Nov. 21, 1967 E. P. FOSTER 3,353,243

FELTING NEEDLE

Filed Dec. 15, 1965

Fig. 1.

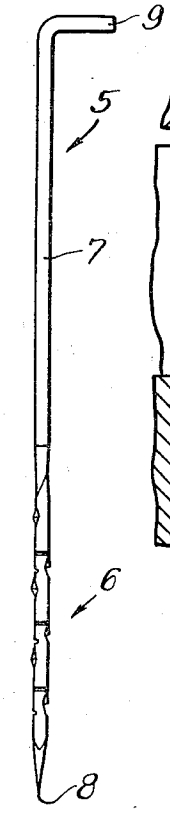


Fig. 2.

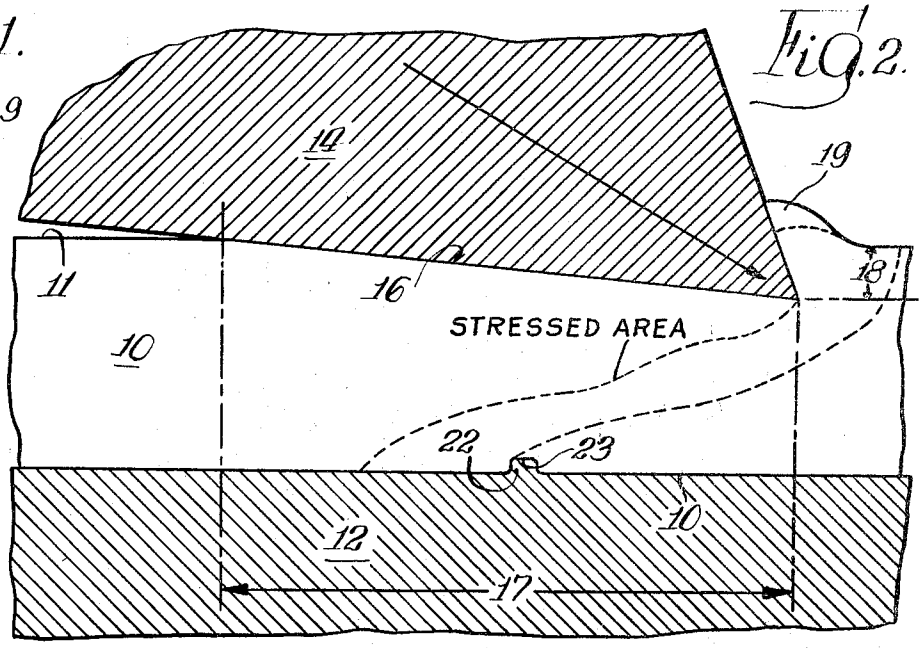


Fig. 3.

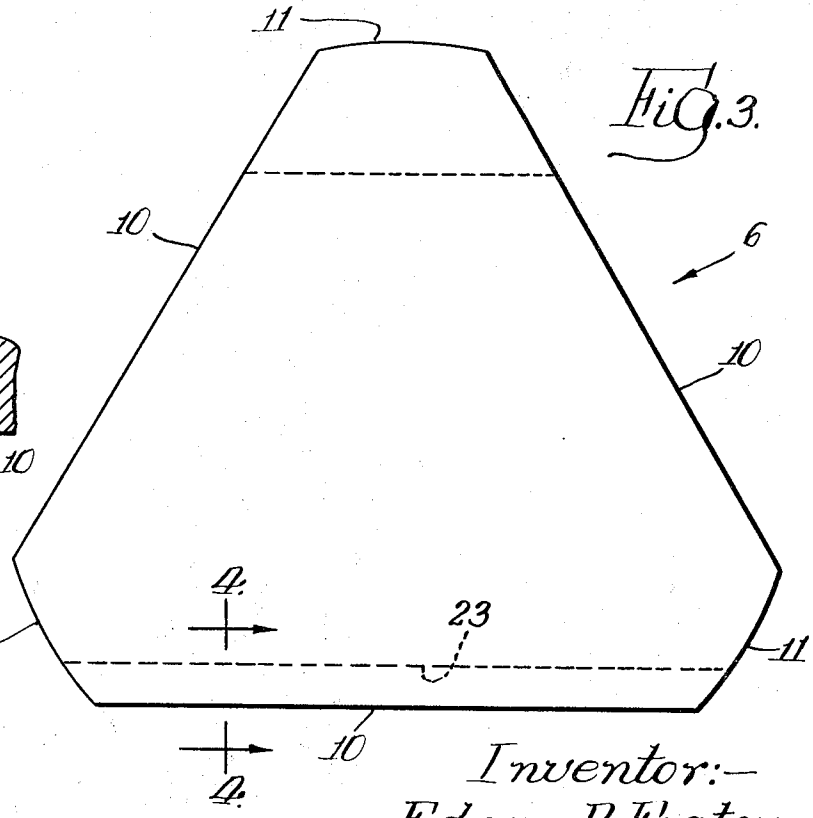
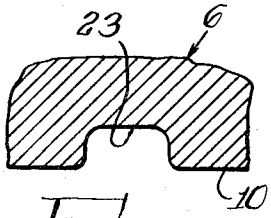


Fig. 4.



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FELTING NEEDLE

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ABSTRACT OF THE DISCLOSURE

A felting needle having one or more barbs in a body portion thereof and a counter-stressing recess opposite and preferably intermediate the ends of each barb recess and of the same area as the area at the throat depth thereof.

My present invention relates to improvements in felting needles.

It is conventional in the art to provide a felting needle having one or more barbs in the body portion of the needle formed by displacing material in the body portion to define a recess of given throat length and throat depth and with the displaced material being formed into a barb at the inner end of the throat recess. In such needle the barb recess at the barb is the weakest portion of the needle and breakage frequently results before wearing away of the barb. This problem is especially acute in felting needles having a large number of barbs.

The aforementioned breakage of felting needles at the barb end of the barb recess is due in the main to the concentration thereat of the stresses created in the grain structure of the steel by the application of a barbing die to the body portion of a needle in forming the barb recess and barb.

It is the purpose of the present invention to distribute the aforementioned stresses longitudinally over the steel grain structure to provide increased strength to the felting needle at the barb recess and thus substantially reduce likelihood of breakage thereat.

According to the present invention the foregoing purpose is accomplished by counter-stressing the steel in the body portion opposite and preferably substantially intermediate the ends of the throat length of the barb recess. Such counter-stressing may be achieved by swaging a counter-stressing recess in the base of the needle body opposite and during formation of the barb recess by the barbing tool. For this purpose a back-up anvil may be provided with a ridge of suitable size which is swaged into the base of the needle body section to form the counter-stressing recess during formation of the barb recess by a barbing tool. Preferably the counter-stressing recess is of the same area as the area at the throat depth of the barbing recess.

In fabricating a felting needle as above described the counter-stressing recess provides a substantially equal and oppositely opposed force to that imposed by the barbing die to the body of the felting needle to the end that the grain structure is stressed in tension between the anvil ridge and the barbing die to disperse the stresses imparted to the grain of the steel of the body portion over a greater area.

Preferred embodiments of the invention will now be described in connection with the accompanying drawings in which:

FIGURE 1 is an elevational view of one form of felting needle of my present invention fabricated as described hereinbelow;

FIGURE 2 is a greatly enlarged side elevational view of a portion of the body of the felting needle showing the manner in which a barbing recess and barb and counter-stress relieving recess are formed in the needle;

FIGURE 3 is a diagrammatic vertical cross sectional view illustrating the cross-sectional areas at the throat depth of the barbing recess and counter-stress relieving recess of the needle of FIGURES 1 and 2; and

FIGURE 4 is a detail vertical sectional view taken substantially along the line 4—4 of FIGURE 3 looking in the direction indicated by the arrows.

Referring now to FIGURE 1 of the drawing, I have shown a felting needle **5** constructed in accordance with my present invention which comprises a body portion **6** and a shank portion **7**. The lower end of the body portion **6** is pointed as at **8** to facilitate penetration of fibrous material to be compacted in a known and conventional manner. The upper end portion of needle may be bent substantially at right angles to the shank portion **7** to provide a securing element or ear **9** for clamping between a base member and a clamping member of a conventional needle plate. As is well known, such needle plate is adapted to support a plurality of felting needles, such as shown in FIGURE 1, which in reciprocation of the plate in the felting machine effects the interlacing and compacting of loose fibrous materials.

In a preferred form of practice of my present invention, the felting needle body portion **6** is preferably of substantially triangular configuration, as viewed in FIGURE 3, in which the body portion is thus provided with intersecting side surfaces **10** with each adjacent pair of such surfaces forming edges at **11** for the needle body. It will be understood that the needle body may be of other cross sectional configurations. It is preferable, however, to provide an edge in which the barbing recesses and barbs may be formed and with a surface of the body opposite the edges such as surfaces **10** opposite each of the corner edges **11** of the needle shown to provide a base for purposes to be described.

As best seen in FIGURE 2, the body portion **6** of the needle is preferably supported with one of its side surfaces **10** on a stationary anvil **12** to support the opposite corner edge **11** to lie in a lengthwise horizontal plane for engagement by a conventional barbing tool **14**. The barbing tool **14** is applied in conventional manner to provide the barbing recess as at **16** having a throat length as indicated at **17** and a throat depth as indicated at **18**. The barbing die is applied to the edge **11** in the direction indicated by the arrow for displacing material at the edge **11** to form the aforementioned barbing recess **16** and the barb **19** at the inner end of the barbing recess.

In the application of a barbing tool **14** as described, stresses are imparted to the grain structure of the steel in the body of the needle which are especially concentrated at a plane perpendicular to the needle body at the throat depth **18** of the barbing recess. In accordance with the present invention, it is proposed to provide the aforementioned anvil **12** with a transversely extending ridge, as indicated at **22**, lying in position substantially intermediate the ends of the throat length **17** so as to form a counter-stressing recess **23** in the opposed base surface **10** of the needle body opposite the edge **11** in which the barbing recess and barb are formed.

Preferably, the counter-stressing recess **23** formed by the ridge **22** is of a recess depth area substantially equal to the area at the throat depth of the barbing recess.

In fabricating a felting needle as above described, I have found that equal and oppositely acting stresses are provided in the grain structure of the body of the needle over a substantial area of the body of the needle as indicated by the dotted lines as shown in FIGURE 2 providing a needle which has remarkable mechanical strength and resistance to breakage at the barbing recess. The grain structure of the body portion of the needle is stressed in tension between the anvil ridge **22** and the barbing tool

which results in a needle of greater mechanical strength at the recess portion.

In a typical example of my invention the felting needle may be fabricated of steel having a body portion of triangular cross section and measuring .040 inch from a side wall **10** to an opposite corner edge **11**, and of a cross-sectional area of .0012 square inch. The material at the edge **11** may be displaced in an amount of .008 inch to provide a throat depth of an area of .0001 square inch. The counter stressing recess may be of a width of .005 inch and a depth of .0025 so as to be of an area of about .0001 square inch.

While there has been shown and described preferred embodiments of the felting needles of the present invention, it will be understood that various modifications and rearrangements may be made therein without departing from the spirit and scope of the invention.

The invention claimed is:

1. As a new article of manufacture a felting needle having a body portion provided with a barbing recess and a barb at said barbing recess formed by displaced material of said body portion, and a substantially equal counter-stressing recess in said body portion opposite and substantially intermediate the ends of said barbing recess.

2. The article of manufacture of claim **1** characterized by said body portion being substantially triangular in cross-section, said barbing recess and said barb being formed in a lengthwise edge defined by two adjacent intersecting surfaces of said body portion, and said counter-stressing recess being formed in the other surface of said body portion and extending transversely relative to the body portion of said needle.

3. The article of manufacture of claim **2** characterized by said barbing recess having a throat length extending diagonally inwardly lengthwise of said edge of said body portion to a throat depth of predetermined extent at said barb, and the area at said throat depth and the area of said counter-stressing recess being substantially equal.

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