

FELT.

1,365,878.

Patented Jan. 18, 1921.

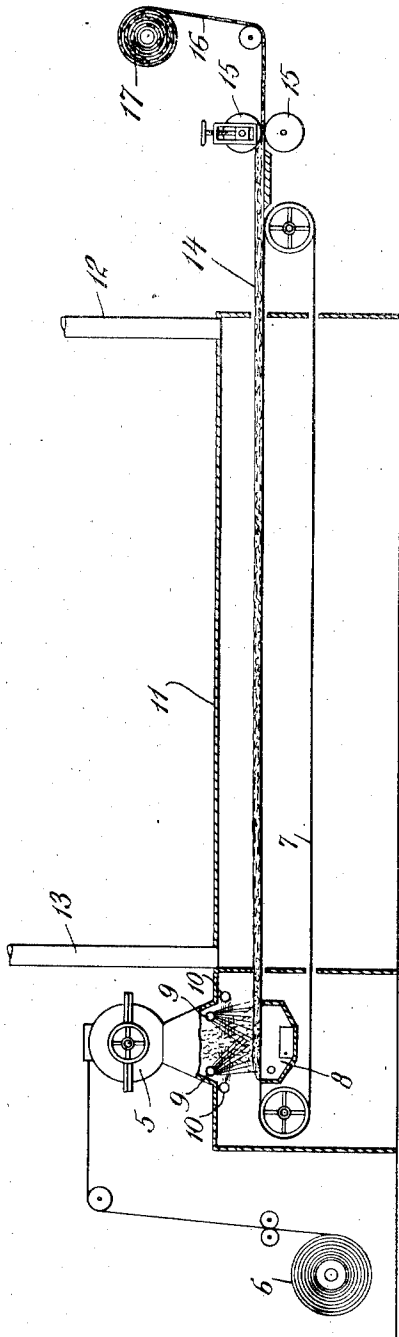


Fig. 1.

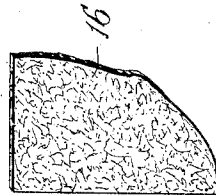


Fig. 2,

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UNITED STATES PATENT OFFICE.

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Specification of Letters Patent.

Patented Jan. 18, 1921.

Application filed August 29, 1919. Serial No. 320,568.

To all whom it may concern:

Be it known that I, HOWARD F. WEISS, a citizen of the United States, residing at Madison, in the county of Dane, State of Wisconsin, have invented certain new and useful Improvements in Felt; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to felts, and more particularly to imitation felts adapted to be used in many places where wool felts are now employed. The invention contemplates as an article of manufacture an improved imitation felt as well as a method of making the same.

The improved felt of the invention comprises a compressed fabric of fibrous material, and preferably wood fibers, cemented together by an appropriate adhesive, preferably a water-resistant adhesive. Prior to the compression, the fibers of this fabric are cemented together in heterogeneous arrangement with the fibers extending in all three cubical dimensions. The compression of the fabric is brought about after the adhesive, cementing the fibers together, has appropriately set or hardened, and serves in a manner to more or less crush the particles of adhesive material without impairing their function as a means for securing the fibers together, and the resulting product is a flexible monolithic fabric closely resembling the ordinary wool felts of commerce. It is not necessary that the adhesive should have completely set or hardened before compressing the cemented-together fibers, and I have obtained satisfactory results by subjecting the cemented-together fibers to compression after the adhesive has partially set. Where the fabric is compressed before the adhesive has sufficiently set the resulting product will be stiff, and the desired flexibility of the felt is therefore secured by allowing the adhesive to set or harden to an appropriate degree before compressing the fabric.

In the following discussion and description of the invention, reference is particularly made to the production of my improved felt from wood fibers, but it is to be understood that other kinds of fibers are available for the purposes of the invention.

In carrying out the invention, I first produce a fibrous mat substantially in accordance with the method described in my application for Letters Patent of the United States, Serial No. 237,446, filed May 31, 1918. Thus, the fibrous material, from which the felt is to be made, is first subjected to a shredding operation in order to separate the fibers, which are then deposited upon a suitable support to form a flocculent layer of the shredded fibers. The shredded fibers are treated with an adhesive to cement them together. I prefer to apply the adhesive in the form of a spray; either during the deposition of the shredded fibers on the support or immediately after the flocculent layer of fibers has been formed. After the adhesive has set or hardened to a suitable extent, the resulting fibrous mat is subjected to compression so as to reduce the mat in thickness to about one-fourth to one-tenth of its original thickness. This compression densifies the mat, but without appreciable tendency toward hardening or caking, since the adhesive is sufficiently dry to prevent any undesired tendency in this direction before the pressure is applied. The resulting compressed fabric is the improved felt of the invention and it may be marketed in any appropriate form or style.

Wood pulp obtained from the soda process, or from the sulfite process, or from the sulfate process may be advantageously used as the source of fibrous material. Preferably the wood pulp is formed into laps or sheets and is fed into the shredding apparatus, as desired, in this form.

The moisture-resisting properties of the felt of the invention may be advantageously improved by sizing the fibers before depositing them on the support. For this purpose a water-resistant size should be employed. I have found aluminum resinate and insoluble soaps in general suitable water-resistant sizes, for the purposes of the invention. The sizing of the fibers may be accomplished in any convenient manner, as, for example, by immersion in a body of the sizing agent. Where an insoluble soap is used as the size, it is advantageous to form the sizing agent *in situ* by adding alum or a similar insolubleizing agent to a solution of soluble soap in which the fibers to be sized are immersed.

As hereinbefore explained, the fibrous ma-

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terial is subjected to a shredding operation previous to its deposition in the form of a flocculent layer of fibers. The purpose of this operation is to separate the fibers into individual particles, and I have throughout this specification and the appended claims employed the term "shredding" and its derivatives in a generic sense to describe the operation of so treating the fibrous material that each fiber is substantially free from any other fiber. In practice a shredding engine will usually be most satisfactory for this purpose, but the desired result may be secured in other ways, as, for example, by brushing or combing. For example, a stiff wire brush revolving at a high rate of speed and coming in contact with a piece of the fibrous material will separate the material into individual fibers.

The adhesive for cementing the fibers together should preferably be a water-repelling or water-resistant adhesive. I have secured satisfactory results by the use of valspar, and similar varnishes, as the adhesive. Hide-stock glue, and similar water-resisting glues, as well as hydrolyzed corn-starch paste may be used with advantage as the adhesive for cementing the fibers together. The adhesive is preferably applied by spraying it into the falling column of shredded fibers, either with or without the presence of steam for suitably softening the adhesive agent.

In Figure 1 of the accompanying drawing, there is diagrammatically illustrated in elevation one form of apparatus for carrying out the invention, but the showing is purely diagrammatic and is given merely to facilitate a complete understanding of the invention. For this reason, the precise structural details of the apparatus are omitted as forming no part of the present invention.

Fig. 2 of the drawing illustrates the improved felt of the invention.

Referring to Fig. 1 of the drawing, there is shown a shredding engine 5 for separating the fibrous material into individual fibers. In this figure the fibrous material is represented as fed into the shredding engine in the form of a sheet which is unwound from a roll of fibrous material 6. The fibers of which the roll 6 is composed are preferably coated or filmed over with a water-resistant size, which sizing operation will take place before the fibers are formed into the sheet.

The shredding engine 5 is arranged to discharge the shredded fibers on to a belt conveyer 7, preferably of the form of a screen conveyer. The fibrous material is thus shredded in the engine 5, and, falling through the discharge thereof, the shredded fibers are deposited on the conveyer 7, to form a flocculent layer of the desired thick-

ness. In this flocculent layer the fibers are heterogeneously arranged and extend in all three cubical dimensions.

I find it desirable to subject the shredded fibers to a slight suction during and directly after their deposition on the conveyer 7. To this end, a suction chamber 8 is arranged below the shredding engine 5 and directly beneath the supporting screen surface of the conveyer 7. The conveyer 7 may be in the form of a screen of suitable mesh, or its supporting surface may be composed of a suitably perforated or foraminated material so that the fibers deposited on the conveyer may be subjected to the suction applied through the instrumentality of the suction chamber 8.

Sprayers 9 are suitably arranged for spraying the shredded fibers with an adhesive agent as they are deposited on the conveyer 7. The sprayers 9 serve to discharge the adhesive either directly upon the fibers deposited upon the conveyer or outwardly in the form of a spray or mist through which the fibers fall. These sprayers may be placed directly under the discharge of the shredding engine 5, or to one side thereof, either arrangement proving satisfactory. In either case the adhesive serves to bind or cement the fibers together, but I have found that when these fibers fall through a mist or spray of the adhesive, a somewhat firmer mat containing fewer loose fibers is produced. The adhesive agent discharged from the sprayers 9 may, if desired, be subjected to the action of steam for the purpose of heating or softening the adhesive agent. Thus, in Fig. 1 of the drawing, steam supply pipes 10 are represented for the purpose of supplying the desired atmosphere of steam. In some instances it has been found desirable to deposit a very thin layer of dried fibers upon the conveyer 7 before the application of the adhesive agent, to provide a cushion which will act to prevent the fibers from sticking to the conveyer.

The layer of shredded fibers deposited on the conveyer 7 is borne along by the conveyer to a drying chamber 11. A suitable drying medium may be passed through the chamber 11 for the purpose of drying or hardening the adhesive agent cementing the fibers together. The chamber 11 is thus represented as having an entrance conduit 12 and an exit conduit 13 for passing a drying or heating medium, such as heated air, through the chamber 11.

As the result of the operations just described, there is formed a mat 14 of fibrous material, in which the fibers are cemented together in heterogeneous arrangement. In accordance with the present invention, this fibrous mat is now passed between a pair of compression rolls 15, which reduce the thickness of the mat to about one-fourth to

one-tenth of its original thickness. In Fig. 1 of the drawing the upper roll 15 is represented as adjustable, so that the degree of compression to which the fibrous mat 14 is subjected, and hence the reduction in thickness of the mat may be varied as desired. The resulting compressed fabric, 16, may then be wound into a roll 17, or given any other appropriate form for marketing or for subsequent treatment or use.

In Fig. 2 of the drawing there is represented a piece of the improved felt of the invention as it is wound into the roll 17 of Fig. 1.

By the proper selection of the raw material from which the felt of the invention is to be made, a substantially white product may be obtained. If desired, the fibers may be dyed before they are fed into the shredding engine, or as to give a felt of any desired color. Or if desired, the felt made in accordance with the invention may be subsequently dyed. The improved felt of the invention can be used in place of the relatively expensive wool felt of commerce in a great many places where wool felt is now used, for instance, as the cushion face of desk accessories, under telephone bases, for pennants, and as high grade packing between china, glassware and the like. The felt may also be used as an inner lining for clothing, bedding, mats for dining room tables or liners for such mats, upholstery or furniture, floor polishing mats, etc.

I claim:

1. The method of manufacturing felt which comprises forming a fibrous mat in which the fibers are coated with a water resistant size and are cemented together by a water resistant adhesive, and subjecting the fibrous mat to compression after the adhesive cementing the fibers together has appropriately hardened; substantially as described.

2. The method of manufacturing felt which comprises shredding fibrous material, depositing the shredded fibers to form a layer of the desired thickness, treating the fibers with an adhesive to cement them together, drying the fibrous mat thus produced, and compressing the dried fibrous mat; substantially as described.

3. The method of manufacturing felt which comprises forming a fibrous mat in which the fibers are cemented together in heterogeneous arrangement with the fibers extending in all three cubical dimensions, treating the fibers with a water resistant adhesive to cement them together, drying the adhesive to an appropriate extent, and subjecting the resulting fibrous mat to compression; substantially as described.

4. The method of manufacturing felt which comprises subjecting fibrous material to a shredding operation for knocking the fibers apart, depositing the so-treated fibers to form a layer of the desired thickness, spraying the fibers with a water resistant adhesive while they are being deposited and immediately after they are deposited to cement them together, drying the adhesive to an appropriate extent, and subjecting the resulting fibrous mat to compression to form a felt of the desired thickness; substantially as described.

5. The method of manufacturing felt which comprises forming a fibrous mat in which the fibers in heterogeneous arrangement and extending in all three cubical dimensions are cemented together with a water resistant adhesive, drying the adhesive to an appropriate extent, and subjecting the fibrous mat to compression to form a felt of from about one-fourth to one-tenth the thickness of the uncompressed fibrous mat; substantially as described.

In testimony whereof I affix my signature.
HOWARD F. WEISS.