May 18, 1954 F. S. BROWN 2,678,484

FELTING NEEDLE

Filed Sept. 26, 1950

Fig. 1.

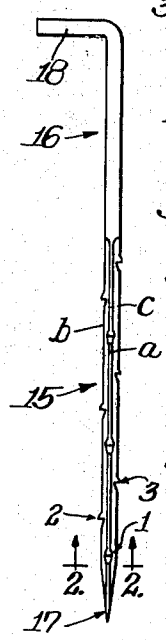


Fig. 2.

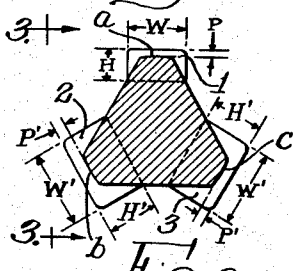


Fig. 3.

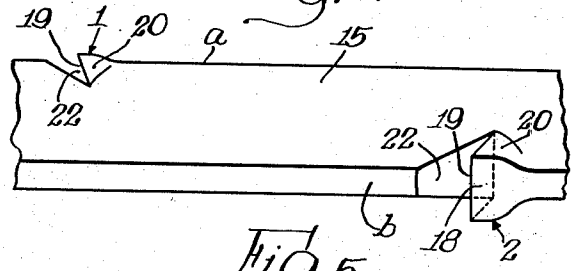


Fig. 4.

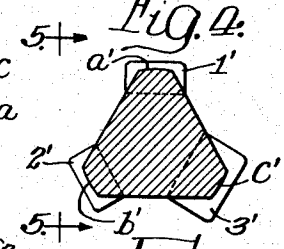


Fig. 5.

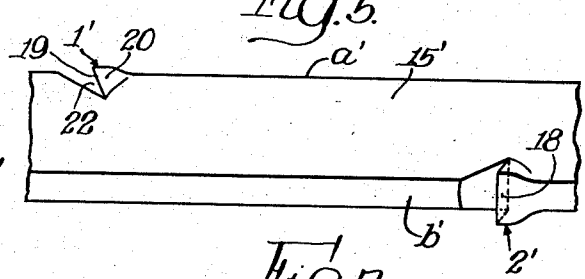


Fig. 6.

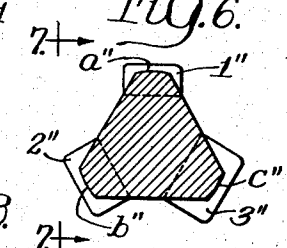


Fig. 7.

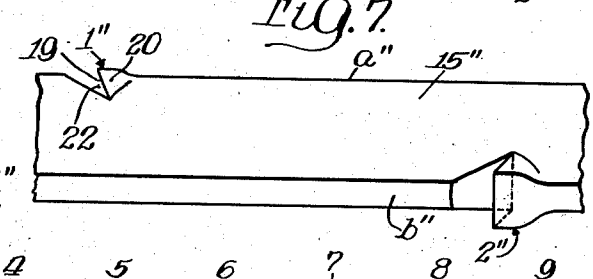


Fig. 8.

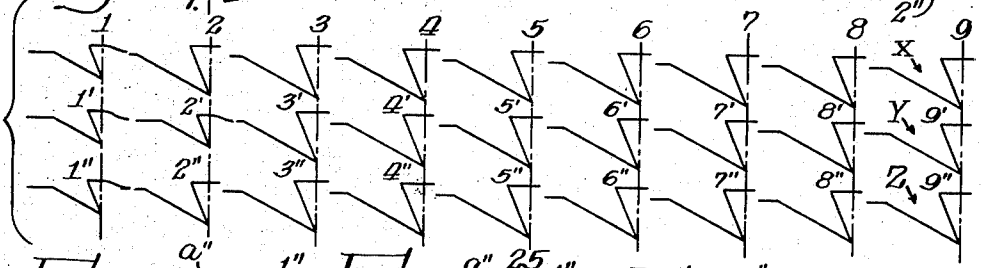


Fig. 9.

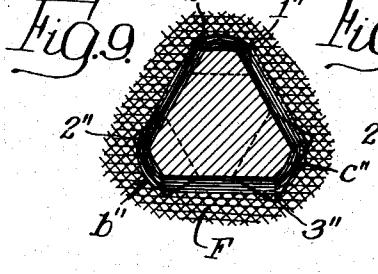


Fig. 10.

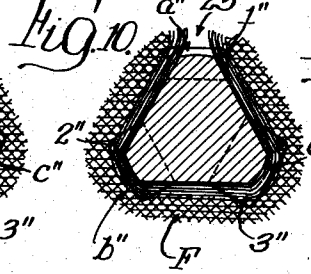
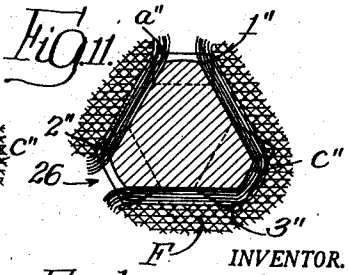


Fig. 11.



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Attys.

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UNITED STATES PATENT OFFICE

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FELTING NEEDLE

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Application September 26, 1950, Serial No. 186,870

2 Claims. (Cl. 28—4)

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My present invention relates to improvements in felting needles.

It has long been the practice to provide felting needles with a plurality of spaced bars or spurs of uniform size about the periphery of the body of the needle. The most common form of felting needle has a body portion of triangular cross section pointed at one end and with the several spurs or barbs being formed in the edges defined by adjacent intersecting surfaces of the body portion of the needle. In this, and other known forms of felting needles, the first or first and second bars at the pointed end of the body portion take the brunt of the fiber tension and wear in the felting operation, due to their lead position in entering the material first.

It is a primary object of my present invention to provide a felting needle having a lead barb or barbs of different characteristics than the remainder of the barbs of the needle to the end of providing a felting needle capable of efficient operation for a long time.

A further object of my invention is to provide a felting needle having a lead barb or barbs which function in a different manner than the remaining barbs of the needle for purposes of increasing the efficiency of the last referred to barbs.

A still further object of my invention is to provide a felting needle having a lead barb or barbs of reduced felting capacity as compared to the remaining barbs, with the lead barb or barbs serving to relieve the tension of the fibers upon which the felting operation is being performed, whereby the succeeding barbs are relieved of such fiber tension and may more effectively accomplish the felting operation.

The above and other objects and features of my invention will appear from the detailed description.

Now, in order to acquaint those skilled in the art with the manner of constructing and using felting needles embodying my present invention, I shall describe, in connection with the accompanying drawings, certain preferred forms of felting needles embodying my invention.

In the drawings:

Figure 1 is a side elevational view of a felting needle embodying my present invention;

Figure 2 is a horizontal cross sectional view taken substantially along the line 2—2 of Figure 1, looking in the direction indicated by the arrows;

Figure 3 is a side elevational view of a portion of the body member of the needle of Figures 1 and 2, taken along the line 3—3 of Figure 2,

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looking in the direction indicated by the arrows;

Figure 4 is a cross sectional view similar to Figure 2, but showing another embodiment of my invention;

Figure 5 is a side elevational view of a portion of the body of a felting needle of the cross sectional configuration of Figure 4, with the view being taken along the line 5—5 of Figure 4, looking in the direction indicated by the arrows;

Figure 6 is a cross sectional view similar to Figures 2 and 4, but showing still another embodiment of my invention;

Figure 7 is a side elevational view of a portion of the body member of the cross sectional configuration of Figure 6, with the view being taken substantially along the line 7—7 of Figure 6, looking in the direction indicated by the arrows;

Figure 8 is a composite view, illustrating diagrammatically from top to bottom the barb arrangements of the needles of Figures 2, 4, and 6, respectively; and

Figures 9, 10, and 11 are views illustrating diagrammatically the manner in which the felting needle, of the form shown in Figures 6 and 7, functions in operation.

Referring now to Figures 1, 2, and 3, I have shown a felting needle embodying my present invention in which the felting needle comprises a body portion 15 and a shank portion 16. The lower end of the body portion 15 is pointed, as indicated at 17, for penetrating the material to be felted by the needle, and the upper portion of the shank 16 may be bent at substantially right angles to provide a securing element 18 for securing the felting needle in a conventional manner in the needle carrying plate means of a felting machine. The body portion 15, in the embodiment of my invention shown in Figure 1, is of triangular configuration, although it will be understood that the body portion may be of other cross sectional shapes without departing from the spirit and scope of my invention. However, the triangular cross sectional needle is the conventional body section of felting needles in use today, and I have, therefore, chosen to illustrate my invention in such a needle. By virtue of providing a needle having a triangular body portion, three edges, indicated at *a*, *b*, and *c*, are provided. Each of the edges *a*, *b*, and *c*, as indicated in Figure 1, have a plurality of barbs or spurs formed therein and these barbs or spurs are identified by reference numerals 1 through 9, beginning, respectively, with barb or spur 1 formed in edge *a* adjacent the pointed end 17 of the needle; with barb 2 formed in edge *b* next

above barb 1; and barb 3 in edge *c* next above barb 2. The several succeeding barbs are formed progressively in the several edges in the sequence noted, so that each edge of the body portion has formed therein three barbs. In the sequence noted, edge *a* will have barbs 1, 4, and 7 formed therein, edge *b* will have barbs 2, 5, and 8 formed therein, and edge *c* will have barbs 3, 6, and 9 formed therein. These several barbs 1 through 9 of the felting needle of Figure 1 are illustrated in profile, in the diagrammatic barb outline of the top row, indicated at X. It will be understood that fewer or greater numbers of barbs may be provided, if desired.

Referring now, more particularly, to Figures 2 and 3, it will be observed that barb 1 of edge *a*, the barb closest adjacent the pointed end 17 of the needle, is of smaller dimension than the barbs 2 and 3 of edges *b* and *c*. The several barbs 1, 2, and 3, as well as barbs 4 through 9, may, for example, be of the form shown in United States Letters Patent No. 2,495,926, dated January 31, 1950, to Edson P. Foster. Referring to Figure 2, it will be observed that the height of barb 1, indicated by the reference character H, is substantially less than the equal heights H', H' of barbs 2 and 3. Further, the projection of barb 1, indicated by the reference character P, is less than the equal projections of barbs 2 and 3, indicated by the reference characters P', P'. Similarly, the width W of barb 1 on edge *a* is substantially less than the equal widths W', W' of barbs 2 and 3. As illustrated in Figure 3, the barbs 1, 2, and 3 are substantially of the same form, but differ in the dimensions previously referred to, and comprise, as disclosed in the aforementioned patent to Edson P. Foster, a spur or projecting portion overlying a recess or notch 22 extending into the body part. An outer lengthwise extending wall 18 defines the limit of the lateral projection of the barbs, and each barb includes an end wall 19 facing recess 22 and serving as a working surface. The end wall 19 is substantially quadrangular and the outer edge portion thereof projects beyond the adjacent edge of the triangular body portion of the needle. The barbs are further defined by side walls 20 which extend substantially in parallel relation upward of the body of the needle, and taper inwardly and merge into the body of the needle. The several barbs may be formed by displacing metal in the triangular body portion to define the recess or notch, and utilizing the displaced metal to form the barb or spur above the notch or recess. It will be understood, however, that the barbs or spurs may be of different configuration than that described, and may be created by cutting the body portion of the needle rather than by displacing the metal as referred to above.

In the construction above noted, it will be observed that the lead barb 1 at edge *a*, most closely adjacent the pointed end 17 of the needle, is of less felting capacity than the barbs 2 and 3. In the construction described, the remaining barbs 4 through 9 of the felting needle are the same as that of the barbs 2 and 3. Thus, the felting needle comprises a lead barb or spur which is of less felting capacity and of smaller dimensions, in the respects above noted, than the remaining spurs or barbs of the needle. In each instance, the depth of the notches or recesses 22 of the several barbs or spurs may be controlled to provide the desired heights or projections of the barbs or spurs. In this connection, the depth of recess 22 of barb 1 would be less than the depth of the recess 22 of barbs 2 through 9.

Referring now to Figures 4 and 5, I have shown a modified form of felting needle embodying my present invention in which the triangular body portion 15' of the needle comprises the corner edges *a'*, *b'*, and *c'*. Felting barbs or spurs 1' through 9' are formed in the edges of the body of the needle in a corresponding fashion to the barbs 1 and 9 of the embodiment of the invention shown in Figures 1, 2, and 3. In the form of my invention herein disclosed, the barbs or spurs 1' and 2', which are the two barbs or spurs closest to the pointed end of the body of the needle, are identical to the construction of the barb or spur 1 of the first form of needle described. Barbs or spurs 3' through 9' are identical to the barbs or spurs 3 through 9 of the embodiment described in connection with Figures 1 through 3. The center row Y of Figure 8 illustrates diagrammatically in profile the barb or spur arrangement of this form of my invention. Thus, in this embodiment, the two lead barbs or spurs are of less felting capacity than the remaining barbs or spurs of the needle.

Referring now to Figures 6 and 7, I have shown still another embodiment of my invention in which the felting needle again comprises a body portion 15'' of triangular cross sectional configuration with the edges thereof, namely, *a''*, *b''*, and *c''*, being formed with barbs or spurs 1'', 2'', and 3'', and in which the remaining barbs or spurs, indicated diagrammatically and in profile in the bottom row at Z in Figure 8, are identical to the barbs or spurs 4 through 9 of the embodiment of Figures 1, 2, and 3; and 4' through 9' of the embodiment of Figures 4 and 5. In the form of the invention illustrated in Figures 6 and 7, the barb or spur 2'' is of slightly greater height, width, and projection than the barb 1'' and slightly less, in the respects noted, of the barb 3''.

In each of the three forms of my invention, it will be observed that the lead barb or barbs are of less felting capacity than the remaining barbs on the needle body. By virtue of the constructions noted, important advantages are achieved. In the felting operation, material into which the felting needles are to be projected afford resistance to penetration of the needles. The needles, by displacement of the material, increase the density and tension of the fibers surrounding the opening created by the needle, and the tension of such fibers tends to pull them off of the barbs of the needle and thus reduces the efficiency of the needle in effecting the felting operation. By providing felting needles as above described, the lead barb or barbs are effective for conditioning the material being worked upon for subsequent efficient operation by the following or remaining barbs or spurs. The lead barb or barbs, as will be described below, with particular reference to the embodiment of Figures 7 and 8, are effective for eliminating or reducing the fabric tension above related.

It will be observed that the lead barb, adjacent the pointed end of the body of the needle in all forms of my invention above described, is of the smallest felting capacity, and that, with respect of Figures 4 and 5, the barb 2' is the same as that of barb 1', and that, with respect to Figures 6 and 7, the barb 2'' is of slightly greater felting capacity than barb 1'', with barbs 3'' through 9'' all being of greater felting capacity than barb 2'', and with barbs 3'' through 9'' being of the same barbing or felting capacity. In all the

needles the action or function of the lead barbs 1, 1', and 1'' is the same.

Reference may now be had to Figures 9 through 11, in which I have illustrated diagrammatically the function or operation in the felting operation of the form of needle described in connection with Figures 6 and 7. In Figures 9, 10, and 11, the material of fibers to be felted is indicated generally at F, and the fibers forming the sides of the hole made by the needle in penetrating the material are plainly shown. It can be easily comprehended that these particular fibers are subject to the most positive felting action. This is because they lie across the path of the barb and around the body of the needle where there is the least likelihood of their slipping off. In Figure 9, the triangular body of the needle is shown penetrating the material, just prior to the felting action of the first barb. Due to the fact that it enters the material first, it becomes the particular function of the first barb to sever or rupture the cohesive wall, forming the sides of the needle hole, during its downward felting stroke. This whole wall has a tenacious unanimity created by the increased density due to the needles displacement and the holding power of fiber laying upon and around fiber. With the passage of the first barb, the encompassing continuity of the fibers is broken and they are set loose for vastly easier felting action by the subsequent barbs, as is clearly shown at 25 in Figure 10. Thus, an important object of my invention is accomplished by providing a first barb of limited capacity to reduce the stress of felting this initial rupture of the needle hole wall.

Continuing with Figure 11, the effects of the downward passage of the second barb are shown. Although this second rupture is made adjacent to that of the first barb, there remains considerable continuity of the needle hole wall structure on the other side and while in no way approaching the stress of the initial rupture, the load on this second barb is greater than that of any barb succeeding it. While not necessary in all cases, it is a further object of my invention to provide where

fine punching is desired and necessary, a second barb of reduced felting capacity.

The sides of the needle hole wall have now been ruptured by barbs 1 and 2 on either side of barb 3 and the fibers operable upon by that barb have no continuity around the needle; they lie adjacent to the barb and are felted by it with a minimum of stress. Consequently, barb 3 and subsequent barbs can and preferably should have a greater felting capacity to achieve the further object of my invention to a felting needle having additional utility from the standpoint of wear and long life.

While I have shown what I consider to be certain preferred embodiments of my invention, it will be understood that various modifications and rearrangements may be made therein without departing from the spirit and scope of my invention.

I claim:

1. A felting needle having a body portion of substantially uniform cross-section and provided with a pointed end, a plurality of barbs disposed in a row lengthwise of said body portion inwardly of the pointed end thereof, and the barb closest to said pointed end being of appreciably less height than the remaining barbs in the row.

2. A felting needle having a body portion of substantially uniform triangular cross section and formed with a pointed end, a plurality of barbs on an edge formed by a pair of intersecting surfaces of said body portion inwardly of the pointed end thereof, and the barb on said edge nearest the pointed end of the needle being of appreciably less height than the next adjacent barb on said edge.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
477,171	Fennerty	June 14, 1892
1,273,427	Von Schrenk	July 23, 1918
2,326,038	Kopriva et al.	Aug. 3, 1943
2,495,926	Foster	Jan. 31, 1950