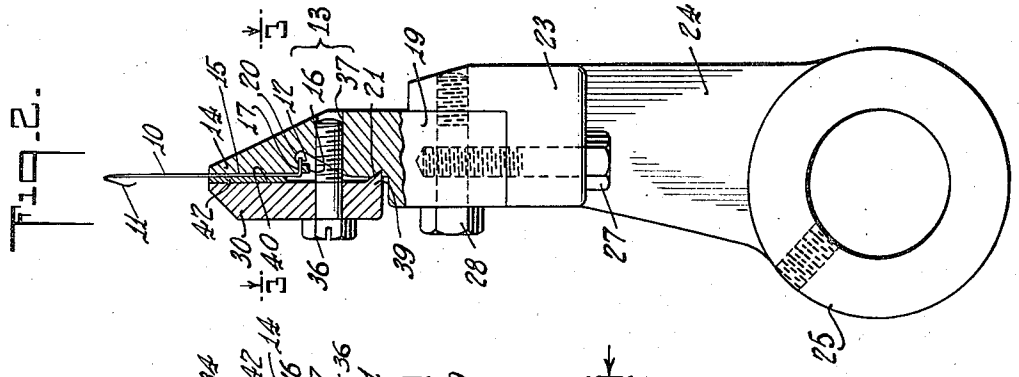
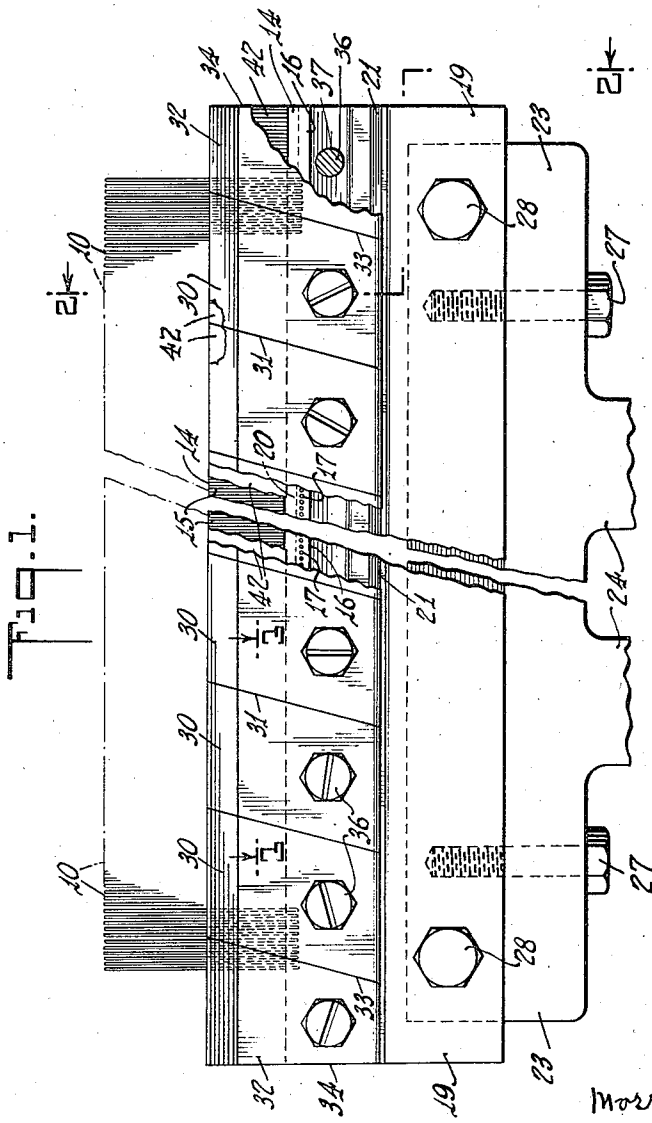
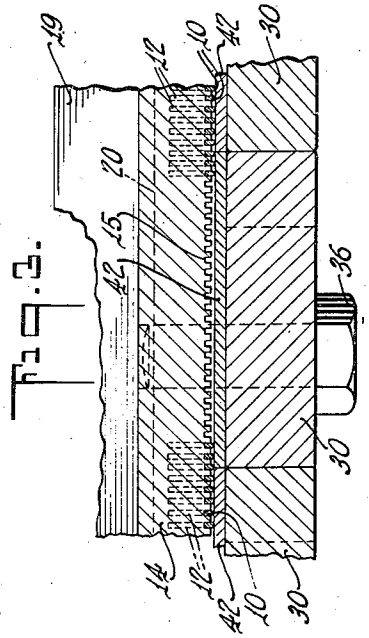
Sept. 2, 1941. V. ANDERSON 2,254,201

UNITED NEEDLE MOUNTING

Filed March 1, 1940







INVENTOR:
Victor Anderson,
BY
Morrison, Kennedy & Campbell
ATTORNEYS.

Patented Sept. 2, 1941 2,254,201

UNITED STATES PATENT OFFICE

2,254,201

UNITED NEEDLE MOUNTING

Victor Anderson, Cliffside Park, N. J., assignor to Alfred Hofman & Company, West New York, N. J., a corporation of New Jersey

Application March 1, 1940, Serial No. 321,644

11 Claims. (Cl. 66—114)

This invention is a novel united needle mounting for use in knitting machines of various kinds, the word needle being intended to include other needle-like or slender knitting instruments an extended series of which may be united in a single rigid mounting.

While the principles of needle mounting herein disclosed may be utilized in full fashioned flat knitting, which is a form of weft knitting as for hosiery, and in other sorts of machine knitting involving the use of a united bank of needles or needle-like instruments, such principles are herein disclosed, for purpose of illustration, as applied to a needle mounting available for so-called tricot knitting, single or double, which is a form of warp knitting, employing one or more extended banks of united needles, cooperating with other instruments including one or more extended banks of yarn or thread guide instruments, each consisting of a yarn eye upon a shank, which sometimes are quite thin, slender and needle-like; and the principles of the invention may further be applicable in machines for circular as well as for straight knitting.

Various needle mountings are known and have been disclosed in connection with tricot and other kinds of knitting, but these have not proven to be wholly satisfactory, and the general object of the present invention is to provide a needle mounting which will be superior in construction and operation and free of the known defects of prior mountings. Prevailing needle mountings involve a heavy structure of needle bed, sometimes of brass, attached upon an iron needle bar, and a further object of the present invention is to afford a more simple mounting, of relatively light weight, yet possessing the rigidity and strength necessary for power driven knitting machines sometimes running at rates of 275 to 450 cycles per minute more or less. It has been customary to provide a series of clamp pieces or blocks for clamping the bank of needles in place against the needle bed, with liner sheets between, and drawbacks have appeared in the use of such clamping means, in relation to the tendency of certain needles, coincident with the joints or dividing lines between clamps or liners, to become loose or displaced, impairing the knitting operations or even leading to breakages; and it is another object of the present invention to provide a needle mounting, with clamping means, adapted to avoid this serious objection and to afford a simple and secure, yet convenient, mounting for the bank of needles. Further objects and advantages will be explained in the hereinafter following description of an illustrative embodiment of the invention or will be understood by those conversant with the subject.

In the accompanying drawing

Fig. 1 is a face elevation view, partly broken away at several points to show details of structure, of a united needle mounting constructed on the principles of the present invention, and of a type suitable for tricot knitting, such as is useful in knitting glove fabrics.

Fig. 2 is an end elevation of the mounting shown in Fig. 1, with the upper part in vertical section taken on the line 2—2 of Fig. 1.

Fig. 3, on an enlarged scale, is a horizontal section view taken on the line 3—3 of Fig. 1 or Fig. 2.

Referring first to the needles 10, an extended series thereof is shown, rigidly united as a needle bank in the mounting to be described. The needles are shown of the type having a barb or eye 11 at the upper or exposed end, and at the other or lower end of the shank an angular portion or butt 12 assisting in the positioning and securing of the needles. In the case of tricot knitting there may be a large number of united needles, up to 40 to the inch, more or less, on a bed as long as 84 inches, making 3360 needles for operation upon the same number of warp threads passing through the eyes of the same number of yarn guides. The needles and the guides, or their shanks, may be of varying lengths in the same bank, for special knitting results.

Referring next to the needle bed and the needle bar, instead of these being the conventional elements, attached to each other and requiring inconvenient and cumbersome design, they are herein illustrated as combined integrally in a unitary bed-and-bar herein called a supporting carriage 13, the upper portion 14 constituting the needle bed and the lower portion 19 the needle bar portion of the carriage. This consolidation affords a simplification and lightening of structure, and preferably the unitary carriage is composed of a light alloy, such as an aluminum alloy of the Duralumin type, possessing hardness, rigidity and strength sufficient for the purposes in hand. The integrating of bed and bar also permits a structural reconstruction of operative value.

The needle bed portion 14 of the one-piece carriage 13, is shown as having the usual needle grooves or slots in what will be termed its rear or clamping face 15, each of these grooves being adapted to accommodate and retain steadily the shank of a needle, as best shown in the enlarged view Fig. 3. The grooved face 15 of the bed 14

is extended downward, terminating in a depending tongue **16** which is perforated with many small holes **17** alined with the grooves and adapted to receive the butts **12** of the needles clamped to the bed. The bed at this point is formed with a recessed contour or bay including a recess extension **20** behind the tongue **16**, the perforations **17** leading into the recess so that they are open at both ends, preventing their becoming clogged.

While the needle bed and bar are integral, they have a smooth and compact outline and there is no definite line of demarcation between them, but the portion below the bolt holes **37** may be considered as the bar, and the portion thereabove as the bed of the needle mounting. The bar **19** at its lowest part may be of its greatest width, the bar being of narrower width at a higher point, extending upwardly to the bed. At its narrower portion the bar **19** is formed with a notch or recess **21**, adapted to receive a clamp flange or tongue **39** as will be described, the notch therefore affording a shoulder or fulcrum for supporting the lower end of the clamp pieces **30**, while holding them in proper mutual alinement.

The described needle bed and bar, and the clamp to be further described, constitute the characteristic structure hereof, and these parts may be carried and operated in the machine in various ways. For example the elongated needle carriage or its bar portion **19** may rest in the angle seats **23** constituting the heads of a series of carrying levers **24**, the lower ends of which are formed into hubs **25** to be suitably mounted on a machine shaft or axle for carrying out the desired needle movements and operations. Fig. 1 shows a carrying lever and seat-forming head arranged at each end of the elongated needle carriage, but preferably there will be three or even a greater number of such levers and heads, so that the bar may be adequately and rigidly supported throughout against sagging. The described system may have rocking movements about the axles of the levers **24**, and may have up and down or other conventional movements in accordance with the kind of knitting to be performed. For attaching the carriage **13** to the angle seats **23** of the carrying levers there is shown a series of vertical bolts **27** extending through each seat into the needle bar, and horizontal bolts **28** extending through the bar into each seat.

Coming now to the series of short clamp members, blocks or pieces **30** these are in mutual alinement and contact along the length of the needle supporting carriage **13**, and each has independent attaching means in the form of a single bolt or screw **36** for tightening it to the carriage, the bolt being in the middle part of the block, between its fulcrum **39** and clamping face **40** to be described, so that its pulling action is like that of a first class lever, the force being between the low fulcrum and the load or pressure point above; and the removal of the bolt permitting removal of clamp block and access to needles.

This multiple clamping system, itself known, designed to facilitate access to a small number of needles to make repairs or replacements, is herein characterized in the feature that the several short clamp members are contiguous to each other along division or joint-lines which are non-parallel to the length of the clamped needles. In other words the needles being considered vertical, the joint-lines between clamp blocks are non-vertical, and this feature is shown to be embodied by designing the blocks with their lines of demarcation at a substantial incline to the length of the needles, as shown, so that the lines dividing the blocks cross the needles, as at a slanting angle, thus insuring that every needle, including those near the joint lines, is fully and firmly clamped, some indeed being clamped each by two adjacent clamp blocks.

While the joint lines between clamp blocks might be zigzag, wavy or of other non-straight contour, the simplest and preferred conformation of blocks is with straight but slanting edges **31**. The slant is preferably between about 10° and 20°, being substantial yet not so marked as to impair the powerful pressure action of the clamping bolts. Each joint line or inclined edge crosses several needles, as shown, and any of these needles may be removed by removing only two blocks; other needles by removing a single block.

In referring to the clamp block joint-lines as being out of parallelism with the needles, this refers mainly of course to so much of each joint line as is back of and corresponds with the clamped portion of the needle bank, that is, with the clamping face **40** of the blocks, being the upper portions of the blocks in the illustrated example; but the inclined joint-lines **31** are preferably continued downwardly across the full height of the blocks, so that each block is shown as a simple rhomboid. Each block between its fulcrum **39** and its face **40** extends across a gap, so that its middle part is like a bridge and is engaged by the pressure producing bolt **36**.

Since the extreme ends of the needle carriage or bed are preferably squared, in accordance with custom, the end clamp blocks **32** are conveniently also made square at their outer ends, so that these constitute special end clamps, each having an inclined edge **33** to conform with the adjacent regular clamp, and with an extreme vertical or squared edge **34**.

In the cases both of regular clamp blocks **30** and the special blocks **32**, each of them is preferably attached and drawn into position by a single bolt **36**, engaged in the middle or bridging part of the clamp block and extending therefrom into engagement with threaded bolt holes **37** in the carriage **13**; although in lieu of threaded bolt holes each bolt might be provided with an exterior loose nut. As already mentioned each block, along its lower edge, has an inwardly extending tongue or flange **39**, which engages with the notch or shoulder **21** of the carriage, this arrangement not merely serving properly to aline and position the blocks but to provide a low fulcrum, between which and the clamping or pressure face **40** of the clamp the bridge part of the clamp extends.

Preferably the practise is followed of providing a strip or liner **42** of sheet material, such as fiber, leather or cardboard, or soft metal, between the clamping faces **40** of the clamps and the needles which are engaged in the grooves of the clamping face **15** of the needle bed. The needle shanks preferably fully occupy the respective grooves, and stand slightly outward thereof, so that when the clamping pressure is applied through the lining material or cushion **42** the needles are effectively put under clamping pressure. The lining material **42** hereof is preferably formed as a series of short auxiliary clamp members, so as to permit removal for getting access to particular needles; and the preferred arrangement is that the successive liners **42** are

separated by joint lines which correspond with the joint lines 31 of the clamp blocks, as indicated in the drawings, so that each liner is of the same rhomboid form as, but of considerably less vertical extent than, the blocks. By this described arrangement the clamping of the needles is effectively secure, since both kinds of clamp members, the blocks and the liners, are shaped with contours separated by joint-lines which are non-parallel to the length of the clamped needles. In one sense it is equally as important, or more so, that the liners be so shaped than the blocks themselves, since the liners, being of softer or cushion material, are more apt to become worn or weakened at their contiguous edges, bringing about in extreme cases a groove which, if parallel to the needles, might allow an appreciable looseness of the needle coinciding therewith. For a full embodiment of the preferred details it is desirable that each liner be shaped correspondingly with the clamp that presses upon it, and that both the liners and the clamps are separated by joint lines non-parallel with, and preferably inclined to, the length of the clamped needles; both are preferably rhomboidal and coextensive, facilitating removal for access to needles.

The needle bed and bar being integrally united as a carriage, the sectional contour thereof may be materially reformed and made compact and efficient, as shown. The fulcrum notch 21 may be in about the plane of the clamping face 15, with only a minor bay and recess between; and the metal section outwardly beyond the recess need not be excessive to give the requisite strength and stiffness to the bed portion 14 thereabove. The butt holes 17 are in the depending extension or tongue 16 and this is readily accessible for drilling the holes, which do not impair the solid strength of the entire carriage, which may be composed of a light alloy as of aluminum or magnesium.

What is claimed is:

1. In combination, a needle bed having parallel grooves for a bank of united needles or the like, and a needle clamping means comprising a series of clamp sections mounted in mutual alinement with their joint lines at an incline to the needle grooves whereby each joint line intersects several needle grooves.

2. In combination, for a flat knitting machine, a needle bed having at its face a series of parallel seats to receive and position a bank of united needles or the like, and a needle clamping means comprising a series of clamp sections mounted with their clamping faces in mutual alinement and constructed with their joint lines at a substantial incline to the needle seats, in the plane of the needles, whereby each joint line intersects several needle grooves.

3. A united needle mounting for the needles or needle-like instruments of a flat knitting machine, the same comprising an elongated carriage for supporting the bank of parallel separate needles with their shanks clamped against the face of the carriage in parallel, and a series of short clamp blocks each with a clamping face opposed to the clamping face of the carriage and with a clamping bolt for tightening it to the carriage, and characterized in that the clamp blocks are contiguous to each other along joint-lines which are at inclines to the shanks of the clamped needles, whereby each joint-line crosses the shanks of a group of several needles and each needle in such group is held by a plurality of clamp blocks.

4. A needle mounting as in claim 3 and wherein the several clamp blocks at the clamping portions thereof are separated by joint-lines extending at a slanting angle to the needles.

5. A needle mounting as in claim 3 and wherein the several clamp blocks at the clamping portions thereof are separated by joint-lines extending at a slanting angle to the needles of between 10° and 20°.

6. A united needle mounting for the needles or needle-like instruments of a knitting machine, the same comprising an elongated bed for supporting the bank of separate needles clamped in parallel seats formed in the face thereof, and a series of separately removable short clamp members each having a clamping face opposed to the clamping face of the bed and having a fulcrum edge remote from its clamping face, with a clamping bolt between fulcrum and face for tightening it to the bed, and characterized in that the clamp members are contiguous to each other along joint-lines which are out of parallelism with the length of the clamped needles; whereby each of such joint-lines intersects the positions of a small group of needles, each of which needles is thus securely clamped by two adjoining clamp members.

7. A needle mounting as in claim 6, and where-the contiguous edges of the clamp members at their clamping portions are at a substantial slanting angle thereby to extend across several needles so that no needle coincides with a joint-line and all needles are securely held.

8. A united needle mounting for the needles or needle-like instruments of a knitting machine, the same comprising an elongated carriage for supporting the bank of upstanding needles clamped in parallel against the grooved face thereof, and a series of separately removable short clamp blocks each having an upper clamping face and having a lower fulcrum edge, with a single clamping bolt in the middle between fulcrum and face for tightening the block to the carriage, and characterized in that the clamp blocks at their clamping faces are contiguous to each other along joint-lines which are inclined to the length of the clamped needles; whereby each of such joint-lines intersects the positions of a small group of needles, each of which needles is thus securely clamped by two adjoining clamp blocks.

9. A needle mounting as in claim 8 and wherein are liner members forming clamping cushions between the clamp block faces and needles, with a liner for each clamp block, and the joint-lines between liners being at a slant corresponding with that of the joint-lines between blocks.

10. In a knitting machine a mounting for a parallel series of needle-like instruments comprising a bed with a clamping face having parallel seats to receive the shanks of the needle-like instruments, and a series of clamp members each with a clamping face opposed to the face of the bed and with a clamping bolt for tightening it to the bed, and characterized in that the clamp members are contiguous to each other along dividing lines which are disposed at a substantial angle to said parallel seats, whereby each dividing line intersects a plurality of such seats.

11. In combination, in a knitting machine, a bank of needle-like instruments with straight stem sections, means for supporting the same including a bed having a width to receive the

straight sections of the stems thereof, yieldable lining means providing a cushion for the needle-like instruments in the clamping zone, a series of clamping members which in the plane of the clamping zone are of rhomboidal form and end clamping members which in the plane of the clamping zone thereof are of trapezoidal form, and wherein said lining means is divided into a series of separate pads which conform with the forms of said clamping members; said forms of the clamping members being such that opposite parallel edges of each are in longitudinal alinement, while the transverse edges are at a substantial angle to the straight sections of the stems of the instruments, whereby each dividing line between members intersects a number of straight shank sections.

VICTOR ANDERSON.