Patented Oct. 25, 1949 2,485,967

UNITED STATES PATENT OFFICE

2,485,967

MANUFACTURE OF PATENT LEATHER AND SIMULATED PATENT LEATHER

Archibald B. Harding, Stoneham, Mass., assignor to Monsanto Chemical Company, St. Louis, Mo., a corporation of Delaware

No Drawing. Application January 30, 1946, Serial No. 644,434

10 Claims. (Cl. 154—97.5)

1

This invention relates to the preparation of patent leather or simulated patent leather, and particularly to improved methods of preparing such leathers or imitation leathers whereby they may be made more economically than by known methods.

Genuine and simulated patent leathers are now made by a variety of methods, all of which are slow and tedious. A typical process of making genuine patent leather involves applying to the leather several layers of a linseed oil or varnish type coating, each layer of which must be dried before applying the next layer, after which the coated leather is given a heat treatment in an oven for several hours and then exposed to sunlight for final curing. The latter step may require several days, depending on the weather, to obtain a satisfactory finish. A typical method of making simulated patent leather includes first spread-coating a fabric or other suitable fibrous base layer with a resinous solution, after which the coated fabric has a second resinous layer applied by calendering thereon a suitable plastic mix. The coating on the fabric is then brought to a high gloss by press polishing, which requires cutting the fabric into short lengths to enable it to fit the press polisher, sandwiching the strips of fabric between highly polished metal plates, and then heating to a temperature above the flow point of the plastic coating while applying pressure. The plates are then removed and cooled, after which the coated fabric is stripped therefrom. The resulting product is in a form which closely simulates patent leather.

It is a primary object of the present invention to provide improved methods of making patent leather or simulated patent leather, which are simpler and speedier and hence more economical than prior methods.

A further object of the invention is to provide a method of making simulated patent leather which can be carried out continuously and is accordingly thoroughly adapted for large scale production.

A further object of the invention is to provide a process of making patent leather or simulated patent leather in which the finish coating is exceptionally adherent to the leather or other backing employed and has an exceptionally glossy appearance of such a nature as to satisfy the rigid requirements of the trade.

Still further objects and advantages of the invention will appear from the following description and appended claims.

The present invention is carried out in general by first applying a resinous base coating to a suitable flexible fibrous backing, such as leather, fabric, paper or the like, as by calendering or application from solution or aqueous dispersion. A similar coating is applied by similar methods to metal foil, which coating is then transferred to the base coated backing material by softening either or both coatings and compressing the coated surfaces together which is preferably accomplished by application of heat and pressure, as for example by means of heated pressure rolls or plates. The metal foil is then stripped off the coated backing leaving a smooth finished surface of high gloss. The resulting product is either in the form of patent leather or simulated patent leather depending on the backing material employed.

2

Instead of using heat and pressure to unite the coated surfaces of the backing and foil, either or both surfaces may be wetted sufficiently to soften the same with a suitable solvent or mixture of solvents for the resin composition employed, after which the two surfaces are cemented together by the application of pressure, preferably by means of rubber rolls to avoid marring the metal foil, and the solvent is allowed to evaporate. In general, this procedure requires much lower pressures than those methods in which heat is employed to soften the resin.

When treating leather, the process is necessarily carried out in a non-continuous manner, in view of the limited size of hides and skins. However, when treating fabric, paper or the like, the process may be advantageously carried out in a continuous manner, as by using continuous strips of fabric and metal foil, applying the resinous coating thereon and continuously passing the fabric and foil with their coated surfaces in contiguous relationship through heated rolls or other mechanical equipment for applying heat and pressure.

The coating compounds suitable for the purposes of this invention include mixtures of thermoplastic resins, plasticizers, pigments and/or dyes, either with or without suitable solvents, depending on whether the resinous compound is applied from solution or by means of calendering. Suitable resins include polyvinyl chloride, polyvinyl acetate, copolymers of polyvinyl chloride and polyvinyl acetate, copolymers of polyvinyl chloride and vinylidene chloride, polyvinyl butyral, cellulose esters and ethers, polystyrene, styrene copolymers, and any other resin or mixture of resins or mixture of resins and plasticizers capable of fusing under heat and pressure or

being softened by means of solvents. The plasticizers used may be varied widely depending on the choice of resins. In some instances the plasticizer may be omitted, as in the case of internally plasticized resins. Any suitable pigment or dye or combination thereof may be employed depending on the color effects desired, and if desired, the pigment or dye may be omitted entirely.

The metal foil used in accordance with this invention is preferably aluminum foil or aluminum alloy foils containing large amounts of aluminum, in view of the fact that aluminum foil can be given an exceptionally high gloss, which in turn produces leathers and simulated leathers of desired smoothness and high gloss. Lead foil, for example, would not be suitable, as it is too soft and tends to produce too dull a finish.

A further understanding of the invention will be obtained from the following examples:

Example I

Bleached cotton sheeting was spread-coated with a resinous compound containing the following constituents in the proportions given:

	Parts by weight
Polyvinyl butyral	15.0
Pigment	15.0
Butyl ricinoleate	7.5
Denatured alcohol	37.5
Petroleum naphtha	25.0

Sufficient of the above compound was applied to leave 4.5 ounces of solids per square yard on the fabric. Unannealed aluminum foil one mil thick was then spread-coated with the same resinous compound in an amount sufficient to apply a film 1.5 mils thick. The film on the foil was then transferred to the coating on the fabric by pressing the fabric and foil together for about 5 seconds in a hydraulic press at a pressure of 5 pounds per square inch and at a temperature of about 200° F. The resulting laminated material was then removed from the press, after which the foil was peeled off. The coated fabric was smooth and of high gloss, closely resembling patent leather. The coating on the fabric was strongly adherent, and did not separate from the fabric on being flexed 10,000 times on a machine which reproduces the effect obtained on the vamp of a shoe during actual wear.

Example II

A hundred yard length of cotton felt was continuously spread-coated with the resinous compound prepared as described in Example I in an amount sufficient to apply 4.5 ounces of solids per square yard. The fabric was then passed through a facing machine to roll down the nap and give a smoother surface. A hundred yard length of unannealed aluminum foil was then continuously roll-coated with the same resinous compound in an amount sufficient to leave a film 1.5 mils thick on the foil. The film on the foil was then transferred to the coating on the fabric by pressing the fabric and foil together between heated pressure rolls at a temperature of about 225° F. This resulted in a continuous length of laminated fabric and foil 100 yards long. Upon stripping the foil from the coated fabric, a material was obtained which closely simulated patent leather and had a highly glossy coated surface which was strongly adherent to the fabric backing.

Example III

Latex saturated paper was spread-coated with the resinous compound prepared as described in Example I in an amount sufficient to apply three ounces of solids per square yard. The coated paper was then passed through a facing machine to give it a smoother surface. Unannealed aluminum foil was then spread-coated with the same resinous compound in an amount sufficient to leave a film 0.5 mil thick on the foil. The film on the foil was then transferred to the coating on the paper by pressing the paper and foil together for about 2 seconds in a hydraulic press at a pressure of 50 pounds per square inch and at a temperature of about 200° F. The laminated material obtained as a result of the above treatment was then removed from the press, after which the foil was peeled off. The coated paper remaining was exceptionally smooth and glossy, and closely resembled patent leather. Its coated surface layer was strongly adherent to the paper backing.

Example IV

Chrome-tanned cowhide was spread-coated with the resinous composition prepared as described in Example I in an amount sufficient to apply a film 0.5 mil thick. Unannealed aluminum foil one mil thick was then spread-coated with the same resinous compound in an amount sufficient to apply a film 1.5 mils thick. The film on the foil was then transferred to the coating on the leather by pressing the leather and foil together for about one second in an hydraulic press at a pressure of 100 pounds per square inch and at a temperature of about 200° F. The laminated material obtained as a result of the above treatment was then removed from the press, after which the foil was peeled off. The coated leather remaining was exceptionally smooth and of high gloss, and constituted genuine patent leather. The coating on the leather was strongly adherent thereto and did not separate on flexing.

Example V

Bleached cotton sheeting was spread-coated with a resinous compound of the following composition:

	Parts by weight
Polyvinyl butyral	12
Nitrocellulose	3
Butyl ricinoleate	8
Pigment	15
Methyl ethyl ketone	30
Denatured alcohol	32

Sufficient of the above compound was applied to leave 4.5 ounces of solids per square yard on the fabric. Unannealed aluminum foil one mil thick was then spread-coated with the same resinous compound in an amount sufficient to apply a film 1.5 mils thick. The coated fabric was then wetted with a 50–50 mixture of methyl ethyl ketone and denatured alcohol, after which the coated surface of the foil and the wetted surface of the fabric were compressed together between cold rolls. The solvent between the layers was then permitted to evaporate, leaving the layers firmly cemented together in the form of a single resin layer between the fabric and foil. Upon stripping the foil from the coated fabric, a material was obtained which closely simulated patent leather and had a highly glossy surface appearance. The adherence of the coating to the fabric backing

was as strong as the products made by means of heat and pressure.

In addition to the backing materials described in the examples, a wide variety of other materials may be employed. Suitable fabrics include cotton sheeting, cotton or wool felt, duck and the like, while all types of paper may be employed including coated or uncoated paper and paper saturated with latex, asphalt and the like.

In the examples the materials being treated were subjected to pressures varying from 5 to 100 pounds over periods of time varying from 1 to 5 seconds. In some instances, however, it is necessary to use greater pressures, as when the supporting surface is uneven, but it is seldom necessary to use over 500 pounds per square inch pressure. The temperatures employed should be sufficiently high to soften the resin or resin mixture employed, and usually vary from 190 to 300° F. In those instances where pressure rolls are used, the time during which the materials are compressed is usually a fraction of a second, which depends on the speed of rotation of the rolls.

Although patent leather and simulated patent leather is commonly made with a smooth unembossed surface, it is possible to emboss the smooth surfaced products of the present invention in any suitable manner to simulate the grain of any desired type of leather, as for example box grain, alligator grain, lizard grain, ostrich grain or the like. This can be accomplished either before or after the metal foil is removed, but is preferably done beforehand in view of the delicate heat control required on unprotected thermoplastic surfaces.

By proceeding in accordance with the present invention, it is possible to produce patent leathers or simulated patent leathers in much less time than by known prior processes, and in fact the methods of this invention are admirably adapted for large scale or commercial production. In the case of genuine patent leather it has been very difficult to obtain resinous or plastic coatings with satisfactory gloss in view of the unevenness of the surface of the leather and the consequent difficulty in press polishing. By using the methods described herein, however, it is not only possible to obtain resin coated leathers of desirable surface characteristics, but to produce such leathers in much less time than by previously employed processes. In the case of simulated patent leather the present methods have the further advantage that they can be carried out in a continuous maner and applied to strips of fabric or paper of any desired length, thereby avoiding the necessity of separately treating a multiplicity of small pieces or strips of material. In all instances, the patent leathers or simulated patent leathers obtained have strongly adherent finish coatings which display an exceptionally high gloss of the type found in high grade patent leathers.

The invention is of further advantage to shoe manufacturers in those instances where the upper is cemented to the sole with a pyroxalin cement or the like. In the past it has been difficult to avoid depositing cement on the finished surface of the uppers, which deposits were practically impossible to remove without damaging the finish. This problem can be overcome by leaving the metal foil applied in accordance with the methods of this invention on the leather or other backing, skiving off a small amount along the edges where the upper is cemented, and cementing along these exposed edges. Upon completion of the shoe the remaining foil may be removed when desired.

What I claim is:

1. The method of making a coated product of the nature of patent leather or simulated patent leather which comprises applying a thermoplastic resin coating to a flexible fibrous backing, separately applying a thermoplastic resin coating to unannealed aluminum foil, and then transferring the coating on said foil to the coating on said backing by rendering at least one of said coatings superficially tacky and compressing the coated surfaces together under pressure and removing said foil from the coated backing, whereby said backing is provided with a smooth and glossy finish.

2. The method of making a coated product of the nature of patent leather or simulated patent leather which comprises applying a thermoplastic resin coating to a flexible fibrous backing, separately applying a thermoplastic resin film to unannealed aluminum foil, and then transferring said film to the coating on said backing by compressing the coated surface of said backing against the film covered surface of said foil with the aid of heat and pressure and removing said foil from the coated backing, whereby said backing is provided with a smooth and glossy finish.

3. The method of making a coated product of the nature of patent leather or simulated patent leather which comprises applying a thermoplastic resin coating to a flexible fibrous backing, separately applying a thermoplastic resin coating to unannealed aluminum foil, and then transferring the coating on said foil to the coating on said backing by superficially wetting at least one of said coatings with a solvent therefor in amount sufficient to render the same superficially tacky and compressing the coated surfaces together under pressure, then permitting the solvent to dry and removing the foil from the coated backing, whereby said backing is provided with a smooth and glossy finish.

4. The method of making a coated product of the nature of patent leather or simulated patent leather which comprises applying a thermoplastic resin base coating to a flexible fibrous backing, applying a thermoplastic resin surface coating to unannealed aluminum foil, and then transferring the coating on said foil to the coating on said backing by superficially wetting at least one of said coatings with a solvent therefor in amounts sufficient to render the same superficially tacky and compressing the coated surfaces together under a pressure of 5 to 500 pounds per square inch and then removing the foil from the coated backing, whereby said backing is provided with a smooth and glossy finish.

5. The method of making a coated product of the nature of patent leather or simulated patent leather which comprises applying a thermoplastic resin base coating to a flexible fibrous backing, applying a thermoplastic resin surface film to unannealed aluminum foil, and then transferring said film to the coating on said backing by compressing the coated surfaces together at a temperature of 190 to 300° F. and at a pressure of 5 to 500 pounds per square inch and then removing said foil from the coated backing, whereby said backing is provided with a smooth and glossy finish.

6. The method substantially as described in claim 5, but further characterized in that the

pressure employed is within the range of 5 to 100 pounds per square inch.

7. The method substantially as described in claim 1, but further characterized in that the fibrous backing is of fabric.

8. The method substantially as described in claim 1, but further characterized in that the fibrous backing is of paper.

9. The method substantially as described in claim 1, but further characterized in that the fibrous backing consists of leather.

10. The method substantially as described in claim 4, but further characterized in that the thermoplastic resin is a polyvinyl butyral resin.

ARCHIBALD B. HARDING.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
661,263	Goldsmith	Nov. 6, 1900
928,235	De Montlord	July 13, 1909
1,694,258	Hartong	Dec. 4, 1928
1,824,690	Schneider	Sept. 22, 1931
2,010,857	Hanson	Aug. 13, 1935
2,015,440	Schur et al.	Sept. 24, 1935
2,029,377	Kaplan	Feb. 4, 1936
2,275,957	Groff	Mar. 10, 1942
2,311,518	Caligari	Feb. 16, 1943

FOREIGN PATENTS

Number	Country	Date
486,619	Great Britain	June 8, 1938

OTHER REFERENCES

Carbide and Carbon Chemicals Corp., Plastics Div., "Bonding Vinylite Plastics (Elastomeric Compounds)," copyright 1944, and "Vinylite Plastic Sheet and Sheeting," copyright 1941.