(No Model.) 4 Sheets—Sheet 1.

E. TWEEDY.

PROCESS OF AND APPARATUS FOR MANUFACTURING FELT HATS.

No. 306,194. Patented Oct. 7, 1884.

Figure 1.

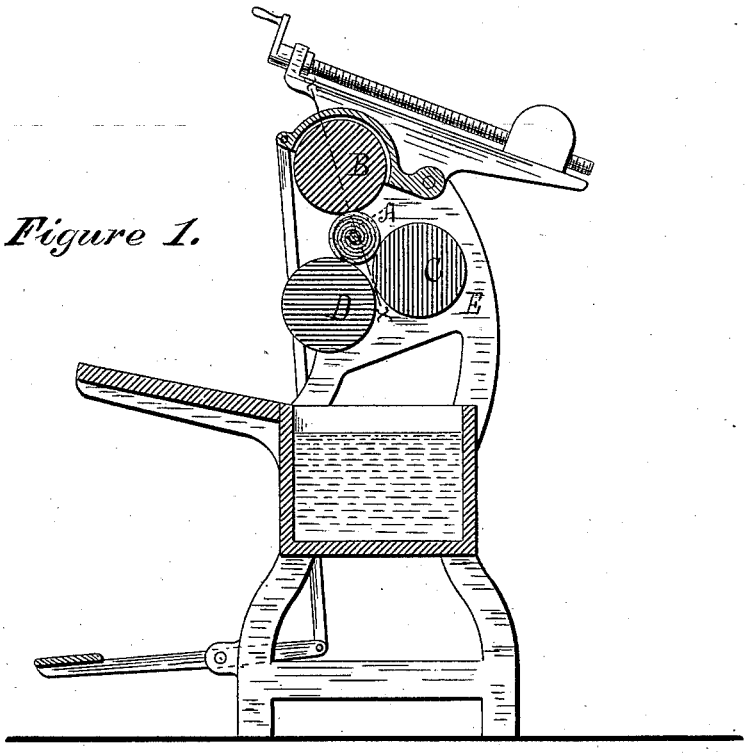
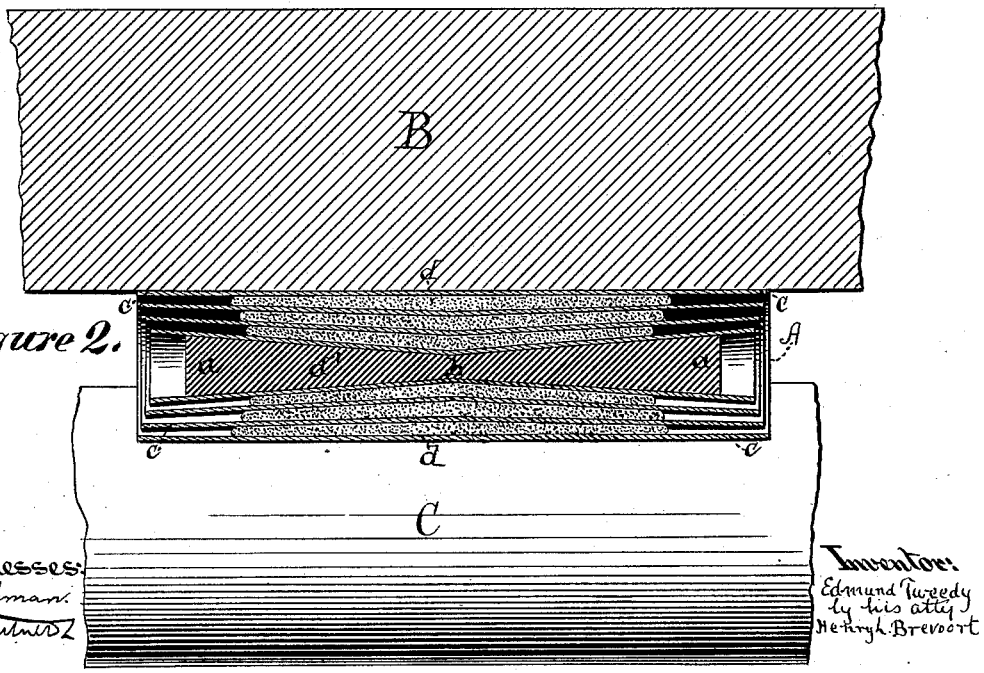


Figure 2.



Witnesses:
A. J. Lehmann.
A. Hilgenstock

Inventor.
Edmund Tweedy
by his attys
Henry H. Brevoort

(No Model.) 4 Sheets—Sheet 2.

E. TWEEDY.

PROCESS OF AND APPARATUS FOR MANUFACTURING FELT HATS.

No. 306,194. Patented Oct. 7, 1884.

Figure 3.

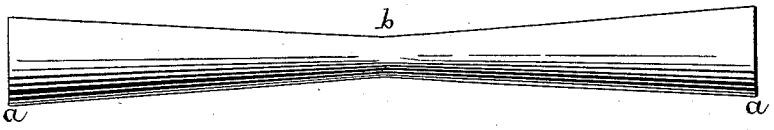


Figure 4.

Figure 5.

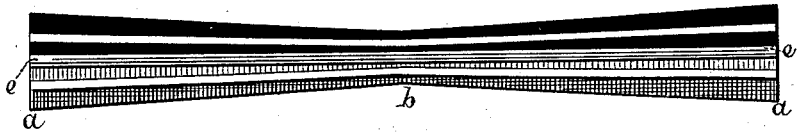


Figure 6.

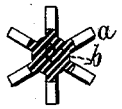


Figure 7.

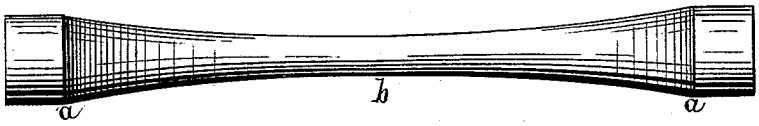


Figure 8.

Witnesses:
A. J. Lehman.
A. H. Gentner 2d

Inventor:
Edmund Tweedy
by his atty
Henry L. Brevoort

(No Model.) 4 Sheets—Sheet 3.

E. TWEEDY.

PROCESS OF AND APPARATUS FOR MANUFACTURING FELT HATS.

No. 306,194. Patented Oct. 7, 1884.

Figure 9.

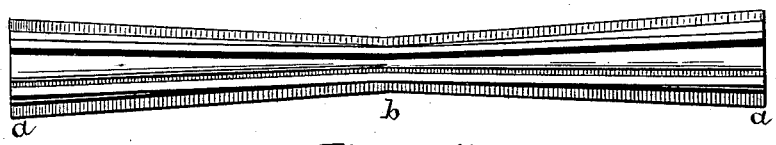


Figure 10.

Figure 11.

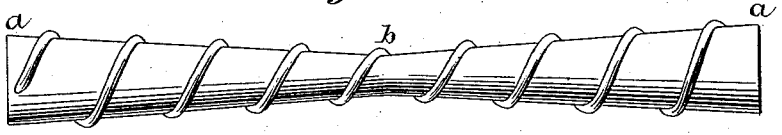


Figure 12.

Figure 13.

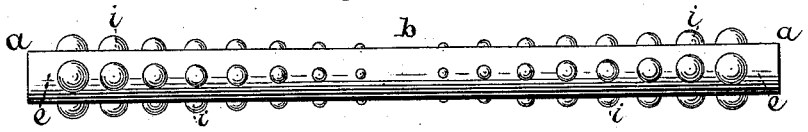
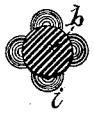


Figure 14.



Witnesses:
A. J. Lehman.
A. Hyatt Jr.

Inventor:
Edmund Tweedy
by his atty
Henry L. Brevoort

(No Model.) 4 Sheets—Sheet 4.

E. TWEEDY.

PROCESS OF AND APPARATUS FOR MANUFACTURING FELT HATS.

No. 306,194. Patented Oct. 7, 1884.

Figure: 15.

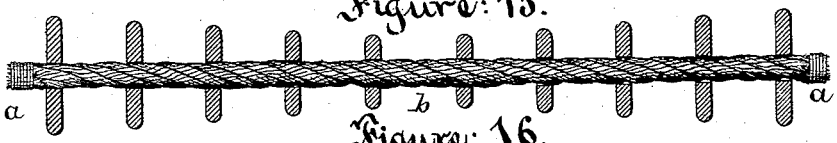
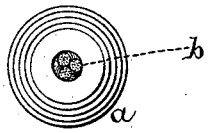


Figure: 16.



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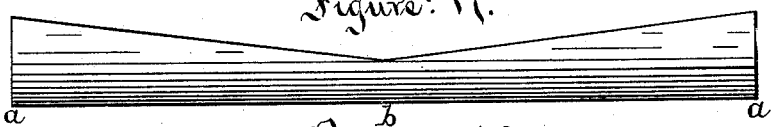
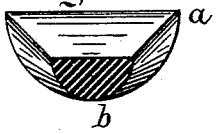


Figure: 18.



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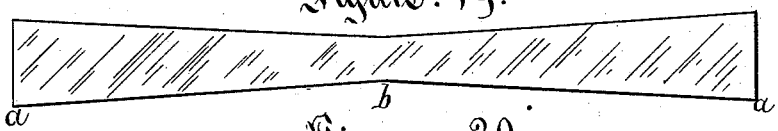


Figure: 20.

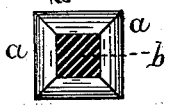


Figure: 21.

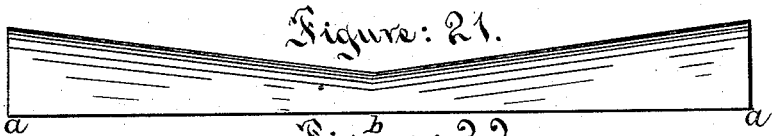
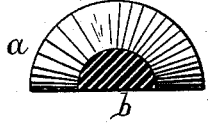


Figure: 22.



Witnesses:
Joseph L Levy.
A. J. Lehman.

Inventor:
Edmund Tweedy
by his atty
Henry L. Bridgwood

UNITED STATES PATENT OFFICE.

EDMUND TWEEDY, OF DANBURY, CONNECTICUT.

PROCESS OF AND APPARATUS FOR MANUFACTURING FELT HATS.

SPECIFICATION forming part of Letters Patent No. 306,194, dated October 7, 1884.

Application filed March 29, 1884. (No model.)

To all whom it may concern:

Be it known that I, EDMUND TWEEDY, a citizen of the United States, and a resident of the town of Danbury, county of Fairfield, and State of Connecticut, have made a new and useful invention relating to the Process of and Apparatus for Manufacturing Felt Hats, of which the following is a full and clear description, which, when taken in connection with the accompanying drawings, will enable others to practice my invention.

In the manufacture of fur hats, after the fur has been "formed" into proper shape for felting, and the "body" thus prepared has been shrunk or felted by gentle pressure and friction to a degree sufficient to give it proper consistency for handling in the subsequent stages of manufacture, which process is known as "hardening," it becomes necessary to "size" or shrink it to the required dimensions, which shrinkage is merely a further felting operation, finally bringing the hair or fur of which the felt is composed to such a state of interlocking contact as to produce a merchantable felt. The former and usual method of doing this work was by wrapping the partially-felted bodies in a "sizing-cloth" or apron and rolling the same by hand, when saturated with hot water, upon a plank. Various machines have been devised to facilitate and render less expensive this operation. In some of these machines the roll of bodies with its enwrapping cloth is rotated by the operation of rolls, generally two, three, or four in number, it being placed in the chamber formed between the rolls. In other machines the rotary movement is given to the roll by the action of a revolving cylinder or endless apron surrounded by a jacket usually slatted and flexible, between which and the cylinder or apron the roll is carried forward. In other machines the roll is subjected to the action of two platens, to one or both of which reciprocating motion is given. In still other machines the roll is placed in a pocket or loop formed by suspending an endless apron over a drum, which has imparted to it a rotary or reciprocating motion. In some machines the reciprocating platen or "jigger" is combined with the rolls or endless apron. Nearly all of the machines which have been devised for the purpose of sizing hat-bodies belong to one of the above classes, and with all of them my invention can be advantageously used. The sizing or felting cloths in which the hat-bodies are wrapped are ordinarily made of some textile material—such as burlaps or twilled muslin—though in the patent of William Fussard, No. 14,599, dated April 1, 1856, they are described as made of a sheet of material having ridges or corrugations, which assist in the felting operation. This patent also shows a roller which may have corrugations upon its surface; but this roller is of equal bulk at all parts, and with it my invention could not be carried out. Felting-machines have also been patented—notably those of Waring, No. 228,704, reissued No. 9,683, and of Yule, No. 238,016—in which working-surfaces having a concaved configuration were used for the purpose of compacting toward the center and from each end the bundle of hats wrapped in a sizing-cloth, which bundle is usually thicker in the middle than at the ends, and thus causing all parts of the roll of bodies to be more evenly operated upon. This method is defective, in that a machine constructed with a certain configuration of working-surfaces cannot be altered without making new working-surfaces, which involve a reconstruction of the machine itself.

My invention relates to a method of sizing hats by which hand labor or machines having a straight transverse configuration of working-surfaces may be used, while at the same time the hats are always compacted toward the center and from each end of the roll to as great or as small an extent as may be desired, depending upon the configuration of the "filler" used inside of the roll of hat-bodies.

The invention of the present application aims at the compacting of the goods toward the center of the roll, but by different mechanical means from any hitherto used.

In carrying out the invention described in this application I use a filler which is rolled up in a felting-cloth of ordinary construction, with the articles to be felted, and which filler is so shaped and formed that when the bundle is subjected to the action of cylindrical rolls or other equivalent mechanical felting instrumentality the articles to be felted will be compacted toward the center of the roll by reason

of the fact that more space is there left for them than at the ends thereof, and which space is provided without any peculiar shape of the rollers or working-surface of the machine or of the sizing-cloth used.

Thus my invention consists in a filler adapted to be rolled up within a bundle of hat-bodies, which may be surrounded by a felting-cloth, and which filler is so shaped as to leave a greater space for the articles being felted at the center of the roll than at the ends thereof; and my invention further consists in the combination of such a filler placed within the hat-bodies and, if desired, a felting-cloth, when combined with felting mechanism, which automatically rotates and acts upon the bundle, so as to facilitate the felting of the fibers of which the felt is to be composed.

Referring to the accompanying drawings, Figure 1 is a transverse section through a felting-machine, showing the three rolls and a bundle within the space between them, which consists of a number of hat-bodies, a felting-cloth, and a filler which embodies my invention. Fig. 2 is a longitudinal section on line *x x* of Fig. 1, showing one roll in section, and another view of the felting-cloth, hat-bodies, and filler. Fig. 3 shows a side view of a filler made in accordance with my invention and ready to be placed in a bundle of hat-bodies. Fig. 4 is a central section thereof.

The rest of the figures show modifications of my invention, in each one of which a filler is shown having a different form, but still embodying my invention. Each modification is represented by two figures—one, as will be seen, consisting of a side view, and the other of a vertical section through the center of the filler, and looking toward one of the ends thereof.

Referring to Figs. 3 and 4, it will be seen that the filler in this case consists of a piece of material, which may be of wood, rubber, or other suitable substance, and which is so shaped as to be more bulky at the ends *a a* than at the center *b*. Thus, when the filler is wrapped in the bundle of hat-bodies, as shown most clearly in Fig. 2, there will be more space for the hat-bodies at and about the center *b* of the filler than there is at or about the ends *a a* thereof.

In Fig. 2 the felting-cloth is shown at *c*, the hat-bodies at *d*, and the filler at *d'*, the entire bundle being represented by A.

In Fig. 1, B C D are the rollers of a felting-machine, E the frame thereof, and A the roll being operated upon. Thus it will be seen that to construct a filler according to my invention it is necessary to so proportion it that it shall occupy or take up more space at and about the ends of the bundle than at the center thereof. In applying this filler it is necessary simply to roll it up with the hat-bodies and felting-cloth exactly as Fussard rolled his roller up in his bundle.

I will now refer to the various modifications of my invention, all of which relate to differently-shaped fillers, but all constructed on one general plan.

Figs. 5 and 6 show a ribbed filler, which is constructed as follows: A cylinder, *e*, is formed, and has attached to it, or made as a part of it, ribs, which, starting from the center of the filler, gradually increase, as shown, in height, or, if desired, in width, or both, from the center to the two ends *a a* of the filler. In this way a filler results which, when wrapped within the bundle of hat-bodies, leaves more space at the center of the bundle than at the ends thereof.

Figs. 7 and 8 show a modification in which the filler is formed as in Figs. 3 and 4, with the exception that the surface is curved in both directions, so as to make a gradual increase in the bulk of the article both ways from the center *b* to the ends *a a*.

Figs. 9 and 10 show a filler like Figs. 3 and 4, with the exception that it is provided with longitudinal ribs.

Figs. 11 and 12 show a filler like Figs. 3 and 4, with the exception that it is provided with a spiral rib.

Figs. 13 and 14 show a plain cylinder, *e*, provided with knobs *i*, which, as they recede from the center *b* of the roll, are made larger and higher, being so arranged as to occupy the greatest space and make the filler more bulky at the ends *a a* than at the center *b*. Of course the knobs *i* could be used in connection with such a filler as is shown in Figs. 3 and 4.

Figs. 15 and 16 show a filler which is made of a piece of rope or the like, though it is not necessarily flexible, and upon which is strung annular rings, balls, egg-shaped pieces, polygonal pieces, or the like, as shown, which increase in bulk as they are located farther each way from the center *b* and approach the ends *a a* of the filler. In this way a filler may be made which is very cheap, and which will serve the purposes of my invention. The annular rings or beads, as I have said, may be of various shapes, and may be of wood, rubber, &c., and are best attached to the rope, though they are not so shown.

Figs. 17 and 18 show how a plain cylinder may be cut so as to embody my invention, the piece taken out being more bulky at the center *b* of the filler than at the ends *a a*, thus leaving an article which is more bulky at the ends than at the center, and which shows one form of my invention.

Figs. 19 and 20 show a filler the cross-section of which is a square at all parts, the center *b* being the smallest part and the ends *a a* the largest.

Figs. 21 and 22 show a filler, which is in substance the filler shown in Figs. 3 and 4, cut in half longitudinally, the center *b* being thus less bulky than the ends *a a*.

Very many other forms can be used, and my invention will be found, so long as there is more space left by the filler for the goods to

be felted at the center than at the ends of the roll, thus compacting the articles being felted toward the center of the roll.

Various differences in relative proportion between the ends *a a* and the center *b* of the fillers may be used, and this will be governed by the size, weight, or quantity of hat-bodies treated in one roll. Making the filler larger in diameter at the ends than it is at the center is the best plan; but ribs can be used upon a plain cylinder, which are arranged to occupy more space by being broader or being more frequent at the ends of the filler than they are at the center thereof, where the ribs must be narrower or fewer in number. Thus a filler may be formed in either way which embodies my invention. Of course the least relative difference between the bulk of my filler at the ends and at the center would be such a difference as would adapt my filler for use with the smallest article which commercially is felted; but in such an event the benefit of my invention would not be so great as when bulkier articles are handled.

My invention contemplates more than a purely nominal difference between the ends and the center of the filler—in fact, such a difference as would be found to be practically efficient and as constituting an advantage as between my filler and the cylindrical roll of Fussard.

Of course my filler may be used with machines having rolls such as Waring's, or surfaces such as Yule's; but this is a useless expense, for the compacting toward the center then might as well be done entirely by the felting-machine proper.

My invention is of most value when used in connection with machines having plain cylindrical rolls or flat working-surfaces.

My filler can be used with any of the known forms of felting-cloth, if any cloth is used at all, for in some stages of felting the cloth is at times dispensed with.

What I claim, and desire to secure by Letters Patent, is—

1. A filler for a roll of hat-bodies or other articles to be felted, the configuration of which is such as to leave a greater space for the goods being felted at the center of the filler than at the ends thereof, substantially as described.

2. A filler for a roll of hat-bodies or other articles to be felted, having longitudinal ribs, which filler has such a configuration as to leave a greater space for the goods being felted at the center of the filler than at the ends thereof, substantially as described.

3. A filler for a roll of hat-bodies or other articles to be felted, having circumferential ribs, which filler has such a configuration as to leave a greater space for the goods being felted at the center of the filler than at the ends thereof, substantially as described.

4. A filler for a roll of hat-bodies or other articles to be felted, having knobs or projections, which filler has such a configuration as to leave a greater space for the goods being felted at the center of the filler than at the ends thereof, substantially as described.

5. A filler for a roll of hat-bodies or other articles to be felted, the configuration of which is such as to leave a greater space at the center of the filler than at the ends thereof, when constructed with flat exterior faces, substantially as described.

6. A filler for a roll of hat-bodies or other articles to be felted, the configuration of which is such as to leave a greater space at the center of the filler than at the ends thereof, when constructed with a flat exterior face or faces, combined with a curved exterior face or faces, substantially as described.

7. A filler for a roll of hat-bodies or other articles to be felted, the configuration of which is such as to leave a greater space at the center of the filler than at the ends thereof, when constructed with a central core, upon which beads, balls, disks, &c., are strung, substantially as described.

8. The combination, with a felting-machine, of a roll consisting of the articles to be felted and a filler within the roll, the configuration of which is such as to leave a greater space for the articles being felted at the center of the roll than at the ends thereof, substantially as described.

9. The combination, with a felting-machine, of a roll consisting of the articles to be felted and a filler within the roll, the configuration of which is such as to leave a greater space for the articles being felted at the center of the roll than at the ends thereof, and a felting-cloth surrounding the roll of articles to be felted and the inclosed filler, substantially as described.

10. The combination of a felting-machine having flat or cylindrical working-surfaces, and a roll consisting of the articles to be felted, and a filler within the roll, the configuration of which is such as to leave a greater space for the articles being felted at the center of the roll than at the ends thereof, substantially as described.

11. The combination of a felting-machine having flat or cylindrical working-surfaces, and a roll surrounded by a felting-cloth, which roll consists of the articles to be felted, and a filler within the roll, the configuration of which is such as to leave a greater space for the articles being felted at the center of the roll than at the ends thereof, substantially as described.

12. The process of felting articles which consists in first wrapping them around or about a filler the configuration of which is such as to leave a greater space at the center of the roll than at the ends thereof, and, second, subjecting this roll so formed to manipulation to felt the articles within the roll, substantially as described.

13. The process of felting articles which consists in first wrapping them in a felting-cloth

and around or about a filler the configuration of which is such as to leave a greater space at the center of the roll than at the ends thereof, and, second, subjecting this roll so formed to manipulation to felt the articles within the roll, substantially as described.

14. The process of felting articles which consists in wrapping them around or about a filler the configuration of which is such as to leave a greater space at the center of the roll than at the ends thereof, and, second, subjecting the roll thus formed to the action of mechanical felting instrumentalities, substantially as described.

15. The process of felting articles which consists in first wrapping them in a felting-cloth and around or about a filler the configuration of which is such as to leave a greater space at the center of the roll than at the ends thereof, and, second, subjecting the roll thus formed to the action of mechanical felting instrumentalities, substantially as described.

EDMUND TWEEDY.

Witnesses:
TIMOTHY JONES,
DAVID B. BOOTH.