

Nov. 21, 1944.

H. W. RICHTER

2,363,439

FELTED WATER-RESISTANT SHEET FIBERBOARD

Filed July 25, 1940

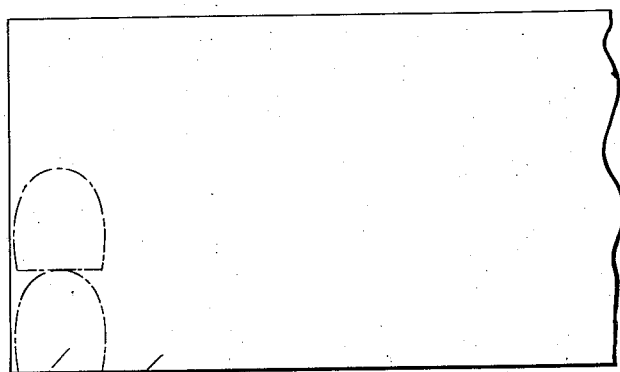


Fig. 1

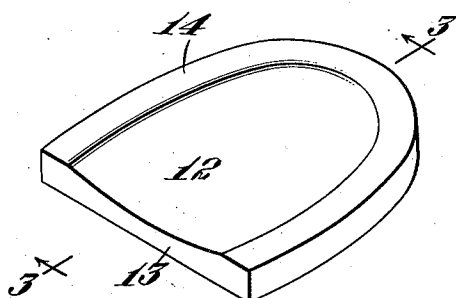


Fig. 2

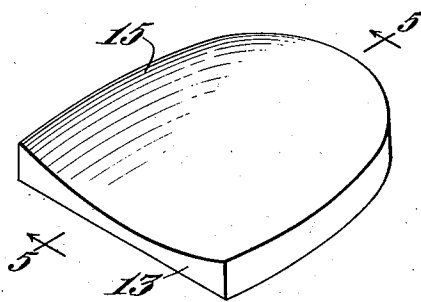


Fig. 4

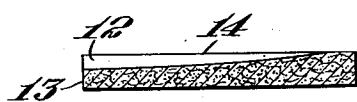


Fig. 3

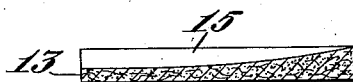
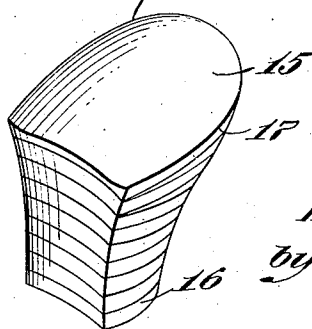


Fig. 5

Fig. 6



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UNITED STATES PATENT OFFICE

2,363,439

FELTED WATER-RESISTANT SHEET
FIBERBOARD

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Application July 25, 1940, Serial No. 347,468

4 Claims. (Cl. 106—156)

This invention relates to a novel felted water-resistant sheet fiber board useful in the manufacture of heel bases and heels for boots and shoes and is a continuation in part of my application for United States Letters Patent Serial No. 225,955, filed August 20, 1938.

So far as I am aware, prior to this invention heels and heel bases have been made principally from leather, leatherboard or rubber. Since the principal use to which the product is intended to be put is for heel bases, I shall refer primarily to that use, intending, however, to include reference to heels as well as heel bases wherever the words "heel base" are used. Rubber heel bases are expensive and are somewhat unsatisfactory in the finishing operation; leather heel bases are expensive and are not water resistant; and leatherboard heel bases likewise are not water resistant. Although attempts have been made to produce felted water-resistant sheet fiber board heel bases containing asphalt, they have not met with success because the waterproofing material has hardened the heel base material to such an extent that the trimming knives are very rapidly dulled, making its use uneconomical and, furthermore, the waterproofing material has loaded the sandpaper in the scouring operation so rapidly that the use of such heel base material is uneconomical for this additional reason.

I have discovered that a felted sheet product containing at least 50% by weight of fiber (including leather fiber and paper or other fibers), and from 8% to 20% inclusive of a bituminous pitch-type waterproofing agent, such as asphalt, provides a water-resistant product which is of great utility in the manufacture of heel bases and which is also relatively inexpensive as compared to leather or rubber. I have also discovered that the product should also contain at least 9% of leather fiber and enough fiber other than leather to make a total fiber content of at least 50% by weight.

The principal object of this invention is to provide a felted water-resistant sheet fiber board useful in the manufacture of heel bases and heels.

Further objects are to provide such a fiber board in which the waterproofing agent is of such a character and is incorporated in such a manner that the heel bases may be trimmed without unduly dulling the trimming knives and scoured without unduly loading the sandpaper.

A further object is to provide such a fiber board containing from 8% to 20% inclusive by weight of a bituminous pitch-type base as the waterproofing agent.

A further object is to provide such a fiber board containing at least 9% by weight of leather fiber and other fiber in sufficient quantity to make a total fiber content of at least 50% by weight.

Other objects will be apparent from the annexed specification and drawing.

In the drawing:

Fig. 1 is a plan view of a sheet of fiber board made in accordance with this invention;

Fig. 2 is a perspective of a heel base after the gouging operation has been performed thereon;

Fig. 3 is a cross section on the line 3—3 of Fig. 2;

Fig. 4 is a perspective of a completed heel base after the compressing operation has been performed thereon;

Fig. 5 is a cross section on the lines 5—5 of Fig. 4; and

Fig. 6 is a perspective of a heel made in accordance with this invention.

In the use of a sheet product for making heel lifts a plurality of heel lifts 10 are dinked or cut of a sheet 11 or strip of the heel base material, which material may conveniently be approximately $\frac{1}{8}$ of an inch in thickness. A gouge 12 (Figs. 2 and 3) is then made in the upper flat surface of the heel lift, this operation being performed upon any standard heel lift gouging machine. The gouge slopes rearwardly and upwardly from the breast 13 of the heel base and also slopes outwardly and upwardly toward the curved edge 14 thereof. The gouged lift then goes to a heel compressor which compresses the gouged lift to form the final uniform heel seat or cup 15 of the heel base. This heel seat may be moulded or compressed to any suitable curvature to comply with the particular last to be used in making the shoe, to the end that the heel seat will snugly conform to the contour of the corresponding portion of the sole of the shoe. The material of which the heel base is made must lend itself readily to the gouging and compressing steps.

In use the heel base and heel lift or lifts are nailed in superimposed position upon the sole of the shoe, the heel seat engaging the sole of the shoe. Then the curved edges 14 thereof are trimmed with a trimming knife or cutter to make the outside surfaces of heel lifts and heel base conform to the corresponding parts of the sole and upper. The exposed surfaces of heel lifts and heel base are then scoured to smooth the trimmed surfaces thereof, and this operation may conveniently be performed by using a rotating wheel, the periphery of which carries a strip of

sandpaper. The heel is then finished with a stain or wax preparation and is thereafter burnished or polished. The material of which the heel base is made must lend itself readily to these trimming, scouring and finishing operations.

A woman's heel is shown in Fig. 6, the top lift 16 being made either of leather or of my novel heel base material and the other heel lifts and the base lift 17 being made of my novel heel base material.

This invention contemplates the use of a felted sheet of fibrous material as the heel base material. The sheet material may be made on paper-making machines of various types from a furnish of beaten fibers; for example, on a standard wet machine. The invention also contemplates the use of any bitumen pitch-type base as the waterproofing material. Examples of such suitable bases are asphalts, bituminous or hydrocarbon materials, tars, pitches of vegetable, animal or mineral origin, and other similar materials. By the notation "bituminous pitch-type base," wherever used in this specification and in the annexed claims, I intend to include any of said materials. Of these bituminous pitch-type base materials I prefer to use asphalt and I will therefore describe the process with specific reference thereto, although it will be understood that any of the other materials may be substituted for the asphalt.

The asphalt base may be incorporated in the sheet product in any suitable manner, but I prefer to add it directly to the beater in the form of a water emulsion or dispersion so that it is mixed with the fiber stock in the beater and thereafter passed over a wet machine, where it is formed into a felted sheet, which sheet is subsequently dried.

The water dispersion of asphalt or other base may conveniently be made as disclosed in United States Patent No. 1,615,303. For example, a mixture of colloidal clay and water is made by agitation and to it molten asphalt is slowly added. During the addition of the asphalt the mixture is rapidly agitated and the asphalt becomes dispersed in fine particle form, the water comprising the external phase, the asphalt the internal or dispersed phase, the latter being insulated or protected by the clay.

After the fibrous material, which preferably includes leather and cellulosic fibers and may include other fibers, has been thoroughly beaten in a Hollander or other beater, a small quantity of sodium silicate solution is added thereto and mixed therewith, and the asphalt dispersion is then added to the beater and thoroughly mixed with the stock. Aluminum sulfate is then added to the beater and this reacts with the sodium silicate to form a flocculent precipitate which is probably aluminum silicate. This precipitate deposits the asphalt particles about the fibers of the stock and the resultant stock is then passed over the wet machine and formed into sheets. The sheets are usually built up to a thickness of approximately $\frac{3}{4}$ of an inch and are then dried in the usual manner. Other suitable flocculating agents to deposit the asphalt particles upon the fibers of the stock are disclosed in United States Patent No. 1,708,926.

A suitable stock may be made as follows:

940 pounds of waste paper material and 250 pounds of leatherboard chips are placed in the beater and thoroughly beaten. The leatherboard comprises substantially 85% leather fiber and 15% paper fiber, so that such a stock would con-

tain about 977.5 pounds of paper fiber and 212.5 pounds of leather fiber. 50 pounds of an aqueous sodium silicate solution is then added to the stock in the beater. This sodium silicate solution contains 38.7% of sodium silicate, so that approximately 19.35 pounds of sodium silicate and 30.65 pounds of water are added in this step. 455 pounds of asphalt dispersion are then added to the stock in the beater. This dispersion contains approximately 52% asphalt, 8% clay, and 40% water, so that approximately 236.5 pounds of asphalt, 36.5 pounds of clay, and 182 pounds of water are added to the stock at this step. After the asphalt dispersion has been thoroughly mixed with the stock, 37.5 pounds of powdered alum (which may be dissolved in water) is then added.

In the dried felted sheet product substantially all of the water has been removed. Approximately 10% of the asphalt and clay is lost in the felting operation, so that approximately 90% thereof remains in the dried product. Approximately 50% of the silicate and alum is lost in the felting operation, so that the dried product contains approximately 50% of the amounts originally added. Thus the dry product made from the aforesaid furnish contains approximately 977.5 pounds of paper fiber, 212.5 pounds of leather fiber, 213 pounds of asphalt, 32.8 pounds of clay, and 28.4 pounds of aluminum silicate; that is, the dry product contains approximately 66.76% paper, 14.51% leather, 14.56% asphalt, 2.24% clay, and 1.93% aluminum silicate.

It will be obvious to persons skilled in the art that coloring pigments, such as carbon black, ochre, iron oxides, etc., may be added in small percentages to vary the color of the final product. Some asphalts without the addition of any coloring agent produce a brown colored board.

It will also be apparent that fillers such as powdered talc may also be added in some quantities to the aforesaid furnish. Talc, in addition to having the properties of a filler, is also believed to have the property of improving the ply adhesion. In any event, I have found that the final dry product must contain from 8% to 20% inclusive of asphalt, and wherever I use the notation "8% to 20%" in this specification or claims, I intend that it shall include 8% and 20% even though the word "inclusive" is not used.

I have found that when the asphalt content exceeds 20% by weight of the dried product, there is appreciable loading of the sandpaper in scouring, there is considerable difficulty with the dulling of the trimming knives during the trimming operation, and the lifts adhere to the die in the dinking operation. When the asphalt content is less than 8% by weight the product loses its water resistant qualities.

I also prefer that at least 50% of the final product shall be fibers and that the final product shall contain at least 9% by weight of leather fibers. When the product contains less than 9% by weight of leather the ply adhesion is poor so that the layers of stock from which it is made tend to separate from each other in the dried product. Furthermore a product containing less than 9% of leather loses its mellowness and good working properties so that particles of the board tend to break away in the trimming operation which tends to prevent the desirable final smooth finish for the visible edges of the heel base in the completed heel.

A suitable procedure for making a board containing talc as a filler is as follows:

940 pounds of paper fiber and 249 pounds of leatherboard chips are beaten in the beater, 215 pounds of talc are then added to the beater, and 59 pounds of the said sodium silicate solution and 520 pounds of the said asphalt dispersion are successively added and mixed; then 44 pounds of alum are added and mixed with the other ingredients. The stock is then passed over the wet machine in the regular manner, and the dry product contains approximately 56.82% paper fiber, approximately 12.34% leather fiber, approximately 14.21% asphalt, approximately 2.17% clay, approximately 12.51% talc, and approximately 1.94% aluminum silicate.

In manufacturing this felted sheet product as disclosed herein, the asphalt becomes uniformly distributed in and among the fibers of the stock and remains so distributed in the final product. The product, containing not more than 20% asphalt and not less than 8% asphalt, is very water resistant, but upon sprinkling with water at spaced intervals of time it will absorb enough water to somewhat soften the product, and this property is of considerable importance, as hereinafter explained.

The dried product preferably is sprinkled with water several times before the heel lifts are dinked out of it and this softens the product to some extent so that the heel lifts are dinked out much more readily and so that in the subsequent trimming operation the trimming knives are not materially dulled. This retention of moisture also makes the material more pliable during the gouging operation and this is of importance because the heel lifts are usually flexed during the gouging step.

I claim:

1. A water-laid felted water-resistant sheet fiber board useful in the manufacture of heel bases comprising 8 to 20% by weight of bituminous pitch type base and more than 50% by weight of fibrous material comprising cellulosic and leather fibers, said fibrous material comprising at least one-half cellulosic fibers and less than one-half leather fibers, said leather fibers being

at least 9% by weight of the fiber board, and said bituminous pitch type base being uniformly distributed throughout the board, said fiberboard being relatively non-plastic and being characterized by a reticular fibrous structure.

2. A water-laid felted water-resistant sheet fiber board useful in the manufacture of heel bases comprising 8 to 20% by weight of asphalt base and more than 50% by weight of fibrous material comprising cellulosic and leather fibers, said fibrous material comprising at least one-half cellulosic fibers and less than one-half leather fibers, said leather fibers being at least 9% by weight of the fiber board, and said asphalt base being uniformly distributed throughout the board, said fiberboard being relatively non-plastic and being characterized by a reticular fibrous structure.

3. A water-laid felted water-resistant sheet fiber board useful in the manufacture of heel bases consisting of from 63% to 92% by weight of fibrous material, from 8% to 20% by weight of bituminous pitch type base and the balance filler, said filler being no more than 17% by weight of the fiber board, said fibrous material comprising cellulosic fibers and leather fibers, the leather fibers consisting of less than one-half by weight of the total fiber content and at least 9% by weight of the fiber board, and said bituminous pitch type base being uniformly distributed throughout the board, said fiberboard being relatively non-plastic and being characterized by a reticular fibrous structure.

4. A water-laid felted water-resistant sheet fiber board useful in the manufacture of heel bases consisting of from 63% to 92% by weight of fibrous material, from 8% to 20% by weight of asphalt base and the balance filler, said filler being no more than 17% by weight of the fiber board, said fibrous material comprising cellulosic fibers and leather fibers, the leather fibers consisting of less than one-half by weight of the total fiber content and at least 9% by weight of the fiber board, and said asphalt base being uniformly distributed throughout the board, said fiberboard being relatively non-plastic and being characterized by a reticular fibrous structure.

HERMAN W. RICHTER.