Feb. 10, 1970 E. MERKLE 3,494,310

PROCESS AND DEVICE FOR CASTING-ON OF WEFT AND WARP-KNIT GOODS ON NEEDLE PLATES

Filed Jan. 29, 1968 3 Sheets-Sheet 1

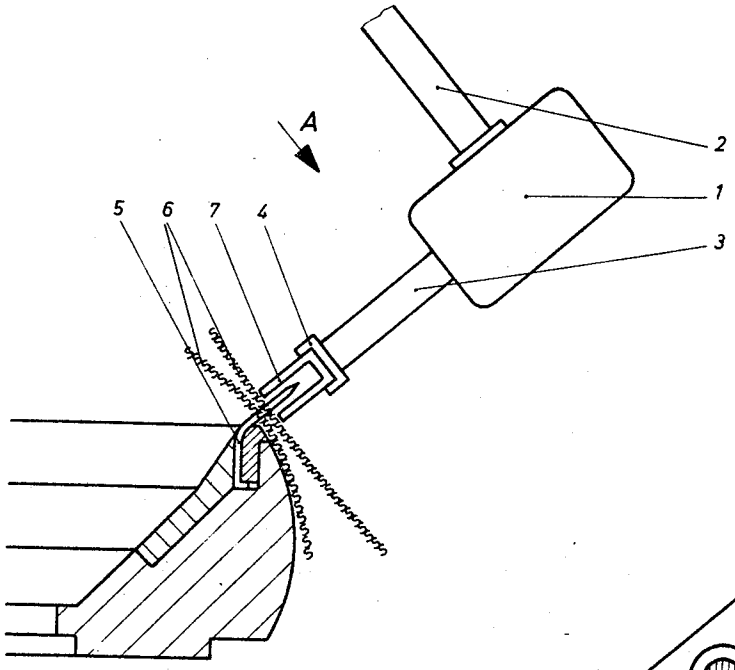

Fig. 1

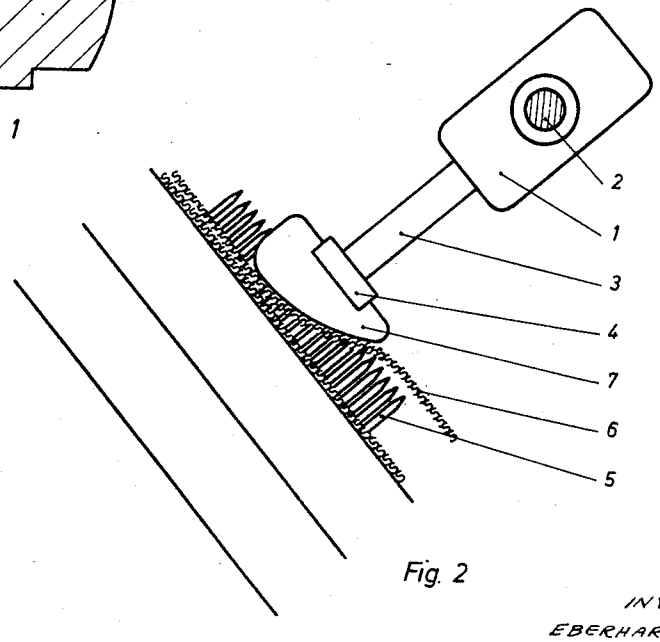

Fig. 2

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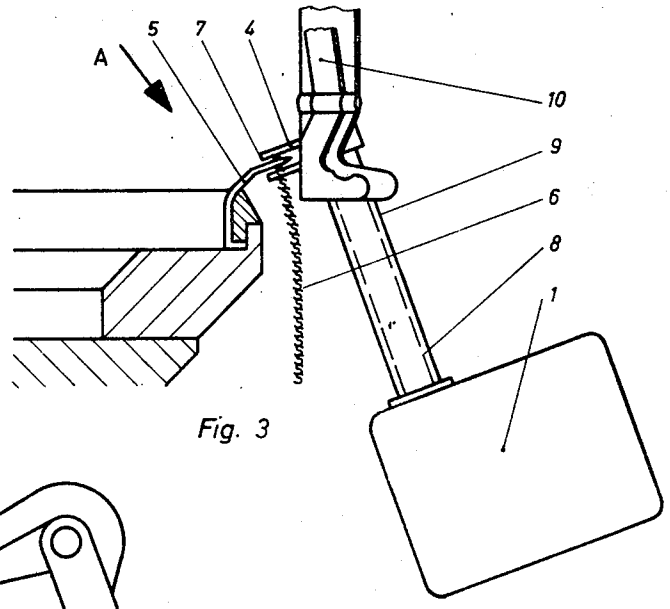


Fig. 3

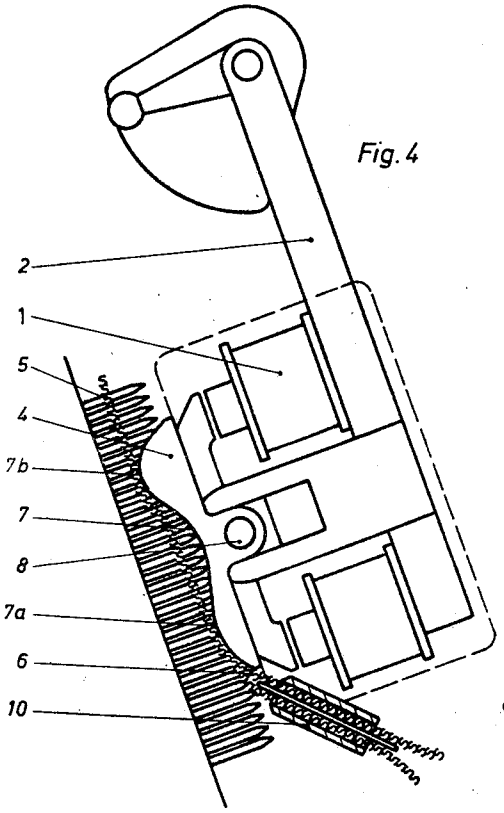
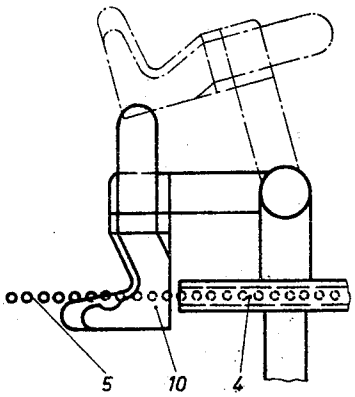


Fig. 4

Fig. 5



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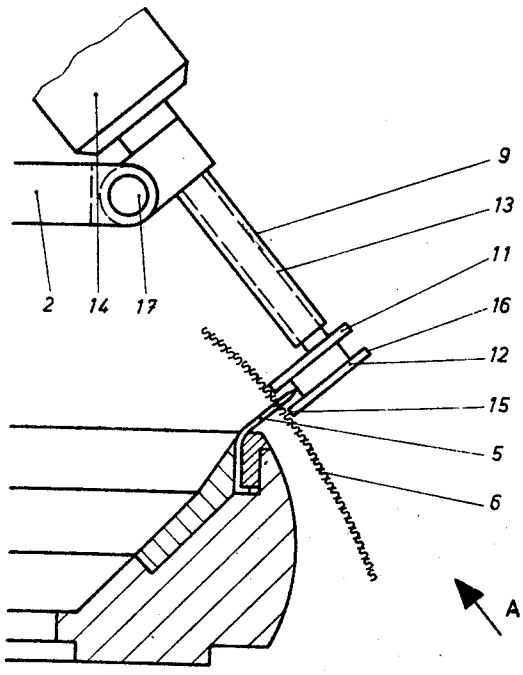

Fig. 6

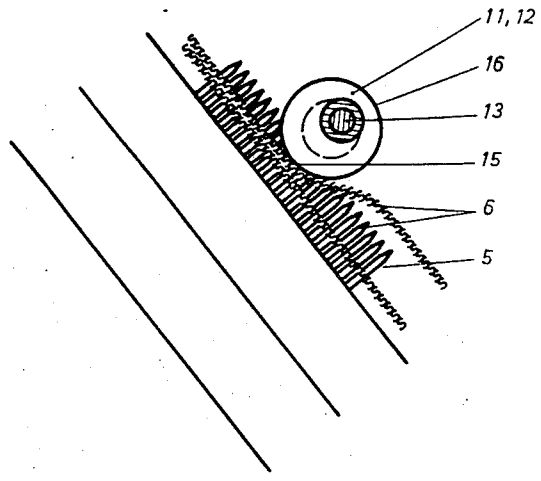

Fig. 7

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PROCESS AND DEVICE FOR CASTING-ON OF WEFT AND WARP-KNIT GOODS ON NEEDLE PLATES

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Int. Cl. D05b 7/00
U.S. Cl. 112—27 12 Claims

ABSTRACT OF THE DISCLOSURE

A process and device for casting-on of weft and warp-knit goods on needle plates of looping machines and on transfer frames of flat warp knitting machines. The goods to be cast-on are thrust down on the needle stems by a casting-on means acting on at least one side of the needle plate and which is connected to and vibrated by a vibrating means.

BACKGROUND OF THE INVENTION

Whereas, in looping machines the looped seam is produced mechanically, in the known art the goods must be cast-on by manual labor, which, in addition to great skill, requires a disproportionately expenditure of time relative to the actual stitching process. The goods are cast-on in two steps, slipping the loops to be stitched over the tips of the needles on the needle plate of the machine and thrusting of the goods down on the stems. The latter step, in particular, requires considerable effort especially in the case of close fabric and if there are several pieces lying one upon another, for example as in braiding. This may strain the fingers and cause permanent injury to the hands, particularly since work is done largely by women. Besides, thrusting the goods down after first slipping them on requires a reversing action of the hands thereby rendering it impossible for the work to progress uniformly. Consequently, the utilization factor of the looping machine is limited.

Attempts have been made to remedy these difficulties by providing rollers or wedge-shaped slides to be passed to and fro along the needle plate to push down the goods. However, the pressure applied by these devices in combination with unavoidable lateral stresses on the needles may easily cause deformation of the needle plate. Besides, such arrangements interfere with visibility with the work.

Casting-on devices have also been proposed that are intended to act on the goods along side or between the needles in a stroke action synchronized step-by-step with the rotation of the annular plate. Such proposals, however, have not generally assumed any practical importance.

SUMMARY OF THE INVENTION

It is an objective of the invention to replace the energy consuming part of the hitherto manual operation in casting the goods on the needle plate by a mechanical process so that the skilled part of the operation can now be carried out continuously, without interruption by subsequently thrusting down the goods by hand and to avoid the disadvantages of the past mechanical casting-on processes. Furthermore, the invention provides a casting-on device to facilitate the operation of this improved mechanical process.

According to the invention, the problem is solved in that the action of the casting-on device upon the goods, slipped on the tips of the needles of the plate manually, takes place through rapid vibration generated by vibrating means, transferred to casting-on means connected thereto, and directed substantially parallel to the axes of the needles to thrust the goods onto the stem of the needles moving past it.

To carry out this process, it is proposed that the construction of the casting-on device be such that a stirrup, two prongs of which straddle the needle plate, with skid-like contact contour, that is, tapered in an arcuate manner on its surface contacting the goods and optionally rising in the direction of introduction of the goods, is connected to an oscillating magnet generating the vibration. The prongs of the stirrup oscillate substantially parallel to the axes of the needles, immediately to either side of the needles, upon the goods to be thrust down with a vibration comparable to a gentle hammering.

A further elaboration of the invention consists of the casting-on means being connected to the rotary armature of an oscillating magnet generating the vibration. The contact contour has at least two convexities and the one first engaging the goods to be pushed down protrudes a lesser amount than the following convexities.

In an extension of the idea of the invention as thus far described, it is proposed further that the construction of the casting-on device be such that to either side of the needle plate, eccentrics having at least one maximum point are mounted perpendicular to the plane of the plate, on a driven shaft, of a high speed rotary drive source. The protruding maximum points of the eccentrics exert vibration impacts of high frequency directly on the goods to be thrust down.

Through the vibration exerted on the goods by the process according to the invention, each stitch slipped on a needle of the plate is struck by a large number of very rapid vibration impacts. The pressure thus exerted on the casting-on device itself may be comparatively slight in comparison to known methods, so that the shape of the needle plate is not impaired and the casting-on can be done easily and continuously with considerable speed. An essential advantage of the invention moreover is that the hands are thereby freed for slipping the goods on the tips of the needles, and that this operation is not interrupted by that of thrusting down the goods which involves a reverse action and requires exertion and great skill.

With the above and other objects in mind, reference is had to the attached drawing of the invention.

BRIEF DESCRIPTION OF THE DRAWING

In the drawings:

FIGURE 1 is a cross-sectional view of the cylinder of a circular looping machine with a casting-on device according to the invention in position;

FIGURE 2 is another view thereof, viewed in the direction of arrow A of FIGURE 1;

FIGURE 3 is a cross-sectional view of an alternative embodiment of a casting-on device according to the invention with an edge roller associated therewith;

FIGURE 4 is another view thereof, in the direction of arrow A of FIGURE 3;

FIGURE 5 is a top view thereof;

FIGURE 6 is a sectional view of a further embodiment of a casting-on device in accordance with the invention; and

FIGURE 7 is another view thereof, viewed in the direction of arrow A of FIGURE 6.

DESCRIPTION OF THE PREFERRED EMBODIMENT

It should be noted that, for full utilization of the increased efficiency due to the invention outlined above, the

rotary motion of the top of the machine is not produced as has been past practice by pushing it along with the hands or by turning the substructure with the feet. This is accomplished by a power drive which the operator can control, for example, by means of a knee lever, thus avoiding any lost motion in the looping operation.

The oscillating magnet 1 is mounted by an arm 2 on a circular looping machine, optionally circularly adjustable about the latter and capable of being swung clear. The vibration generated by oscillating magnet 1 is transmitted by way of a bar 3 to the two prongs of a stirrup 4 of U-shaped cross section which extends with one prong on each side of the needle-cylinder 5 to act upon the goods 6 slipped on the latter. A plurality of needles are straddled at any one time. The prongs of stirrup 4 have a skid-like contact contour 7, this is tapered in an arcuate manner on its surface contacting the goods, rising in the direction of motion of cylinder 5, with the anterior end of the contour engaging with the goods imposed on the tips of the needles, and the most remote protuberance of the contour corresponding to the desired depth of thrusting the goods 6 down on the stems of the needles. The mode of operation is as follows. The goods are slipped on the tips of the needles by hand and drawn by the motion of the cylinder between the prongs of stirrup 4. The stirrup vibration generated by oscillating magnet 1 then thrusts it on the stems of the needles without further manual assistance. It may only be necessary to adjust the depth manually.

Surprisingly enough, it has been found that this operation proceeds rapidly and effortlessly even with several pieces of goods to be looped together and thrust down simultaneously, or with very heavy goods, without application of any special pressure. Manual labor can thus be limited to the arranging of the loops on the tips of needles.

Alternative, to direct transmission, the vibration can be transmitted from oscillating magnet 1 to stirrup 4 by interposition of some transmission means, for example, the hydraulic or pneumatic type, depending on the design of the machine.

In the embodiment illustrated in FIGURES 3, 4, and 5, the prongs of stirrup 4 have two convexities *7a* and *7b*. Convexity *7a*, anterior in the direction of motion of cylinder 5, protrudes to a lesser depth than convexity *7b* arranged at the posterior end of contract contour 7. Stirrup 4 is fixedly mounted on extended shaft 8 of the rotary armature of an oscillating magnet. Shaft 8 rests in tube 9, fixedly attached to the housing of the oscillating magnet. Oscillating magnet 1 is attached to swinging arm 2 of the looping machine. The rotary oscillation of stirrup 4 on shaft 8 first thrusts the goods 6 on the tips of the needles of cylinder 5 through the deflection of the anterior convexity *7a*. The casting-on operation is completed by the wider oscillation of the posterior convexity. Instead of two convexities *7a* and *7b*, more convexities may be provided on contact contour 7, those farther back in the direction of motion of the cylinder protruding farther than the preceding.

The multi-stage casting-on operation that can be performed with this embodiment has the advantage that the goods 6 are thrust down on the needles at a rather flat angle. They are thus protected from distortion by avoiding any excess stretching of the loops.

FIGURES 6 and 7 represent a further elaboration of the invention. In this, the vibration is generated by an eccentric and rapid rotation, acting directly on the goods. The eccentric 11, 12 driven by an electric motor or similar source of power, and having its plane of rotation parallel to the needle plate, is so arranged as to act directly on the goods to be thrust down. The eccentric according to the invention consists preferably of an eccentric disc 11, 12 acting on one side or of two acting on both sides next to the needle plate. In operating position, the maximum points of the eccentrics will bear down along side the needles to the desired depth to which the goods are to be pushed, while a minimum point lies substantially on level with the points of the needles or above, so that the goods laid upon them can readily be introduced underneath the eccentric.

The eccentrics may be in the form of a simple eccentric, or, to generate higher frequencies of oscillation, in the form of cams with more than one maximum point. The eccentrics are mounted directly on the drive shaft of a preferably noiseless electric motor or equivalent source of power, preferably capable of being swung clear. By the motion of the needle cylinder or transfer frame, the goods laid on the points of the needles ahead of the casting-on device according to the invention, are fed under it and pushed down by the motion of the rapidly rotating eccentric or eccentrics, which thereby act in a vibratory manner. Once again, manual labor can thus be limited to slipping the goods on the points of the needles, for which both hands are now free. As is readily apparent, the mode of operation is similar to that of the previous embodiments.

In reference to the drawings, eccentrics **11** and **12** are directly mounted eccentrically on driven shaft **13** of electric motor **14**. Their maximum points **15** act on either side of the needles of cylinder **5** on the goods **6** to be cast-on, while the minimum point **16** of the eccentrics **11** and **12** are, when facing the goods **6** to be cast-on, about on level with the tips of the needles of cylinder **5**, enabling the goods **6** to be introduced. Electric motor **14** will swing or rotate on pivot **17** and is arranged on an arm **2** attached to the column of the circular looping machine. The high frequency vibration generated by the rapid rotation of eccentrics **11** and **12** thrusts the goods onto the stems of the needles to the depth determined by the maximum points **15** of eccentrics **11** and **12**.

As previously pointed out, to generate higher frequencies of oscillation, eccentrics **11** and **12** may be in the form of cams with more than one maximum point.

The casting-on device according to the invention may be equipped with suitable interchangeable indicating and control means, for example guide rails or edge roller **10** (FIGURES 3, 4, and 5) in front of stirrup **4** or eccentrics **11** and **12** automatically laying down the goods, or facilitating this operation as the cylinder moves along under the device. The arrangement of the edge roller **10** is such that more than one thickness of goods can be cast-on at once, if desired.

These means may be so fashioned that a suitable indicator visualizes the behavior of those needle points should they be concealed behind the goods. This eliminates the time consuming search for the track of needle points, permitting a considerable saving of time. In a further extension of the invention, the field of operation can be illuminated by a source of light running parallel with the casting-on device according to the invention and optically magnified by means carried along a similar manner. Either accessory may, if desired, be attached to arm **2** or to tube **9**.

Furthermore, to facilitate operation, markings may be provided on a stationary part of the casting-on device for exact identification of the needle points.

The device according to the invention is not confined to cylindrical and flat looping machines, but may be applied with equal advantages to the transfer frames of flat-warp knitting machines. For special applications, it may also be expedient to employ the device according to the invention as a hand tool with no suspension.

Thus, the above-mentioned objects of the invention, among others, are achieved.

I claim:

1. Casting-on apparatus adapted for the casting on of weft and warp-knit goods on a knit-goods machine having a needle plate with a plurality of aligned needles on at least one side of the needle plate, said casting-on apparatus comprising: vibrating means mounted on a supporting

structure, and casting-on means connected to said vibrating means and adapted to be positioned adjacent the needle plate of a knit-goods machine so that said vibrating means will cause said casting-on means to vibrate in a diretcion substantially parallel to the axes of the needles on the needle plate and will thrust the goods down on the needle stems on at least one side of the needle plate.

2. The invention in accordance with claim **1** wherein the supporting structure is a looping machine.

3. The invention in accordance with claim **1** wherein the casting-on means includes a stirrup having two prongs with a tapered arcuate configuration on the surface thereof which contacts the goods, said stirrup straddling the needle plate, and said stirrup and said vibrating means including an oscillating magnet connected thereto, the tapered arcuate contact surface rising in the direction of the end of said stirrup where said goods are introduced to be passed thereunder, and a transmission means on said vibrating means to transmit the vibrations generated by said magnet to said stirrup.

4. The invention in accordance with claim **1** wherein the casting-on means includes a stirrup having two prongs of a contour having at least two convexities on the surface thereof contacting the goods, the convexity first engaging the goods to be thrust down protruding less than the following convexities, and said stirrup being arranged on the rotary armature of an oscillating magnet of said vibrating means generating the vibration thereof.

5. The invention in accordance with claim **1** wherein the casting-on means includes at least one eccentric having at least one maximum point and being arranged on at least one side of the needle plate, said at least one eccentric being mounted on a driven shaft perpendicular to the plane of the plate of a high-speed rotary drive source.

6. The invention in accordance with claim **1** wherein said supporting structure is a transfer frame of a flat warp-knitting machine.

7. The invention in accordance with claim **1** wherein a light source to illuminate the field of work is associated with said casting-on means, and an optical means for magnifying the field of work is associated with said casting-on means.

8. The invention in accordance with claim **1** wherein control means are associated with said casting-on means for laying on the goods before being thrust down on the needle plate, the control means having an edge roller, and markings are provided on a stationary part of said casting-on device for exact indication of the needle points.

9. The invention in accordance with claim **1** wherein said supporting structure is a hand-gripping means to facilitate the portable use of said device.

10. A process for casting-on of weft and warp-knit goods on a needle plate of a knit-goods machine by use of a casting-on means connected to a vibrating means comprising: positioning said casting-on means adjacent to and on at least one side of said needle plate, and vibrating said casting-on means by activating said vibrating means so that said casting-on means vibrates substantially parallel to the axes of the needles on said needle plate so that the goods are thrust down on the stems of the needles by said casting-on means.

11. The invention in accordance with claim **10** wherein during said process the field of work is illuminated by a light source associated with said casting-on means, and during said process the field of work is magnified by an optical means associated with said casting-on means.

12. The invention in accordance with claim **10** wherein prior to the goods thrust down on the needle plate the goods are laid on by control means associated with said casting-on means.

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