May 4, 1954 K. MOOS 2,677,506

TRAVERSE WINDING MACHINE

Filed Aug. 14, 1951 2 Sheets-Sheet 1

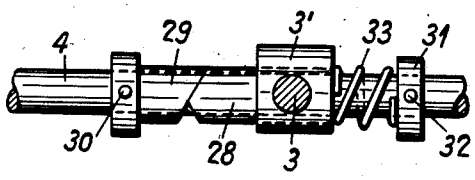


Fig. 1

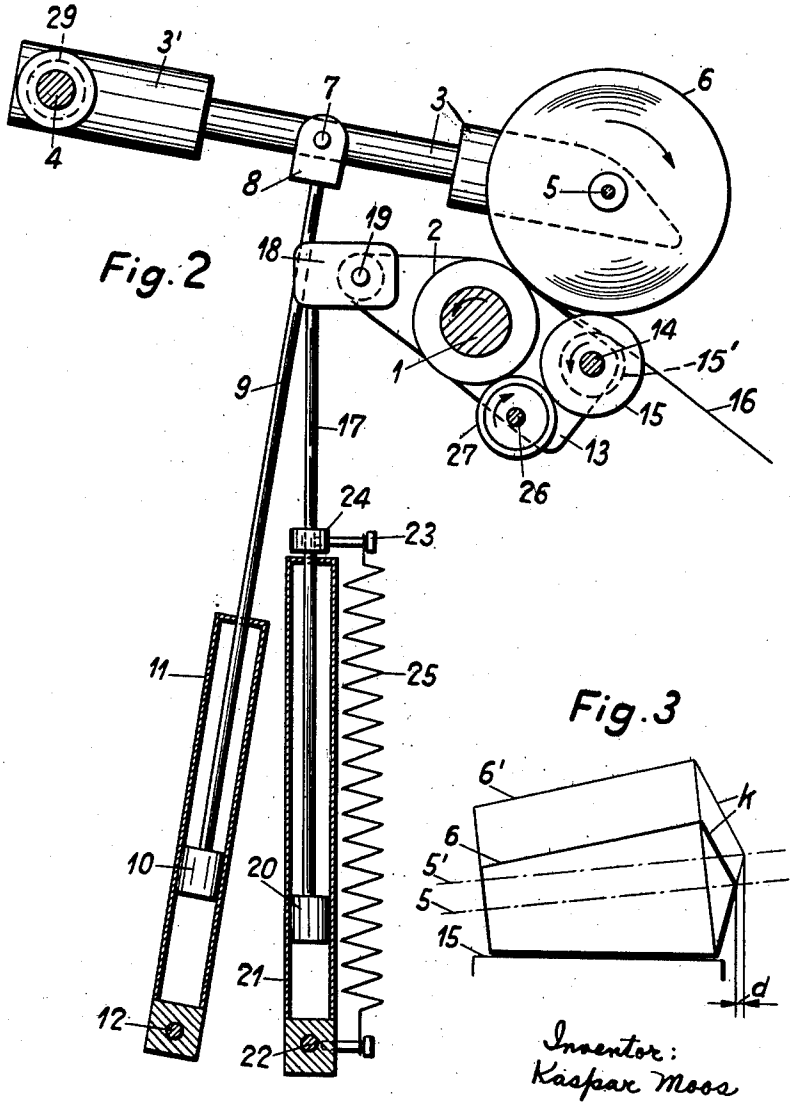


Fig. 2

Fig. 3

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TRAVERSE WINDING MACHINE

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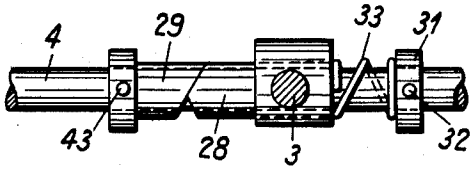


Fig. 5

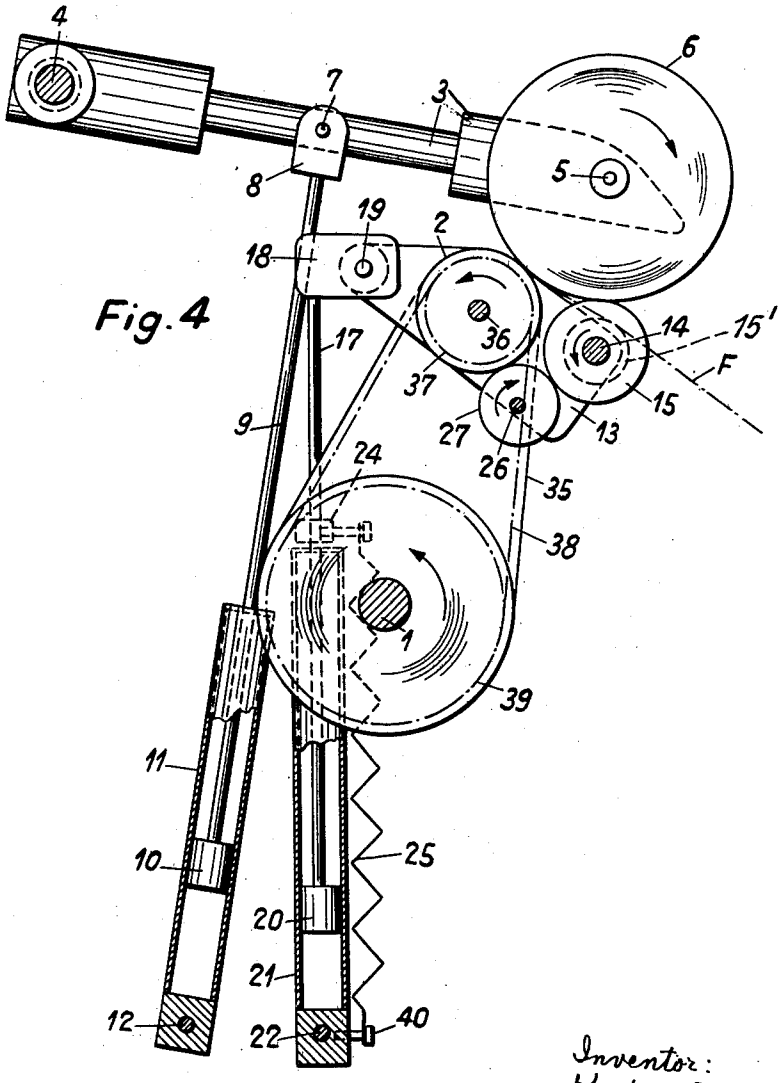


Fig. 4

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UNITED STATES PATENT OFFICE

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TRAVERSE WINDING MACHINE

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Claims priority, application Switzerland
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10 Claims. (Cl. 242—18)

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The present invention deals with a winding machine for the production of firm or loose cylindrical or conical cross wound bobbins for single or doubled yarn, such as cotton, cellulose, carded wool or worsted yarn, flax, linen and mixed yarn.

Traverse winding machines are known, where the bobbin body is driven by a smooth shaft and thread guider, by a cam, or by a similar suitable mechanism. It has been shown in practice that winding machines of this construction are suitable only for low winding speeds, on account of the mechanism of the thread guider drive. Also, the thread guider tends to roughen the yarn.

In other traverse winding machines the bobbin body is driven either by a split drum, which at the same time functions as a thread guider, or by a smooth shaft. In this case the thread guiders are rotating sheet metal wings, which are formed to produce the required winding. With these two systems, the thread is roughened at medium and high winding speeds, i. e. the fibre is damaged.

Other traverse winding machines are known, where the spool body is driven by a grooved drum, with the grooved drum functioning either by itself, or in combination with guides supporting the thread, as thread guider. In some types of traverse winding machines the thread has to be taken through a right angle round the thread guider between the brake and the winding mechanism; this produces in the last third of the cop very high tensions, particularly at medium or high winding speeds, these tensions are very exacting and may cause the thread to break.

Direct drive of the bobbin by split or grooved drum has undesirable effects on the yarn and on the formation of the bobbin because the top layers of the thread are subject to greater wear than the bottom layers by the quickly rotating driving devices with their slots and grooves.

When the thread breaks directly in front of the cross-wound bobbin, the yarn is frequently wound round the rotating parts of the drive. If these faults are removed with sharp instruments, the thread guiding devices are likely to become damaged, and this again may cause more trouble.

Certain yarns can be wound on reasonably utilisable bobbins only when the speed has been reduced to a considerable extent, and after laborious adjustments on the machines. This applies to cellulose flake yarns, knop yarns, voile yarn 105–2 (unsteamed) etc.

The object of the present invention is the construction of a traverse winding machine which

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is suitable for delicate and fine materials, such as cellulose flake yarns, knop yarns, voile yarn 105–2 (unsteamed) and others, where these materials can be wound at comparatively high maximum bobbin speeds with great care.

In accordance with the invention this will be obtained in the following manner: a grooved drum, acting as a thread guider to ensure the formation of the cross winding, is pressed against a cross-wound bobbin, which obtains its motion from the cylindrical surface of a driving shaft, on which it rests. The thread runs at least approximately on a tangent to the bottom diameter of the grooves. Both the holder of the cross wound bobbin and the holder of the thread guide-grooved drum are provided with dampers to eliminate vibrations.

The holder of the thread guider-grooved drum could be a bearing fork pivoted on the driving shaft, the thread guider-grooved drum being supported in the fork so that it is parallel with the driving shaft. It is convenient to fix a spring to the bearing fork so that the thread guider-grooved drum is lightly pressed against the cross wound bobbin, and to arrange a frictional drive so that the thread guider-grooved drum is driven from the driving shaft.

The drawings show examples of two constructions of the object of the present invention in diagrammatical form.

Fig. 1 is a side view, partly in section, of the essential parts, for the purposes of the invention, of a traverse winding machine.

Fig. 2 shows the axis adjustment of the holder,

Fig. 3 shows the motion of the axis of the bobbin, effected by the axis adjustment, while the diameter increases.

Fig. 4 shows the side view of a modified form of the winding mechanism of a traverse winding machine, partly in section.

Fig. 5 shows the arrangement of the bobbin holder when used for conical bobbins.

In Figs. 1 to 3, which show the first example, 1 is the driving shaft, supported in bearings in the frame of the winding machine and driven in a known manner at a variable speed. Driving drums 2 are fixed at regular intervals, side by side, on the driving shaft. These driving drums have a smooth cylindrical surface. Each drum works in conjunction with a bobbin holder 3, which is pivoted on a pin 4, fixed to the machine frame. Pin 5 of each bobbin holder supports the cross wound bobbin 6 so that it can rotate, while its weight is carried by the drive drum 2; the bobbin is driven by friction from the drive

drum. Holder 3 carries on a pin 7 the fork 8 of a piston rod 9, which can pivot about pin 7 and carries a piston 10 at its lower end. Piston 10 works in a cylinder 11, filled with oil, the cylinder pivots about a pin 12. Piston 10 and cylinder 11 are a damping device which acts on the bobbin holder and eliminates vibrations of the bobbin. A holder 13, which acts as a two-armed lever, is pivoted on the drive shaft 1 at each of the drive drums 2. A pin 14, which is parallel to the drive shaft 1, at the front arm of the holder, carries the thread guider-grooved drum 15. This drum can rotate on pin 14, and its grooves guide the thread in a known manner to and fro, to form the cross winding, where the thread 16 is at least approximately tangential to the bottom 15' of the grooves. The rear end of lever 13 is connected to a piston rod 17 through a bearing block 18 and a pin 19; the piston rod carries at its lower end a piston 20. Piston 20 works in a cylinder 21, filled with oil, which is pivoted on a pin 22. A tension spring 25, which acts on the screw 23 of the collar 24 on the piston rod 17, places a turning moment on holder 13, so that the thread guider-grooved drum is pressed only very lightly against bobbin 6. A friction roller 27 supported on shaft 26 at the front end of lever 13 engages on one side with the drive drum 2 and on the other side with the thread guider-grooved drum 15 and ensures that the latter is driven at the same speed at which the thread runs through the guide groove. This reduces the friction of the thread against the grooved drum to a minimum. Also, the light pressure of the grooved drum against the bobbin is useful to avoid, as far as possible, damage to the winding surface. The oil cylinder damper 20, 21, which acts on the grooved drum holder, prevents vibrations of holder 13 and grooved drum 15. Owing to the smooth running of bobbin and winding mechanism, free from vibration, a uniform formation of the winding is obtained.

In the case of winding machines for conical bobbins, the cross wound bobbin holder can move with its bearing block 3' axially on pin 4, as shown in the drawings. The axial motion is controlled by the angular motion of holder 3, so that with the increase of the bobbin diameter from 6 to 6' the bobbin moves axially by a distance *d*, in order to produce the conical top K of the bobbin. The axial motion of the cross wound bobbin, with respect to the bobbin holder 3, is obtained from two tubular cams 28, 29, where cam 28 is fixed to block 3', while cam 29 is fixed to pin 4 by means of a pin 30. 31 is a collar fixed to pin 4 by means of a pin 32, and 33 is a compression spring between collar 31 and block 3', which keeps holder 3 with its tubular cam 28 pressed against the fixed tubular cam 29. This method ensures that when the holder is lifted because the bobbin diameter has increased, the cross wound bobbin is moved in an axial direction so that a conical face is formed at the thicker end of the bobbin.

The construction of the traverse winding machine in accordance with the second example (Figs. 4 and 5) is characterised by the fact that it can be used for high winding speeds (up to 1000 m./min.). The reason for this is that the weights of the quickly rotating parts are kept low and that the braking action of the pivot bearings of the grooved drum is entirely removed.

The winding mechanism, which is one of several arranged in a row, is provided with a bearing bracket 35, mounted on the machine as shown in the drawings, Figs. 4 and 5, 1 is the drive shaft. The bracket carries at its free end on a pin 36 the bobbin drive drum 2, rotating on two ball races. The drum is provided with a belt pulley 37, and it is driven through a belt 38 from a belt pulley 39 keyed on the drive shaft 1. A holder 13, shaped like a lever, is pivoted on pin 36. This holder carries on a pin 14 the thread guider-grooved drum 15. A friction roller 27 is carried on a pin 26 on holder 13, said friction roller 27 being in frictional engagement on the one hand with the bobbin driving roller 2 and on the other hand with the grooved thread guide drum 15 for driving said roller 2 and drum 15. At the other end of holder 13, a damping mechanism acts through its piston rod 17 and bearing block 18 on a pin 19. The damping mechanism consists of a cylinder 21, filled with oil, and a piston 20 which works in cylinder 21, and is attached to piston rod 17. Cylinder 21 is pivoted at its lower end on a pin 22, which is fixed to the machine frame. A tension spring 25 acts on a collar 24 on piston rod 17, the lower end of the spring is held by a screw 40 in cylinder 21. Tension spring 25 acts through piston rod 17 on the holder 13 so that the thread guider-grooved drum 15, which runs in bearings in the holder 13, is pressed lightly against cross wound bobbin 6, which rests on the drive drum 2. The bobbin is at the free end of a bobbin holder 3, and the holder 3 is pivoted through a pin 7 on fork 8. The piston rod 9 of an oil damping device is connected to the centre of the bobbin holder 3 by means of a fork 8. At the lower end of the oil damping device a piston 10 works in an oil filled cylinder 11. This cylinder is pivoted at its lower end on a pin 12 fixed to the machine frame.

The weight of bobbin 6 is carried by the bobbin drive drum 2, which again is carried through holder 13 on the drive shaft 1. Holder 13, which pivots on shaft 36, moves almost without friction and, owing to the action of spring 25, presses the thread guider-grooved drum 15 lightly against the cross wound bobbin 6. The vibrations of the thread F during the winding operation, and which are transmitted to the bobbin holder 3 and also to the holder of the thread guider-grooved drum, are eliminated by the oil dampers 20, 21 and 10, 11.

Additional controls are not required for the bobbin holders of machines used for the production of cylindrical cross wound bobbins. But in the case of winding machines for conical bobbins an automatic control device must be provided which imparts to the bobbin holder during its angular motion, caused by the building-up of the bobbin, a motion in its axial direction so that the end with the larger bobbin diameter forms a conical face, which makes a stronger winding. This control device comprises two tubular cams 28 and 29 on pin 4, which are adjacent with their cam profiles touching; the first one is the bearing for the bobbin holder, it can slide and pivot on pin 4, while the other one is fixed to pin 4 by means of a set screw 43. A compression spring 33 between collar 31, fixed to pin 4, and the bobbin holder bearing presses the tubular cam 28 of bobbin holder 13 against the fixed tubular cam 29, so that angular motion of the bobbin holder, owing to the build-up of the bobbin produces at the same time an axial displacement of the bobbin holder.

It will be noted that in the modification of the machine according to the present invention, as hereinbefore described and exemplified in Fig. 4

of the drawings, shaft 36 does not rotate with the drive drum 2, but is constructed as a stationary bearing pin, which supports the bobbin drive drum through ball races. This construction enables the rotating mass of drum 2 to be kept low, so that the winding speed can be increased without increasing the danger of breaking the thread. Also, the elimination of the braking action of holder 13 is convenient for the increase of the winding speed.

While the invention has been described in detail with respect to a now preferred example and embodiment of the invention it will be understood by those skilled in the art after understanding the invention, that various changes and modifications may be made without departing from the spirit and scope of the invention and it is intended, therefore, to cover all such changes and modifications in the appended claims.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. In a traverse winding machine, a movable bobbin holder for guiding a cross-wound bobbin along a predetermined path, and including means for rotatably supporting the bobbin, a driving drum for rotating the bobbin and adapted to engage thread wound on said bobbin for moving said bobbin along said predetermined path, a grooved thread guide drum adapted to be pressed against the periphery of the cross wound bobbin, for guiding the thread for traverse winding of the bobbin, a shaft for said guide drum, a second movable holder for said guide drum shaft, a damper member connected to the bobbin holder, and a damping member connected to the second holder, for reducing vibration of said holders.

2. In a traverse winding machine, a bobbin holder rotatably supporting a bobbin, drive means for rotating the bobbin, a grooved thread guide drum adapted to be pressed against the periphery of the cross wound bobbin, for guiding the traverse winding of the bobbin, a second shaft mounted on said lever and carrying the grooved thread guide drum, a spring acting upon said lever so as to gently press the thread guide drum against the cross wound bobbin, and a friction drive roller driving the thread guide drum from said driving means.

3. In a traverse winding machine, a movable bobbin holder for guiding a cross-wound bobbin along a predetermined path, and including means for rotatably supporting the bobbin, a driving drum for rotating the bobbin and adapted to engage thread wound on said bobbin for moving said bobbin along said predetermined path, a grooved thread guide drum adapted to be pressed against the periphery of the cross wound bobbin, for guiding the traverse winding of the bobbin, means for guiding the thread to be wound in such a way that it runs at least approximately tangentially to the internal diameter of the groove in the thread guide drum, a driving shaft supporting and driving said driving drum, a lever pivoted on the driving shaft, a second shaft mounted on said lever and carrying the grooved thread guide drum, a spring acting upon said lever so as to gently press the thread guide drum against the cross wound bobbin.

4. In a traverse winding machine, a movable bobbin holder for guiding a cross-wound bobbin along a predetermined path, and including means for rotatably supporting the bobbin, a driving drum for rotating the bobbin and adapted to engage thread wound on said bobbin for moving said bobbin along said predetermined path, a

grooved thread guide drum adapted to be pressed against the periphery of the cross wound bobbin, for guiding the traverse winding of the bobbin, a driving shaft supporting and driving said driving drum, a two-armed lever pivoted on the driving shaft, a second shaft mounted on one arm of said two-armed lever and carrying the grooved thread guide drum, a tension spring acting upon the other arm of said two-armed lever, a damping member adapted to reduce the vibration of said two-armed lever and comprising a cylinder and piston arrangement and a piston rod which is operatively connected with said other arm, and a friction drive roller driving the thread guide drum from the driving drum.

5. In a traverse winding machine, a movable bobbin holder for guiding a cross-wound bobbin along a predetermined path, and including means for rotatably supporting the bobbin, a driving drum for rotating the bobbin and adapted to engage thread wound on said bobbin for moving said bobbin along said predetermined path, a grooved thread guide drum adapted to be pressed against the periphery of the cross wound bobbin, for guiding the traverse winding of the bobbin, means for guiding the thread to be wound in such a way that it runs at least approximately tangentially to the internal diameter of the groove in the thread guide drum, a driving shaft supporting and driving said driving drum, a two-armed lever pivoted on the driving shaft, a second shaft mounted on one arm of said two-armed lever and carrying the grooved thread guide drum, a tension spring acting upon the other arm of said two-armed lever, a damping member adapted to reduce the vibration of said two-armed lever and comprising an oil-operated cylinder and piston arrangement and a piston rod which is operatively connected with said other arm, and a friction drive roller driving the thread guide drum from the driving drum.

6. In a traverse winding machine, a movable bobbin holder for guiding a cross-wound bobbin along a predetermined path, and including means for rotatably supporting the bobbin, a driving drum for rotating the bobbin and adapted to engage thread wound on said bobbin for moving said bobbin along said predetermined path, a pin rotatably supporting said driving drum, a grooved thread guide drum adapted to be pressed against the periphery of the cross wound bobbin, for guiding the traverse winding of the bobbin, a second holder for said thread guide drum which holder is pivoted on said pin, a driving shaft, and means for driving said driving drum from the driving shaft, the masses of the rapidly rotating parts being constructed so as to have a low weight.

7. In a traverse winding machine, a movable bobbin holder for guiding a cross-wound bobbin along a predetermined path, and including means for rotatably supporting the bobbin, a driving drum for rotating the bobbin and adapted to engage thread wound on said bobbin for moving said bobbin along said predetermined path, a pin rotatably supporting said driving drum, a grooved thread guide drum adapted to be pressed against the periphery of the cross wound bobbin, for guiding the traverse winding of the bobbin, a second holder for said thread guide drum which holder is pivoted on said pin, a driving shaft, and belt and pulley means including a belt pulley rigidly connected to said pin for driving said driving drum from the driving shaft.

8. In a traverse winding machine, in com-

bination, a pivoted holder for guiding a cross-wound bobbin along a predetermined path and including a pin rotatably supporting the bobbin; a first damping member including an oil cylinder and a piston; a first connecting rod pivotally connected at one end thereof to said first holder, and fixedly secured to said piston at the other end thereof; a driving drum for rotating the bobbin and adapted to engage thread wound on said bobbin for moving said bobbin along said predetermined path; a two-armed lever having a fixed pivot point; a grooved thread guide drum rotatably mounted on one arm of said lever; a friction roller rotatably mounted on said one arm of said two-armed lever and engaging said driving drum and said thread guide drum for driving the latter; a second damping member including an oil cylinder and a piston movable therein; a second connecting rod pivotally connected at one end thereof to the other arm of said two-armed lever and secured to said piston on the other end thereof; and a spring acting on said other arm of said two-armed lever so as to turn the same and to urge said thread guide drum against the bobbin.

9. An arrangement as claimed in claim 8 wherein said first connecting rod is connected to said first holder at a point located between the pivoting point thereof and said bobbin supporting pin.

10. An arrangement as claimed in claim 9 wherein said driving drum is rotatable about an axis coinciding with the pivoting axis of said two-armed lever, and including a pulley connected to said driving drum for rotation therewith, and belt and pulley means for driving said pulley.

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