Aug. 10, 1948. K. E. QUEITZSCH 2,446,608

MACHINE FOR BENDING WIRE INTO RIBBON FORM

Filed May 2, 1947 3 Sheets-Sheet 1

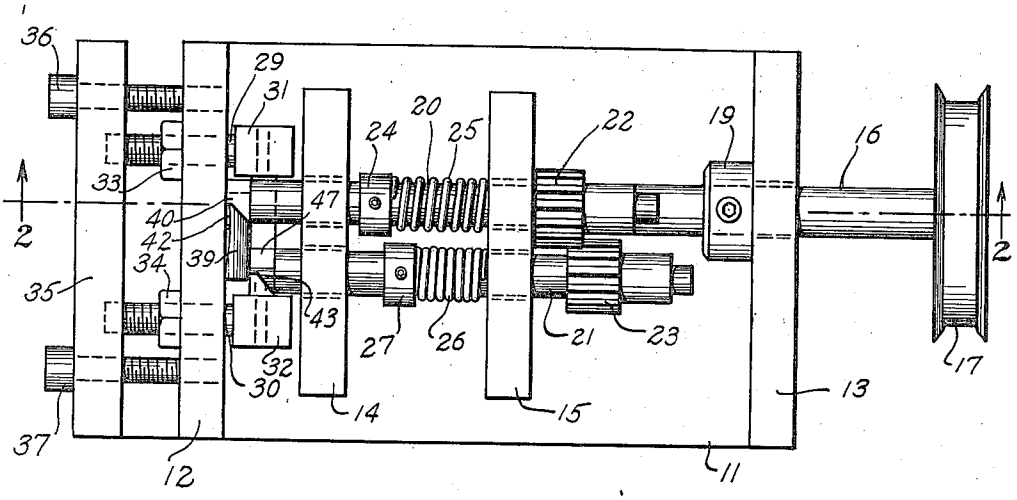


Fig. 1

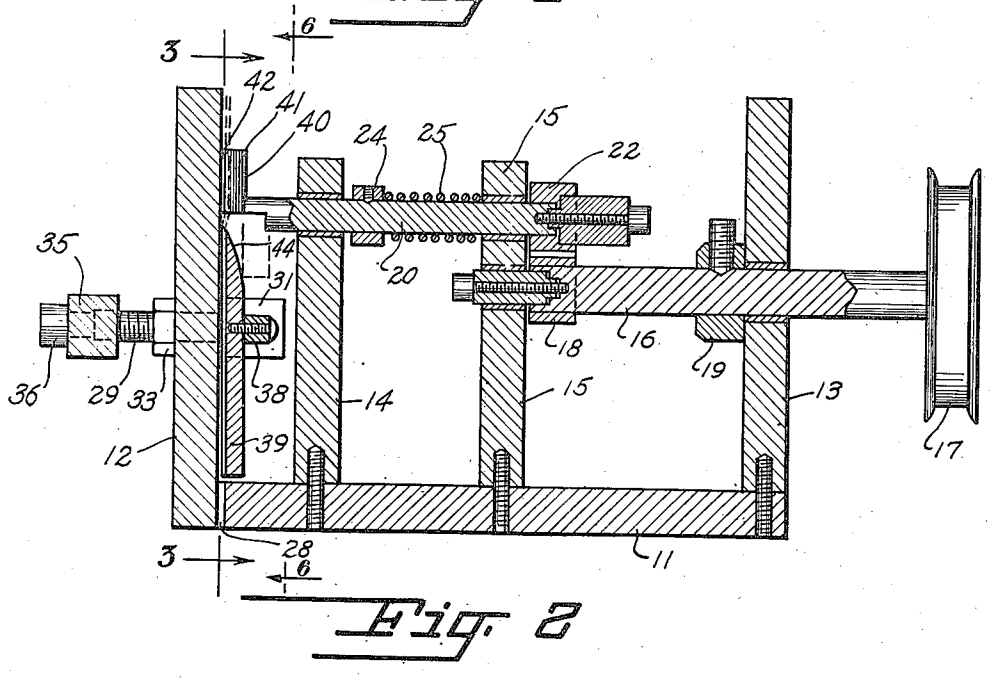


Fig. 2

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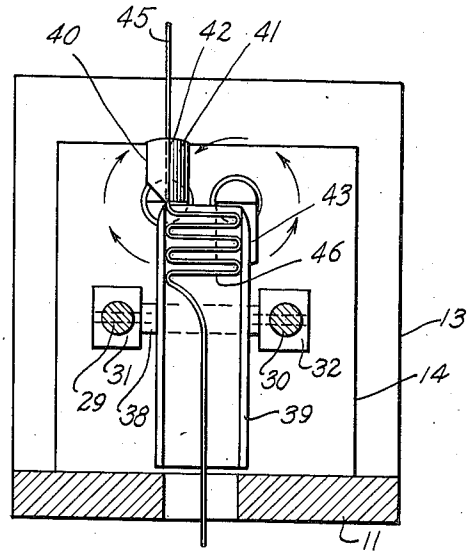


Fig. 3

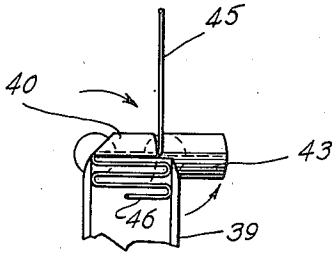


Fig. 4

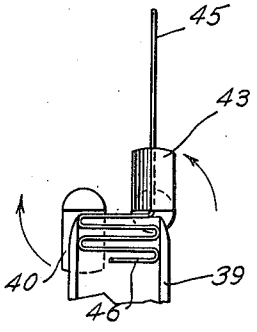


Fig. 5

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Filed May 2, 1947 3 Sheets-Sheet 3

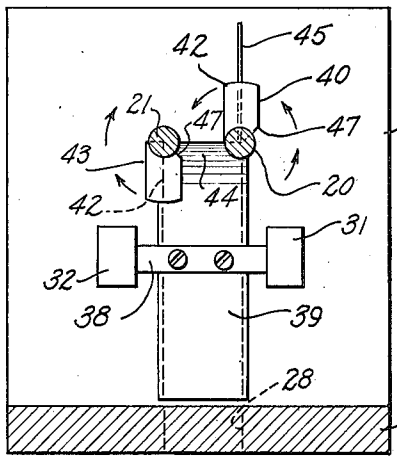


Fig. 6

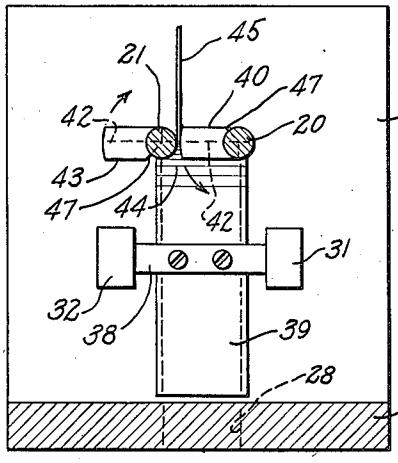


Fig. 7

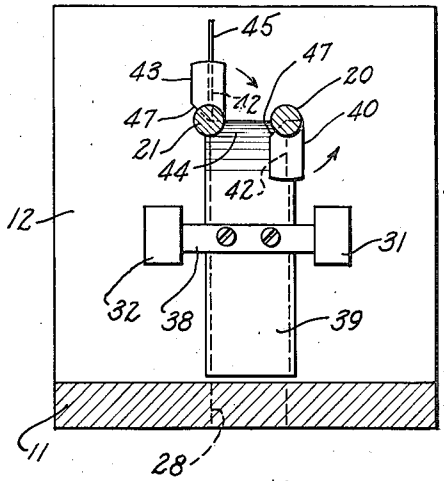


Fig. 8

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MACHINE FOR BENDING WIRE INTO RIBBON FORM

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Application May 2, 1947, Serial No. 745,365

5 Claims. (Cl. 140—71)

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This invention relates to wire bending machines, and more particularly to a device for bending wire into ribbon form for use in electrical heating devices and the like.

A main object of the invention is to provide a novel and improved wire bending machine which is very simple in construction, efficient in operation and reliable in performance.

A further object of the invention is to provide an improved machine for bending resistance wire into ribbon form for use in electrical heating equipment, resistors, and the like, said machine having only a few parts and being very inexpensive to manufacture and operate.

Further objects and advantages of the invention will become apparent from the following description and claims, and from the accompanying drawings, wherein:

Figure 1 is a top plan view of a wire bending machine according to the present invention.

Figure 2 is a vertical longitudinal cross-sectional view taken on line 2—2 of Figure 1.

Figure 3 is a vertical transverse cross-sectional view taken on line 3—3 of Figure 2.

Figure 4 is a detail view illustrating the position of the wire bending elements of the machine in a position successive to the position shown in Figure 3.

Figure 5 illustrates a position of the wire bending elements successive to that shown in Figure 4.

Figure 6 is a cross-sectional view taken on line 6—6 of Figure 2.

Figure 7 is a cross-sectional view similar to Figure 6 but showing the wire bending elements of the machine in the positions of Figure 4.

Figure 8 is a cross-sectional view similar to Figure 6 but showing the wire bending elements of the machine in the positions of Figure 5.

Referring to the drawings 11 designates a base plate having secured thereto a forward vertical end plate 12 and a rear vertical end plate 13 parallel to and aligned with the forward plate 12. Secured to base plate 11 parallel to the end plates is a first inner vertical plate 14 adjacent to end plate 12 and a second vertical plate 15 intermediate plates 13 and 14. Journalled in plates 13 and 15 is a horizontal shaft 16 extending longitudinally of base plate 11 and carrying at its outer end a pulley 17 rigidly secured thereon. Rigidly secured on shaft 16 adjacent plate 15 is a pinion gear 18. Rigidly secured on said shaft inwardly adjacent end plate 13 is a bearing collar 19. Gear 18 and collar 19 prevent endwise movement of shaft 16.

Journalled in plates 14 and 15 and longitudinally slidable therein are a pair of horizontal longitudinal shafts 20 and 21. Rigidly secured to the rear end of shaft 20 is a pinion gear 22 meshing with gear 18 and likewise rigidly secured to the rear end of shaft 21 is a pinion gear 23 equivalent to and meshing with gear 22. Secured to shaft 20 adjacent plate 14 is a collar 24 and encircling shaft 20 is a coil spring 25 bearing between collar 24 and plate 15. A similar coil spring 26 encircles shaft 21 and bears between a collar 27 secured to shaft 21 and the plate 15. The springs 25 and 26 bias the respective shafts 20 and 21 forwardly. Gears 18, 22 and 23 are of substantial peripheral width so that shafts 20 and 21 may move longitudinally for substantial distances without disengaging the gears from their meshing relationship. It will be also apparent that when shaft 16 is rotated, shafts 20 and 21 rotate in opposite directions.

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Base plate 11 is formed adjacent end plate 12 with a transversely extending notch 28 which is centered with respect to shafts 20 and 21. Notch 28 defines with respect to end plate 12 a transverse slot through which wire stock bent to ribbon form emerges from the machine, as will be subsequently described.

Passing through end plate 12 and symmetrically located with respect to the central longitudinal vertical plane of the machine are a pair of studs 29 and 30. Stud 29 is provided with a rectangular head 31 and stud 30 is provided with a similar rectangular head 32. The outer end portions of studs 29 and 30 are threaded and engaged thereon are respective nuts 33 and 34. The ends of the studs are received in recesses formed in a horizontal bar member 35 which is adjustably secured to end plate 12 by a pair of screw bolts 36, 37 passing through the bar member and threadedly engaged with end plate 12. Bar member 35 cooperates with nuts 33 and 34 to lock studs 29 and 30 in an adjusted longitudinal position.

Pivoted to heads 31 and 32 is a horizontal bar 38 to the intermediate portion of which is secured a clamping plate 39. Clamping plate 39 is vertically aligned with notch 28 and is spaced from end plate 12 a sufficient distance to permit free movement therebetween of a ribbon of formed wire when the clamping plate is free. When the top end of the clamping plate is rotated counterclockwise as viewed in Figure 2 said top end is effective to clamp the wire to end plate 12.

Shaft 20 carries at its forward end a forming arm 40 extending at right angles to the shaft. Arm 40 is beveled along its length at 41 and is formed with a narrow rib 42 at the edge thereof

adjacent end plate 12. Spring 25 normally biases said edge into abutment with plate 12. Shaft 21 carries at its forward end a forming arm 43 similar to but opposing forming arm 40. The shafts 20 and 21 are geared so that the forming arms 40 and 43 are 180 degrees displaced in position, but since said shafts rotate in opposite directions, the forming arms move alternately into position over clamping plate 39 as the drive shaft 16 is rotated. The rear top surface of clamping plate 39 is smoothly curved, as shown at 44, so that as each forming arm rotates past the top edge of plate 39, the bevel on the arm slides onto curved surface 44 causing the arm and its carrying shaft to be moved rearwardly against the pressure of its biasing spring. When one arm has been thus moved rearwardly it provides clearance for the other arm and at the same time exerts clamping pressure on the top portion of clamping plate 39. After the arm leaves curved surface 44 there is a short interval during which the clamping plate 39 is free, whereby the wire stock may be pushed downwardly a distance corresponding to the distance between bends by the opposing forming arm as said opposing arm completes its bending stroke.

Figures 3 and 6 show forming arm 40 in raised vertical position and engaging the wire stock 45 at the beginning of a bending stroke. The formed portion of the wire shown at 46 is meanwhile clamped between plate 39 and end plate 12 by forming arm 43 which is in its rearwardly pushed depending position. As the arms rotate in the directions indicated by the arrows, arm 40 bends the wire to a horizontal position, the wire being engaged by the rib 42 on said arm during the bending operation. Arm 43 meanwhile rotates to a horizontal position, as shown in Figures 4 and 7, and at this time clamping plate 39 is free, whereby the wire may be moved downwardly into position for the next stroke. Arm 43 then rotates to a vertical position into engagement with the wire and arm 40 rotates to a depending position bearing on clamping plate 39 to hold the wire rigid while arm 43 moves through its bending stroke. Figures 5 and 8 show the position of the parts as arm 43 begins its bending stroke.

The wire 45 is continuously fed downwardly between the bending arms and emerges through notch 28 under base 11 in ribbon form.

The downward movement of the wire is automatically obtained by the downward thrust imparted thereto by the forming arm as it completes its bending stroke, the opposite forming arm being at that time out of contact with the clamping plate 39. Immediately after this trust is delivered the forming arm comes into engagement with curved surface 44 and clamps the wire.

The required free period of the clamping plate 39 is insured by providing a corner bevel 47 at the heel portion of each forming arm.

While a specific embodiment of a wire ribbon forming machine has been disclosed in the foregoing description, it will be understood that various modifications within the spirit of the invention may occur to those skilled in the art. Therefore it is intended that no limitations be placed on the invention other than as defined by the scope of the appended claims.

What is claimed is:

1. A machine for bending wire stock into ribbon form, comprising a vertical support, bearing means adjacent said support, a pair of shafts rotatably and slidably mounted in said bearing means, said shafts being normal to said support, means biasing said shafts toward said support, a first forming arm carried on the end of one of the shafts, a second forming arm carried on the end of the other shaft, means for rotating said shafts in opposite directions and arranged so that said forming arms move inwardly in alternate sequence, said forming arms slidably bearing on said support during inward movement thereof, and a clamping plate pivoted to said support, said plate being spaced from the support at its pivotal plane, each forming arm being arranged so as to engage said plates at the termination of its inward movement so as to exert clamping pressure on said plate.

2. A machine for bending wire stock into ribbon form, comprising a vertical support, bearing means adjacent said support, a pair of shafts rotatably and slidably mounted in said bearing means, said shafts being normal to said support, means biasing the ends of the shafts into contact with the support, a first wire bending arm carried on the end of one of the shafts, a second wire bending arm carried on the end of the other shaft, gear means coupling the shafts together for opposite rotation, said gear means being formed and arranged so that said wire bending arms move inwardly in alternate sequence, said arms slidably bearing on said support during inward movement thereof, and a clamping plate pivoted to said support on an axis parallel to the support and to the plane of said shafts, said plate being spaced from the support at its pivotal plane, each arm being formed and arranged so as to clampingly engage said plate following the termination of its arc of inward movement.

3. A machine for bending wire stock into ribbon form, comprising a vertical support, bearing means adjacent said support, a pair of shafts rotatably and slidably mounted in said bearing means, said shafts being normal to said support, means biasing the ends of the shafts into contact with the support, a first wire bending arm carried on the end of one of the shafts, a second wire bending arm carried on the end of the other shafts, means coupling the shafts for counter rotation and arranged so that said arms move inwardly in alternate sequence, said arms slidably bearing on said support during inward movement thereof, and a clamping plate pivoted to said support on an axis parallel to the support below and parallel to the plane of said shafts, said plate being spaced from the support at its pivotal region, each arm being formed so as to cammingly engage said plate following the termination of its arc of inward movement to move the arm away from the support and to exert clamping pressure on the plate.

4. A machine for bending wire stock into ribbon form, comprising a vertical support, bearing means adjacent said support, a pair of horizontal shafts rotatably and slidably mounted in said bearing means normal to said support, means biasing the ends of the shafts into contact with the support, means for driving the shafts in counter rotation, a first wire bending arm carried at the ends of one of the shafts, a second wire bending arm carried at the end of the other shaft, said arms being arranged to move inwardly in alternate sequence and slidably bearing on the support during such inward movement, and a clamping plate pivoted to the support below the plane of said shafts, said clamping plate having a cam surface arranged so as to be cammingly engaged by an arm immediately subsequent to the termination of the inward movement of the arm, the arm

being moved rearwardly and exerting pressure on the plate as a result of such engagement, whereby a piece of wire may be clamped by the plate while it is being bent by the other arm.

5. A machine for bending wire stock into ribbon form, comprising a vertical support, bearing means adjacent said support, a pair of horizontal shafts rotatably and slidably mounted in said bearing means normal to said support, spring means biasing the ends of the shafts into contact with the support, means for driving the shafts in counter rotation, a first wire engaging arm carried at the end of one of the shafts, a second wire engaging arm carried at the end of the other shaft, said arms being arranged to move inwardly in alternate sequence and slidably bearing on the support during such inward movement, and a clamping plate pivoted to the support below the plane of said shafts, said clamping plate and arms having inter-engaging cam surfaces formed so that each arm cammingly engages the plate immediately subsequent to the termination of inward movement of the arm to push the arm and its shaft rearwardly and exerting clamping pressure on the plate, the arm being further formed to release the plate shortly before the other arm terminates its inward movement.

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