

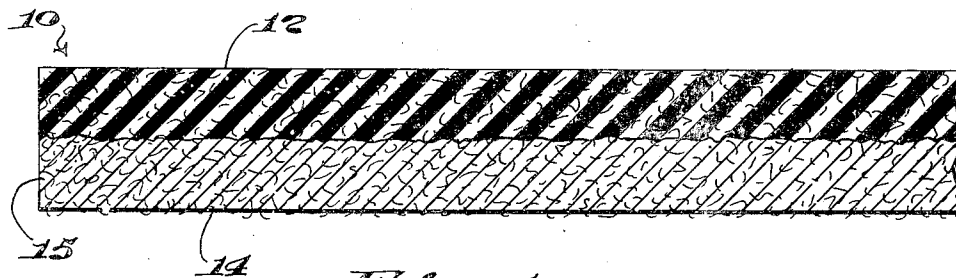
Nov. 2, 1943.

E. H. ENOS

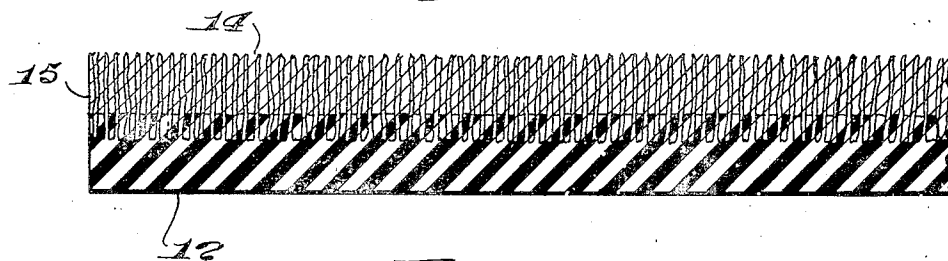
2,333,303

SHOE HAVING AN IMPREGNATED FABRIC SOLE

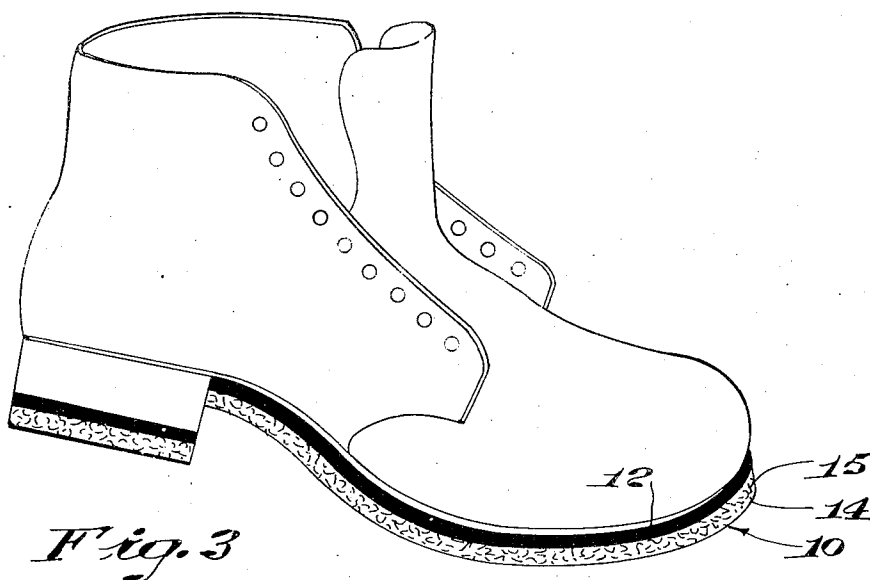
Filed May 16, 1941



*Fig. 1*



*Fig. 2*



*Fig. 3*

INVENTOR.

Edward H. Enos

BY

J. Stanley Churchill  
att'y.

## UNITED STATES PATENT OFFICE

2,333,303

SHOE HAVING AN IMPREGNATED FABRIC  
SOLE

Edward H. Enos, Wellesley Hills, Mass.

Application May 16, 1941, Serial No. 393,787

2 Claims. (Cl. 36—25)

This invention relates to an impregnated fabric and more particularly to an impregnated fabric of the type having a surface characterized by unspun fibers.

One object of the invention is to provide a novel and highly useful impregnated fabric of the character specified impregnated with a flexible adhesive binder, such as a plastic or a rubber composition, to impart thereto additional strength, density, and other desired characteristics. The impregnation is controlled so as to preserve the unspun fibrous character in one surface of the fabric and also in a portion of the body thereof adjacent such surface, thus providing a composite structure in which the desirable characteristics of the impregnated portion in combination with the desirable characteristics of an unimpregnated portion are obtained. Such a partially impregnated fabric finds particular use for a large number of commercial purposes, as will be described.

A further object of the invention is to provide a novel partially impregnated fibrous material of the character above referred to which is particularly suitable for use in the production of outer and inner soles for boots and shoes.

With these objects in view and such others as may hereinafter appear, the invention consists in the partially impregnated fabric hereinafter described and particularly defined in the claims at the end of this specification.

In the drawing, Fig. 1 is a cross-sectional view of an impregnated fabric embodying the present invention; Fig. 2 is a similar view of a modified form of the present impregnated fabric; and Fig. 3 is a perspective view of an outer sole for a boot or shoe embodying the invention.

The original characteristics of various fabrics of the type having a surface characterized by unspun fibers, such as felts, nap fabrics and pile fabrics, are such as to particularly adapt such materials for various commercial purposes and for the production of various articles of manufacture, but in many instances it is desirable that the strength, body and resistance of such fabrics to penetration by liquids of such fibrous materials be enhanced while retaining the original characteristics of the unspun fibers of the fabric. The present invention aims to provide an impregnated fabric of the character specified in which the body thereof is impregnated in such a manner as to improve the strength, body or resistance to the penetration of liquids of one portion while preserving the original fibrous characteristics of the remaining portion thereof.

Accordingly, the fabric is impregnated with a flexible adhesive binder through one portion thereof, preserving the remaining portion in its natural or original unimpregnated condition. Such a partially impregnated fabric may be used with advantage in the production of various commercial articles including the production of anti-slipping soles for boots and shoes, printers' blankets, for acoustical purposes and insulating material, for upholstery, and in general, for many of the industrial and commercial purposes for which the original fabric itself is adapted for use.

Referring now to the drawing, 10 represents a foundation member which may in practice comprise a sheet of woven or pressed felt, punched felt, or needle goods, cotton or wool wadding, woven fabrics characterized by an unspun fibrous surface, or any other fibrous foundation material characterized by a surface having unspun fibers and which is adaptable for use in the production of any commercial article. The foundation 10 is in accordance with the present invention impregnated from one surface 12 thereof and partially therethrough with a flexible adhesive binder which may be selected from a variety of materials, depending upon the use to which the impregnated product is to be put, so as to leave the second surface 14 thereof and a portion 15 of the body portion extending inwardly from the surface 14 in an unimpregnated natural or original condition. The impregnating materials may comprise any flexible adhesive binder including rubber, latex, rubber compositions, synthetic rubber, and other plastic materials including the synthetic resins, plasticized nitro-cellulose, and the like. The impregnating operation is conducted in such a manner as to enable the degree of penetration of the impregnant from one surface 12 into the body portion for a distance exceeding that produced by conventional surface coating operations and terminating short of the opposed surface 14 of the foundation to provide the foundation with an unimpregnated surface portion comprising the surface 14 and the part of the body portion adjacent thereto in an unimpregnated condition and possessing the natural characteristics of the original fibrous foundation member. The degree of impregnation may be controlled in any desired manner, preferably by controlling the viscosity of the impregnating material, the wetting properties thereof, and the time of exposure of the material to the impregnating operation, and in practice, either a coated roll or a doctor roll or blade, or a partial submersion operation may be utilized in the applica-

tion of the impregnating material to one surface of the fibrous foundation. As above pointed out, the extent of the penetration exceeds that produced by ordinary conventional coating operations which I am advised does not exceed from 2% to 3%, and for various purposes the extent of penetration may, in accordance with the present invention, vary between the limits of 10% and 90%, although for many purposes an impregnation of from 25% to 75% is preferred.

When it is desired to utilize a napped or a pile fabric as the fibrous foundation member, the fabric may be treated to impregnate it from the unnapped surface thereof in different degrees of penetration within the limits above set forth, and the impregnation controlled to terminate so as to leave a substantial portion of the nap or pile in its original unimpregnated condition.

After impregnation and if the character of the adhesive binder requires, the fabric may be subjected to vulcanization or curing to cause the binder to set, harden or assume final characteristics. In some instances and for some purposes, pressure may be employed to compact the sheet before or during vulcanization or curing whereby to form a compact, dense and wear-resisting product.

One of the commercial products which may be produced embodying a partially impregnated fabric comprises foot-wear having an anti-slipping sole and one in which the anti-slipping feature of the sole is combined with enhanced strength and moisture protection. As illustrated in Fig. 3, such a sole may be produced in accordance with the invention by partially impregnating a woven or pressed felt with a rubber or equivalent composition as above described, and when embodied in a boot or shoe, a foot-wear is produced affording firmer footing on wet, icy or otherwise slippery surfaces. This affords protection for the wearer during military or naval maneuvers and for various industrial purposes such as the use of foot-wear by workers in dye houses, slaughter houses, tanneries, etc., and in which the original condition of the unspun fibers of the fabric impart the desired anti-slipping characteristics to the sole while the impregnation with rubber and the like affords the desired protection against moisture. Such a sole may be produced which is relatively light weight and in which the flexibility may be controlled by the character of the impregnant and the degree of impregnation.

In addition to the foregoing, for some purposes I may prefer to produce an impregnated fabric embodying the invention utilizing a multi-ply structure wherein one portion or ply of the composite fibrous product may be completely impregnated, and then vulcanized or otherwise secured to a coated and unimpregnated fabric of the character specified, to thereby produce a composite fibrous product in which one portion of the same is impregnated while preserving the other portion in its natural condition characterized by unspun fibers.

The present partially impregnated fabric finds use for a large number of industrial and commercial purposes and the physical characteristics thereof may be varied within a wide range, de-

pending upon the particular characteristics of the various impregnants employed and the degree of penetration. By the selection of the proper impregnant, increased resistance to the penetration of different liquids may be obtained, such as increased resistance to oil, solvents and other liquids.

As used throughout the specification and claims, the word "fabric" means any fibrous structure, either woven or not woven, made up with the form carrying dimensions of length, breadth and thickness, and the terms "a surface characterized by unspun fibers" or an "unspun fibrous surface" mean that the unspun fibers are any fibers not part of a yarn or thread (an illustration of which would be the fibers in what is generally known in the trade as a pressed felt, not woven felt), or any ends of fibers or partially released fibers of a yarn or thread, produced in the process of manufacture of the fabric or later produced by any means prior to the process of impregnation. For illustration, as produced by a process such as napping, brushing, buffing, shearing, cutting, etc.

Having thus described the invention, what is claimed is:

1. As a new article of manufacture, a shoe having a light weight, flexible anti-slipping sole having enhanced strength and providing improved protection against moisture, said shoe comprising: a single layer fibrous out-sole member, said out-sole member having a napped fibrous wear surface and being impregnated with a flexible, waterproof binder to modify the characteristics and strength of said out-sole member in the impregnated portion thereof, said impregnation extending outwardly from the shoe contacting surface of said out-sole member into the body thereof for a distance of about 25 to 75% of the thickness of said body so that the impregnation terminates short of said napped fibrous wear surface to provide the out-sole member with an unimpregnated wear surface possessing the original characteristics inherent in the napped fibrous material of the foundation.

2. As a new article of manufacture, a shoe having a light weight, flexible anti-slipping sole having enhanced strength and providing improved protection against moisture, said shoe comprising: a single layer, pressed felt out-sole member, said out-sole member consisting of a single thickness and having a napped fibrous wear surface, said out-sole member being impregnated with vulcanizable rubber to modify the characteristics and strength of said out-sole member in the impregnated portion thereof, said impregnation extending outwardly from the shoe contacting surface of said out-sole member into the body thereof for a distance of about 25 to 75% of the thickness of said body so that the impregnation terminates short of the napped fibrous wear surface to provide the out-sole member with an unimpregnated wear surface possessing the original characteristics inherent in the napped fibrous material of the out-sole member.

EDWARD H. ENOS.