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Kohl

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[45] **May 22, 1973**

[54] **HOLDING DEVICE FOR THE INSTRUMENTALITIES OF AN AUTOMATIC WARP KNITTING MACHINE**

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Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 857,529, Sept. 12, 1969, abandoned.

[30] **Foreign Application Priority Data**

Mar. 13, 1971 Germany.....P 21 12 122.2

[52] **U.S. Cl.**.....**66/86 R,** 66/114

[51] **Int. Cl.**.....**D04b 27/02,** D04b 27/06

[58] **Field of Search**.....66/86 R, 114

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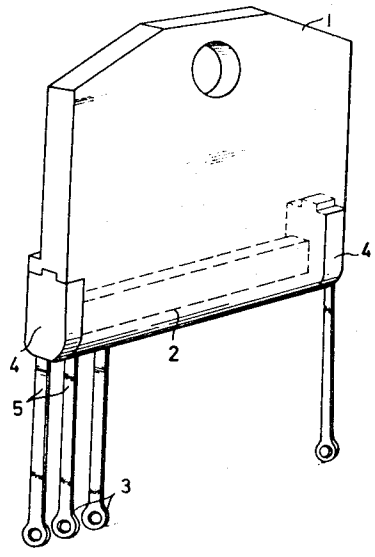
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[57] **ABSTRACT**

A holding device for an automatic warp knitting machine, in which a plurality of knitting needles or needle-like instrumentalities, such as yarn guides, are held in rigid alignment. The device includes an anchor bar in which one end of each needle is embedded. Advantageously, the bar is made of lead, or similar alloy, and is itself embedded in a plastic plate which, together with the anchor bar and the needles, forms the entire assembly. The ends of the anchor bar are formed into flanges which inhibit dimensional changes in the plastic, thereby maintaining the alignment of the needles.

6 Claims, 5 Drawing Figures



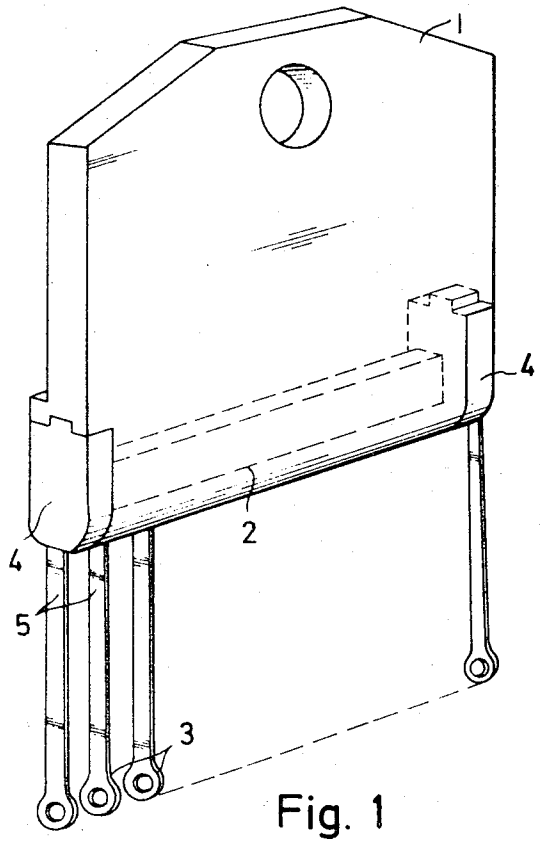


Fig. 1

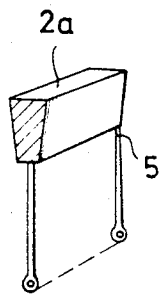


Fig. 3

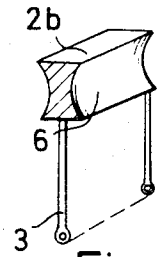


Fig. 4

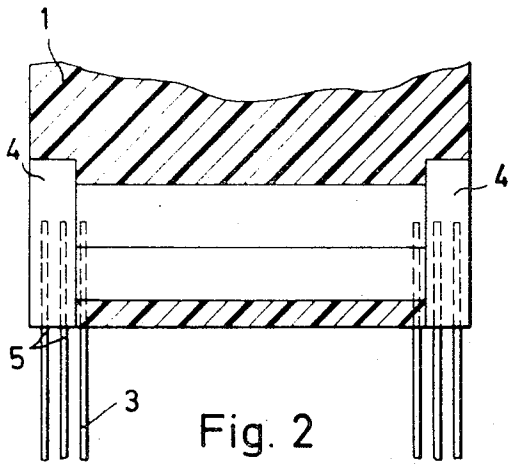


Fig. 2

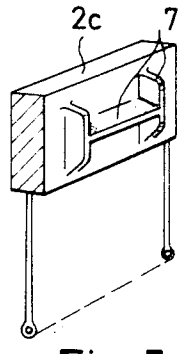


Fig. 5

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HOLDING DEVICE FOR THE INSTRUMENTALITIES OF AN AUTOMATIC WARP KNITTING MACHINE

This is a continuation-in-part of my co-pending application, Ser. No. 857,529, filed Sept. 12, 1969 and now abandoned.

This invention relates to automatic warp knitting machines. More particularly, the invention relates to a holding device for knitting needles or yarn guides and the like, in an automatic warp knitting machine.

In the automatic warp knitting machine industry, it is well known to anchor the ends of the knitting needles or yarn guides in special metal plates, typically made from lead or a similar low melting point alloy. This is done because lead forms an excellent bond with the ends of the needles, which are typically made from steel, yet is sufficiently malleable to permit precise adjustment of the needle alignment without cracking or deformation of the lead plate.

Unfortunately, lead is an extremely heavy metal and the combined weight of the dozens of lead plates required in a typical automatic warp knitting machine poses severe mechanical problems, as well as placing an upper limit on the speed at which the machine may safely operate.

Attempts have been made to substitute other and lighter metals for the lead heretofore employed. Aluminum, for example, has been tried but has not proven satisfactory as it does not form a good bond with the ends of the needles. Plastics have also been tried and although they form good bonds with the needles, they are not dimensionally stable. It is thus difficult to maintain precise alignment of the needles during the injection molding process. Worse than that, during operation of the machine, the plastic warps and stretches, with disastrous results.

Yet another prior art proposal involves anchoring the ends of the needles in a lead bar and then molding plastic about the bar, and forming the plate-like needle holding assembly of plastic. This proposal suffers from the disadvantage that dimensional changes in the plastic may still affect the alignment of the needles, as only their ends are firmly embedded in the lead bar.

The problem, then, is to find a needle assembly which combines the advantages of a lead anchor with the lightness of a material such as plastic, yet which is free from needle misalignment due to dimensional changes in the lighter material.

As a solution to the above problem, one illustrative embodiment of the invention comprises a holding assembly for holding a plurality of needle-like knitting machine instrumentalities in rigid alignment. The assembly includes an anchor bar of a first material having one end of each of the needle-like instrumentalities embedded therein. The first material forms a strong bond with the instrumentalities. The assembly further comprises a plate-like structure of a second material, the structure being molded about the anchor bar and at least a portion of the needle-like instrumentalities. First and second flange portions are formed at the extremities of the anchor bar and confine therebetween the portion of the plate-like structure which is molded about the bar and the portions of the instrumentalities. As a result, dimensional changes in the second material, which tend to affect the alignment of the needle-like instrumentalities, are inhibited by the restraining influence of the flange portions.

In the drawing,

FIG. 1 is an isometric view of a needle-holding assembly according to the invention;

FIG. 2 is a partial, cross-sectional view of the lower end of the assembly shown in FIG. 1;

FIG. 3 is an isometric view of a lead bar for anchoring the needle ends in FIG. 1;

FIG. 4 is an isometric view of another lead bar for anchoring the needle ends in FIG. 1; and

FIG. 5 is an isometric view of yet another lead bar having anchoring fins.

FIG. 1 depicts an illustrative assembly for holding a plurality of needles or needle-like yarn guides, etc., in an automatic warp knitting machine. As shown, the assembly comprises a holding plate 1 of synthetic resin, or similar material, cast in the customary plate-like shape, and having a centrally located aperture for engagement with the guide bar of the knitting machine (not shown).

The lower end of plate 1 is cast about an anchor bar 2, of lead or similar metal or alloy, in which the ends 5 of a plurality of yarn guides or needles 3 are firmly embedded. The extreme ends of the lead anchor bar have flange portions 4 formed therein which are at least co-extensive with the dimensions of the plastic holding plate, and preferably slightly larger. The plastic material which forms holding plate 1 does not, then, overlay the flanges 4 and, in fact, is confined therebetween in a direction which is parallel to the longitudinal axis of the anchor bar.

Thus, during operation, any tendency for the plastic material proximate the ends 5 of needles 3 to deform is inhibited by the restraining action of the flanges 4 which are themselves maintained in alignment by anchor bar 2. It is, thus, impossible for the needles or yarn guides 3 to shift due to dimensional changes in the plastic of holding plate 1.

FIGS. 3, 4 and 5 depict alternate configurations for the anchor bar 2. In FIG. 3, for example, anchor bar 2*a* has a trapezoidal cross-section, thereby increasing the resistance of the bar to displacement in the downward direction. Similarly, in FIG. 4, the anchor bar 2*b* is provided with concave depressions which, when filled with plastic during the injection molding process, provides a very stable configuration. In FIG. 5, anchor bar 2*c* is provided with extensions 7, on both faces, in the manner of an "I" beam, which not only increases the rigidity of the anchor bar, per se, but also increases its resistance to motion in the vertical as well as the horizontal plane.

One skilled in the art will appreciate that the embodiment described above is merely illustrative and that various modifications and substitutions may be made, without departing from the spirit and scope of the invention.

What I claim is:

1. A holding assembly for holding a plurality of needle-like knitting machine instrumentalities in rigid alignment, which comprises:

1. an anchor bar of a first material comprising lead and having one end of each of said needle-like instrumentalities embedded therein,said first material forming a strong bond with said needle-like instrumentalities;

2. a plate-like structure of a second material comprising a synthetic resin, said structure being molded

about said anchor bar and a portion of said needle-like instrumentalities; and

3. first and second flange portions of said first material formed at the extremities of said anchor bar, said first and second flange portions confining therebetween the portion of said plate-like structure which is molded about said bar and the portion of said needle-like instrumentalities, whereby dimensional changes in said second material tending to affect the alignment of said instrumentalities are inhibited by the restraining influence of said flange portions.

2. The holding assembly according to claim **1**, wherein said anchor bar is trapezoidal in cross-section and tapers towards said needle-like instrumentalities.

3. The holding assembly according to claim **1**, wherein said anchor bar has at least one concave depression formed therein, in a direction along the longitudinal axis thereof.

4. The holding assembly according to claim **1**, wherein said anchor bar has a plurality of fins formed thereon to increase the resistance thereof to motion relative to said plate-like structure.

5. The holding assembly according to claim **1**, wherein said needle-like instrumentalities comprise yarn guides for an automatic warp knitting machine.

6. The holding assembly according to claim **1**, wherein at least one of said needle-like instrumentalities is embedded in said flange portions of the anchor bar.

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