

May 16, 1944.

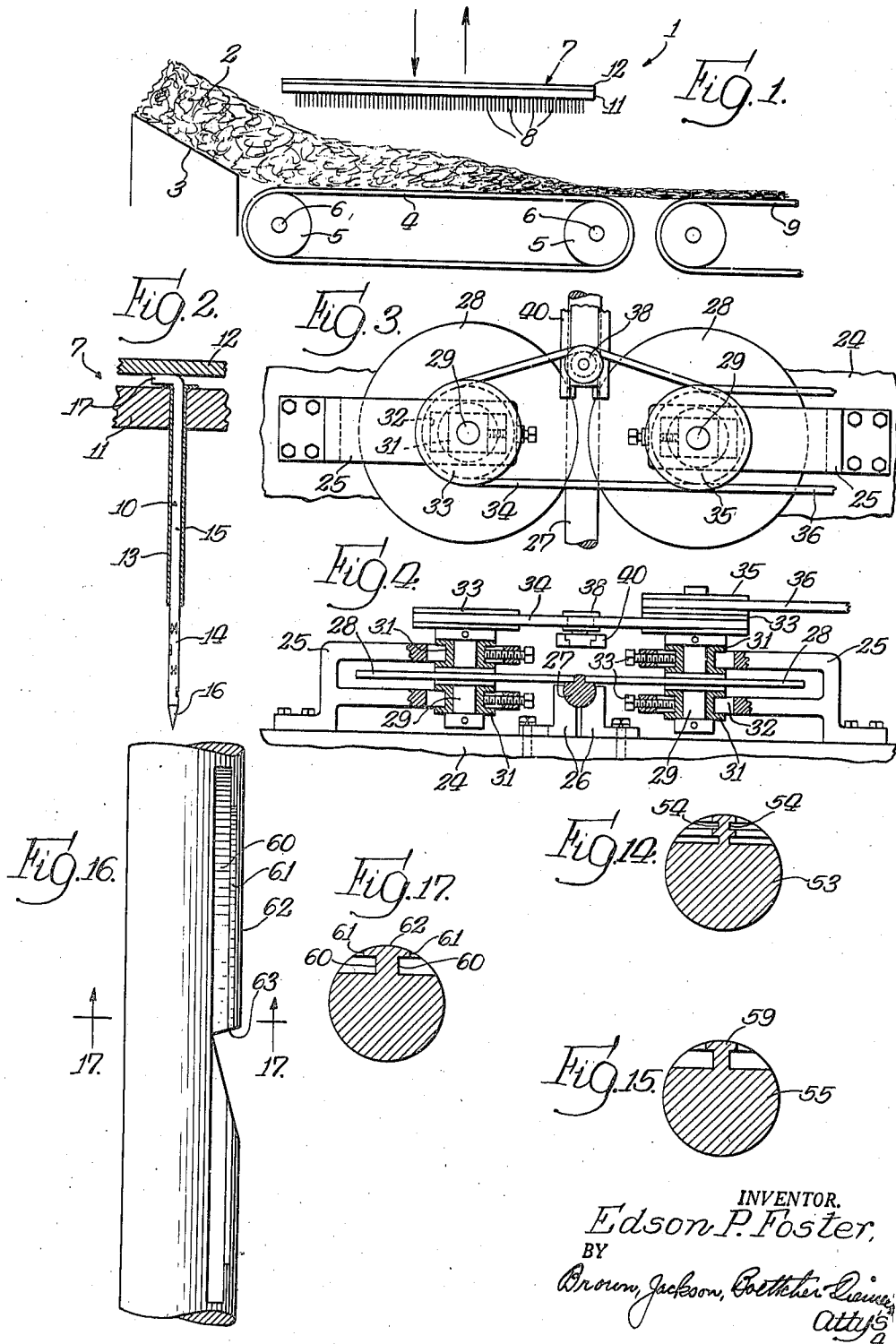
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2,349,086

FELTING NEEDLE

Filed Feb. 25, 1943

3 Sheets-Sheet 1



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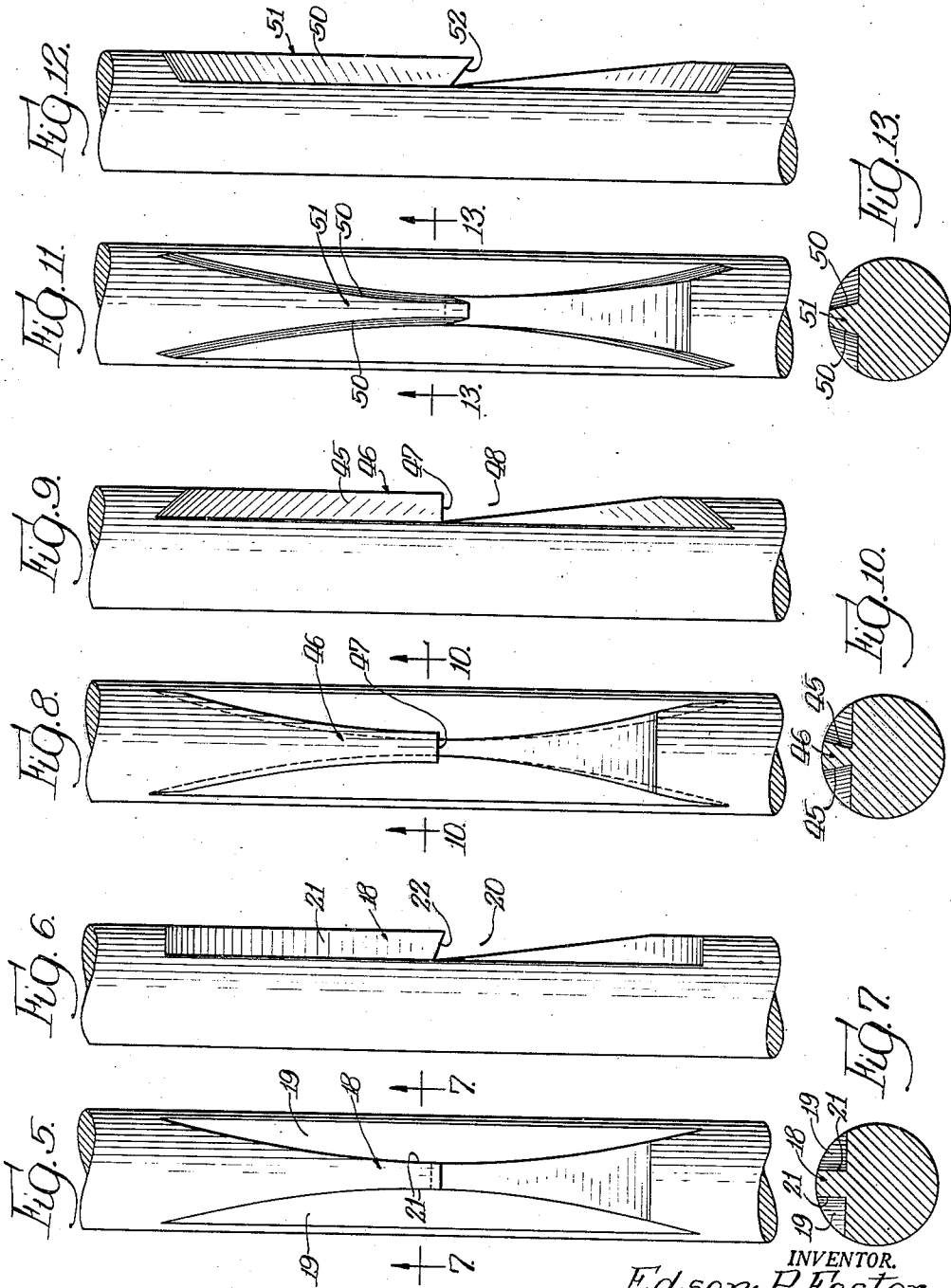
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3 Sheets-Sheet 2



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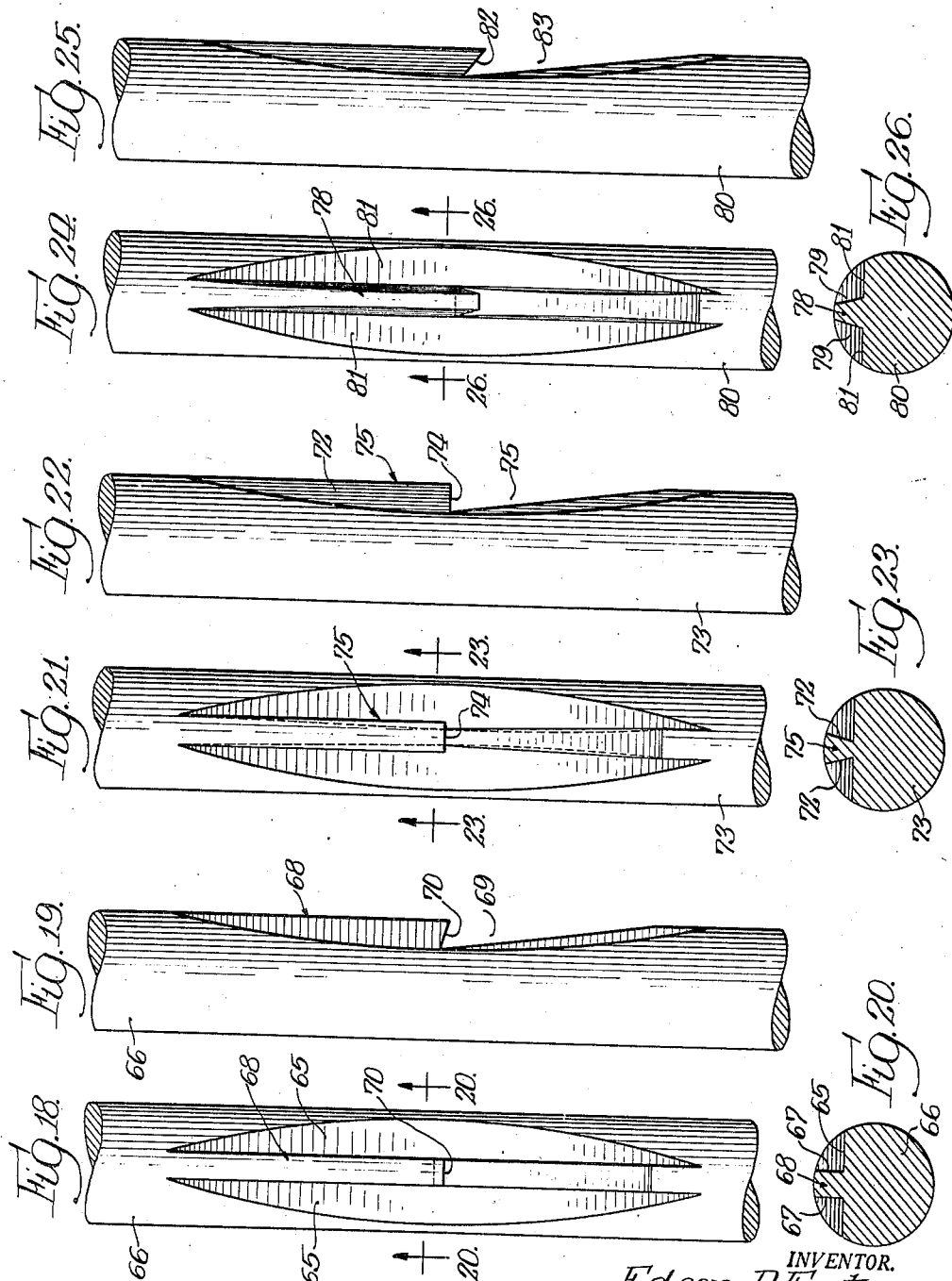
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FELTING NEEDLE

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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

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FELTING NEEDLE

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Application February 25, 1943, Serial No. 477,091

14 Claims. (Cl. 28—4)

The present invention relates to an improvement in felting needles and method of making the same.

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 analogous materials. It is the general practice in the art to deliver the fibrous material to be compacted upon a slowly moving endless felt 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 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 obtained.

Generally, the needle plate for supporting the felting needles comprises a base member and a superimposed clamping member. The base member is provided with a suitable number of apertures through which the needles are inserted. The needles are provided with securing elements which are adapted to seat upon the top surface of the base member. The clamping member and base member are then bolted or otherwise secured together rigidly clamping between them the securing elements at the upper ends of the needle shanks.

Felting needles are well known in the art and several different forms of barbs or spurs have been proposed. Generally, it has been the accepted practice to provide barbs or spurs comprising a triangular working surface formed by cutting or displacing material in the body portion. In needles in use today the body is of triangular or other polygonal cross section with the spurs or barbs extending into the body from the edges thereof. A departure in the shape of the working portions of known forms of spurs or barbs is disclosed in my copending application Serial No. 461,704, filed October 12, 1942, and in that application I have disclosed a felting needle formed by downwardly and angularly inclined

surfaces which intersect to form a working edge extending inwardly of the needle. In spurs having the triangular working surface of the prior art, many of the fibers have a tendency to creep to the point of the spur and slip off so that these fibers will not be interlaced. The spur of my application above referred to alleviates the disadvantage last noted of the triangular working surfaces of the spurs of the prior art. However, I have found that it is desirable to provide a spur having a working surface of greater area for increased capacity and of a character which avoids the aforementioned slippage of the fibers. Further, the spur of the needle of the present application may be satisfactorily formed in felting needle stock of round cross section. This is of advantage in that in using felting needle stock of round cross section, the apertures formed in the base member of the needle plate may be of a diameter substantially equal to the diameter of the stock providing a snug fit for the needles restraining them against movement relative to the needle plate and avoiding breakage due to this cause. In the prior art, in order to attain the advantages of a felting needle having a cylindrical shank it has been necessary to swage the stock forming the body portion to provide corner edges for the spurs.

It is an object of my invention to provide a felting needle having a spur in the body of the needle with the spur having a material engaging surface of considerable or appreciable width at its outer edge.

It is a further object of my invention to provide a felting needle having a spur in the body formed by generally downwardly directed side walls lying within the outline of the body, and an end wall extending transversely of the body intersecting the side walls to form a working surface of considerable area.

It is a further object to provide a felting needle made of stock of round cross-section to provide a cylindrical body portion in which the spur of my invention may be formed. Felting needle stock of substantially round cross-section is preferred in that the cross-sectional area thereof is substantially greater than the cross-sectional area of triangular or other polygonal stock for the same size needle. Due to the material available in stock of round cross-section, the spur or spurs may be formed by cutting the stock away in the cylindrical body portion and yet provide a needle of sufficient mechanical strength.

The side walls of the spur of my present invention may be formed in a great many ways to

extend generally lengthwise of the needle. For example, the side walls may be formed by a milling cutter operating generally lengthwise of the stock to remove material from the body of the stock, or, if desired, arcuate cutting or grinding wheels may be utilized to form opposed arcuate recesses in the body of the stock. The end wall is thereafter formed by removing material transversely of the body intersecting the side walls to form a working surface for the spur, the transverse recess formed by this operation providing access for the fibers of the spur.

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

Now, in order to acquaint those skilled in the art with the manner of utilizing my invention, I shall describe in conjunction with the accompanying drawings certain preferred embodiments of the same.

In the drawings:

Figure 1 is a diagrammatic side view of a known form of felting machine, illustrative of the use of the needles of my present invention;

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

Figure 3 is a plan view of suitable apparatus for forming the side walls of a spur in accordance with my present invention;

Figure 4 is a front elevational view, partly in section, of the apparatus shown in Figure 3;

Figure 5 is an enlarged front elevational view of a portion of the body of a felting needle illustrating one form of spur of my invention;

Figure 6 is a side elevational view of the spur of Figure 5;

Figure 7 is a detail sectional view taken on line 7—7 of Figure 5, looking in the direction indicated by the arrow;

Figure 8 is an enlarged front elevational view along the lines of Figure 5 but illustrating a modified form of spur;

Figure 9 is a side elevational view of the spur of Figure 8;

Figure 10 is a detail sectional view taken on line 10—10 of Figure 8, looking in the direction indicated by the arrows;

Figure 11 is an enlarged front elevational view along the lines of Figure 5 but illustrating another modified form of spur;

Figure 12 is a side elevational view of the spur of Figure 11;

Figure 13 is a detail sectional view taken on line 13—13 of Figure 11 looking in the direction indicated by the arrows;

Figure 14 is a detail transverse sectional view showing a further modified form of the spur shown in Figures 5 through 7;

Figure 15 is still another modified form of spur shown in Figures 5 through 7;

Figure 16 is a side elevational view of the body portion of another form of felting needle along the lines of Figure 15;

Figure 17 is a detail sectional view taken substantially on the line 17—17 of Figure 16;

Figure 18 is a front elevational view of the body portion of a needle having a spur formed by side walls extending lengthwise of the needle;

Figure 19 is a side elevational view of the spur of Figure 18;

Figure 20 is a detail sectional view taken on

the line 20—20 of Figure 18 looking in the direction indicated by the arrows;

Figure 21 is a front elevational view of the body portion of a felting needle having a spur slightly modified from that shown in Figure 18;

Figure 22 is a side elevational view of the spur shown in Figure 21;

Figure 23 is a detail sectional view taken on line 23—23 of Figure 21 looking in the direction indicated by the arrow;

Figure 24 is a front elevational view of the body portion of a felting needle showing another form of spur along the lines of Figure 18;

Figure 25 is a side elevational view of a needle shown in Figure 24; and

Figure 26 is a detail sectional view taken on the line 26—26 of Figure 24 looking in the direction indicated by the arrows.

Referring now to the drawings, I have illustrated diagrammatically in Figure 1 a known form of felting machine 1, in which the needles of my present invention may be used. Loose fibrous material such as wool, fur, hair or the like, indicated at 2 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 on 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 contact and interlace the fibrous material 2 upon the upper run of belt 4, in the reciprocation of a needle plate, as previously stated. A second conveyor 9, adjacent the discharge end of 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 the needle plate 7 of a felting machine. This plate comprises a base member 11 and a clamping member 12. The base is apertured to receive a cylindrical sleeve 13, one for each felting needle, which sleeve is provided with a flanged end which rests upon the upper surface of the base member 11. It will be understood that if desired the base member 11 may be countersunk to receive the flange of sleeve 13. However, it will be understood that if desired the sleeve 13 may be dispensed with and the needles 10 may be disposed directly in the base member 11. The needle of my invention preferably is formed of a piece of stock of substantially uniform circular cross-section although it will be understood that stock of other cross-sectional configuration is contemplated within the broader aspects of my invention. Substantially cylindrical stock is preferred since it will result in a needle of greater mechanical strength and may be more securely retained directly in the felting needle plate or in a reinforcing sleeve such as the cylindrical sleeve 13. The needle 10 comprises a body portion 14 and a shank portion 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 angle providing a securing element 17 adapted to be clamped between clamping member 12 and base member 11 of the needle plate and in engagement with the flange of sleeve 13. The inner diameter of the cylindrical sleeve 13 is preferably substantially equal to the diameter of the needle shank and snugly fitting therein whereby the needles are rigidly held in the sleeves carried by the needle plate. Further ad-

vantages of the reenforcing sleeve are set forth in my aforementioned application to which reference may be had.

Referring now to Figures 5 to 7, in which a portion of the body of one form of needle of my present invention is shown on a greatly enlarged scale; it will be seen that the body portion 15 is cylindrical, or of round cross section, and is provided with a spur 18. It will be understood that a plurality of spurs 18 may be provided in the body portion of the needle if desired. The spur 18 is defined by a pair of opposed arcuate recesses 19 extending into the body of the needle. A recess 20 is formed by a suitable cutting operation and extends transversely of the needle across the lower portion of the rib formed by the arcuate recesses 19 forming a rectangular working surface or end wall 22 for the spur intersecting the side walls 21. The side walls 21 are perpendicular to the bases of the arcuate recesses 19 as will be clear from Figure 7 of the drawings.

In Figures 3 and 4 I have illustrated one suitable form of apparatus for forming the spur shown in Figures 5 through 7. A platform 24 has suitably secured thereto a pair of spaced yoke brackets 25 and a pair of clamping members 26, one of the clamping members being suitably mounted upon the platform 24 to be movable relative to the other bracket member to provide a clamping means for holding felting needle stock 27 in position to have the arcuate recesses 19 formed therein by a pair of grinding or cutting wheels 28, each of which is suitably rotatably mounted adjacent the outer or free ends of the arms of the yoke brackets 25. A vertical shaft 29 extends through an enlarged hub portion formed centrally of each of the wheels 28, the shafts 29 being suitably journaled in bearings 31 one each being provided for each arm of the brackets 25, and which are slidably mounted horizontally in elongated slots 32 formed adjacent the outer end portions of the arm members of the yoke brackets 25. Set screws 33 are suitably threadedly mounted in the free ends of the arms of the brackets 25 and extend into the slots 32 for limiting movement of the grinding wheels or cutters 28 toward each other. A pulley 33 is suitably fixed to each of the shafts 29. The shaft 29 disposed to the right of Figure 4 is provided with a pulley 35 about which is trained a belt 36 extending to a source of motive power (not shown). A take-up pulley 38 is suitably mounted for sliding movement in a horizontal plane in the plane of the belt 34 in a suitable tongue and groove assembly 40. A belt 34 is trained over pulleys 33 and pulley 38 whereby a drive is established to the grinding wheels 28 from the source of motive power by the belt 26 to pulley wheel 33 to the right of the drawings. The pulley 38 by means of the assembly 40 is movable in a horizontal plane to cause the grinding wheels 28 to be urged inwardly of the felting needle stock 27 to form the arcuate recesses 19 therein. It will be understood that the bearings are provided with intermediate portions having spaced side walls for sliding engagement with the walls defined by the longitudinal slots 32 permitting movement of the grinding cutters 28 toward each other in response to movement of the take-up pulley 38 to form the recesses 19, a portion of which subsequently define the side walls 21 of the spur 18. It will be observed that the edges of the grinding wheels or cutters 28 are perpendicular to the faces of the cutters 28 providing the side walls 21 described in connection with Figure 5. It will be understood that the

apparatus described is only exemplary of one suitable form of apparatus for forming the arcuate recesses of the spur of Figures 5 to 7, and that other apparatus or other means may be devised to form the spur of my invention. After formation of the arcuate recesses 19 in the manner described, the aforesaid referred to transverse recess 20 may be formed by any suitable transverse cutter forming the end wall or working surface 22 for the spur and providing a recess below the spur so that it has access to the fibers to the interwoven. It will be noted that in Figure 6 that the working surface 22 extends angularly downwardly toward the pointed end of the needle. Preferably, the leading edge of the working surface lying on the surface of the body is disposed at substantially the narrowest portion of the rib formed by the arcuate recesses 19.

Referring now to Figures 8 to 10, I have shown a portion of the body of a felting needle somewhat along the lines of that of Figures 5 to 7 but in which the wide walls 45 of the spur 46 extend angularly toward each other inwardly of the stock of the body. Further, in this form of the invention we have shown an end wall or working surface 47 having its widest portion at the outer end of the spur with the polygonal end surface lying in a plane normal to the longitudinal axis of the needle. The side walls 45 of this embodiment of the invention may be formed by using substantially frusto-conical cutters in lieu of the cutters 28 described in conjunction with Figures 3 and 4. The transverse recess 48 for forming the end wall 47 may be formed in a manner similar to that described in conjunction with Figures 5 through 7, the cutter for this embodiment of the invention being positioned to form the end wall or working surface so that it lies in a plane lying normal to the longitudinal axis of the needle.

In Figures 11 to 13 I have shown another modified form of the invention in which the side walls 50 of the spur 51 extend angularly away from each other inwardly of the body of the stock. This form of side wall structure may be readily accomplished by providing suitable cutters of inverted frusto-conical shape. In this form of the invention I have shown an end wall 52 formed in a manner previously described and extending downwardly toward the pointed end of the needle.

If desired, a felting needle 53, shown in Figure 14, may be provided with grooved side walls 54. The grooved side walls 54 may be readily formed by providing a plurality of stacked grinding wheels or cutters of different diameters which when an opposed pair are used in an apparatus such as described in conjunction with Figures 3 and 4 may be brought to bear into the stock to form these side walls in body portion of the needle.

In the felting needle 55 shown in Figure 15, the opposed cutting wheels comprise two superimposed cutting or grinding wheels of different diameters forming a spur of substantially T-shape cross section.

In Figures 16 and 17 I have shown a spur formed by a pair of opposed arcuate recesses 60 and 61 extending into the felting needle stock to provide grooved side walls for the spur 62. It will be observed in Figure 16 that the end wall 63 lies in a plane extending angularly away from the pointed end of the needle which construction is feasible in that the side walls of the spur of this embodiment of the invention will prevent the fibers or fibrous material being felted from slipping off the spur.

In Figures 18 through 26, I have shown three

modified forms of felting needles, the first form being shown in Figures 18 to 20, the second form in Figures 21 to 23, and the third form in Figures 24 to 26, all of which embody the novel features of the spur of my present invention, but which are formed in a slightly different manner from that described in conjunction with Figures 5 through 17.

Referring now to Figures 18 to 20 it will be seen that a pair of recesses 65 extend lengthwise of the felting needle stock 66 to define side walls 67 for the spur 68. The recesses 65 may be made by any suitable cutter, such as a milling machine.

As before a recess 69 extends transversely of the lower portion of the rib formed by the longitudinally or lengthwise extending recesses 65 providing an end wall or working surface 70 for the spur 68. The recess 69 provides access of the fibrous material to the working surface 70 of the spur. It will be further observed that the side walls 67 are disposed in substantially uniformly spaced parallel planes.

In Figures 21 to 23, the side walls 72 of the spur 75 lie in planes extending angularly toward each other inwardly of the stock of the needle 73. The end wall 74 as before is formed by a transverse recess 75.

It will be noted that the end wall 70 of the spur shown in Figures 18 to 20 lies in a plane extending angularly downwardly toward the pointed end of the needle, and that the end wall 74 of the embodiment of the invention shown in Figures 21 to 23 lies in a plane normal to the longitudinal axis of the needle stock 73.

In Figures 24 to 26, I have shown a spur 78 defined by side walls 79 which lie in planes extending away from each other inwardly of the felting needle stock 80. As before these side walls are formed by lengthwise extending recesses 81, and an end wall or working surface 82 is formed by a transverse recess 83 formed in the lower portion of the rib defined by the longitudinal recesses 81. The working surface or end wall 82 lies in a plane extending angularly downwardly toward the pointed end of the needle.

While I have shown and described several forms of felting needles and methods of making the novel spur of the present invention, it will be understood that various modifications and rearrangements may be made therein without departing from the scope of my invention.

I claim:

1. As a new article of manufacture, a felting needle comprising a body provided with a recess therein, and a spur formed by downwardly directed side walls lying within the outline defined by said body, and an end wall extending transversely of the body intersecting said side walls forming a working surface for the spur extending inwardly of said body above said recess.

2. As a new article of manufacture, a felting needle comprising a substantially cylindrical body provided with a recess therein, and a spur formed by downwardly directed side walls lying within the cylindrical outline of said body, and an end wall extending transversely of said body intersecting said side walls and defining a working surface for the spur extending inwardly of said body above said recess.

3. As a new article of manufacture, a felting needle comprising a substantially cylindrical body provided with a recess therein, and a spur above said recess formed by side walls lying in planes extending lengthwise of said body, said side walls lying within the cylindrical outline of said body, 75

and an end wall lying in a plane extending transversely of said body intersecting said side walls and defining a working surface for the spur extending inwardly of said body above said recess.

4. As a new article of manufacture, a felting needle comprising a substantially cylindrical body provided with a recess therein, and a spur above said recess formed by a pair of arcuate side walls extending downwardly toward each other inwardly of said body, said side walls lying within the cylindrical outline of said body, and an end wall lying in a plane extending transversely of said body intersecting said side walls and defining a working surface for the spur extending inwardly of said body above said recess.

5. As a new article of manufacture, a felting needle comprising a substantially cylindrical body provided with a recess therein, and a spur above said recess formed by a pair of side walls lying in spaced parallel planes extending lengthwise of said body, said side walls lying within the cylindrical outline of said body, and an end wall lying in a plane extending transversely of said body intersecting said side walls and defining a working surface for the spur extending inwardly of said body above said recess.

6. As a new article of manufacture, a felting needle comprising a substantially cylindrical body provided with a recess therein, and a spur above said recess formed by a pair of side walls lying in planes extending lengthwise of said body directed angularly outwardly from each other inwardly of said body, said side walls lying within the cylindrical outline of said body, and an end wall lying in a plane extending transversely of said body intersecting said side walls and defining a working surface for the spur extending inwardly of said body above said recess.

7. As a new article of manufacture, a felting needle comprising a substantially cylindrical body provided with a recess therein, and a spur above said recess formed by a pair of side walls lying in planes extending lengthwise of said body directed angularly outwardly away from each other, said side walls lying within the cylindrical outline of said body, and an end wall lying in a plane extending transversely of said body intersecting said side walls and defining a working surface for the spur extending inwardly of said body above said recess.

8. As a new article of manufacture, a felting needle comprising a substantially cylindrical body provided with a recess therein, and a spur above said recess formed by a pair of arcuate side walls defined by opposed arcuate recesses in said body each having a base wall with which the associated arcuate side wall is substantially perpendicular, and an end wall extending transversely of the body intersecting said side walls forming a working surface extending inwardly of said body above said first recess.

9. As a new article of manufacture, a felting needle comprising a substantially cylindrical body provided with a recess therein, and a spur above said recess formed by a pair of arcuate side walls extending downwardly and angularly toward each other inwardly of said body, and an end wall extending transversely of said body intersecting said side walls forming a working surface extending inwardly of said body above said recess.

10. As a new article of manufacture, a felting needle comprising a substantially cylindrical body provided with a recess therein, a spur above said recess formed by a pair of arcuate side walls extending downwardly and angularly away from

each other inwardly of said body, and an end wall extending transversely of said body intersecting said side walls forming a working surface extending inwardly of said body above said recess.

11. As a new article of manufacture, a felting needle comprising a substantially cylindrical body provided with a recess therein, a spur above said recess formed by side walls extending lengthwise of said body and lying within the cylindrical outline thereof, each of said side walls being provided with a plurality of grooves extending lengthwise of said body, and an end wall extending transversely of said body intersecting said side walls forming a working surface for the spur extending inwardly of said body.

12. As a new article of manufacture, a felting needle having a spur in the body portion thereof, said spur being formed by side walls extending in a direction lengthwise of said body directed angularly toward each other in a direction inwardly of said body to form a working surface for the spur wider at its outer end than at its inner end.

13. As a new article of manufacture, a felting needle having a body portion provided with a spur, said spur being formed by spaced grooved side walls extending lengthwise of said body, and an end wall extending transversely of said body intersecting said grooved side walls, there being no common point of intersection of said end wall with said side walls.

14. As a new article of manufacture, a felting needle having a body portion provided with a spur, said spur being formed by spaced apart side walls extending generally lengthwise of said body with their lower edges extending outward of the body in spaced apart non-intersecting relation and joined at their outer ends by an end wall having its lower edge extending transversely of said body and defining with the lower edges of said side walls a material engaging surface of generally quadrangular outline at the lower end of the spur.

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