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METHOD OF MANUFACTURING WOOL FELT

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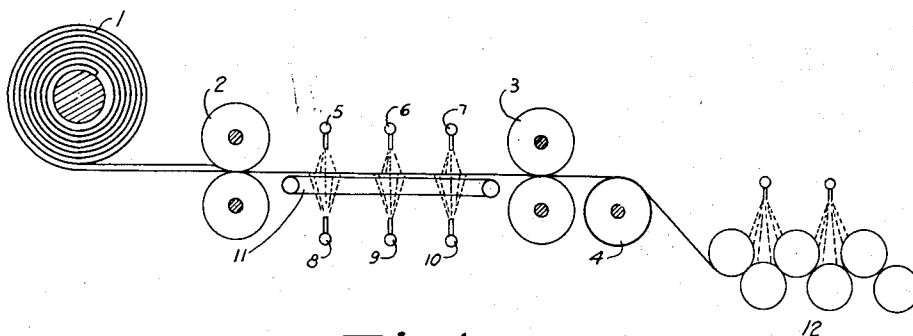


Fig. 1

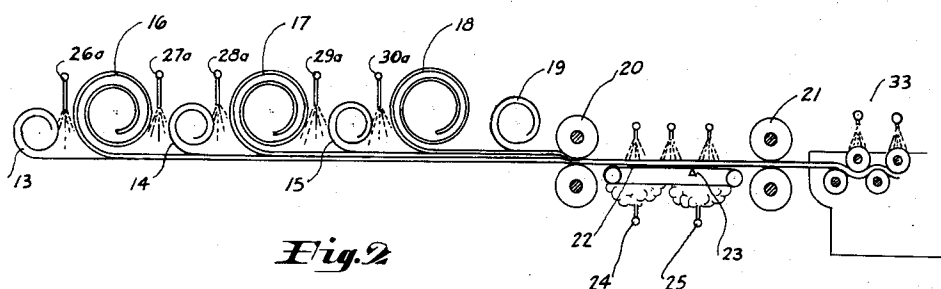


Fig. 2

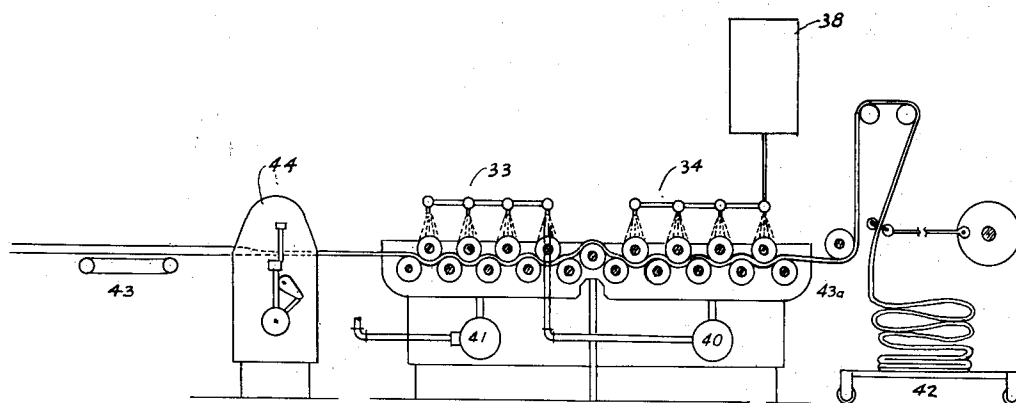


Fig. 3

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METHOD OF MANUFACTURING WOOL FELT

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3 Claims. (Cl. 28—72.3)

This invention relates to the manufacture of felt, and more particularly of wool felt.

One object of the invention is to provide a method which yields an inexpensive kind of wool felt that can be manufactured with a minimum of machinery and the manufacturing process of which involves a minimum of separate operations, a plurality of essential operations being performed simultaneously.

Another object of the invention is to provide a method which yields an inexpensive kind of wool felt from batts produced by superimposing and condensing a plurality of wool webs, i. e. webs as produced on a conventional card.

Another object of the invention is to provide a method for manufacturing wool felt permitting the hardening and fulling steps to be effected with the same equipment, thus calling for a relatively small investment as regards the prime cost for equipment.

Another object of the invention is to provide a method for manufacturing wool felt batts wherein a relatively simple pretreatment of the batts takes the place of the conventional hardening thereof and wherein pretreated batts not processed in any conventional hardening machine are supplied to a multiroller type machine where they are simultaneously hardened, fulled and cleaned.

I have discovered that a multiroller can be used for simultaneous hardening and fulling of batts which contain at least a part of well-felting fibers in the blend, preferably wool, whenever a fully continuous and more efficient manufacturing process is sought.

The elimination of the preceding steam-hardening operation in a separate, expensive plate hardener is possible whenever heavy batting and a blend of well-felting materials is used. It can be facilitated, however, for less favorable cases if the batts—while being fed into the multiroller—are first subjected to conditions which substitute for the hardening. A practical method to that effect is the creation of condensing pressure and the spraying of the condensed batt with water while it is carried into the multiroller on a conveyor, preferably on a wire apron.

In certain cases it is of advantage to subject the batts to a second condensing effect after being sprayed and before entering into the multiroller. A solution of acid or soap in the spray water further assists in the preparation of the unhardened batts for immediate fulling. If simultaneous cleaning or deoiling or depitching is warranted in the multiroller, an emulsion with cleaning fluids in the spray is of particular advantage, due to the fact that the paint and tar is not "sealed-in," as by the hardening effect, but freely exposed to the scrubbing action of vibrating rollers and cleaning fluid.

While such spraying and condensing of the batting or batts as part of the feeding into the multiroller creates sufficient coherence that tearing or winding around the rollers of the machine is avoided, the conditions can be further improved by simultaneously exposing the batts on the conveyor apron to steam.

A still better substitute for a separate hardening operation is the combination of steam treatment with a side-ward oscillation of the condensing pressure rolls and heating them.

As a further means for effecting complete condensa-

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tion of the batting without a separate hardening operation, the conveyor on which the batting is carried to the multiroller may also be rapidly vibrated; such vibration under steam treatment enhances the setting of the batt.

5 Immediate and intense felting action is applied to the thus prepared batting when it enters into the multiroller, due to the influence of the ample supply of hot water. For this reason, the carding and crossing of the fibers in the preceding operations becomes less important and

10 garnetting will suffice in some cases. In other cases shredding and garnetting will give good results, particularly when followed by punching in a needle-loom, another means for condensation prior to multiroller treatment.

15 It is obvious that blends which are subjected to batting and such, or any other condensation as proposed, prior to the multiroller treatment with hot water, must contain at least part of felting fibers. Wool, hair, fur and other felting materials can be used, either each alone

20 or in combinations with each other and other, non-felting fibers. If a predominantly fur containing blend, or a blend of 100% fur is to be used, blowing machines can be used such as employed in the fur hat trade under the name of "fur blower," instead of garnetting or shredding machines as preferable on wool blends. Another

25 machine which is of very good use is the "Rando-Webber" of the Curlator Corporation. While on these kinds of blowing machines subsequent punching by a needle loom is helpful, it is not absolutely necessary.

30 As apparent from the foregoing, battings can thus be simultaneously hardened, fulled and cleaned in a multiroller type machine. Instead of cleaning, other important textile operations can be carried out in combination with hardening and fulling, such as bleaching, tinting and dyeing. In certain cases, the dyeing can be done

35 together with a slight cleaning.

It is apparent that, this way, felt can be treated for hardening, dyeing and fulling in subsequent operations, yet being done in one and the same machine. For such

40 subsequent operations, an electric timing device of the "Formatrol" type can be used to good advantage.

An advantage takes place in the case of combined hardening, fulling and dyeing where complete uniformity and preservation of quality can be obtained due to the pressure with which the dyestuff is forced through the

45 felt, preferably with acid, while being gradually increased in tightness.

Other objects and advantages of the present invention will be more fully apparent from the particular description thereof, in conjunction with the appended drawings

50 which show, in preferred form, the several novel mechanisms of the invention.

The accompanying drawing illustrates diagrammatically several ways in which the method according to my invention can be carried into effect.

55 Fig. 1 is a diagrammatic view in side elevation of the means which may be used for carrying my method into effect;

Fig. 2 shows the same parts as Fig. 1 adding to it preferred equipment for forming a thoroughly wet batt from

60 a plurality of separate webs; and

Fig. 3 is a diagrammatic side elevation of an arrangement comprising a needle loom for pretreating a batt before hardening and fulling thereof.

Referring now to Fig. 1, numeral 1 has been applied to designate a batt made up of a plurality of superimposed webs. While any conventional web may be used the best way for the purposes of the invention in which to combine a plurality of webs into a batt will be more fully disclosed below in connection with Fig. 2 of the drawing illustrating preferred means for producing a thoroughly wet batt. Reference numeral 2 has been applied to designate a first pair of pressure rollers for

condensing batt 1. Batt 1 is moved by a conveyor (not shown) from the point where it is stored in form of a roll to the nip of pressure rollers 2, where it is pre-condensed. The pre-condensed batt then proceeds on a movable apron 11, and while resting on apron 11, is subjected to sprays of water coming from nozzles 5, 6 and 7 arranged above and nozzles 8, 9 and 10 arranged below apron 11. The wetted batt 1 is then fed to the nip of a pair of pressure rollers 3 where considerable pressure is applied upon it. After passing over the supporting roll 4 the batt is fed to a machine known in the trade as a multiroller, generally designated by numeral 12. A plurality of nozzles are arranged above multiroller 12, subjecting the batt in transit through the multiroller to the joint action of jets of water and steam, and to the action of a cleaning fluid, i. e. of a cleaning emulsion. Each cooperating pair of rollers of multiroller 12 exerts pressure upon the batt, and since the cooperating rollers of a multiroller are also moved back and forth, or reciprocated, or vibrated in a direction longitudinally thereof, the batt 1 is also subjected to a rubbing action while moving through each cooperating pair of rollers of multiroller 12. I have found that a pre-condensed batt consisting of several web layers can simultaneously be hardened, fulled and cleaned in a multiroller comprising a sufficient number of pairs of cooperating rollers, and thus converted into a substantially clean and uniform length of felt.

While it is possible to start the above process with a batt previously formed simply by superimposing a plurality of fiber webs, it is preferable—as shown in Fig. 2—to wet the webs before superimposing the same to form a batt of increased thickness. According to Fig. 2 a plurality of webs 16, 17 and 18 separated by non-felting interlayers 14 and 15, respectively, are moved by an apron 13 from the left to the right. The webs 16, 17 and 18 are individually wetted by jets coming from spray nozzles 26a, 27a, 28a, 29a and 30a before being superimposed. Reference numeral 19 has been applied to indicate a roll of a thin, non-felting, water permeable fabric used to cover the wetted batt. Upon travelling over a table (not shown) the batt is fed into the nip of a pair of heated pressure rollers 20 which may be oscillating, if desired. After being pre-condensed between pressure rollers 20 the batt is delivered upon a moving wire apron 22 where it is re-wetted by water released from a number of spray nozzles arranged above apron 22. Simultaneously the batt is heated and moistened by steam allowed to escape from the steam pipes 24 and 25 arranged below wire apron 22. It is desirable, though not necessary, to shake the batt while on apron 22, which can be readily achieved by means of vibrator 23 acting upon apron 22. The wet and hot batt is then fed into the nip of a pair of cooperating rollers 21 which may be identical with the rollers 20 used for pre-condensing the batt. Reference numeral 33 has been applied to indicate a so-called multiroller of substantially the same design as the multiroller shown in Fig. 1, and including means for subjecting the batt to appropriate fluid treatment, as described, while moving from one pair of cooperating rollers to another. It will be understood that the term multiroller is being applied to a machine of the kind wherein cooperating rollers are reciprocated longitudinally one with respect to the other, thus adding rubbing action to the pressure action of the rollers.

Referring now to Fig. 3, reference numeral 43 has been applied to indicate a conveyor moving a heavy batt formed by a plurality of superimposed wool webs from left to right. The batt is then supplied to a needle loom 44 wherein it is punched. This method of pre-condensing the batt is particularly well adapted to produce a felt product made of wool which does not require the crushing action of heavy rollers shown in the arrangements of Figs. 1 and 2 as means for pre-condensing the

batt. The punched batt is then supplied to a multiroller cascade comprising a first multiroller 33 and a second multiroller 34. Wetting and cleaning fluid is stored in the tank 38 and supplied to multiroller 34 by a set of spray nozzles arranged above the multiroller. The fluid dropping down by gravity from the multiroller 34 is collected in a tank 43a and supplied by pump 40 to a set of spray nozzles arranged above the multiroller 33. Pump 41 pumps the fluid from a tank situated below multiroller 33 back to storage tank 38, thus completing the circuit of the fluid flow. The hardened and fulled batt is folded by means of conventional folding equipment (not shown) and deposited on cart 42. If additional shrinkage is desirable, needle loom 44 is moved out of the way, cart 42 moved in its place and additional passes through multirollers 33 and 34 are given to the product until the desired tightness or thickness is reached.

Having described several methods of the invention in preferred form, what I desire to claim and secure by Letters Patent is:

1. The method of producing wool felt comprising the steps of condensing a batt consisting of a plurality of superimposed webs of wool fibers, of feeding said condensed but substantially unhardened batt successively through a plurality of zones wherein pressure and rubbing action are simultaneously applied to said batt, of subjecting said batt to the joint action of water, steam and a cleaning fluid while in transition between said plurality of zones to effect simultaneously hardening, fulling and cleaning of said batt when fed through said plurality of zones, and of continuing to feed said batt successively through said plurality of zones until said batt is converted into a substantially clean and uniform length of felt.

2. The method of producing wool felt comprising the steps of wetting simultaneously a plurality of webs of wool fibers by jets of liquid, of superimposing said plurality of wetted webs to produce a wet batt, of condensing said batt by simultaneous application of pressure and heat, of re-wetting and steam treating the condensed batt, of feeding said batt in incompletely hardened condition into the first of a plurality of zones in each of which pressure and a rubbing action are simultaneously applied to said batt and of feeding said batt successively through said plurality of zones, of subjecting said batt to the joint action of water, steam and of a cleaning emulsion while in transition between said plurality of zones to effect simultaneous hardening, fulling and cleaning of said batt when fed through said plurality of zones, and of continuing to feed said batt successively through said plurality of zones until said batt is converted into a substantially clean and uniform length of felt.

3. The method of producing wool felt comprising the steps of punching a heavy wool fiber batt in a needle loom, of feeding the needle-loom-punched yet unhardened batt successively through a plurality of zones wherein pressure and a rubbing action are simultaneously applied to said batt, of subjecting said batt to the action of jets of water and to the action of a cleaning fluid while in transit between said plurality of zones to effect simultaneously hardening, fulling and cleaning of said batt when fed through said plurality of zones, and of continuing to feed said batt through said plurality of zones until said batt is converted into a substantially clean and uniform length of felt.

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