Dec. 25, 1962 J. STEICHELE 3,069,835

SPINDLE DRIVE ARRANGEMENT FOR TEXTILE MACHINES

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Fig. 1

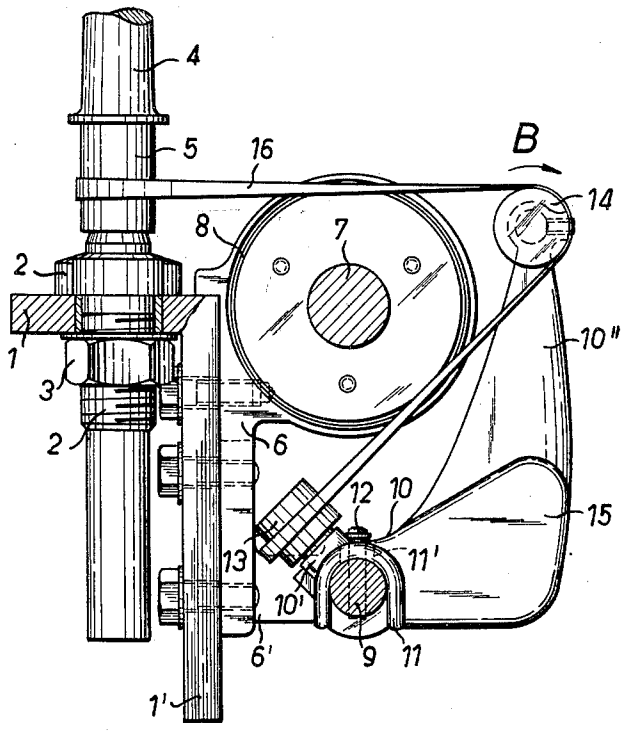

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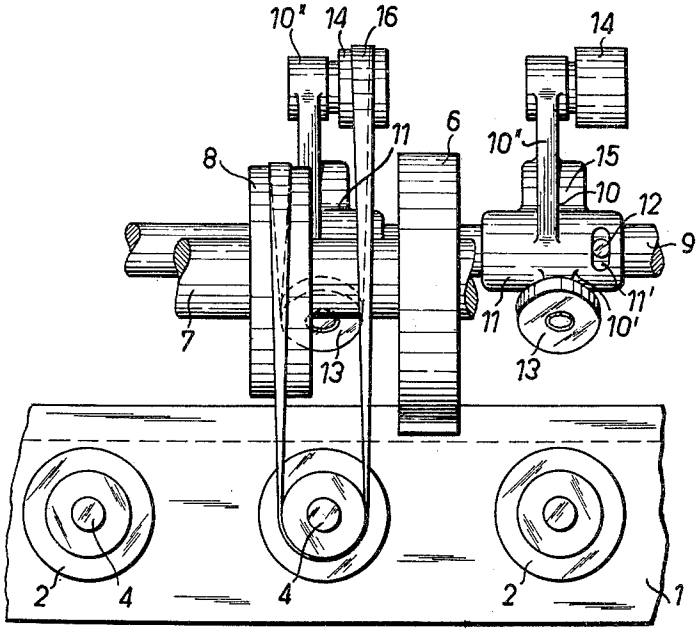
Fig. 2



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SPINDLE DRIVE ARRANGEMENT FOR TEXTILE MACHINES

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7 Claims. (Cl. 57—105)

This invention relates to textile machinery, and more particularly to a drive arrangement for the spindles of a spinning, twisting, or similar machine.

In such machines a plurality of spindles are commonly arranged in a row which extends along the drive shaft of the machine. Drive pulleys axially spaced on the drive shaft are connected to the whorl portion of each portion of each spindle by belt means, such as ropes or round belts, tapes, or flat belts.

It is the principal object of the present invention to provide a drive arrangement of the general type described which requires but a minimum of space.

Another object is the provision of such a drive arrangement which has but few and simple moving parts arranged in such a manner that they need not be critically aligned during assembly, and are thus quickly and easily assembled by only moderately skilled workmen.

A further object of the invention is the provision of a drive arrangement for a spinning machine and the like which is rugged and dependable so as to give long, uninterrupted service, and to require but a minimum of maintenance.

It is an additional object of the invention to provide a drive arrangement as described above which gives easy access to all elements requiring maintenance, and more particularly permits rapid changing of drive belts for maintenance purposes.

With these and other objects in view, the invention provides lever means pivoted on the frame of the spinning machine and two idler pulleys mounted on the lever means for rotation about fixed respective axes. An endless belt is sequentially trained over a drive pulley on the shaft of the machine, the two idler pulleys, and the whorl portion of a spindle which is intended to be driven by the drive arrangement. Pressure means urge the lever means to pivot on the machine frame for belt tensioning movement of the idler pulleys.

In its more specific aspects the invention is concerned with a drive arrangement for a plurality of spindles which are rotatable on a machine frame, and are aligned in a row substantially parallel to the axis of the main machine drive shaft. Each of the spindles has a whorl portion adapted to receive a drive belt. A plurality of two-armed levers are pivoted on the machine frame about respective pivoting axes which are substantially parallel to the axis of the drive shaft. A tensioning and a reversing pulley are respectively mounted on the two arms of each of the levers and are capable of rotating about axes which are fixed with respect to the lever. An endless belt is sequentially trained over each one of the drive pulleys, one of the reversing pulleys and the tensioning pulley on the same coordinated lever, and then over the whorl portion of a coordinated spindle so as to transmit the rotary movement of the shaft to the spindles.

Other features and many of the attendant advantages of this invention will become apparent to those skilled in the art as the disclosure is made in the following description of a preferred embodiment of the invention as illustrated in the accompanying drawing in which:

FIG. 1 is a side-elevational, partly sectional fragmentary view of a spinning machine equipped with a drive arrangement of the invention; and

FIG. 2 shows the apparatus of FIG. 1 in fragmentary plan view, with some elements broken away to reveal others.

Referring now to the drawing, and initially to FIG. 1, there is seen a spindle rail 1, 1' which is a member of the stationary machine frame and extends along the entire front of a spinning machine which is shown in FIG. 1 only to the extent necessary for an explanation of the present invention. The spindle rail 1, 1' is of inverted L-shaped cross section, and the shorter leg 1 of the L-shape is provided with a number of aligned openings in each of which a spindle bearing 2 is mounted by means of clamping nuts 3 in the usual manner. Only one spindle and the associated elements are seen in FIG. 1. A rotary spindle shaft 4 is rotatably mounted in the bearing 2. It has an integral whorl portion 5 of conventional shape.

The longer leg 1' of the L-shaped spindle rail 1, 1' carries longitudinally spaced pillow blocks 6 in the aligned bores of which a drive shaft 7 is mounted to extend perpendicularly to the spindle shaft 4. The drive shaft carries a plurality of drive pulleys 8, one of which is associated with each one of the spindles.

The bottom portion of each pillow block 6 has an integral bracket 6' attached thereto in which a cylindrical supporting rod 9 parallel to the shaft 7 is fixedly mounted. A bell crank lever 10 is pivoted on the rod 9 to swing in a plane through the related spindle. A pivot portion 11 of the lever 10, which is seated on the rod 9 for rocking support of the lever 10, is formed with a substantially semi-cylindrical recess. Pivoting movement of the lever 10 on the rod 9 is limited by a guide pin 12 which is fixedly fastened on the rod 9 and engages an opening 11' of the pivot portion 11. The opening which is circumferentially elongated fixes the axial position of the lever 10 on the rod 9, and abutment of the pin 12 against the axially extending end walls of the slot 11' limits the pivoting movement of the lever 10 to an angle of approximately 15°.

The bell crank lever 10 has a short arm 10' and a long arm 10'' on which two idler pulleys 13 and 14 are respectively mounted for rotation about respective fixed pins. The axis of rotation of the idler pulley 13, hereinafter referred to as reversing pulley, extends radially from the axis of rod 9. The axis of the idler pulley 14, hereinafter referred to as tensioning pulley, is parallel to the axes of rod 9 and of the main drive shaft 7.

A tensioning weight 15 is integral with the lever 10 and its weight together with the excess of weight of the longer arm 10'' over the short lever arm 10' tends to pivot the bell crank lever 10 in a clockwise direction about the axis of the rod 9, as viewed in FIG. 1. A narrow drive belt 16 is trained over the whorl portion 5 of the spindle, the drive pulley 8, and the idler pulleys 13 and 14 as will be better apparent from FIG. 2.

FIG. 2 is a fragmentary plan view of the spinning machine shown in FIG. 1. Three spindles are shown to be mounted on the shorter leg 1 of the spindle rail 1, 1' but the drive arrangement of only one of the spindles is shown completely, the drive arrangement of another one is shown only in part, and the drive arrangement of the third one has been completely omitted in order not to crowd the drawing.

Referring to the drive arrangement of the central spindle shown, it is seen that the belt 16 is trained sequentially over the drive pulley 8, the whorl portion 5 of the spindle, the tensioning pulley 14 and the reversing pulley 13, whereupon it returns to the drive pulley 8. The direction of belt movement is indicated by the arrow B in FIG. 1.

While the drive arrangement of the invention is capable of many variations and modifications, the illustrated specific arrangement of the several pulleys over which

the belt **16** is trained, has been found most economical of space, an important consideration in a spinning machine. The two strands of the belt **16**, which in the embodiment illustrated is a narrow tape, are passed from the whorl portion **5** in approximately a common horizontal plane towards the drive pulley **8** and the tension pulley **14** respectively. The two pulleys rotate about parallel axes which are offset in a vertical direction by the difference of their effective radii. In this manner the plane defined by the two strands of the belt **16** is substantially tangential to the drive pulley **8** and the tensioning pulley **14**. The reversing pulley **13** is arranged in such a manner with respect to the drive pulley **8** and the tensioning pulley **14** that the two strands of the belt which extend from the reversing pulley **13** toward the drive pulley **8** and the tensioning pulley **14** respectively define a plane which is tangential with respect to both pulleys **8** and **14**.

The weight **15** and the difference in weight of the arms **10'** and **10''** tends to move the tensioning pulley **14** away from the whorl portion **5** of the spindle and thus to tension the belt **16**. The distance between the reversing pulley **13** and the tensioning pulley **14** is fixed because of the fixed arrangement of the pulley pins and the movement of the bell crank lever **10** does not influence the length of belt between the two idler pulleys. The shortening of the belt strand between the reversing pulley **13** and the drive pulley **8** is substantially less than the lengthening of the effective distance between the whorl portion **5** and the tensioning pulley **14** during movement of the latter because of the difference in the effective length of the lever arms **10'** and **10''**.

The extent of pivoting movement of the lever **10** about the pin **9** is small. Only very little lubrication is needed on the bearing faces of the lever **10** and of the rod **9**, and such lubrication may readily be provided by making the bearing face of the pivot portion **11** of a porous, powdered metal sleeve impregnated with oil, as is well known. Permanent lubrication adequate for the limited movement of the lever **10** on the rod **9** may also be provided by facing either the rod or the pivot portion of the lever with a synthetic plastic material having a low coefficient of friction such as nylon.

The apparatus illustrated is very quickly and easily disassembled, and reassembled, if desired without the use of tools. By pulling the spindle shaft **4** from the spindle bearing **2**, the loop of the belt **16** which surrounds the whorl portion **5** is freed, and the belt may then be slipped off the drive pulley and the idler pulleys. Alternatively, the long lever arm **10''** may be moved toward the shaft **7** until the belt **16** is slack enough to be slipped from the reversing pulley **13** whereupon it may be pulled over the spindle shaft **4** without removal of the latter.

If it should be desired to perform maintenance work on the idler pulleys or their supporting structure, the lever **10** may readily be raised until the pin **12** clears the slot **11'** whereupon the lever may be laterally displaced and radially removed from the rod between two adjacent drive pulleys **8**. Reassembly of the drive arrangement involves the same steps in opposite order, and is simple. It does not require the use of tools, and proper alignment of all elements of the drive arrangement is automatic without requiring any skill on the part of the operator or mechanic.

While only a single drive arrangement has been illustrated in FIG. 1, and one drive arrangement and elements of a second drive arrangement are shown in FIG. 2, it will be understood that there are as many drive pulleys **8** mounted on the drive shaft **7** as there are spindles **4** and that each pulley and spindle cooperate with two idler pulleys mounted on a lever **10** in the manner described above. The pulley arrangement associated with each spindle is axially aligned close to the radial plane about the drive shaft **7** in which the axis of rotation of the spindle shaft **4** is located. The direction of movement of the belt is substantially parallel to this radial plane except for two turns of approximately 180° as the belt travels about the whorl portion **5** of a spindle and about the circumference of the reversing pulley **13**. In order to prevent the belt **16** from slipping from the reversing pulley, the belt receiving face of the reversing pulley is preferably conically shaped as best seen from FIG. 2.

Although belt travel in the direction of the arrow B is preferred, it is apparent that the drive arrangement of the invention may be employed for driving the whorl portion **5** of the spindle in either direction without changing the position of the drive or idler pulleys.

The apparatus may be enclosed in a housing as is customary, and may be further equipped with brake elements for arresting movement of the spindles in a manner known in itself.

It should be understood of course, that the foregoing disclosure relates only to a preferred embodiment of the invention, and that it is intended to cover all changes and modifications of the example of the invention herein chosen for the purpose of the disclosure which do not constitute departures from the spirit and scope of the invention set forth in the appended claims.

What I claim is:

1. A drive arrangement for the spindles of a spinning machine and the like, comprising, in combination, a support; a drive shaft mounted on said support for rotation about an axis; a plurality of drive pulleys mounted on said drive shaft in axially spaced relationship; a plurality of spindles rotatable on said support, said spindles being aligned in a row substantially parallel to said axis, and each having a whorl portion; a plurality of two-armed levers, each pivoted on said support about a pivoting axis substantially parallel to the axis of said drive shaft; a tensioning and a reversing pulley respectively mounted on said arms of each said levers for rotation about respective fixed axes; and a plurality of endless belt means, respective ones of said endless belt means being sequentially trained over each one of said drive pulleys, a reversing pulley and a tensioning pulley on a coordinated one of said levers, and the whorl portion of a coordinated one of said spindles for transmitting the rotary movement of said drive shaft to said spindles, said support having a cylindrical bearing face, and said levers being formed with a substantially semi-cylindrical bearing face portion for pivoting engagement with a respective portion of the bearing face of said support, one of said face portions being formed with a circumferentially extending slot having axially extending end walls, the arrangement further including stop means radially projecting from the other face portion engaging said one face portion, and extending into said slot for limiting pivoting movement of the respective lever.

2. A drive arrangement for the spindles of a spinning machine and the like, comprising

(*a*) a support,

(*b*) a plurality of spindles rotatably mounted on said support, each spindle having a whorl portion,

(*c*) a drive shaft mounted on said support for rotation about an axis substantially transverse to the extent of said spindles,

(*d*) a plurality of drive pulley means fixedly mounted on said shaft,

(*e*) a plurality of lever means, each of said plurality of lever means having a longer and a shorter arm and being pivoted to said support for movements about a pivoting axis substantially parallel to said shaft,

(*f*) tensioning idler pulley means mounted on said longer arm,

(*g*) reversing idler pulley means mounted on said shorter arm,

(*h*) a plurality of endless belt means, each of said plurality of belt means being trained over one of said drive pulley means, the whorl portion of one of said plurality of spindles, the tensioning idler pulley

means and reversing idler pulley means of one of said lever means, and again said one drive pulley means, and

(*i*) pressure means urging each lever means to pivot so as to increase the distance between the related whorl portion and tensioning idler pulley means without appreciably decreasing the distance between the related reversing idler pulley means and drive pulley means, said shaft and each lever means being arranged so that on pivoting a lever means the related belt means is tensioned by the related tensioning idler pulley means without being appreciably slackened by the related reversing idler pulley means.

3. In the drive arrangement according to claim 2, the tensioning idler pulley means of each lever means being rotatable about an axis substantially parallel to the related pivoting axis, the reversing idler pulley means of each lever means being rotatable about an axis substantially transverse to the related pivoting axis.

4. In the drive arrangement according to claim 2, said plurality of lever means being pivoted to said support for movements about a common axis.

5. In the drive arrangement according to claim 2, the tensioning idler pulley means and reversing idler pulley means of each lever means being supported on opposite sides of a plane through the axis of said shaft and extending parallel to a spindle of said plurality of spindles.

6. In the drive arrangement according to claim 2, the tensioning idler pulley means of each lever means being supported above a horizontal plane extending through the axis of said shaft.

7. In the drive arrangement according to claim 2, said shaft and each lever means being provided so that both of said idler pulley means will be inside the endless path of the related belt means.

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