Feb. 21, 1939. R. KUKULA 2,147,904

HEEL FOR SHOES

Filed March 27, 1936

Fig.1

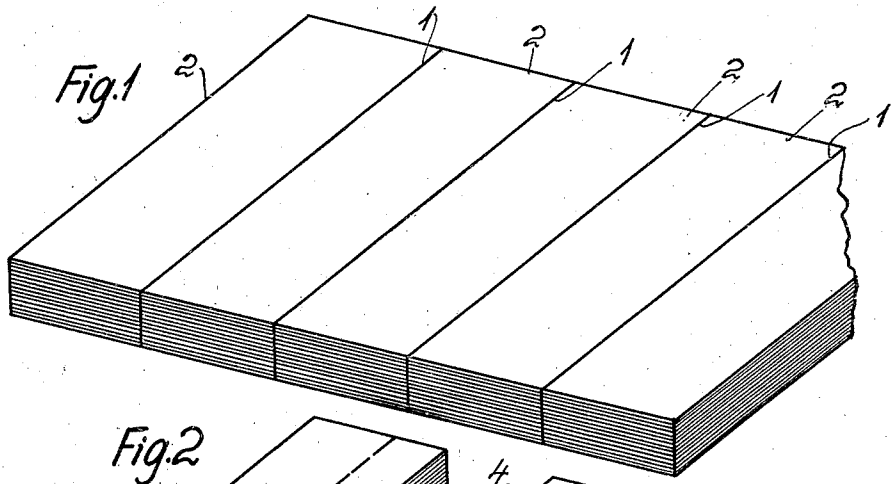


Fig.2

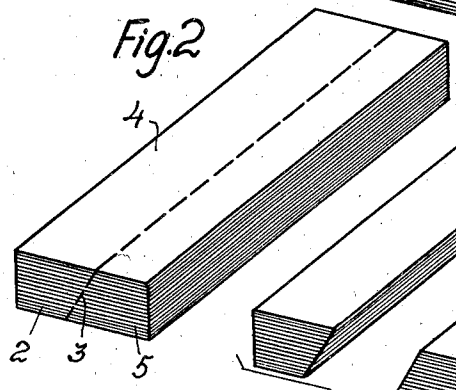


Fig.3

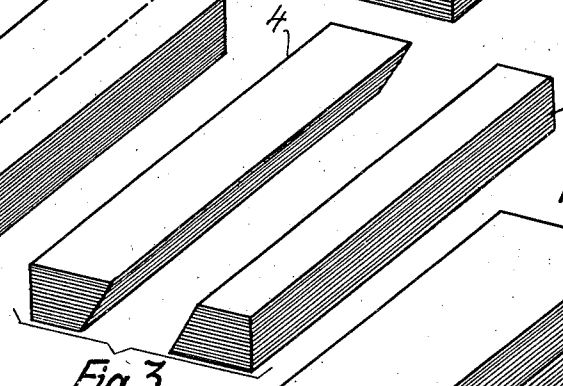


Fig.4

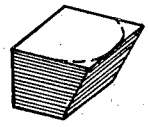


Fig.5

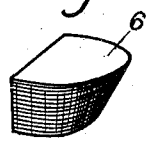
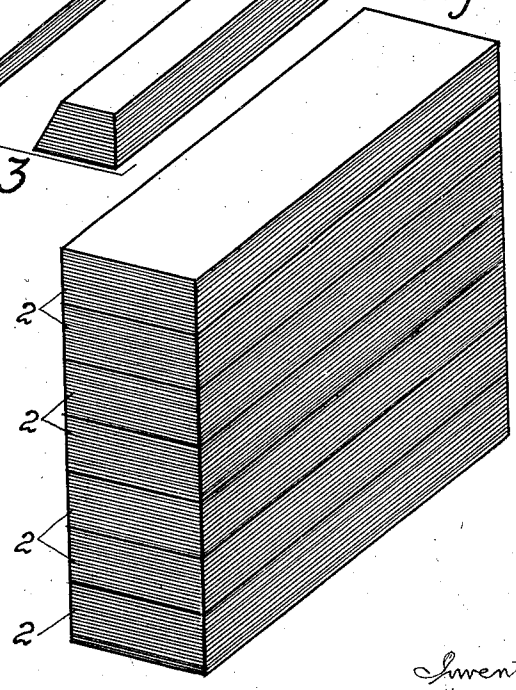


Fig.6



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HEEL FOR SHOES

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Application March 27, 1936, Serial No. 71,098
In Austria April 3, 1935

2 Claims. (Cl. 36—34)

This invention relates to heels for shoes and method of manufacturing the same. It is known to make heels from millboard or paper-board by stamping out plates of mill board or paper-board as in the production of heels from leather, placing these plates one on the other and securing them to each other by nailing it, the sheets or plates of millboard or paper-board being adapted as to shape and size to the individual cross sections of the heel to be formed.

Since this method is very cumbrous it has been proposed to form a panel or slab from a plurality of sheets of millboard stuck together, the thickness of this panel being approximately equal to the height of the heels to be produced, and to obtain uniform work-pieces from the panel by means of saw cuts in a similar manner to that already known in connection with the manufacturing of wooden heels, which work-pieces are then given the shape of heels by milling or in any other suitable manner. In this way the intention has been to avoid the stamping out of different sized millboard discs and the tedious fitting together of these discs to form heels. As starting material there was used for this purpose ordinary brown mechanical pulp mill-board, that is to say mill board consisting of mechanical wood-pulp obtained from steamed wood.

However, due to the toughness of its fibres brown mechanical pulp mill-board cannot be machined or can only be machined with great difficulty with cutting tools, such as for example milling cutters. The tools very soon become blunt and smoothly machined surfaces cannot be obtained at all. As a consequence, the method mentioned in the foregoing paragraph cannot be carried out in practice on an industrial scale.

This invention is based on my recognition of the surprising and unexpected fact that there exists a millboard material which is highly adapted for carrying out said method on an industrial scale and permits producing heels with smoothly machined surfaces without excessive dulling of the milling tools. The material I have found so highly adapted for the manufacture of heels is millboard made from white mechanical wood pulp obtained from unsteamed or slightly steamed wood. The fibres of such mill board are less soft and elastic and also considerably shorter than those of a mill-board produced from steamed mechanical wood, and a work piece consisting of such mill board of white mechanical wood pulp can be machined just as well as wood. If therefore a panel or strip be formed by sticking together superposed sheets of mill board made from mechanical wood pulp obtained from non-steamed or only slightly steamed wood, heels can be manufactured therefrom in just the same way as heels are made from wood, and the same machines can also be used.

A further disadvantage of the paste board or mill board material hitherto used in the manufacturing of heels resides in the fact that the substances with which the heels are impregnated to render them resistant to moisture, water, and snow do not penetrate far enough into the material, so that the effect of these substances is always insufficient. I have found the density of the brown mechanical pulp millboard responsible for this drawback, such millboard, in manufacturing, being normally couched under high pressure and then compressed, with the result that it becomes very dense.

In accordance with the present invention this drawback is obviated by using as starting material a highly porous variety of mill boards, namely a variety the weight of which in the dry state, with the normal moisture content of about ten percent of the dry substance, amounts to approximately 0.42 to 0.50 grams per cc., in contrast to the usual mill board the weight of which amounts to more than 0.60 grams per cc. at the same moisture content. If the work piece consists of such highly porous mill board it becomes possible above all to dry out the moisture derived partly from the process of manufacturing the mill board and partly from the binding agent with which the sheets of mill board are stuck together more rapidly and more completely than is otherwise possible. Heels made from such mill board also possess high absorbing power, so that the impregnating and coloring matter with which the finished heels are treated can penetrate very far in, whereas in the case of mill board made from steamed mechanical wood the water-repelling substances remain on the surface of the heels. It will be clear that the thorough penetration of such treating substances very greatly increases the length of life of the heels.

For heels made according to my invention, I preferably employ impregnating substances which do not cause the wood fibre to swell, that is to say for example resin solutions in hydrocarbon compounds such as for example gasolin, benzol or xylene. Impregnating substances of this nature also possess great creeping power, which aids their thorough penetration into the mill board material, which property renders these

substances suitable for impregnating ordinary paste board also.

Furthermore, heels made from highly porous mill board are far more elastic and lighter in weight than when made from denser paste board, and also deaden sound better so that walking on heels made in this way does not set up any annoying clapping sound.

Highly porous mill board of this nature can be so produced that only a relatively low couching pressure is employed on its manufacturing, and that the sheets taken from the collecting cylinder of the mill board machines are not, as is otherwise usual, subjected to a very high hydraulic pressure for the purpose of dehydration. On the contrary, the mill board sheets are only subjected to quite slight pressure to remove the greater part of the surplus water, after which the moisture still remaining in the mill board sheets can be got rid of by natural or artificial drying, since the relatively loose structure of these mill board sheets enables the moisture content to be evaporated almost without remainder.

If such highly porous mill board be manufactured from mechanical wood pulp obtained from non-steamed or slightly steamed wood it will also be endowed with the above mentioned qualities which enable it to be satisfactorily machined with cutting tools.

The actual method by which the heels can be obtained from superposed sheets of mill board stuck together can vary within wide limits. One such method will now be described with reference to Figs. 1 to 5 of the accompanying drawing, it being remarked at once that this method is in part similar to a method which is already known in connection with the manufacturing of heels from wood or multi-ply paste board.

Fig. 1 shows the assembly of mill board sheets and line of cutting.

Fig. 2 is one of the strips from the divided assembly.

Fig. 3 shows the two equal sections cut from Fig. 2.

Fig. 4 is the rough heel work piece.

Fig. 5 is the shaped heel piece.

Fig. 6 shows an alternate method of assembling the sheets from that in Fig. 1.

Mill board sheets of normal size are placed one upon the other in a suitable number and stuck together. In this manner there is obtained a panel as shown in Fig. 1, the thickness of this panel being made to correspond to the height of the heels to be manufactured. This panel is then divided up into strips **2** by parallel cuts **1** made at right angles to the plies of the material. The breadth of these strips is equal to the sum of the length of the larger and smaller end surfaces of the heels to be produced. Fig. 2 shows a single one of these strips **2**. Each of these strips, as can be seen from Fig. 2 is divided by an inclined longitudinal cut **3** into two congruent prismatic portions **4** and **5** which are shown separated from each other in Fig. 3. Each of these strips **4** and **5** is then divided up by transverse cuts into work-pieces as shown in Fig. 4, from which the heels shown in Fig. 5 are then obtained by milling or otherwise. The top surface is then hollowed by pressing or milling to fit the sole.

A disadvantage of this method consists in the fact that the initial panels, which are formed by sticking together superposed sheets of millboard (Fig. 1), can not be obtained in precisely the same thickness, since it is impossible to manufacture the sheets of millboard in exactly the same thickness and consequently impossible to obtain invariably the same thickness of panel by stacking a certain number of such sheets. The final thickness of the panels also depends on the thickness of the layers of adhesive between the millboard plies, and variations in the thickness of these adhesive layers are unavoidable, so that, practically speaking, it is not possible to obtain heels of exactly the same height from a larger number of panels of the type shown in Fig. 1, without in some way or other correcting the height of the individual heels in a separate working stage.

This drawback can be overcome in accordance with the invention by obtaining the strips **2** shown in Fig. 2, for subsequent working up into heels in the manner indicated in Figs. 2–5, not by dividing up a panel of the type shown in Fig. 1 but by dividing up a block as shown in Fig. 6. This block consists of strips of millboard of the breadth of the prismatic strips shown in Fig. 2 superimposed one upon the other and stuck together. This block can be made of any desired height, that is to say any desired number of millboard strips can be stuck together in superposition. The block shown in Fig. 6 differs essentially from the panel shown in Fig. 1 inasmuch as the stratification of the panel shown in Fig. 1 is parallel to the main surfaces of the panel, whereas the stratification of the block shown in Fig. 6 is at right angles to the main surfaces of the block. The block shown in Fig. 6 can then be divided up, by parallel cuts made in the direction of the plies, into strips as shown in Fig. 2, and that in such a manner that all the strips thus obtained are of precisely the same height. This result can be achieved without difficulty since the cuts made in the direction of the plies can be spaced to correspond exactly to the height of the heels to be produced, quite irrespectively of the thickness of the individual sheets of millboard constituting the block. These dividing cuts may thus split the plies of millboard of which the block consists, so that then each individual strip of the type shown in Fig. 2 need not consist of a whole number of plies of millboard, as in the case of the method first described, but can also contain fractions of a millboard ply.

When the strips according to Fig. 2 are obtained in this manner it is perfectly immaterial whether the constituent millboard plies are of the same thickness or not, since the dividing up of the block according to Fig. 6 can be carried out without regard for the adhesive joints between the individual superimposed millboard plies, at precisely equal intervals. There are therefore obtained strips of the type shown in Fig. 2 which are of precisely the same thickness, and consequently also heels which are of precisely the same height.

When dividing up a block according to Fig. 6 into strips according to Fig. 2 a remnant is generally left over the height of which is less than that of a full strip. This remnant is by no means scrap, since it can be used bodily in the formation of a fresh block.

The block according to Fig. 6 can be formed by cutting up the individual sheets of millboard into strips, and sticking these strips together in superposition. It is also possible to make up the block by sticking together the thick strips **2** obtained from a panel as shown in Fig. 1.

Dividing up the panel according to Fig. 1 by sawing would result in a relatively large amount

of waste in the form of saw-dust. The same applies also to the dividing of the strips by the inclined cut indicated by the line 3 in Fig. 2, and also to the dividing up of the prismatic strips 4 and 5 to obtain the work-pieces shown in Fig. 4. This waste in the form of saw-dust can be avoided in accordance with the invention by effecting the dividing up of the initial panels, and of the strips 2 and work-pieces 4 and 5, by cutting with the aid of knives. In accordance with the invention this cutting is effected while the binding agent with which the individual millboard plies are stuck together is still plastic and yielding, so that the millboard plies can become relatively displaced in the direction of their planes in response to the pressure of the tapered knife as it penetrates into the material. Consequently, the knife does not meet with excessive resistance in cutting through the stacked material. In consequence of the relative displaceability of the millboard plies the parts severed by the cut become deformed, so that the millboard plies no longer lie accurately one upon the other but are somewhat displaced relatively to each other. However, to counteract this effect, as long as the binding agent is still plastic and yielding, that is to say as soon as possible, the strips or work-pieces, after having been cut, are pressed in the direction in which the displacement of the millboard plies has taken place, so that the displacement of the plies occurring at cutting is cancelled.

The work-pieces according to Fig. 4 are left to dry before being machined by milling tools or the like. The excellent machinability of the heel consisting of mill-board material made from white mechanical wood pulp produced from non-steamed or but slightly steamed wood also enable the hollowing of the upper surface 6 of the heel (Fig. 5) to be effected by means of milling cutters or the like.

The high absorbing power of the millboard used in accordance with the invention also affords advantages when the heels are produced in a different manner from that described in connection with the example here given. It is thus possible, for example, to stamp out of the highly porous millboard discs of the requisite shape and size, and to make the heel in the usual manner by placing the discs one upon the other and nailing. A heel of this nature has the advantage over heels made in the same manner from stamped out discs of ordinary pasteboard, that it can be impregnated better and to a greater depth, that it is specifically lighter in weight, and that it is more elastic.

The impregnating can also be carried out in such a manner that the discs are impregnated before being combined to form the heel. Since it is not necessary that the discs be steeped with the impregnating liquid from the flat sides, and since the discs when impregnated from the flat sides take up too much of the impregnating agent and thus become unnecessarily heavy, the procedure can be such that a larger number of stamped out discs are placed loosely one upon the other and so pressed together by means of a clamping device that the joints between the discs are tightly closed, after which this stack of discs is immersed in the impregnating agent. The impregnating liquid can thus only penetrate into the discs from the narrow peripheral surfaces, and this liquid need only be allowed to penetrate into the depth required in each individual case. The above-mentioned resin solutions enable uniform impregnating to be effected even with discs of wood-pulp material of any nature.

For the outermost disc, which constitutes the walking surface of the heel, there can also be employed a disc which is impregnated through and through.

I claim:

1. A heel for shoes and boots composed of layers of highly porous mill-board having the normal moisture content of about 10 per cent and weighing from 0.42 to 0.50 grams per cubic centimetre.

2. A heel for shoes and boots composed of layers of highly porous mill-board made from white mechanical wood-pulp, said mill-board material having the normal moisture content of about 10 per cent and weighing about 0.42 to 0.50 grams per cubic centimetre.

RUDOLF KUKULA.