

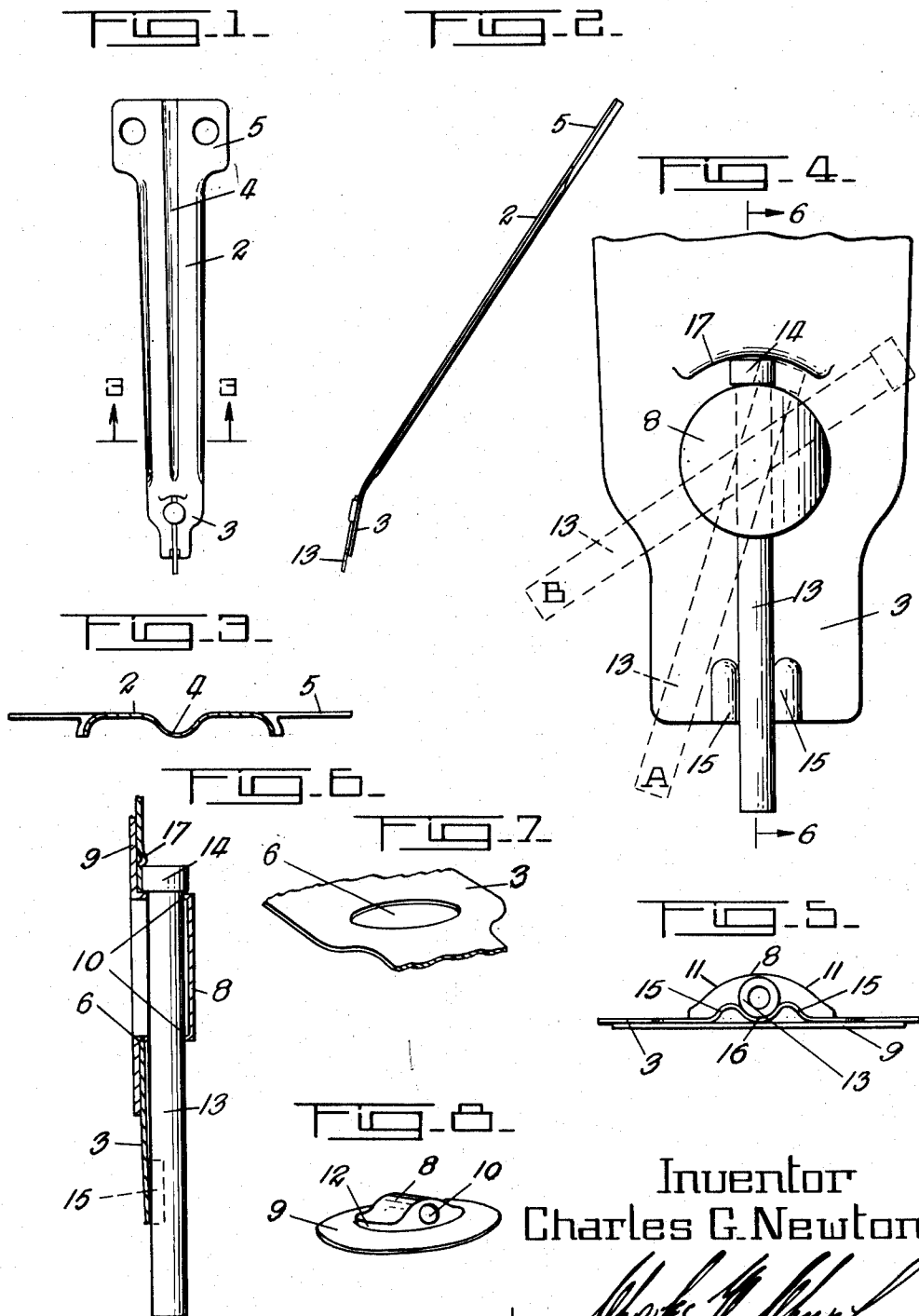
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YARN CARRIER OF KNITTING MACHINES

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Att.

## UNITED STATES PATENT OFFICE

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## YARN CARRIER OF KNITTING MACHINES

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This invention relates to improvements in yarn carriers of knitting machines and particularly those used in machines of the traversing yarn feed type which are used for the production of flat fashioned hosiery blanks and in which the yarn carriers are formed with yarn guide tubes at their lower ends to lay the yarns across the nibs of the sinkers in feeding the yarns to the needles of the machines.

As there is always the possibility of a sinker or several sinkers being accidentally displaced outwardly into the path of travel of the yarn carrier tubes, a number of yarn carriers have been invented wherein the yarn carrier tubes are either resilient or capable of being swung upon striking an obstruction such as a displaced sinker with the object of avoiding damage to the sinkers or other machine parts.

The main object of this invention is to provide a yarn carrier of the swingable tube type wherein the tube is carried within a mounting pivoted upon the face of the tip portion of the yarn carrier finger whereby the tube is capable of being swung aside should it contact an obstruction such as a displaced sinker, the tube mounting being so arranged that the tube may be readily removed and replaced by the operator without the use of any tools.

A further and important object of my invention is to form the carrier finger of very thin sheet steel and to mount the yarn tube upon the face of the finger tip which is an integral part of the finger, the tip resiliently bearing against the tube to retain it in its normal operating position.

A still further object of the invention is the provision of a pair of protuberances upon the face of the outer end portion of the finger tip and between the sides of which the tube is normally positioned, the resiliency of the tip and the height of the protuberances being so arranged that the tube will swing over one of the protuberances against the resiliency of the tip should the tube strike an obstruction such as a displaced sinker.

Another object of the invention is the provision of a tube with a collar at its upper end which is positioned to bear against the tube mounting to prevent the tube from sliding downwardly or forwardly along the finger tip. A further object is the provision of a second protuberance upon the face of the inner portion of the finger tip at a point adjacent to the inner end face of the tube for limiting the movement of the tube in an inward or upward direction on the finger tip; the second protuberance being so proportioned that it retains the tube against inward or upward

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movement should the tube be swung upon striking an obstruction but permits the tube to be slid upwardly after it is manually swung a further degree in order to effect removal of the tube from the carrier.

With the foregoing and other objects in view as shall appear, my invention consists of a yarn carrier constructed and arranged all as herein-after more particularly described and illustrated in the accompanying drawing in which:

Fig. 1 is a front elevational view of the yarn carrier finger.

Fig. 2 is a side elevational view thereof.

Fig. 3 is an enlarged transverse cross sectional view taken through the line 3—3 Fig. 1.

Fig. 4 is a greatly enlarged front elevational view of the tube carrying tip portion of the carrier finger.

Fig. 5 is an end elevational view of the carrier finger tip as shown in Fig. 4.

Fig. 6 is a longitudinal cross sectional view through the carrier finger tip, being taken through the line 6—6 Fig. 4.

Fig. 7 is a perspective view of a fragmentary portion of the finger tip and showing the orifice therein within which the tube mounting is pivotally contained, and

Fig. 8 is a perspective view of the tube mounting or turret which is contained within the orifice in the tip as illustrated in Fig. 7.

Like characters of reference indicate corresponding parts in the different views of the drawing.

As will be understood by those skilled in the art, the yarn tubes and mountings therefor upon the carrier fingers are necessarily of comparatively small construction. For example, a standard tube is not very much more than one half an inch long with an outside diameter varying from .035 inch to .040 inch, and as the finger tips in passing one another during the knitting operation have only a clearance of several one thousandths of an inch, such requirements demand a very small tube mounting and carrier finger which is both rigid and light and yet capable of slight bending by the operator to obtain the desired adjustment when setting up the machine.

While most carriers are so designed that the tube is contained within the thickness of the finger tip, I depart from this standard arrangement by forming my carrier finger and tip of very thin spring sheet steel and pivotally mounting my tube upon the face of the tip; the finger or body portion of the carrier being formed with longitudinal corrugations whereby the desired rigidity

of the finger or body portion of the carrier is obtained. By this construction I provide a strong rigid carrier of very light weight and wherein the tip portion is resiliently set at an inclination to the face of the body portion to resiliently bear against the side of the tube carried thereon.

Figs. 1 and 2 illustrate the complete carrier which consists of a finger 2 and an integral tip 3, set at an inclination to the finger. As the carrier is made of thin sheet steel, the finger 2 is longitudinally corrugated to provide the necessary rigidity, a central corrugation 4, as illustrated in Figs. 1 and 3, extending from the upper end of the finger to the inclination of the tip at the lower end of the finger and constituting a groove along which the yarn passes to the tube. The finger is formed with a conventionally shaped head 5 by which it is secured to the knitting machine.

An orifice 6, Fig. 7, is formed centrally of the upper portion of the tip 3, the orifice containing a mounting or turret within which the yarn tube is carried. The turret comprises a circular hollow dome 8 which makes a snug rotatable fit within the orifice 6 and is formed with a circular flange 9 which rests against the under face of the tip 3, as illustrated in Fig. 6. The dome 8 has a pair of diametrically opposed orifices 10 for the reception of the tube.

As will be seen upon reference to Figs. 5 and 8, the dome 8 is formed with a curved top wherein the sides 11 of such top are substantially parallel to the axis of the orifices 10. The purpose of this dome formation is to furnish a relatively smooth upper turret surface wherein the sides 11 of the dome may be said to merge into the face of the tip 3 for the purpose of obviating the possibility of the carrier tip assemblies fouling one another should the clearance between passing tips be set too small.

The turret dome is furthermore so proportioned that the lower edges of the orifices 10 are spaced away from the adjacent face of the flange 9 a distance which is only slightly greater than the thickness of the finger tip whereby the insertion of the tube through the orifices 10 in the dome draws the face of the dome flange 9 into close contact with the bottom face of the tip 3.

The skirt 12 of the dome 8 is preferably of imperceptible inverse frusto conical form, its upper major diameter being minutely fractionally larger than the orifice 6 in the carrier tip whereby the dome of the turret is snapped into place in its receiving orifice 6, and will not fall out of the orifice when its tube is removed.

The orifices 10 within the turret dome are so dimensioned that the tube 13 extending there-through is a relatively close fit, and in order to prevent the tube from sliding downwardly or outwardly along the tip after it is set in position, the tube is formed with a collar 14 upon its upper end and which bears against the outside face of the turret dome, as will be seen upon reference to Figs. 4 and 6.

For retaining the tube in its centrally arranged normal knitting position, as shown in full lines in Fig. 4, the outer end portion of the tip 3 is formed with a pair of protuberances 15, and between the sides of which the tube normally rests, as illustrated in Fig. 5.

The tip 3 is resiliently set so that its protuberance containing outer end portion bears towards and exerts pressure against the side of the tube so that the tube is normally firmly seat-

ed within the valley 16 formed by the sides of the protuberances 15, but is capable of being swung aside against the resilience of the tip under impact.

To retain the tube against upward or inward movement when in the normal operating position, a curved protuberance 17 is formed upon the face of the tip 3 concentric with the turret dome 8 and adjacent to the inner end of the tube 13. The collar 14 upon the tube bears against the curved protuberance 17 to restrain the tube against upward movement.

In practice I form the finger and tip of the carrier from sheet steel of approximately .015 inch or less in thickness, and as standard tubes generally have an outside diameter of .035 inch or more, it will be seen that the thickness of my carrier and tip is less than the diameter of the supported tube.

From the foregoing description it will be apparent that should a normally protruding carrier tube meet with an obstruction, such as a displaced sinker, in the carrier's travel, the tube will readily swing aside under the impact into an obstruction clearing position substantially as shown in dotted lines in position A in Fig. 4, thus obviating any damage to either the obstructing sinker or the tube.

When it is desired to replace the tube it is only necessary to swing the tube into the position B shown in dotted lines in Fig. 4, wherein the inner collar carrying end of the tube is clear of the protuberance 17 whereby the tube can be pushed upwardly out of its turret.

It will be appreciated that the operator can remove and replace a tube solely by the use of the fingers, the first step being to push the protruding end of the tube to one side across a protuberance 15 against the resiliency of the tip and to then swing the tube to the removal position. The replacement tube can be readily threaded through the orifices 10 within the turret cap 8, and when the collar 14 rests against the turret, the tube and turret may then be swung into the operating position as shown in full lines in Fig. 4.

What I claim as my invention is:

1. A yarn carrier for straight knitting machines comprising a finger having a tip resiliently set at an inclination to the face of the body of the finger, a rigid guide tube for the yarn which is to be fed to the needles of the knitting machine and pivotally mounted upon one face of the resilient tip intermediately of the length of the tube and projecting from the end of the tip, and the outer end portion of the tip exerting a resilient pressure against the side of the tube.

2. A yarn carrier as claimed in claim 1, wherein the portion of the resilient tip normally underlying the tube is of less thickness than the outside diameter of the tube.

3. A yarn carrier as claimed in claim 1 wherein a pair of protuberances are formed upon the face of the resilient tip and between the sides of which the tube is normally positioned.

4. A yarn carrier as claimed in claim 1 wherein the guide tube extends through a mounting pivoted upon the face of the tip, the portion of the tip normally underlying the tube being of less thickness than the outside diameter of the tube, and a pair of protuberances formed upon the face of the outer end portion of the tip and between the sides of which the tube is normally positioned.

5. A yarn carrier as claimed in claim 1, wherein the guide tube extends through an orifice in

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a mounting pivoted upon the face of the tip, the portion of the tube remote from the end of the tip being formed with an enlargement of greater size than the size of the orifice in the tube mounting to constitute a stop for limiting the movement of the tube in one direction in the mounting, and a pair of protuberances formed upon the face of the outer end portion of the tip and between the sides of which the tube is normally positioned.

6. A yarn carrier as claimed in claim 1, wherein the tube mounting contains an orifice through which the tube extends, an enlargement of greater size than the orifice in the mounting and formed upon the end of the tube remote from the outer end of the finger tip to constitute a stop for limiting the movement of the tube in an outward direction in the mounting, a protuberance formed upon the face of the inner portion of the finger tip at a point adjacent to the transverse surface at the inner end of the tube for limiting the movement of the tube in an inward direction in the mounting, and a pair of protuberances formed upon the face of the outer portion of the tip and between the sides of which the tube is normally positioned.

7. A yarn carrier for straight knitting machines and comprising a finger having a tip portion set at an inclination to the body of the finger, a rigid guide tube for the yarn which is to be fed to the needles of the knitting machine and located to lie along one face of the tip portion of the finger and to project from the end of the tip, a pivotal member mounted upon the tip portion of the finger and within which the tube is carried and pivoted about a point immediately of the length of the tube with the capacity to swing across the face of the tip portion of the finger from a normal central position on said tip portion in the event that the tube meets with an obstruction incident to the traverse of said finger in either direction.

8. As a new article of manufacture, a yarn tube carrier finger for flat knitting machines and having an integral tip portion resiliently set at an inclination to the face of the body of the finger, a yarn tube mounting pivotally carried upon one face of the tip portion and containing a tube receiving bore having its longitudinal axis extending substantially parallel to the face of the tip, and a tube engaging upturned portion formed upon the outer end of the tip.

9. As a new article of manufacture, a yarn tube carrier finger for flat knitting machines and formed of sheet metal of less thickness than the outside diameter of the tube it is adapted to carry, and having a body portion bent to resist normal longitudinal and transverse bending strains, an integral finger tip portion resiliently set at an inclination to the face of the body portion, a yarn tube mounting pivotally carried upon one face of the tip portion and containing a tube receiving bore having its longitudinal axis extending substantially parallel to the face of the tip, and a pair of tube seating protuberances formed upon the tip portion.

10. A yarn carrier for knitting machines, said yarn carrier comprising a finger having a tip portion, a member rotatably carried by said tip portion, and a yarn guide tube mounted on said member and projecting from said member to overlie said tip portion.

11. A yarn carrier for knitting machines, said yarn carrier comprising a finger having a tip portion, a member rotatably carried by said tip

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portion, and a yarn guide tube mounted on said member and projecting from opposite sides of said member to overlie said tip portion.

12. A yarn carrier for knitting machines, said yarn carrier comprising a finger having a tip portion, a member rotatably carried by said tip portion and means in said member located above the plane of said tip portion for mounting a yarn guide tube therein.

13. A yarn carrier for knitting machines, said yarn carrier comprising a finger having a tip portion, a member rotatably carried by said tip portion and having means for supporting a yarn guide tube, and a yarn guide tube supported by said means and projecting from opposite sides of said member to overlie said tip portion.

14. A yarn carrier for knitting machines, said yarn carrier comprising a finger having a tip portion, a member rotatably carried by said tip portion and having means for supporting a yarn guide tube, a yarn guide tube supported by said supporting means and projecting from said member to overlie said tip portion, and means for yieldingly retaining said tube in an operative position in substantial alignment with said finger.

15. A yarn carrier for knitting machines, said yarn carrier comprising a finger having a tip portion, a member rotatably carried by said tip portion and having means for supporting a yarn guide tube, a yarn guide tube supported by said supporting means and projecting therefrom to overlie said tip portion, means projecting from the plane of said tip portion for yieldingly retaining said tube in an operative position in substantial alignment with said finger, and means for preventing relative longitudinal movement of said member and tube when said tube is in its operative position.

16. A yarn carrier for knitting machines, said yarn carrier comprising a finger having a tip portion, a turret rotatably carried in said tip portion and projecting above an upper face thereof, and means in said projecting portion of said turret for releasably mounting a yarn guide tube therein.

17. A yarn carrier for knitting machines, said yarn carrier comprising a finger having a tip portion, a turret rotatably carried in said tip portion and projecting above an upper face thereof, means in said projecting portion of said turret for releasably mounting a yarn guide tube therein, and a yarn guide tube releasably mounted in said mounting means and overlying said tip portion.

18. A yarn carrier for knitting machines, said yarn carrier comprising a finger having a tip portion, a turret rotatably carried in said tip portion and projecting above an upper face thereof, a tube receiving passageway in said projecting portion, and a yarn guide tube releasably mounted in said passageway and extending from said turret to overlie said tip portion.

19. A yarn carrier for knitting machines, said yarn carrier comprising a finger having a tip portion, a turret rotatably carried in said tip portion and projecting above an upper face thereof, a tube receiving passageway in said turret and a yarn guide tube extending through said passageway to overlie said tip portion on opposite sides of said turret, the end of the tube remote from the end of the tip portion having an enlargement of greater size than that of the passageway to constitute a stop for limiting the movement of the tube in one direction.

20. A yarn carrier for knitting machines, said

yarn carrier comprising a finger having a tip portion, a turret rotatably carried in said tip portion and projecting above an upper face thereof, a tube receiving passageway in said turret and a yarn guide tube extending through said passageway to overlie said tip portion on opposite sides of said turret, the end of the tube remote from the end of the tip portion having an enlargement of greater size than that of the passageway to constitute a stop for limiting the movement of the tube in one direction, and a pro-

tuberance projecting from the tip portion adjacent said end of the tube for limiting the movement of the tube in the other direction.

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