March 18, 1969 R. MEAGHER 3,432,896

FELTING NEEDLES

Filed Oct. 10, 1966

FIG. 1

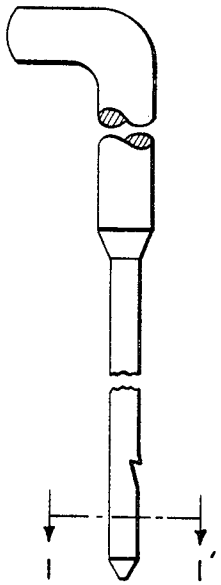


FIG. 2

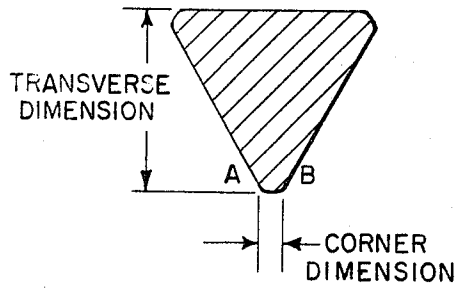


FIG. 3

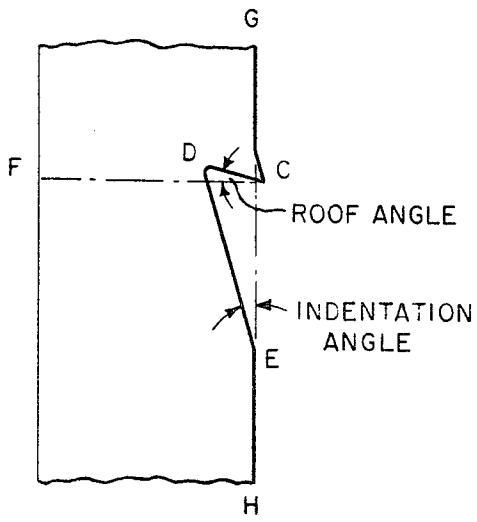
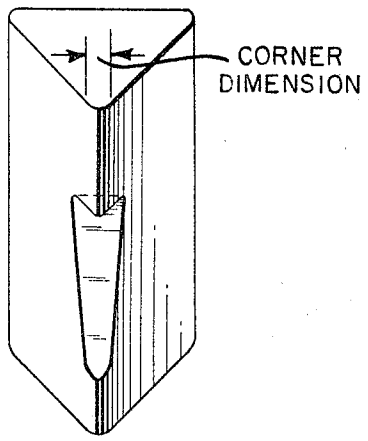


FIG. 4



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FELTING NEEDLES

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Int. Cl. D04h 18/00

This invention relates to needles. It is more particularly directed to felting needles having improved wear characteristics.

In the drawings:

FIGURE 1 is a side view of a needle of the invention;

FIGURE 2 is an enlarged cross-sectional view of a needle of the invention, taken at line 1–1′ of FIGURE 1;

FIGURE 3 is an enlarged side view of a barb on the blade of a needle of the invention, the angles being slightly exaggerated; and

FIGURE 4 is an enlarged perspective front view of a barb on the blade of a needle of the invention.

Triangular felting needles of the general type shown in the drawings have been used for some time. It has now been found that if certain criticalities in the blade configuration of such a needle are built into it during its manufacture, the needle's wear can be greatly reduced and its useful life increased by a factor of 10 or 15. For example, steel needles of the invention have performed effectively for over 14 million strokes, while conventional needles of the same composition are worn and useless after only 1–3 million strokes.

The configurational criticalities of the needles of the invention are in corner dimension and roof angle. These terms will be more easily understood by referring to the drawings. In FIGURE 2, "corner dimension" is the distance in inches between point A and point B, at which points the two sides of the blade intersect the flattened arc defined by a corner of the blade. In FIGURE 3, "roof angle" is the angle defined by the intersection of the roof of the barb, represented by line CD, and the transverse axis of the needle, line CF.

Also in FIGURE 3, "indentation angle" is the angle defined by the intersecton of the wall of the barb, represented by line DE, and the longitudinal edge of the needle, line GEH. "Throat length" is the distance in inches between point D and a line at a right angle to line GEH through point E.

According to the invention, the corner dimension of the blade of the needle should be no larger than about 0.004 inch. A needle preferred for its good wearing qualities will have a corner dimension of about .003 to .0035 inch. The best needle will have as small a corner dimension as possible. Only the edge of the blade bearing the barb need have these dimensions, but as a practical matter all three edges will have corner dimensions within these ranges.

The roof angle of the barb should be from about 15° to about 40°, preferably from about 15° through about 21°.

The indentation angle should be from about 4° through about 10°, preferably from about 5° through about 7°, and the throat length should be from about .013 inch through about .033 inch.

The barb is located on a longitudinal edge of the blade, as illustrated in FIGURE 4. The needle can have one or more barbs. When two or more are present, they can all

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be on the same edge or can be distributed on the other edges in any desired fashion.

The blade's length and thickness will be dictated by need and usage. The length will vary according to the equipment in which the needle is to be used and the type and thickness of fabric to be felted, and the thickness will be governed by the needle's composition and the size of the hole which can be tolerated in the fabric. As a practical matter, the blade will seldom have a transverse dimension larger than about .025 inch, and will preferably have a transverse dimension of from .012 to .020 inch. "Transverse dimension," as illustrated in FIGURE 2, is defined as the shortest distance in inches between a side of the blade and the center of the opposite corner.

In FIGURES 1 and 3, the needles are illustrated as having barbs with kickup, kickup (as shown in FIGURE 3) being the shortest distance in inches between point C and the needle's edge, line GEH. However, observing the design criticalities just mentioned will give a needle so efficient it will work effectively in most cases if it has no kickup at all. Kickup of more than about .00035–.0004 inch is unnecessary, and indeed, in certain cases may even adversely effect needling performance. Needles having a kickup of no more than about .0004 inch are therefore preferred and needles having no kickup are even more preferred.

From all this it will be clear that a preferred needle of the invention will bear a barb having a roof angle of from about 15° through about 21°, and indentation angle of from about 5° through about 7° and a throat length of from about .013 through about .033 inch. The corner dimension of this preferred needle will be about .003–.0035 inch, the transverse dimension will be about .012–.020 inch, and its kickup will be minimal.

The felting needle of the invention, in the usual case, will be metallic, but a needle for a particular use may be of plastic or ceramic material.

The needle can be made by conventional needle manufacturing techniques.

The claims are:

1. A felting needle having a blade whose transverse cross-section defines a triangle with rounded corners, the blade bearing at least one barb, the barb having a kickup of no more than .0004 inch, a roof angle of from about 15° through about 40°, an indentation angle of from about 4° through about 10° and a throat length of from about .013 inch through about .033 inch, the edge of the blade bearing the barb having a corner dimension no greater than about .004 inch.

2. A needle according to claim 1 whose barb has a roof angle of from about 15° through about 21° and an indentation angle of from about 5° through about 7°, and whose blade has a corner dimension of about .0003 through about .0035 inch and a transverse dimension of from about .012 through about .020 inch.

3. A needle according to claim 2, the needle's barb being free of kickup.

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LOUIS K. RIMRODT, *Primary Examiner.*