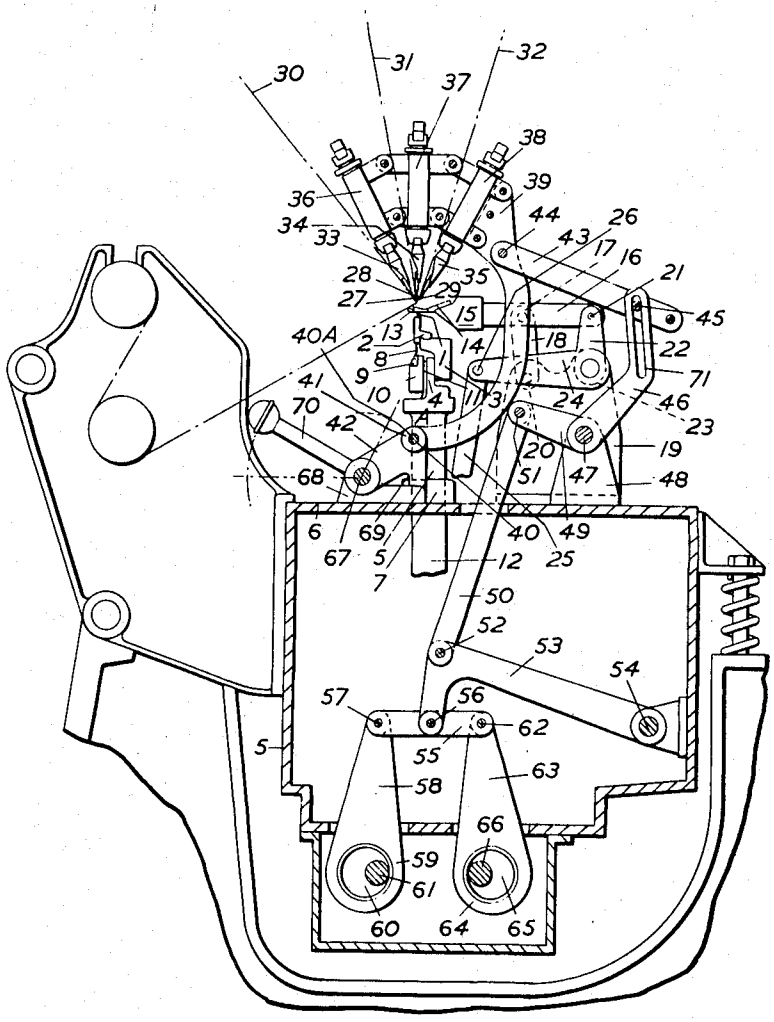
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KNITTING MACHINE

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KNITTING MACHINE

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This invention relates to warp knitting machines, and particularly to knitting machines in which the threads are laid in the hooks of the needles by guides which, during the formation of a stitch, move between the needles, then across the front or open side of the open hooks, and back between the needles.

The actual guides are usually eyes carried on guide bars which are normally mounted to swing about a pivotal axis lying near to or on the longitudinal axis of the needle, but displaced from the needle some considerable distance in the direction in which the hook end of the needle points. Thus, in conventional machines with upwardly pointing needles, the axis about which the guide bars swing is some distance above the needles. The movement of carrying the eyes through the row of needles is produced by swinging the guide bars about this pivotal axis, and the shogging movement across the front of the open needles, and subsequently the return movement across the back of the needles, is produced by displacing the guide bars along this pivotal axis.

As the guides move from back to front of the row of needles and vice versa on a small arc of a circle about the said pivotal axis, the direction of the threads from the eyes to the knitting point where the individual warp threads change into a fabric tends to become nearly tangential to the path of the eyes at the extremes of the movements of the eyes. Thus, if several sets of guide eyes are being used, unless they are set at different heights, the threads from the various eyes tend to interfere with each other and tend to foul the eyes themselves. This can only be avoided by a critical setting of the height of the different sets of eyes.

The present invention obviates this critical setting, since the pivotal axis for the guide bars is placed so that the loci of the guide eyes are part of a circle containing the knitting point so that the direction of the threads to the eyes can never become tangential.

According to the invention, the axis about which the guides are swung is close to and parallel to the plane of the row of needles and displaced from the needles, not in the direction in which the hook ends point, but in the opposite direction to that in which the needles point. Thus, in a vertical machine in which the hook ends are uppermost and the needles move vertically, the centre of rotation of the guide bars is near to or on the axis of the needles, but situated some distance beneath them instead of above them.

The drawing shows an end view of an example of a flat warp knitting machine according to the invention.

The needles 1 are mounted in blocks 2, clamped to a long needle bar 3. This bar is supported at intervals by the members 4 at the upper ends of vertical rods 5 which extend upwards from casings 6 which have guides 7 in which the vertical rods 5 slide.

The needles 1 are tubular, the tongues 8 of the needles sliding inside the tubular needle shanks. These tongues are carried by blocks 9, clamped to a long tongue bar 10 which is also supported at intervals, in the same way as

the needle bars 3, on members 11 at the upper ends of vertical rods 12 which also are arranged to slide in the casings 6.

The sinkers 13 are mounted in blocks 14, clamped to a long sinker bar 15 supported at intervals at the end of horizontal arms 16 pivoted at 17 to a link 18 which is pivoted to a stationary support 19 at 20, and pivoted at 21 to a short arm 22 secured to a shaft 23 which is rocked by a rocker arm 24 to which a push rod 25 is pivoted at 26. The shaft 23 is journalled in bearings on the stationary support 19.

Three sets of guide eyes 27, 28 and 29 are provided for the warp yarns 30, 31, 32 respectively and are carried by guide bars 33, 34, 35 respectively, which are supported at intervals by members 36, 37, 38, secured to curved arms 39 which are pivoted at 40 to a shaft 41 carried by bearing blocks 42. The shogging motion is imparted to the guide eyes 27, 28, 29 by a mechanism acting longitudinally upon the shaft 41 and which is not shown.

The guide eyes are swung through the needles by a link 43 pivoted to the arms 39 at 44 and pivoted at 45 to arms 46 on a shaft 47 carried by a bracket 48. The shaft 47 also carries arms 49 to which links 50 are pivoted at 51. The links 50 are pivoted at 52 to a member 53 which is pivoted to the casings 6 at 54 and is pivoted to a two-armed lever 55 at 56. One end of this lever is pivoted at 57 to an eccentric rod 58 having straps 59, embracing an eccentric 60 on a shaft 61. The other end of the two-arm lever 55 is pivoted at 62 to an eccentric rod 63 having eccentric straps 64 embracing an eccentric 65 on a shaft 66. The shaft 66 is driven at twice the speed of the shaft 61 and by choosing the ratios of the linkages and suitable throws for the eccentrics 60 and 65, the desired motion is imparted to the guide eyes 27, 28, 29.

Similar double eccentric mechanisms driven by the shafts 61 and 66 are provided to drive the vertical rods 5 for the needle bar, the vertical rods 12 for the tongue bar, and the push rods 25 for the sinker bar, the throws and phasing of the various eccentrics being adjusted in accordance with the specification of United States Letters Patent No. 2,292,287. These eccentric mechanisms are no part of the invention and are omitted from the drawing for the sake of clarity. All the eccentric mechanisms could of course be replaced by suitable cams.

The bearing blocks 42 are mounted on a shaft 67 journalled in blocks 68 mounted on the casings 6. The blocks 42 have projections 69 which normally bear upon the outer faces of the blocks 68 and thus take the weight of the arms 39 and the guide bars. The shaft 67 is provided with a hand lever 70, and when this is depressed the bearing blocks 42 are raised so that the pivot point 40 moves to a position 40A. This causes the arms 39 to pivot on the links 43 so that the guide eyes 27, 28, 29 are moved upwards and rocked so that they are presented in an accessible manner to the operator. This arrangement enables threading up to be facilitated.

To enable the movement of the guide eyes 27, 28, 29 to be adjusted, the pivot point 45 is adjustable on the arm 46 in the slot 71.

I claim:

1. A flat warp knitting machine comprising a plurality of hooked needles arranged side-by-side in a common plane, driving mechanism to impart to and fro longitudinal movement to said needles simultaneously, a plurality of warp guides arranged side-by-side in a line parallel to the plane of said needles and pivoted about an axis parallel to the plane of said needles and lying in a plane perpendicular to said plane and which intersects said plane in a line parallel to and displaced from said needles in a sense opposite to the direction in which the hooked ends of said needles point, and means to impart to and fro arcuate movement to said warp guides.

2. A flat warp knitting machine according to claim 1, in which the pivotal axis of the warp guides lies substantially in the plane of said needles.

3. A flat warp knitting machine according to claim 2, in which the said needles point vertically upwards and the said axis of rotation of the warp guides is directly beneath said needles.

4. A flat warp knitting machine according to claim 1, comprising guide bars upon which said warp guides are mounted, members supporting said guide bars pivoted on said axis of rotation, and linkages connected to said driving mechanism and to said members to impart said to and fro arcuate movement to said guide bars.

5. A flat warp knitting machine according to claim 4,

in which said supporting members are pivoted to said linkages on an axis parallel to the plane of said needles displaced from said plane in a direction opposite to the open sides of the hooks of said needles.

6. A flat warp knitting machine according to claim 5, in which said supporting members are each pivoted to a member tiltable about an axis parallel to the pivotal axis of the supporting members and displaced therefrom in the direction in which the open sides of said hooks face.

References Cited in the file of this patent

UNITED STATES PATENTS

2,292,287 Peel et al. ---------- Aug. 4, 1942