March 25, 1930. C. ROBERTS 1,751,557

RUBBER TREAD FOR SHOES

Filed July 2, 1928

Fig.1.

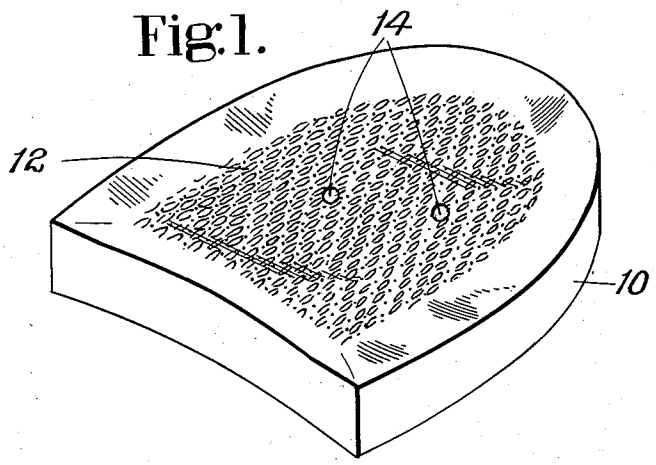



Fig.2.

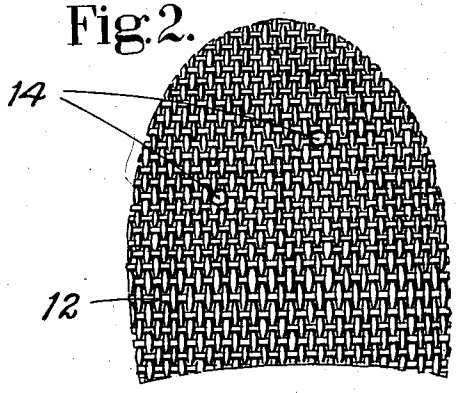



Fig.3.

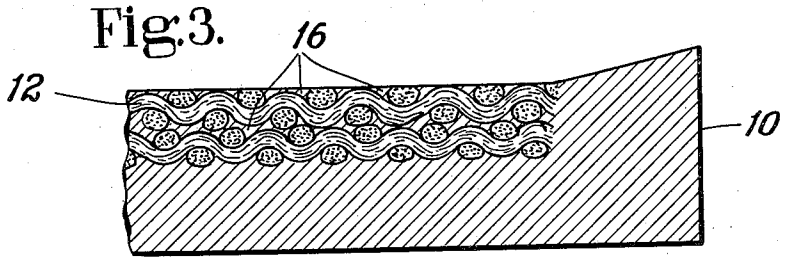
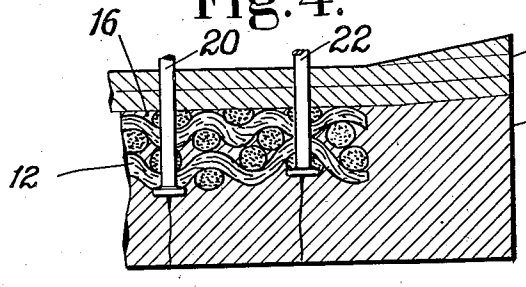



Fig.4.




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# UNITED STATES PATENT OFFICE

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## RUBBER TREAD FOR SHOES

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This invention relates to rubber treads for shoes and is herein illustrated as embodied in a rubber heel of the cored type.

An object of the invention is to provide an improved cored tread member which will be economical to manufacture, will be capable of easy and secure attachment, in which the core will be so strongly bonded to the rubber that there will be no danger of separation in use, and in which the core will successfully resist penetration of moisture and resultant deterioration.

In the accomplishment of the above stated object an important feature of the invention resides in the employment in a rubber heel or sole of a novel core of paper textile fabric, a material which has heretofore never been used or recognized as capable of successful use in heel or sole manufacture but which has certain valuable characteristics of which advantage may be taken by proper use of said material in combination with a soft rubber body. Among these characteristics are cheapness, a degree of flexibility or stiffness which may be varied within rather wide limits, large bulk in proportion to weight, and permeability to rubber and to strengthening and waterproofing materials. This material can be cut to required shapes and sizes more easily than other materials which have proved practical for heel cores, and maintains its thickness better than do other textile fabrics, such as canvas, when subjected to pressure in a heel vulcanizing mold.

The paper textile fabric may be woven, knitted, or formed of crossed paper strips, filaments or cords united in any desired manner, but having a distinct mesh, as distinguished from common paper or paper board, which consists of fibers felted together into a solid, continuous sheet having no mesh or texture.

A form of paper material which I have found to give excellent results is an open mesh fabric woven from rather coarse twisted paper cord. Cores of any desired shape may be very easily died out of this material, which is free from those fine, soft fibers which make it difficult to produce cleanly cut edges with a cutting die upon an article cut from cotton fabric.

While my novel and improved core may be used in the manufacture of heels or soles either with or without a preliminary strengthening and waterproofing treatment, I prefer, before incorporating it in the manufactured article, to coat or impregnate it with some material which will increase its mechanical strength, preserve it from access of moisture and perhaps increase its stiffness more or less. Various materials may be used for this purpose and, as illustrative of one class of such materials, there may be mentioned the so-called phenolic condensation materials, many of which are well known, bakelite varnish being one example. It should be understood, however, that the scope of the invention is not limited to the use of this particular material or class of materials for strengthening purposes, but may embrace the use of strengthening, waterproofing, or stiffening substances of other types, of which hæmoglobin and hard rubber may be mentioned as diverse examples. The phenolic condensation materials, in common with various suitable materials of other kinds or types such, for example, as those above-mentioned, have the desirable qualities of adhering strongly to, or penetrating, the paper fabric and curing under heat and pressure to such a state or condition that the treated fabric is materially strengthened and also thoroughly protected from moisture.

By reason of the rough surface and relatively open texture of the paper textile fabric, the plastic rubber in the mold in which the article is vulcanized penetrates the fabric readily and a very strong mechanical bond between the rubber and the core is easily obtained, each of the paper cords constituting the fabric being virtually surrounded by the rubber of the molded mass.

These and other features and advantages of the invention will be more fully understood and appreciated from reading the following detailed description of one embodiment thereof in connection with the accompanying drawings, in which

Fig. 1 is a perspective view of a heel embodying the invention;

Fig. 2 is a plan view of my improved core, ready for incorporation in a heel;

Fig. 3 is an enlarged sectional view of a portion of the heel shown in Fig. 1; and

Fig. 4 is an enlarged sectional view showing how the core co-operates with the heel attaching nails.

In the drawings, 10 indicates a rubber heel of any preferred form, molded and vulcanized, as usual, in a mold of suitable conformation by the application of heat and pressure.

Embedded in the attaching face of the heel 10, and permanently bonded to the rubber thereof, is a core or insert 12 which is strikingly novel in that it consists of paper textile fabric. In the illustrated embodiment of the invention the paper textile fabric is made by weaving together separate and distinct cords, threads or filaments of paper, the weave preferably being loose enough to produce a fabric of somewhat open mesh. The paper cords or filaments may be made by twisting strips of paper and are similar to ordinary paper twine. Fig. 2 illustrates a core or insert died out of such paper fabric as that just described, 14 indicating two holes which may be punched in the core to co-operate with pins in the heel vulcanizing mold to ensure accurate positioning of the core in the mold.

Inasmuch as paper is free from those fine, loose, soft fibers which make it so difficult to produce cleanly cut edges with a cutting die upon an article cut from cotton or similar fabric, the employment of the paper fabric greatly facilitates the production of heel cores or inserts by the rapid and efficient method of die cutting.

One or more layers of paper textile fabric may be used, in accordance with the requirements of the work. For example, in the case of a thin rubber top lift, a single layer may serve satisfactorily, whereas, in thicker or heavier heels, or in deformable heels which exert considerable pull upon the attaching nails, it may be advantageous to employ two or more layers. In Figs. 3 and 4 of the accompanying drawings two such layers are shown.

The core, as shown in Fig. 2, may, in some cases, be used without any further preparation. In cases where greater strength is desired than is provided by the untreated paper fabric, I treat the fabric, before incorporating it in a heel, with some material which will increase its mechanical strength. One class of such materials which affords excellent results comprises the so-called phenolic condensation materials, of which bakelite is a well known example. Other strengthening materials, of different origin, may also be used. Obviously, it is impracticable to name all materials suitable for the purposes of the invention, but hæmoglobin and hard rubber may be mentioned as examples of well known substances which may be employed.

This treatment of the paper fabric may be effected before the core is cut from the sheet of fabric, or the core may be treated after it is cut out. Preferably the material employed in the strengthening treatment will also have waterproofing characteristics, so that the resistance of the paper fabric to the penetration of moisture will be increased. In the case of such materials as bakelite, the treatment may be effected by dipping the paper fabric in bakelite varnish or the fabric may be otherwise impregnated with bakelite in liquid form, as by spraying or application with a brush or otherwise; or the bakelite may be applied dry in the form of powder. If substances of other kinds are used, the mode of application may be varied to suit the behavior of the particular substance employed, as will be readily understood by those skilled in the art.

The strength of the paper fabric is very materially increased by such treatment as has just been described and, in this connection, the use of a phenolic condensation material is especially advantageous for the reason that it becomes cured to a measureable degree by the heat and pressure subsequently applied in the vulcanization of the rubber heel in which my improved core is incorporated. This curing of the material with which the paper fabric has been treated still further increases the strength of the core and may also increase its stiffness to some extent.

In the manufacture of my improved heel a core, either treated or untreated, consisting of the desired number of layers of paper textile fabric is placed in a rubber heel mold together with a biscuit of suitable rubber composition, and heat and pressure are applied for sufficient time to produce proper vulcanization of the rubber. Under the influence of the heat the rubber becomes very soft and the applied pressure causes it to flow through the meshes of the core fabric and to penetrate all the interstices of the fabric, each of the paper cords constituting the fabric being virtually surrounded by the rubber of the molded mass, as shown for example, at 16 in Figs. 3 and 4, so that the core is so strongly and permanently bonded in the heel as to obviate any danger of its separation therefrom during the wear of the heel.

My novel and improved heel core has relatively large bulk in proportion to its weight which is advantageous in that it takes the place of a considerable amount of rubber, reducing both the weight and cost of the heel. This bulkiness of the core material is maintained to a surprising degree even under the vulcanizing pressure, the percentage of reduction in thickness of the paper textile

fabric core under the pressure employed in the vulcanizing process being materially less than in the case of cotton fabrics such as have been used heretofore. The paper textile fabric is also very much cheaper, volume for volume, than canvas, duck, or the like and, consequently, a relatively thick core may be employed without incurring the prohibitive cost which is incident to the use of a multiplicity of layers of cotton fabric.

In this connection Figure 4 illustrates a very important practical advantage resulting from the use of a core of substantial thickness. In this Figure 18 indicates a heel base of conventional form which may be understood to be applied to a shoe to which the base and the rubber heel 10 are attached by nails such as those shown at 20, 22. It is difficult to drive a gang of heel attaching nails all to exactly the same depth from the tread surface of the heel, whether the nails are driven by hand or by machinery, and in practice it is not unusual to find that, after a heel has been attached, the nails are somewhat as shown in Fig. 4, wherein the head of the nail 22 is sunken more deeply than that of the nail 20. When a core or insert which is very thin is used in a rubber heel there is great danger that either a nail such as the one shown at 20 will not be driven deeply enough for its head to seat upon the core and draw the latter tightly into contact with the heel base, or else that the head of a nail such as that shown at 22 will break through the core, in which event, of course, that nail becomes useless as an attaching fastening. My improved core may readily be made of such thickness that ample leeway is provided for normal variations in the depth to which the heads of the attaching nails are driven, with the result that the nails may all be driven deeply enough to insure a tight attachment of the heel without danger of any of them breaking through.

It should be understood that the showing and specific description herein of the invention as embodied in a heel is only for purposes of illustration and that the invention is equally applicable to shoe treads of other kinds such, for example, as heel lifts, tips, protectors and soles.

While it is usually preferable that the area of the core or insert 12 be less than that of the attaching face of the tread member, as is the case in the heel illustrated herein, it may be desired in some kinds of treads that the core or insert shall extend all the way to the edge, and it should be understood that such a structure, as well as other modifications and equivalents of the specific structure herein shown, is to be regarded as within the scope of the invention.

Having described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. A rubber tread for shoes having a core comprising a paper textile fabric.

2. A rubber heel having a core consisting of woven paper fabric.

3. A rubber heel having a core consisting of open mesh paper textile fabric.

4. A rubber tread for shoes having a core of waterproofed and strengthened paper textile fabric.

5. A rubber heel having a paper textile fabric core impregnated with a heat cured strengthening and waterproofing material.

6. A rubber heel having embedded in its attaching face a nail holding core of fabric woven of paper cord and treated with a phenolic condensation strengthening material which is at least partially cured.

7. A rubber heel element consisting of fabric woven of paper cord.

8. An insert for rubber treads for shoes consisting of woven paper fabric treated with a strengthening material.

9. A core for rubber heels consisting of paper textile fabric treated with strengthening material which is capable of being cured by heat and pressure.

10. A core for rubber heels consisting of woven paper fabric impregnated with a phenolic condensation product varnish.

11. A rubber heel having a core consisting of open mesh paper textile fabric, the rubber of the heel occupying the interstices of the fabric and substantially surrounding the individual cords thereof.

In testimony whereof I have signed my name to this specification.

CLIFFORD ROBERTS.