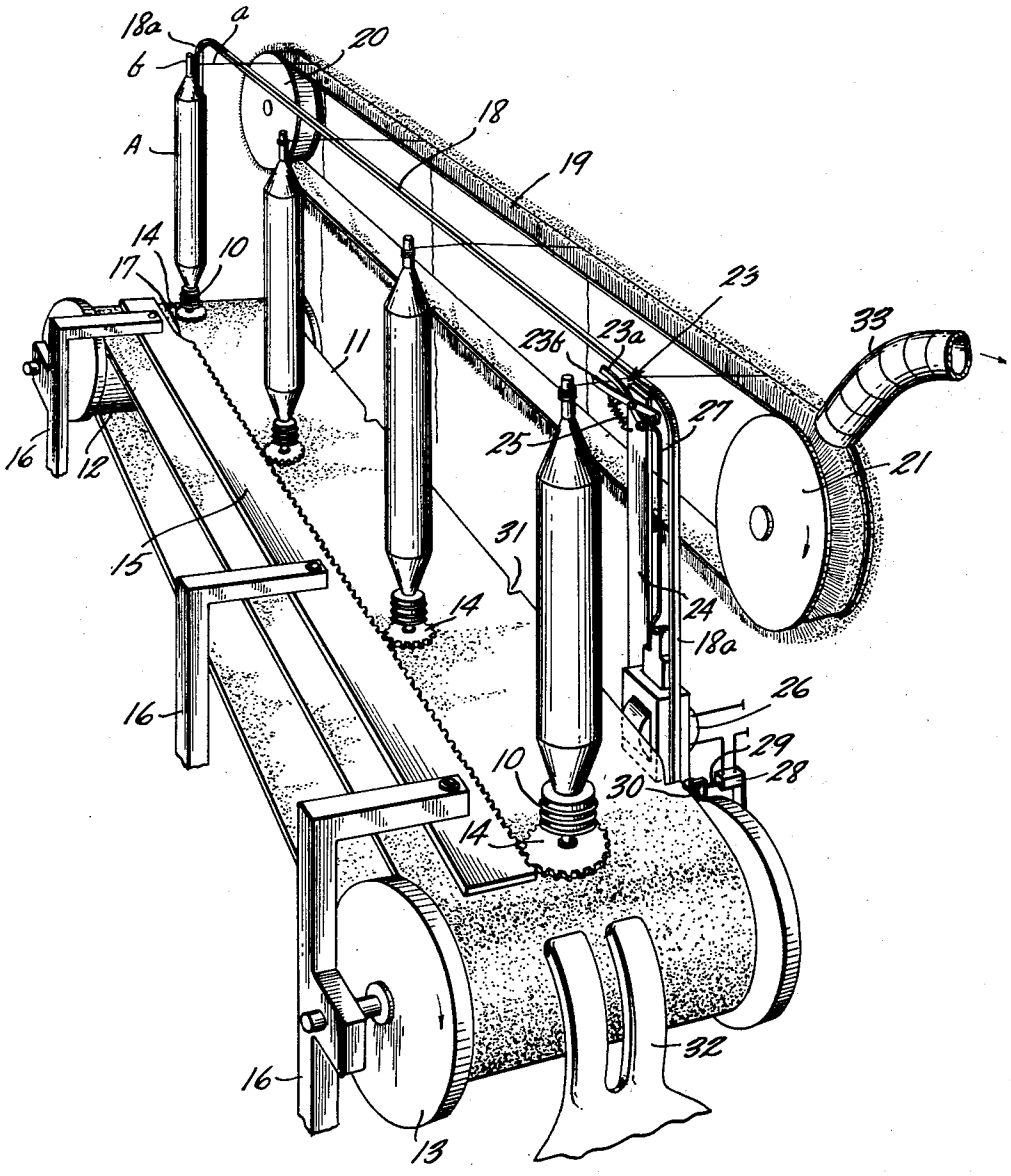
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BOBBIN TIP BUNCH BUILDER

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# BOBBIN TIP BUNCH BUILDER

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This invention relates to apparatus for winding an end length of yarn of a wound or full bobbin in a plurality of turns around the tip end of the bobbin to build a bunch.

In the textile industry, increasing use is being made of looms equipped with automatic bobbin replenishers. In these machines the bobbins are loaded in the magazine of the loom, and they are used in sequence as needed. Formerly, in loading bobbins in the magazine of the loom, it was necessary to place the starting ends of the yarns in guides on the bobbin transfer apparatus. However, in modern looms this is no longer necessary because such looms are equipped with devices which engage a bunch formed on the tip end of the bobbin and hold it during the transfer of the new bobbin into the shuttle and during the initial operation of the shuttle.

Various proposals have been made for forming a suitable bunch on the tip end of a wound bobbin. Generally speaking, however, these proposals have been unsatisfactory because they have resulted in bunches of different sizes or in bunches formed at different positions on the tip end of the bobbin. In most of these prior proposals, the bunch was formed during or just after the spinning operation, and it was found that the bunches were frequently pulled off or otherwise disarranged by subsequent handling or during storage of the bobbins before use.

The present invention provides apparatus for making uniform bunches consistently to the desired specifications. The apparatus provides one or more bobbin holders mounted on a movable conveyor. The wound bobbins which are to be loaded in the magazine of a loom are delivered to the bobbin holders, each with a loose or dangling end length of yarn from which the bunch is to be formed. As the bobbin is conveyed by the movable conveyor it is also rotated, and while the bobbin is so rotated the loose end of the yarn is guided by suitable guide means so that a number of turns of yarn from the dangling end is formed about a tip end of the bobbin, thereby constituting the bunch. At the discharge end of the carrier, the bobbin is removed from the holder of the conveyor and delivered to the magazine of a loom equipped with an automatic bobbin replenisher.

For a complete understanding of the present invention, reference may be had to the detailed description which follows and to the accompanying drawing in which the apparatus of the present invention is shown in a perspective view.

Referring to the drawing, a plurality of bobbin holding spindles **10** are rotatably supported on an endless conveyor belt or carrier **11** which travels around a pair of guide rollers **12** and **13**. One of the rollers **12** and **13** is driven by a motor (not shown), imparting a continuous drive to the conveyor belt **11**. Each of the rotatable spindles has a pinion **14** affixed at its base, and the pinions are adapted to mesh with the teeth of a long stationary rack **15**. The rack **15** extends above and generally parallel to the upper span of the conveyor belt. The rack is supported by suitable supports **16** of the main frame of the machine. At the feed end of the apparatus, the rack teeth are cut away, as at **17**, so that some distance will elapse between the time that a spindle first comes onto the upper span of its path of travel until the point at which the pinion **14** of the spindle engages the rack teeth.



The bobbins A are inserted into the bobbin holders or spindles **10** at the feed end of the conveyor **11** by hand or other suitable means. A length *a* of the yarn, preferably from twenty-four to thirty inches, is disengaged from the bobbin before the bobbin is inserted in the spindle. The loose or dangling end of the yarn is looped once around the tip end *b* of the bobbin, and the remaining length is placed over both a guide rod or rail **18** and a tensioning device **19** at the feed end of the apparatus. This is preferably done before the pinion **14** comes into engagement with the teeth of the rack **15**.

The guide rod or rail **18** extends generally parallel with the upper span of the conveyor **11** at a height which corresponds approximately with the upper tip end of the bobbin on which the bunch is to be formed, although it may be adjusted to a higher or lower level if desired. The guide rod or rail **18** is supported at opposite ends by vertical upright legs **18***a* formed integrally with the horizonal portion of the rail **18**. The lower ends of the vertical uprights **18***a* are supported by any suitable means which permits the guide rod or rail to be adjusted to the desired height.

The tensioning device **19** comprises a wire brush belt which is driven at the same rate of speed as the spindle carrier **11**. The wire brush belt travels around end pulleys **20** and **21**, and the upper span of the belt **19** extends generally parallel with the upper span of the conveyor **11**, but at a higher level. As the yarn is drawn through or across the closely spaced wires of the wire brush belt, the brush serves to clean it by picking up lint and loose fibers, to remove any kinks or loops in the yarn, and to give it the proper tension for winding the bunch around the tip end of the bobbin.

It is generally deemed desirable to build a bunch of thirteen turns of yarn about one-half to one-quarter of an inch from the tip end *b* of the filling bobbin. A bunch thus formed is ideally suited for use in the magazine battery of a Draper type loom. After the bobbins are spun and doffed in the usual manner on a conventional spinning frame, they are then brought to the feeding end of the bunch building apparatus of the present invention. The operator manually draws about twenty-four to thirty inches of yarn off the bobbin and places one end of the bobbin in the rotatable bobbin holder or spindle **10**. The loose end *a* of the yarn is then placed over the guide rod **18** and the upper span of the wire brush belt **19**. As the conveyor continues to advance and the pinion **14** comes into mesh with the teeth of the rack **15**, the bobbin holder or spindle is rotated in a clockwise direction, thus winding the loose end of the yarn onto the tip *b* of the bobbin. After forming a bunch of about thirteen turns, the yarn is guided by the guide rod **18** between the jaws of a cutting device **23** which cuts the remaining unwound yarn (ordinarily between four and eight inches in length). Also, at about the same time, the pinion moves out of mesh with the discharge end of the rack **15**, so that the rotation of the bobbin A ceases before it is ejected from the spindle **10**.

For purposes of illustration, the cutting device **23** is shown as comprising a fixed upper jaw **23***a* and a pivotal lower jaw **23***b*. Both jaws are mounted at the upper end of a support member **24**. The movable jaw is normally held open by a tension spring **25**. The jaw, however, is adapted to be closed by the operation of a sole-

noid **26** which is connected to the movable jaw by a long vertically disposed rod **27**. The solenoid may be energized by any suitable means such as, for example, by a switch **28** actuated by a spring urged arm **29**. The spring urged arm **29** carries a roller **30** which engages one edge of the conveyor belt **11**. The edge of the belt contains notches **31** spaced apart at predetermined intervals, and when the roller detects a notch **31** in the edge of the belt, the switch **28** is closed to energize the solenoid **26**, thereby operating the cutting device **23**.

At the discharge end of the upper span of the conveyor **11**, the bobbin is automatically ejected from the spindle **10** by a stationary claw **32**. The butt end of the bobbin is lifted out of the spindle by the claw, and the bobbin is then deposited on a chute (not shown) which carries it to and loads it automatically in the magazine of the loom.

As the wire brush belt **19** passes around the pulley **21** at its discharge end, the belt moves beneath a suction conduit **33** of a vacuum device (not shown), thereby removing from it the severed ends and any other foreign material.

From the foregoing description, it is apparent that the present invention requires no changes in the conventional spinning or in the operating techniques customarily used in the textile industry. In addition, in the present invention the bunch is built just prior to placing the bobbin in magazines, so that there is little danger of it being accidentally pulled off or disarranged before use, such as could be expected if the bobbin had then to be handled or stored for a period of time prior to its use. It is also apparent that one of the bunch building machines of the present invention is capable of taking care of the requirements of one or more looms.

The present invention is shown in single preferred form and by way of example only, and obviously many modifications and variations can be made therein without departing from the spirit of the invention. The invention, therefore, is not to be limited to any particular form or embodiment, except in so far as such limitations are set forth in the claims.

We claim:

1. A bobbin tip bunch winding apparatus comprising a moving conveyor, bobbin holding means carried by the conveyor for receiving a wound bobbin having a loose end of yarn extending therefrom, means for rotating the bobbin about its axis as it is transported by said conveyor, and yarn guiding means at substantially the same height as the bobbin tip on which the loose end is to be wound, said yarn guiding means guiding the loose end as the bobbin is rotated about its axis to wind the loose end on the bobbin tip.

2. A bobbin tip bunch winding apparatus comprising a moving conveyor, bobbin holding means carried by said conveyor for receiving a wound bobbin having a loose end of yarn extending therefrom, yarn guiding means extending substantially parallel to the direction of travel of the conveyor for engaging and guiding the loose end of the yarn as the bobbin holder is transported by the conveyor, and means for rotating the bobbin about its axis as it is transported by said conveyor, thereby winding the loose end of the yarn on the bobbin tip under the guidance of said guide means.

3. A bobbin tip bunch winding apparatus as set forth in claim 2 including means for cutting the loose end of the yarn after a predetermined number of turns have been formed on the bobbin tip.

4. A bobbin tip bunch winding apparatus as set forth in claim 2 including yarn engaging means movable at approximately the same velocity as the conveyor and in a direction substantially parallel thereto.

5. A bobbin tip bunch winding apparatus comprising a moving conveyor, a bobbin holding spindle rotatably carried by said conveyor for receiving a wound bobbin having a loose end of yarn extending therefrom, yarn guide means extending substantially parallel to the direction of travel of the conveyor for engaging the loose end of the yarn, a pinion coaxially connected to the rotatable spindle, and an elongated rack extending generally parallel to the path of travel of the conveyor, the teeth of said rack driving the spindle pinion, thereby rotating the spindle and the bobbin carried thereby to wind the loose end of the yarn on the bobbin tip under the guidance of said guide means.

6. A bobbin tip bunch winding apparatus as set forth in claim 5 including cutting means for severing the loose end of the yarn after a predetermined number of turns have been formed at the tip end of the bobbin.

7. A bobbin tip bunch winding apparatus as set forth in claim 5 including means for collecting the severed ends of the yarn.

8. A bobbin tip bunch winding apparatus comprising an endless conveyor, a plurality of bobbin holders rotatably mounted on said endless conveyor, a pinion mounted concentrically with each of said bobbin holders, a stationary elongated rack gear extending parallel to the path of travel of said conveyor for meshing with and rotating the pinions and the corresponding bobbin holders, yarn guide means extending substantially parallel to the direction of travel of the conveyor for engaging a loose end of the yarn of a bobbin carried by each of said bobbin holders, and yarn cleaning and tensioning means movable at the same velocity as the conveyor.

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