June 22, 1943. E. P. FOSTER 2,322,573

FELTING NEEDLE

Filed Dec. 9, 1940

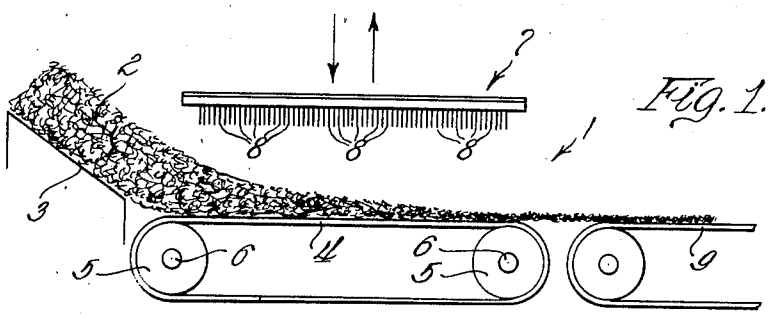


Fig. 1.

Fig. 2.

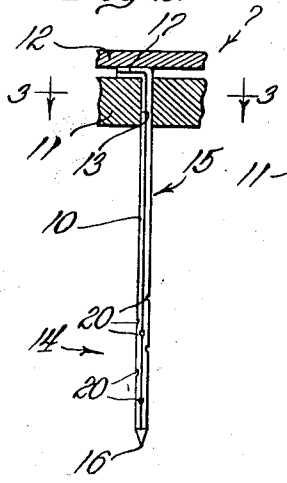


Fig. 3.

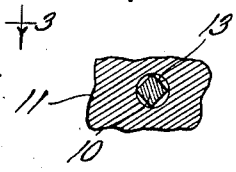


Fig. 4.

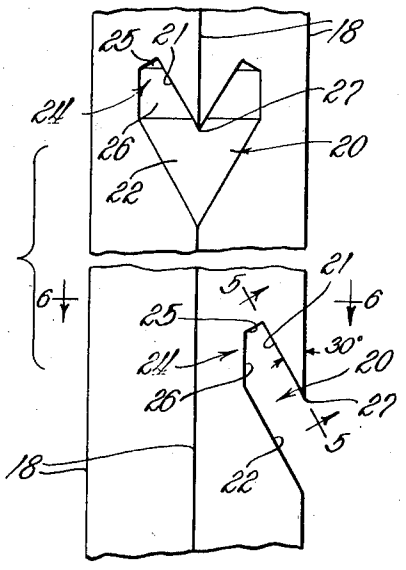


Fig. 5.

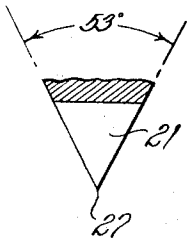
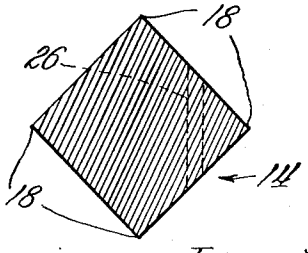


Fig. 6.



Inventor:
Edson P. Foster
By Brownjacksonboettcher Denver
Attys

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FELTING NEEDLE

Edson P. Foster, Evanston, Ill.

Application December 9, 1940, Serial No. 369,165

5 Claims. (Cl. 28—4)

The present invention relates to an improvement in felting needles and has to do with means for providing the body portion of a felting needle with barbs or spurs.

The felting needle of my present invention is an improvement of the felting needle described and claimed in my copending application Serial No. 315,725, filed January 26, 1940, for Felting needle.

Felting machines are well known and are employed for matting and compacting loose fibrous materials, such as wool, hair and fur or a combination of these or other similar materials. It is the general practice in the art to deliver the fibrous material to be compacted upon a slowly moving endless belt conveyor above which a two part needle plate, having a large number of felting needles secured therein, is disposed. This plate is mounted for rapid vertical reciprocatory movement, above the conveyor belt. The felting needles referred to have barbs on the body portions thereof, which upon downward movement of the plate with respect to the conveyor, engage the fibers of the material and function to interlace the fibers together. These barbs are so formed as to free themselves readily of the material upon upward movement of the plate. Upon continued repetition of the upward and downward movement of the plate the fibrous material is compacted and interlaced to form a mat. Machines of the type referred to may be suitably designed so that any desired degree of compacting and matting of such fibrous material, within limits, may be attained.

In my above referred to application, there is disclosed a felting needle in which barbs are formed in the body portion thereof by downwardly and outwardly inclined slots comprising a lower wall, an upper wall and an end wall which is substantially perpendicular to the upper and lower walls, so that there are no wedge-shaped portions within which the fibers may remain lodged when the needle is being withdrawn from the material being compacted. These slots preferably should extend a substantial distance into the body portion of the needle to provide spurs of considerable length so that the needle is efficient in operation. It will be seen that the inward extension of these slots into the body of the needle substantially reduces the cross-sectional area of the needle at the intersections of the end walls with the lower walls of the slots with consequent weakening of the needle. Also, strains to which the needle is subjected to in use are localized along the intersections noted with the result that the strength of the needle is further lessened.

It is an object of my present invention to provide a felting needle in which the fibers being compacted will not wedge and which is of increased mechanical strength. More specifically it is an object to provide a felting needle having a spur formed by upper and lower walls and an end wall, the latter comprising a first portion substantially perpendicular to the upper wall and a second portion extending substantially longitudinally or lengthwise of the needle and connecting the first portion and the lower wall.

Other objects and advantages of my invention will appear from the detail description.

In the drawing:

Figure 1 is a diagrammatic side view of a known type of felting machine, illustrative of the use of the needle of my invention;

Figure 2 is an elevational view of the needle of my invention mounted in the needle plate of a felting machine, the needle plate being shown fragmentarily and in section;

Figure 3 is a sectional view taken substantially on line 3—3 of Figure 2 and looking in the direction of the arrows, on an enlarged scale;

Figure 4 is a greatly enlarged partial elevational view of the body portion of my improved needle;

Figure 5 is a sectional view taken substantially on line 5—5 of Figure 4 looking in the direction of the arrows; and

Figure 6 is a horizontal sectional view taken substantially on line 6—6 of Figure 4 and looking in the direction of the arrows.

Referring now to the drawing, I have illustrated diagrammatically in Figure 1 a known form of felting machine 1, in which the needle of my invention may be used. Loose fibrous material such as wool, fur, hair or the like is indicated at 2 and is fed by means of a suitable chute 3 onto an endless belt conveyor 4, which is trained over a pair of wheels 5 mounted for rotation by shafts 6, one of which may be driven in any suitable manner.

A two part needle plate 7, reciprocated in any suitable known manner, is disposed above the conveyor belt 4. Felting needles 8 are suitably fixed in the needle plate and serve to compact and interlace the fibrous material 2 upon the upper run of belt 4, in the reciprocation of the needle plate, as previously stated. A second conveyor 9, which may be similar to the conveyor 4, receives the matted material and conveys it away from the conveyor 4.

In Figure 2 I have shown a felting needle 10 embodying my invention mounted in needle plate 1 of a felting machine. This plate comprises a base member 11 and a clamping member 12. Circular openings 13, one for each felting needle, are provided in the base member 11 and the needles are passed therethrough. The needle 10 of my invention preferably is formed of a piece of stock of substantially uniform square cross-section. It will be understood, however, that stock of other cross-sectional configuration is contemplated within the broader aspects of my invention. Needle 10 comprises a body 14 from the upper end of which extends a shank 15. The lower end of body 14 is pointed at 16 to facilitate penetration of the fibrous material. The upper portion of shank 15 may be bent at substantially right angles providing a securing element 17 to be clamped between clamping member 12 and base member 11, of the needle plate. The apertures 13 of base member 11 are of such a diameter that the needles fit tightly therein. The needles are thus rigidly fixed in the needle plate of a felting machine. Any other suitable means may be provided for clamping the needles, which may be appropriately formed, where necessary, to that end, as will be understood.

Referring to Figure 4, in which a portion of the body of the needle is shown on a greatly enlarged scale, it will be seen that at intervals the edges 18, defined by intersections of adjacent side surfaces of the needle, I provide angular slots or notches 20. These slots may be cut by means of a milling tool or formed by a suitable die, and comprise substantially parallel upper and lower walls 21 and 22, respectively, in the edges 18 of the needle body 14. These slots may extend to any desired depth and the cutting tool or die is designed so that the end wall comprises a first wall portion 25 which extends in a plane substantially perpendicular to the upper wall 21 and a second wall portion 26 which extends in a plane substantially longitudinal or generally lengthwise of the body of the needle.

Each of the slots 20 is cut at a substantial angle to a vertical edge 18 of the needle body 14, such that a spur or point 27 is formed at the intersection of two adjacent surfaces of the body, at side 21 of the slot. The spurs or points 27 extend downwardly toward the pointed lower end of the needle body, so that when the needles are used in the felting machine they will engage the fibers of the material and compact and interlace the same. As the needle enters the fibrous material the latter is slightly displaced and compressed laterally of the needle body. This material expands into the open outer ends of slots 20 and is then engaged by spurs 27 and directed thereby into the slots. In the upward movement of the needles the inclined walls 21 and 22 of the slots assure ready passage therefrom of the material operated upon.

As disclosed in my copending application above referred to, I have found that by disposing the slot 20 at an angle of about 30° to the edge 18 and inclined downwardly and outwardly of the needle, the angle of the spur or point 27, defined by the intersection of the upper side 21 of the slot with the adjacent side faces of the body of the needle, is approximately 53°, as shown in Figure 5. This angle is of importance since, if the included angle of wall 21 of slot 20 exceeds 60° the fibers or threads tend to slip off of spur 27 and are not so readily guided into slot 20, resulting in reduced efficiency of the needle. If stock of fewer than four sides is used the angle at which the slot is cut preferably should be increased somewhat, so that the included angle of the inner face of the spur or point will not exceed 60°. If stock of a greater number of sides than four is used, then the angle of the slot to the edge of the needle may be decreased for the same reason.

By forming portion 25 of the end wall 24 of the slot perpendicular to the upper wall 21 there will be no possibility of the fibers becoming lodged in the slot when the needle is being withdrawn from the material being compacted and, since the portion 26 extends generally lengthwise of the body of the needle, the cross-section of the needle is of sufficient extent along the slot to avoid weakening and consequent breakage of the needle thereat. Also by forming the portions 26, as described, strains to which the needle is subjected to in use are distributed over a large area further adding to the strength of the needle.

While I have shown the slots 20 comprising substantially parallel upper and lower walls 21 and 22, respectively, it will be understood that this is a matter of convenience only since it simplifies the design of milling tools or dies for forming these slots. It will be obvious that if desired the lower wall 22 of the slot could be cut at different angles to the body of the needle without departing from the spirit and scope of my invention.

I claim:

1. As a new article of manufacture, a felting needle having a body of substantially uniform cross-section provided with downwardly and outwardly inclined slots open at their lower ends each having an upper wall, a lower wall substantially parallel with said upper wall, an end wall extending inward of said body from the inner end of said upper wall substantially perpendicular thereto of materially less length than the distance between said upper and lower walls, and a fourth wall connecting the inner end of said end wall and the inner end of said lower wall substantially parallel with said body and at least as long as the distance between said upper and lower walls.

2. As a new article of manufacture, a felting needle having a body of substantially uniform polygonal cross-section provided in its corner edges with downwardly and outwardly inclined slots open at their lower ends each having an upper wall, a lower wall substantially parallel with said upper wall, an end wall extending inward of said body from the inner end of said upper wall substantially perpendicular thereto of materially less length than the distance between said upper and lower walls, and a fourth wall connecting the inner end of said end wall and the inner end of said lower wall substantially parallel with said body and of greater length than the distance between said upper and lower walls.

3. As a new article of manufacture, a felting needle having a body of substantially uniform square cross-section provided in its corner edges with downwardly and outwardly inclined slots open at their lower ends each having an upper wall, a lower wall substantially parallel with said upper wall, an end wall extending inward of said body from the inner end of said upper wall substantially perpendicular thereto of materially less length than the distance between said upper and lower walls, and a fourth wall connecting the

inner end of said end wall and the inner end of said lower wall substantially parallel with said body and at least as long as the distance between said upper and lower walls, the distance from the inner end of said end wall to the center of said body being materially greater than the length of said end wall.

4. As a new article of manufacture, a felting needle having a body of substantially uniform cross-section provided with downwardly and outwardly inclined slots open at their lower ends each having an upper wall, a lower wall substantially parallel with said upper wall, an end wall extending inward of said body from the inner end of said upper wall substantially perpendicular thereto of materially less length than the distance between said upper and lower walls, and a fourth wall connecting the inner end of said end wall and the inner end of said lower wall substantially parallel with said body.

5. As a new article of manufacture, a felting needle having a body of substantially uniform cross-section provided with downwardly and outwardly inclined slots open at their lower ends each having an upper wall, a lower wall generally parallel with said upper wall, an end wall extending inwardly of said body from the inner end of said upper wall, and a fourth wall substantially parallel with said body extending from the inner end of said lower wall to the inner end of said end wall.

EDSON P. FOSTER.