Jan. 31, 1950 E. P. FOSTER 2,495,926

FELTING NEEDLE

Filed Jan. 30, 1947 2 Sheets-Sheet 1

Fig. 1.

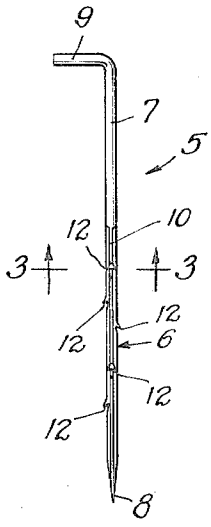


Fig. 2.

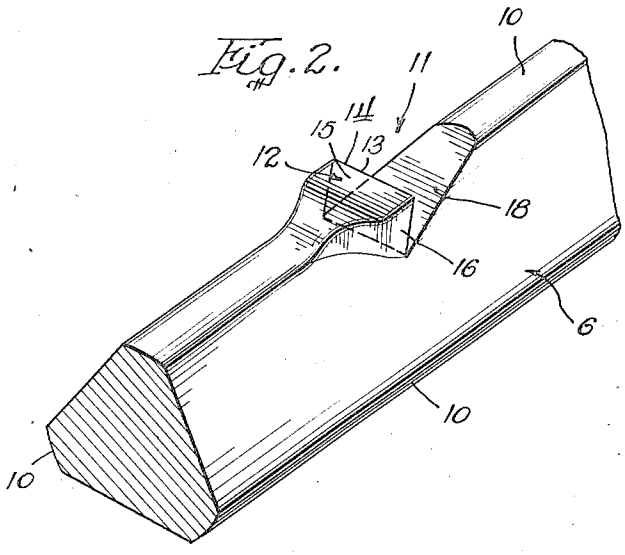


Fig. 3.

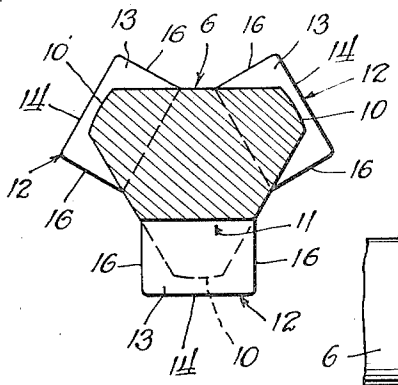
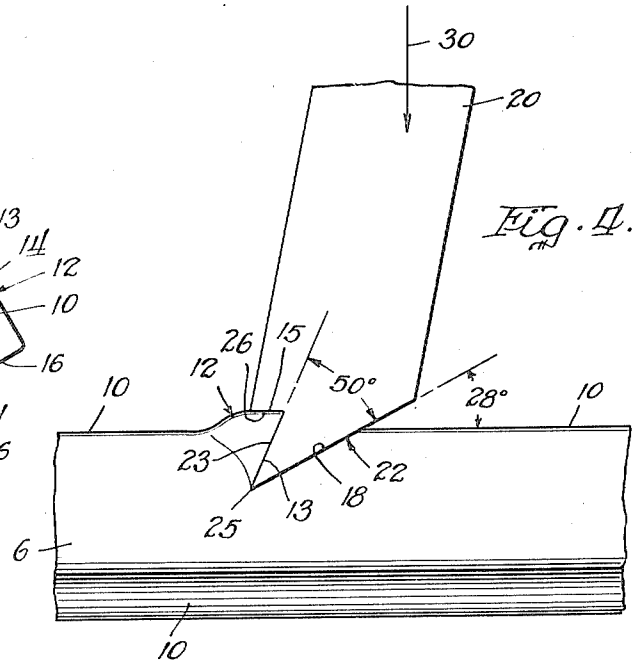


Fig. 4.



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FELTING NEEDLE

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Fig. 5.

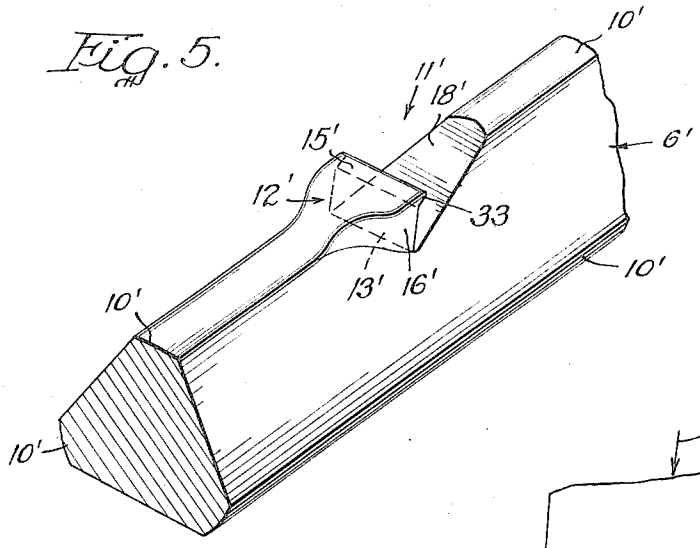
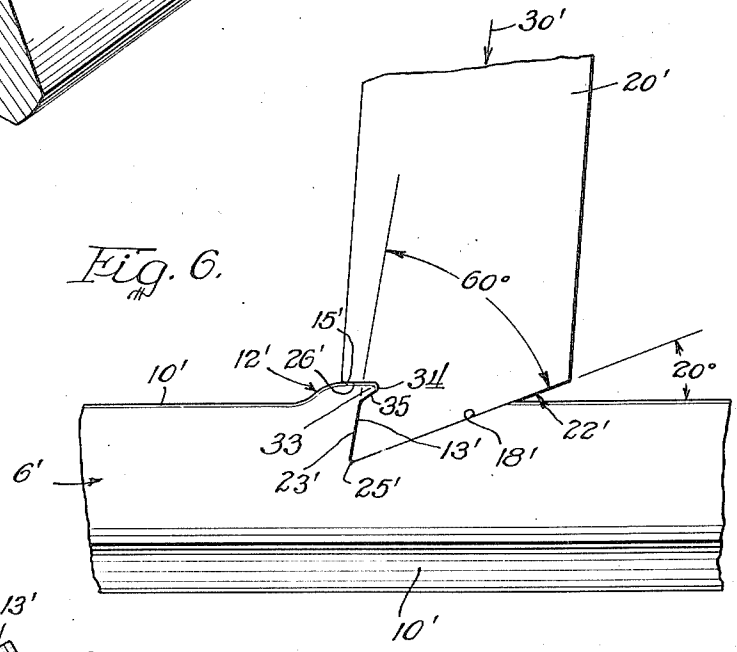


Fig. 6.



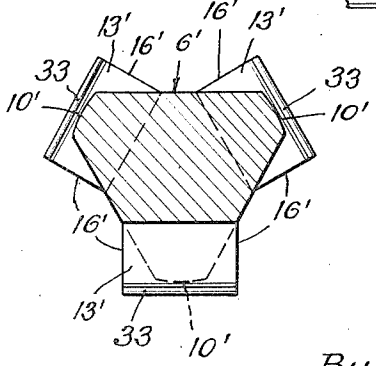


Fig. 7.

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Patented Jan. 31, 1950 2,495,926

UNITED STATES PATENT OFFICE

2,495,926

FELTING NEEDLE

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Application January 30, 1947, Serial No. 725,205

11 Claims. (Cl. 28—4)

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My present invention relates to an improvement in felting needles.

In my Patent No. 2,349,086, dated May 16, 1944, I have disclosed a felting needle having a spur or barb in the body portion thereof having a material engaging surface of considerable or appreciable width at its outer edge and of generally quadrangular outline. Such a working surface for the spur or barb provides for substantially increasing the efficiency of a felting needle since the width of the outer edge prevents considerable slippage of fibers being interlaced and with the substantial area of the working surface increasing the capacity of the spur over the prior known form of barbs or spurs.

As above indicated felting needles are used in felting machines which, as is known, are employed for compacting loose fibrous materials such as wool, hair and fur or a combination of these or other like materials. Felting machines in use today comprise a needle mounting plate for supporting a plurality of felting needles which plate is mounted for vertical reciprocatory movement above an endless horizontal conveyor upon which the material to be compacted is carried below the reciprocating plate. The barbs or spurs of the needles carried by the plate are formed with pointed ends so that upon the downward movement of the plate the needles penetrate the fibrous mass with the barbs or spurs serving to engage and interlace the fibrous material on the conveyor and with the barbs being formed to free themselves of the material upon upward movement of the plate. The needles may be secured in any suitable manner in the needle plate. The usual practice is to form the plate of two members with one member forming a base and having a plurality of openings through which the needles extend. The needles opposite the pointed ends thereof are formed with bent over ends which rest upon the upper surface of the base member with these ends of the needles then being secured in place by clamping the other member of the plate to the base member. By controlling the speed of the conveyor and the reciprocating plate the degree of movement of the needles in and out of the material as it is carried along by the conveyor below may be controlled to compact the material, within limits to the desired degree.

My present invention is concerned primarily with an improved spur having a working surface of the character of my above mentioned patent. In that patent there is disclosed a spur formed in the body portion of a needle by generally

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downwardly directed parallel side walls and an end wall extending transversely of the body and intersecting the side walls with the end wall forming a substantially quadrangular working surface for the spur. As disclosed in that patent such a spur for a felting needle preferably is formed by removing material from cylindrical stock to form the pair of lengthwise extending side walls to provide in effect a rib extending lengthwise of the body portion of the needle. Thereafter the end wall of the spur is formed by removing material transversely of the rib which end wall intersects the parallel side walls and with the recess thus formed in the rib providing for access of fibers to the working surface of the spur defined by the end wall.

As above noted in making felting needles in accordance with the method of my above patent it is preferable to use substantially cylindrical stock so that sufficient material remains after removal of the material to define a rib in which the spur is formed to provide adequate mechanical strength for the needle.

My instant invention contemplates the provision of an improved form of spur or barb having the quadrangular working surface of my earlier patent but which may be of greater area and in which the barb or spur is formed of substantially more material so that it is of greater efficiency and longer life.

Further, my present invention in another embodiment thereof is concerned with a felting needle having a spur in which the outer edge of the working surface is formed with a longitudinally extending lip which serves in the operation of the needle to engage and prevent fibers being interlaced from slipping off of the spur.

Still further, and perhaps most importantly, my invention contemplates the making of felting needles in a manner whereby the projection of the spur with respect to a corner edge in which the recess and spur are formed may be controlled i. e., in the formation of a spur or barb by my present invention the position of the outer lengthwise extending wall defining the spur or barb may be caused to be disposed in a predetermined relation with respect to the corner edge of the needle body in which the spur or barb is formed. For example, if desired, the outer working edge can within predetermined limits be disposed to extend any desired distance from the corner edge of the felting needle body.

According to my present invention I propose to form one or more spurs or barbs in the body portion of a felting needle with the body por-

tion preferably being of substantially polygonal cross-section to provide corner edges extending lengthwise of the needle in which the spurs or barbs are formed. It is conventional in the art today to make a felting needle from substantially cylindrical stock with that portion of the stock which is to form the body portion of the needle being swaged as, for example, to form it of substantially triangular cross-section to provide corner edges in which the barbs or spurs may be formed.

It is old in the art to form barbs in such a body portion by striking the edges thereof with a barbing knife formed similar in shape to a chisel. In using such a knife a substantially V-shaped recess is formed in the edge of the body portion with material being displaced to form a projecting barb above the recess and transversely of the sides of the recess. By the use of such a barbing knife no control of the displaced material to predetermine the position of the outer edge of the barb with respect to the corner edge of the needle body is possible. Further, the projecting barb thus formed consists of only a relatively small portion of the displaced material and wears away rapidly after a short period of use.

It is an object of my invention to provide a felting needle having a barb or spur projecting laterally outwardly of the body portion of the needle and in which the outer lengthwise extending wall or outer edge of the working surface of the barb or spur is disposed in a predetermined relation with respect to the plane of the body portion of the needle in which the barb or spur is formed.

Another object of my invention is to provide a felting needle having a barb or spur formed in the body portion thereof in which the material displaced to form a notch or recess below the barb is utilized to provide a larger barb comprising substantially all of the displaced material so that it is more efficient in operation and not subject to rapid wearing away.

Another object of my invention is to provide a spur or barb as last aforesaid in which the working surface thereof is of substantially quadrangular outline.

Another object of my invention is to provide a spur or barb having a surface of substantially quadrangular outline and in which a lip extends longitudinally of the outer edge of the spur or barb in a position overlying the recess above which the spur or barb is disposed.

The above and other objects and advantages of my invention will appear from the following detailed description of a preferred embodiment of my invention.

Now, in order to acquaint those skilled in the art with the method of making and utilizing felting needles in accordance with the principles of my present invention I shall describe in connection with accompanying drawing a preferred embodiment of my invention.

In the drawing;

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

Figure 2 is a greatly enlarged perspective view of a portion of the body of the felting needle of Figure 1 illustrating the barb or spur of my present invention;

Figure 3 is a detail horizontal sectional view taken substantially on the line 3—3 of Figure 1 looking in a direction indicated by the arrows;

Figure 4 is a side elevational view illustrating the manner in which a barb of Figures 2 and 3 is formed in the body portion of a felting needle.

Figure 5 is a view similar to Figure 2 illustrating another embodiment of my invention in which a longitudinally downwardly extending lip is disposed at the outer transversely extending edge of the spur or barb and lying above the notch or recess in the body portion of the needle providing access of fibers to the spur or barb;

Figure 6 is a view similar to Figure 3 but showing the plurality of spurs or barbs like the spur or barb of Figure 5; and

Figure 7 is a side elevational view illustrating the manner in which the barbs or spurs of Figures 5 and 6 are formed in the body portions of a felting needle.

Referring now to the drawing I have shown in Figure 1 a felting needle **5** constructed in accordance with my 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 the manner above related. The upper end portion of the needle may be bent substantially at right angles to the shank portion **7** to provide a securing element or ear **9** to be clamped between a base member and clamping member of a needle plate as previously described. Also as previously related such a needle plate is adapted to support a plurality of felting needles such as that shown in Figure 1 which, in the reciprocation of the plate in the felting machine, effects the interlacing and compacting of loose fibrous materials.

The felting needles of my instant invention may be made of any suitable stock having the necessary mechanical strength as for example steel wire. In making up the needles of my present invention preferably originally round steel wire stock is used from which a suitable length is cut to form a needle with the portion thereof which is to become the body of the needle being appropriately swaged to form it of triangular cross section. The body portion may then be pointed at its end with the other end of the shank being bent to form the securing element as above noted. The shank portion **5** is not disturbed and remains of round cross section and which portion together with the securing element provides for mounting of the needle in a needle plate as previously described.

It is preferable in practicing my present invention to provide a felting needle having a body portion of polygonal cross section such as that of conventional triangular cross section providing a plurality of corner edges **10** as illustrated in the fragmentary portion of the body of the needle shown in Figure 2.

Referring now to Figure 2 it will be observed that a corner edge of **10** of the body portion is preferably slightly rounded and that a portion of the material in the corner edge is displaced in the forming of the notch **11** is shaped to form a spur or barb **12** above the notch **11** projecting laterally of the body portion and which spur or barb as will be clear from Figures 2 and 3 is formed with a substantially quadrangular end wall **13** defining the working surface of the spur or barb. The outer lengthwise extending wall **15** defining the limit of the lateral projection of the barb and outer edge **14** of the working surface formed by end wall **13** of the barb **12** shown in Figure 3 project substantially beyond the corner edge **10** of the body portion in a position where the outer edge **14** may readily engage and interlace loose

fibrous material. As shown in the figure last noted, the wall 15 lies in a plane disposed lateraly outwardly of the surface of the body portion of the needle in which the barb 12 is formed, and substantially parallel to the longitudinal axis of the needle. However, as will be described later, the position of the wall 15 and edge 14 may be otherwise disposed with respect to the plane of the corner edge 10 of the felting needle as desired. Also, it will be observed that the barb 12 is of a width substantially in excess of the width of the rounded corner edge 10.

The barb 12 is further defined by side walls 16—16 which are substantially in parallel relation for a substantial distance upward of the end wall 13 and then taper inwardly and merge together with the upper end of the outer wall 15 into the rounded corner edge 10 upwardly of the end wall 13 of the spur.

The material displaced in forming the notch 11 as will be clear from Figure 2 is substantially caused to be displaced upwardly of the needle body and transversely into the spur 12 without there being any substantial transverse displacement of the metal at the notch or recess as sidewise of the diagonally inwardly directed surface or wall 18 which together with the end wall 13 define the notch 11. The material thus displaced in the corner edge 10 of the needle body to form the V-shaped notch 11 is substantially all caused to be moved generally upwardly of the pointed end of the needle to form the spur or barb 12 with a substantially quadrangular working end wall 13 which is of substantially greater width than the rounded corner edge 10 and with the outer edge 14 of the end wall 13 projecting in the form shown in Figure 2 beyond the rounded corner edge 10 in a position where it may readily engage fibers to be interlaced. Substantially all of the material thus displaced in forming of the notch 11 is utilized in the formation of the barb or spur 12 being of substantial depth along the parallel portions of side walls 16—16 in a lengthwise direction of the body portion of the needle to provide a long wearing as well as an efficient fiber engaging surface for the spur or barb.

It will be understood that the several rounded corner edges 10 of the body portion of a needle each may be provided with one or more of the barbs 12 and notches 11 of the construction above described in detail in connection with Figures 2 and 3 and as shown in the latter and in Figure 1 so that upon a single reciprocation of the felting needle a large number of fibers are caused to be engaged and interlaced.

Referring now to Figure 4 I have shown a body portion 6 of the felting needle of my present invention disposed horizontally and illustrating a barbing die 20 of a form for forming the notch 11 and barb 12 in a corner edge 10 of the body portion of a felting needle. It will be observed that the barbing tool or die 20 is shown in the position it occupies upon completion of the spur 12. The barbing die 20 may be mounted in any suitable clamp or holding device adjacent its upper end for moving the die substantially vertically toward and away from the body portion of a needle with such mounting preferably being of a character to provide for slight longitudinal movement lengthwise of the needle in a direction toward the spur or barb being formed. It will be observed that the die 20 as viewed in profile in Figure 4 comprises a first surface 22 for forming the wall 18 disposed at an angle of approximately

28 degrees to the horizontal end which together with a wall 23 forms a chisel-like intersection 25 with the wall 23 being disposed at about an angle of 50 degrees with respect to the wall 22. The walls 22 and 23, it will be observed, are adapted to form the substantially V-shaped notches 11 in the body of the felting needle. A substantially horizontal extending wall 26 extends outwardly from the upper inner end of the wall 23 with the walls 26 and 23 providing a notch or recess which serves to control the displaced metal in the formation of the spur or barb 12 and with the wall 26 controlling the position of the outer lengthwise wall 15 of the spur or barb with respect to the corner edge 10.

It will be understood that the above angular relation of the several walls of the die 20 may be varied if desired but by forming the die in such manner a satisfactory spur of my invention may be readily formed. Also, in that die the wall 26 was of a length of 0.1'' and the wall 23 was of a length of 0.18''. It will be observed from these dimensions that the spurs and notches are of small size with the showing in the drawing being greatly enlarged to clearly illustrate one suitable form of die with which my present invention may be practiced. As above indicated the barbing die 20 at its upper end is preferably mounted in a slightly resilient mounting bracket means so that upon the substantially vertical downward movement of the die as indicated by the arrow 30 the edge 25 formed by the intersection of the surface or wall 22 and the wall 23 cuts into the corner edge 10 of the felting needle and in a sense effects the displacement of the metal from the notch lengthwise of the needle without there being any substantial displacement of metal transversely of the wall 18 of the notch or downwardly of the body portion of the needle as viewed in Figure 4. The flow of the displaced material is confined in the notch formed by the wall 23 and the horizontally extending wall 26 to form the spur 12 of Figure 2.

The barbing die 20 may be made of any convenient width so that as the corner edges of the several walls thereof become worn, the die or the needle stock, or both, may be shifted transversely with respect to each other to present new cutting and forming edges.

I have found that by using a barbing die 20 such as that above described in connection with Figure 4 that the spurs 12 formed therewith comprise about two-thirds more material than spurs of present day needles formed with the conventional form of barbing knives. The barbing knives of the prior art usually comprise a single chisel like edge which are caused to be moved at right angles into the body of the needle which movement causes considerable of the material displaced to form the notch to move transversely of the notch rather than into the spur or barb above the notch. Further, these prior barbing knives are not formed with a wall like the wall 26 of die 20 to control the flow of the displaced material into the barb. As above stated, the use of a barbing die such as the die 20 that although the die is moved substantially at right angles into the corner edge 10 of the body of the felting needle a very limited resilient mounting of the tool at its upper end effects a slightly generally lengthwise movement of the outer end of the die to effect the displacement of substantially all of the material upwardly of the needle to form by reason of the arrangement of walls 22, 23 and 26 a spur of the character indicated above

the notch thus formed. It will be observed that the wall 26 determines the position of the outer wall 15 and outer edge 14 of the working surface 13 of the barb with respect to the plane of corner edge 10 of the body portion of the needle so that by appropriate spacing of the end wall 26 from the intersecting edge formed by the walls 22 and 23, substantially any desired relation of the outer wall 15 and corner edge 14 of the spur with respect to a corner edge may be provided. For example, if desired, the outer wall 15 and corner edge 14 could be readily formed to lie substantially flush with the corner edge of the needle body.

Referring now to Figures 5 through 7 I have shown a modified form of needle of my present invention with the primed reference numerals of these figures indicating like or similar elements or steps in the method as described in connection with embodiment of Figures 1 through 4 and to which reference may be had.

The needle shown in Figures 5 through 7 conforms in all respects to the needle first described except that in this embodiment of the invention the barb or spur 12 is formed with an integral lip 33 at the outer edge of the working surface 13'. The lip 33 as is apparent is effective to engage fibers being interlaced and prevent them from slipping off of the spur 12'. The inner surface of the lip 33 is defined by a short wall 35 forming an inner wall of the barb extending at an angle to the wall 13' of the recess, as best shown in Figure 6. The recess in the body portion of the needle is thus defined by the two walls 13' and 18' extending inwardly toward the longitudinal axis of the body portion and toward each other. The barb thus overhangs the outer end of the wall 13', with the wall 35 of the barb extending at an angle thereto.

Referring now to Figure 7 the longitudinally extending lip 33 is caused to be formed with an outer flattened surface of substantial lateral extent as a result of a swaging operation by providing an appropriately formed transversely extending groove 34 at the intersection of walls 23' and 26'. Also, in this form of barbing die 20' I have shown a second angular relation of the walls of the die with the walls 23' and 18' defining an angle of 60° and with the wall 18' extending at an angle of 20° to the horizontal in the position of the die shown in Figure 7. The latter angular relation is probably more convenient in the formation of the barbs or spurs for it is effective to cause a slightly greater longitudinal displacement of the material removed in forming the notch and also more readily facilitates the displacement of the material to form the notch. It will be understood that the above angular relationship of the several walls with respect to each other are but illustrative for purposes of describing operative embodiments of my invention and that such angular relationship may vary widely.

While I have shown and described what I consider to be the 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. As a new article of manufacture, a felting needle having a recess in the body portion thereof, a spur above said recess said spur having a material engaging surface of substantially quadrangular outline facing said recess with the outer edge thereof projecting beyond the periphery of said body portion.

2. As a new article of manufacture, a felting needle having a body portion of substantially polygonal cross-section with the corner edges thereof being rounded between adjacent pairs of the side faces of said body portion, a substantially V-shaped notch in one of said corner edges, a spur above said recess formed of substantially all of the material displaced in the forming of said notch, the end wall of said spur facing said notch being of substantially quadrangular outline, said spur being further characterized by a substantial portion of the displaced material being disposed in a lengthwise direction of the needle from the end wall of said spur so that it is of appreciable mass to provide a long wearing material engaging surface.

3. As a new article of manufacture, a felting needle having a barb on the body portion thereof, said barb projecting laterally beyond the surface defining said body portion, and said barb having an outer wall portion defining the limit of its lateral projection beyond the surface of said body portion and lying substantially parallel to the longitudinal axis of the needle.

4. A felting needle having an elongated body portion, a recess therein, a barb above said recess projecting laterally beyond the surface of said body portion and formed of material displaced in the formation of said recess, said recess being defined by two walls extending inwardly toward the longitudinal axis of said body portion and toward each other, and said barb having the outer end thereof overhanging the outer end of one of said walls and having an inner wall at an angle thereto.

5. A felting needle having a body portion, a recess therein, a barb projecting outwardly of said body portion and overhanging said recess, said barb having the outer surface thereof flattened as a result of a swaging operation whereby to increase substantially the lateral extent thereof.

6. A felting needle having a body portion, a recess therein, a barb overhanging said recess formed by a swaging operation to project laterally beyond the surface of said body portion, and said barb having the outer surface thereof flattened as a result of a swaging operation to reduce substantially the extent of the lateral projection thereof beyond the surface of said body portion.

7. As a new article of manufacture, a felting needle having a body portion of substantially triangular cross-section, a barb on an edge of said body portion projecting laterally therebeyond, and said barb having an outer wall portion defining the limit of its lateral projection beyond said edge and lying substantially parallel to the longitudinal axis of said needle.

8. A felting needle having an elongated body portion of substantially triangular cross-section, a recess in an edge of said body portion, a barb on said edge above said recess projecting laterally beyond said edge and formed of material displaced in the formation of said recess, said recess being defined by two walls extending inwardly toward the longitudinal axis of said body portion and toward each other, and said barb having the outer end thereof overhanging the outer end of one of said walls and having an inner wall at an angle thereto.

9. A felting needle having a body portion of substantially triangular cross-section, a recess extending inwardly of a corner edge of said body portion, a barb projecting outwardly of said edge

and overhanging said recess, said barb having the outer surface thereof flattened as a result of a swaging operation whereby to increase substantially the lateral extent thereof.

10. A felting needle having a body portion of substantially triangular cross-section, a recess extending inwardly of a corner edge of said body portion, a barb overhanging said recess formed by a swaging operation to project laterally beyond said edge, and said barb having the outer surface thereof flattened as a result of a swaging operation to reduce substantially the extent of the lateral projection thereof beyond said corner edge.

11. As a new article of manufacture, a felting needle having a recess in the body portion thereof, and a spur above said recess formed of material displaced in the body portion to form said recess, said spur having an end wall of substantially quadrangular outline facing said recess with the outer edge of said end wall extending

longitudinally of said body portion and being disposed outwardly of said body portion.

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