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FREE SPINNING CAP ASSEMBLY

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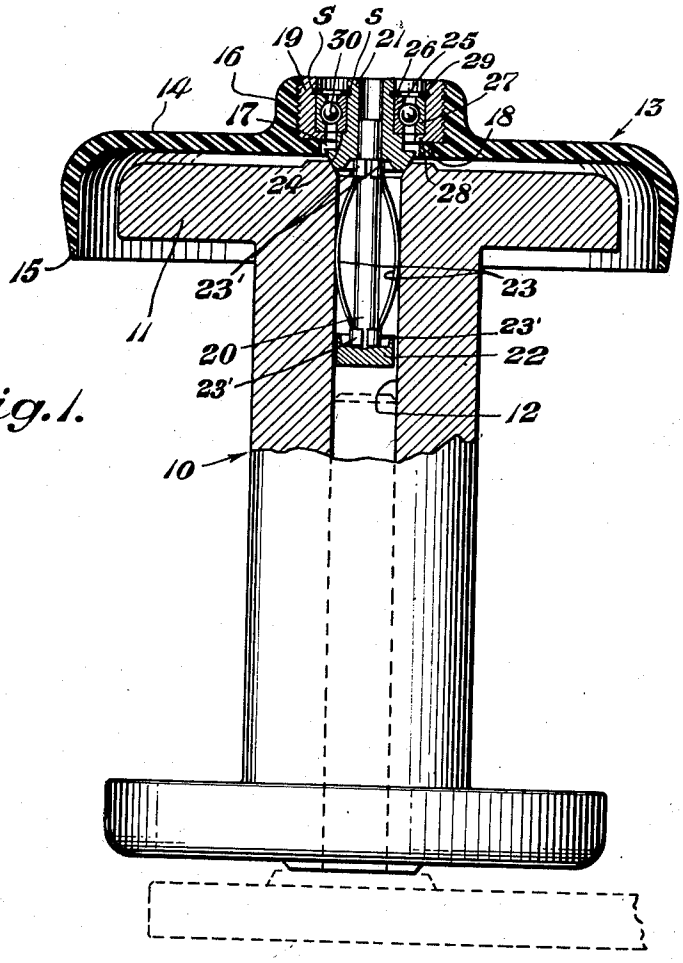

Fig. 1.

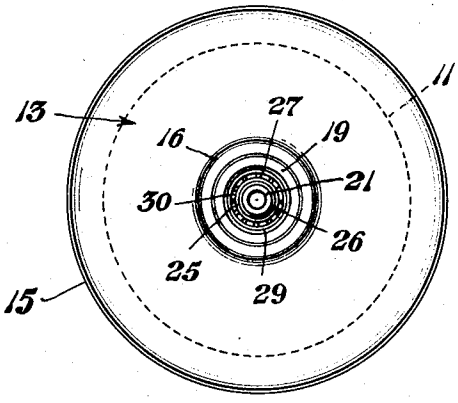

Fig. 2.

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FREE SPINNING CAP ASSEMBLY

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7 Claims. (Cl. 242—128)

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This invention relates to material unwinding devices, and more particularly to a device for unwinding a continuous strand of material from spools, reels, or the like.

In the endwise unwinding of a continuous strand of material from a flanged spool, the material balloons to an increasing extent as the unwinding point travels downward towards the base of the spool and decreases as the unwinding point travels upward toward the top of the spool, being at a minimum at the top, with the result that the pull on the material may cause it to bind momentarily upon the top flange of the bobbin and break. During such an operation, the material often becomes entangled or entrapped, whereby the continuous unimpeded withdrawal thereof is prevented. These difficulties occur as a result of numerous factors, such as the manner in which the material has been wound onto the spool, which may result in overwinds at the ends, so that as the layers are withdrawn the possibility of entanglement is created. Likewise, spools which have been tightly wound may bulge or mushroom at the ends to cause difficult unwinding.

A spinning flyer has been previously proposed, that has an eyelet through which the strand of material passes. The objection to this device is that when the unwinding is stopped, the momentum of the revolving flyer entangles the materials or results in a number of unwinded turns of the material.

It is an object of the present invention to provide a device which permits overend delivery of a continuous strand of material with a uniform tension.

It is a further object of the present invention to provide a rotating device for a stationary spool or bobbin which permits high speed overend unwinding of a continuous strand of material from the spool or bobbin with the elimination of snagging.

Other objects and the nature and advantages of the instant invention will be apparent from the following description taken in conjunction with the accompanying drawings, wherein:

Fig. 1 is a view partly in front elevation and partly in vertical section, showing the device inserted into the end of a bobbin, and

Fig. 2 is a reduced plan view thereof.

Referring more particularly to the drawings, the numeral 10 indicates a bobbin, spool or reel on which a continuous strand of material is wound. The bobbin 10 is provided with upper and lower flanges or heads 11 and with a barrel

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provided with a core 12 extending through the center thereof. The bobbin is preferably mounted in a stationary manner on a suitable support at the bottom thereof, and the strand of material is unwound overend about the free spinning device indicated generally by the numeral 13. The device 13 includes a rotatable cap member 14 which is preferably made of plastic and a downwardly extending flange 15 on the outer periphery thereof adapted to cover the upper spool flange or head 11 as well as a portion of the wound material on the barrel. An upwardly extending circular flange 16 is provided integral with the cap 14 of slightly greater diameter than the central opening 17 therein, thus forming a shoulder 18 surrounding the opening 17. A retaining ring 19 is attached to the cap 14 within the upwardly extending flange 16, resting on the shoulder 18 therein. Preferably the retaining ring 19 is made of metal and is molded in place.

Extending through the opening 17 of the cap into the core 12 of the bobbin is a plug assembly adapted to be connected rigidly to the bobbin 10. The plug assembly comprises a shaft 20 attached at the top thereof to a plug 21 and the bottom to a plug 22. The lower plug 22 is of smaller diameter than the core 12 of the bobbin so that it can be inserted therein. The upper plug 21 is of greater diameter than the core 12 of the bobbin and rests on the upper head 11 thereof. The upper plug 21 has a smaller diameter than the central opening 17 in the cap so that it may be inserted therein. A plurality of leaf springs 23 are associated at their ends 23' with the plug assembly between the plugs 21 and 22 surrounding the shaft 20. The leaf springs 23 are bowed outwardly at their center portions so as to tightly engage the walls of the core 12 of the bobbin and provide a rigid connection between the bobbin and the plug assembly.

The outer circumferential surface of the plug 21 is formed with a shoulder 24 on which an inner bearing race 25 is located. A lock ring 26 secured in the slot S in the plug 21 retains the inner bearing race 25 in position. An outer bearing race 27 resting on a shoulder 28 on the inner peripheral surface of the retaining ring 19 is held in position by a lock ring 29 which is secured in the slot S in the retaining ring 19. Ball bearings 30 are positioned between the inner and outer races.

In operation, the plug assembly carrying the freely rotatable cap member 14 is rigidly inserted in one end of the bobbin as shown in Fig. 1. When the unwinding operation is initiated, the

strand of material takes the form of a balloon and the unwinding proceeds until the draw-off of the strand is impeded for some reason. The resulting tension on the strand causes the strand to contact the depending flange 15 on the rotatable cap member 14. Upon contact with the cap member, the latter is rotated in the direction in which the strand is unwound by reason of the tension on the strand. This rotation of the cap member will decrease the angle of tbe strand with respect to the axis of the bobbin and will thereby give extra impetus to the strand between the point where it is trapped and the point at which it touches the rotatable member. This will act to free the entrapped strand and facilitate the continued unwinding thereof uninterruptedly. As soon as the strand is freed, it will again balloon outwardly out of contact with the rotatable cap member.

In the operation of this device, the only time the strand material comes in contact with the rotatable cap member is when the speed of unwinding is low on a full bobbin so that there is little ballooning or at higher speeds when the bobbin becomes partially empty and the drag increases, especially when the strand is closest to the upper head of the bobbin. The device has proven of special value in the case where the delivery of the material is stopped and the strand winds happen to be in the topmost part of the bobbin. In this case, many times, when starting at high speeds, the strand snaps due to the drag on the head of the bobbin. Using the present invention, however, this unsatisfactory condition has been essentially eliminated and more uniform winding tensions and higher speeds are made possible.

This device is particularly adapted for use with thread and yarn and has been found highly efficient in filling bobbins as well as in high speed warp beaming operations. However, the device can likewise be used in unwinding other types of strand material such as wire, cable, twine and the like.

This device may be used with a spool or bobbin not only for unwinding, but also for over-end winding to form the original package. In the use of the device in this manner, the operation would be just the reverse of that described above.

It will be obvious to those skilled in the art that various changes may be made without departing from the spirit of the invention and therefore the invention is not limited to what is shown in the drawings and described in the specification but only as indicated in the appended claims.

We claim:

1. In a device for the endwise winding and unwinding of a hollow package of a continuous strand of wound material, a plug assembly engaging the inner wall of the hollow package rigidly, said plug assembly comprising means fitting into the lower hollow portion of the package, a second means fitting into the upper hollow portion of the package, and resilient means mounted between the first and second means engaging the inner wall of the hollow package, a cap member rotatably attached to said plug assembly, said cap member including a depending flange at the outer periphery of said cap member covering the upper end of the wound portion of the said package, and bearing structure mounted between the said cap member and the said plug assembly to permit rotation of the cap member with respect to the plug assembly and the package.

2. A device in accordance with claim 1 wherein the cap member is integral with a metal retaining ring.

3. In a device for the endwise winding and unwinding of a continuous strand of material from a flanged spool, a cap member, a plug assembly engaging the inner wall of the hollow package rigidly, said cap member being rotatably attached to said plug assembly, said plug assembly including a shaft, a lower plug fitting into the core of the spool attached to the lower end of said shaft, an upper plug engaging the upper flange of the spool attached to the upper end of said shaft, a plurality of leaf springs mounted between the two said plugs and bowed outwardly at their center portions so as to tightly engage the inner wall of the core of the spool, and bearing structure mounted between the said cap member and the said plug assembly to permit the rotation of the cap member with respect to the plug assembly and the spool.

4. In a device for the endwise winding and unwinding of thread from a flanged spool, a plug assembly including a shaft, a lower plug fitting into the core of the spool attached to the lower end of said shaft, an upper plug engaging the upper head of the spool attached to the upper end of said shaft, a plurality of leaf springs mounted between the two said plugs and bowed outwardly at their center portions so as to tightly engage the inner wall of the core of the spool, an inner race attached to the outer surface of said upper plug, a rotatable cap member of greater diameter than the spool surrounding said upper plug, a depending flange at the outer periphery of said cap member covering the upper flange of the spool and a portion of the wound portion of the barrel of the spool, an outer race attached to the cap member located opposite the inner race, and ball bearings mounted between the inner and outer race to permit rotation of the cap member with respect to the spool.

5. A device in accordance with claim 4 wherein the cap member includes an upwardly extending circular flange near the center thereof, a metal retaining ring attached to the inner surface of the said flange adapted to receive the said outer race.

6. A device in accordance with claim 5 wherein the cap member is integral with the metal retaining ring.

7. A device in accordance with claim 3 wherein the cap member is made of a smooth plastic material and includes an upwardly extending circular flange near the center thereof, a metal retaining ring attached to the inner surface of the circular flange, said cap member being integral with the said retaining ring.

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