April 19, 1949. O. WIRTH 2,467,643

RING WINDING MACHINE

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Fig. 1.

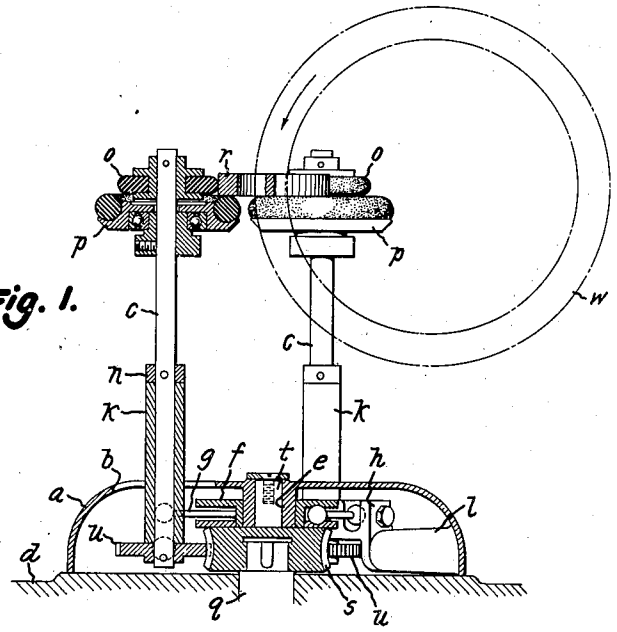
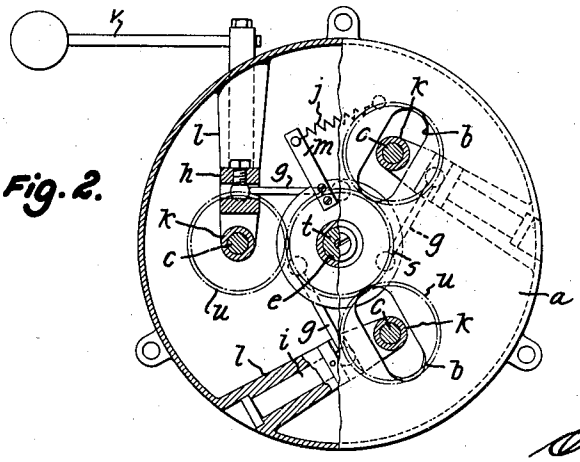


Fig. 2.



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RING WINDING MACHINE

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12 Claims. (Cl. 242—4)

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For winding rings continuously with wire, cord or tape, a machine can be used in which the winding material is automatically passed around the cross-section of the ring which is to be wound. Since generally the plane of the circular shuttle, which contains the winding material and is perpendicular to the plane of the ring which is to be wound, is stationary, the ring must be moved progressively about its axis by an amount equal to the winding pitch. The feed shaft by means of which this is effected is driven automatically over gearing with a suitable transformation ratio, like the feed of a machine tool. If the same machine is to be used for winding rings with different diameters, a change gear is employed. The ring becomes thicker as it is wound so that the ring support which holds the ring in position during winding must be able to follow the thickening of the ring. The point where the turns of winding material are brought on to the ring, that is the actual winding place, must be kept free of all constructional elements. In addition the ring support must ensure that the shuttle crosses or penetrates the plane of the ring in the central axis of the ring.

All these conditions are fulfilled by the ring support according to the invention due to it consisting of at least three rods actuated from the vertical feed shaft over gear wheels, the rods being capable of being swivelled outwards and having a freely rotatable supporting plate and a coupled feed roller mounted thereon, the rods being pressed by a spring against the ring which is to be wound.

A constructional example of the invention is illustrated in the accompanying drawing in longitudinal section and plan. One of the three supporting elements is shown in section in Fig. 1, whilst in the left half of the plan view of Fig. 2 the upper part of the cover is removed.

This cover is indicated by the reference letter *a* and is provided with three radial slots *b* through which the three supporting rods *c* pass. Cover *a* with slots *b* is bolted to the machine frame *d* and is thus stationary. On the hollow central boss *e* is journalled the mounting *f* of the three links *g* which are provided at each end with ball joints, these links being connected at their outer ends to crank arms *h* which extend above shafts *i*. The cylindrical bearings *k* for the rods *c* are secured to and supported by the crank arms *h*, and the rods *c* are thus pivotally supported by the shafts *i* for movement of their upper ends towards and away from each other. The shafts *i* are journalled in bearing sleeves *l* which project inwardly from the rim of the cover *a*, and a tension spring *j* is connected between the cover *a* and an arm *m* fixed to mounting *f* to apply a torque tending to turn the mounting *f* clockwise, see Fig. 2. The forces thus applied to the links *g* urge the upper ends of the several rods inwardly towards each other, and one of the shafts *i* extends outside of the cover *a* and has a lever or handle *v* by which the operator may turn the shafts *i* against the force exerted by spring *j* to swing the upper ends of the rods *c* outwardly or away from each other.

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Supporting rods *c*, to the upper end of which the rubber feed rollers *o* are fixed, rotate in bearings *k* and are held by an adjustable ring *n*. Directly underneath these rollers *o* are supporting plates *p* for the ring *r* which is to be wound, these plates having a rubber covering and rotating on ball bearings.

The feed is achieved by means of gearing located below the cover and actuated by a shaft *q* which is driven through change-speed gearing not shown in the drawing. The shaft carries a gear *s* mounted on a pivot *t* which rotates inside the boss *e*, the teeth of this gear lying on an arc about the movable axles *i*. The driving gears *u* which are fixed to the lower ends of rods *c* also have helical teeth and are therefore in uniform engagement with worm wheel *s* for every position of rods *c* which swing about the axles *i*, without there being any change in the transmission ratio.

The axes of the several rods *c* lie in vertical planes which pass through the common axis of the ring *r* and the drive shaft *q*. The path of the shuttle *w* when passing through ring *r* is indicated by broken lines in Fig. 1. The shuttle is rotated by mechanism, not shown, which forms no part of the present invention, and the ring *r* is simultaneously rotated by the described gearing and shaft *q* which is driven through a change-speed mechanism, not shown, to provide the desired winding pitch.

In the operation of the winding machine, the upper ends of the supporting rods *c* are yieldingly urged inwardly towards each other by the spring *j* and the rollers *o* seat with a uniform pressure against ring *r* and transmit the feed motion to the latter, independently of the increase in diameter which occurs as the winding process progresses. By means of lever *v* rods *c* can be swung apart against the tension of spring *j*, whereby empty rings of any diameter can be inserted and the wound rings removed from the machine. The machine can be adjusted to suit

various ring thicknesses by a vertical adjustment of supporting plates *p* on rods *c*.

I claim:

1. Mechanism for supporting and rotating a ring which is to be wound, said mechanism comprising at least three rotatable rods, means for rotating said rods simultaneously and in the same sense, feed rollers carried by one set of ends of said rods for engagement with the periphery of a ring to rotate the same, bearing means at the other ends of said rods and supporting the same for rocking movement to displace the feed rollers towards or away from each other, spring means biasing said rods for movement to press said feed rollers towards each other, means for rotating said rods, and ring supporting plates rotatably mounted on said rods adjacent the feed rollers carried thereby.

2. Mechanism as recited in claim 1, wherein said rods extend substantially vertically, said feed rollers being at the upper ends of said rods, and said supporting plates being below said feed rollers.

3. Mechanism for supporting and rotating a ring which is to be wound from a circular shuttle, said mechanism comprising at least three rods in angularly spaced vertical planes which intersect to define the axis about which the ring is to be rotated, feed rollers secured to the upper ends of said rods, means supporting said rods for rocking movement about axes extending substantially through the lower ends of the respective rods, means biasing said rods for rocking in their respective axes to urge said rollers towards each other, and means for rotating said rods; said rotating means comprising a driven gear secured to the lower end of each rod, and a common drive gear in mesh with all of said driven gears.

4. Mechanism as recited in claim 3, wherein the teeth of the common drive gear are curved longitudinally, the radius of curvature being equal to the spacing of the curved teeth from the rocking axes of said rods.

5. Mechanism as recited in claim 3, in combination with supporting plates for a ring, said supporting plates being rotatably mounted on the several rods below the feed rollers secured thereto.

6. Mechanism as recited in claim 5, in combination with bearings for said supporting plates adjustably mounted on the several rods below the rollers secured thereto.

7. Mechanism as recited in claim 3, wherein the lower ends of said rods and said means for rotating the same are housed within a cover, said cover having radial slots through which the rods extend.

8. Mechanism as recited in claim 3, wherein said biasing means for rocking said rods includes

means connecting said rods for simultaneous movement, and a single spring biasing said connecting means.

9. Mechanism for supporting and rotating a ring which is to be wound from a circular shuttle, said mechanism comprising a cover member having a hollow boss depending from the top wall thereof, a drive gear having a hub journalled in and secured against displacement from said boss, at least three bearing sleeves within said cover and spaced circumferentially about the axis of said boss, the axes of said sleeves being in a common plane normal to the axis of said boss, shafts journalled in said sleeves and each carrying a cylindrical bearing, the axes of said cylindrical bearings being in vertical planes whose intersection coincides with the axis of said boss, rods rotatably mounted in said cylindrical bearings, gears on the lower ends of said rods and meshing with said drive gear, feed rollers secured to the upper ends of said rods, ring supporting plates rotatably mounted on said rods below the feed rollers, and means biasing said cylindrical bearings for rocking movement to displace said feed rollers towards each other.

10. Mechanism as recited in claim 9, wherein said biasing means includes a mounting member journalled on said hollow hub, and links connecting said mounting member to each of said cylindrical bearings above the shafts which support the same.

11. Mechanism as recited in claim 9, wherein said biasing means includes a mounting member journalled on said hollow hub, links connecting said mounting member to each of said cylindrical bearings above the shafts which support the same, and a spring connected between said mounting member and said cover member.

12. Mechanism as recited in claim 9, wherein one of said shafts extends through its bearing sleeve to the exterior of the cover member, and a lever is secured to that shaft for actuation to rock said cylindrical bearings to move the feed rollers away from each other.

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