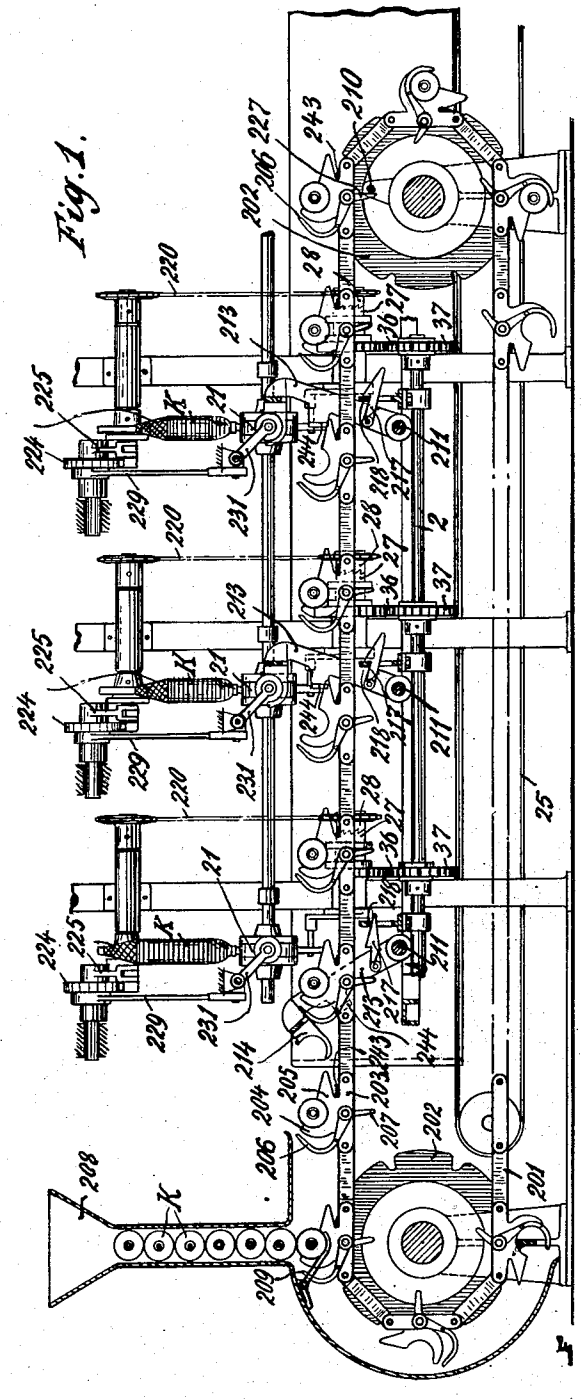
June 6, 1944. W. REINERS ET AL 2,350,927

CROSS WINDING FRAME

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Fig. 1.



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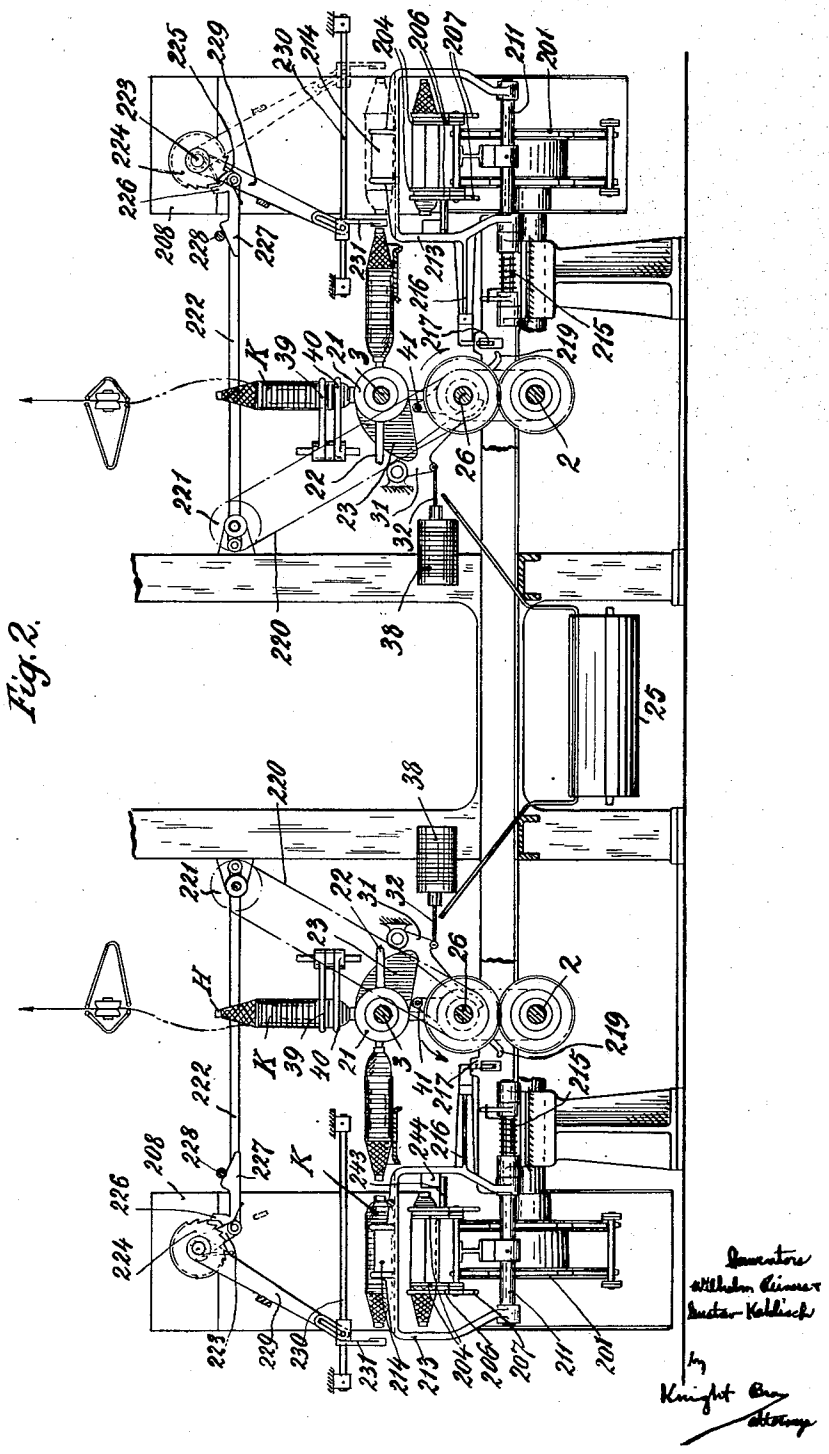


Fig. 2.

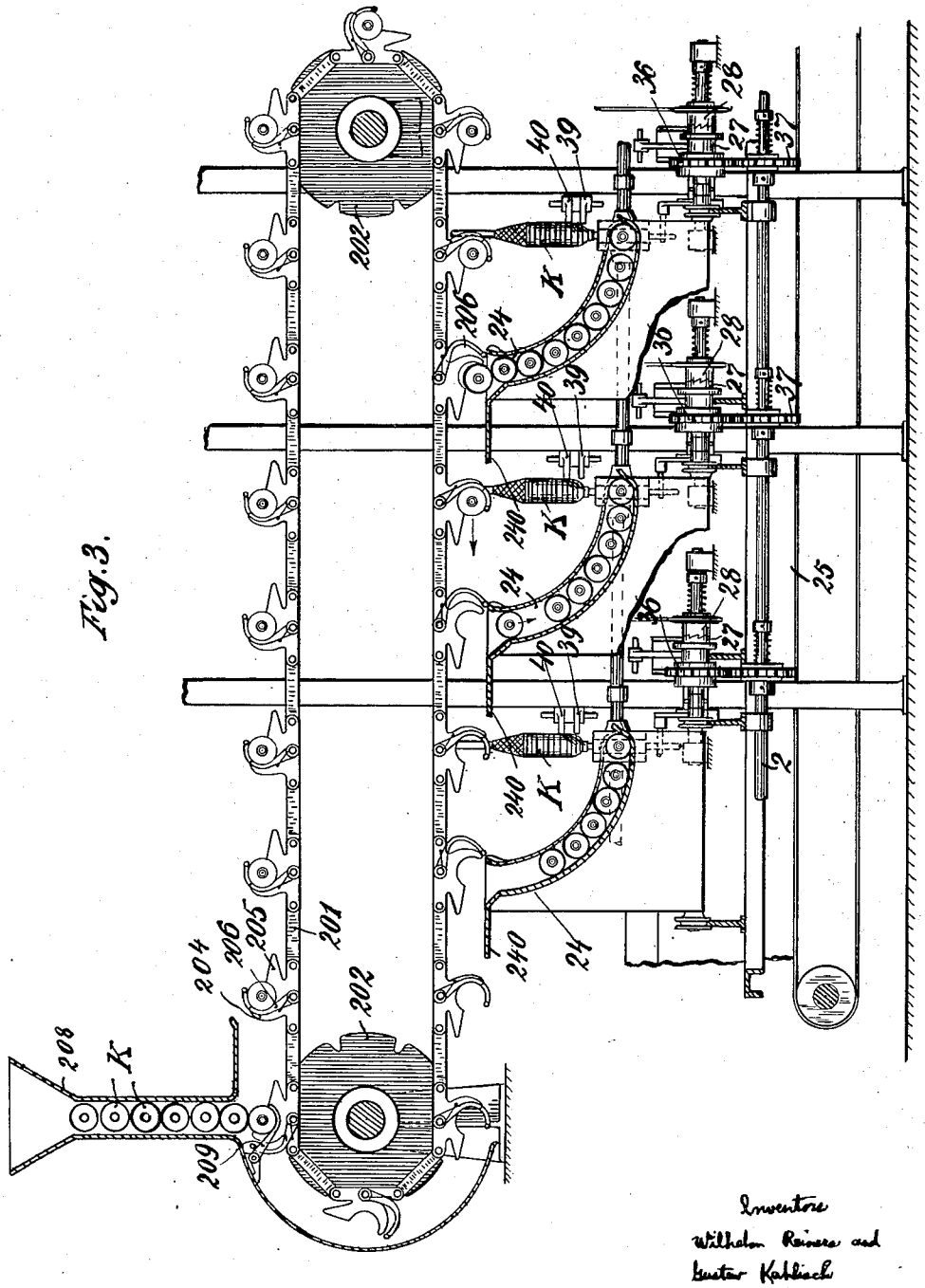
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CROSS WINDING FRAME

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Fig. 3.



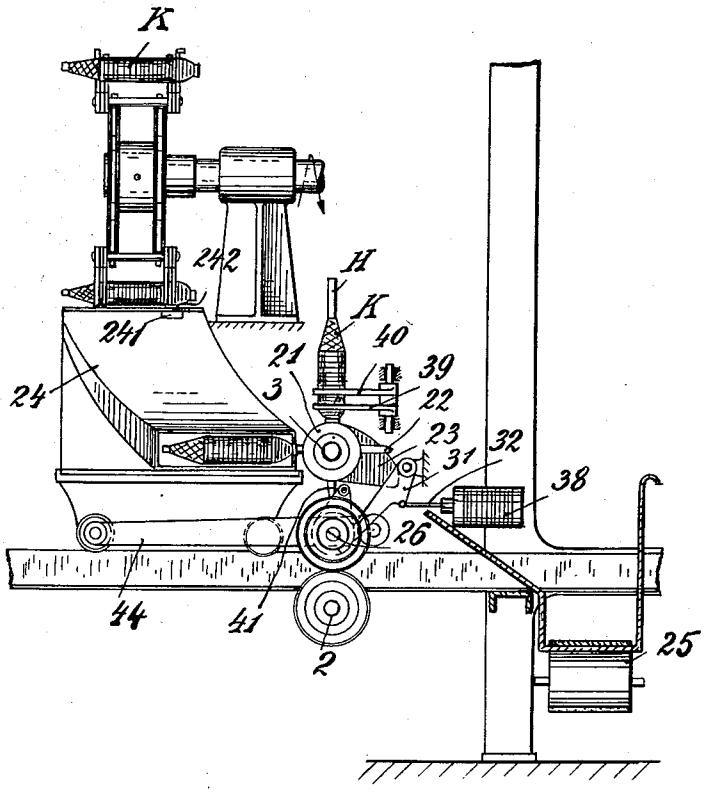
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Fig. 4.



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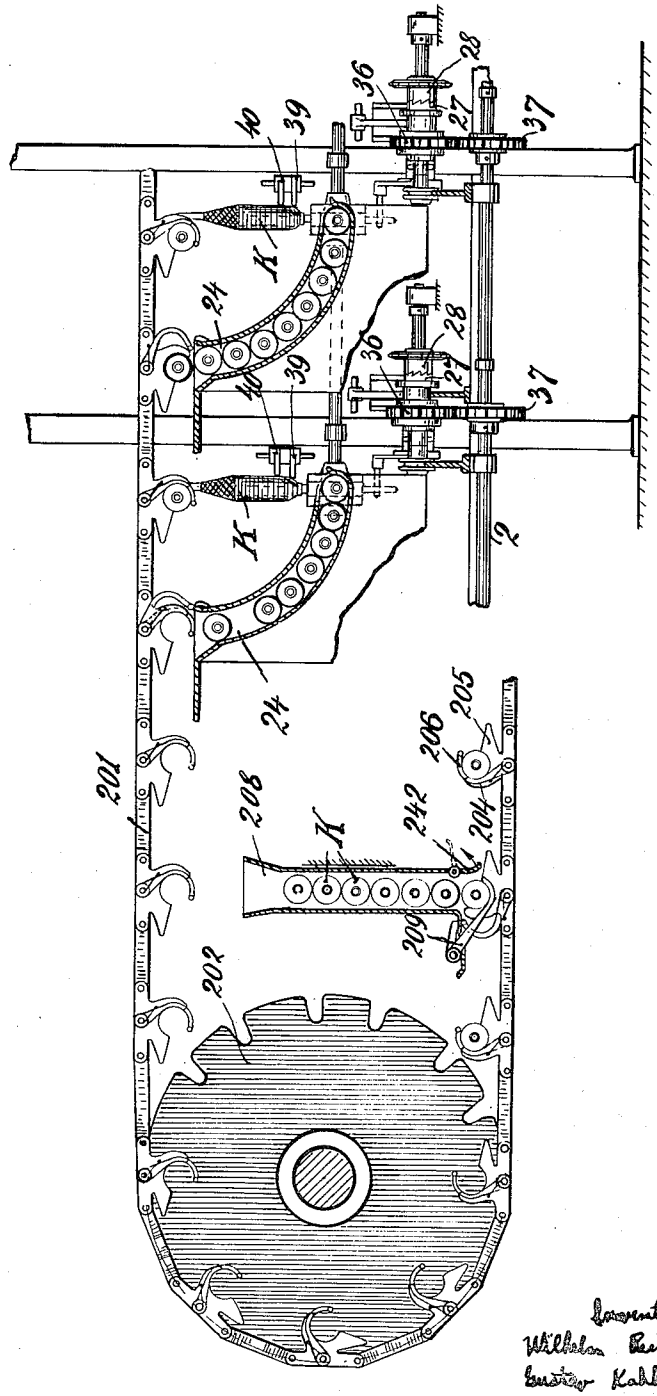


Fig. 5.

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UNITED STATES PATENT OFFICE

2,350,927

CROSS WINDING FRAME

Wilhelm Reiners, Gladbach-Rheydt, and Gustav Kahlisch, Rheydt, Germany; vested in the Alien Property Custodian

Application March 6, 1941, Serial No. 381,944
In Germany June 7, 1939

6 Claims. (Cl. 242—35.5)

According to the patent application in U. S. A. Serial No. 326,641, a cross winding frame with automatic replenishing means for the winding bobbins and automatic yarn connection is further developed to such an extent that at each winding point a yarn knotting device and a sleeve magazine are coordinated. By adding the knotting device and magazine, the winding work in the individual winding points can automatically progress, independent of the proceedings in the neighboring winding points. The sleeve-magazines are arranged on carriages, each carriage being shiftable in a radial plane of the rotary star, so that an axially alined lowermost bobbin of the magazine is pushed onto one of the mandrels of the star in timed relation to the revolving movement of the star.

In winding machines according to this patent application in U. S. A., Serial No. 326,641, the reserve of the winding bobbin heads is obtained by manually filling the magazines.

In order to further simplify the attendance of the frame, the feeding of reserve bobbins is carried out according to the invention, by means of a stationary magazine and lap lattice conveyor. Winding bobbins are automatically taken, when necessary, from the conveying cradles of the lattice conveyor, by means of grippers coordinated to each winding bobbin head or by means of the magazines provided according to the patent application in U. S. A., Ser. No. 326,641, said magazines being accordingly altered, in that the grippers during the continued running of the lattice conveyer, are oscillated into and out of the path of the conveying cradles, or the locking devices holding the bobbins in their cradles are released when passing along the magazines. When grippers are employed, the bobbins are adapted to be pushed by means of a pushing device from grippers onto mandrels, and bobbins not taken from the endless lattice conveyor are secured against slipping out of their conveying cradles at the reversing points of the lap lattice conveyor. In other words, when the top section of the conveyor passes over an end pulley or sprocket, the direction of travel is reversed and the bobbins will fall from the cradles unless secured in position.

If, however, separate magazines for more than one bobbin are employed in the individual winding bobbin heads the inlet slot of each winding bobbin magazine is positioned, according to the invention, relative to the delivering point of the magazine, so that the stroke of the magazine carriage for shifting the winding bobbin on a mandrel of the rotary star remains unaltered. The rotation of the star, however takes place outside the range of the lap lattice conveyor.

The invention further provides, as a separate space-saving arrangement of the lap lattice conveyor, in that the individual magazines of the winding bobbin heads and the main magazine for automatically supplying of the lap lattice conveyor are situated within the space enclosed by the endless lap lattice conveyor.

Several embodiments of the invention are illustrated by way of example in the accompanying drawings. Working elements having the same effect are designated by similar reference numerals.

Figs. 1 and 2 are front and side elevations respectively, with portions thereof in section, showing the coordination of a stationary main bobbin magazine and a lap lattice conveyor for supplying bobbins to a plurality of winding points on a winding frame, together with grippers each holding in reserve a bobbin for the rotary star of each winding bobbin head,

Figs. 3 and 4 are front and side elevations with portions thereof in section, showing the coordination of a stationary main bobbin magazine and a lap lattice conveyor for supplying bobbins to the individual magazines of the several winding bobbin heads,

Fig. 5 is a front elevation with portions thereof in section, showing a special construction similar to Figs. 3 and 4.

At each winding point, the arrangement for replenishing filled bobbins is driven by a shaft 2, a clutch coupling 27, 28, and toothed gear wheels 36, 37, as explained in detail in the U. S. patent application Serial No. 326,641. When the thread reserve of the unwinding bobbin K is exhausted, the contact levers 39, 40 close a control circuit through the relay 38. The rod 32 and the lever arm 31 are thereby actuated to cause the coupling element 28 to be connected with the toothed wheel 36 by means of a coupling bolt. The rotary star 21 is then turned through the revolution of shaft 26 which in turn rotates pin 41 against the lowermost star mandrel 22, whereby the foot of the empty bobbin H (Fig. 4) is axially shifted by the stationary stripper 23 from its mandrel 22, and the empty bobbin is thereafter permitted to fall upon this conveyor belt 25.

In the example shown in Figs. 1 and 2, an endless lap lattice conveyor 201 travels in front of the winding bobbin heads, and over driving and guiding wheels 202. Every other chain link 203 supports a conveying cradle member 204, each

cradle member having integral therewith a forwardly directed nose portion 205. Each conveying cradle comprises a pair of members 204 and is further equipped with locking levers. The upper hooks 206 of the locking levers confine the inserted bobbin in the cradle members when the lower arm 207 strikes against a pin 210.

The pin 210 is located immediately below the top section of the endless belt 201, and at a point prior to the cradle passing over pulley 202 to the lower section of the belt. The pulley 202 is, therefore, the reversing point; that is, the point where the direction of travel of the cradle members and the belt are reversed.

If an empty cradle 204 of the lap lattice conveyor 201 moves under the magazine 208, the lowermost bobbin K, which is prevented by tongues 209 from slipping out, is removed by the cradle noses 205; whereas, if the cradle is filled, when passing beneath the magazine, the contents of the magazine are correspondingly pressed upwardly by the moving bobbin sufficiently to permit passage. Upon passage of the cradle, the lowermost bobbin in the magazine slides over the rounded rear wall of the cradle down onto the tongues 209.

In front of each winding bobbin head, a bobbin gripper 214 is mounted upon an arm 213, said arm being pivotally secured upon a shaft 211, said bobbin gripper being urged by a spring 215 (Fig. 2) into the path of the lap lattice conveyor 201 and into the path of the approaching bobbin immediately after latch 217 is released. The latch is fixed on an arm 216, and is released by a pin 218 under the action of a stop 219, which stop is operated at the bobbin changing. The conveying cradle 204, therefore, delivers its bobbin, when the movement of the conveyor continues, to the downwardly oscillating gripper 214 and then presses the same upwards by means of the noses 243, 244, so that the latch members 217, 218 engage each other. The bobbin is thus brought into axial alinement with one of the mandrels 22 as shown in Fig. 2. A ratchet wheel 224 is then rotated through the intermediary of a chain drive 220, a crank 221, a rod 222, and a lever 225, said lever being mounted for oscillation about shaft 223. The lever 225 has a control nose or pawl 226 which is adapted to engage the teeth of ratchet wheel 224 to rotate same, said control nose 226 being held out of engagement with the ratchet wheel 224 by the cam 227 and the pin 228 during a portion of the oscillation of arm 225. Each time the ratchet wheel is rotated by pawl 226, a long arm 229 is moved, in opposition to the action of a spring, towards the winding bobbin head, and thereby the reserve bobbin is shifted onto a mandrel 22 of the star 21 by means of a stop 231, said stop being slidably mounted upon a rod 230 in the left-hand half of Fig. 2.

By observing Fig. 2, it can be seen that one end of link 222 is pivotally connected to the free end of crank 221, whereas the other end of the link is pivotally connected to the free end of lever 225, said lever having its upper end mounted for oscillation about the axis of rotation of ratchet 224. At the connection between members 222 and 223, the pawl 226 and cam 227 are pivotally mounted. The arm 229 is rigidly connected to ratchet 224, and the lower end of arm 229 operatively engages slidable stop 231 on rod 230.

In the embodiment illustrated in Figs. 3 to 5, the supply of the reserve bobbins is effected according to the teaching of U. S. patent application, Serial No. 326,641, in which the magazine carriage for carrying the magazine 24 is moved by a crank drive including the control rod 44.

The inlet opening of each magazine 24 is disposed immediately below the lower section of endless conveyor belt 201. As the belt travels, the cradle 204 and the associated bobbins K pass over these inlet openings. If a magazine is not completely filled, the bobbin in the cradle is caused to fall into the magazine but, if the magazine is filled, the bobbin remains in its associated cradle. It will be noted that all of the bobbins have their longitudinal axes disposed in parallel relation to a horizontal mandrel 22 of star 21. In fact, the lowermost bobbin in each magazine is axially alined with a mandrel 22, when the bobbin is transferred from the magazine to the mandrel.

When passing over the inlet openings of magazines 24, the locking arms 206 engage the top edges of the openings and are thereby oscillated rearwardly against the action of the associated springs, which springs normally hold the arms in confining position over the bobbins. The bobbin is permitted to fall into the magazine 24 if it is not completely filled. When the magazine is filled, however, the bobbin continues to roll over the uppermost bobbin in the magazine until it moves onto a horizontal guide plate 240. The guide plate presses the bobbin again into the conveying cradle and permits the locking arms to again grip the bobbin. In the edge of each magazine 24, an indentation 241 may be provided and also a small transverse bar 242 as shown in Fig. 4, which enables the closing position of the locking arms 206 as long as a magazine is not exactly within the range of the conveying cradle owing to the shifting-on movement.

The special construction shown in Fig. 5 shows a space-saving arrangement of all single magazines 24 and of the main magazine 208. In this arrangement, the conveyor belt encloses all of the magazines. Attention is called to the fact that the bobbins K are transferred from the main magazine 208 to the cradles 204 on the lower section of the belt. As the belt rotates, the cradles are carried to the top section of the belt where the bobbins are deposited in the individual magazines 24 in a manner similar to the preceding form of the invention shown in Figs. 3 and 4. On account of this special arrangement, the cradles and locking arms project inwardly from the supporting belt instead of outwardly, as in the preceding form.

Briefly, the operation of the apparatus shown in Figs. 1 and 2 is as follows:

The spaced bobbin cradles on the conveyor 201 successively pass beneath main magazine 208. If a cradle is empty, a bobbin is automatically transferred from the magazine but, if the cradle is filled, a transfer does not take place.

As the top section of the belt moves to the right in Fig. 1, the transferred bobbins are carried along and are moved into engagement with grippers 214, which grippers remove the bobbins from the cradles and position the same in axial alinement with horizontal mandrels 22 of star members 21. When the thread supply, on the bobbin from which yarn is being drawn, becomes exhausted, an electrical circuit is automatically closed, thereby energizing a solenoid 38 and, thus, effecting a 90° rotation of star member 21. It will be noted that each star member has four mandrels, spaced 90° apart. This rotation will raise the horizontally disposed bobbin K on one of the mandrels 22 (Fig. 2) to a vertical position

and, at the same time, position an empty mandrel 22 in axial alinement with the adjacent bobbin K on the gripper. Also, this rotation will move the base of the empty bobbin into engagement with a stripper 23, and the stripper will, in turn, remove the empty bobbin from its mandrel 22, after which the empty bobbin will fall onto conveyor belt 25. Subsequent to the last-named rotation of star 21 and mandrels 22, the arm 229 and associated member 231 will be oscillated as previously described to thereby transfer the bobbin K from the gripper 214 to the adjacent empty axially alined mandrel 22 of star member 21.

The operation of the conveyor belt structure in the forms of invention shown in Figs. 3 to 5 inclusive is practically the same as the operation of the form shown in Figs. 1 and 2. The principal difference in the latter forms resides in the manner of transferring the bobbins from the conveyor belts to the mandrels. This transfer operation has been fully set forth in the preceding paragraphs as well as in patent application Serial No. 326,641.

What we claim as our invention and desire to secure by Letters Patent of the United States is:

1. In a winding machine, a bank of independently operating winding units each comprising a supply bobbin support, a series of individual reserve bobbin holders associated with the respective supply bobbin supports for holding reserve bobbins in ready position for mounting on said supports, means for transferring bobbins from said reserve bobbin holders to said supply bobbin supports, a conveyor means adapted to carry a succession of bobbins past said series of reserve bobbin holders, and means whereby each reserve bobbin holder, after giving up a bobbin to its appertaining supply bobbin support is supplied with a bobbin from said conveyor, said conveyor being adapted to retain bobbins passing filled reserve bobbin holders.

2. A winding machine as described in claim 1, in which each of said reserve bobbin holders is movable from a position in which it holds a bobbin ready for mounting on the appertaining supply bobbin support to a position in which it is adapted to pick up from said conveyor the first bobbin reaching it and to be moved thereby back into said first position and out of the path of the bobbins on said conveyor, and means whereby said reserve bobbin holder is moved from said first position to said second position upon the transfer of a bobbin therefrom to said supply bobbin support.

3. A winding machine as described in claim 1 wherein said conveyor comprises an endless circulating mechanism travelling in a vertical plane and provided with cradles to hold bobbins, said conveyor having hooks associated with each cradle for holding the bobbins in the cradles, said hooks being oscillatable from bobbin releasing to bobbin holding position, and means whereby said hooks are thrown from bobbin releasing to bobbin holding position upon reaching that part of the circuit of said conveyor where it turns downward to start its return movement.

4. A winding machine as described in claim 1 wherein said reserve bobbin holders are in the form of individual magazines associated with the respective supply bobbin supports, said magazines having filling openings over which bobbins are carried by said conveyor, said conveyor having retaining means normally holding said bobbins to said conveyor and adapted to be released upon passing the filling opening of each of said individual magazines, said retaining means being adapted to swing back to re-secure a bobbin prevented from dropping into the filling opening of an individual magazine by a quota of bobbins filling the same.

5. In a winding machine, a bank of independently operating winding units, each comprising a rotatable supply bobbin support having a star-shaped arrangement of bobbin skewers thereon, a series of individual magazines associated with the respective supply bobbin supports, each having a filling opening and a delivery opening, the delivery opening being opposite one of the skewers of the appertaining supply bobbin support, individually operating means for reciprocating said individual magazines in the direction to skewer bobbins in the delivery openings thereof upon the appertaining supports, a conveyor adapted to carry a succession of bobbins along the series of individual magazines, the filling openings of said magazines being normally positioned to receive bobbins from said conveyor, said conveyor being positioned beyond the path of movement of the extremities of bobbins on said rotatable supply bobbin support and said magazines having their filling openings displaced with respect to their delivery openings, in the axial direction of the bobbins therein.

6. A winding machine as described in claim 5, wherein a main supply magazine is provided to load bobbins onto said conveyor, said main supply magazine and all of said individual magazines being located within the ambit of said conveyor.

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