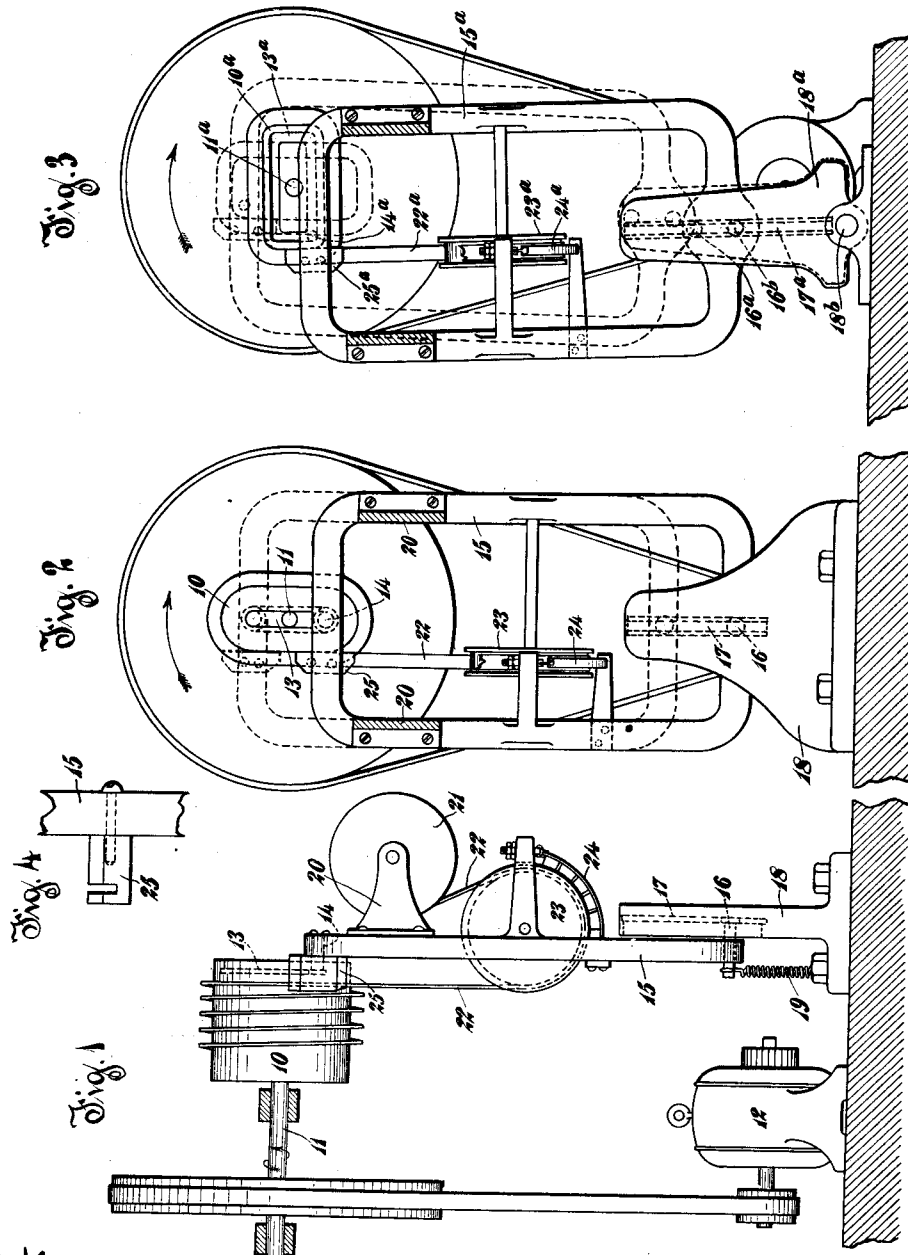


A. H. WOUTERS.
WINDING MACHINE.
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1,028,983.

Patented June 11, 1912.



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WINDING-MACHINE.

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To all whom it may concern:

Be it known that I, ALFRED H. WOUTERS, belonging to the Kingdom of the Netherlands, residing at Norwood, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Winding-Machines, of which the following is a full, clear, and exact specification.

My invention relates to coil-forming machines and especially to automatic machines for forming non-circular coils of metallic strip wound edgewise.

Heretofore in winding coils of this sort it has generally been necessary to stop the winding machine at each quarter or half turn in order to shift certain bending levers. On account of this slow and tedious method of winding the cost of these coils has oftentimes been prohibitive in cases where their use would be most desirable.

It is the object of my present invention to provide a machine in which these coils are wound automatically. Moreover, with my invention a single operator is sufficient, whereas heretofore two or more operators have been required.

My invention comprises the combination in an edgewise winding machine, of a rotatable former, a movable frame carrying a supply of metallic strip to be wound, and an anti-buckling guide movable with said frame.

More specifically my invention comprises the combination in a machine for winding metallic strip or ribbon edgewise, of a rotatable former the periphery of which is composed of straight lines and arcs of circles, a guide for preventing buckling of the strip, means for moving said guide curvilinearly as the strip is being bent around the curved parts of the former, and means for moving said guide parallel to a straight part of the former intermediately.

Many other features of my invention will appear from the description and drawings and will be particularly pointed out in the claims.

Figure 1 is a front elevation of one form of bending machine embodying my invention; Fig. 2 is an end elevation of the same with some parts broken away; Fig. 3 is a view similar to Fig. 2, showing a modification; and Fig. 4 is a plan view on a larger scale of the anti-buckling guide.

The former 10 mounted on the shaft 11 is rotated in any desired manner, as by means of an electric motor 12. In Figs. 1 and 2, the former is arranged to wind coils having two parallel sides joined by semi-circular portions. The former is of the same shape. In the end of the former 10 is a slot 13 in which slides a pin 14 on the upper end of a frame 15. The slot 13 joins the two centers of the semi-circular ends of the former so that the pin 14 may come to either of these two centers. This slot preferably has an enlarged inner portion for receiving the enlarged head of the pin 14, as shown. At the lower end of the frame 15 is a pin 16 which fits into a slot 17 on a stationary support and guide 18. The frame 15 with its attached parts is biased downward either by gravity or a spring 19 or both. If desired, other means may be provided for forcing this frame downward at the proper time.

Mounted near the upper end of the frame 15 are supports 20 in which is rotatably supported the reel 21 of material to be wound into a coil. From this reel 21 the strip 22 of copper or other material to be wound passes around a disk 23 and under an adjustable brake 24 to the slot in an anti-buckling guide or bending bar 25. In the guide 25 is a slot through which the strip 22 passes as it is being fed onto the former. All of these parts are supported by the frame 15 and move with it.

In the operation of the device, the motor 12 rotates the former 10 in the direction of the arrow about the axis of the shaft 11. Say that the parts start from the position shown in full lines in Fig. 2, with the pin 14 in the lower end of the slot 13. As the former 10 is rotated, the pin 14 moves in a semi-circle about the shaft 11. This causes the frame 15 and its attached parts to move upward to the position shown in dotted lines, in this movement swinging first to the left and then to the right, so that the guide 25 always remains at that point of the former at which the strip 22 is then being bent. As soon as the frame 15 gets into the position shown in dotted lines in Fig. 2, and not before, the guide 25 and the slot 13 and pin 14 allow said frame to move downward in a straight line to the full line position, when the cycle just described is repeated for the

other semi-circular end of the former. In both the curvilinear and the rectilinear movement of the pin 14, the strip 22 is unwound from the reel 21 and drawn around the disk 23 under the brake 24 to the slot in the guide 25.

The operation just described will be repeated automatically until the entire coil is wound, when the machine can be stopped and the coil removed.

In Fig. 3 the former and the coils have two pairs of opposite parallel straight sides, the adjacent sides being joined by quadrants of circles. In the former 10^a is a slot 13^a which joins the different bending centers, which are the centers of the four circles of which the respective quadrants form parts. The frame 15^a is provided with parts similar to those with which the frame 15 of Figs. 1 and 2 is provided, save that at the lower end of the frame 15^a are two pins 16^a and 16^b which engage the slot 17^a in the member 18^a to keep the frame always in line with said slot. This member 18^a is pivoted at 18^b instead of being fixed as the member 18 of Figs. 1 and 2. As the shaft 11^a is rotated in the direction of the arrow, the former 10^a is rotated with it. Say that the parts start from the full line position, with the pin 14^a in the lower left hand corner of the slot 13^a. After a rotation of a little more than 90° this lower left hand corner becomes the upper left hand corner, as shown in dotted lines, this corner in its movement carrying the pin 14^a with it and constraining the guide 25^a to so move that it is always at the point where the strip 22^a is being bent. When the long side of the slot 13^a, which at first was the lower side of said slot, comes into alinement with the slot 17^a, and not until then, the pin 14^a automatically slides downward until it reaches what has become the lower left-hand corner of said slot. This operation is now repeated to wind the next corner of the coil, after the completion of which the pin 14^a slides downward along one of the short sides of said slot. Thus the quadrants at each corner of the coil are wound successively by movements of the former through angles alternately greater and less than 90°, the strip 22^a being unwound from the reel and drawn around the disk 23^a and under the brake 24^a in both the rectilinear and the curvilinear movement of the pin 14^a. As in the modification shown in Figs. 1 and 2, the arrangement of Fig. 3 will continue to operate automatically as long as desired.

Many modifications may be made in the precise arrangements here shown and described, and all such which come within the spirit and scope of my invention I aim to cover in the following claims.

What I claim as new is:—

1. The combination in a winding machine,

of a rotatable non-circular former of fixed shape, a bending bar, and automatic means whereby said bending bar is constrained to so move that the part of the material which is being bent is always in substantially the same position relative thereto.

2. In an edgewise winding machine, a rotatable former, a movable frame carrying a supply of metallic strip to be wound, and an anti-buckling guide movable with said frame.

3. In an edgewise winding machine, a rotatable former, a movable frame carrying a supply of metallic strip to be wound, an anti-buckling guide movable with said frame, and means for causing said frame to so move that the bending surface of the guide is always at substantially the same distance from the periphery of the former.

4. In an edgewise winding machine, a rotatable former, a movable frame carrying a supply of metallic strip to be wound, and an anti-buckling guide and a tension device carried by said frame.

5. In an edgewise winding machine, a rotatable former, a movable frame carrying a supply of metallic strip to be wound, an anti-buckling guide and a tension device carried by said frame, and means for causing said frame to so move that the bending surface of the guide is always at substantially the same distance from the periphery of the former.

6. In a winding machine, a rotatable non-circular former, and a bending guide automatically movable both rectilinearly and curvilinearly so that it is always substantially at the place where the material is being bent.

7. In a coil winding machine, a rotatable former the periphery of which is composed of relatively fixed straight and curved parts, a bending guide, and means for so moving said guide that its bending surface is always at substantially the same distance from the periphery of the former as the curved parts of the coil are being formed and for moving it from one curved part of the former to another intermediately.

8. In a machine for winding metallic strip or ribbon edgewise, a rotatable former the periphery of which is composed of straight lines and arcs of circles, a guide for preventing buckling of the strip, and means for moving said guide curvilinearly as the strip is being bent around the curved part of the former and rectilinearly intermediately.

9. In a machine for winding metallic strip or ribbon edgewise, a rotatable former the periphery of which is composed of straight and curved parts, a slotted bar for preventing buckling of the strip, means for moving said bar curvilinearly as the strip is being bent around the curved parts of the

former, and means for moving said bar parallel to a straight part of the former immediately.

10. In a machine for winding metallic strip or ribbon edgewise, a rotatable former the periphery of which is composed of relatively fixed curved and straight parts, a guide for preventing buckling of the strip, and means for moving said guide so that it is always at the place of bending as the strip is being bent around the curved parts of the former and for moving it from one curved part to another immediately.

11. An apparatus for winding edgewise a metallic strip or ribbon, which comprises a non-circular former provided in its end with a slot which is parallel with its periphery, a frame automatically movable relatively to said former, means mounted on said frame for preventing the strip from buckling, and a pin in said frame engaging the slot in said former.

12. In an edgewise winding machine, a rotatable member having a forming surface and a guiding surface parallel thereto, a movable member engaging said guiding surface and carrying a supply of metallic strip to be wound, and means attached to said movable member for preventing buckling of the strip.

13. In an edgewise winding machine, the combination of a rotatable former the periphery of which is parallel to a slot in its end, a pin engaging said slot, and means connected to said pin for preventing buckling.

14. In an edgewise winding machine, the combination of a rotatable former the periphery of which is parallel to a guiding surface thereon, a member having a guiding surface, a movable frame engaging the guiding surfaces of said member and said former, and a bending guide carried by said frame.

15. In an edgewise winding machine, the combination of a rotatable former the periphery of which is parallel to a guiding surface thereon, a member having a guiding surface, a movable frame carrying a supply of metallic strip to be wound and engaging the guiding surfaces of said member and said former, and a bending bar carried by said frame.

In testimony whereof I affix my signature, in the presence of two witnesses.

ALFRED H. WOUTERS.

Witnesses:

GEO. B. SCHLEY,
FRED J. KINSEY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."