Jan. 26, 1943. E. J. ABBOTT 2,309,085

WINDING MACHINE

Filed Aug. 1, 1940 3 Sheets-Sheet 1

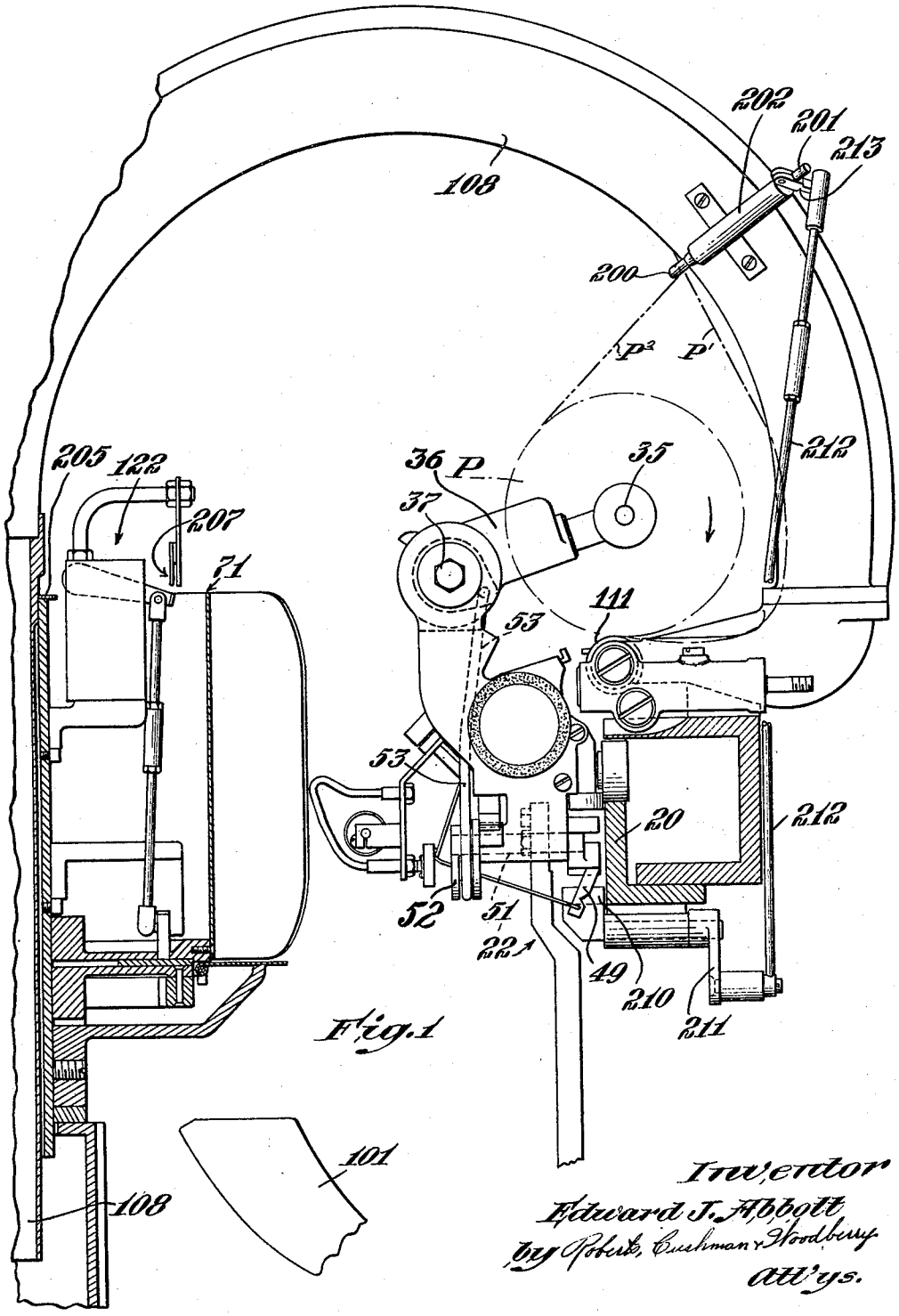


Fig. 1

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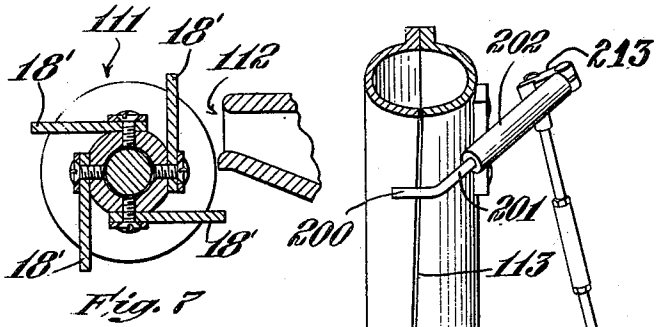


Fig. 7

Fig. 2

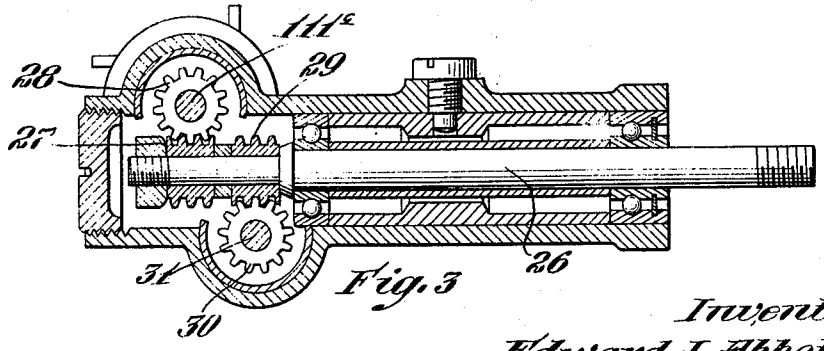


Fig. 3

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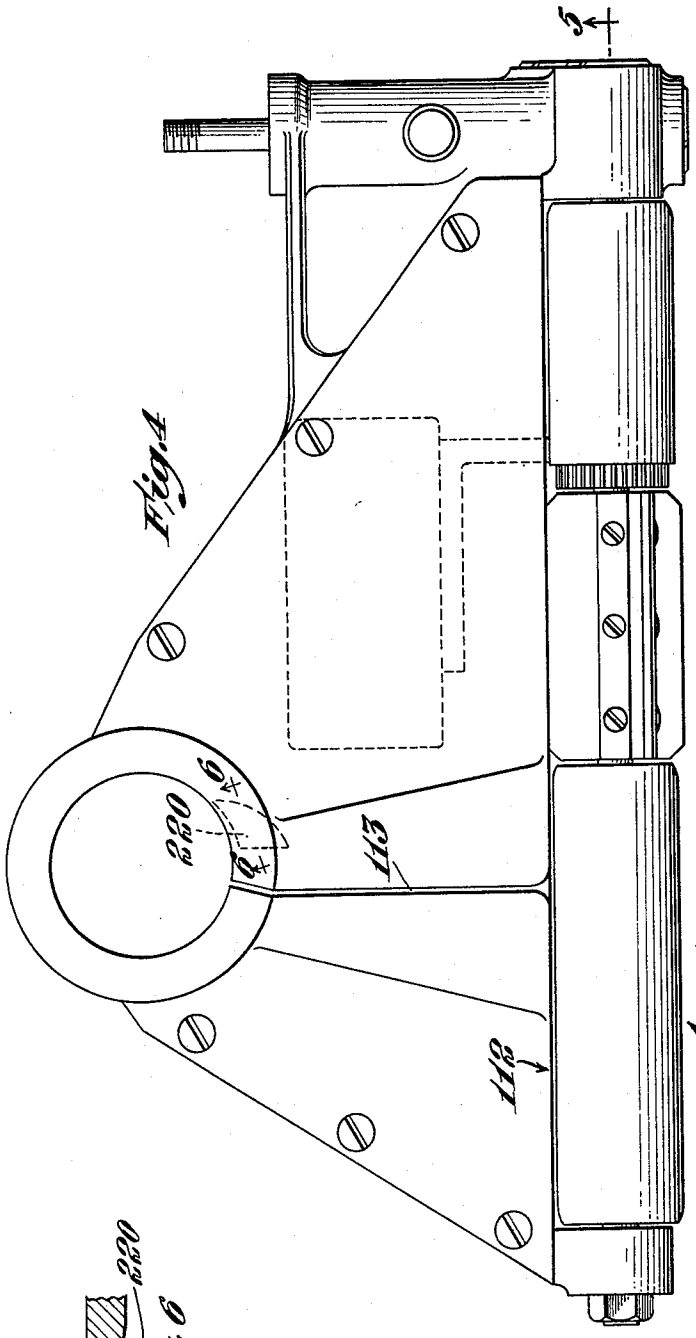


Fig. 4

Fig. 5

Fig. 6

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UNITED STATES PATENT OFFICE

2,309,085

WINDING MACHINE

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Application August 1, 1940, Serial No. 349,105

13 Claims. (Cl. 242—35.6)

This invention relates to automatic winding machines and more particularly to the type of machine in which an end of yarn is automatically found on the surface of a wound package and conveyed to a thread-uniting means to be joined to another end of yarn such as that of a new supply bobbin or that of the old formerly unwinding bobbin of the winding unit.

Among the objects of the invention are to provide for timing the delivery of the found thread to the thread-uniting means in relation to the action of the end-finding means; to enable the thread-uniting means to operate quickly after the end-finding means but to insure that the end-finding means will have finished with the package before the found thread is delivered to the thread-uniting means; and to prevent a thread which has been delivered to the thread-uniting means from being acted upon further by the end-finding means.

Although the principles of this invention are of general applicability to winding machines of this type, the preferred illustrated embodiment applies the invention to a machine having end-finding mechanism such as shown and described in the copending application of Edward J. Abbott, Serial No. 302,994, filed November 6, 1939, now Patent No. 2,238,923.

Other objects of the invention and features of advantage and utility will be apparent from this specification and its drawings wherein the invention is explained by way of example.

In the drawings:

Fig. 1 is a vertical sectional view through the track and magazine of a traveling spindle automatic winder, showing also the end-finding and thread-uniting mechanism of the machine, and one traveling winding unit progressing away from the point of view of the observer;

Fig. 2 is a right side elevation of the end-finding mechanism of Fig. 1, with the winding unit removed to show certain parts in rear thereof, and with the thread conveying tube broken away;

Fig. 3 is a vertical sectional view on the line 3—3 of Fig. 2;

Fig. 4 is a plan view of the end-finding mechanism and its suction nozzle;

Fig. 5 is a vertical sectional view on the line 5—5 of Fig. 4;

Fig. 6 is a fragmentary vertical sectional view on the line 6—6 of Fig. 4 showing a recess in the inside surface of the upper wall of the suction nozzle; and

Fig. 7 is a fragmentary vertical sectional view on the line 7—7 of Fig. 2.

Referring to the drawings, the machine like that of United States Patent No. 2,177,763 is equipped with a track or guide 20 along which the several traveling winding units 22 are pulled by a suitable chain, an end-finding roll indicated generally by the reference character 111 adapted to rotate a wound package P in the unwinding direction, a suction nozzle 112 (Fig. 4), a suction tube 108 leading from the nozzle to the center of the magazine 71 and slotted at 113 (Figs. 2 and 4) to permit the end of yarn P' that is carried to the magazine from the package P to leave the tube 108 and be drawn into a knotter indicated generally at 122.

The magazine 71 is constructed generally similarly to the magazine of said Patent No. 2,177,763 and is equipped with the necessary devices to effect a knotting of the end of yarn P' with another end of yarn, and with means including for example a chute 101 for delivering new supply bobbins to the supply bobbin-holders of the several winding units.

For lifting the winding package off the package driving rolls with which machines of this type are provided, and for use in lowering the package onto the end-finding roll 111, suitable lifting and lowering mechanism is provided. As shown in said Patent No. 2,177,763 on each unit the winding package spindle 35 may be carried by an arm 36, pivoted at 37 and lifted and lowered by means including a rod 53. The lower end of the rod 53 is connected to a crank 52 on the left end of a shaft 51 (Fig. 1). The right end of this shaft 51 carries a cam-follower surface as explained in said Patent No. 2,177,763 adapted to cooperate with stationary cam means on the track to lower the package into a position such as shown in Fig. 1 where it rests on the end-finding roll 111, and also carries a pawl 49 used as explained in said Patent No. 2,177,763 to lift the package. When the pawl 49 of the moving winding unit is detained by contact with a non-traveling element in its path, the pawl 49 turns the shaft 51 to lift the package from the roll 111.

After the package P is placed on the roll 111, the time elapsing before the found end of the yarn will be drawn into the tube 108 is variable, depending of course upon the diameter of the package and upon how many revolutions it makes before the end of yarn is found. It might at some times occur that an end of yarn would be drawn into the tube 108 and carried to the knotter so quickly that the package would be still in contact with the roll 111, in which case the suction nozzle might draw in a loop of yarn and

attempt to deliver that loop to the knotter, thereby producing a snarl. The invention therefore provides for delaying the delivery of the found yarn end to the knotter until after the unwinding roll has finished with the package. A finger 200 comprising a bent extension of a shaft 201 has its shaft 201 rotatably mounted in a sleeve 202 on the side of the tube 108 in a position for the finger 200 normally to block the exit of the yarn from the slot 113 at this place. At the magazine, the slot 113 is further blocked by a lip 205, so that being constrained to stay in the slot 113 at the lip 205 and finger 200, and being pulled along through the tube 108 under strong suction, the yarn is held in the tube 108 between the finger 200 and the lip 205 and hence held above the level of the package P. The tendency of the yarn indicated at P' to leave the portion of the tube 108 below the finger 200 (that is between the roll 111 and the finger) is therefore prevented from being transmitted to the yarn in the remainder of the tube 108. The yarn therefore continues to run freely through the tube 108 down the central part of the magazine as it is unwound from the package P, and is held out of the clamp 207 of the knotter.

As more and more yarn is drawn down into the central portion of tube 108 in the magazine, the portion between the finger 200 and the unwinding roll pulls out of the slot in tube 108, whipping over to the double-dot and dash line position P^2 of Fig. 1, direct from the package to the finger 200.

At approximately the time the package is lifted from the roll 111, the finger 200 is withdrawn from its position across the slot 113 by rotating the shaft 201. This motion is preferably accomplished by the use of the means for lifting the package from the roll, more particularly, by use of an element which is struck by and operates upon the pawl 49. As shown in Figs. 1 and 2, a crank arm 210 of a double crank is interposed in the path of the pawl 49, and the other arm 211 is connected by a lifter rod 212 to a crank arm 213 fastened to the shaft 201. Thus when the pawl 49 strikes the crank arm 210, this arm 210 and the other arm 211 are turned slightly, lifting rod 212 and swinging the finger 200 so that it no longer lies across slot 113. Further movement of the winding unit then causes the pawl 49 to be detained by the crank arm 210 (which has reached the limit of its movement) and the pawl 49 and shaft 51 thereby are caused to turn to lift the package off the roll 111.

With the finger 200 out of the way, the yarn in tube 108 is then able to leave the slot 113 and whip across directly from the bottom of the package into the clamp of the knotter.

As indicated above, the yarn tends to be withdrawn from that portion of the slot 113 below the finger 200 before the finger is shifted. It is desirable to delay such withdrawal of the yarn until the package has progressed along the roll 111 to at least the slot 113 in the suction nozzle, thus preventing the thread from drawing across the path in front of the leading end of the package. For this purpose, the under side of the top wall of the suction nozzle cover is provided with a shallow notch 220 (Figs. 4 and 6) increasing in depth in the direction of the slot 113 and positioned to intercept and detain a yarn against initially leaving the slot at a point removed from the mouth 112 of the nozzle. When the package has progressed far enough for the found yarn in the nozzle 112 to leave the slot 113 at its end at the nozzle mouth, the direction of pull of the yarn is such as to remove it from the notch 220 and allow it to pull out of the remainder of the slot 113 up to the point where the finger 200 is encountered. The shallow notch 220 thus insures that the yarn will begin to leave the slot 113 at the end or mouth of the slot, and not at some intermediate point, and that it will remain in the slot long enough at least to allow the leading end of the package to reach the end or mouth of the slot.

A plain end-finding roll 111 may be employed, but it is preferred to use the construction described in the copending application of Edward J. Abbott, Serial No. 302,994, filed November 6, 1939, wherein between two roll sections 111^a and 111^b (which are driven in the unwinding direction by a shaft 111^c), there is arranged a brush element 16' having thereon flaps 18' (driven in a direction opposite to that of the roll sections 111^a and 111^b by gears 38, 37 and shaft 31). A constantly rotating cross shaft 26 (Fig. 3) is adapted to drive shaft 111^c through gears 27 and 28, and to drive shaft 31 through gears 29 and 30 as explained in more detail in said application Serial 302,994. With such a construction, the flaps 18' brush over the surface of the reversely-rotating package and insure that the end of yarn will be carried into the nozzle 112.

I claim:

1. An automatic winding machine having therein means for finding a thread end of a winding package and thread-uniting means adapted to act on the found thread end, and means for detaining the found thread from engagement with the thread-uniting means until after a predetermined cycle of operation of the end-finding means, to prevent premature delivery to the thread-uniting means of a thread that is quickly found by the end-finding means.

2. An automatic winding machine having therein means for finding a thread end of a winding package, thread-uniting means adapted to act on the found thread end, a suction conduit for conveying the found thread end to the thread-uniting means, the conduit having an opening to permit the thread to leave the conduit for reception by the thread-uniting means, and means for temporarily detaining the thread from leaving the conduit through said exit, thereby to time the reception of the thread by the uniting means in relation to the operation of the end-finding means.

3. An automatic winding machine having therein means for finding a thread end of a winding package, thread-uniting means adapted to act on the found thread end, a slotted suction conduit extending in an indirect path from the end-finding means to adjacent to the thread-uniting means, whereby the thread is adapted to leave the conduit through said slot for reception by the thread-uniting means, a member adapted to extend across the slot, and means for automatically removing said member from its position across the slot in timed relation to the action of the end-finding means upon the package.

4. An automatic winding machine having therein means for finding a thread end of a winding package, thread-uniting means adapted to act on the found thread end, a slotted suction conduit extending in an indirect path from the end-finding means to adjacent to the thread-uniting means, whereby the thread is adapted to leave the conduit through said slot for reception by the thread-uniting means, a member

adapted to extend across the slot at a point where said member can cause the thread to remain in a sufficient length of the conduit to keep out of the thread-uniting means and means for automatically removing said member from its position across the slot in timed relation to the action of the end-finding means upon the package.

5. An automatic winding machine having therein thread end-finding means including means for rotating a thread package in an unwinding direction, means for operatively associating the package with said package-rotating means, a suction conduit adapted to receive an end of thread from the package while the latter is thus rotated, a thread-uniting means to which the conduit is adapted to deliver the found thread, and means for temporarily preventing such delivery of the thread to the uniting means during the time the package-rotating means is acting on the package.

6. An automatic winding machine having therein thread end-finding means including a roll adapted to rotate a thread package in an unwinding direction, a suction conduit adapted to receive an end of thread from the package while the latter is thus rotated, a thread-uniting means to which the conduit is adapted to deliver the found thread, means for placing the package in contact with said roll and means for removing the package from the roll, and means, operating in timed relation to the package-removing means, for temporarily delaying delivery of the found thread to the uniting means.

7. An automatic winding machine having therein thread end-finding means including a roll adapted to rotate a thread package in an unwinding direction, a suction conduit adapted to receive an end of thread from the package while the latter is thus rotated, a thread-uniting means to which the conduit is adapted to deliver the found thread, means for placing the package in contact with said roll, means for shifting the package away from the roll, and means adapted to detain the thread in the conduit and actuable by said shifting means to release the thread.

8. An automatic winding machine having therein thread end-finding means including a roll adapted to rotate a thread package in an unwinding direction, a suction conduit adapted to receive an end of thread from the package while the latter is thus rotated, a thread-uniting means to which the conduit is adapted to deliver the found thread, means for placing the package in contact with said roll and means for removing the package from the roll, said package-removing means acting later in the case of a package of large diameter than in the case of a package of small diameter, and means, operating in timed relation to the package-removing means, for temporarily delaying delivery of the found thread to the uniting means.

9. An automatic winding machine of the type in which a plurality of winding units are conveyed past end-finding and thread-uniting mechanisms, the machine including a roll adapted to rotate the thread packages of the successive units in an unwinding direction, a suction conduit adapted to receive an end of thread from a package rotated by the roll and to deliver the thread to the thread-uniting means, means for detaining the thread against delivery by the conduit, each unit including package shifting mechanism adapted to remove the package from the roll, and the machine including means actuated by the package-shifting mechanisms of the several units to render said detaining means ineffective.

10. An automatic winding machine of the type in which a plurality of winding units are conveyed past end-finding mechanism, the machine including means adapted to rotate a thread package in an unwinding direction, a suction nozzle having a mouth adapted to receive an end of thread from the package, a suction conduit leading from the nozzle to convey the found end of thread, the conduit and nozzle having a slot extending in the general direction of conveyance of the thread, said slot extending to and opening into the mouth of the nozzle, the package being moved past the nozzle, and the nozzle having a recess shaped to detain a thread against leaving the nozzle through its slot at a point removed from the nozzle mouth until the movement of the package brings the thread to the slot at the nozzle mouth.

11. An automatic winding machine of the type in which a plurality of winding units are conveyed past end-finding mechanism, the machine including means adapted to rotate a thread package in an unwinding direction, a suction nozzle having a mouth adapted to receive an end of thread from the package, a suction conduit leading from the nozzle to convey the found end of thread, the conduit and nozzle having a slot extending in the general direction of conveyance of the thread, said slot extending to said opening into the mouth of the nozzle, the package being moved past the nozzle, and the nozzle having means adapted to detain a thread against leaving the nozzle through its slot at a point removed from the nozzle mouth until the movement of the package brings the thread to the slot at the nozzle mouth.

12. An automatic winding machine of the type in which a plurality of winding units are conveyed past end-finding mechanism, the machine including means adapted to rotate a thread package in an unwinding direction, a suction nozzle having a mouth adapted to receive an end of thread from the package, a suction conduit leading from the nozzle to convey the found end of thread, the conduit and nozzle having a slot extending in the general direction of conveyance of the thread, said slot extending to and opening into the mouth of the nozzle, the package being moved past the nozzle, and the nozzle having a recess shaped to detain a thread against leaving the nozzle through its slot at a point removed from the nozzle mouth until the leading end of the package has at least reached the slot at the nozzle mouth.

13. An automatic winding machine of the type in which a plurality of winding units are conveyed past end-finding mechanism, the machine including means adapted to rotate a thread package in an unwinding direction, a suction nozzle having a mouth adapted to receive an end of thread from the package, a suction conduit leading from the nozzle to convey the found end of thread, the conduit and nozzle having a slot extending in the general direction of conveyance of the thread, said slot extending to said opening into the mouth of the nozzle, the package being moved past the nozzle, and the nozzle having means adapted to detain a thread against leaving the nozzle through its slot at a point removed from the nozzle mouth until the leading end of the package has at least reached the slot at the nozzle mouth.

EDWARD J. ABBOTT.