United States Patent

[11] 3,603,114

[72] Inventors **Manfred Erich Jaskulski Kandler;**
Gerd Heinz Ruger, Karl-Marx-Stadt;
Wolfgang Kurt Wunsch, Karl-Marx-Stadt,
all of, Germany

[21] Appl. No. **828,439**
[22] Filed **May 22, 1969**
[45] Patented **Sept. 7, 1971**

[73] Assignee **Veb Nahwirkmaschinenbau Malimo Karl-Marx-Stadt**
Karl-Marx-Stadt, Germany

Continuation of application Ser. No. 781,668, Oct. 9, 1968, now abandoned, Continuation of application Ser. No. 534,868, Mar. 16, 1966, now abandoned.

[54] WARP-KNITTING MACHINE

12 Claims, 2 Drawing Figs.

[52] **U.S. Cl.** **66/85**
[51] **Int. Cl.** **D04b 23/06**
[50] **Field of Search** 66/83–87, 190–195; 242/137

[56] **References Cited**

UNITED STATES PATENTS

Re. 25,749	3/1965	Mauersberger	66/84
2,022,448	11/1935	Wirth	66/86
2,429,231	10/1947	Lambach	66/86
2,469,360	5/1949	Amidon	66/86
2,680,959	6/1954	Walford	66/86
2,690,066	9/1954	Schoenster	66/86
2,820,356	1/1958	Meiners et al.	66/86
2,890,579	6/1959	Mauersberger	66/192
2,899,812	8/1959	Attenborough	66/86 X
2,913,888	11/1959	Amidon	66/86
3,099,921	8/1963	Liebrant	66/86
3,166,921	1/1965	Suoboda et al.	66/84
3,253,426	5/1966	Mauersberger	66/84
3,279,221	10/1966	Gliksmann	66/192
3,327,501	6/1967	Bahlo	66/202
3,442,101	5/1969	Ploch et al.	66/194

FOREIGN PATENTS

26,110	10/1963	Germany	66/85
1,207,201	2/1960	France	66/86
1,397,982	3/1965	France	66/86

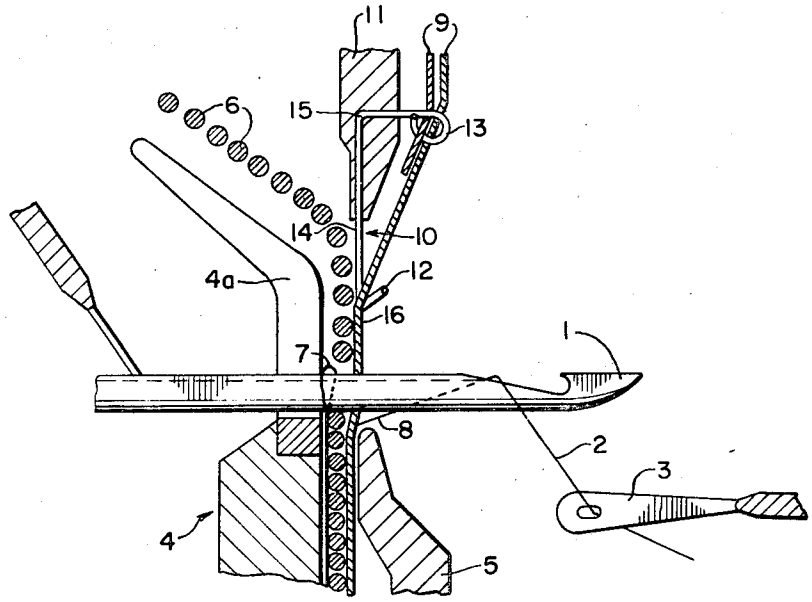
OTHER REFERENCES

K. W. Bahlo, " New Fabric Without Weaving," a paper presented on Sept. 8, 1965, Meeting of the Amer. Ass. for Textile Tech. Inc. in NYC, NY (Pub. in Modern Textiler Magazine, pages 51 to 55

Porcelain Enameled Iron & Glass for Textile Machinery 1911, Catalogue of Mitchell-Bessell Co. Fleming Press, NYC, NY, page 71 (copy in grp. 352)

Primary Examiner—Ronald Feldbaum
Attorney—Nolte and Nolte

ABSTRACT: A warp-knitting machine for furnishing a base material with a knitted fabric on both sides thereof in which the base material is supported at one side thereof, a plurality of needles adapted to penetrate reciprocably between selected threads in the base material, the base material on at least one side thereof is supported by additional threads disposed in close proximity to an upper portion of the base material above the penetration of the needles, the additional threads provide a support for the base material by remaining in close proximity thereto under a predetermined tension.



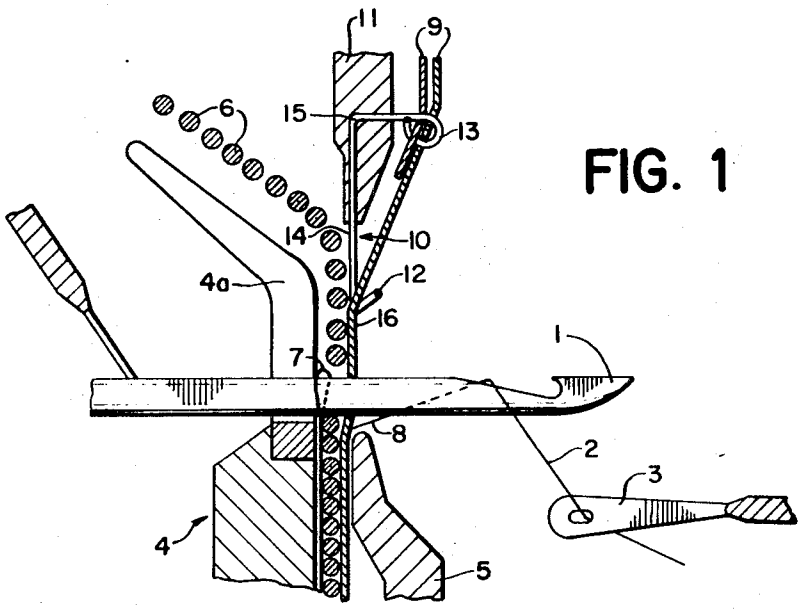
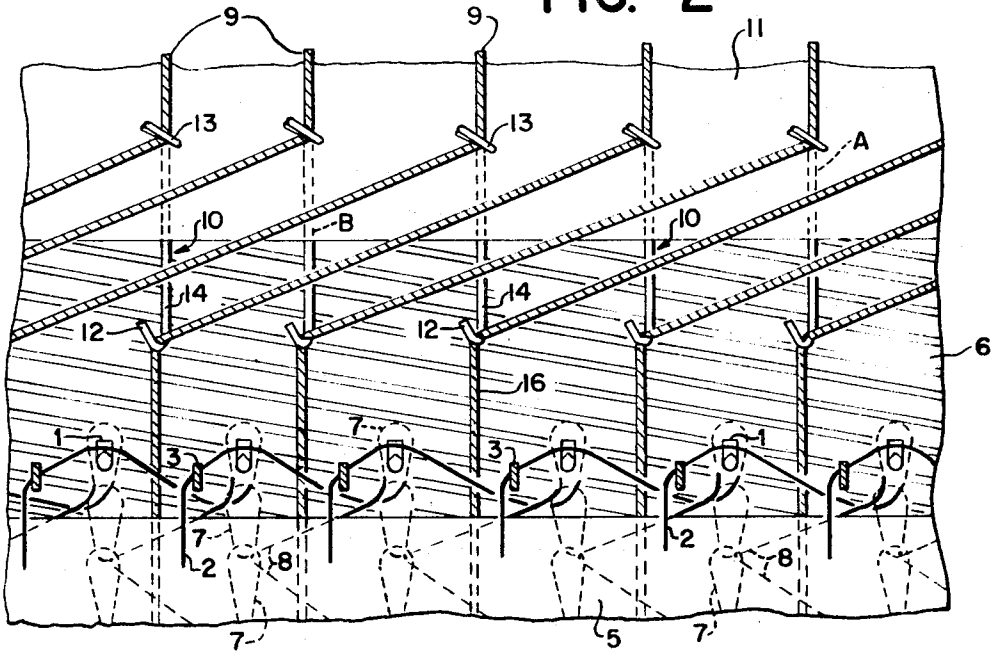


FIG. 1

FIG. 2



INVENTORS
MANFRED E. JASKULSKI,
GERD H. RUGER,
WOLFGANG K. WUNSCH

WARP-KNITTING MACHINE

This application is a continuation of U.S. Pat. application Ser. No. 781,668 filed Oct. 10, 1968 now abandoned, which is a continuation of U.S. Pat. application Ser. No. 534,868 filed Mar. 16, 1966 now abandoned.

This invention relates generally to a warp-knitting machine, and it relates more particularly to a knitting machine for making of a textile material in which a warp knitting encloses a base material and in which loose warp threads are tied to the front of the base material by sinker meshes formed on the warp knitting.

In order to provide a high quality textile material of such complex structure, it is necessary that the base material, which might be of any known type textile, from heavy to very thin or even tricot-type material, should receive adequate support on both of its surfaces when passed through the machine for working additional textile pattern thereto. The need for adequate support is most pronounced in the stitch or mesh-forming location of the machine where a loose warp thread is secured to the base material by a mesh pattern. It is also important that the loose warp threads being secured to the base material be fed to the mesh-forming location at adequate tension and in a manner which permits constant supervision of the mesh-forming location.

In the known warp-knitting and knitting machines, the rear supporting or locking means for the base material consists of an upwardly directed stripping comb, and the front supporting or locking means consists of a downwardly directed needle comb and a supporting bar. The stripping comb extends upwardly above the mesh-forming location, while the needle comb extends below it. The upper edge of the supporting bar is disposed below the mesh-forming location, but above the free ends of the comb needles. Since the supporting bar is disposed in front of the needle comb, the needle comb may engage the supporting bar during the forward movement of the warp needles. The thread guides for the loose warp threads are usually mounted at the bar of the needle comb, and serve the exclusive purpose of guiding the loose warp threads in a spaced manner to the mesh-forming location. The thread row formed by the loose warp threads runs freely and spaced from the front of the base material and is led to the mesh-forming location at an acute angle.

The disadvantage in these machines is that such disposition of the needle comb covers the mesh-forming location and prevents supervision of the mesh forming. This frequently leads to interruptions in the operating process. Also, the loose warp threads easily become entangled in the pointed ends of the needle comb. Another shortcoming of the known machines is that the warp threads which form the warp-knitted fabric, upon completion of a cycle and upon the subsequent retraction of the warp needles will come to rest on the needles of the needle comb. The sinker meshes of the warp-knitted fabric become free from the needle comb only below the mesh-forming location, so that a certain dimensional expansion and looseness of the sinker meshes of the warp-knitted fabric takes place. Therefore, it becomes impossible in known machines to securely tie the loose warp threads onto the front face of the base material.

It is, therefore, an object of the present invention to provide an improved knitting machine which is free from the above-mentioned shortcomings.

It is a further object of the invention to provide a knitting machine in which the needle comb in front of the base material, or any other individual locking means over the front face of the base material above the mesh-forming location, omits everything which would obstruct operation of the machine.

The warp knitting machine, particularly a knitting machine in accordance with the invention, is provided with improved locking or enclosing supporting means for the base material on the reverse side as well as on the front side of the base material.

The knitting machine in accordance with the invention provides also improved guide means for the loose warp threads, such guide means being suitably correlated with the locking-supporting arrangement of the machine to improve support of the base material and of the loose warp threads being worked into the base material.

The invention provides that the loose warp threads which are disposed directly above the mesh-forming location form locking-supporting means for the base material. Thus the need for additional special locking means is avoided in that particular location, namely above the mesh-forming location over the front fact of the base material. To attain this locking effect, the loose warp threads are tensioned and are guided by means of their associated thread guides parallel to the front face of the base material and/or are in close proximity thereto.

By omitting, for instance, the needle comb, not only the warp-knitting machine, particularly the knitting machine is improved, but at the same time the quality of the textile fabric processed thereon is increased in view of the fact that interference of the fiber meshes with mechanical parts, such as a needle comb, is eliminated after their formation.

For a better understanding of the invention, its operating advantages and the specific objects attained by its use, reference should be had to the exemplary accompanying drawings and descriptive matter in which:

FIG. 1 is a fragmentary view of a knitting machine showing the mesh-forming portion thereof partly in section, with the textile material therein, in accordance with the invention; and

FIG. 2 is a front view of the mesh-forming portion shown in FIG. 1.

With reference to FIGS. 1 and 2, the knitting machine is provided with a plurality of reciprocating warp needles 1, which are sliding latch needles in the illustrated embodiment. The drive mechanism performing the reciprocation is not shown, and may be any well known drive mechanism. Needles 1 are fed with warp threads 2 which are guided in feed guides 3 for forming the warp knitted fabric. The knitting machine also comprises an upwardly extending stripping comb generally indicated 4 including associated sinkers 4*a*. In the front of the stripping comb 4 and spaced therefrom is a support bar 5. Sinkers 4*a* of the stripping comb 4 extend upwardly with respect to the stitch-forming portion and the warp needles 1 extend through and beyond the sinkers 4*a* of stripping comb 4. The upper edge of support bar 5 is disposed below the stitch-forming portion. The base material 6 is fed from above through the stitch-forming location, between the stripping comb 4, sinkers 4*a* and support bar 5. The base material 6 may have any shape.

In the particular embodiment shown, base material 6 consists of transverse threads which are connected with each other by the knitted fabric being formed by warp threads 2. Base material 6 may also be of a fibrous fleece, or the like. The warp-knitted fabric which encloses base material 6 is advantageously a tricot material. For making the tricot material, the feed guide 3 feeds alternately warp threads 2 over two adjacent needles 1 which form knitted stitches 7 of the warp-knitted fabric on the rear face of base material 6 and sinker meshes 8 on the front face thereof. Thus base material 6 is disposed between knitted stitches 7 and sinker meshes 8 of the warp-knitted material (FIG. 2). Sinker meshes 8 extend above two adjacent warp loops and serve to tie loose warp threads 9 to the front face of the base material 6. For guiding loose warp threads 9, thread guides 10 are provided and are disposed on a support 11. Support 11 is arranged above the stitch-forming location in front of base material 6. During the rearward movement of needles 1, base material 6 is supported by the stripping comb 4, comprising sinkers 4*a*, while during the forward movement of the needles 1, the base material is supported by the supporting bar 5. In that way the stripping comb 4 and the supporting bar 5 form a locking means for the base material 6.

It is necessary to support the front face of base material 6 also above the mesh-forming location during the forward

movement of needles 1. In accordance with the invention, this is achieved by the thread portions of loose warp threads 9 which are directly disposed above the mesh forming location. Warp threads 9 are tightened and are guided parallel to base material 6 or at least closely adjacent to it by means of the suitably arranged and shaped thread guide 10. The corresponding thread portions may also be guided in close proximity to base material 6 by thread guides 10. Thread guides 10, which are preferably made from wire, are directed downwardly and have formed on the front ends thereof nearest to the needles 1 upwardly directed hooks 12 which extend laterally with respect to the axis of guides 10 (FIG. 2).

The loose warp threads 9 are deflected out of the plane of thread guides 10, as seen in FIG. 2, and are simultaneously tightened by means of the hooks 12, so that they form a front locking means for the base material 6 above the stitch-forming location. Since the loose warp threads 9 are taken off from a decelerated warp-supporting member, they are already tightened to a certain extent, which tightness is further increased by hooks 12 of thread guides 10 wherein the hooks deflect warp threads 9 in the form of a rearwardly extending knee. The tightening of loose warp threads 9 may be improved by simultaneously displacing them obliquely and laterally, as shown in FIG. 2, before they are moved toward the front face of base material 6. For this purpose, thread guides 10 are provide with eyes 13 arranged on the end disposed away from the stitch-forming location. The drawing of loose warp threads 9 is done in the following manner. Each warp thread 9 which is guided to an eye 13 of a certain thread guide 10, is further guided to the stitch-forming location over the hook 12 of another thread guide 10 which another thread guide is spaced by a predetermined number of courses away from the thread guide through the eye 13 of which warp thread 9 enters the stitch-forming location. In the illustrated embodiment, particularly in FIG. 2 thereof, it is seen that such spacing amounts to three courses and the thread guides defining the spacing are identified additionally by A and B. Shafts 14 of thread guides 10 have a fastening portion 15 held in support 11 between hooks 12 and eyes 13 and formed substantially at a right angle.

Usually the thread portions 16 of the loose warp threads 9 which are fed in close proximity to the front face of base material 6 above the stitch-forming location, are sufficient for supportingly enclosing the front face. For this purpose, hooks 12 are advantageously arranged as close as possible to warp needles 1. The mentioned thread portion 16 of loose warp threads 9 are sufficiently tight, particularly if they are guided as shown in FIG. 2, since the two deflections at 12 and 13 in the loose warp threads 9 impart an additional braking effect, consequently, additional tightness, to thread 9. The base material 6 is also supported by shafts 14 of thread guides 10. For this purpose, shafts 14 are arranged in close proximity and substantially parallel to the base material 6 as seen in FIG. 1.

The above description discloses a preferred embodiment of my invention. My invention is by no means to be limited to the embodiments shown and described, but the invention should be defined by the following claims.

What is claimed is:

1. In a warp-knitting machine for manufacturing a textile fabric including a base material, a knitted material covering at least one side of the base material and warp threads attached to the base material by a plurality of stitches disposed on one side of said base material, said machine comprising a stitch-forming zone, knitting needles positioned so that their operating paths reciprocate transversely through the base material in the stitch-forming zone, means for guiding a thread onto each of the needles so that the needles form the threads which the needles carry into stitches as the needles reciprocate in the stitch-forming zone, means for feeding a plurality of warp threads to positions between the base material and the forward extremity of reciprocation of the needles so that the stitches which are formed by the needles attach the warp threads to the base material, support means disposed on the side of the base material opposite the side to which the warp threads are fed in the region where the base material approaches the knitting zone and in the region where the textile fabric leaves the knitting zone and further support means to restrain the base material against the forward movement of the knitting needles, a first of the further support means being disposed at the side of the base material to which the warp threads are fed and in the region where the base material is fed to the knitting zone and a second of the further support means being disposed at the side of the base material to which the warp threads are fed and in the region where said finished textile leaves the knitting zone, the improvement comprising tensioning means for said warp threads, said tensioning means being positioned before the knitting zone and at the side of the base material to which the warp threads are fed to hold the warp threads under tension in abutment with the side of the base material as the base material approaches and passes through the knitting zone, said tensioning means thereby constituting said first further support means and the knitting zone being free of support means on the side of the base material to which the warp threads are fed.

2. A warp-knitting machine according to claim 1, in which said tensioning means comprises a guide for each of the warp threads.

3. A warp-knitting machine according to claim 2, in which each of said warp thread guides comprises an eye portion for receiving one of the warp threads and downstream from the eye portion a hook portion for holding the warp thread in abutment with the side of the base material in a longitudinal orientation parallel to the direction of travel of the base material.

4. A warp-knitting machine according to claim 3, in which the eye portion is spaced further than the hook portion from the base material.

5. A warp-knitting machine according to claim 3, in which the hook portion of each warp thread guide is positioned to receive a warp thread from the eye portion of an adjacent warp thread guide.

6. A warp-knitting machine according to claim 4, in which the hook portion of each warp thread guide is positioned to receive a warp thread from the eye portion of an adjacent warp-thread guide.

7. In a warp-knitting machine comprising at least one knitting needle, means for supporting a base material with a side of the base material facing the needle and transverse to the operating path of the needle, means for feeding a thread to the needle, means for reciprocating the needle so that the needle passes through the base material and thereby knits the thread through the base material with portions of the thread extending to the other side of the base material, and means for guiding at least one warp thread to said other side of the base material in the zone of the knitting so that said warp thread is fastened to said other side by the knitting, the improvement comprising tensioning means for the warp thread, said tensioning means being positioned outside the knitting zone and facing said other side to hold the warp threads under tension in abutment with said other side in the knitting zone thereby to cause said warp threads to restrain the base material against the forward thrust of the needle, the knitting zone being free of means for thus restraining the base material.

8. A warp-knitting machine according to claim 7, in which said tensioning means comprises a guide for the warp thread.

9. A warp-knitting machine according to claim 8, in which said warp thread guide comprises an eye portion for receiving a warp thread and a hook portion for receiving a warp thread from an eye portion and for holding the warp thread in abutment with said other side.

10. A warp-knitting machine according to claim 9, in which the eye portion is spaced further than the hook portion from said other side.

11. A warp-knitting machine according to claim 9, in which the warp thread received by the hook portion of the guide is received from the eye portion of an adjacent like guide.

12. A warp-knitting machine according to claim 10, in which the warp thread received by the hook portion of the guide is received from the eye portion of an adjacent guide.