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KNITTING NEEDLE

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1 Claim. (Cl. 66—117)

The invention described herein relates to a knitting-needle.

According to the invention, the needle has a smooth middle part of smaller diameter than the largest diameter of the fore part on which the stitches are formed, whereby the stitches are enabled to glide easily on this middle part.

The invention is hereinafter more fully described and claimed.

10 The accompanying drawing gives, by way of examples, several constructional forms of the knitting-needle.

15 Figs. 1, 2, 3 are respectively a view, a partial longitudinal section and a cross section of a first constructional form.

Fig. 4 is a view of a second constructional form.

Fig. 5 is a view of a further constructional form.

20 Fig. 6 shows a fourth constructional form.

Figs. 7 and 8 relate to two means for securing the middle part to the fore part of the knitting needle.

25 Figs. 9 and 10 are alternative cross sections taken on the line IX—IX of Fig. 5.

Figs. 11 and 12 are alternative cross sections taken on the line XI—XI of Fig. 5.

30 Fig. 1 shows a knitting-needle which consists of a fore-part *a* of in general conical form, of a middle-part *b*, *c*, *d* and of an end-part *e*, which has the form of a button. The middle part *b*, *c*, *d* is again composed of three parts: of a cylindrical part *b*, the diameter of which is exactly the same as the largest diameter of the conical head *a*, which in itself is changing over smoothly into part *b*, and of a connecting part *c* which has the form of a rotary body, for instance of a truncated cone the largest diameter of which is equal to the diameter of part *b*, and of a cylindrical part *d* the diameter of which is equal to the smallest diameter of *c*.

35 The length of part *b* is chosen after careful tests in conformity with psychotechnical rules, thus that it best fits the hand of the knitter; it is for instance 3—4 cm. for children and 5—7 cm. for grown up persons.

40 For the sake of manufacturing the parts *a*, *b*, *c* are made out of a single piece of wire which has at *c* a short axial bore, shown in Fig. 2, in order to secure a solid connection with part *d*.

45 Part *d* is preferably made out of a flexible cable which is solidly fastened in the above mentioned axial bore of part *c* by welding, squeezing or hard-soldering (with hard-silver

or cadmium-solder) but by no means by soft-soldering (with tin solder).

The cable itself is composed of thin metal wires, which are either all of a practically non-oxidable, but not coated material such as German silver, white brass, nickel, Monel-metal, stainless steel etc. or of which only the outer layers are of such non-oxidable material, whereas the inner wires are of ordinary soft steel or another material.

60 If the wires are of bright iron, steel, brass, aluminium, without any coating, they will oxidize and soil the fingers as well as the knitting material, especially if the latter is of fair or white colour. If however the wires are tinned, the cable can be fastened only by soft soldering to the end-parts. But such a joint will not last. On the other hand even a very careful tin-coating does not give a perfectly smooth surface; delicate knitting material, as for instance fine wool or silk will therefore suffer and get coarse. The tin-coating will also wear off and the oxidable metal reappears. Nickel-coating would be better; but it is very difficult to get a good durable coating, therefore small parts of the coat will peel off and the needles get rough.

70 All these disadvantages are according to the invention avoided by making at least the outer layers of the cable of uniform, nonoxidable material and by making the surface smooth, hard and nonoxidable. On account of the harder material the cable will not wear off and even a slight wearing would not be detrimental, as the material is uniform and through and through nonoxidable.

75 In case the cable would be composed only of circular wires, its surface would show helicoidal grooves which, as experience shows, will in time hurt the palm of the hand and spoil the knitting material.

80 Fig. 3 shows that this is avoided by forming the inner part of the cable of circular wires *i* and making the outer layers of flattened wires *j* the section of same being such as to make the surface of the cable quite smooth.

85 Instead of flattened wires the outer layers of the cable may also consist of helicoidal wound ribbons.

90 The free end of the cable carries the button *e* which is fastened to the part *d* equally by hard-soldering, squeezing or welding. This button is made as light as possible in order not to load the inactive end of the needle.

95 Part *d* may also consist of one or several more

or less flexible single wires of a smaller total diameter than the one of part *b*; one end of these wires being fastened into the bore of part *c* by hard-soldering, welding or squeezing.

5 In case part *d* is made only out of one flexible wire, it may be made in one piece with the parts *a*, *b*, *c* as is shown by Fig. 4; or it may be attached to *c* by hard soldering directly.

10 In case part *d* is made of a rather rigid material it may be given from the origin a certain curvature in order to fit to the form of the hand.

15 In case the button *e* consists of the same material as part *d* it may be made by upsetting the end of part *d*.

Fig. 5 shows a knitting-needle with which the button *e* is replaced by an other end-piece, for instance by an end-piece equal to *a*, *b*, *c*; this makes the needle symmetrical; if thereby *d* is given an adequate length one obtains the arch-shaped needle which may be used for hose-knitting work.

25 Fig. 6 shows another form of the needle, whereby the forepart *a* is directly connected with the middle-part *f* which has the form of a truncated cone, the largest diameter of which is equal to the largest diameter of *a* and which is provided at the thinner end with the button *e*.

30 Part *d* may also be joined to parts *a*, *b*, *c* to be disconnectable from same; for instance according to Fig. 7 by a design similar to press-buttons or as Fig. 8 shows by a fine screw-thread. Such a connection would permit to use the middle part *d* with end parts of different diameters.

35 Such a removable connection may be used as well with a flexible as with a half rigid middle-part.

As Fig. 9 shows the cable may also consist of one, or as shown in Fig. 10 of several cabled thin metal wires which are embedded in a common flexible shell of celluloid or an other flexible material. Fig. 5 shows at *m* how the metallic core may thereby preferably be roughened or enlarged at the ends, in order

45 to form a solid connection with the parts *b*, *c*. Fig. 5 shows on the left side how also the parts *a*, *b*, *c* may be made instead of metal of a piece of wire as section Fig. 11 shows or of a cable as the sectional view in Fig. 12 shows, in both cases the metal parts being embedded in a shell of celluloid or an other similar material. The metal core is in this case nothing else than the prolonged core of the middle-part of the needle, serving to make the needle unbreakable.

55 Knitting-needles made as explained above

have several important advantages, especially on account of the rather larger knittings one makes now, where 100-200 stitches accumulate on one needle.

(1) The shortened part *a*, *b*, *c* joined with the flexible and smooth middle-part *d* is fitted to the palm of the hand in such a manner, that it is not hurt and the hand gets less tired.

(2) On account of the smaller diameter of the middle-part *d* the stitches formed on the part *a*, *b* glide easily and of their own accord over part *c* on part *d*, where they accumulate without requiring the troublesome and time-wasting stripping of the stitches by the knitter.

(3) On account of the easy sliding of the stitches they will not stick to the needles and be distorted, a plane laid through the stitch will always be perpendicular to the axle of the needle, such that on a needle of equal length more stitches may be accumulated. The knitting may therefore be performed with shorter, lighter and more convenient needles; broader knittings may be made than with ordinary needles of the same length.

(4) On account of the smaller diameter of the middle-part and the light button, these parts are by themselves light; besides the back-part of the needle being bent by its own weight and the one of the knitting, the lever at which attacks the weight of the knitting is substantially shortened. The hand is therefore little tired and the fore-part of the needle may be much easier manipulated. Easier, quicker and more uniform knitting is obtained. The bending of the needle facilitates also the gliding of the stitches from the head-part where they are formed to the middle-part where they accumulate.

I claim herein as my invention:

A knitting needle, comprising a unitary portion consisting of a tapered point, a cylindrical part contiguous with said point, and a second part, having a taper reversed with respect to said point and contiguous with said cylindrical part at its end remote from said point, and a shank hard-soldered to said unitary portion and of a smaller diameter than the largest diameter of said unitary portion, said shank consisting of flexible stranded cable, the outer strands of which, originally round, have been flattened to fill in the interstices between the outer strands, and to thereby impart to the shank a substantially continuous smooth exterior surface.

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