Dec. 7, 1937. F. G. WEISBECKER 2,101,801

KNITTING MACHINE

Filed Dec. 20, 1935

Fig. I

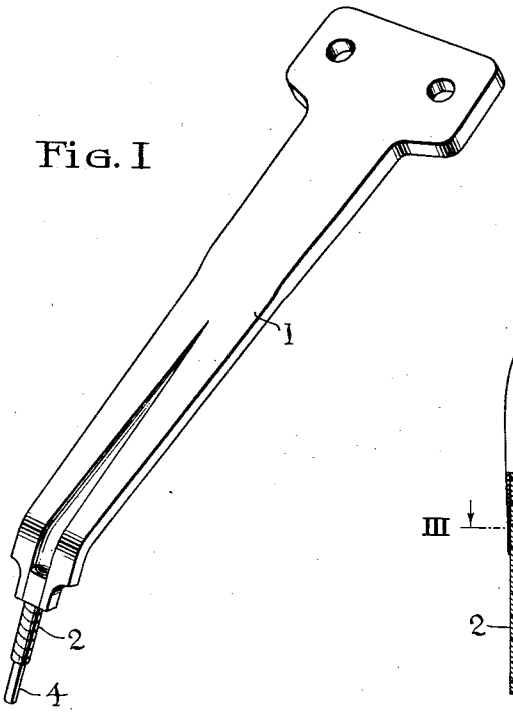


Fig. II

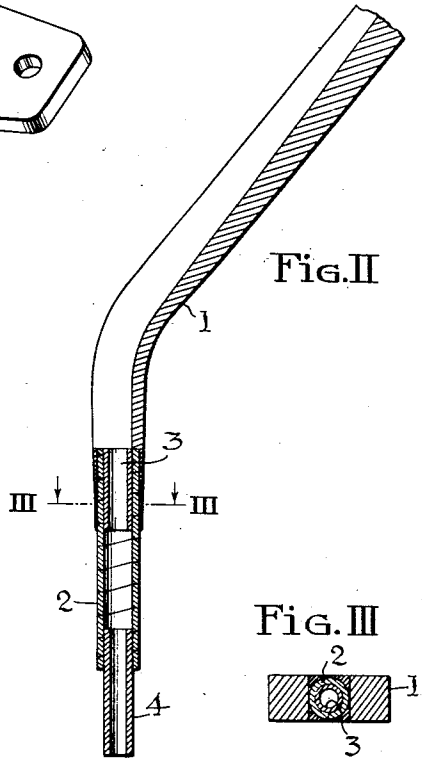


Fig. III

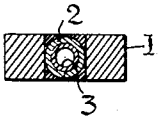


Fig. IV

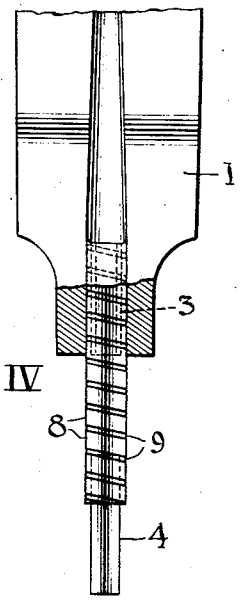
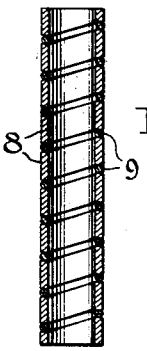


Fig. V



Inventor

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By

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2,101,801

UNITED STATES PATENT OFFICE

2,101,801

KNITTING MACHINE

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Application December 20, 1935, Serial No. 55,473

21 Claims. (Cl. 66—126)

The present invention relates to improvements in knitting machines, and more particularly to yarn carriers for straight knitting machines.

As this invention relates to yarn carriers of the type disclosed in my Patent No. 2,014,341, dated September 10, 1935, that patent may be referred to for a general explanation of the type of yarn carrier and knitting machine with which the present invention is concerned.

Investigation shows that some types of coiled wire provide better flexible yarn guides than others, an example of a flexible yarn guide being member 12 of the above patent. It is found that a yarn guide consisting of a tubular coil formed of wire having a round shape in cross-section is sometimes too flexible or lacking in sufficient rigidity. If the cross-sectional area of the round wire were enlarged to effect an increase in rigidity, the external diameter of the yarn guide would exceed permissible or desirable limits and cause the yarn guides of adjacent yarn carriers to strike each other as they pass in the knitting operation, as, for example, when a plurality of yarn carriers are used alternately, or otherwise, in the well known special knitting operation employed to eliminate shadows and streaks in full-fashioned silk hosiery. The close spacing of the lower or yarn laying ends of the yarn carriers in a conventional straight knitting machine, which spacing limits the permissible thickness of the yarn guides, is clearly illustrated in Figure 2 of the patent (No. 1,606,378) to Noble, dated November 9, 1926. In that figure of Noble's patent, the yarn carriers are shown depending from carrier bars 7.

It is, therefore, an object of this invention to provide a yarn carrier with a yarn guide which is flexible and at the same time has the rigidity suited to the numerous conditions which are encountered in the various conventional knitting operations.

Another object of the invention is the provision of an improved yarn carrier and yarn guide.

A further object is the provision of a flexible yarn guide with a relatively small overall width or external diameter to secure adequate clearance of the yarn guides in passing during the knitting operations.

Further objects of this invention and a more detailed description of same will appear below in the description of the accompanying drawing, in which:

Figure I is a perspective view of a yarn carrier provided with a yarn guide embodying the present invention.

Figure II is an enlarged longitudinal cross-sectional view through the lower end of the yarn carrier shown in Figure I.

Figure III is a transverse cross-sectional view taken on line III—III of Figure II.

Figure IV is a front elevational view of a yarn carrier (parts being broken away for illustration purposes) provided with a modified form of yarn guide.

Figure V is an enlarged detail view in cross-section of the yarn guide shown in Figure IV.

Referring now to the drawing, Figure I shows a complete yarn carrier comprising a supporting arm 1 and yarn guide 2. The supporting arm 1, according to usual practice, is formed of steel or other suitable material to give it the desired rigidity. The yarn guide 2 which embodies the present invention is formed of a helical coil of flat wire or metallic ribbon. The ribbon may be any type of flat wire and preferably is substantially rectangular in cross-section with its width greater than its thickness. In forming this flat wire or metallic ribbon into helical shape, it is so arranged that its width extends longitudinally of the yarn guide as clearly shown in Figure II. The ribbon may be formed of any suitable metal, and it is found that so-called "stainless" steel is particularly suited to the requirements of a yarn guide.

One end of the yarn guide 2 is secured, as, for example, by soldering or welding, within the bifurcated end of the supporting arm 1. To provide this end of the yarn guide 2 with a smooth interior free of solder or the like, which may enter the guide 2 through its walls when the guide is secured to arm 1, it is lined with a tightly fitting small tube 3 of nickel or other suitable material. This tube 3 not only ensures an open, unrestricted passageway for the yarn while being fed in the knitting operation but also facilitates threading of the yarn guide. Tube 3, furthermore, wedges the convolutions of the yarn guide 2 against the sides of the forked end of arm 1 and holds the yarn guide 2 in place in the event the solder or weld fails to serve its purpose. Tube 3 also prevents collapse of the yarn guide 2 during the soldering or welding operation.

If desired, the free end of the yarn guide 2 may be provided with a detachable and replaceable steel tube 4 similar to tube 13 in my patent referred to above.

The yarn guide 2 of Figures I to III is found to possess much more rigidity than a helical coil of round wire having substantially the same internal and external diameters as yarn guide 2.

The use of metallic ribbon also provides the tubular yarn guide with relatively thin walls and a minimum external diameter. By reducing the external diameter of the yarn guide, clearance between yarn guides when passing on the knitting machine is ensured. Consequently there will be less likelihood of the adjacent yarn guides interfering with each other during the knitting operation.

Where it is desired to have a yarn guide more flexible than that shown in Figures I to III, but less flexible than a yarn guide formed of a helical coil of wire round in cross-section, the yarn guide is manufactured in accordance with the modification shown in Figures IV and V. In this case, the yarn guide is formed of two helical coils of wire 8, 9. The helical coil 8 is formed of ribbon similar to the flat wire of the yarn guide 2 in Figures I to III. In the modification of Figures IV and V, however, the convolutions of the ribbon 8 are disposed in spaced-apart relation and are interfitted with the convolutions of helical coil 9. The wire of coil 9 may be of any suitable size in cross-section and is preferably round in cross-section. Coil 9 is also preferably formed of steel, though it may be formed of bronze or other suitable material.

From Figure V, it is clear that the yarn guide comprises two sets of convolutions, one set being formed of round wire and the other of flat wire or ribbon. Figure V also shows the convolutions of flat wire alternating with the convolutions of round wire and the adjacent convolutions having their opposed edges in abutting relation. The contact between the two coils 8 and 9 is in a single line as one coil (9) presents a round abutting surface and the other (8) presents a plane abutting surface substantially normal to the axis of the tubular yarn guide.

By providing the helical coil 9 with an internal diameter smaller than that of the helical coil 8, the frictional resistance offered to the yarn passing through the guide will be substantially reduced, and the round wire will hold the yarn off the corners of the flat wire.

The yarn guide of Figures IV and V may obviously be used without the helical coil 9 of round wire. In this case, the convolutions of the coiled ribbon 8 would be left in spaced relation, such spacing being found to increase the flexibility of a yarn guide formed of flat wire.

Both types of yarn guides shown in the drawing secure important advantages, and the type shown in Figures IV and V is found to be generally preferable to that illustrated in Figures I to III.

One of the advantages incident to the use of the present yarn guides is the improved selvage of the knitted fabric. These yarn guides, while capable of yielding under abnormal conditions, have sufficient rigidity to provide a controlled, regular and even selvage always necessary for perfect knitting.

With regard to the yarn guide of Figures IV and V, it is found that this type of guide has a relatively long life as compared with other flexible guides, and is less likely to fracture.

Other advantages and modes of practicing this invention will readily occur to one skilled in the art.

I claim:

1. For use in a yarn carrier of straight knitting machines, a spring cooperating with said carrier and forming a yielding means for laying the yarn of said carrier along the sinkers and needles of the knitting machine, said spring comprising a metallic ribbon having its width greater than its thickness, said ribbon being in the form of a helical coil with its width extending longitudinally of the spring.

2. For use in a yarn carrier of straight knitting machines, a spring cooperating with said carrier and forming a yielding means for laying the yarn of said carrier along the sinkers and needles of the knitting machine, said spring comprising a metallic ribbon having its width greater than its thickness, said ribbon being in the form of a helical coil with its convolutions spaced apart and with its width extending longitudinally of the spring.

3. For use in a yarn carrier of straight knitting machines, a spring cooperating with said carrier and forming a yielding means for laying the yarn of said carrier along the sinkers and needles of the knitting machine, said spring comprising wire in the form of a helical coil having successive convolutions of a substantial part thereof disposed in spaced relation, the cross-sectional shape of said wire being non-circular.

4. For use in a yarn carrier of straight knitting machines, a spring cooperating with said carrier and forming a yielding means for laying the yarn of said carrier along the sinkers and needles of the knitting machine, said spring comprising a metallic ribbon in the form of a helical coil having successive convolutions of a substantial part thereof disposed in spaced relation.

5. For use in a yarn carrier of straight knitting machines, a spring cooperating with said carrier and forming a yielding means for laying the yarn of said carrier along the sinkers and needles of the knitting machine, said spring comprising wire in the form of a cylindrical coil having two sets of convolutions, one set of said convolutions being formed of wire substantially round in cross-section, and the other set of convolutions being formed of wire substantially noncircular in cross-section.

6. For use in a yarn carrier of straight knitting machines, a spring cooperating with said carrier and forming a yielding means for laying the yarn of said carrier along the sinkers and needles of the knitting machine, said spring comprising wire in the form of a cylindrical coil having two sets of convolutions, one set of said convolutions being formed of wire substantially round in cross-section, and the other set of convolutions being formed of wire substantially rectangular in cross-section, said convolutions throughout a substantial part of the spring having such relative positioning that no two adjacent convolutions are of the same cross-section.

7. For use in a yarn carrier of straight knitting machines, a spring cooperating with said carrier and forming a yielding means for laying the yarn of said carrier along the sinkers and needles of the knitting machine, said spring comprising a metallic ribbon in the form of a helical coil having successive convolutions of a substantial part thereof in spaced relation, and a helically coiled wire substantially round in cross-section and positioned between the spaced convolutions of said ribbon to provide a tubular spring with convolutions of round wire alternating with convolutions of metallic ribbon.

8. For use in a yarn carrier of straight knitting machines, a spring cooperating with said carrier and forming a yielding means for laying the yarn of said carrier along the sinkers and needles of the knitting machine, said spring comprising a

metallic ribbon in the form of a helical coil having successive convolutions of a substantial part thereof in spaced relation, and a helically coiled wire substantially round in cross-section and positioned between the spaced convolutions of said ribbon to provide a tubular spring with convolutions of round wire alternating with convolutions of ribbon, the adjacent convolutions in the part of the spring formed of both round wire and ribbon having their edges abutting each other.

9. For use in a yarn carrier of straight knitting machines, a spring cooperating with said carrier and forming a yielding means for laying the yarn of said carrier along the sinkers and needles of the knitting machine, said spring comprising coiled wire having a plurality of convolutions forming a tube in which alternate convolutions have a given cross-sectional shape characteristic and the intermediate convolutions have a different cross-sectional shape characteristic.

10. For use in a yarn carrier of straight knitting machines, a spring cooperating with said carrier and forming a yielding means for laying the yarn of said carrier along the sinkers and needles of the knitting machine, said spring comprising coiled wire in the form of a tube with adjacent convolutions having their opposed edges such that they abut and provide line contact therebetween, one of said edges being a plane surface substantially normal to the axis of the tube.

11. In combination with a straight knitting machine having sinkers and needles, a yarn carrier for laying yarn along said sinkers and needles, said carrier including a yarn guide carrying portion and a yielding yarn laying guide carried thereby, said guide comprising two separate interfitted helical coils with the convolutions of one coil alternating with the convolutions of the other coil, said coils being formed of wire of different cross-sectional shape.

12. In combination with a straight knitting machine having sinkers and needles, a yarn carrier for laying yarn along said sinkers and needles, said carrier including a yarn guide carrying portion and a yielding yarn laying guide carried thereby, said guide comprising two separate interfitted helical coils with the convolutions of one coil alternating with the convolutions of the other coil, one of said coils being formed of metallic ribbon and the other of said coils being formed of round wire.

13. A yarn carrier for straight knitting machines comprising a supporting arm having a cut-out portion to receive a yarn guide, a tubular yarn guide formed of coiled wire, said guide having one end secured within said cut-out portion and its other end free to lay yarn and to be deflected under abnormal operating conditions, and a lining tube within and extending along that end of said yarn guide secured within said cut-out portion but not along the guide part provided for said deflection.

14. For use in a yarn carrier of straight knitting machines, a guide cooperating with said carrier and forming a yielding means for laying the yarn of said carrier along the sinkers and needles of the knitting machine, said guide at least in part comprising a helical coil of resilient material having a non-circular cross-sectional shape.

15. A yarn carrier for straight knitting machines comprising a supporting arm, a flexible tubular yarn guide having a part of the length thereof externally supported by said arm and another part of its length free to lay yarn and to be deflected under abnormal operating conditions, and a lining tube extending along the interior of said supported part of the guide but not along the guide part provided for said deflection.

16. A yarn carrier for straight knitting machines comprising a supporting arm, a flexible tubular yarn guide having a part of the length thereof supported by said arm and another part of its length free to lay yarn and to be deflected under abnormal operating conditions, and a lining tube extending along the interior of said supported guide part but not along the guide part provided for said deflection.

17. A yarn carrier for straight knitting machines comprising a supporting arm, a flexible tubular yarn guide having a part of the length thereof supported by said arm and another part of its length free to lay yarn and to be deflected under abnormal operating conditions, and two lining tubes, one of said lining tubes extending along the interior of said supported guide part and the other of said lining tubes being positioned within the yarn laying part of said yarn guide.

18. In a yarn carrier for straight knitting machines, a guide forming a yielding means for laying the yarn of said carrier along the sinkers and needles of the knitting machine, said guide comprising at least one helical coil, said coil being formed of flat wire.

19. In a yarn carrier for straight knitting machines, a guide forming a yielding means for laying the yarn of said carrier along the sinkers and needles of the knitting machine, said guide comprising at least two coils having different resilient characteristics.

20. In a yarn carrier for straight knitting machines, a guide forming a yielding means for laying the yarn of said carrier along the sinkers and needles of the knitting machine, said guide comprising at least one helical coil, the cross section of the coil convolutions being polygonal.

21. For use in a yarn carrier of straight knitting machines, a tube to cooperate with said carrier and form a yielding means for laying the yarn of said carrier along the sinkers and needles of said knitting machine, said tube in at least a portion intermediate its ends comprising flexible convolutions having a non-circular cross-sectional shape.

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