Dec. 26, 1944. P. W. BRISTOW 2,365,801

KNITTING MACHINE AND METHOD

Filed Nov. 11, 1942 2 Sheets-Sheet 1

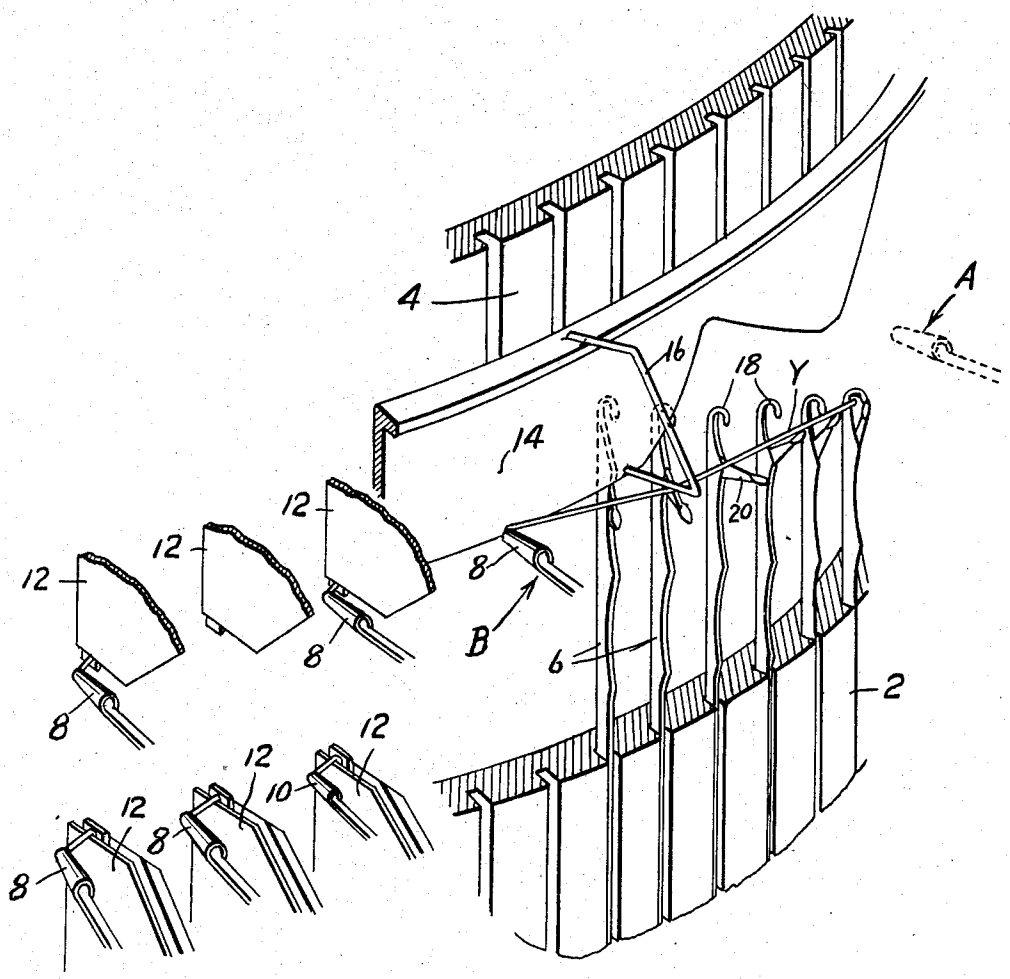


FIG. 1.

WITNESS:

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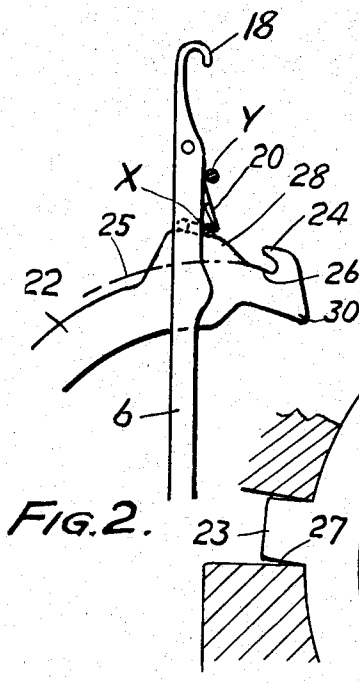


FIG. 2.

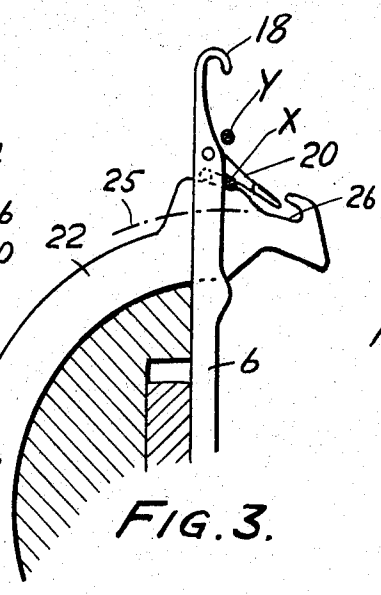


FIG. 3.

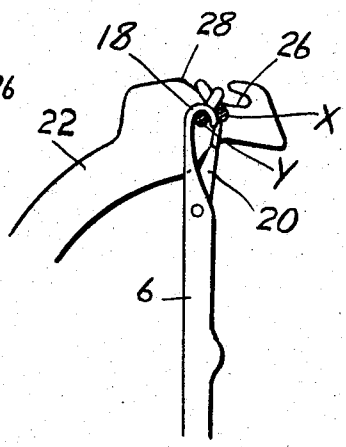


FIG. 4.

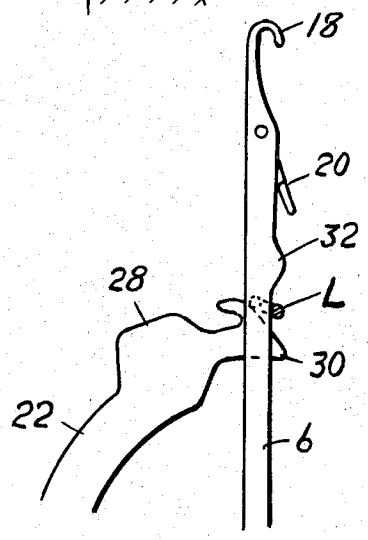


FIG. 5.

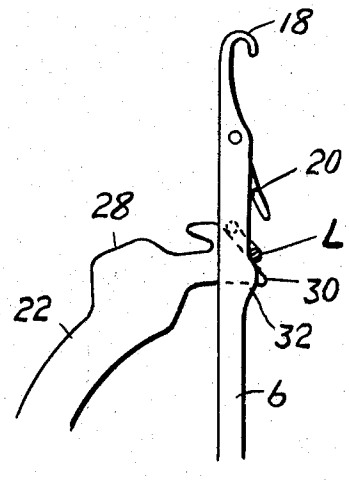


FIG. 6.

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2,365,801

UNITED STATES PATENT OFFICE

2,365,801

KNITTING MACHINE AND METHOD

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Application November 11, 1942, Serial No. 465,185

9 Claims. (Cl. 66—14)

This invention relates to a knitting machine and method, and in particular relates to the handling of yarns by the needles and associated elements.

In the application of Lawson and Bristow, Serial No. 460,378, filed October 1, 1942, there are described a knitting method and machine specifically of the superposed cylinder type involving various novel matters of construction and the handling of yarns, the type of machine specifically described being that of the patent to Bentley 1,838,651, dated December 29, 1931. Said application relates to various matters of joint invention concerned with the arrangement of yarn fingers, clamps and cutters and yarn guiding means whereby the yarns may be properly fed to the needles. The present invention relates to certain features of sole inventorship embodied in the same machine.

One of the objects of the present invention is to provide means for accelerating the seizure of yarns presented to the needles to insure their proper seizure at a predetermined point of the needle circle in a minimum of time. While this feature of the invention is particularly advantageous in a machine of the superposed cylinder type where the movements of the yarn fingers are of a special nature, it will be obvious that the invention is of broader application and adapted to machines in which the needles may be carried by a single cylinder.

A further object of the invention is the provision of means for insuring the proper relationship of the loops to the needles and sinkers when the needles are lowered into action, following their being picked up out of action.

A further object of the invention is the provision of a novel type of sinker.

These and other objects of the invention, particularly relating to details of construction and manipulation, will become apparent from the following description, read in conjunction with the accompanying drawings, in which:

Figure 1 is a fragmentary perspective view showing in particular the guidance of a yarn being fed to the needles and the positions taken by the yarn fingers in effecting the introduction of a yarn and the subsequent feed thereof;

Figures 2, 3 and 4 are fragmentary diagrammatic views illustrating the fashion in which the yarns are handled by special cooperation of needles and sinkers resulting in acceleration of seizure of an ingoing yarn; and

Figures 5 and 6 are fragmentary diagrammatic views illustrating the action of an extended nose of a sinker in preventing undesired downward movements of loops during the picking of the needles into action in heel and toe knitting.

Reference may be made to said Lawson and Bristow application for details of construction of the machine herein disclosed, which form no part of the invention claimed herein. As in said joint application, the knitting machine is provided with lower and upper cylinders 2 and 4, respectively, in axial slots in which there slide the independent double-ended needles 6, the needles being located in the lower cylinder during plain knitting and selectively in the upper and lower cylinders in the formation of ribs. Yarn fingers 8 are provided for the presentation of various yarns to the needles while a yarn finger 10 carries an elastic yarn also adapted to be presented to the needles to be held between the reversely concatenated loops for the formation of an elastic rib portion of the fabric. The various fingers 8 and 10 are associated with clamping and cutting devices indicated at 12. In their inactive positions, these various fingers lie adjacent the clamping and cutting devices, their yarns being held by movable elements thereof.

As pointed out in detail in said joint application, and following in general the mode of presentation and feed of yarns of said Bentley machine, when a finger 8 is to present its yarn to the needles, it is moved from the position adjacent to its clamp and cutter to a position such as indicated at A, this movement first involving an outward movement of the finger with respect to the needle cylinder, movement in a direction substantially tangent to the cylinder and an inward movement whereby the yarn is drawn into position to be seized by the closing latches of the needles. Immediately after such seizure occurs, the yarn finger again moves outwardly and back to a position B and thereupon continues to feed its yarn to the needles, the corresponding clamp releasing the yarn immediately after its seizure by the needles when the finger is in the position A. As described in said joint application, the fixed latch guard 14 carries a wire loop 16 so positioned as to serve as a guide engaged by the yarns to insure the proper approach of the yarns to the needles, in particular insuring that the yarns extending during the entry period from any of the upper clamps will occupy the same path with respect to the needles which are to seize it, this being such that any yarn is held low to insure its being introduced below the needle hooks. The loop 16 also holds the yarn coming out of action from going so high as to miss the hooks of needles

particularly in travelling into an upper binder from which it feeds before being cut and clamped.

The various movements of the yarn fingers so involved take place with great rapidity, and to insure that the yarns are properly engaged by the needles, during a yarn change and before the outgoing yarn is withdrawn from the needles, the present invention provides for an acceleration of the closure of the needle latches over the yarn in excess of the normal rapidity of closure of the latches in prior machines of this type.

To effect this result, the sinkers in the present machine are specifically constructed.

Referring to Figures 2 to 4, inclusive, the needles are provided with upper hooks indicated at **18** and upper latches **20** of conventional form. The sinkers **22** are also substantially conventional, being arcuate in form and arranged to move in circular arcs about centers concentric with their shank portions under the action of cams **27** on butts **23** thereof whereby all of the desired sinker motions are obtained. Each of the sinkers is provided with a hook **24** in usual position, but is also provided inwardly of the hook with a hump portion **28** projecting substantially above the arc **25** which would continue the throat portion **26** beneath the hook. Each of the sinkers is also provided with an extended nose **30** as contrasted with conventional sinkers which terminate just outwardly of the hook. The action of the sinker in accelerating the seizure of a yarn Y will be evident from the successive steps of operation indicated in Figures 2, 3 and 4. Normally, the loops X about the needle shanks would lie approximately at the level of the arc indicated at **25**, but in the present case, prior to the descent of the needle to seize the yarn Y and draw stitches, the sinker moves outwardly so that the hump **28** cams upwardly the series of loops held by the needles. As the descent of a needle begins, the latch immediately engages the loop on the shank of its needle, with the result that it is very quickly flicked upwardly to trap the incoming yarn Y. As will be evident from Figures 3 and 4, the entrapment of the yarn will take place with a very slight descending movement of a needle corresponding to a short movement of the needle about the axis of the needle cylinder. As the needle moves to its lowermost position, the adjacent sinkers move inwardly so that the stitches are drawn over the outer portion of the ledge **28** or substantially in the throat **26**.

Figures 5 and 6 illustrate the fashion in which the nose **30** of the sinker prevents the loops from getting too low as the needles are picked down into action in the formation of heels and toes.

As is conventional, each of the needles has a hump **32** located beneath the latch, and when a needle is picked up out of action, the hump **32** will lie above the level of a loop L about its shank. At this same time, the stitch will be above the hook of the sinker due to the action of the associated conventional bluff sliders. Accordingly, if a needle is then lowered, the hump **32** will tend, frictionally, to pull the loop downwardly to draw an adjacent loop of a sinker wale below the back of a sinker which, on thereafter being projected, may penetrate the fabric, break the yarn, or push a needle outwardly so that it might be damaged by a latch guard. Provision of the extended nose **30** on the sinker prevents this action in assuring that the loop remains above the sinker at all times. This action will be evident from consideration of the successive steps of Figures 5 and 6, the latter showing the needle picked down to such extent as to bring the hump **32** beneath the loop.

What I claim and desire to protect by Letters Patent is:

1. A knitting machine comprising a series of latch needles, means for feeding yarn to the needles, sinkers associated with said needles having inwardly opening hooks and ledges extending from the throats within the hooks to provide yarn-supporting portions raised beyond the portions of said ledges within the hooks, and means for moving said sinkers to bring said raised yarn-supporting portions into position to hold the yarn of the course of loops carried by the needle shanks as the yarn is about to be seized by the needles, thereby to accelerate closure of the latches to seize the yarn.

2. A knitting machine comprising a series of latch needles, means for feeding yarn to the needles, sinkers associated with said needles having inwardly opening hooks and ledges extending from the throats within the hooks to provide yarn-supporting portions raised beyond the portions of said ledges within the hooks, means for supporting said sinkers for arcuate movement, and means for moving said sinkers to bring said raised yarn-supporting portions into position to hold the yarn of the course of loops carried by the needle shanks as the yarn is about to be seized by the needles, thereby to accelerate closure of the latches to seize the yarn.

3. A sinker having a hook and a ledge extending from the throat within the hook to provide a yarn-supporting portion raised beyond the portion of said ledge within the hook, said raised yarn-supporting portion being arranged to position yarn of a course of loops carried by needle shanks to accelerate closure of needle latches in the seizure of yarn.

4. A sinker of arcuately movable type having a hook and a ledge extending from the throat within the hook to provide a yarn-supporting portion raised beyond the portion of said ledge within the hook, said raised yarn-supporting portion being arranged to position yarn of a course of loops carried by needle shanks to accelerate closure of needle latches in the seizure of yarn.

5. The method of accelerating latch closure upon a yarn being seized by needles comprising moving the yarn of a course of loops carried by the needles towards the needle hooks beyond the position occupied by throats of cooperating sinkers so that during yarn seizing movements of the needles their latches engage earlier the loops carried by their shanks.

6. The method of effecting seizure of a yarn by a latch needle comprising causing closure of the needle latch upon said yarn by producing movement of a loop carried by the shank of the needle towards the hook thereof, and then releasing the loop to follow the needle during its movement to draw the seized yarn.

7. A sinker having an arcuate edge for guidance of its movements and having a hook and a ledge comprising a portion within the hook substantially concentric with the center of curvature of said arcuate edge and a portion outside the hook raised beyond the portion within the hook, said raised portion being arranged to position yarn of a course of loops carried by needle shanks to accelerate closure of needle latches in the seizure of yarn.

8. The method of accelerating latch closure

upon a yarn being seized by needles for a yarn change comprising moving the yarn of a course of loops carried by the needles towards the needle hooks beyond the position occupied by throats of cooperating sinkers so that during yarn seizing movements of the needles their latches engage earlier the loops carried by their shanks to insure overlap of ingoing and outgoing yarns in the fabric.

9. The method of effecting seizure of a yarn by a latch needle for a yarn change comprising causing closure of the needle latch upon said yarn by producing movement of a loop carried by the shank of the needle towards the hook thereof, and then releasing the loop to follow the needle during its movement to draw the seized yarn to insure overlap of ingoing and outgoing yarns in the fabric.

PAUL W. BRISTOW.