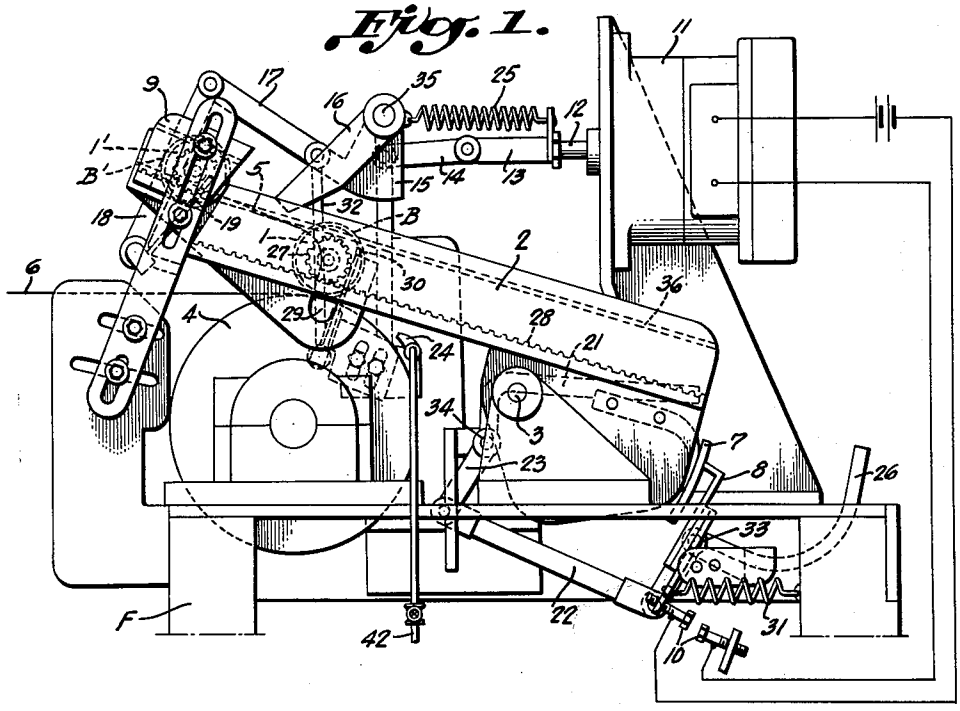
Jan. 29, 1963 J. M. PERRAUT ETAL 3,075,714

APPARATUS FOR AUTOMATICALLY LOADING AND CHANGING BOBBINS

Filed Nov. 15, 1957 4 Sheets-Sheet 1

Fig. 1.



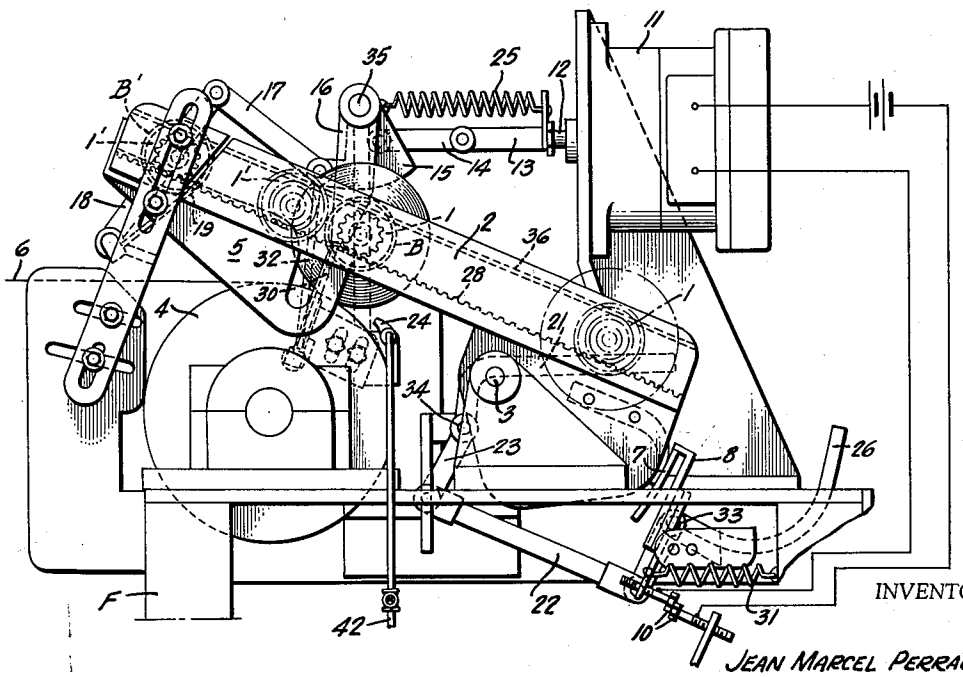


Fig. 2.

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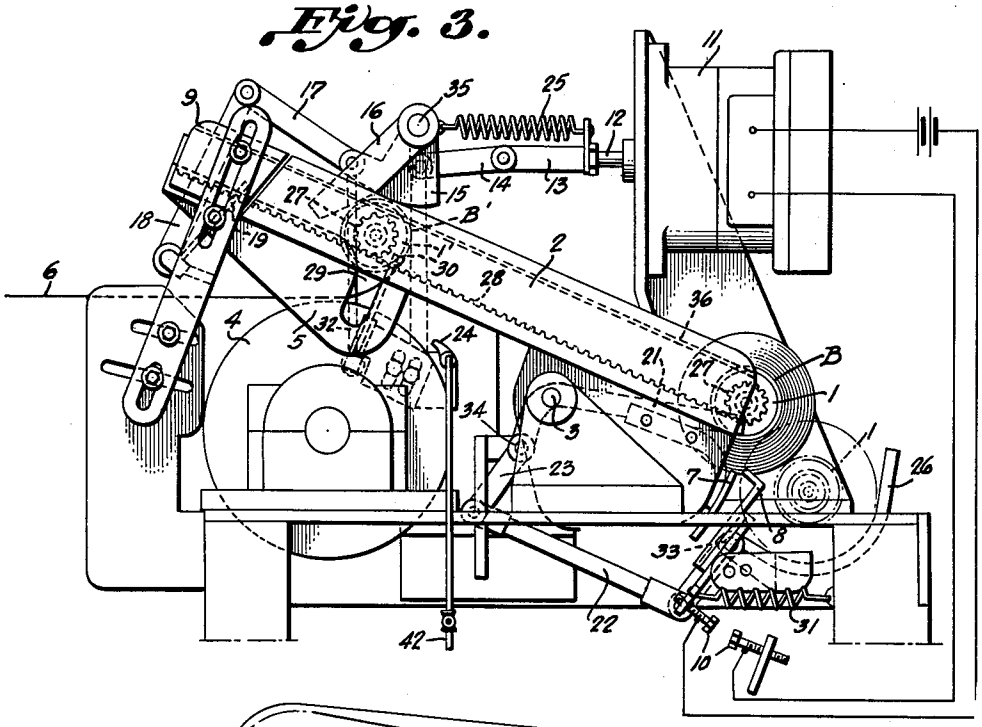
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APPARATUS FOR AUTOMATICALLY LOADING AND CHANGING BOBBINS

Filed Nov. 15, 1957 4 Sheets-Sheet 2

Fig. 3.



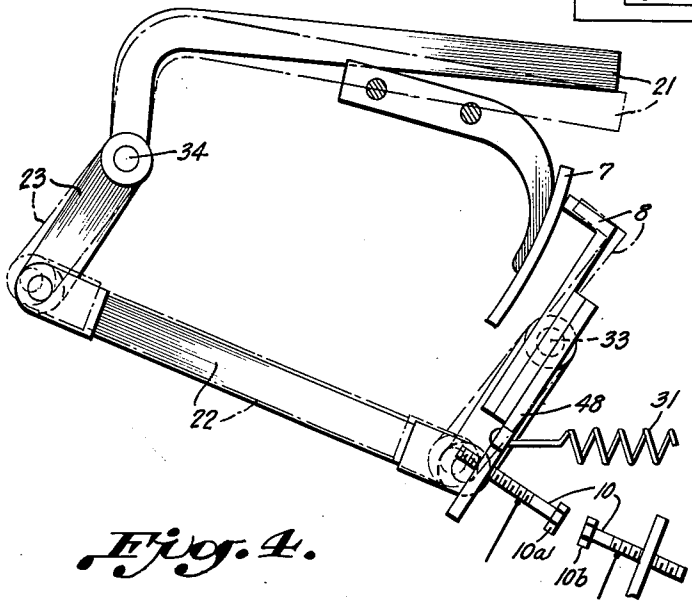


Fig. 4.

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APPARATUS FOR AUTOMATICALLY LOADING AND CHANGING BOBBINS

Filed Nov. 15, 1957 4 Sheets-Sheet 3

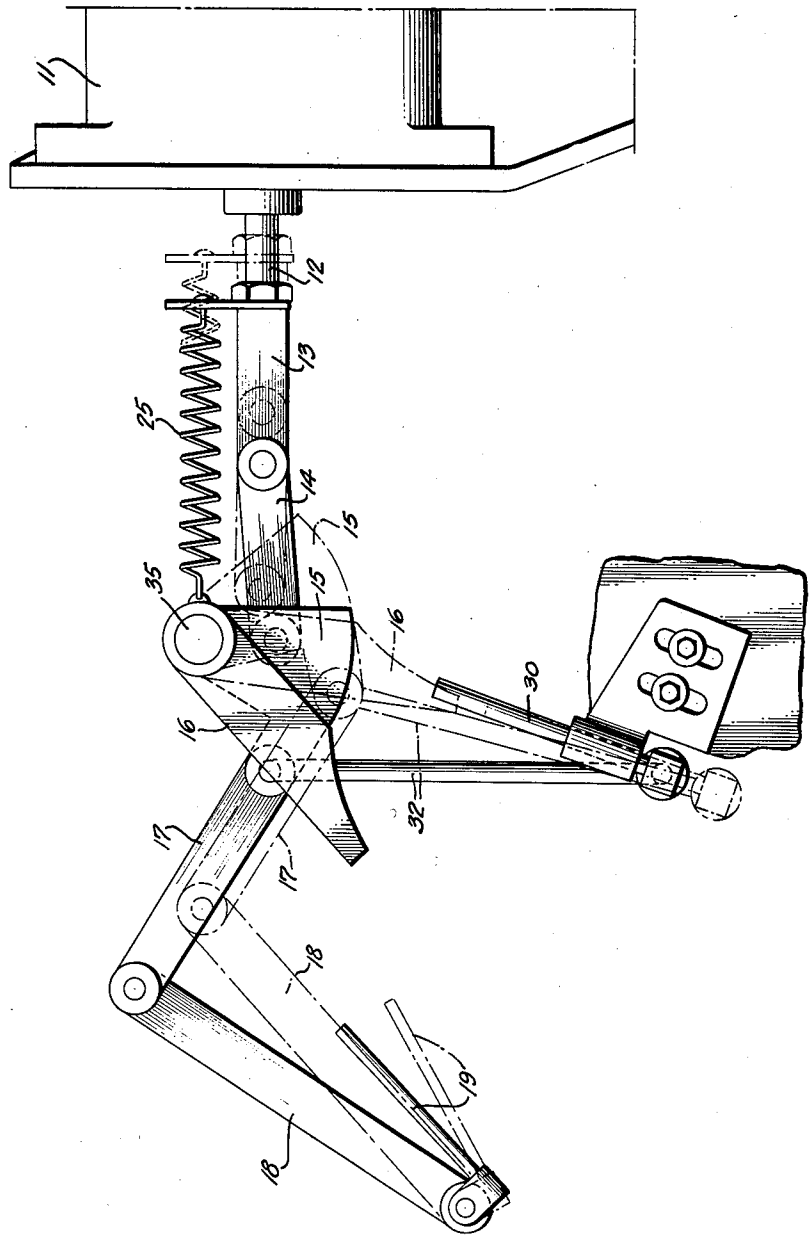


Fig. 5.

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APPARATUS FOR AUTOMATICALLY LOADING AND CHANGING BOBBINS

Filed Nov. 15, 1957 4 Sheets-Sheet 4

Fig. 7.

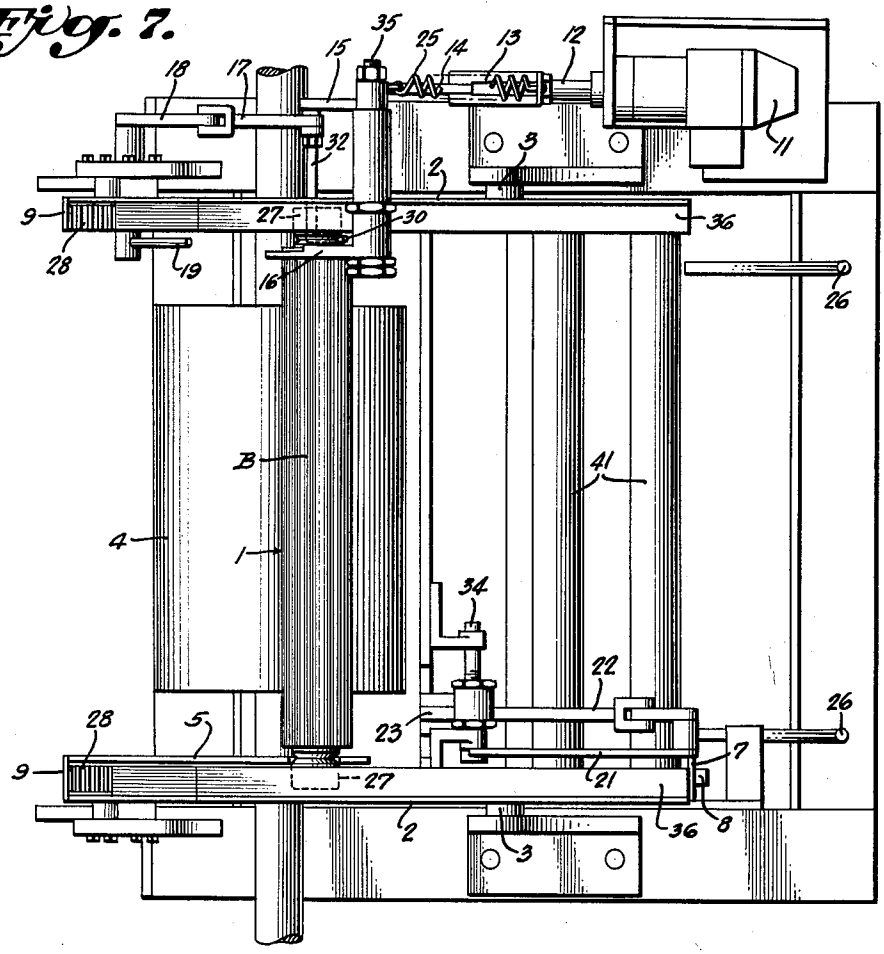
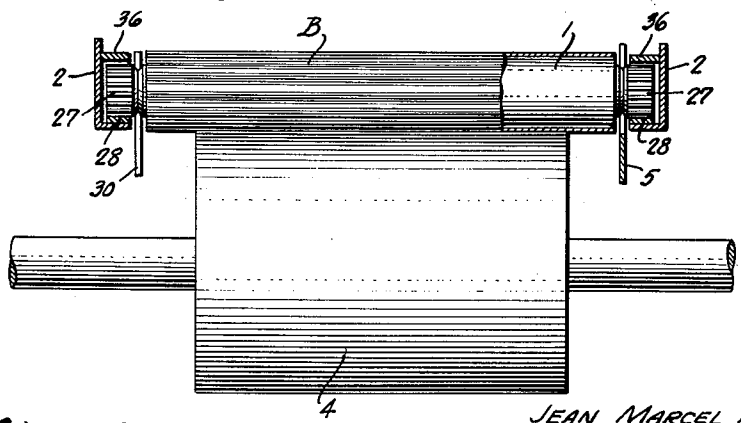


Fig. 6.



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United States Patent Office 3,075,714 Patented Jan. 29, 1963

3,075,714
APPARATUS FOR AUTOMATICALLY LOADING AND CHANGING BOBBINS

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Filed Nov. 15, 1957, Ser. No. 696,773
Claims priority, application France Sept. 24, 1954
8 Claims. (Cl. 242—18)

The present invention relates to a winding apparatus utilized in installations for the manufacture of strand and thread of textile fibers, and has for its object the perfection of the apparatus utilized for the winding of the strands and thread on bobbins. It can be applied to the strands and thread of organic and inorganic nature alike, and especially to strands of fiber glass or other thermoplastic material.

The invenion consists of an apparatus which renders the changing of bobbins completely automatic while winding; the removal of a full bobbin and its replacement taking place in an instantaneous manner and without the necessity of a watching attendant.

This apparatus consists essentially of a tilting ramp pivoted on a fixed axis, the ramp carrying the bobbin which is in process of being filled, and the inclination of which varies in the course of the progression of the winding on said bobbin. When this ramp reaches a point of inclination corresponding to the diameter of the full bobbin it functions in such a way as to start automatically the ejection of the full bobbin while breaking the thread, and simultaneously it frees an empty bobbin which places itself in position for winding, the free end of the oncoming thread catching immediately on the empty bobbin by means of a suitable device such as a blowing nozzle.

Other objects and purposes of the invention will be apparent from the following description in relation to the accompanying drawings, which are only exemplary, and which illustrate a preferred embodiment of the invention wherein:

FIGURE 1 is a front elevation showing the apparatus for changing bobbins, this view showing various mechanisms in the process of winding;

FIGURE 2 is a front elevation of the same apparatus at the time of ejection of the filled bobbin and the release of the empty one;

FIGURE 3 is a similar view of the apparatus at the time of the ejection of the full bobbin and the placing of the empty one in position for dropping into cooperative relation with the winding drum;

FIGURE 4 is an enlarged view of the lever linkage mechanism for controlling the discharge of the filled bobbin, the solid line showing this mechanism corresponding to the positioning of the parts shown in FIGURE 1, and the dotted lines, at the time of re-setting the levers following the discharge of the filled bobbin, corresponding to the positioning of the parts shown in FIGURE 3;

FIGURE 5 is an enlarged view of the electromagnetically controlled lever mechanism for ejecting and releasing the filled and empty bobbins, the levers shown in solid lines corresponding to the normal positioning of the parts shown in FIGURE 1, and in dotted lines, at the time of energization of the electromaget corresponding to the positioning of the parts shown in FIGURE 2;

FIGURE 6 is a left end view of FIGURE 1 showing the cooperation between the rotary winding drum and the bobbin supported by the spindle in the tilting ramp; and

FIGURE 7 is a plan view of part of the machine showing the tilting ramp supporting the spindle carrying the bobbin being wound by frictional contact with the rotary winding drum therebelow.

As shown in the drawings, a frame F is formed of suitable structural members to present opposing sides for bobbin spindles, the ends of which move along the sides of the frame. A tilting ramp 2 which is rotatably mounted on the frame at the two opposite sides thereof by means of axle trunnions 3 (FIG. 7), moves within the confines of the frame F. This tilting ramp is formed by two inwardly facing channels, each having a toothed rack 28 at the base thereof and an overlying projection 36 at the top thereof. The forward portion of the ramp, shown at the left end of the several drawings, and particularly the guide channels between the gear racks 28 and the covering projections 36, are freely open in order to permit the entry of a spindle 1 into the ramp. A toothed pinion 27 is disposed at each end of the spindle, the teeth of which engage the teeth of the gear racks 28, and a cylindrical tube or spool B is fitted over the main body of the spindle. The opposite sides of the tilting ramp on the right of the trunnions 3 are interconnected by transverse framing members 41 to impart strength and rigidity thereto.

A guide element 5, having an upwardly extending restraining slot 29 therein, is affixed to one side of the frame and permits the active spindle 1 carrying the winding bobbin to be disposed adjacent to a rotary winding drum 4 which is rotatably mounted between the opposite sides of thet frame and is driven at a constant speed by any known means such as an electric motor or other prime mover. The winding bobbin B is rotated by frictional contact with the winding drum 4 and serves to wind the strand 6 onto the winding bobbin as the same is pulled by the machine and is traversed across the width thereof in a manner well known in the art of winding of beams or other spools.

The object of the present machine is to automatically effect the discharge of a fully wound bobbin after it has reached a predetermined diameter and to charge the same with a new spindle carrying an empty bobbin and to initiate the winding of the strand thereon without need of any attention from an attendant. This object is realized by the provision of an inclined support 9 at the left side of the frame for mounting an idle spindle 1' carrying an empty corrugated bobbin B' thereon. This bobbin is preferably corrugated on its exterior to facilitate the entrainment of the strand thereon by frictional contact with the rotary drum and by the blowing thereon of the ruptured end of the strand which has been broken from the strand on the completed bobbin. To induce this entrainment quickly, a blower nozzle 24 is provided beyond the bobbin tube and the winding drum for the purpose of blowing the loose end of the strand onto the periphery of the corrugated tube until the same is entrained after the first few turns of the tube. While the blower nozzle 24, which is fed from a source of compressed air through conduit 42, blows air continually in order to simplify the operation of the machine, it is effective only at the time of initiation of the winding on a new tube.

The support 9, for retaining the replacement spindle and empty tube in readiness for charging, may be adjustably positioned at the left side of the machine by suitable pins and slots. Tube B' may be restrained on inclined toothed gear racks similar to gear racks 28, in readiness for charging onto the tilting ramp 2 by means of a lever or restraining finger 19 which may be rocked from its blocking position at a predetermined point in the cycle of operation of the machine, as explained in greater detail below.

Mounted on one side of the tilting ramp 2 adjacent the discharge end thereof is a locking sector 7, the upper end of which is normally disengaged from a cooperating pivoted locking lug or detent 8 so that the ramp may assume its normal tilting movements about its pivotal axis 3 as the bobbin grows in diameter by virtue of the strand being fed thereonto. This clockwise tilting movement is

effected by the pinions 27 acting against the overlying projections 36 on the side of the ramp. At the same time the spindle 1 experiences a translating movement along the restraining slot 29 in addition to its rotary movement by virtue of its frictional contact with rotary winding drum 4.

At a predetermined point of tilting of the rack 2, when the open left end thereof comes into alignment with the end of storage frame 9, the rack 2 has travelled in a clockwise direction from the position shown in FIGURE 1 to that shown in FIGURE 2, at which time the locking detent 8 engages the top of the locking sector 7 by the action of spring 31 connected to the lower arm 48 of locking lug 8 which is pivoted on axis 33. This serves to lock the tilting ramp in the position shown in FIGURE 2 and brings into operation the electromagnetically controlled lever linkage at the upper part of the machine for ejecting the completed bobbin and releasing the empty bobbin for positioning adjacent to the winding drum for the next winding operation.

As shown in FIGURE 4, when locking lever 48 is rotated in a counterclockwise direction around its axis 33 by the force of spring 31, electrical contact is made between terminals 10*a* and 10*b* which completes a circuit to the solenoid 11 to effect the movement of armature 12 which is interconnected with a lever mechanism shown in greater detail in FIGURE 5. Upon the energization of solenoid 11, armature 12 is attracted to the right, as indicated in dotted lines, against the force of spring 25, carrying with it jointed levers 13 and 14, to the latter of which is affixed a sector 15 which is pivotally mounted on stub axle 35. A collar on the latter, extending from sector 15, terminates in an ejecting finger 16 which acts to push the filled bobbin down the ramp 2 by the rolling movement of the pinions 27 along the teeth of gear racks 28, the strand being severed from the supply by the pushing movement of ejecting finger 16. This movement is permitted by the previous clockwise rocking of a second restraining finger 30 from the path of the active spindle 1, which is actuated by the movement of sector 15. Jointed levers 17 and 18 are connected to sector 15 and lever 32 extends from the former to rock the shaft supporting finger 30. The other restraining finger 19 is connected to the same rocking shaft as the free end of lever 18 and is rocked clockwise from its position shown in FIGURE 1 to the position shown in FIGURE 2, permitting the empty spindle to run down its inclined tracks and to pass from the storage rack 9 to the tilting ramp 2 since these parts are now in alignment.

The position of the ejecting finger 16 as shown in FIGURE 2 does not block the dropping of the new bobbin into contact with the winding drum, and the ejecting finger is in readiness to return to its position shown in FIGURE 3 as soon as the solenoid 11 is deenergized, as described below.

The machine is re-set for the winding operation by the provision of a lever mechanism adjacent to the discharge end of the ramp 2 which includes lever 21 pivotally mounted on axis 34 and interconnected with jointed levers 23 and 22 which are in turn pivotally connected to lever 48. When the full bobbin approaches the end of its travel along the ramp 2, as shown in dotted lines in FIGURE 3, lever 21 is rocked in a clockwise direction around its axis 34, which effects a corresponding rocking of lever 48 in a clockwise direction around axis 33 against the force of spring 31, to withdraw locking lug 8 from above sector 7. With the release of sector 7, the ramp is free to turn in a counterclockwise direction by virtue of the weight thereof and the disposition of the empty spindle at the forward end, now that the full bobbin has passed from the ramp and has been deposited in cradle 26 adjacent the outer end thereof for transportation therefrom at any time before the next bobbin is completed. The rocking of lever 48 serves to separate the contact terminals 10*a* and 10*b* to break the circuit of the electromagnet 11 which permits spring 25 to rock lever 16 in a clockwise direction to its position shown in FIG. 3. One end of the new spindle disposed in the ramp is received within the restraining slot 29 in guide member 5 as the left end of the ramp 2 tilts downwardly, bringing the empty tube into contact with the rotary winding drum 4 and onto which is blown the loose end of the strand 6. The free end of the strand takes hold on the bobbin upon the completion of the first few turns thereof.

The return movement of the sector 15 also brings restraining finger 19 into position for holding a new spindle bobbin in storage frame 9 in preparation for the next operation. Releasing finger 30 for the winding bobbin is also brought into position to prevent the ejecting movement of the bobbin until after it has grown to the proper diameter and is in readiness for discharge by the action of ejector finger 16, which starts the downward travel of the filled bobbin and simultaneously severs the strand therefrom.

The operation described above in connection with the locking of the ramp in its raised position, the ejection of the fully wound spool therefrom with the rupture of the stand thereat, the placing of a new spindle and bobbin in position for winding with the engagement of the loose strand thereon, and the re-setting of the machine for the winding operation in preparation for the next exchanging cycle are executed virtually simultaneously without need of any intervention by an operator.

This application is a continuation-in-part of our application Serial No. 536,166, filed September 23, 1955, now abandoned.

We claim:

1. An apparatus for automatically changing bobbins upon the completion of winding of a strand thereon comprising a supporting frame, means at one end of said frame for storing an empty bobbin at an elevated level, a ramp tiltably mounted on said frame for accommodating a spindle carrying a cylindrical bobbin onto which the strand is adapted to be wound, a plate mounted on said frame having an upwardly extending restraining slot for one end of said spindle, a rotary drum mounted on said frame in frictional contact with said last-mentioned bobbin for imparting rotary movement thereto, means responsive to the bobbin attaining a predetermined diameter and the consequent tilting of the ramp to a predetermined degree whereupon said spindle moves beyond said slot, to eject said completely wound bobbin down said ramp while rupturing the strand therefrom and to release said empty bobbin for positioning adjacent to said rotary drum for winding of the strand thereonto, and blowing means acting in the field of the ruptured strand to automatically entrain the oncoming portion of said strand onto said empty bobbin to initiate the winding of the strand thereon.

2. An apparatus for automatically changing bobbins upon the completion of winding of a strand thereon comprising a supporting frame, means at one end of said frame for seating an idle spindle carrying an empty bobbin at an elevated level, a restraining finger in the path of said idle spindle, a ramp tiltably mounted on said frame for accommodating an active spindle carrying a cylindrical bobbin onto which the strand is adapted to be wound, a plate mounted on said frame having an upwardly extending restraining slot for one end of said active spindle, a rotary drum mounted on said frame in frictional contact with said last-mentioned bobbin for imparting rotary movement thereto, a second restraining finger in the path of said active spindle, means responsive to the bobbin attaining a predetermined diameter and the consequent tilting of the ramp to a predetermined degree, whereupon said active spindle moves beyond said slot, to eject said completely wound bobbin down said ramp while rupturing the strand therefrom and to release said empty bobbin for positioning adjacent to said rotary drum for winding of the strand thereonto.

3. An apparatus as set forth in claim 2 wherein said

last-mentioned means comprises a locking segment mounted on said ramp, a locking detent for said segment actuated by the predetermined degree of tilting of said ramp to lock said ramp against movement in alignment with the seating means for the idle spindle, an electromagnet energized by the movement of said locking detent and having an armature actuated thereby, a lever mechanism actuated by said armature comprising said restraining fingers and an ejector finger which impels the wound bobbin down the ramp and ruptures the strand therefrom after the movement of the second restraining finger from the path of the active spindle, while the movement of said first restraining finger from the path of the idle spindle permits the idle bobbin to gravitate down the ramp in overlying position with the restraining slot for eventual deposit therein and frictional contact with the rotary winding drum.

4. An apparatus as set forth in claim 3 including blowing means acting in the field of the ruptured strand to automatically entrain the oncoming portion of said strand onto said empty bobbin to initiate the winding of the strand thereon.

5. An apparatus as set forth in claim 4 including means for automatically re-setting the machine for the winding operation on the idle bobbin comprising a re-setting lever adjacent to the discharge end of the ramp adapted to be tripped by the discharging full bobbin and connected with said locking detent to rock the same from its locking engagement with said locking segment, whereby said electromagnet is deenergized to return said restraining fingers and ejector finger to their normal positions and said ramp is freed to tilt reversely by the weight of the idle spindle disposed thereon to bring the bobbin thereon into frictional winding engagement with the rotary drum.

6. An apparatus as set forth in claim 5 wherein a cradle for the filled bobbin is disposed at the discharge end of the ramp.

7. An apparatus for automatically changing bobbins upon the completion of winding of a strand thereon comprising a supporting frame, means at one end of said frame for storing an empty bobbin at an elevated level, means on said frame for accommodating a bobbin onto which the strand is adapted to be wound, a rotary drum mounted for rotation on a fixed axis in said frame with said fixed axis substantially parallel to the movable axis of said last-mentioned bobbin, and with the peripheral surface of said drum in frictional contact with said last-mentioned bobbin for imparting rotary movement thereto, a ramp tiltably mounted on said frame about another fixed axis beyond the fixed axis of said rotary drum from said one end of said frame, means interconnecting said ramp with the bobbin receiving the strand being wound thereon to impart a gradual tilting movement to the ramp from the start of the winding of the strand onto the bobbin to the completion thereof in consequence of the gradual increase in diameter of the strand winding on the bobbin, and means responsive to the growth of the wound bobbin to a predetermined diameter and the consequent tilting of the ramp to a predetermined degree to eject said completely wound bobbin down said ramp and to release said empty bobbin for positioning adjacent to said rotary drum for winding of the strand thereonto.

8. An apparatus for automatically changing bobbins upon the completion of winding of a strand thereon comprising a supporting frame, means at one end of said frame for seating an empty bobbin at an elevated level, means on said frame for accommodating a bobbin onto which the strand is adapted to be wound, a rotary drum mounted for rotation on a fixed axis in said frame with said fixed axis substantially parallel to the movable axis of said last-mentioned bobbin, and with the peripheral surface of said drum in frictional contact with said last-mentioned bobbin for imparting rotary movement thereto, a ramp tiltably mounted on said frame about another fixed axis beyond the fixed axis of said rotary drum from said one end of said frame, means interconnecting said ramp with the bobbin receiving the strand being wound thereon to impart a gradual tilting movement to the ramp from the start of the winding of the strand onto the bobbin to the completion thereof in consequence of the gradual increase in diameter of the strand winding on the bobbin, means responsive to the growth of the wound bobbin to a predetermined diameter and the consequent tilting of the ramp to a predetermined degree to eject said completely wound bobbin down said ramp while rupturing the strand therefrom, and to release said empty bobbin for positioning adjacent to said rotary drum for winding of the strand thereonto, and means for automatically entraining the ruptured strand onto said empty bobbin to initiate the winding of the strand thereon by frictional contact of said rotary drum therewith.

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