Feb. 7, 1939. E. KINSELLA 2,145,935

YARN WINDING MACHINE

Filed July 23, 1937

FIG. 1

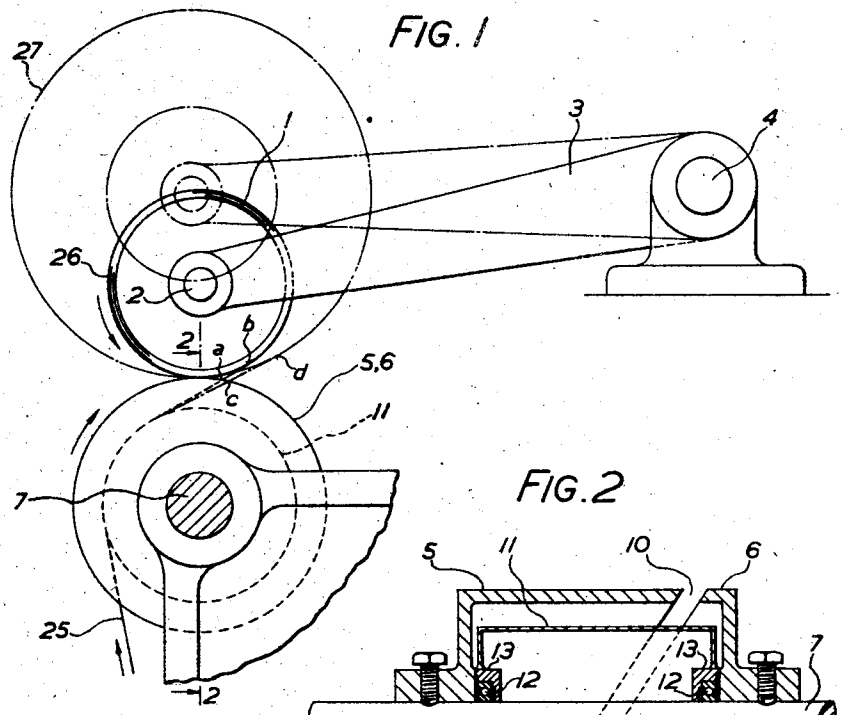


FIG. 2

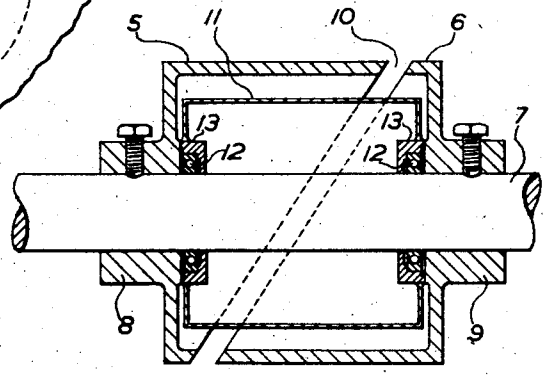


FIG. 4

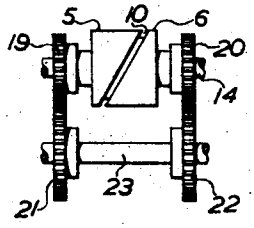
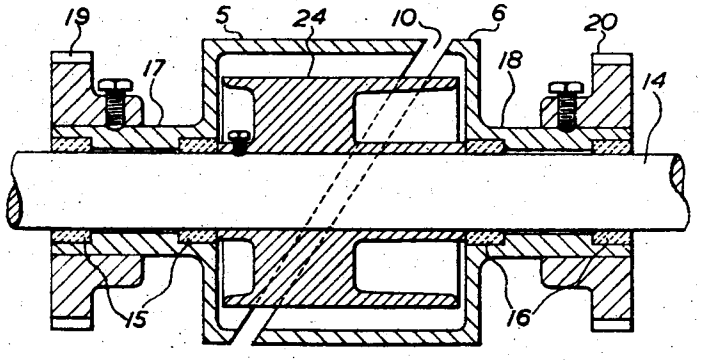


FIG. 3



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YARN WINDING MACHINE

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Application July 23, 1937, Serial No. 155,190
In Great Britain August 6, 1936

3 Claims. (Cl. 242—43)

This invention relates to machines for the winding of cross-wound cheeses, bobbins and similar packages of yarn.

The yarn winding machine according to the invention comprises a rotatable drum adapted to roll against the surface of the package, the drum being formed with an endless slot to engage the yarn and traverse it lengthwise of the package during the rotation of the drum, and a cylinder or roller within the drum and capable of rotation independently of the drum.

Due to the independent rotation of the inner cylinder, the speed of its periphery, against which the yarn bears as it passes through the slot in the drum, is not dependent on the peripheral speed of the drum and consequently it can accommodate itself (or can be accommodated) to the speed of the yarn. Thus, the inner cylinder may be driven by frictional contact with the yarn itself, so as to avoid the drag that would be imposed on the yarn if the cylinder rotated at the same speed as the drum with the consequent difference in the peripheral speeds of the yarn and the cylinder. The yarn, therefore, is not constrained by the inner cylinder but is free to move at the rate at which it is taken up on the package notwithstanding the lesser diameter of the inner cylinder as compared with the diameter of the drum.

The cylinder may, however, be positively driven at the same peripheral speed as the yarn, so as to free the yarn from the necessity to drive the drum, or at some greater or less speed in order control the tension imparted to the yarn during winding. For example, the cylinder may be driven at a greater peripheral speed than the yarn speed to enable soft-wound packages to be produced.

The invention enables a large measure of control to be maintained during the building of the package, the continual bearing of the yarn against the inner cylinder keeping the yarn sufficiently deep in the slot to resist any tendency of the yarn to jump out of the slot, and the independent rotation of the inner cylinder enabling the yarn to be wound under low tension, which is of importance in avoiding tight-wound packages.

If the inner cylinder is to be driven by the yarn itself, it may conveniently be mounted on ball or like bearings on a shaft to which are secured members with inclined faces constituting the slotted drum, the inclined adjacent faces of the members being slightly spaced apart to provide the endless slot. If, however, the inner cylinder is intended to be positively rotated it may be secured on a shaft on which the two drum members are mounted for free rotation, the two members being provided with means by which they are driven at the same speed as each other and at desired speed relative to the inner cylinder.

By way of example the invention will now be described in greater detail with reference to the accompanying drawing, in which

Fig. 1 is a diagrammatic end elevation of part of a winding machine constructed in accordance with the invention;

Fig. 2 is a slightly enlarged cross-sectional elevation of the rotatable drum taken on the line 2—2 of Fig. 1;

Fig. 3 is a slightly enlarged cross-sectional elevation of the rotatable drum showing an alternative construction;

Fig. 4 is a reduced diagrammatic view of the drum shown in Fig. 3 in driving connection with part of the winding machine.

Referring to Figs. 1 and 2, a package support 1 is carried by a spindle 2 in an arm 3 pivoted on a shaft 4. The support 1 is supported on a yarn traversing drum consisting of two members 5 and 6 supported on the shaft 7 by hubs 8 and 9. The members 5 and 6 are formed with inclined faces and are secured to the shaft 7 with the inclined faces slightly spaced apart so as to form an endless slot 10. Within the drum 5, 6 is a cylinder or roller 11 mounted for free rotation on the shaft 7 on ball bearings 12 housed in hubs 13. In the alternative construction shown in Figs. 3 and 4, the drum members 5 and 6 are mounted for free rotation on a shaft 14, the drum members 5 and 6 being provided with bushes 15 and 16 supported in hubs 17 and 18. Secured to the hubs 17 and 18 are gears 19 and 20 meshing the gears 21 and 22 secured to a shaft 23 so that by rotation of the shaft 23 the drum members 5 and 6 are rotated in constant speed relationship. A cylinder or roller 24 is mounted within the drum 5, 6 and is secured to the shaft 14.

In operation the package support 1 by reason of its frictional contact with the rotating drum 5, 6 draws yarn 25 from a supply package (not shown) through the endless slot 10 between the drum members 5 and 6, the rotation of which causes the yarn 25 to be traversed back and forth along the length of the support 1 to form a cross-wound package 26. As winding continues and the package consequently increases in diameter, the centre of the package moves with the arm 3 about the pivot 4 as indicated by dot and dash

lines in Fig. 1, the full package being represented by the line 27.

During its passage through the slot 10, the yarn 25 bears against the inner cylinder 11 (or 24) which enables a low degree of penetration of the yarn 25 within the slot 10 to be maintained and at the same time enables the yarn 25 to be kept at a constant depth within the slot 10 which resists any tendency of the yarn to jump out of the slot during winding. The inner cylinder 11 (or 24), by maintaining a small depth of penetration of the yarn 25 within the slot 10, limits the degree of variation during the growth of the package of the "uncontrolled" length of yarn extending from the periphery of the drum 5, 6 to the point of contact with the package 26, 27 i. e. the length extending from the point *a* to the point *b* in the case of the small package 26, and from the point *c* to the point *d* in the case of the large package 27, and thus enables good winding conditions to be maintained.

It will be seen that due to the independent rotation of the inner cylinder 11, (or 24), the speed of its periphery, against which the yarn 25 bears during its passage through the slot 10, is not dependent on the peripheral speed of the drum 5, 6 and consequently it can accommodate itself (or, where it is positively driven, can be accommodated) to the speed of the yarn. Thus, when the inner cylinder is freely mounted on the shaft 7 as shown in Fig. 2, the cylinder 11 is free to be rotated by the pull of the yarn so that, apart from the light force necessary to rotate the freely mounted cylinder 11, the yarn is not constrained by the inner cylinder but is free to move at the rate at which it is taken up on the package notwithstanding the lesser diameter of the inner cylinder as compared with the diameter of the drum 5, 6.

By using the positively driven inner cylinder 24 shown in Figs. 3 and 4, however, the yarn may be entirely freed from drag by driving the inner cylinder 24 at exactly the same peripheral speed as the yarn, or, on the other hand, a controlled degree of tension may be imparted to the yarn by driving the inner cylinder 24 at a different peripheral speed from that of the yarn, for instance, the inner cylinder 24 may be driven at a greater peripheral speed than the yarn speed so as to avoid tight-wound packages.

Having described my invention what I desire to secure by Letters Patent is:—

1. Apparatus for the production of a cross-wound package of yarn, comprising a rotatable drum adapted to roll against the surface of the package, the drum being formed with an endless slot for engaging the yarn and traversing it lengthwise of the package during the rotation of the drum, and a cylinder concentric with respect to and within the drum and capable of rotation independently of the drum.

2. Apparatus for the production of a cross-wound package of yarn, comprising a rotatable drum adapted to roll against the surface of the package, the drum being formed with an endless slot for engaging the yarn and traversing it lengthwise of the package during the rotation of the drum, and a cylinder freely mounted within the drum and concentric with respect thereto and adapted to be rotated by frictional contact with the yarn during winding.

3. Apparatus for the production of a cross-wound package of yarn, comprising a rotatable drum adapted to roll against the surface of the package, the drum being formed with an endless slot for engaging the yarn and traversing it lengthwise of the package during the rotation of the drum, a cylinder concentric with respect to and within the drum, and means for driving the cylinder independently of the drum.

EDWARD KINSELLA