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2,430,695

KNITTING MACHINE

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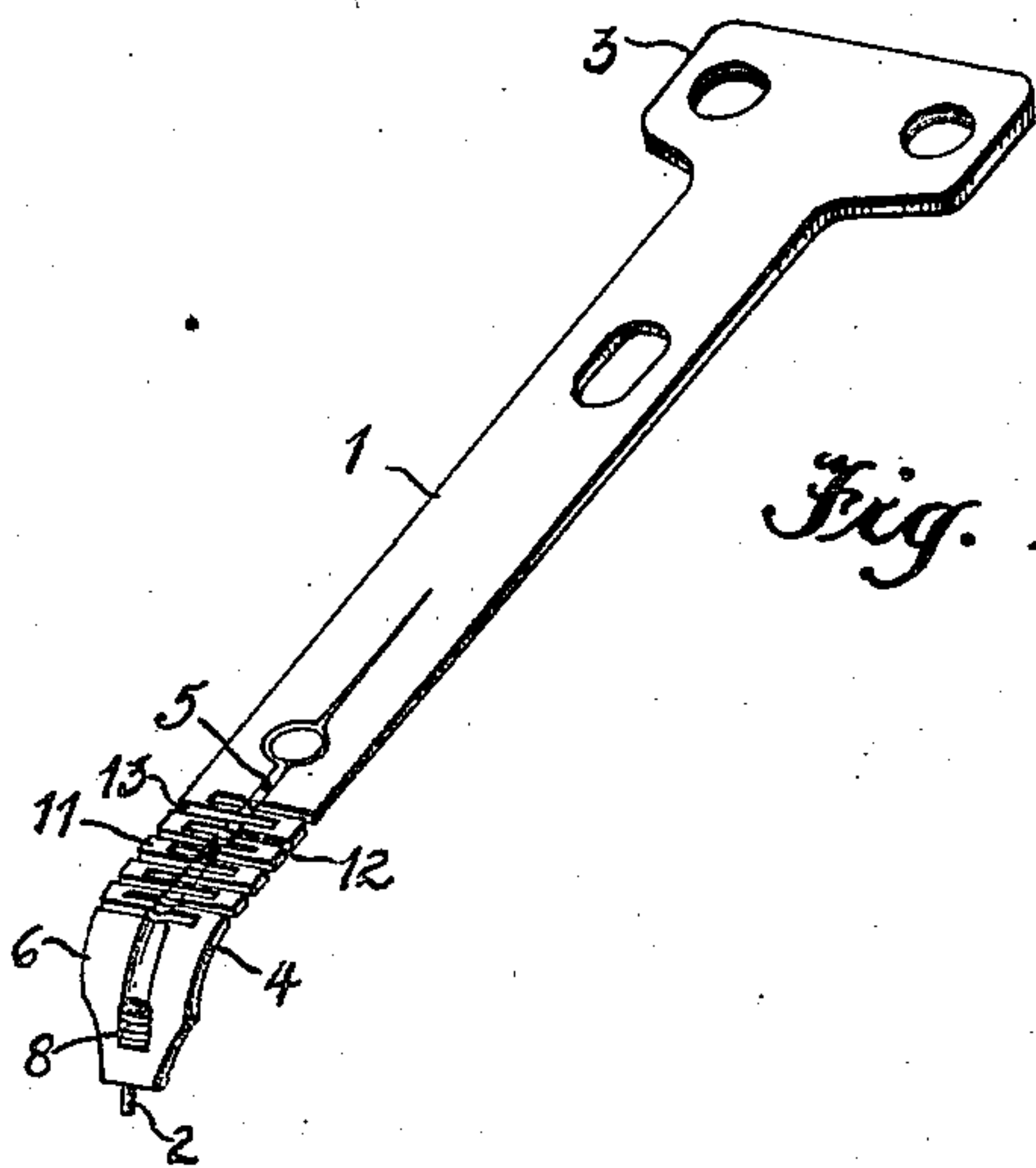


Fig. 1.

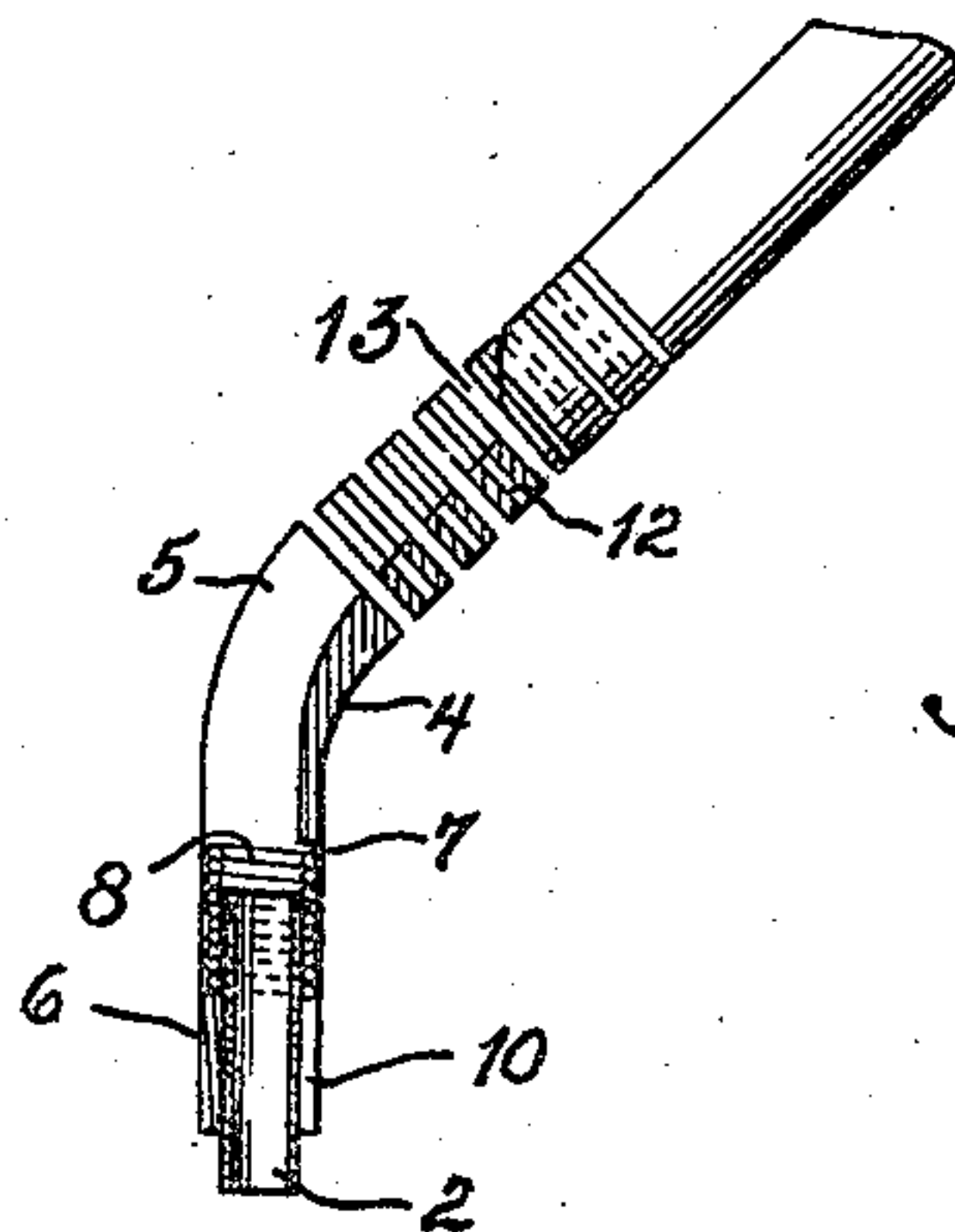


Fig. 2.

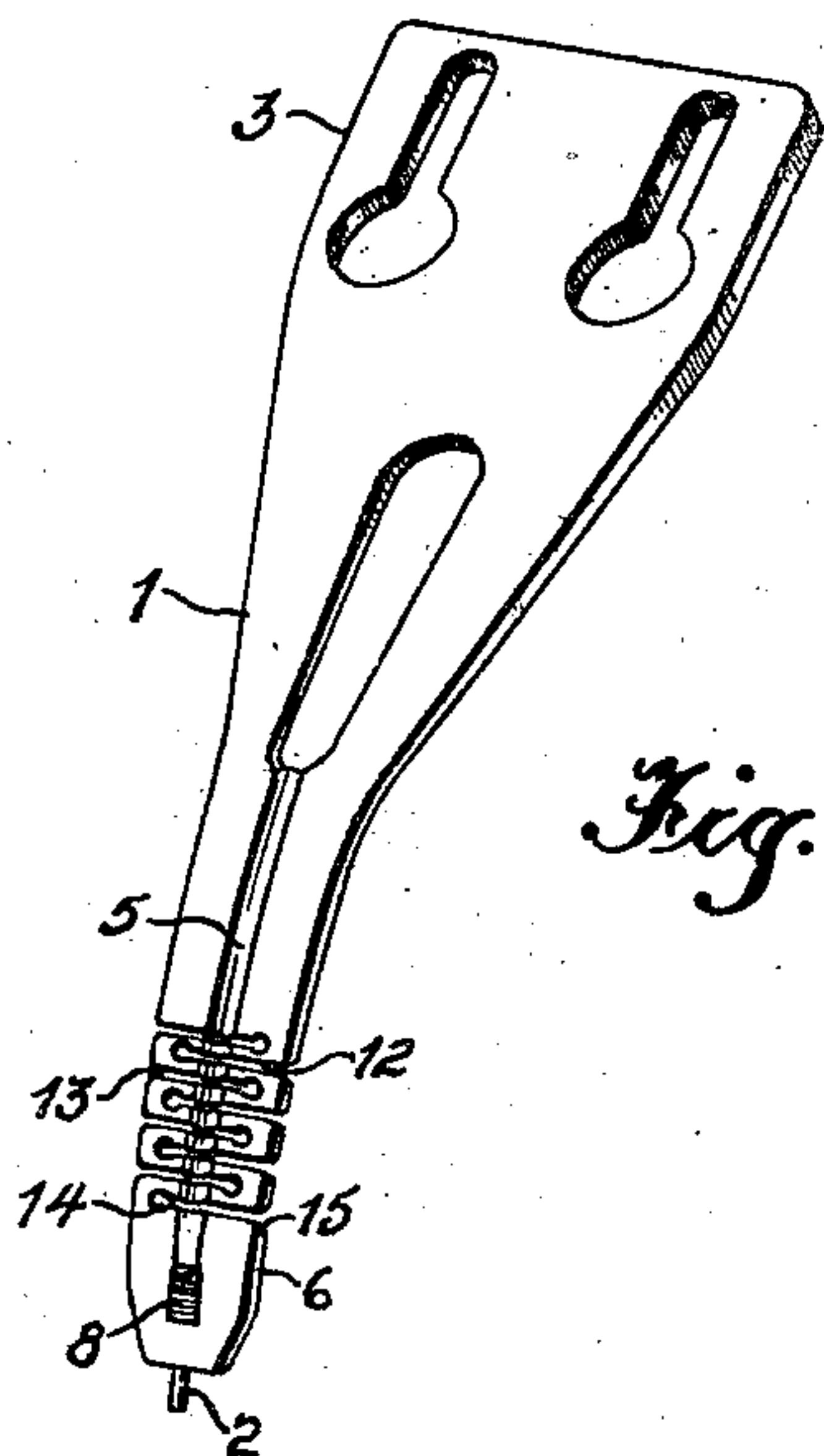


Fig. 3.

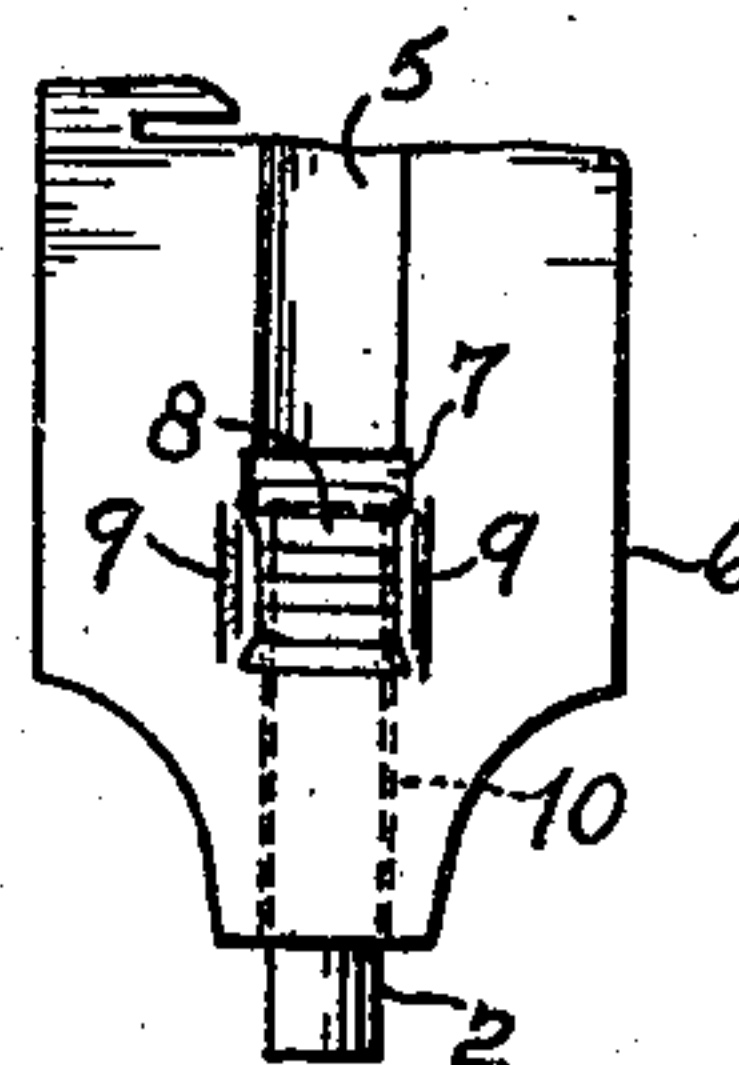


Fig. 4.

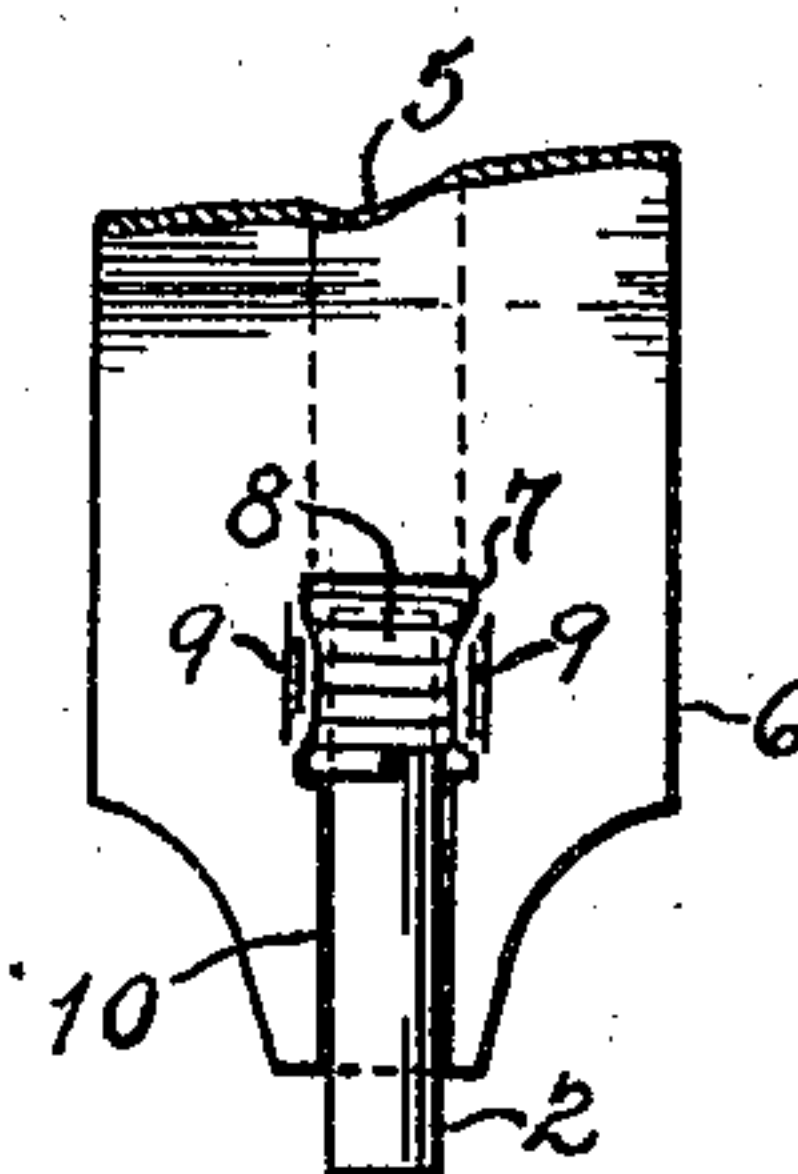


Fig. 5.

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UNITED STATES PATENT OFFICE

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KNITTING MACHINE

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12 Claims. (Cl. 66—126)

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This invention relates to improvements in knitting machines and more particularly to improvements in a yarn carrier for use in straight knitting machines such as those which produce full fashioned hosiery blanks.

For a showing of the general type of yarn carrier with which this invention is concerned and its use on a straight full-fashioned hosiery knitting machine, reference may be made to U. S. Patent No. 2,014,341, to Frank G. Weisbecker on September 10, 1935. Other modified forms of yarn carriers are disclosed in the U. S. patents to Frank G. Weisbecker, No. 2,026,514, dated December 31, 1935; No. 2,093,789, dated September 21, 1937; No. 2,214,712, dated September 10, 1940; No. 2,218,978, dated October 22, 1940; and No. 2,317,318, dated April 20, 1943. These patents may be referred to for an explanation of some of the advantages of flexible yarn carrier constructions and readily replaceable yarn guide tubes.

It is an object of this invention to provide an improved form of flexible yarn carrier which is relatively simple and inexpensive to manufacture, and which is both durable and efficient in use on a knitting machine.

A further object of this invention is to provide a yarn carrier having an improved guide tube support which permits yarn guide tubes to be readily replaced.

Other objects and advantages of this invention will be apparent from the following description, the appended claims, and the accompanying drawing, in which:

Figure 1 is a perspective view of a yarn carrier embodying this invention and ready for use on a straight, full-fashioned hosiery knitting machine such as shown in Figure 1 of my Patent No. 2,014,341, dated September 10, 1935.

Figure 2 is a cross-sectional view of the lower end of the yarn carrier shown in Figure 1 taken on the center line thereof.

Figure 3 is a perspective view of another type of yarn carrier embodying a modification of this invention.

Figure 4 is a front elevation of the lower end of the yarn carrier shown in Figure 1 and illustrating a preferred form of the improved yarn guide tube support.

Figure 5 is a rear elevation of the construction shown in Figure 4.

The yarn carrier of Figure 1 comprises a carrier arm 1 and a removable yarn guide tube 2. The carrier arm may be formed from a flat strip of relatively thin metal, with an upper end

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portion 3 conventionally shaped to be attached to a carrier bar (not shown) of a conventional knitting machine. The carrier arm 1 is bent at an angle at its lower end as shown at 4 and includes a gradually deepened yarn guide groove 5 leading into a tip portion or section 6. The lower end of groove 5 terminates in the substantially rectangular recess or opening 7 best shown in Figure 4. A coiled member or spring 8 is mounted in opening 7 by crimping or swaging the metal of the tip portion 6 over the spring on both sides of the opening 7, and preferably on both the front and rear faces of the carrier arm. This crimping is illustrated in Figures 4 and 5 as indicated by the numeral 9. The member or spring 8 may be secured in place in the opening 7 by soldering or other cementing means rather than crimping. On the rear or under surface of the tip section 6 of the carrier arm, there is a channel or groove 10 in a line with the yarn guide groove 5 and extending from the opening 7 to the end of the carrier arm. The yarn guide tube 2 lies in channel 10 and is frictionally engaged at its upper end in the coils of spring 8. This construction provides adequate support for a replaceable yarn guide tube, which tube may readily be removed by pulling it downward out of frictional engagement with the spring 8. A new tube may then be inserted in the spring by pushing the end of the tube into the spring. The channel 10 serves as a guide for the tube 2 and restricts the latter to very limited transverse movement with respect to the carrier arm.

A flexible resilient portion or section, indicated generally by 11, of the carrier arm 1 is located immediately above the bend 4 in the lower end thereof. The resilient portion 11 connects the yarn guiding portion or tip 6 to the main portion of the arm. Extending from one edge of the carrier arm to within close proximity of the other edge is a series of equally spaced parallel slots 12 preferably at right angles to the center line of the carrier arm and perpendicular to the surface thereof. A similar series of slots 13 extends from the other edge of the carrier arm in between the slots 12. This construction leaves a relatively small cross-sectional area of the arm material between adjacent overlapping slots 12 and 13 and also at the end of each slot. The plurality of small cross-sections of the material provide flexibility and resiliency to the carrier arm. When the tip section 6 of the carrier arm is deflected transversely of the main portion of the arm by reason of the yarn guide tube 2 hitting an obstruction in its path during the knitting opera-

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tion, the slots extending from that side of the carrier arm next to the obstruction are slightly opened while those on the opposite side are slightly closed, thus allowing limited movement of the tip section 6 with respect to the rigid main portion of the carrier arm 1 above the slots. Such deflection allows the tip section to ride over obstructions without causing damage either to the carrier or to the obstructions. The carrier arm 1 preferably is made of spring steel or material with similar characteristics, so that the tip section 6 will spring back into original position after passing the obstruction. The flexible resilient construction also allows, where necessary, deflection of the tip section with respect to the main portion of the carrier arm in directions other than that of the direction of movement of the carrier in yarn laying.

The construction shown in Figure 3 illustrates a modification of my invention in which the carrier arm 1 has its lower end somewhat downwardly curved, instead of being bent at an angle to the main portion as in Figure 1. Slightly above the tip section 6 and the opening 7 is a series of slots 12 and 13, formed in a manner similar to those illustrated in Figure 1. The inner end of each of these slots, however, preferably has a width greater than the width of the main portion of the slot, and which may be a substantially cylindrical opening 14 formed by a drilling operation. These openings 14 are perpendicular to the surface of the carrier arm. The outer end of each of the slots is outwardly flared or curved as indicated by the numeral 15. The construction illustrated provides for a springing or resilient action by the metal surrounding the end of each slot as well as by that lying between adjacent overlapping slots.

The yarn guide groove 5 extending through the flexible section 11 of both constructions shown in Figures 1 and 3 provides the material between adjacent overlapping slots with a central portion which is of thinner cross section than the remaining portions. This thin central portion further adds to the flexibility and resiliency of the flexible section 11.

Although the slots 12 and 13 shown in both Figures 1 and 3 have been described as being parallel, it will be readily apparent that slots not accurately parallel to one another may also provide good results. In like manner, the slots 12 and 13 and the openings 14, although shown and described as having edges perpendicular to the surface of the carrier arm, may obviously be cut or formed at a slight angle thereto. Similarly, equal spacing of the slots is desirable but not essential to my invention.

Accordingly, the foregoing description is to be understood as illustrative, since this invention is intended to include any and all modifications and embodiments coming within the scope of the appended claims.

I claim:

1. A yarn carrier for knitting machines comprising; a relatively rigid attaching portion at one end of said carrier, a guide tip at the other end of said carrier, and a relatively thin resilient portion intermediate the ends of said carrier, said resilient portion having a plurality of slots extending from an edge of said portion to within close proximity of the other edge providing said portion with a plurality of resilient sections of relatively small cross sectional area.

2. A yarn carrier for knitting machines comprising; a relatively rigid attaching portion at

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one end of said carrier, a guide tip at the other end of said carrier, and a relatively thin resilient portion intermediate the ends of said carrier, said resilient portion having a plurality of slots extending from each edge of said portion to within close proximity of the opposite edge of said portion, the slots from one edge extending between the slots extending from the opposite edge.

3. The structure as set forth in claim 1 in which the slots are transverse to the resilient portion and substantially parallel to one another.

4. The structure as set forth in claim 2 in which the inner end of each of the slots is of greater width than the width of the major portion of said slots.

5. The structure as set forth in claim 2 in which the inner end of each of the slots is enlarged to form a substantially cylindrical opening of a diameter greater than the width of said slots, and in which the outer end of each of the slots is outwardly flared.

6. The structure as set forth in claim 2 including a yarn guiding groove extending across the slots in the resilient portion toward the guide tip.

7. A yarn carrier for knitting machines comprising; a relatively rigid attaching portion at one end of said carrier, a yarn guiding portion at the other end of said carrier, and a relatively thin resilient portion intermediate the ends of said carrier, said resilient portion having a series of relatively narrow and relatively closely and equally spaced transverse slots extending in substantially parallel relationship from one edge of said resilient portion to within close proximity of the opposite edge of said resilient portion and a similar series of slots extending from said last named edge between said first named slots to within close proximity of said first named edge.

8. A yarn carrier for knitting machines comprising; a relatively rigid attaching portion at one end of said carrier, a guide tip at the other end of said carrier, a relatively thin resilient portion intermediate the ends of said carrier, said resilient portion having a plurality of slots extending from an edge of said portion to within close proximity of the other edge providing said portion with a plurality of resilient sections of relatively small cross sectional area, and a yarn guide tube secured to said guide tip and projecting beyond the end of said tip.

9. A yarn carrier for knitting machines comprising; a relatively rigid attaching portion at one end of said carrier, a guide tip at the other end of said carrier, a relatively thin resilient portion intermediate the ends of said carrier, said resilient portion having a plurality of slots extending from an edge of said portion to within close proximity of the other edge providing said portion with a plurality of resilient sections of relatively small cross sectional area, said guide tip having a recess therein, a coiled spring positioned in said recess, portions of the edges of said recess being crimped against said spring to secure the same in said recess, and a yarn guide tube extending into said recess and having an end thereof frictionally engaged within the coils of said spring.

10. A yarn carrier for knitting machines comprising; a supporting arm, the lower end portion of said arm having a recess therethrough, a coiled spring positioned in said recess, portions of the edges of said recess being crimped against said spring to secure the same in said recess, and a yarn guide tube extending into said recess and

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having an end thereof frictionally engaged within the coils of said spring.

11. A yarn carrier arm for knitting machines having a relatively rigid attaching portion at one end thereof, means for supporting a yarn guide tube at the other end thereof, and a resilient portion intermediate said ends, said resilient portion having a plurality of slots extending inwardly from opposite edges thereof providing said resilient portion with a plurality of sections of relatively small cross-sectional area whereby said other end may be deflected with respect to said attaching portion.

12. A yarn carrier for knitting machines having a relatively rigid attaching portion at one end thereof, a guide tip at the other end thereof, and a thin flat resilient portion intermediate said ends, said resilient portion having a plurality of

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slots extending inwardly from opposite edges thereof providing said resilient portion with a plurality of sections of relatively small cross-sectional area.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,773,541	Mueller	Aug. 19, 1930
2,214,712	Weisbecker	Sept. 10, 1940
2,218,976	Weisbecker	Oct. 22, 1940
2,275,848	Feustel	Mar. 10, 1940
2,289,256	Feustel	July 7, 1942