Oct. 15, 1940. J. H. McGILL 2,217,961

PROCESS OF TREATING LEATHER AND PRODUCT

Filed Aug. 9, 1937

Fig.1

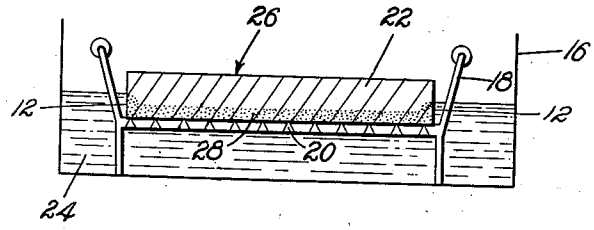


Fig.4

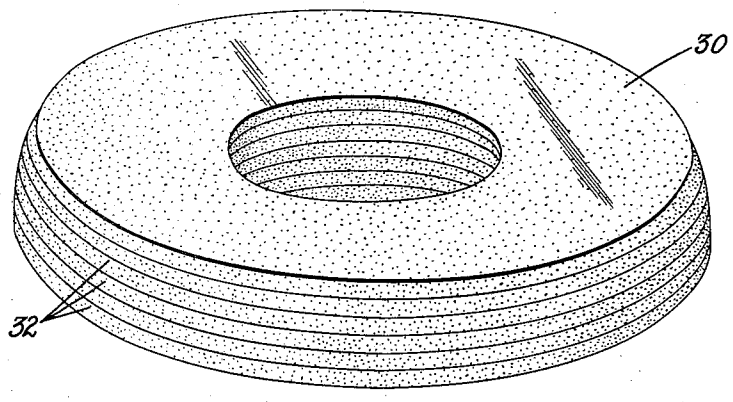


Fig.2

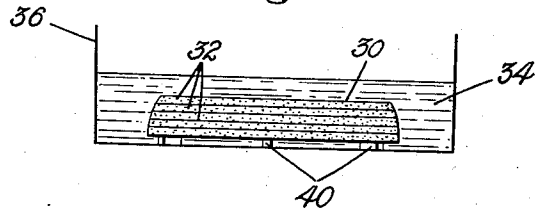
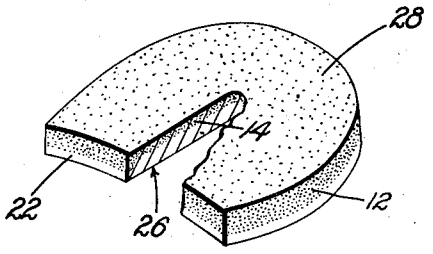


Fig.3



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UNITED STATES PATENT OFFICE

2,217,961

PROCESS OF TREATING LEATHER AND PRODUCT

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Application August 9, 1937, Serial No. 158,017

1 Claim. (Cl. 36—34)

This invention relates to leather and leather articles of advantageous properties and to methods of preparing the same.

Objects of this invention are to provide leather articles of improved characteristics, including stiffness, wearability, resistance to fraying, and resistance to detanning upon exposure to water, while in other respects having essentially the normal characteristics of leather. Another object is to provide leather articles wherein the flesh side of the leather and adjacent portions are improved in such respects, while preserving the grain side of the leather in its original condition. Other objects are to provide advantageous methods of preparing such articles.

In accordance with the above and other objects, the invention, in one of its aspects, resides in leather articles wherein leather is impregnated from the flesh side with molten thermoplastic material selected from the general group consisting of waxes and resins and wherein said impregnation has taken place to a predetermined degree approaching but not reaching the grain side thereof. As a practical matter, the leather or leather articles have the moisture content of "air-dry" leather, that is, leather containing the moisture content of leather subjected to the atmosphere. In such leather articles the flesh side of the article remains firm and stiff throughout the life thereof. The invention makes possible the use of so-called "fleshy" leather for many purposes hitherto impossible by reason of the soft, yielding and unsubstantial properties of the flesh side of such leather. As a result of this invention, such leather may be treated to provide properties of firmness and stiffness equal to those of leathers of considerably higher quality. In the case of high quality leather, the invention may be employed greatly to improve the properties of the leather for many purposes.

A highly advantageous application of the above aspect of the invention is in the preparation of detachable heel lifts such as disclosed, for example, in United States Letters Patent No. 1,844,248, granted February 9, 1932, in the names of Frank T. Gentile and Fred Maccarone. In such constructions, a leather heel lift is detachably disposed with the flesh side thereof contiguous to the lift-receiving surface of a wood heel and the lift is secured to the heel by means of a post extending into and secured in a socket in the heel. When the lift is worn, removal thereof is ordinarily accomplished by first inserting a leverage tool between the flesh side of the lift and the adjacent top-lift-receiving surface of the wood heel. By the present invention, heel lifts may be prepared wherein the flesh side of the leather and adjacent portions are stiffened and hardened, and which lifts when worn sufficiently for replacement readily may be pried off the wood heel and removed, the hardened flesh surface of the leather providing a substantial bearing surface for the removing tool. Moreover, during wear, such lifts exhibit substantially no fraying at the treated portions thereof.

Another aspect of this invention involves a process of impregnating leather from the flesh side with a molten thermoplastic selected from the general group consisting of waxes and resins. This may be accomplished by mechanically supporting the leather, flesh side downward, at a predetermined depth in a bath of such molten thermoplastic material. A wax alone, or a resin alone, may be used, or two or more waxes, or two or more resins, or a mixture or blend of waxes and resins. The temperature of the bath is maintained at a point sufficient to insure speedy penetration, and ordinarily is within the range of 115° C. to upwards of 140° C. The time of immersion of the leather is dependent upon the desired degree of penetration and upon the temperature of the bath and should be sufficiently short so as not to destroy the fibrous structure and the identity of the leather. The hotter the bath of molten material, the shorter will be the time required to accomplish a specific degree of penetration. At a given temperature, the longer the immersion in the molten material, the greater will be the penetration into the leather.

In another aspect, this invention relates to leather articles the entire exterior surfaces of which, including the grain surfaces, are impregnated to a predetermined degree with molten thermoplastic material selected from the general group consisting of waxes and resins. Heel lifts of this character may be prepared. Another important example of this type of article is found in leather gaskets such as employed in fire hydrants. Leather fire hydrant gaskets contemplated by this invention possess considerably longer life than the gaskets hitherto used, due in part to the fact that the gaskets of this invention exhibit considerably greater resistance to the detanning action of the water to which they are exposed. Valve sticking is greatly reduced due to a lessened corrosive effect upon the metallic valve seats with which the gaskets cooperate. Furthermore, due to their waterproof character, gaskets so treated resist the swelling, distorting

and weakening action of water, and, generally speaking, such gaskets exhibit generally better wearing properties under the difficult conditions to which they are subjected.

This invention further contemplates a method of preparing articles impregnated throughout their exterior surfaces with molten thermoplastic material selected from the general group consisting of waxes and resins, for example, fire hydrant gaskets. Such method involves complete immersion of such articles in the aforementioned thermoplastic material at a temperature and for a time sufficient to accomplish the desired impregnation.

In the drawing,

Fig. 1 is a diagrammatic vertical sectional view of impregnating apparatus illustrating the impregnation of leather from the flesh side and edges by supporting the leather to a predetermined degree below the surface of molten wax or resin;

Fig. 2 is a diagrammatic vertical sectional view of impregnating apparatus illustrating the impregnation of a leather fire hydrant gasket throughout its exterior surface;

Fig. 3 is a perspective view, partially broken away, of a leather heel lift impregnated with molten wax or resin from the flesh side and edges, the impregnation extending toward, but not reaching the grain side of the leather lift; and

Fig. 4 is a perspective view of a leather fire hydrant gasket treated in accordance with this invention.

With respect to the impregnation of leather on its flesh side the invention may be carried out by immersing the leather to a predetermined depth in a bath of molten thermoplastic material selected from the general group of waxes and resins. Thus, by way of specific example and referring to Fig. 1, the tray **16** contains a removable holder **18** with spaced horizontal surfaces **20** arranged to carry leather stock, such as the heel lift **22**. The tray **16** contains molten thermoplastic material **24**, specifically, in this example, carnauba wax, maintained at a temperature of about 115 to 125° C. A leather heel lift **22** of ordinary vegetable-tanned sole stock and containing the ordinary amount of moisture of leather which has been exposed to the atmosphere, namely, "air-dry" leather, and having a thickness of about 9/48 of an inch, was supported on the surfaces **20** with the grain side **26** thereof above the surface of the carnauba wax **24** and with the flesh side **28** down and immersed in the wax **24**. The leather lift **22** was allowed to remain in contact with the carnauba wax **24** for about 3 minutes during which period bubbles of air and moisture appeared in the wax **24** in the vicinity of the lift **22**. The lift **22** was then removed from the bath **24**. After removal of the lift **22** from the bath nearly all of the excess wax on the edges **12** and the flesh side **28** was wiped off by means of a cloth. Remaining traces of wax appearing on the surfaces **28** and **12** of the leather were caused to disappear into the substance of the leather by directing a blast of hot air at a temperature of about 130° C. at the surfaces **28** and **12** for about a minute. By this procedure, the wax remaining on the surfaces of the leather was melted and driven into the substance thereof, leaving no visible evidence of the wax on the surfaces.

In carrying out the impregnation, the leather **22** may be disposed on the surface **20** and removed therefrom while the holder **18** remains in the molten bath, or the holder **18** may be removed from the bath, the piece or pieces of leather to be treated placed thereon, the holder **18** disposed in the tray **16** for the desired period of impregnation, and the holder subsequently removed therefrom. Other suitable arrangements may, of course, be provided for maintaining the leather suspended to a predetermined depth of immersion in the wax or resin bath.

The heel lift **22** (Fig. 3) treated in the manner described above was impregnated as indicated at **14** with carnauba wax to about one-fourth of its thickness from the flesh side **28**. Penetration to a like extent had taken place from the edges **12**. The impregnated portion **14** was relatively hard and stiff and free from any tendency to fray. The grain side **26** and the major portion of the substance of the lift was in its original condition and free from the impregnating material. The edges **12** of the leather lift **22** were found to receive leather finishes and polishes in a very satisfactory manner and to give results equal to, or even better than, ordinary leather under similar conditions. Moreover, the treated lift **22** was found to exhibit superior properties when used in association with a detachable heel construction, such as shown in the Gentile and Maccarone Patent No. 1,844,248. Thus, the metal prongs of a post of a detachable heel construction, such as shown in the patent above mentioned, were readily incorporated into the substance of the lift **22** from the flesh side thereof to form a secure mechanical attachment. Moreover, upon application to a shoe heel as part of such a detachable heel construction, lifts treated in the manner of this invention exhibited substantially no fraying in those portions thereof which had been impregnated with the wax. Furthermore, the flesh side **28** retained its hardness and firmness through the life of the lift, thereby providing a firm bearing surface for removal of the lift when worn. It has further been found that leather lifts treated in the manner above described resist the detanning action of water to a far greater extent than leather not so treated.

The use in a detachable heel construction of a leather lift prepared in accordance with this invention is disclosed and claimed in my copending application, Serial No. 158,016, filed August 9, 1937 (now Patent No. 2,189,811, granted February 13, 1940).

In the above specific example, I have illustrated the practice of the invention with carnauba wax. The same procedure, times, and temperatures have been followed in carrying out the impregnation with cumar resin, and with a mixture of 60% montan wax and 40% M rosin. (The "M" refers to U. S. Department of Agriculture classification.) Results were obtained equivalent to those obtained with carnauba wax, and as described above.

In carrying out the invention, various waxes, resins, and mixtures or combinations thereof may be employed. Examples of suitable materials which may be used singly or in combination are as follows: candelilla wax, carnauba wax, montan wax, Rangoon wax, ozokerite, black ozokerite, bayberry wax, H rosin, M rosin, cumar resin, gum dammar.

The leather may be of vegetable, chrome, or other tannage, and may contain moisture to the extent of leather exposed to the atmosphere and is conveniently in ordinary "air-dry" condition. The temperature of the molten wax or resin bath

may be varied through a reasonably wide range and may be controlled in any suitable manner, although the temperature preferably remains below about 150° C. in order to prevent destruction of the fibrous structure of the leather and to prevent possible explosive evaporation of moisture contained in the leather. The time of immersion will depend upon the depth of penetration or impregnation desired and upon the temperature of the molten wax or resin. I have found that suitable periods of immersion will range from about 30 seconds in the case of a wax or resin bath having a temperature in the neighborhood of 140° C. to about 20 minutes in the case of wax or resin at a temperature about 115° C. Between these extremes, by way of example, at a temperature of about 125° C., an immersion time of 3 to 5 minutes was found suitable in the case of molten baths of #3 carnauba wax, or yellow ozokerite, or cumar resin, or a combination of 60% bleached montan wax and 40% M rosin. The time of immersion and temperature of the wax or resin bath is dependent upon the nature of a particular leather to be treated and in part upon the moisture content thereof. It is well to keep the temperature of the bath as low as possible but it should be high enough so that bubbles of air and water vapor appear when the leather is disposed in the bath, indicating a rapid penetration of the wax or resin.

By varying the depth of immersion of the leather in the wax or resin bath, the characteristics of the impregnation may be varied. Thus, if a top lift of leather similar to sole stock is immersed in a wax or resin bath, flesh side down, to an extent that only the grain surface remains out of the bath, the impregnation of the wax or resin will take place simultaneously from the edges of the lift (12—Fig. 3) as well as from the bottom thereof (14—Fig. 3). After a relatively short period of immersion, therefore, the result will be substantially a case hardening effect on the edges and flesh side of the leather, the grain side and the major portion of the substance of the heel being free from the impregnating material. Upon longer immersion the wax or resin, aided by capillary action, tends to penetrate from the flesh side further up through the leather and tends to penetrate to a level at least equal to that of the wax or resin in the bath. If the leather is immersed flesh side down in the wax or resin to only a slight degree, the penetration of the wax or resin takes place substantially entirely on the flesh side. In carrying out the impregnation, a piece of leather stock of suitable size may be impregnated, and subsequently smaller articles, such as heel lifts, may be died out or cut out of such larger pieces.

Upon removing the leather from the bath it is generally quite easy to remove excess wax or resin by wiping the leather with a cloth. If further removal is necessary, it may be accomplished by scraping, abrading, or by melting the wax or resin and driving it into the leather by means of a hot air blast maintained above the melting point of the wax, resin, or mixture of waxes and resins used.

In the Figs. 2 and 4, I have illustrated the application of this invention to a case wherein it is desired to impregnate a leather article over its entire surface area. Specifically, I have illustrated a fire hydrant gasket 30 consisting of a plurality of plies 32 of leather which are joined together by a suitable adhesive, such as pyroxylin. In order to accomplish the impregnation of the gasket 30 throughout its surface extent and to provide a "case hardened" effect, the gasket 30 having the moisture content of leather exposed to the atmosphere is completely immersed in the molten wax or resin bath 34 contained in the tray 36. Preferably, supporting means 40 is provided upon which the gasket 30 may rest upon the bottom of the tray 36, said supporting means being so arranged as to permit the molten wax or resin to contact with the surface of the gasket throughout its extent. With molten waxes or resins, such as carnauba wax, or cumar resin, or a mixture of 60% montan wax and 40% M rosin, at a temperature in the neighborhood of 110° to 125° C., a suitable impregnation may be accomplished by permitting the gasket 30 to remain in the molten wax or resin for a period of about 5 minutes. The temperature and time of immersion of the gasket 30 in the wax or resin 34 may of course be varied within limits as indicated hereinbefore. After removal of the gasket 30 from the molten wax or resin bath 34 any excess wax or resin remaining on the surface of the gasket may be removed by wiping, scraping or abrading or by means of a hot air blast above the melting point of the impregnating material.

A gasket treated in the manner described above has unique properties when employed in a fire hydrant in that the presence of the wax or resin imparts to the gasket the property of resisting the detanning and deteriorating effects of water to a far greater degree than ordinary untreated leather. Such increased resistance to detanning and consequent retention of tannic acid in the leather diminishes the corrosive effect on the metal valve seat with which the gasket contacts and consequently the occurrence of valve sticking is greatly minimized, if not substantially eliminated.

The aspect of this invention pertaining to the impregnation of a leather article throughout its exterior surface may also be practiced with respect to a heel lift, in which case the lift is completely immersed in a wax or resin bath.

In the practice of this invention, various dyes, miscible or compatible with the waxes or resins used, may be added to the mixture. An example is the addition of 3 grams of oil black dye to 97 grams of black ozokerite wax. Such impregnating agent imparts not only the previously-mentioned advantageous properties to the leather but also dyes it a permanent black.

Having described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

A detachable leather heel lift arranged for contact by its flesh side with a heel, the flesh side and adjacent edges of said lift being case hardened by impregnation by material selected from the general group consisting of waxes and resins, whereby the flesh side of the lift exhibits hardness and firmness throughout the life of the lift and provides a firm bearing surface for removal of the lift when worn, and the edges of the lift exhibit substantially no fraying, while the grain side of the lift and the major portion of the substance thereof exhibit their original leather properties.

JOHN H. McGILL.