, adhesive applying means engageable with the condenser on the arbor to adhere the trailing end of the web to the condenser, means for ejecting a wound condenser from the arbor, means for wrapping the leading edge of the web onto the arbor to initiate the winding of a new condenser, and means for rotating the roller support through one half revolution to cause the rollers to move and support a portion of said web in a

predetermined position relative to said cutting means and said wrapping means.

9. In a condenser winding machine, the combination of a rotatable arbor for winding a composite web into a condenser, a plurality of movable guide rollers, roller supporting means for mounting said rollers in parallel, equi-angular, and equi-distant spaced relation to said arbor and for movement about the axis of said arbor, guide means for guiding said web from a supply onto one of said guide rollers whereby, said web is guided over said one roller onto said arbor during the winding of said condenser, cutting elements mounted on said supporting means adjacent the path of travel of said web, a cutter mounted for movement through a predetermined path into engagement with one of said cutting elements to sever said web, means for indexing said supporting means through a predetermined distance to move the cutting elements and portions of said web successively into operative position relative to said cutter and to cause the guide rollers to move and support a portion of the web in a predetermined position adjacent said arbor whereby when said web is severed the end of the web supply is disposed in close proximity to said arbor and in a position to be wrapped therearound, means for rotating said arbor, and means for actuating said cutter.

10. In a condenser winding machine, the combination of a rotatable arbor for winding a composite web into a condenser, a pair of movable guide rollers, supporting means rotatable about the axis of said arbor for mounting said rollers in parallel, diametrically opposite and spaced relation to said arbor for guiding and supporting the web, stationary guide means for guiding said web from a supply onto one of said guide rollers whereby said web is guided over said one roller onto said arbor during the winding of said condenser, cutting elements mounted on said supporting means intermediate the arbor and the rollers thereon, a cutter mounted for movement through a predetermined path into engagement with one of said cutting elements to sever said web, means for indexing said supporting means through 180° to move the cutting elements and portions of said web successively into operative position relative to said cutter and to cause the other guide roller to move and support a portion of the web between said rollers in a predetermined position adjacent said arbor, whereby when said web is severed the end of the web supply is disposed in close proximity to said arbor and in a position to be wrapped therearound, means for rotating said arbor, and means for actuating said cutter.

11. In a condenser winding machine, the combination of a rotatable and axially reciprocable arbor for winding a composite web into a condenser, a pair of movable guide rollers, supporting means rotatable about the axis of said arbor for mounting said rollers in parallel, diametrically opposite and spaced relation to said arbor for guiding and supporting the web, stationary guide means for guiding said web from a supply onto one of said guide rollers whereby said web is guided over said one roller onto said arbor during the winding of said condenser, a pair of cutting elements mounted on said supporting means intermediate the arbor and the rollers thereon, a cutter mounted for movement through a predetermined path into engagement with one of said cutting elements to sever said web, means for indexing said supporting means through one half revolution to move the cutting elements and portions of said web successively into operative position relative to said cutter and to cause the guide rollers to move and support a portion of the web between said rollers in a predetermined position adjacent said arbor whereby when said web is severed the end of the web supply is disposed in close proximity to said arbor and in a position to be wrapped therearound, means cooperating with one of said rollers for gripping and holding the web thereagainst during the cutting of said web, means for rotating said arbor, means for actuating said cutter, and means for reciprocating said arbor to eject a wound condenser therefrom.

12. In a condenser winding machine, the combination of a rotatable arbor for winding a composite web into a condenser, a plurality of movable guide rollers, supporting means for mounting said rollers in parallel, equi-angular, and equi-distant spaced relation to said arbor and for movement about the axis of said arbor, guide means for guiding said web from a supply onto one of said guide rollers whereby said web is guided over said one roller onto said arbor during the winding of said condenser, cutting elements mounted on said supporting means adjacent the path of travel of said web, a cutter mounted for movement through a predetermined path into engagement with one of said cutting elements to sever said web, means for indexing said supporting means through a predetermined distance to move the cutting elements and portions of said web successively into operative position relative to said cutter and to cause the guide rollers to move and support a portion of the web in a predetermined position adjacent said arbor whereby when said web is severed the end of the web supply is disposed in close proximity to said arbor and in a position to be wrapped therearound, gripping means cooperating with one of said rollers for holding the web during the severing of said web, means for rotating said arbor, means for actuating said cutter, means for ejecting said condenser from said arbor, and means for wrapping the end of said web supply around said arbor to secure said web thereto.

13. In a condenser winding machine, the combination of a rotatable arbor for winding a composite web into a condenser, a plurality of movable guide rollers, supporting means for mounting said rollers in parallel, equi-angular, and equi-distant spaced relation to said arbor and for movement about the axis of said arbor, guide means for guiding said web from a supply onto one of said guide rollers whereby said web is guided over said one roller onto said arbor during the winding of said condenser, cutting elements mounted on said supporting means adjacent the path of travel of said web, a cutter mounted for movement through a predetermined path into engagement with one of said cutting elements to sever said web, means for indexing said supporting means through a predetermined distance to move the cutting elements and portions of said web successively into operative position relative to said cutter and to cause the guide rollers to move and support a portion of the web in a predetermined position adjacent said arbor whereby when said web is severed the end of the web supply is disposed in close proximity to said arbor and in a position to be wrapped therearound, means for rotating said arbor, means for actuating said cutter, means for ejecting said condenser from said arbor, web positioning means for moving the supply web into engagement with said arbor and for supporting the end portion of said web in transversely extending relation to said arbor, wrapping means including an element movable through a predetermined path into engagement with the transversely positioned end portion of said web for wrapping said end portion around the arbor to attach the web to said arbor, and means cooperating with one of said rollers for holding said web during the severing thereof and the wrapping of the end around the arbor.

14. In a condenser winding machine, the combination of a rotatable arbor for winding a composite web into a condenser, a plurality of movable guide rollers, supporting means for mounting said rollers in parallel, equi-angular, and equi-distant spaced relation to said arbor and for movement about the axis of said arbor, guide means for guiding said web from a supply onto one of said guide rollers whereby said web is guided over said one roller onto said arbor during the winding of said condenser, cutting elements mounted on said supporting means adjacent the path of travel of said web, a cutter

mounted for movement through a predetermined path into engagement with one of said cutting elements to sever said web, means for indexing said supporting means through a predetermined distance to move the cutting elements and portions of said web successively into operative position relative to said cutter and to cause the guide rollers to move and support a portion of the web in a predetermined position adjacent said arbor whereby when said web is severed the end of the web supply is disposed in close proximity to said arbor and in a position to be wrapped therearound, means for rotating said arbor, means for actuating said cutter, means for ejecting said condenser from said arbor, web positioning means for moving the supply web into engagement with said arbor and for supporting the end portion of said web in transversely extending relation to said arbor, wrapping means including an element movable through a predetermined path into engagement with the transversely positioned end portion of said web for wrapping said end portion around the arbor to attach the web to said arbor, means cooperating with one of said rollers for holding said web during the severing thereof and the wrapping of the end around the arbor, an adhesive applicator, means for moving said applicator into engagement with the condenser on said arbor to apply adhesive thereto for adhering the trailing end of said web to said condenser, and means for effecting the actuation of said various means in timed relation to each other.

15. A condenser winding machine comprising a rotatable arbor for winding a composite web into a condenser, a pair of movable guide rollers, roller supporting means mounting said rollers in parallel, equi-angular, and equidistant spaced relation to said arbor and for movement about the axis of said arbor, guide means for guiding said web from a supply onto one of said guide rollers whereby said web is guided over said one roller onto said arbor during the winding of said condenser, cutting elements mounted on said supporting means adjacent the path of travel of said web, a cutter mounted for movement through a predetermined path into engagement with one of said cutting elements to sever said web, means for indexing said supporting means through a predetermined distance to move the cutting elements and portions of said web sucessively into operative position relative to said cutter and to cause the guide rollers to move and support a portion of the web in a predetermined position adjacent said arbor whereby when said web is severed the end of the web supply is disposed in close proximity to said arbor and in a position to be wrapped therearound, means for rotating said arbor, means for actuating said cutter, means for ejecting said condenser from said arbor, means for directing air against the end portion of said web for moving the web into engagement with and partially around said arbor and for supporting the end portion of said web in transversely extending relation to said arbor, wrapping means including an element movable through a predetermined path into engagement with the transversely positioned end portion of said web for wrapping said end portion around the arbor to attach the web to said arbor, means for actuating said wrapping means, means cooperating with one of said rollers for holding said web during the severing thereof and the wrapping of the end around the arbor, an adhesive applicator, means for moving said applicator into engagement with the condenser on said arbor to apply adhesive thereto for adhering the trailing end of said web to said condenser, and means for effecting the actuation of said various means in timed relation to each other.

16. In a machine for winding condensers from a composite web, the combination of a rotatable arbor for winding the web thereon, means for guiding said web from a supply thereof onto said arbor, a member engageable with said web in spaced relation to said arbor, means for moving said member about said arbor to form a loop in said web having a portion thereof extending from said member past said arbor and adjacent thereto, means for severing the looped portion of said web between said arbor and said member to form an end portion of said web supply adjacent said arbor and in a position to be wrapped around the arbor, and means for wrapping the end portion of said web supply around said arbor to secure the web thereto.

17. In a machine for winding condensers from a composite web, the combination of an arbor for winding the web thereon, means for guiding the web from a supply thereof onto said arbor, means including a member mounted in spaced relation to said arbor for forming a loop in said web after said condenser has been wound, the loop in said web having a first portion extending from the condenser on said arbor to said member and a second portion extending from said member past said arbor and in close proximity thereto, cutting means engageable with the first portion of said loop for severing the web intermediate the arbor and said member to form an end portion of said web supply disposed adjacent said arbor in a position to be wrapped around the arbor, means for wrapping the end portion of said web around said arbor for securing the web thereto, and means for ejecting the condenser from the arbor.

18. In a machine for winding condensers from a composite web, the combination of an arbor for winding the web thereon, means for guiding the web from a supply thereof onto said arbor, means including a member mounted in spaced relation to said arbor for forming a loop in said web after said condenser has been wound, the loop in said web having a first portion extending from said arbor to said member and a second portion extending from said member past said arbor and in close proximity thereto, cutting means engageable with the first portion of said loop for severing the web intermediate the arbor and said member to form an end portion of said web supply in a position adjacent said arbor, a first wrapping means movable through a predetermined path for partially wrapping the end portion of said web supply around said arbor and supporting the end portion of the web supply transversely of said arbor, a second wrapping means movable through a predetermined path and engageable with the end of said web for partially wrapping the end portion of the web around the arbor and to secure the web to said arbor, and means for applying adhesive to the condenser on said arbor to adhere the end of said web thereto.

19. In a machine for winding condensers from a composite web, the combination of an arbor for winding the web thereon, means for guiding the web from a supply thereof onto said arbor, means including a member mounted in spaced relation to said arbor for forming a loop in said web extending from a condenser after it has been wound on the arbor to dispose a portion of the web in a position to be severed from the condenser and wrapped around the arbor, cutting means engageable with the looped portion of the web for severing the web, and means for wrapping the end portion of said web around said arbor for securing the web thereto.

20. In a strip winding machine the combination of an arbor for winding a strip thereon into a roll, means for guiding a strip from a supply thereof onto said arbor, means including a member mounted in spaced relation to said arbor for forming a loop in said strip extending from the roll after it has been wound on the arbor to dispose a portion of the strip in a position to be severed from the roll and wrapped around the arbor, means engageable with the looped portion of the strip for severing the strip, means for ejecting the roll from the arbor, and means for wrapping the end portion of the severed strip around the arbor for securing the strip thereto.

21. In a strip winding machine the combination of an arbor for winding a strip thereon into a roll, means for

guiding a strip from a supply thereof onto said arbor, means including a member mounted in spaced relation to said arbor for forming a loop in said strip extending from the roll after it has been wound on the arbor to dispose a portion of the strip in a position to be severed from the roll and wrapped around the arbor, means engageable with the looped portion of the strip for severing the strip, means for applying adhesive to the roll on the arbor to adhere to the roll the trailing end of the strip from which the roll is wound, means for

ejecting the roll from the arbor, and means for wrapping the end portion of the severed strip from said supply around the arbor for securing the strip thereto to wind another roll.

References Cited in the file of this patent

UNITED STATES PATENTS

2,040,323	McCain	May 12, 1936
2,272,940	Gerard	Feb. 10, 1942
2,361,265	Christman	Oct. 24, 1944