Aug. 14, 1934. E. KINSELLA ET AL 1,969,754

SUPPORTING OF THREAD GUIDES OF WARP KNITTING MACHINES

Filed Oct. 26, 1932 2 Sheets-Sheet 1

FIG. 1.

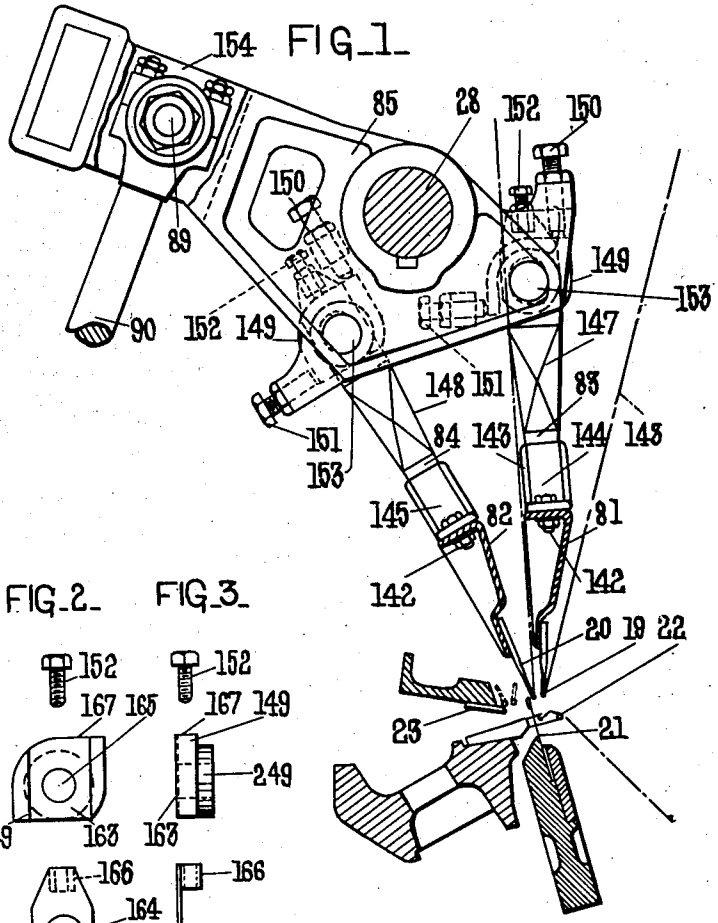
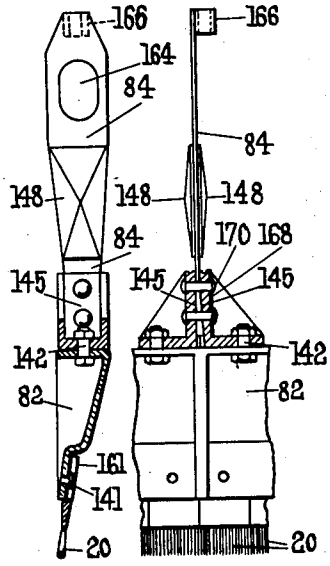


FIG. 2.

FIG. 3.



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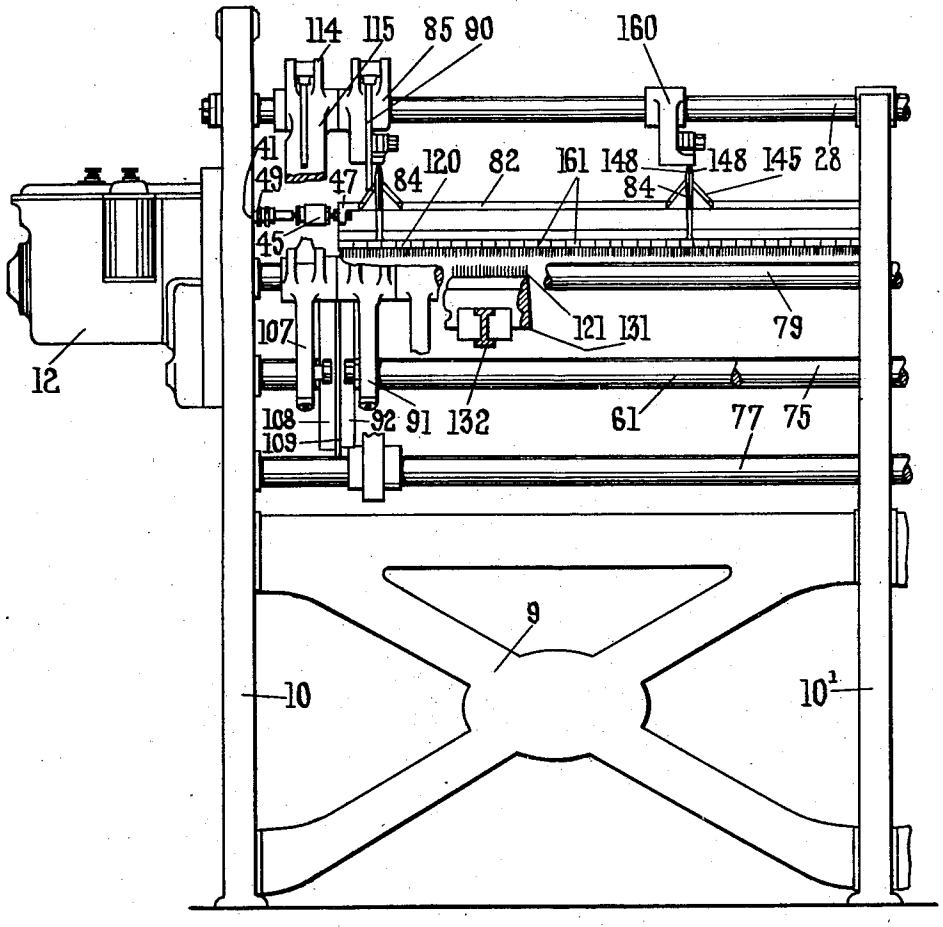
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FIG 4



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UNITED STATES PATENT OFFICE

1,969,754

SUPPORTING OF THREAD GUIDES OF WARP KNITTING MACHINES

Edward Kinsella, John Gordon Pratt, and Bernard Kelsall, Spondon, near Derby, England

Application October 26, 1932, Serial No. 639,632
In Great Britain November 3, 1931

16 Claims. (Cl. 66—86)

This invention relates to the production of textile fabrics, and more particularly to the production of knitted fabrics on warp knitting machines.

As is known the principal mechanisms involved in the knitting operation are required to perform oscillatory movements which have to be carried out at a high speed. In particular the guide bars have a to and fro endwise motion which must take place with great rapidity and accuracy on account of the fact that it must fit in with the between-needle movement of the thread guides in a direction at right-angles to the length of the needle bar and with the movement of the other knitting parts, e. g. the sinkers and needles.

The invention is mainly concerned with a lapping motion of the thread guides, that is their endwise movement to and fro along the length of the needle bar, and it is an object of the invention to enable such lapping motion to be carried out at high speed with certainty of movement and freedom from undesirable deflection of the supporting members or the guide bars.

According to the present invention means are employed for carrying the guide bars which comprise supporting means on the frame of the machine, and connecting means between said supporting and securing means adapted to permit the bars to move in the direction of the length of the needle bars by a swinging motion of the connecting means. In this way, the moving parts involved in the lapping motion are only the bar and guides, and the supporting members, apart from links or like members connecting the bars to their actuating mechanism. The swinging suspension of the bar results in the guides having a slightly curved path, but this is immaterial for guide movements of small amplitude. Moreover, the curvature can be made exceedingly small by the use of supports which are long in relation to the guide movement.

A particularly efficacious form of swinging connection consists in spring blades extending between the support and the guide bar, and permitting the endwise movement, while being sufficiently rigid in a direction at right-angles to such movement to resist deflection in that direction. Thus, the guide bar may be carried by a suitable number of flat springs arranged at intervals along its length, the plane of the springs being at right-angles to the length of the bar. The lower end of the spring may conveniently be clamped between brackets secured to the upper surface of the guide bar, while the upper end of the spring is connected in a rigid manner to means by which the guide bar is given its oscillatory movement to bring the guides from one side to the other of the needles.

In order to increase the rigidity of the springs in the direction transverse to the lapping movement a stiffening plate may be riveted or otherwise secured to one or both sides of each spring, this plate having the effect of reducing the spring to a hinge operating at two points, one close above the position at which it is secured to the guide bar, and the other close to its attachment to the supporting member, a sufficient number of such supporting springs being used to carry the guide bar and prevent deflection of the bar under its own weight. The springs may be perforated to reduce their weight and increase their flexibility without substantial loss of rigidity.

A guide suspension as described above avoids to a large extent sliding motion, so reducing any tendency to deflection, and rendering lubrication unnecessary.

The invention is of particular advantage in connection with the invention described in U. S. applications S. Nos. 639,631, 639,633, 639,634, 639,635 and 639,638 all filed on Oct. 26, 1932. These specifications are chiefly concerned with the reduction of vibration due to the oscillation of the working parts of the machine and of the deleterious effects of such vibration on the quality of the fabric and the life of the machine. The inventions described in U. S. applications S. Nos. 639,636 and 639,637, both filed on October 26, 1932, being concerned primarily with the reduction of deflection of the needle bar, sinker bar and guide bar and also with the reduction in the weight of these bars, are also of special advantage in carrying out the present invention.

The invention will now be described in greater detail with reference to the accompanying drawings but it is to be understood that this description is given by way of example only and is in no respect limitative.

Figure 1 shows the guide bars assembled and attached to the guide rocker arm;

Figures 2 and 3 are two detailed views of the guide bar suspension; and

Figure 4 is a rear view of a section of the machine showing the relationship of one guide bar and its suspending means to the other parts of the machine.

Referring to Figure 1 the guides 19, 20 are shown in their relationship to the needles 21; sinkers 22 and the presser 23, the guides being in their forward position. The rear position of the guides behind the needles is shown in dotted lines.

The guides 19, 20 are secured in sections to the guide bars 81, 82 which are attached by means of bolts 142 to brackets or angle pieces 144 and 145. The pieces 144, 145 firmly embrace the lower ends of flat springs 83, 84 which are attached to members 149, pivotally mounted on stub shafts 153. The springs 83, 84 are reinforced on each side by means of pyramidal

plates 147, 148 so that they do not flex over that part of their length covered by such plates.

Angular adjustment of the guides 19, 20 about the stub shafts 153 is effected by means of screws 150, 151 acting on the faces of the supporting pieces 149, so as to displace the supporting piece and the springs 83, 84 through any desired small angle. Vertical adjustment of the guides may be effected by means of the screws 152, suitable play being provided for this purpose. In this way, the position of each set of guides may be adjusted independently with respect to the needles, so that the warp threads 143 can be properly presented to the needles.

The oscillating motion of the guides between the needles is effected by means described in U. S. application S. No. 639,633, comprising a rod 90 pivoted to the bracket 85 carrying the guides and guide supports, the bracket 85 being keyed to a shaft 28 which oscillates with it. The bracket 85 is broken away at 154 to show the connection of the pivot 89.

Figures 2 and 3 show the guides 20, guide bar 82 and one supporting spring 84 separated from the connecting piece 149 and the adjusting screw 152. The upper part of the spring blade 84 fits closely into a slot 163 on one face of the connecting piece 149 so that the blade moves solidly therewith and takes up the definite position imposed by the adjusting screws 150, 151. The elongated perforation 164 in the spring 84 fits over the bore 165 of the connecting piece and the boss 249 thereon through which the stub shaft 153, described with reference to Figure 1, is threaded, and allows for the vertical adjustment of the blade. The screw 152 passes through a piece 166 secured to the upper end of the spring 84 and engages against the upper surface 167 of the connecting piece 149, so that the weight of the spring 84 and of the guide bar 82 and guides 20 rests upon the point of the screw 152 and on the upper surface 167 of the piece 149. Tightening of the screw 152 thus raises the blade 84.

It will be seen that the lower end of the spring 84 increases in thickness as shown at 168 and is firmly gripped by two brackets 145 on either side, the two brackets 145 being secured by means of rivets 170. The guides 20 which are formed in sections indicated at 161 are attached in such sections to the guide bar 82 by means of suitable bolts as indicated at 141.

Figure 4 shows a rear view of a section of the machine in which the guides are carried by suspension means according to the invention. The machine comprises frames 10, 10' rigidly connected together at the base by means of a girder section 9. Shafts 61, 76, 77, and 79 carry respectively the main cams of the machine, the sinker arms, the presser arms, and the needle arms while the shaft 28 carries the guide bars. The guide bar 82 is shown in this figure, the bar 81 being concealed by the bar 82. The guides are indicated diagrammatically at 120, being attached to the bar in sections indicated at 161. The guide bar 82 is operated from driving brackets 85 and supported intermediately by non-driven brackets 160 along the length of the machine, the springs 84 and connecting brackets 148 being clearly shown in this figure. It is to be understood that there are as many driving and supporting brackets 85, 160 as the length of the machine requires. In general, one pair of such brackets suffices for each machine section, as shown in Figure 4.

The oscillating motion of the guides is effected as described with reference to Figure 1 by operating each bracket 85 by means of a rod 90 pivoted to the bracket 85 and actuated by a cam-follower lever 91 mounted on a shaft 79 which also carries the needle rocker arms, part of one of which is shown at 132 connected to the bar 131 carrying the needle series 121. These connections, which are described in detail in U. S. application S. No. 639,633, are broken away in this figure in order to show the guides and guide suspension clearly. U. S. application S. No. 639,633, also describes the balancing of the forces involved in bringing about the oscillating motion of the guides 120 between the needles, such balancing being effected by means of oscillating weights 115 carried on brackets 114 and operated in a manner similar to that employed for oscillating brackets 85, with equal angular velocities but in the opposite direction. Conveniently the cams 92, 108 for actuating the guides and guide balance weights respectively are mounted together on a single hub 109 on the cam-shaft 61.

The lateral oscillation of the guides, that is their lapping movement, is effected from the cam box 12 through push rods one of which is shown at 41, the push rod being connected to the end of the guide bar 47 by means of a universal joint 45 and a connecting nut 49 by means of which the guide bar may be disconnected from the cam mechanism. The mechanism contained in the cam casing 12 is described in greater detail in U. S. application S. No. 639,631.

What we claim and desire to secure by Letters Patent is:—

1. A warp knitting machine comprising a machine frame, a thread guide bar, supporting means on said frame, and connecting means intermediate between said supporting means and said guide bar, adapted to permit the guide bar to move in the direction of its length by a swinging motion of said connecting means.

2. A warp knitting machine comprising a machine frame, a thread guide bar, supporting means on said frame, and flat spring blades connecting said bar to said supporting means, said springs being disposed in planes at right angles to said bar so as to permit the guide bar to move in the direction of its length by flexing of the springs.

3. A warp knitting machine comprising a machine frame, a thread guide bar, supporting means on said frame, clamping means on said guide bar, and flat spring blades connecting said bar to said supporting means, said blades being clamped by said clamping means in planes at right angles to said bar so as to permit the guide bar to move in the direction of its length by flexing of the springs.

4. A warp knitting machine comprising a machine frame, a thread guide bar, supporting means on said frame, flat spring blades connecting said bar to said supporting means, said springs being disposed in planes at right angles to said bar so as to permit the guide bar to move in the direction of its length by flexing of the springs, and stiffening means adapted to be secured to the faces of said springs to increase the rigidity of the blades and to prevent flexing thereof otherwise than in the direction of the length of the guide bar.

5. A warp knitting machine comprising a machine frame, a thread guide bar, supporting means on said frame, clamping means on said guide bar, flat spring blades connecting said bar

to said supporting means, said blades being clamped by said clamping means in planes at right angles to said bar so as to permit the guide bar to move in the direction of its length by flexing of the springs, and stiffening means adapted to be secured to the faces of said springs, and adapted, in co-operation with said clamping means, to increase the rigidity of the blades and to prevent flexing thereof otherwise than in the direction of the length of the guide bar.

6. A warp knitting machine comprising a machine frame, a thread guide bar, supporting means on said frame, connecting means intermediate between said supporting means and said guide bar, adapted to permit the guide bar to move in the direction of its length by a swinging motion of said connecting means, and means in connection with said supporting means for adjusting the position of the guide bar in a direction transverse to the guide bar and the connecting means.

7. A warp knitting machine comprising a machine frame, a thread guide bar, supporting means on said frame, connecting means intermediate between said supporting means and said guide bar, adapted to permit the guide bar to move in the direction of its length by a swinging motion of said connecting means, and means in connection with said supporting means for adjusting the position of the guide bar in the direction of the length of the connecting means.

8. A warp knitting machine comprising a machine frame, a thread guide bar, supporting means on said frame, flat spring blades connecting said bar to said supporting means, said springs being disposed in planes at right angles to said bar so as to permit the guide bar to move in the direction of its length by flexing of the springs, and means in connection with said supporting means for adjusting the angular position of said blades, so as to adjust the position of the guide bar in a direction transverse to the guide bar and the blades.

9. A warp knitting machine comprising a machine frame, a thread guide bar, supporting means on said frame, flat spring blades connecting said bar to said supporting means, said springs being disposed in planes at right angles to said bar so as to permit the guide bar to move in the direction of its length by flexing of the springs, and means in connection with said supporting means for adjusting the position of said springs in the direction of their length, so as to adjust the position of the guide bar in the direction of the length of the springs.

10. A warp knitting machine comprising a machine frame, a thread guide bar, supporting means on said frame, flat spring blades connecting said bar to said supporting means, said springs being disposed in planes at right angles to said bar so as to permit the guide bars to move in the direction of its length by flexing of the springs, and independent means in connection with said supporting means for adjusting the positions of said blades with respect to said supporting means both angularly and in the direction of the length of the blades, so as to adjust the position of the guide bar in directions respectively transverse to the guide bar and springs, and in the line of the springs.

11. A warp knitting machine comprising a machine frame, a thread guide bar, supporting means on said frame adapted to be oscillated thereon about an axis parallel to the length of the machine, and connecting means intermediate between said supporting means and said guide bar, adapted to act as a rigid connection for transmitting the oscillation of the supporting means to said guide bar, but to permit the guide bar to move in the direction of its length by a swinging motion of said connecting means.

12. A warp knitting machine comprising a machine frame, a thread guide bar, supporting means on said frame adapted to be oscillated thereon about an axis parallel to the length of the machine, and flat spring blades connecting said bar to said supporting means, said blades being disposed in planes at right angles to said bar, so as to act as a rigid connection for transmitting the oscillation of the supporting means to said bar, but to permit the guide bar to move in the direction of its length by flexing of the springs.

13. A warp knitting machine comprising a machine frame, a thread guide bar, supporting means on said frame adapted to be oscillated thereon about an axis parallel to the length of the machine, flat spring blades connecting said bar to said said supporting means, said blades being disposed in planes at right angles to said bar, so as to act as a rigid connection for transmitting the oscillation of the supporting means to said bar, but to permit the guide bar to move in the direction of its length by flexing of the springs, and independent means in connection with said supporting means for adjusting the positions of said blades with respect to said supporting means both angularly and in the direction of the length of the blades, so as to adjust the position of the guide bar in directions respectively transverse to the guide bar and springs, and in the line of the springs.

14. Supporting means for the guide bar of a warp knitting machine, said means comprising a flat spring blade, adapted to be secured at one end to a support carried by the machine, and provided at the other end with clamping means for securing the blade to the guide bar.

15. Supporting means for the guide bar of a warp knitting machine, said means comprising a flat spring blade, adapted to be secured at one end to a support carried by the machine, and provided at the other end with clamping means for securing the blade to the guide bar, and on each face of the spring with stiffening means.

16. Supporting means for the guide bar of a warp knitting machine, said means comprising a block, adapted to be pivotally mounted on the machine, a flat spring fitting near one end into a broad groove on said block and pierced with an elongated hole to accommodate the pivot of said block, a solid piece mounted on one end of said spring and projecting over said block, a screw through said piece adapted to bear on a face of said block to adjust the longitudinal position of said spring with respect to said block, faces on said block adapted to be engaged by screws to adjust and maintain the angular position of said block and spring with respect to the pivot, stiffening plates on the faces of said spring, and clamping means at the free end of said spring adapted to secure the spring to the guide bar in a plane at right angles to the guide bar.

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CERTIFICATE OF CORRECTION.

Patent No. 1,969,754. August 14, 1934.

EDWARD KINSELLA, ET AL.

It is hereby certified that the above numbered patent was erroneously issued to the inventors whereas said Letters Patent should have been issued to Celanese Corporation of America, a corporation of Delaware, as assignee of the entire interest in said invention as shown by the records of assignments in this office; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 11th day of September, A. D. 1934.

(Seal)

Leslie Frazer
Acting Commissioner of Patents.