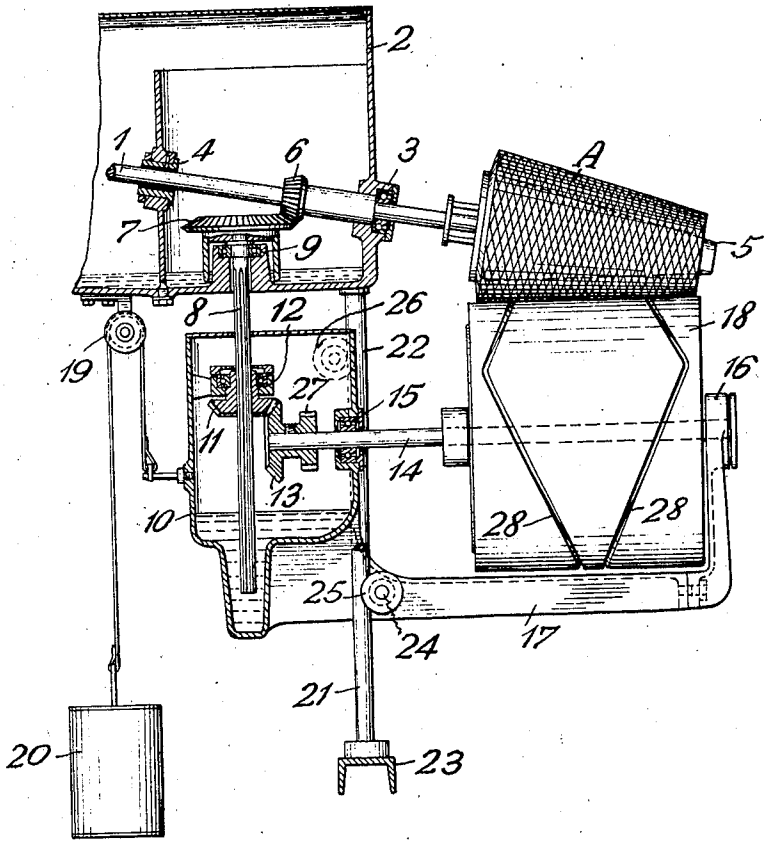
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WINDING MACHINE

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Inventor:

Walter Siegenthaler

by Sommers & Young

Attorneys

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WINDING MACHINE

Walter Siegenthaler, Erlenbach, Zurich, Switzerland, assignor to Maschinenfabrik Schärer, Erlenbach, Zurich, Switzerland

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This invention relates to winding machines. Winding machines are known in which the winding spindles are driven by means of driving drums and the speed of revolution of said spindles is kept to a constant relation to the number of revolutions performed by the thread guide disc, for the purpose of obtaining a winding the compactness of which is uniform throughout the thickness of this winding. The crosswinders operating on this principle are provided with a traversing cam for reciprocating the thread guide. The masses thus having to be reciprocated are relatively great in consequence whereof the working speed of the machine must be kept within correspondingly narrow limits in order to prevent the winding thread from being excessively strained and to provide for the wear on the machine parts to be minimized as much as possible.

In the winding machine according to the present invention the winding spindle is in positive driving association with a thread guide drum and in the operation of the machine one of these two concomitantly driven parts is adjusted relative to the other part due to the thread winding increasing and bearing on the thread guide drum.

By this means the relation between the speeds of revolution of the winding spindle and the thread guide drum remains constant while the winding operation proceeds so that uniformity of the crosswind which is obtained throughout, contrary to what may be termed an undesirable at random crosswind which results if the angular velocity decreases as the diameter of the winding increases. The winding spindle and the thread guide drum can be driven at high rotary speeds whereby a correspondingly high efficiency of working accrues without the wear on the machine parts or the straining of the winding thread becoming excessive.

An embodiment of the invention is illustrated in a sectional elevation by way of example only in the accompanying drawing.

The illustration is restricted to the showing of the parts necessary for a good understanding of the invention. The numeral 1 designates the winding spindle which is mounted in an inclined position in bearings 3 and 4 in a gear box 2 and has a winding support 5 arranged thereon at the lower end portion of this spindle. Driving movement is transmitted to the winding spindle 1 at the higher spindle end portion not shown. This driving movement can be effected, for example, by an endless driving belt which is provided in common with a plurality of winding machines mounted on one and the same frame.

The winding spindle 1 transmits driving movement by means of a bevel gear drive 6, 7 to an upstanding fluted spindle 8 which is guided in a bearing 9 on the bottom of the gear box 2 and projects into a casing 10 in which this spindle protrudes through a bevel wheel 11 which is suspended from a bearing 12 mounted in the casing 10. The bevel wheel 11 which is in mesh with the fluted spindle 8 for rotation therewith meshes in a bevel wheel 13 which is secured to a horizontal shaft 14 which is mounted in two bearings 15, 16. The bearing 15 is situated in the gear casing 10 and the bearing 16 is arranged on an angular bracket 17 which is connected to this casing.

On the shaft 14 the thread guide drum 18 is secured. The gear casing 10 is engaged by one end of a flexible tension member which passes over a guide roller 19 fastened to the gear box 2 and the second end of which carries a weight 20 by effect of which the load constituted by the gear casing 10 and the thread guide drum 18 is overcome and the drum 18 is thus urged in the direction toward the winding support 5, that is, against the crosswind A being in progress of formation on said support. The gear casing 10 is vertically displaceably guided by means of two rods 21, 22 which lie in one and the same plane and the lower ends of which rest on a common carrier rail 23 while their upper ends support the gear box 2.

On a cross bolt 24 carried by the bracket 17 on the gear casing 10 two rollers 25 are mounted which bear against the guide rods 21, 22 from the front. Two rollers 26 that are arranged on the upper portion of the gear casing 10 bear against the guide rods 21, 22 from behind by which means the casing 10 is given vertical guidance and is laterally steadied. A spur gear 27 forms with the bevel wheel 13 being housed in the gear casing 10 a self-contained unit, the gear 27 transmitting rotational movement to a thread guide, which is mounted on the shaft of a gear (not shown) and cooperates with the gear 27 outside of the gear casing 10. This thread guide conducts the winding thread arriving from a lower spool toward the drum 18 which receives the thread by means of its intercrossing groove portions 28.

In the operation of the crosswinder precedingly described the driven winding spindle 1 positively transmits driving motion via the bevel wheel drive 6, 7 to the fluted spindle 8, the bevel gear drive

11, 13 and to the shaft 14 to the thread guide drum 18. Due to the fact that the thread guide drum 18 is urged against the crosswind A in progress of formation on the winding support 5 by influence of the weight 20 the thread guide drum 18 is readjusted together with its driving and mounting shaft 14 in accordance with the increasing thickness of the thread winding and is thus moved downwardly, this downward movement being shared by the gear casing 10 so that the bevel wheel 11 is accordingly shifted longitudinally of the spindle 8 in engagement with the spindle surface.

The thread guide drum 18 exerts on the thread winding A in progress of formation a slight pressure only so that the winding does not become unduly tight but tight enough for preventing the structure of the thread winding from being detrimentally affected by influence of centrifugal force. On the other hand the bearing engagement between the thread guide drum 18 and the thread winding A contributes toward enhancing the precision with which the winding thread is placed on the winding support 5. Again, by virtue of the thread guide drum 18 sharing in the driving movement the winding thread is preserved insofar as it is not subjected to material friction at the point of contact between the drum 18 and the thread winding A. The provision of unidirectional movement at all times during the operation of the machine for the drum which serves as the thread guide facilitates uniformity of tensioning of the winding thread.

The bearing pressure between the thread guide drum 18 and the winding A in progress of formation can be regulated by accordingly choosing the size of the weight 20. The construction of the machine may also be such that the thread guide drum 18 comes into contact with the thread winding only after the latter has reached a certain thickness.

In the drive of the winding spindle 1 an auxiliary gearing may be included which functions to reduce the speed of revolution of the winding spindle 1 and consequently also that of the shaft 14 of the thread guide drum 18 automatically during the operation of the machine commensurate with the increase in diameter of the winding for the purpose of maintaining the velocity of the thread portion passing on to the winding, that is, the angular velocity of the thread constant at all times.

Further the construction of the machine may be such that in the operation, owing to the thread winding or package increasing, not the thread guide drum is displaced, that is, readjusted relative to the stationary winding spindle, but the winding spindle is displaced, that is, readjusted relative to the then stationary thread guide drum. Obviously, with such an arrangement the remaining machine parts concerned must be accordingly altered.

I claim:

1. In a machine for winding a thread package, a driven winding spindle for supporting a thread package, a thread guide drum engaging said package, positive driving means, independent of the cooperation between the drum and package, drivingly connected between said winding spindle and said guide drum for concomitantly rotating said two cooperative parts, means for adjusting the position of one of said two cooperative parts relative to the other part in accordance with the growth of said package, and means for urging said drum against said package.

2. In a machine for winding a thread package, a driven winding spindle for supporting a thread package, a thread guide drum engaging said package, positive driving means including a rotary fluted spindle axially displaceably carrying a first bevel wheel in intermeshing relation with its fluted surface to rotate together with said fluted spindle and including a second bevel wheel driven by said first bevel wheel and drivingly connected with the drum, said driving means being drivingly connected between said winding spindle and said guide drum for concomitantly actuating these two cooperative parts, whilst said bevel wheel is allowed to shift axially of said fluted spindle, means for adjusting the position of one of said two cooperative parts relative to the other part in accordance with the growth of said package, and means for urging said drum against said package.

3. In a machine for winding a thread package, a driven winding spindle rotatable on a stationary axis for supporting a thread package, a displaceable thread guide drum engaging said package, positive driving means drivingly connected between said winding spindle and said guide drum for concomitantly actuating these two cooperative parts, means for adjusting the position of said displaceable drum relative to said stationary winding spindle in accordance with the growth of said package, and means to urge said drum against said package.

4. In a machine for winding a thread package, a driven winding spindle rotatable on a stationary axis for supporting a thread package, a displaceable thread guide drum engaging said package, positive driving means drivingly connected between said winding spindle and said guide drum for concomitantly actuating these two cooperative parts, means for adjusting the position of said displaceable drum relative to said winding spindle in accordance with the growth of said package, and a weight for urging the drum against the package.

5. In a machine for winding a thread package, a driven winding spindle rotatable on a stationary axis for supporting a thread package, a displaceable thread guide drum mounted on a driving shaft engaging said package, positive driving means comprising a gear casing drivingly connected between said winding spindle and said guide drum for concomitantly actuating these two cooperative parts, said guide drum driving shaft being arranged on said gear casing, means for adjusting the position of said displaceable drum relative to said winding spindle in accordance with the growth of said package, and a weight for urging the drum against the package.

6. In a machine for winding a thread package, a driven winding spindle rotatable on a stationary axis for supporting a thread package, a displaceable thread guide drum mounted on a driving shaft engaging said package, positive driving means comprising a vertically guided gear casing drivingly connected between said winding spindle and said guide drum for concomitantly actuating these two cooperative parts, said guide drum driving shaft being arranged on said vertically guided gear casing, means acting upon said gear casing for adjusting the position of said displaceable drum relative to said winding spindle in accordance with the growth of said package, and a weight for urging the drum against the package.

7. In a machine for winding a thread package, a driven winding spindle rotatable on a stationary axis for supporting a thread package, a displaceable thread guide drum mounted on a driving shaft engaging said package, positive driving

means, independent of the cooperation between the drum and package, and including a rotary fluted spindle axially displaceably carrying a bevel wheel in intermeshing relation with its fluted surface to rotate together with said fluted spindle, a bevel wheel on said drum driving shaft engaging said first-mentioned bevel wheel, said driving means comprising a vertically guided gear casing and being drivingly connected between said winding spindle and said guide drum for concomitantly relatively actuating said spindle and drum, whilst said bevel wheel shifts axially of said fluted spindle as said vertically guided gear casing is relatively displaced, said guide drum driving shaft being arranged on said vertically guided gear casing, means acting upon said gear casing for adjusting the position of said relatively displaceable drum relative to said winding spindle in accordance with the growth of said package, and a weight for urging the drum against the package.

8. In a machine for winding a thread package, a driven winding spindle for supporting a thread package, a thread guide drum mounted on a driving shaft engaging said package, said winding spindle extending obliquely to said guide drum driving shaft, positive driving means, independent of the cooperation between the drum and package, drivingly connected between said winding spindle and said guide drum for concomitantly rotating said winding spindle and thread guide, means for adjusting the position of one of said two cooperative parts relative to the other part in accordance with the growth of said package, and means for urging said drum against said package.

WALTER SIEGENTHALER.