

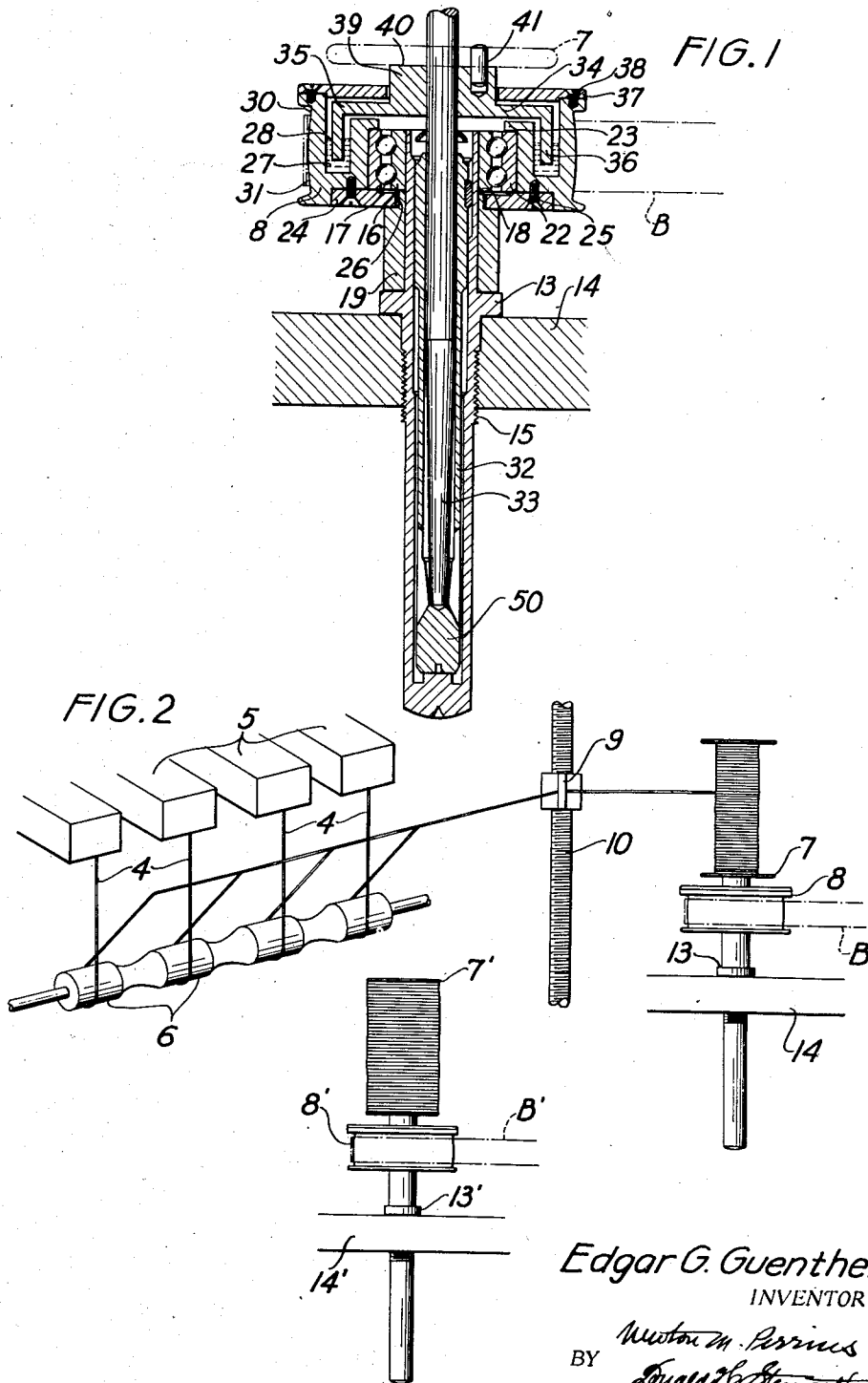
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BOBBIN SUPPORTING AND DRIVING DEVICE

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BOBBIN SUPPORTING AND DRIVING
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This invention relates to the winding of yarns onto bobbins, and particularly to a hydraulic tendency drive between a bobbin and its associated driving whorl to compensate for the increase in the effective diameter of the bobbin as it fills up by allowing the bobbin to progressively slow down independently of the driving whorl.

The principle herein disclosed applies to such yarns as cotton, woolen, worsted, linen, etc., but it is of particular benefit in spinning certain forms of various synthetic yarns such as cellulose acetate, cellulose nitrate, viscose or cuprammonium yarns. This disclosure deals specifically with the spinning of such artificial filaments, but the method may be applied to certain redrawing and other winding operations.

In the spinning of artificial filaments, as for instance by the cellulose acetate process, a viscous spinning solution is forced through a plurality of small orifices downward through a current of warm air and thence to a godet or draw roll. The construction and operation of this type of spinning machine is such that the filaments upon reaching the draw roll are properly cured or dried and are substantially parallel, i. e., without twist. These filaments are then drawn from the draw roll, through suitable thread guides, and to a bobbin or spool. Inasmuch as the rate of speed in the spinning of artificial filaments remains substantially constant, it is necessary in the winding operation to compensate for the increase in the effective diameter of the bobbin as it fills up. In the cap spinning or ring twisting methods of winding, the bobbin is rotated at a constant speed and the increase in the effective diameter of the bobbin is compensated for by the "balloon" method, which method is common knowledge in the textile art. However, it is sometimes advantageous to wind the yarn directly to the bobbin without the insertion of twist whereby yarns of substantially parallel filaments are obtained. This latter method is known in the textile art as the "direct" method of winding, and in this method of winding it is necessary to compensate for the increase in the effective diameter of the bobbin when it fills up by progressively slowing down the speed of the winding bobbin in one way or another. Various methods of driving the bobbin spindle have been employed to this end, such as variable speed mechanical and electrical drives.

One object of the present invention is the provision of a bobbin supporting and driving device by means of which yarns may be wound directly to the bobbin without the use of any variable

speed transmissions. Another object is the provision of a device of the type described wherein a tendency drive is provided between the bobbin support and its driving means whereby the speed of rotation of the bobbin is controlled by the tension in the yarn between the bobbin and the spinning cabinet. And still another object is to provide a driving whorl containing a fluid which is constrained to move in a given path and into which the driven bobbin support extends to receive energy from the movement of the fluid. And yet another object is to provide a bobbin supporting and driving device of the type described which is simple in construction, efficient in its operation, and designed to appear as a single unit.

Briefly, the device consists of a whorl driven by a belt, gearing, or the like; and a bobbin support rotatably mounted relative to the whorl. Only a hydraulic connection exists between the whorl and the bobbin support, the driving medium being a fluid such as oil, water, etc., which is moved in a constrained path by the whorl. With this connection, if the whorl is driven at a predetermined speed, a rotation, due to the fluid friction of the fluid driving medium, will be imparted to the bobbin support. As the tension increases in the strand of yarn, due to the increase in the effective diameter of the bobbin, a certain slip or difference in the rotational speed between the bobbin support and a whorl will ensue to compensate for the difference in the speed or take-up and thereby prevent the yarn from breaking.

The novel features that I consider characteristic of my invention are set forth with particularity in the appended claims. The invention itself, however, both as to its organization and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawing in which,

Fig. 1 is a vertical section of the preferred form of the bobbin supporting and driving device, and

Fig. 2 diagrammatically illustrates the steps in the spinning and winding operations using the "direct" winding method.

Like reference characters refer to corresponding parts throughout the drawing.

Referring to Fig. 2, in the "direct" method of winding artificial yarn, the individual strands 4 emerging from the spinning cabinet 5 are passed over godet or draw rolls 6. The construction and operation of these spinning machines is well

known, and is such that the filaments 4 upon reaching the godet or draw rolls 6 are properly cured or dried. A plurality of individual strands 4 after passing over the godet rolls are drawn together in a substantially parallel relation, and are wound directly onto a bobbin 7 which is driven by a driving whorl 8 which in turn is driven at a constant speed by means of a belt B connected to some source of power, not shown.

In going from the godet roll 6 to the bobbin 7 the gathered filaments 4 pass through a traversing guide 9 which serves to direct the yarn onto the spool in even convolutions. This traversing guide may be of any well-known form, and for the purpose of illustration is shown as comprising a screw member 10 on which the guide 9 rides up and down as the screw member is rotated by means not shown. When the bobbin 7 becomes full, the strand running to the bobbin is guided by hand and looped once or more about the barrel of the spool 7' running all the while to bobbin 7. When this is accomplished the strand running to bobbin 7 is severed and bobbin 7' immediately picks up the strand, proceeding to wind the yarn until full when the process is again repeated with an empty bobbin in exchange for the full bobbin 7. Since the rate of feed of the filaments 4 from the spinning cabinet 5 is generally constant, it will be understood that as the effective size of the bobbin increases the speed of the bobbin will have to be decreased so that the spool will not tend to wind up the yarn faster than it is supplied, and thus set up a tension in the yarn which will break the same. This contingency is taken care of by my novel bobbin supporting and driving device, described hereinafter, wherein the speed of the bobbin is directly controlled by the tension in the yarn being wound thereon.

Referring now to Fig. 1, wherein a preferred embodiment of the bobbin supporting and driving device is shown, the device comprises a spindle case 13 which is fastened to the machine frame 14 by having a threaded portion 15 thereof screwed into a tapped opening in the machine frame. The inner race 16 of a combined radial and thrust ball-bearing 17 has a drive fit with the case 13 and rests on the end 18 of the spacing collar 19 which is pressed onto the case 13. The annular open ended whorl 8 has a drive fit with the outer race 22 of the ball-bearing 17, and is positioned vertically relative to the bearing through the engagement of the flange 23 thereon and the top of the race 22.

After assembling the whorl 8 on to the bearing 17 the bottom of the whorl is covered by an annular cap 24 which may be fastened in place by screws 25. A loose fit, indicated at 26, is provided between the cap 24 and the end of the spacing collar 19 to permit the whorl to rotate relative to the case 13, and this loose fit may be filled with any suitable anti-friction packing, not shown. An annular recess 27 is provided in the whorl and contains a quantity of fluid 28 such as oil, water, etc. The periphery of the whorl 8 has a belt groove 30 formed therein, which may or may not be crowned as indicated at 31, in which rides a belt B, see Fig. 2, driven from some source of power, not shown, whereby the whorl is driven at a substantially constant speed. Although I have chosen to show the whorl driven by means of a belt, it is to be understood that the present invention is not limited to this form of drive, but the whorl could

be driven through a gearing or by any other suitable means.

Inserted into the spindle case 13 is a spindle bolster or bearing 32 within which is rotatably mounted the spindle 33 over which the bobbin 7, having the customary hole extending therethrough is adapted to slip. A driven rotor 34 is pressed onto the spindle 33 to rotate therewith. The driving rotor includes a disc portion 35 which extends radially from the spindle over the inner wall of the recess 27 in the whorl and from the periphery of which a downwardly extending flange 36 extends into the recess 27 and into the fluid contained in said recess. It will be noticed that the rotor 34 is mounted in such a way that at no time is any part of it in physical contact with the whorl, but is connected to the whorl only through the medium of the fluid contained in the recess 27 thereof. It is to be noted that the thrust load of the bobbin 7, rotor 34 and the spindle 33 is transmitted to the cone bearing 50 in the spindle case 13 at the bottom of the spindle, and the ball bearing 17 carries the thrust and axial load of the whorl.

After the fluid has been placed in the recess 27 and the driven rotor 34 has been mounted in its assembled position, the open end of the whorl 8 is covered by an annular cap 37 which is fastened to the top of the outer wall of the recess 27 by screws 38. The hub portion 39 of the driven rotor 34 extends through and above the cap 37 so that the surface 40 thereof will serve to support a bobbin when it is slipped over the spindle. A driving pin 41 fixed to and extending from the surface 40 of the driven rotor 34 is adapted to enter a corresponding aperture in the flange of the bobbin to connect the bobbin to the rotor 34, so that the two will rotate together. While the rotor alone serves as the supporting member for the bobbin 7, the spindle and rotor together constitute the complete supporting means for the bobbin.

From the above description, it will be readily understood how this device operates in the following manner: The whorl 8 is driven at a constant, predetermined, speed by means of the belt B, or any other suitable means, and the fluid 28 carried thereby will tend to rotate at the same speed. Due to the fluid friction of the medium 28, rotation will be imparted to the driven rotor or bobbin supporting member 34, the flange 36 of which extends into the fluid, and the bobbin 7 and spindle 33 will be rotated to wind up the yarn. The speed of the whorl 8 is such that the rotation transmitted through the fluid medium to the rotor or bobbin supporting member 34 will be sufficient to take up the yarn as fast as it is produced when the bobbin is empty. It will be understood that, as the tension increases in the strand of yarn, due to the increased effective diameter of the bobbin, a certain slip or difference in rotational speed of the bobbin supporting member 34 and the whorl will be obtained. Thus, as the rotor or bobbin supporting member slips in the whorl, a slowing down of the bobbin comes about and the winding proceeds in an orderly manner. The torque transmitted to the rotor or bobbin supporting member from the whorl through the fluid medium, and the relative slipping between the two members can be varied by using fluids of different viscosity in the whorl, and following this line of reasoning, the winding of different yarns requires the use of different fluids. The

fluid chamber for such a device may be so designed that a substantially constant torque is brought to bear on the bobbin supporting member over a relatively wide range of speeds.

By using the above-described hydraulic drive for the bobbin, a resulting roving of substantially parallel filaments of good quality is obtained, because the winding proceeds with an even tension on the strand at all times. This device also makes it possible to wind the filaments directly as they emerge from the spinning cabinets, and by so reducing the handling of the yarn to a minimum, provides a roving having no broken filaments, a requisite of a roving of this type.

Although I have shown and described a certain specific embodiment of my invention, I am fully aware that many modifications thereof are possible. My invention, therefore, is not to be restricted except insofar as is necessitated by the prior art and the spirit of the appended claims.

Having thus described my invention, what I declare is new and desire to secure by Letters Patent of the United States is:

1. In a bobbin supporting and driving device, the combination of a stationary support, a whorl rotatably mounted on said support and having a smooth walled recess concentric with its periphery, a quantity of fluid contained in said recess and forming a power transmitting element, means for driving said whorl, bobbin supporting means mounted on said support to rotate relative to said whorl and including a smooth walled circular member fixed thereto and extending into the fluid in said recess whereby a rotation of the whorl will tend to rotate said bobbin supporting means.

2. In a bobbin supporting and driving device, the combination of a stationary support, a whorl rotatably mounted relative to said support, and provided with an annular recess having smooth walls, a quantity of fluid contained in said recess and forming a power transmitting element, means for driving said whorl, a spindle rotatably mounted in said support, a driven member mounted on said spindle to rotate therewith, a

circular smooth surfaced flange on the driven member extending into the fluid in the recess to receive kinetic energy therefrom, and means on the driven member adapted to engage a bobbin when it is slipped onto the spindle whereby the bobbin is connected to the driven member and spindle to rotate therewith.

3. In a bobbin supporting and driving device, the combination of a stationary support, a whorl rotatably mounted on said support and having an annular smooth walled recess, a quantity of fluid contained in said recess and forming a power transmitting element, means for driving said whorl, a spindle rotatably mounted in said support, a circular bobbin supporting member mounted on said spindle coaxially with the whorl to rotate therewith, a smooth surfaced circular flange on the bobbin supporting member extending into the annular recess in said whorl and into the fluid therein, but not contacting the whorl physically, and means on the bobbin supporting member adjacent the spindle for rotatively connecting a bobbin thereto when the bobbin is slipped onto the spindle.

4. A bobbin supporting and driving mechanism, comprising a stationary support, a vertical spindle rotatably mounted on said support, a whorl rotatably mounted on said support and encircling said spindle, said whorl provided with a smooth walled annular recess encircling said spindle, a quantity of fluid contained in said recess and forming a power transmitting element, means for driving said whorl, including a belt contacting the periphery of the same, a circular bobbin supporting member mounted on said spindle to rotate therewith, a smooth surfaced flange depending from the periphery of said bobbin supporting member and extending into the annular recess in said whorl and into the fluid therein, and means on said bobbin supporting member adjacent the spindle for rotatively connecting a bobbin thereto when the bobbin is slipped onto the spindle.

EDGAR G. GUENTHER.