July 13, 1937. H. SCHMIDT 2,086,962

PLATED NEEDLE

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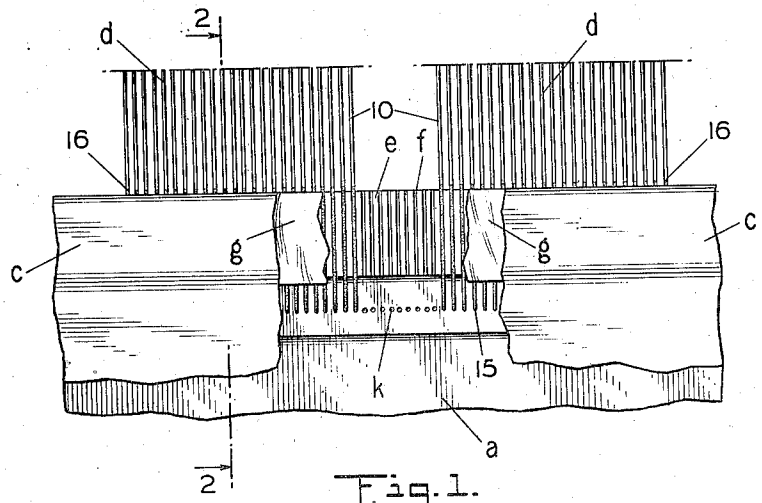


Fig. 1.

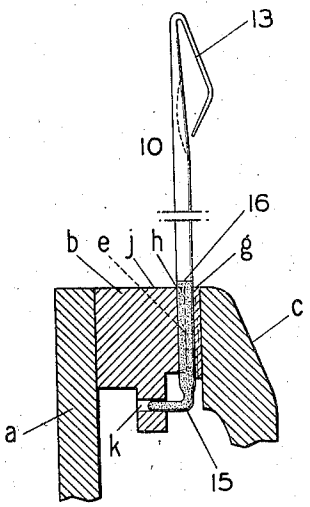


Fig. 2.

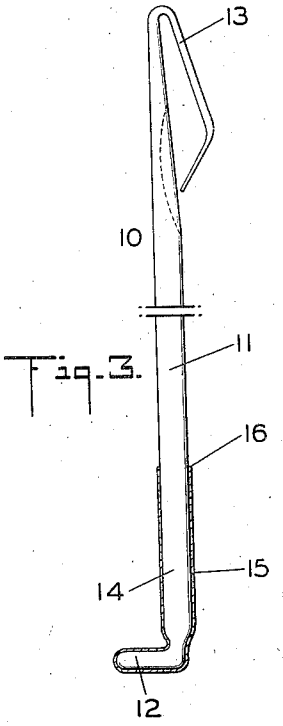


Fig. 3.

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PLATED NEEDLE

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7 Claims. (Cl. 66—114)

The invention relates in general to an improved form of needle, specifically a machine needle, and the invention also relates to such needles in their cooperative relation to the parts of the machine which mount the needles in place.

Knitting machine needles are conventionally mounted in closely related position in a brass needle bed with the lower end of the bank of needles firmly clamped in position and the upper work end of the needles exposed to perform their knitting functions. These needles are usually made of steel; are made from extremely thin gauge of material and the finer the resulting work desired, the thinner the needles must be made and the more closely positioned must the needles be assembled in the machine. It follows, of course, that the extremely thin needles are quite liable to rust quickly simply by exposure to damp atmospheric conditions and this condition is exaggerated in those cases where the thread, yarn or other material fed to the needle is moist, not infrequently with a weak acid solution. This moisture and acid usually collects on top of the needle bed at the junctures between the line of needles and the top surface of the bed with the result that rust and deterioration of the needles occurs most frequently at the points where the needles project above the bed, that is, at the base of the upwardly projecting portion of the needles as they project above the top of the bed.

The primary object of the invention is to provide a form of needle which will retain the resiliency, the thin dimensions and the other advantages inherent in known forms of such needles, particularly at its upper or work end; and at the same time to provide a form of needle which will defeat, or at least tend to defeat, the present tendencies of such needles to rust or corrode in the portion contained in the needle bed and particularly in the part just above the top of the bed where rust usually occurs; and, further, to maintain the mounted portion of the needle with such dimensions as will permit it to be mounted in the usual thin size slots at present forming part of the clutching face of known forms of knitting machines.

Broadly these objects are obtained simply by electroplating the lower or mounting end of the needle with a non-corroding metal formed thereon as in an extremely thin layer or shell and preferably extending the shell for a short distance above the part of the needle engaged by the clamping jaws of the machine in which it is mounted but terminating the coating a sufficient distance from the work end of the needle so as not to interfere with the desired resiliency, the small size and the other characteristics which it is desired to retain at the work end of the needle.

Still another object of the invention is to provide a form of needle which will more snugly fit in the slots in the needle bed than has been possible heretofore and at the same time to provide a slippery form of surface engagement between the needle and the side walls of the slots such as will permit the easy mounting of a fresh needle in the slot and the withdrawing of a broken needle from the slot without difficulty despite the desirable snugness of fit.

While several metals, particularly electrolytically deposited metals have been used, cadmium has been selected as the preferred metal because of its tenaciousness in adhering to the thin steel needle, in this respect being better than chromium which tends to flake off from the steel needle. Further, cadmium is cheap and easily applied, but it has been selected primarily because, as it is relatively soft it forms a soft cushion which does not wear away the grooves in which such needles are mounted as do the usual all steel needles; cadmium provides sufficient plasticity or capability of distortion to the clamped part of the needle so that when clamped in position in the machine the clamping pressure is sufficient to cause the coating to become distorted sufficiently to conform more or less to the configuration of the portion of the slot in which it is being forced, and at the same time the smooth fine-grained texture characterizing electrolytically deposited cadmium provides sufficient slipperiness to facilitate the mounting and dismounting of the needle in the slot.

Various other objects and advantages of the invention will be in part obvious from an inspection of the accompanying drawing and in part will be more fully set forth in the following particular description of one form of needle embodying the invention, and the invention also consists in certain new and novel features of construction and combination of parts hereinafter set forth and claimed.

In the drawing:

Fig. 1 is a view in front elevation of a portion of the knitting machine showing installed therein a bank of needles the tops of which have been cut off and the individual needles of which form a preferred embodiment of the invention;

Fig. 2 is an enlarged transverse sectional view

taken on the line 2—2 of Fig. 1 looking in the direction indicated by the arrows, showing one of the improved needles in place and with the mid-length broken away to reduce the length of the figure; and

Fig. 3 is an enlarged view of one of the needles shown in the preceding figures, similarly broken away at its mid-portion.

Referring first to the conventional parts of the needle mounting element of a knitting machine, there is shown a needle bar *a* provided with a brass needle bed *b* constituting one of the jaws of a needle bank clamp or clutch, the coacting element or jaw *c* being operatively disposed to clamp therebetween a bank *d* of needles. The clamping face *e* of the bed *b* is provided with a series of parallel needle receiving slots *f* for receiving the needles **10** herein featured. Also following conventional practices in mounting needles in place, a layer of compressible material such as a layer *g* of compressible material (such as paper), is positioned between the clamping jaw *c* and the needle bed *b*. In the known forms of needles when so mounted in a holder of the type herein disclosed, rust occurs primarily at the point or rather line *h* defining the joints between each needle and the top surface *j* of the needle bed. The needle bed is also provided beneath the slots with the usual aperture *k* for receiving the lower or hook end of the needles also following conventional structures in this respect.

The needle **10** is illustrated as being of the bearded type, this being selected for illustration simply to show the application of the invention to a type of needle which is extremely thin, particularly in its width dimension as shown in Fig. 1. The needle **10** is formed of high grade steel and includes a mounting shank **11** terminating at its lower part in a bent or hook end **12** and terminating at its upper end in the conventional spring or bearded loop **13**. In all other respects it is understood that the steel part of the needle is of conventional size, material, form and functional capacity.

The novel aspect of the needle is that its lower portion has been electroplated so as to form in effect an inner steel core **14** enclosed in a thin shell **15** in this case suggested to be a shell of electrolytically deposited cadmium.

While it is obviously within the scope of the disclosure to coat the entire needle, including its work end **13**, there would be a disadvantage in electroplating or otherwise coating the upper end of the needle. The additional thickening of the work end of the needle, even if the coating were extremely thin, would add material to the upper portion of the needle at which portion it is highly desirable to maintain minimum thickness. Besides, any coating above the upper part **13** would tend to minimize the resiliency and springiness desired in such needles.

Accordingly, the present disclosure features the maintaining of the work end of the needle in its conventional form free of the coating herein featured and restraining the coating to the base portion of the needle and particularly to the portion contained between the clamping jaws as shown in Fig. 2. Preferably, the protecting coating should extend a sufficient distance above the top *j* of the jaws *b*—*c* so as to cover the portion of the needle adjacent the joint *h* about which the moisture and acid collect. In the showing herein illustrated the coating extends below the jaws and about the hook end **12** simply because it is easier and therefore cheaper to form the coating about the entire lower end of the needle rather than to attempt to block off from the action of the electrolytic bath the lower extreme end of the needle.

The needles are formed from the stock steel needles now on the market simply by mounting the upper ends of a bank of the needles in a carrying frame and exposing the lower ends to the action of an electrolytic bath, preferably a bath containing cadmium, but it is suggested that other similar non-rusting metals may be used, such as nickel and chromium. Others of the precious metals might be used but their cost is prohibitive. No particular pains need be exercised to insure the location of the upper end **16** of the shell **15** as it is required simply that the shell be sufficiently long to extend above the place *h* where rust usually forms on the needle and, of course, the end **16** should be a sufficient distance down on the shank **11** so as not to interfere with the desired attributes possessed by the needles at their work ends. In one form of the invention a number 45 gauge bearded needle was coated with cadmium to a thickness of about five ten-thousandths of an inch. Such needles had a longer life and did not rust away as rapidly as did adjacent unplated needles, both exposed to the same operating conditions.

While there has been shown, described and pointed out in the annexed claims, certain novel features of the invention, it will be understood that various omissions, substitutions and changes in the form and details of the needle illustrated and in its operation may be made by those skilled in the art without departing from the spirit of the invention.

I claim:

1. A machine needle formed primarily of a thin steel wire one end thereof forming a mounting shank and the other end fashioned to form a relatively flexible work end, a portion of the mounting shank providing a jaw clamp engaging portion, a coating of electrolytically deposited non-corroding metal covering the jaw clamp engaging portion, projecting therebeyond and terminating a short distance towards the work end leaving the balance of the shank between the coating and the work end together with the work end with the flexibility inherent in the portion of the steel wire which forms the same, and the coating being relatively soft compared to the steel needle to accommodate itself to its mounting means and acting to resist rusting of the steel wire in the region just beyond the clamp engaging portion.

2. A machine needle formed primarily of a thin steel wire including a mounting shank and a work end, the mounting shank including a portion adapted to be clamped in the mechanism for mounting the needle, and said mounting shank provided for a portion of its length with a coating of an electrolytically deposited non-corroding metal softer than steel and terminating at one end in spaced relation both to the work end and to the clamped portion, said coating acting to make the mounting part of the needle coated thereby relatively rigid compared with the relatively flexible uncoated work end of the steel wire.

3. A machine needle having a work end and a mounting shank, a shell of electrolytically deposited cadmium coating the part of the mounting shank which is adapted to be mounted in the slots of a mounting clamp, said cadmium

coating acting to resist rusting of the portion of the steel mounting shank adjacent the part grasped by the mounting clamp, being sufficiently soft to conform to and thus fit snugly in the needle mounting slots of the clamp when forced into the slots and providing a surface sufficiently slippery to permit the withdrawing of the needle from its slot without difficulty despite the snugness of fit.

4. A machine needle having a mounting shank with the lower portion thereof only coated with a thin layer of a rust resistant material softer than steel to permit slight distortion of the layer and having a fine grain texture to provide sufficient slipperiness to facilitate the mounting and dismounting of the needle in its mounting mechanism and said needle being uncoated at its upper end and said lower coated portion being sufficiently extensive to provide a rust resistant area for engaging the mounting means.

5. A steel machine needle adapted to be mounted in a narrow slit of a mounting clamp, and having the portion thereof adapted to be contained in the slit coated with a thin layer of electrolytically deposited rust resisting metal softer than the steel and capable of accommodating itself to the conformation of the slit.

6. The combination of a needle clamp, a needle having a portion clamped thereby and an active end projecting from the clamped portion, the clamped portion being coated with a protective layer of metal permanently secured thereto and capable of distortion under use and the active end being uncoated, the protective layer extending a short distance beyond the clamp towards the uncoated active end of the needle.

7. In a knitting machine, the combination of means forming a needle clamp, a needle having a portion clamped thereby and another portion projecting from the clamp, the portion of the needle engaged by the clamp as well as a short length of the needle above the clamp being coated with a relatively soft non-corroding metal, and the other projecting portion being for the most part uncoated.

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