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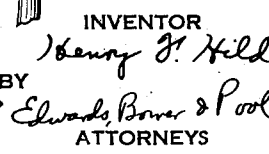
H. F. HILD

2,333,570

AUTOMATIC WINDING MACHINE

Filed March 15, 1939

5 Sheets-Sheet 1



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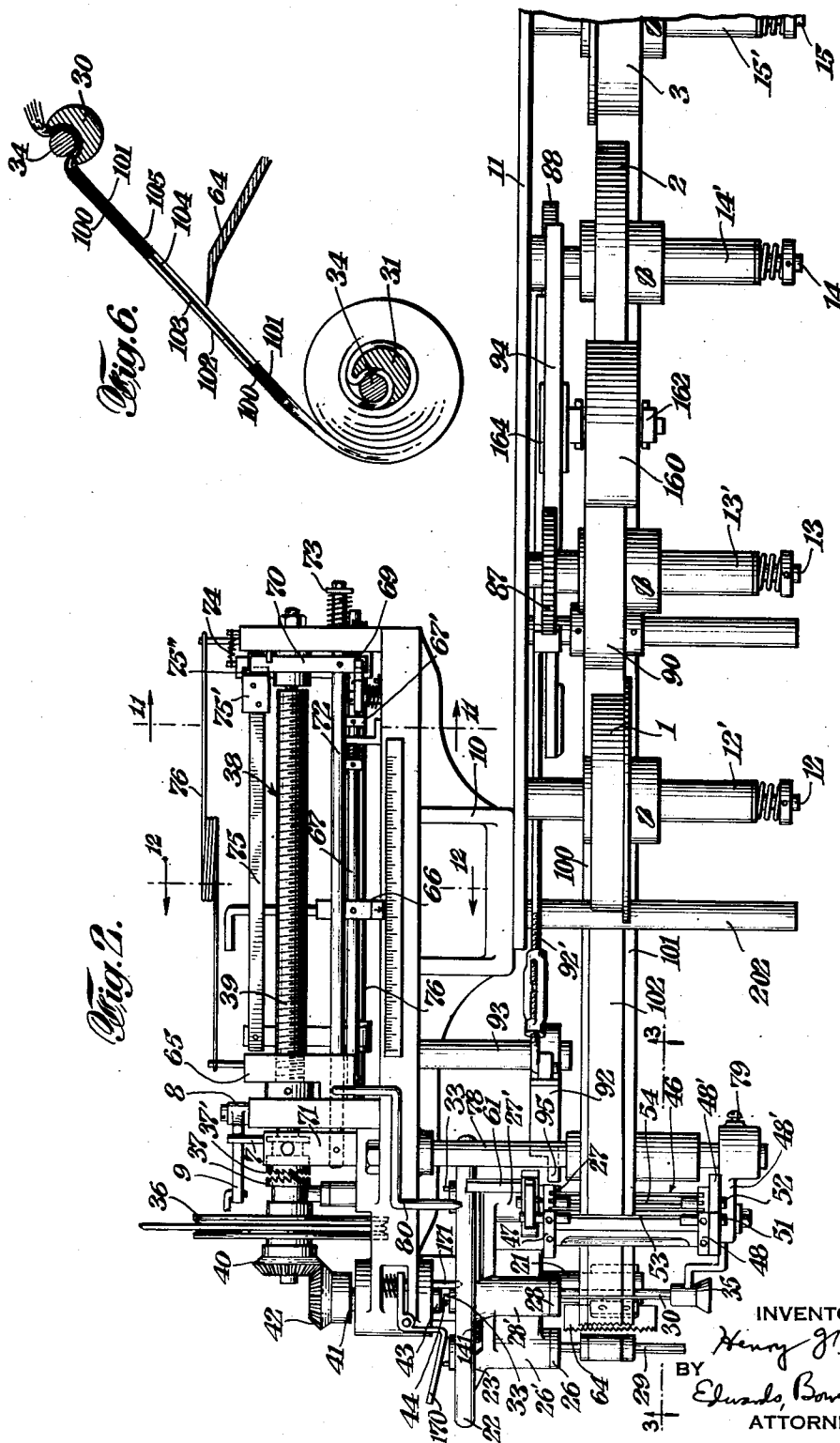
H. F. HILD

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AUTOMATIC WINDING MACHINE

Filed March 15, 1939

5 Sheets-Sheet 2



INVENTOR

Henry J. Hild

BY Eduardo, Burr, & Poole
ATTORNEYS

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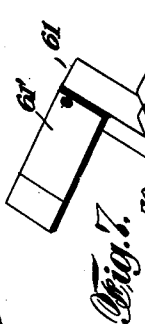
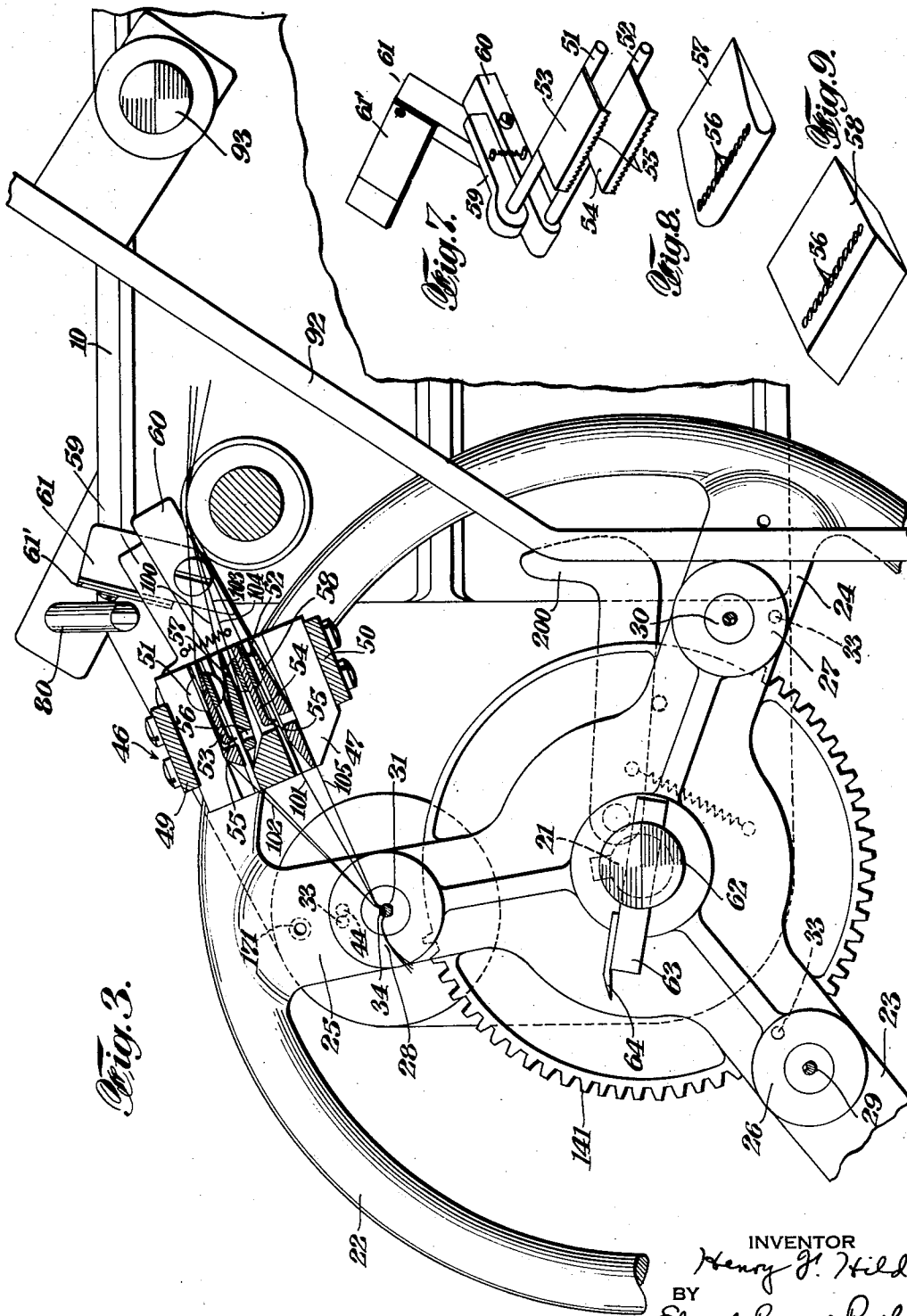
H. F. HILD

2,333,570

AUTOMATIC WINDING MACHINE

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5 Sheets-Sheet 3



INVENTOR
Henry F. Hild
BY
Edwards, Bower & Pool
ATTORNEYS

Nov. 2, 1943.

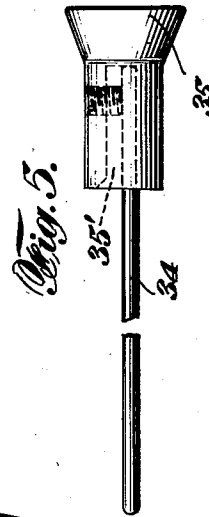
H. F. HILD

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AUTOMATIC WINDING MACHINE

Filed March 15, 1939

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Nov. 2, 1943.

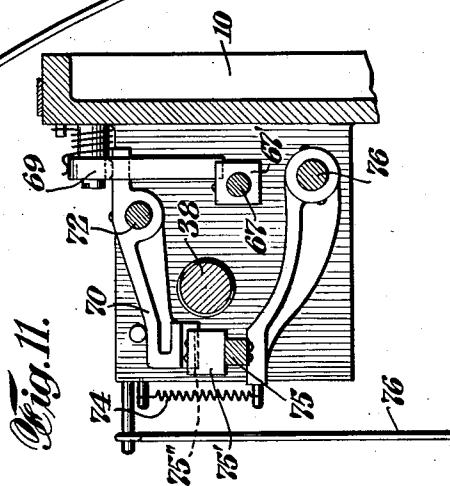
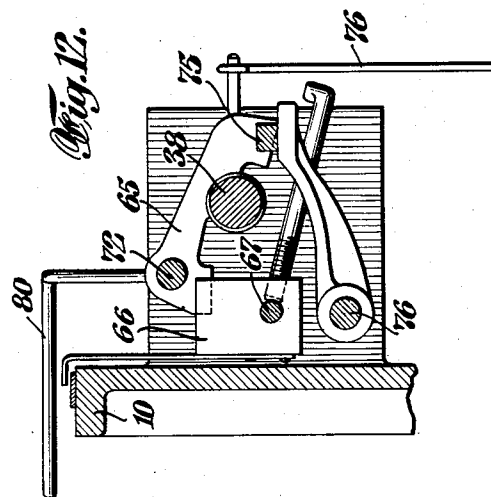
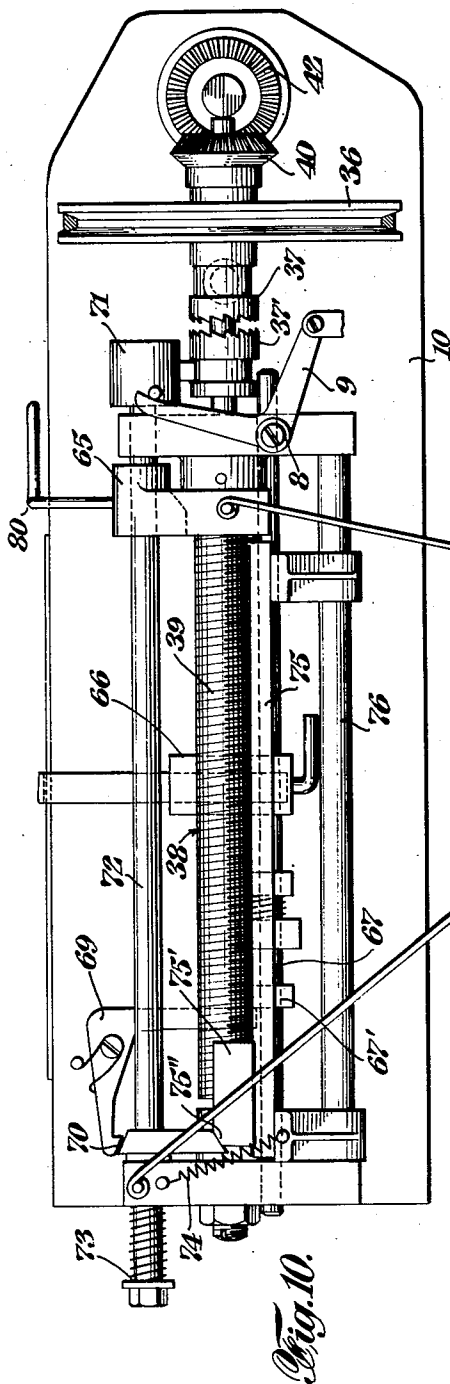
H. F. HILD

2,333,570

AUTOMATIC WINDING MACHINE

Filed March 15, 1939

5 Sheets-Sheet 5



INVENTOR
Henry G. Held
BY
Edwards, Bower & Pool
ATTORNEY

UNITED STATES PATENT OFFICE

2,333,570

AUTOMATIC WINDING MACHINE

Henry Frank Hild, Plainfield, N. J., assignor to
Condenser Corporation of America, South
Plainfield, N. J., a corporation of New York

Application March 15, 1939, Serial No. 261,953

20 Claims. (Cl. 242—56)

This invention relates to winding machines for winding into condenser rolls alternate strips of foil and insulation and has for its principal objects to simplify the winding of such rolls, minimize waste of materials and increase the rate of production.

It has heretofore been the practice in the winding of foil and paper or other insulator strips into condenser rolls, for the operator to cut the strips when the condenser roll is completed and to tear away the end portion of the foil strip to insure that no part of the foil strips shall extend beyond the ends of the covering paper strips; for if any part of the foil did extend beyond the ends of the insulation there would be danger of the foil strips touching each other and thus short-circuiting the condenser. This has entailed loss of time and of the foil material. According to this invention this loss is eliminated by automatically perforating the foil and pulling the foil apart at the perforations before the insulating strips are cut, and then cutting the insulating strips at a point between the severed foil ends.

Further objects and advantages of the invention will become apparent from the following detailed description considered in reference to the following drawings of which,

Fig. 1 illustrates a side view of the winding apparatus;

Fig. 2 illustrates a top view of the apparatus;

Fig. 3 illustrates a sectional detail of Fig. 1 taken at line 3—3 of Fig. 2, showing the foil perforating apparatus;

Fig. 4 is another sectional detail of the apparatus shown in Fig. 3 illustrating a different position of the mandrels;

Fig. 5 shows a mandrel pin;

Fig. 6 is an enlarged view showing the separation of the foil strips during the operation of the machine;

Figs. 7, 8 and 9 show details of parts of the perforating mechanism;

Fig. 10 is a rear elevation view of the clutch and drive portion of Fig. 2;

Fig. 11 is a sectional view taken at line 11—11 of Fig. 2; and

Fig. 12 is another sectional view taken at line 12—12 of Fig. 2.

The drawings illustrate a condenser winding machine into which the foil perforating and separating mechanism according to this invention is incorporated.

The winding machine comprises a frame 10 supporting a vertical panel 11 which supports eight pins 12 to 19, inclusive, carrying rotatable spindles 12' to 19', respectively, which support rolls of foil and insulating material such as paper. Rolls 1, 2, 3 and 4 are paper or insulating rolls and rolls 90 and 91 are foil rolls. At the opposite

end of frame 10 from the panel there is fastened a stud 21 on which is journaled a hand wheel 22 which acts as a rotatable mandrel support. A head 62 on this stud holds the hand wheel in place. The hand wheel is provided with three radial arms 23, 24 and 25, each of which carries a hub 26', 27' and 28', respectively, in which are journaled bushings 26, 27 and 28, respectively, through which protrude grooved mandrels 29, 30 and 31, respectively, fixed to their respective bushings. (See Figs. 3 and 4.) Each of the bushings is free to rotate within its hub or bearing 26', 27' or 28' (see Fig. 2), and at the back end of each bushing there is fastened a pinion (140, 140' and 140'' respectively) and also a collar provided with a driving pin 33 (shown in Fig. 2). A mandrel pin 34 having a head 35, shown in Fig. 5, is adapted by placing it in the groove in each mandrel to hold the assembled strips of foil and paper in layers between the pin and groove to cause them to wind up into the condenser roll when the mandrel is rotated, as shown in Fig. 3.

Power means is provided for driving the mandrels. This comprises a power driven pulley 36 (Fig. 2) fastened to a clutch member 37, the pulley and clutch member being free to rotate on a shaft 38 which is journaled in the frame 10. Shaft 38 has threads 39 for a substantial distance at one end, and at the opposite end has attached to it a beveled gear 40. A clutch member 37' attached to the shaft 38 is adapted to engage with clutch member 37 to that when the member 37' is moved sideways into engagement with the other clutch member 37 the entire shaft and beveled gear 40 is rotated. For the purpose of engaging the clutch members there is provided a lever 9 which when operated turns a bell crank 8 against a dog 7 fastened to the clutch journal bearing arm 71, thereby moving the members 37', 71, 72 and 70 to the left (Fig. 2).

As shown in Fig. 2, there is also journaled to the vertical wall of frame 10 another shaft 41 having at one end a beveled gear 42 in engagement with beveled gear 40, and at the opposite end a collar 43 with a driving pin 44 which when the hand wheel 22 is in the position of Figs. 1 to 3, engages the driving pin 33 of the mandrel bushing collar with which it is in engagement; being thereby enabled to drive that mandrel and wind the foil and paper strips into the condenser roll.

There is provided in accordance with this invention an automatic foil strip perforator 46 (shown in section in Figs. 3 and 4) which perforates the foil strip at the proper point so that the foil strip severs when tension is applied at both sides of the perforation, followed by the cutting of the paper strip in the manner hereinafter described. The perforator 46 comprises two

end blocks 47 and 48 joined at the top and bottom by bars 49 and 50. This device 46 is held by an arm 48' attached to block 48, a pin 78 fixed to the frame 10 being passed through a hole in arm 48'; and the arm 48' is fixed to the pin 78 by set screw 79. Extending between the end blocks are two rotatable pins 51 and 52 (see the sectional view of Fig. 3) each having held between its ends a plate 53 and 54, respectively, each plate having perforating teeth 55 attached to protrude into holes 56 of perforation plates 57 and 58, respectively, fixed between the end blocks 47 and 48. Fig. 7 shows a detail of the assembly of plates 53 and 54 and their pins. Fig. 8 illustrates a detail of fixed plate 57 and Fig. 9 shows fixed plate 58. Pin 51 has fastened to one end a lever 59 and pin 52 similarly has fastened to it a lever 60 immediately under and in sliding engagement with lever 59. Lever 60 has fastened to it an arm 61 carrying flexible engaging plates 61' which extend horizontally and are adapted to be operated automatically to rotate pins 51 and 52 and thus depress teeth 55 into holes 56 to perforate the foil strips at the proper time along the line of the perforated teeth.

As shown in Figs. 1, 2, 3 and 4, there is attached to the head 62 of the stud 21 a bar 63 having at one end a knife blade 64 which functions to cut the paper strips after the foil has been perforated and broken apart.

For determining the amount of paper and foil strip permitted to be wound on the mandrel before the perforating and cutting of the strips, there is provided a mechanism (shown in Fig. 2) for counting the revolutions of the mandrel. This is the mechanism shown in Weiss Patent 2,166,852 issued July 18, 1939. This comprises a half nut 65 slidably pivoted at one side thereof on a rod 72 and engaging the threaded shaft 39 so that when this half nut is in engagement with the rotating shaft it travels to the right (with reference to Fig. 2) until it strikes a stop 66 fixed to a bar 67. Bar 67 has at its end a dog 67' which strikes a catch 68 adapted to engage a head 70 located at the end of shaft 39. Head 70 is rigidly fastened to bar 72, the other end of the bar being attached to the journal bearing arm 71, which moves clutch 37'. When the stop 66 is engaged by the traveling half nut 65 the catch 68 is lifted from head 70 causing the latter to spring to the right (with reference to Fig. 2) by action of compression spring 73, and thus disengage the clutch members 37 and 37' so that the mandrel which is being driven now stops. At the same time, due to the disengagement of the under surface of head 70 from over member 75' on bar 75, spring 74 is permitted to lift bar 75, which lifts the half nut out of engagement with the threads 39, pivoting it on bar 72 and permitting the half nut to return home by the action of hairpin spring 76. When the half nut is almost back in its initial position the bar 80 attached to the half nut strikes the cushion plates 61' attached to the arm 61 of the perforating mechanism, in passing, because the half nut is now tilted toward arm 61 by bar 75 to permit this striking. The striking of plate 61 rotates the shafts 51 and 52 to produce a line of perforations in the foil strips which are under the teeth. These shafts 51 and 52 then drop back to the unperforating position by the weight of arms 59 and 60.

There is provided a braking mechanism for braking the rotation of the foil rolls 90 and 91. This apparatus (shown in Fig. 1) comprises a rod 92 pivoted at pin 93 to the frame and connected

by a connecting rod 92' with a ratchet pawl 94 which pivots at pin 94. On the spindles 13 and 17 to which are fixed the foil rolls 90 and 91 there are fastened ratchet wheels 87 and 88, respectively, adapted to be engaged by the pawl teeth 85 and 86, respectively. The arrangement is such that when the hand wheel 22 is rotated the hub 27' moves out of engagement with the portion 95 of rod 92, allowing the spring 82 to pull the pawl teeth 85 and 86 into engagement with the respective ratchet wheels 87 and 88, thus stopping the rotation of the foil rolls. Then when the next hub 28' on the hand wheel pushes member 95, the pawls are disengaged, allowing the foil rolls to rotate again.

There is also provided a stationary mutilated gear 141 fastened on fixed stud 21 whose teeth are cut away approximately 120 degrees as shown in Figs. 3 and 4 which gear is in engagement with two of the pinion gears 140, 140' and 140'' rigidly fastened to the bushings 26, 27 and 28 of mandrel shafts 29, 30 and 31, respectively. When hand wheel 22 is rotated in a counterclockwise direction pinion gear 140'' engages gear 141 and rotates mandrel 31. The first teeth of gear 141 are so positioned that the pinion gears do not engage it and are free to rotate while in the winding position.

To facilitate the feeding of the strips of foil to the mandrel there is provided a feeding mechanism comprising idler wheels 160 and 161 (see Figs. 1 and 2), the wheel 160 being held in frictional engagement with the foil roll 90 and paper roll 2 and the other wheel 161 being held in frictional engagement with the foil roll 91 and the paper roll 4. The top wheel is journaled at the end of an arm 162, the opposite end of this arm being pivoted on lever arm 163, one end of this latter lever 163 being pivoted at the spindle of the paper roll 2 and the other end having a weight 164 for causing the idler wheel to rest firmly on the rolls 90 and 2. By this arrangement the idler wheel is always maintained at the same definite frictional engagement with each of rolls 90 and 2. The lower idler wheel 161 is similarly journaled on the lower end of arm 165, the upper end of which is pivoted on the end of a lever arm 166 journaled on the spindle of roll 4. The opposite end of this latter lever 166 carries a weight 167 which always pulls the idler wheel up against the two rolls 4 and 91.

When the insulating strips are pulled the idler wheels 160 and 161 rotate and tend to rotate the foil rolls with which the idlers are in engagement. This arrangement facilitates the feeding of the foil strips by causing the rotation of the foil rolls 90 and 91 when the ratchet pawls 85 and 86 are not engaged. This foil feeding arrangement is described and claimed in greater detail in my copending application, Serial No. 261,952, filed concurrently herewith, now Patent No. 2,228,764 issued January 14, 1941.

In the operation of the machine the operator leads the strips over pin 201, held in the panel, and under pin 202; and then threads the foil strips 100 and 101 under the respective perforating plates 53 and 54 of perforator 46, as shown in Fig. 3, and also threads the paper strips 102, 103, 104 and 105 through device 46, the paper 102 passing over plate 53, paper 103 and 104 passing under plate 57, and paper 105 passing under plate 58, as shown in Figs. 3 and 4. These layers of strips are then run past the groove of mandrel 31 and the mandrel pin 34 is inserted in the groove and into the end of bushing 28 to hold them. The

outer end of the mandrel fits into the space 35' of the mandrel pin head 35. (See Fig. 5.) The starting lever 9 connected with member 71, is then operated to engage the clutch members 37 and 37' and to depress bar 75 by the riding of head 70 on bevel 75'' to the top of member 75' on bar 75. The shafts 38 and 41 and mandrel 31 are rotated, thus rolling the condenser. The half nut 65, which prior to the rotation of shaft 38 was in its initial position shown in Fig. 2, moves to the right on the rotating shaft 38, and at the end of a predetermined number of mandrel turns the half nut 65 strikes the stop 66, moving bar 67 to the right and thus lifting catch 69 from head 70 and causing this head on the clutch member 37' attached thereto to spring to the right away from the other clutch member 37. This stops the revolution of the mandrel and simultaneously causes bar 75 to lift half nut 65 from the worm, causing the half nut to spring to the left so that immediately the perforator arm 61' is struck by bar 80, causing the two foil strips 100 and 101 to be perforated by the perforating members. Immediately after the perforating operation the perforating plates move back to their initial position due to the weight of arms 59 and 60. The operator then grasps the hand wheel at the same time operating catch 170 to retract pin 171 from an indentation in the hand wheel, and rotates the hand wheel counterclockwise (with reference to Fig. 1) for 120 degrees to bring the next mandrel 30 into operating relation with the shaft 41 where it is held in position by pin 171.

After the hand wheel 22 starts to turn, the pinion gear 140'' engages gear 141 thus rotating mandrel 31 further, and the perforated foil is pulled and driven to the winding position of the next mandrel. Hub 27' then leaves engagement with bar 95, and the spring 92 rotates the lever 94 in the clockwise direction about its pivot 84 so that the pawl teeth 85 and 86 engage respectively with ratchet wheels 87 and 88 that are fastened rigidly on the foil spindles. Thus, when the operator has rotated the hand wheel partway, for example, about 60 of the 120 degrees rotation to the next mandrel position, the foil spindles are stopped from further rotation by the brake, and the foil being thereby stopped from further feeding, breaks along the line of perforations which have just been made. As the hand wheel continues to rotate to the full 120 degrees the paper strips continue to be pulled so that they will lay over the next succeeding mandrel, and the broken foil ends separate several inches within the paper strips. Fig. 4 shows the turned position of the hand wheel at the instant the foils are breaking apart at 130. As the operator continues to operate the hand wheel to the full 120 degrees the ends of the foils 100 and 101, severed at the perforations, pull further apart, assuming the position shown in Fig. 6; and during this turning of the hand wheel the mandrel which has just been wound continues to rotate in the winding direction by the meshing of the pinion 140'' with stationary gear 141 so as to continue to roll up the severed strips of foil and the uncut insulating strips. At the end of the 120 degrees travel the insulating strips engage the stationary cutter 64, as shown in Fig. 6, which cutter is adapted to cut the paper about midway between the severed ends of the foil strips. A label may then be pasted over the roll to hold the strips on the wound mandrel.

Terminals may then be attached to the foils of the wound condensers. If the foil rolls 90 and 91 be positioned at their spindles so that the edge of

one foil strip extends beyond the edge of the paper strips, and the opposite edge of the other foil strip extends beyond the opposite edge of the paper strips, the condenser roll will be formed with the foil edges protruding from the two ends of the roll, so that conducting terminals may readily be soldered to these protruding foils.

Since the insulating and foil strips will extend over the next mandrel 30 at the end of the 120 degrees rotation, it is only necessary in order to start the next condenser roll, to place the mandrel pin in a groove in mandrel 30 prior to the cutting of the paper strips. Then after the cutting the roll on mandrel 30 is wound up in the same way as described for the mandrel 31, because mandrel 30 is now in operating relation with shaft 41.

It will be noted that when the mandrel 30 is coming up to the winding position while the hand wheel is being turned, its driving pin 33 engages with a movable spring latch cam 200 which rotates with pin 33 to the top of the hand wheel so that when the pin leaves the camming surface it has positioned the mandrel with the groove upward, ready to receive the foil and insulating strips for the succeeding mandrel winding. Just before the mandrel reaches the operating position in relation to its driving shaft 41 the latch 200 drops back to the position shown in Fig. 1, ready to operate on the driving pin of the next mandrel when the hand wheel is again rotated.

By reason of the automatic perforating and severing of the foil and cutting of the paper strips, the labor heretofore involved of tearing out the ends of the foil to insure that they lie well within the ends of the paper is eliminated; and also the wastage of foil heretofore attendant upon tearing out parts of it is eliminated. By the use of the foil perforator in connection with the brake for the foil roll, it has been found that the output of a machine can be greatly increased. It will also be noted that by reason of the fact that the foil is perforated and not cut it is not thrown out of line when severed, as due to the perforation the foil severs at the perforation without moving out of line.

I claim:

1. A foil-severing mechanism in combination with a machine for winding foil and insulating strips into condenser rolls of the type comprising a drive shaft, an engageable clutch through which said shaft is adapted to be driven from a source of power, a mandrel support having journaled therein a plurality of mandrels, said support being rotatable for placing said mandrels successively in driving relation with said drive shaft, a lever for engaging said clutch to start the mandrel winding, and a device for automatically disengaging said clutch upon the expiration of a predetermined number of mandrel revolutions, said severing mechanism comprising: foil perforating teeth positioned adjacent the foil traveling to the mandrel, an arm for operating the teeth and a lever operable upon disengagement of said clutch to operate said arm and thus produce a line of perforations across the foil, an interlocking means adapted to interlock with the mandrel by movement of said rotatable mandrel support, said interlocking means when interlocked with the mandrel being adapted to prevent rotation of the mandrel in the unwinding direction, a braking means operated by movement of said mandrel support to retard the foil strips at the side of the perforations remote from the mandrel against traveling toward the mandrel when said mandrel support is turned to move the

wound mandrels out of driving relation with the drive shaft, so that the foil strips are pulled apart at the perforations and the torn ends separate during the turning, thereby permitting severing of the insulating strips between the separated foil ends.

2. In a foil and insulating strip winding machine comprising a movable frame a winding mandrel mounted on said frame and rotatable relatively thereto, a power drive for said mandrel, a plurality of spindles for holding rolls of foil and insulating strips to be wound into a roll on the mandrel, and means for automatically stopping the rotation of the mandrel after a predetermined number of turns is wound thereon: a perforating device through which the foil strips are passed in traveling from the foil rolls to the mandrel, said perforating device having movable perforating teeth for perforating the foil, a lever automatically operated upon the stopping of the rotation for moving the teeth to perforate the foil strips, and a brake which when set holds the foil rolls from further rotation, said movable frame associated with the mandrel acting to set the brake and operate on the mandrel side of the perforations to pull the foil strips and thereby sever the foil at the perforations.

3. The method of making condenser rolls which comprises winding on a mandrel alternate interleaved strips of insulating material and conducting material, stopping the rotation of the mandrel after the desired number of turns has been wound, perforating the conducting strips along a line crossing said conducting strips, at a position outside the mandrel winding, moving the mandrel in a direction to pull the strips in the general direction they were traveling while the mandrel was rotating while holding the mandrel against rotation in the unwinding direction, then holding those parts of the conducting strips which are at the side of the perforations remote from the mandrel against further travel in the direction of the mandrel while the mandrel is being moved, thereby parting the conducting strips at the perforations, pulling the parted ends of the conducting strips apart, and then severing the insulating strips between the parted ends of the conducting strips.

4. In a winding machine for winding a plurality of foil and insulating strips into a condenser roll: a winding mandrel on which the strips are wound, said mandrel having a pinion attached to it, a turns-counter operated means for automatically stopping the winding of the roll on the mandrel after a number of turns is wound, a perforator for perforating the foil after the turns are wound, a movable frame on which the mandrel is mounted for moving the mandrel in a direction to pull the strips in the general direction in which said strips were traveling to the mandrel during the winding, a fixed gear for engaging the pinion on the mandrel during said movement of the movable frame for producing further mandrel rotation, a brake operating on the foil at the side of the perforations remote from the mandrel for tensioning the foil to part it at the perforations, and a knife for severing the insulating strips at a position between the separated severed ends of the foil.

5. Mechanism adapted to sever a foil strip which is wound with insulating strips into a condenser in a winding machine having a winding mandrel supported on a movable frame and driven from a source of power through an engageable clutch, a turns-counting device which

automatically disengages said clutch when a predetermined number of turns of foil and insulating strips is wound on said mandrel from rolls, said movable frame being operable to pull from the rolls, after a winding is made on the mandrel, sufficient additional length of the strips to reach the winding position of the mandrel for the succeeding winding after the strips are severed at a position between the wound mandrel and the rolls, said severing mechanism comprising: foil perforating teeth positioned adjacent the foil strip traveling from the foil roll to the mandrel, an arm operative to move said teeth into perforating engagement with the foil strip, a lever moved upon the disengagement of said clutch to operate said arm and thus produce a line of perforations across the foil strip, an interlocking means adapted to interlock with the mandrel by movement of said movable frame, which when interlocked with the mandrel, prevents rotation of the mandrel in the unwinding direction, a brake operated during movement of said movable frame to hold the foil roll against further rotation in the direction of feeding to the mandrel so that the foil pulls apart at the perforations and the parted ends separate for a distance, thereby permitting severing of the insulating strips between the separated foil ends.

6. A mechanism adapted to sever a foil strip which is wound with insulating strips into a condenser in a winding machine having a winding mandrel supported on a movable frame which when in its winding position may be driven from a source of power through an engageable clutch, a turns-counting device which automatically disengages said clutch when a predetermined number of turns of foil and insulating strips is wound on said mandrel from rolls, said movable frame being operable to pull from the rolls, after a winding is made on the mandrel, sufficient additional length of the strips to reach the winding position of the mandrel for the succeeding winding after the strips are severed between the wound mandrel and the rolls, said severing mechanism comprising: foil perforating teeth positioned adjacent the foil strip travelling from the foil roll to the mandrel, an arm operative to move said teeth into perforating engagement with the foil strip, a lever moved upon the disengagement of said clutch to operate said arm and thus produce a line of perforations across the foil strip, gear means movable into engagement by movement of said movable frame to rotate the mandrel in the direction to continue the winding of the strips thereon, a brake operated during movement of said movable frame to hold the foil roll against further rotation in the direction of feeding to the mandrel so that the foil strip severs at the perforations and the severed ends separate for a distance, thereby permitting severing of the insulating strips between the separated foil ends.

7. In a foil and insulating strip winding machine comprising a winding mandrel supported on a movable frame, a power drive, a releasable clutch through which the mandrel is driven from said drive, a plurality of spindles for holding rolls of foil and insulating strips to be wound into a roll on the mandrel, and means for automatically disengaging the clutch after a predetermined number of turns is wound on the mandrel: a perforating device through which the foil strips are passed in travelling from the foil rolls to the mandrel, said perforating device having movable perforating teeth for making a line of perforations across the foil, a lever operated upon

release of the clutch for moving the teeth to perforate the foil strips, a brake which when set holds the foil strips at the side of the perforations remote from the mandrel from further feeding toward the mandrel, said movable frame being adapted to move the mandrel to pull the foil strips from the mandrel side of the perforations and to set the brake and thereby sever the foil at the perforations.

8. In a winding machine for winding a plurality of interleaved foil and insulating strips from supply rolls to form a condenser: a movable frame having mounted on it a mandrel on which the strips are rolled, means for stopping the rotation of the mandrel, a foil perforator, an arm which automatically operates the perforator when the mandrel rotation is stopped to produce a line of perforations across the foil before the part of the foil thus perforated reaches the condenser roll, said movable frame carrying said mandrel being operable on the part of the foil which is on the side of the perforations nearer the mandrel to pull the perforated part some distance beyond the perforator, a device operated during motion of said frame for rotating the mandrel in the direction to continue the rolling of the condenser, and a brake operated during motion of said frame for holding the foil at the side of the perforations remote from the mandrel.

9. In a foil and insulating strip winding machine comprising a movable frame, a winding mandrel mounted on said frame, a power drive for said mandrel, a plurality of spindles for holding rolls of foil and insulating strips to be wound into a roll on the mandrel, and means for automatically stopping the rotation of the mandrel after a predetermined number of turns is wound thereon: a perforating device through which the foil strips are passed in traveling from the foil rolls to the mandrel, said perforating device having movable perforating teeth for perforating the foil, means automatically operated upon the stopping of the rotation for moving the teeth to perforate the foil strips, a brake which when set holds the foil rolls from further rotation, said brake being operated by movement of said movable frame so that the foil strips are pulled by movement of the frame from the mandrel side of the perforations against the force of the brake, to sever the foil at the perforations.

10. In a winding machine for winding a plurality of interleaved foil and insulating strips from supply rolls to form a condenser: a movable frame, a rotatable mandrel mounted on said frame on which the strips are rolled, means for stopping the rotation of the mandrel, a foil perforator, a device which automatically operates the perforator when the mandrel rotation is stopped to produce a line of perforations across the foil before the part of the foil thus perforated reaches the condenser roll, said frame when moved operating on the part of the foil which is at the side of the perforations nearer the mandrel to pull the perforated part some distance beyond the perforator, a device operated during motion of said frame for rotating the mandrel in the direction to continue the rolling of the condenser, and a brake operated during motion of said frame for holding the foil at the side of the perforations remote from the mandrel.

11. In a machine for winding a succession of condenser rolls, a plurality of rotatable mandrels mounted on a support which is movable to successive positions to place the mandrels suc-

cessively in operating relation with a mandrel drive, means for leading a plurality of conducting and insulating strips in interleaved relation to the mandrel which is related to the drive, a device for perforating the conducting strips after turns have been wound on the driven mandrel, a brake operable to retard the movement of the conducting strips toward the driven mandrel from the side of the perforations remote from the mandrel, the counterclockwise movement of the mandrel support from one mandrel position to the next serving to operate the brake and being in a direction to pull the strips over the succeeding mandrel moved into relation with the drive by said movement and to part and separate the parted conducting strip ends at a place between the two last-mentioned mandrels, a device for continuing the rolling up of the strips on the wound mandrel when the mandrel support is thus moved, a device for clamping the strips to said succeeding mandrel, a knife for cutting the insulating strips at a position between the said two last-mentioned mandrels and between the separated conducting strip ends, whereupon said succeeding mandrel can be driven and the roll on the first-mentioned mandrel completed and removed from its mandrel.

12. In a machine for winding a succession of condenser rolls, a plurality of rotatable mandrels mounted on a support which is movable to successive positions to place the mandrels successively in operating relation with a mandrel drive, means for leading a plurality of conducting and insulating strips in interleaved relation to the mandrel which is related to the drive, a device for perforating the conducting strips after turns have been wound on the driven mandrel, a brake operable to retard the movement of the conducting strips toward the driven mandrel from the side of the perforations remote from the mandrel, the movement of the mandrel support from one position to the next serving to operate the brake and being in a direction to pull the strips over the succeeding mandrel moved into relation with the drive by said movement and to part and separate the parted conducting strip ends at a place between the two last-mentioned mandrels, an interlocking means adapted to interlock with the mandrel by movement of said support to prevent rotation of the mandrel in the unwinding direction, a device for clamping the strips to said succeeding mandrel, a knife for cutting the insulating strips at a position between the said two last-mentioned mandrels and between the separated conducting strip ends, whereupon said succeeding mandrel can be driven and the roll on the first-mentioned mandrel completed and removed from its mandrel.

13. Apparatus according to claim 12 in which said mandrels are spaced apart on the support by a distance at least as great as said separation of the conducting strips so that said separation lies between said mandrels when the insulating strips are cut.

14. In a machine for winding a succession of condenser rolls, a plurality of rotatable mandrels mounted on a frame which is movable to successive positions to place the mandrels successively in operating relation with a mandrel drive, means for leading a plurality of conducting and insulating strips in interleaved relation to the mandrel which is related to the drive, a device for parting the conducting strips after turns have been wound on the driven mandrel, means for retarding the movement of the conducting strips to-

ward the driven mandrel from the parted side remote from the mandrel, the movement of the frame from one position to the next being in a direction to pull the strips over the succeeding mandrel moved into relation with the drive by said movement and to separate the parted conducting strip ends at a place between the two last-mentioned mandrels, an interlocking means adapted to interlock with the mandrel by movement of said support to prevent rotation of the mandrel in the unwinding direction, a device for clamping the strips to said succeeding mandrel, whereby the insulating strips may be cut at a position between the two last-mentioned mandrels and between the separated conducting strip ends and the succeeding mandrel then driven and the roll on the first-mentioned mandrel completed and removed from its mandrel.

15. In a winding machine for winding a plurality of interleaved foil and insulating strips from supply rolls to form a condenser: a movable frame carrying a mandrel on which the strips are rolled, a foil perforator, means for automatically operating the perforator to produce a line of perforations across the foil before the part of the foil thus perforated reaches the condenser roll, said movable frame being operable with the rotating mandrel to pull the part of the foil in advance of the perforation so as to part and sever the foil along the line of perforations while the foil is being retarded at a point in back of the perforations by a braking device operated during the motion of said frame.

16. In a winding machine for winding a plurality of interleaved foil and insulating strips from supply rolls to form a condenser: a movable frame carrying a mandrel on which the strips are rolled, means for measuring the foil and insulating strips wound on the mandrel, a foil perforator, means which automatically operate the perforator to produce a line of perforations across the foil before the part of the foil thus perforated reaches the condenser roll, said movable frame being operable with the rotating mandrel to pull the foil so as to part and sever the foil along the perforations while the foil is being retarded by a braking device operated during the motion of said frame, and having cutting means so arranged on said frame so as to cut the insulating strips between the parted and separated ends of the foil during the completion of the winding up of the condenser.

17. In a machine for winding coil condensers, means for supplying a plurality of foil and insulating strips to a driven mandrel mounted on a movable frame, means for cutting said insulating strips, an automatic clutch mechanism operable after predetermined lengths of foil and insulating strips have been wound, perforating means arranged between the foil supply rolls and the insulating strip cutting means which operate to perforate the foil; the movable frame being adapted to pull on the side of the foil in advance of the perforations, means operating on the foil supply rolls to retard the advance of the foil while under the action of the movable frame so that the foil separates at the perforations; said strip cutting means being affixed to the movable frame to cut the insulating strips between the separated ends of the foil and means mounted on the movable frame for rotating said mandrel to wind up the severed ends of the strips.

18. In a winding machine for winding a plurality of interleaved foil and insulating strips

from supply rolls to form a condenser: a rotatable mandrel driven from a source of power through an engageable clutch, control means adjustable to predetermine the amount of said strips to be wound to disengage said clutch, said control means comprising a half nut slidable in one direction on a threaded revolving shaft driven from the source of power and returnable to starting position, a measuring rod, a device for stopping of the half nut at any fixed point of its travel in one direction on said measuring rod, means set in operation by said stopping device to disengage the clutch from the driven shaft and reverse the direction of travel of said half nut and means operable by said half nut in returning to its original starting position to operate a foil perforator mechanism to produce a line of perforations across the foil, means acting to tension the foil against the pull of the winding mandrel so as to sever and separate the perforated foil along the line of perforations, and means to cut the insulating strips between the separated ends of the foil.

19. In a condenser winding machine a rotatable mandrel for winding up interleaved foil and insulating strips driven from a source of power through an engageable clutch, a movable frame on which said mandrel is mounted, control means connected to the source of power for disengaging the clutch when definite lengths of foil and insulating strips have been wound, said means controlling the operation of a lever for operating foil perforators to perforate the foil at that time, said movable frame being operable with the rotating mandrel to pull the foil, a brake for preventing further feeding of the foil while said movable frame is in motion so that the foil strips sever and separate at the perforations, means affixed to the movable frame for severing the insulating strips and means for rotating the mandrel after the severance of the foil and the insulating strips to wind the trailing ends of the strips onto the mandrel.

20. A foil measuring and severing mechanism in combination with a machine for winding foil and insulating strips into condenser rolls of a type comprising a rotatable mandrel supported on a movable frame and driven from a source of power through an engageable clutch, said foil measuring and severing mechanism comprising a half nut slidable on a threaded revolving shaft driven from the source of power, a measuring rod, a device for stopping the travel of the half nut at a predetermined point, means set in motion by said stopping device to disengage said clutch, means to return the half nut to its original position, a foil perforator actuated by a lever on the return of said half nut to produce a line of perforations across the foil, an interlocking means adapted to interlock with the mandrel by movement of the movable frame, said interlocking means when interlocked with the mandrel being adapted to prevent rotation of the mandrel in the unwinding direction, a brake operable upon the movement of said frame to retard the feeding of the foil toward the driven mandrel, so that during the movement of said movable frame the foil is severed and separated along the line of perforations, and cutting means so arranged on said movable frame as to sever the insulating strips between the separated foil ends to produce a condenser of the exact length of the foil measured.

HENRY F. HILD.