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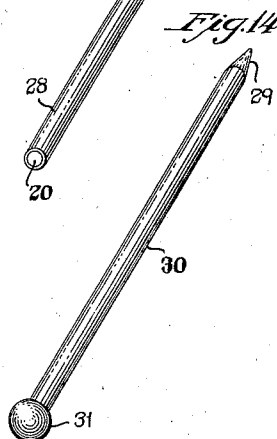
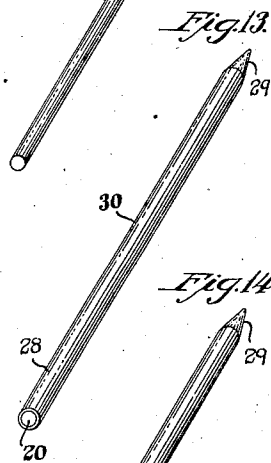
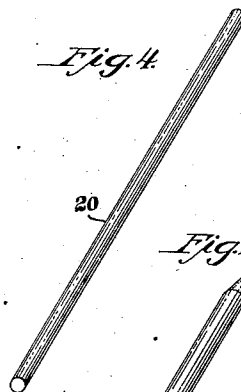
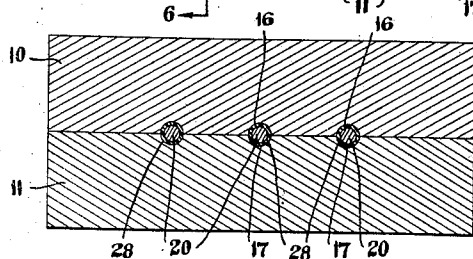
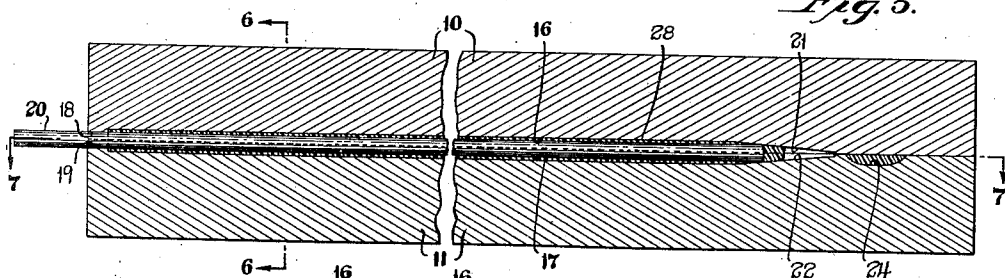
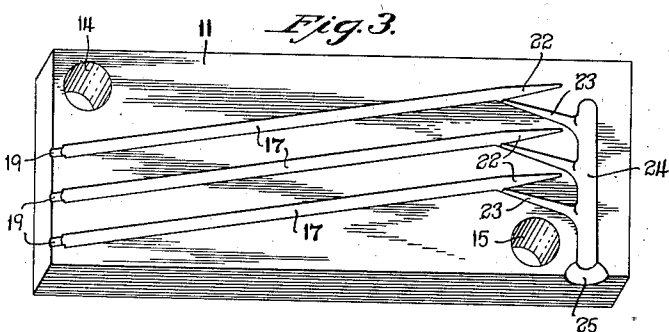
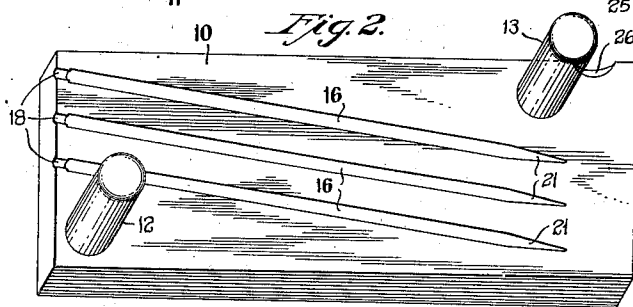
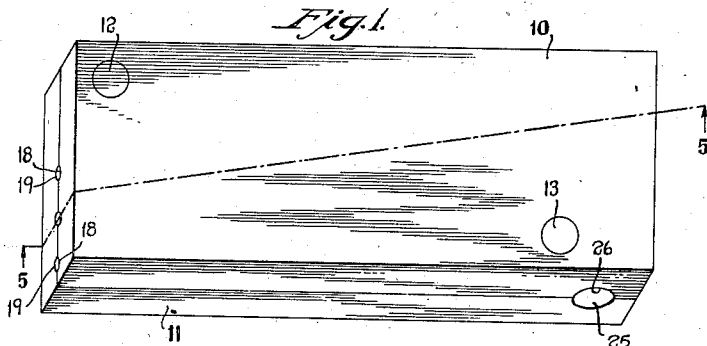
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2,453,739

METHOD FOR PRODUCING PLASTIC-COATED KNITTING NEEDLES

Filed Feb. 18, 1947

2 Sheets-Sheet 1



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METHOD FOR PRODUCING PLASTIC-COATED KNITTING NEEDLES

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2 Sheets-Sheet 2

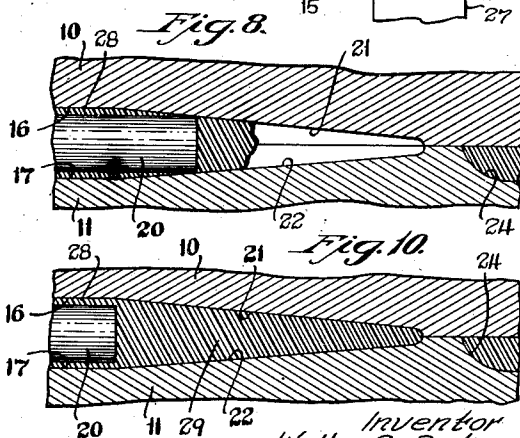
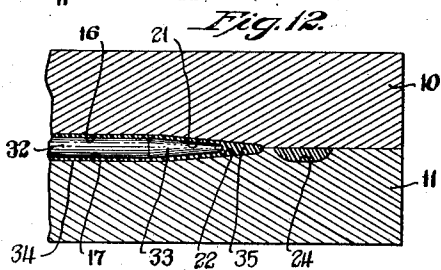
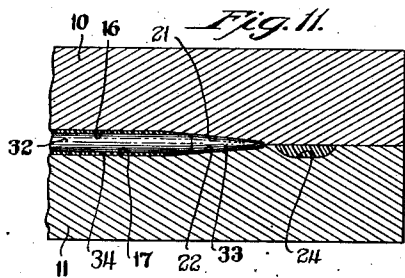
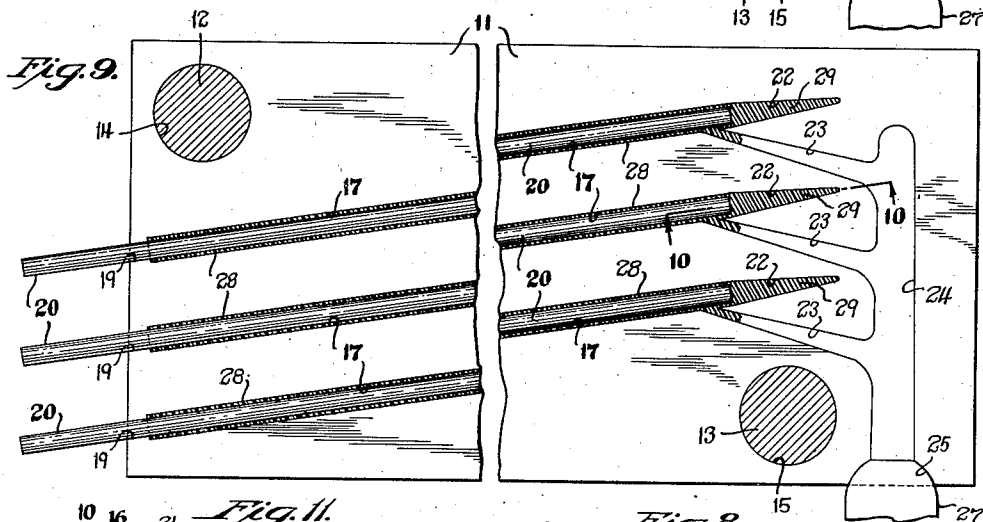
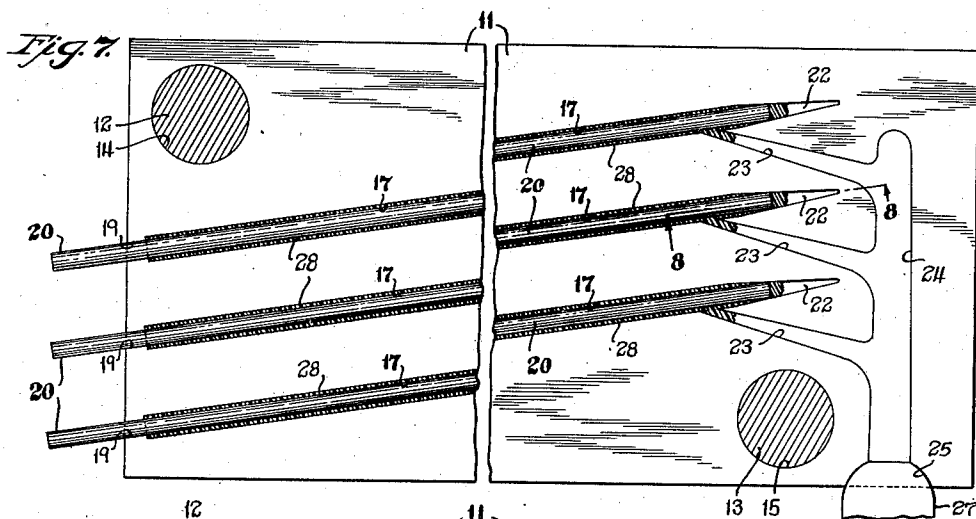


Fig. 10

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UNITED STATES PATENT OFFICE

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METHOD FOR PRODUCING PLASTIC-COATED KNITTING NEEDLES

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4 Claims. (Cl. 18—59)

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The present invention relates to improvements in methods or processes for producing knitting needles and relates more particularly to improvements in methods or processes for producing plastic-coated knitting needles.

Heretofore, in efforts to provide knitting needles with plastic coatings of appreciable thickness, it has been proposed to repeatedly dip the knitting needle in a solution or dispersion of the desired plastic material. This method requires long pauses between the application of each relatively-thin coating and is thus slow and expensive, as well as being otherwise unsatisfactory.

One of the main objects of the present invention is to provide a simple, reliable and effective method whereby knitting needles may be rapidly provided with a relatively-thick coating of plastic materials.

Another object of the present invention is to provide a superior method whereby knitting needles may be provided with coatings of substantial thicknesses at a low cost for manufacture.

With the above and other objects in view, as will appear to those skilled in the art from the present disclosure, this invention includes all features in the said disclosure which are novel over the prior art.

In the accompanying drawings, in which certain modes of carrying out the present invention are shown for illustrative purposes:

Fig. 1 is a perspective view of a pair of complementary mold-members shown as engaged in face-to-face relationship;

Fig. 2 is a perspective view of the upper mold-member, viewing the same mainly from its underside;

Fig. 3 is a similar view of the lower mold-member but viewing the same mainly from its upper side;

Fig. 4 is a perspective view of a core-member suitable for being coated in accordance with the present invention, to provide a plastic-coated knitting needle;

Fig. 5 is a broken longitudinal sectional view taken on the line 5—5 of Fig. 1, but on a larger scale and showing a core-member in its initial or centered position and the plastic material as having been flowed therearound;

Fig. 6 is a transverse sectional view taken on the line 6—6 of Fig. 5;

Fig. 7 is a horizontal sectional view taken on the line 7—7 of Fig. 5;

Fig. 8 is a broken enlarged-scale sectional view equivalent to a section taken on the line 8—8 of Fig. 7, but including also the upper mold-member;

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Fig. 9 is a view similar to Fig. 7 but showing the core-members retired to permit the completion of the tips thereon;

Fig. 10 is a broken enlarged-scale sectional view equivalent to a section taken on the line 10—10 of Fig. 9, but including the upper mold-member also;

Fig. 11 is a broken sectional view similar to Fig. 8 but showing a core having a pointed end in place in the die-cavity;

Fig. 12 is a view similar to Fig. 10, but showing the effect of the slight withdrawal of the pointed core-member of Fig. 11 to permit the full formation of a tip-portion thereon;

Fig. 13 is a perspective view of a coated knitting needle after the severance of the projecting end of its core-member and prior to the application of a cap thereto; and

Fig. 14 is a perspective view of a completed knitting needle.

In the accompanying drawings are illustrated two complementary mold-members suitable for use in carrying out the method of the present invention and which may be respectively designated as an "upper" mold-member 10 and a "lower" mold-member 11. The said complementary mold-members 10 and 11 are adapted to be mounted in any suitable injection-molding machine, which latter does not require any description or illustration herein.

In the instance illustrated in the accompanying drawings, the upper mold-member 10 is provided at diagonally-opposite locations with downwardly-extending guide-pins 12 and 13 which are respectively adapted to slide with a close sliding fit in passages 14 and 15 formed respectively at diagonally-opposite locations in the lower mold-member 11.

The upper mold-member 10 is formed in its under face with three (more or less) cavities, each generally designated by the reference character 16 and each of semi-circular form in cross section. The said cavities 16 are respectively adapted to register with and complement a similar series of cavities 17 formed in the upper face of the lower mold-member 11. Each of the cavities 17 just referred to is of semicircular form in cross section and when registered with a similar cavity 16 of the upper mold-member 10, provides a complete cavity of circular form in cross section.

At one end, each of the cavities 16 of the upper mold-member 10 is connected to the adjacent end of the said mold-member by a seat-portion 18 which communicates with the adjacent edge of the mold-member 10. The seat-portions 18 are

each of semicircular form in cross section and are of a lesser radius than the radius of the main portion of the particular cavity 16 with which they connect.

Each of the seat-portions 18 of the upper mold-member 10 is adapted to register with and complement one of three similar seat-portions 19 formed in the lower mold-member adjacent one end thereof. When the upper mold-member 10 and the lower mold-member 11 are engaged in face-to-face relationship, each seat-portion 18 registers with one of the seat-portions 19 to provide a cylindrical passage substantially corresponding in diameter to the diameter of a rod-like core-member 20 of the character shown in Fig. 4, or a core-member 32 shown in Figs. 11 and 12.

At its end remote from the seat-portions 18, each of the cavities 16 in the upper mold-member 10 is formed with a tapered tip-forming portion 21 which is adapted to register with and to complement a similar tip-forming portion 22, one of which latter is formed at the adjacent end of each of the cavities 17 in the lower mold-member 11.

Leading from each of the cavities 17 in the lower mold-member 11 is one of three similar channel-like gates 23 each of which leads at its opposite end from a channel-like runner 24 which, like the said gates 23, is formed in the upper surface of the lower mold-member 11, as is especially well shown in Figs. 7 and 9. The runner 24 leads from a flaring sprue-portion 25 formed in the edge of the lower mold-member 11. The sprue-portion 25 just referred to is complemented by a sprue-portion 26 formed in the similar edge of the upper mold-member 10.

Preferably, the two sprue-portions 25 and 26 above referred to are cylindrically contoured and together provide a substantially-hemispherical socket adapted to receive the similarly shaped end of a nozzle 27 forming a usual feature of any suitable injection-molding machine.

In utilizing the mold-members 10 and 11 and the blunt-ended core-members 20 as shown in Figs. 4 to 10 inclusive, the two mold-members 10 and 11 may be first brought into face-to-face engagement following which three core-members 20 may be respectively inserted through the passages afforded by the seat-portions 18 and 19 until each of the said core-portions seats firmly against and is centered by a complementary pair of the tapered tip-forming portions 21 and 22, in the manner shown in Figs. 5, 7 and 8.

The core-members 20 project outwardly beyond the respective ends of the mold-members 10 and 11 at which the seat-portions 18 and 19 are located and may there be supported in any suitable manner so as to maintain their opposite ends in engagement with the sloping portions 21 and 22 with any desired degree of firmness. The fit of the respective core-members 20 in the complementary seat-portions 18 and 19 through which they extend is reasonably snug but preferably the fit is such that air entrapped in the cavities may escape past the said seat-portions, to thus provide the required venting.

While the ends of the respective core-members 20 are firmly seated against their adjacent sloping tip-forming portions 21 and 22 and while the mold-members are hot, any suitable hot and fluid plastic material may be injected into the sprue-portions 25 and 26 from the nozzle 27 to flow through the runner 24 and thence through the respective gates 23 into each of the plurality of

mating cavities 16 and 17 to completely fill the said cavities, with the exception of the point-portions thereof, substantially in the manner indicated in Figs. 5, 7 and 8. Thus, each core-member 20 will be laterally enveloped and provided with a plastic coating 28.

As shown in Figs. 5, 7 and 8, some of the plastic material (preferably a thermoplastic) may leak past the end of the core-members 20 which are seated against the tip-forming portions 21 and 22, though if desired, this may be prevented by very tightly seating the said ends of the core-members against the said portions 21 and 22.

Immediately following the initial injection of plastic material in the manner above described, the core-members 20 are moved axially into the positions in which they are shown in Figs. 9 and 10, while the pressure of the plastic material from the nozzle is still being exerted. Under these conditions, the plastic material will resume flow and will fill out the tip-forming portions 21 and 22 of each of the cavities 16 and 17, to thus provide each of the said core-members with a full tapering point-portion or tip 29 integral with the coating 28, as is clearly shown in Figs. 9 and 10.

The mold-members 10 and 11 may now be separated (after the nozzle 27 has been retired) and the unit comprising the group of core-members, their coatings, tips and the attached portions of plastic materials formed in the gates 23, runner 24 and sprue-portions 25 and 26, may be jointly removed.

After removal of the multi-part unit from the mold-members in the manner above described, each coated core-member may be severed from its respective gate and may have the portion of the core-member 20 which projects beyond the end of the plastic coating 28, severed in the manner indicated in Fig. 13, to thus produce what may be regarded as a completed knitting needle 30, as is shown in Fig. 13.

It is preferable, though not necessary, to then apply a suitable cap such as 31 over the end of the knitting needle 30 opposite its tip 29, in the manner illustrated in Fig. 14. The cap 31, or its equivalent, may be retained in place by crimping, cement or by heating the plastic coating 28 to cause the adherence thereto of the said cap.

By means of the procedure above outlined, the core-members 20 are accurately centered during the formation of their respective coatings 28 and are then provided with suitable tips such as 29 by the mere action of withdrawing the said cores slightly, under conditions wherein the previously-injected coatings 28 are sufficiently firm to serve to hold the said cores from losing their central positions within the said coatings.

Instead of employing a blunt-ended core-member like 20, a core-member 32 may be employed which is provided with a tapered tip 33 prior to being coated, as is shown in Figs. 11 and 12.

A plurality of core-members 32 may be installed in the previously described cavities of the mold-members 10 and 11 so that the tip 33 of a given core-member 32 firmly fits against the adjacent complementary tip-forming portions 21 and 22 of the individual cavities, in the manner illustrated in Fig. 11.

In the manner previously described in connection with the description of the formation of the knitting needle 30, a suitable plastic material may be injected around the said core-members to provide coatings 34, after which the said core-members may be slightly withdrawn into the position illustrated in Fig. 12 and the injection of the

plastic continued to provide a plastic point-portion or tip 35 for each of the said cores. The tip 35, unlike the tip 29, will itself be reinforced by the tip 33 of the core-member 32.

The core-members 20 and 32, or their equivalents, may be made of any suitable material providing the desired degree of rigidity such, for instance, as aluminum, steel, brass, hard wood, etc.

The plastic materials referred to may also assume a wide variety of forms such for instance, as cellulose-acetate, ethyl-cellulose, styrene resins, nylon, rubber, phenolic-base compounds, etc.

The invention may be carried out in other specific ways than those herein set forth without departing from the spirit and essential characteristics of the invention, and the present embodiments are, therefore, to be considered in all respects as illustrative and not restrictive, and all changes coming within the meaning and equivalency range of the appended claims are intended to be embraced therein.

I claim:

1. The method for producing plastic-coated knitting needles which includes the steps of: movably supporting a rod-like core-member of relatively-small diameter in an elongated molding-cavity of relatively-large diameter throughout the major portion of its length and which cavity is formed at one end with a tapering tip-forming portion; forcing an end of the said core-member into engagement with the tapering tip-forming portion of the said cavity to hold the portion of the core-member adjacent its said end out of engagement with the walls of the cavity proper; injecting a plastic coating material around the said core-member while the same is thus centered; and subsequently slightly axially retiring the said core-member out of engagement with the tapering tip-forming portion of the said cavity before said coating material loses its plasticity and forcing the said coating material to fill the said tip-forming portion and thus provide the now-coated core with a unitary tapering tip of plastic material.

2. The method for producing plastic-coated knitting needles which includes the steps of: movably supporting a rod-like core-member of relatively-small diameter in an elongated molding-cavity of relatively-large diameter throughout the major portion of its length and which cavity is formed at one end with a tapering tip-forming portion; forcing an end of the said core-member into engagement with the tapering tip-forming portion of the said cavity to hold the portion of the core-member adjacent its said end out of engagement with the walls of the cavity proper; injecting a plastic coating material around the said core-member while the same is thus centered; and subsequently slightly axially retiring the said core-member out of engagement with the tapering tip-forming portion of the said cavity before said coating material loses its plasticity and while still maintaining the said plastic material

under pressure to thus cause the said coating material to fill the said tip-forming portion and thus provide the now-coated core with an integral tapering tip of plastic material.

3. The method for producing plastic-coated knitting needles which includes the steps of: movably supporting a pointed rod-like core-member of relatively-small diameter in an elongated molding-cavity of relatively-large diameter throughout the major portion of its length and which cavity is formed at one end with a tapering tip-forming portion; forcing the point of the said core-member into engagement with the tapering tip-forming portion of the said cavity to hold the portion of the core-member adjacent its said point out of engagement with the walls of the cavity proper; injecting a plastic coating material around the said core member while the same is thus centered; and subsequently slightly axially retiring the point of said core-member out of engagement with the tapering tip-forming portion of the said cavity before said coating material loses its plasticity and forcing the said coating material to fill the said tip-forming portion and thus provide the now-coated core with a unitary tapering tip of plastic material surrounding its said point.

4. The method for producing plastic-coated knitting needles which includes the steps of: movably supporting a pointed rod-like core-member of relatively-small diameter in an elongated molding-cavity of relatively-large diameter throughout the major portion of its length and which cavity is formed at one end with a tapering tip-forming portion; forcing the pointed end of the said core-member into engagement with the tapering tip-forming portion of the said cavity to hold the portion of the core-member adjacent its pointed end out of engagement with the walls of the cavity proper; injecting a plastic coating material around the said core-member while the same is thus centered; and subsequently slightly axially retiring the point of said core-member out of engagement with the tapering tip-forming portion of the said cavity before said coating material loses its plasticity and while still maintaining the said plastic material under pressure to thus cause the said coating material to fill the said tip-forming portion and thus provide the now-coated core with an integral tapering tip of plastic material surrounding its said point.

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