Feb. 25, 1947. B. S. CROSS 2,416,289

LEATHER BURNISHING AND PLATING

Filed Feb. 5, 1942

Fig. 1

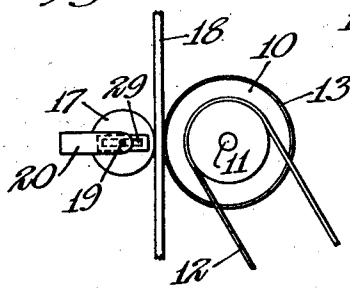


Fig. 2

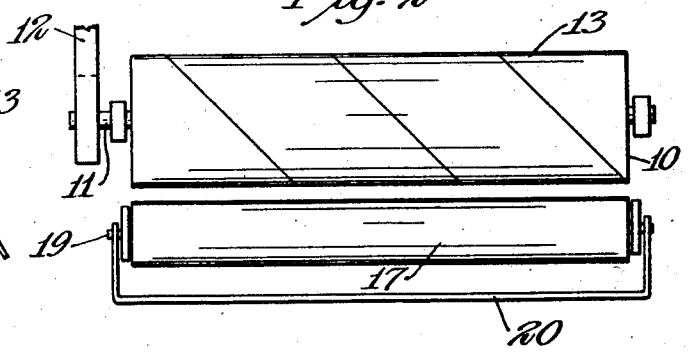


Fig. 3

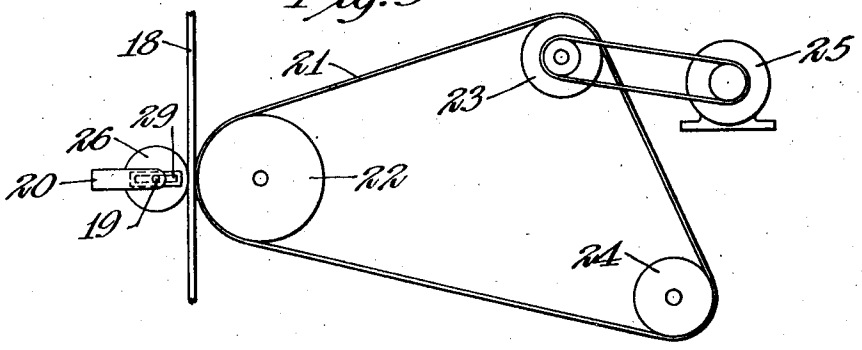


Fig. 4

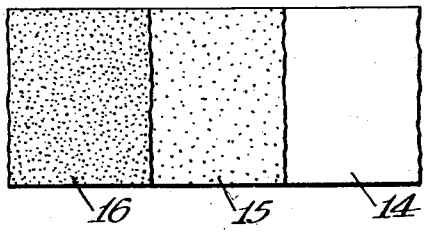


Fig. 5



Fig. 6

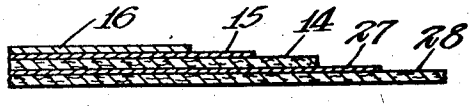
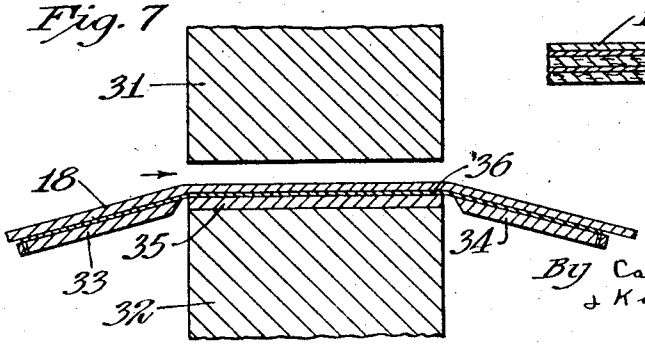


Fig. 7



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2,416,289

LEATHER BURNISHING AND PLATING

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Application February 5, 1942, Serial No. 429,695

1 Claim. (Cl. 69—1)

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This invention relates to leather working and more particularly to improvements in apparatus for leather burnishing, polishing, glazing, plating and the like. Improved equipment novel to the leather working art may be employed in the leather finishing steps mentioned by reason of a heat-resistant, oil resistant cellulosic sheeting employed as an element of such equipment permitting the employment of high-speed apparatus.

In the art of finishing leather, the leather is brought to its final finish by one or more of a number of steps, such as buffing, glazing, burnishing and plating, and the leather may be plated or pressed before or after the buffing and plating steps. Various methods have been employed for working the leather to finish and polish it and to improve its texture and where desired, to bring its fat and other oily constituents to the surface, such as by burnishing with steel, brass or glass rolls, or by plating it in a hydraulic press with a sheet of ordinary paper between the leather sheet and a face of the press jaw. However, certain difficulties arise from the use of these materials, some of which may be enumerated as "spotting" of the glazed leather by deposits thereon in lump form of the worked out residue or oils, and scratching of the burnishing surface, which consequently decreases its utility and provides uneven surfaces which further tend to effect deposits of residue and oils. Particularly do these factors slow up production, tending to increase its cost and depreciate the quality of the finished leather. Further, in plating leather, e. g., in a hydraulic press, the surfaces used for compressing it must be of such nature as to give a fine smooth appearance, and when such material as herein described replaces the ordinary paper sheets used heretofore, the finish is smoother and more compact than that heretofore obtained with the additional advantage that my improved leather working material has greater life than sheets heretofore used in plating leather.

It is not uncommon for rough particles such as "buck shot" to be found in the hides of cattle and the resulting leather sheets. In the case of burnishing with steel, brass or glass rolls, as aforesaid, the surface of the roll is gouged or roughened, with the result that this roughness then scuffs the hides. When this happens, the roll requires replacement, which is expensive and cumbersome.

On the other hand, after encountering "buck shot" of the like during use, my burnishing sheet has much less tendency to gouge or scuff the work, e. g., a leather sheet; furthermore the burnishing surface can be replaced cheaply and quickly.

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A salient aspect of the present invention involves improvements in the art of burnishing leather, where leather to be polished is brought into contact with a rotating cylinder covered with my composite burnishing sheet, or into contact with a rapidly moving belt of my sheet material.

It is one of the objects of this invention to produce improved apparatus for burnishing or finishing leather. For example, in its broader aspects, the apparatus may comprise a power-driven burnishing drum and an adjacent rotatably mounted roll between which the leather piece to be finished may be passed, the roll being readily movable toward or away from the drum for forcing the leather piece against the surface of the drum. The surface of the drum is covered with a leather working sheet of the type described, which may be spirally wrapped about the drum and its loose ends secured by suitable fastening devices or which may be wrapped straight around the drum with its ends extending into a longitudinal slot in the drum, equipped with take-up reels to tighten the working sheet about the surface of the drum. A modified form of the invention contemplates the employment of a burnishing roll and spaced pulley members, the improved leather work material passing around the burnishing roll and pulley members in the form of a belt. In this embodiment, a pressure roller is mounted adjacent the burnishing roll or pad for forcing the leather piece against the face of the leather working belt. The invention also includes improvements in plating apparatus in that by reason of the oil-resistant nature of my improved plating element, pitting or corroding of the platen of the press is substantially eliminated in addition to the fact that my plating element has a much longer life than such elements customarily employed by the art.

The burnishing and plating sheet of this invention is provided with a burnishing surface formed of a coating which may advantageously comprise a heat-convertible synthetic resin, e. g., a phenol-aldehyde resin, adhered to a paper or other sheet. The paper or cloth backing is impregnated to some extent with the coating material, but the coating material preferably does not extend through the sheet. The thickness of the surface coating may vary somewhat from .0005 to .004 inch more or less. It is of considerable importance that the coating material be heat-resistant and it should have a softening point higher than the temperatures attained during the finishing

treatment in order that the coating material will not adhere or offset onto the leather piece. Satisfactory results have been obtained with coating materials which do not soften below 150° C. Furthermore, the coating material should not be affected, such as softened, by the oils of the leather with which it comes in contact. It is also of considerable importance that the burnishing and plating surface be smooth and free of nibs and relatively small particles, such as may be formed from dust in the air or dirt in the resin. Care must be taken in the preparation of the resin to avoid formation of jelly-like particles which may conglomerate to form hard particles that may mar the leather surface to be finished. Though presently considered less advantageous by reason of lack of high heat-resistance, the burnishing and plating coating may consist of the hardened product of a film-forming inorganic material, e. g., a sodium silicate solution, with or without modifying or insolubilizing agents, such as precipitated chalk ($CaCO_3$), sodium fluosilicate, zinc oxide, etc. Generally, sheets of the type described when employed in plating leather, do not require a surface as glossy-smooth as in burnishing.

It is believed the invention will be readily understood from the following description in conjunction with the accompanying drawing, in which:

Figure 1 is a side elevational view of one embodiment of my improved leather burnishing apparatus;

Figure 2, a top-plan view of the apparatus as shown in Figure 1;

Figure 3, a side elevation of another embodiment of my invention;

Figure 4, a top-plan view of one embodiment of my leather-finishing sheet, with the two upper coatings thereof partially removed, to illustrate the construction of the same;

Figure 5, a vertical sectional view of the composite sheet of Figure 4;

Figure 6, a vertical sectional view showing a modification of the leather working sheet material of Figs. 4 and 5 to include a further supporting layer or sheet; and

Figure 7, a vertical sectional view of my improved plating apparatus.

Referring to Figs. 1 and 2 of the drawing, the reference character 10 indicates a drum mounted on a shaft 11 and connected to a suitable source of power by the belt 12. The drum 10 is preferably formed of yieldable material, as rubber or the like, or if a metal drum is employed it may be provided with a covering of rubber or felt or the like. Secured about the periphery of the drum is a leather working sheet 13, comprising a base of paper or cloth 14 to which coatings 15 and 16, as shown in Figs. 4, 5 and 6 hereinafter described, are applied. A rotatably mounted presser roll 17, preferably formed with a hard rubber surface, is disposed adjacent the drum 10 and it is to be understood that the drum 10 and the presser roll 17 are suitably mounted in frame members not shown. As shown in Fig. 1 the leather work sheet 18 is adapted to be passed between the presser roll 17 and the drum 10 to receive the finishing treatment and accordingly the presser roll 17 may be moved toward or away from the leather sheet 18 and the drum 10 to force the leather piece 18 against the working sheet 13 on the surface of the drum 10. To control its position, the shaft of the presser roll 17 is provided with adjustable

members which may comprise adjusting screws 19 carried in slots 29 in the brackets 20.

As shown in Fig. 2, the working sheet 13 may be spirally wrapped about the drum 10 with its ends secured to the drum by suitable mechanical fastening members, such as rubber faced metal clamps, or by a suitable adhesive, such as resins or the like, which are not decomposed by heat. It is also to be understood that the drum 10 may be provided with a longitudinal slot in which are housed take-up members which may comprise a pair of rollers equipped with a dog and ratchet, and in this form the leather working sheet 13 may be wrapped around the periphery of the drum 10 with the sides of the leather working sheet 13 substantially parallel to the edge of the drum. The ends of the working sheet are fed into the take-up reels which are tightened to retain the working sheet tautly about the periphery of the drum.

The drum may be driven at a speed of from approximately 4000 to 6000 feet per minute and the leather may be fed between the drum and roll at about 30 feet per minute. Thus the burnishing operation may be performed rapidly with my improved apparatus.

In the embodiment of Fig. 3 the leather working material is employed in the form of a belt 21 which passes around a burnishing roll 22 and pulleys 23 and 24, the pulley 23 being driven by the motor 25 to effect movement of the leather working belt 21. A presser or billy roller 26 is rotatably mounted in suitable frame members, as are the roller 22 and the pulleys 23 and 24, and is adapted to be moved toward and away from burnishing roll 22 to force the leather piece 18 adapted to be passed between the rollers 22 and 26, against the leather working belt 21. The billy roller 26 is provided with suitable adjusting means which may comprise brackets 20 having slots 29 in which the ends of the roller shaft may be journalled, and an adjusting screw 19. The rollers 22 and 26 may be provided with somewhat yielding coverings similar to those on the drum 10 and roll 17 of the embodiment of Fig. 2.

Referring to Fig. 7 of the drawing wherein is shown my improved leather plating apparatus, the reference characters 31 and 32 indicate the upper and lower platens or jaws, respectively, of a leather press or mangle which may be mechanically or hydraulically operated. One or both of the platens 31, 32 may be heated to more effectively remove the wrinkles, etc., from the leather surfaces. The lower jaw 32 is provided at each side with guide ways 33 and 34 over which the leather work pieces are drawn in entering and leaving the area between the platens. The lower platen 32 is a stationary element having either a resilient or solid facing element 35 upon which the leather strip 18 is smoothed and compressed, or punched by the reciprocating weighted platen 31. The facing element 35 is surfaced with a leather working sheet 36 which is readily removable, may be retained thereon by adhesives or adhesive tape and which may comprise a base of paper or fabric 14 having a smooth oil- and heat-resistant coating 16, and if desired an impregnating or filler coating 15, as shown in Figs. 4, 5 and 6, hereinafter described.

The leather working material, which may be formed in sheets or strips 13 or in belt form 21 or the like, is shown in detail in Figs. 4 and 5 and comprises, for example, a paper or fabric base 14, saturated with a filler 15 and surfaced

with a compact heat- and oil-resistant smooth surface 16, all of which are hereinafter described in greater detail.

The modification shown in Figure 6 discloses a leather working material, as illustrated in Figs. 4 and 5, having laminated to the base material 14, by suitable heat-resistant resin as phenol-aldehyde or urea-formaldehyde or glue adhesive 27, a reinforcing and strengthening member 28 of the nature of paper or cloth.

I have found that my improved relatively stiff but flexible leather working sheet will have sufficient life to meet the requirement of modern leather working industries and will at the same time produce results of superior quality to those obtained with present glass and metal working faces, provided certain basic principles be followed. I will now give illustrations by which such materials can be made, it being understood that the illustrations are examples only and are not intended to be limitative.

The leather working sheet material comprises a tough flexible backing sheet 14 such as cloth, paper, vulcanized fibre, and the like, or combinations of the same, having the fibres covered, or one face of the backing sheet covered, by a smooth, compact heat- and oil-resistant surfacing 15 and 16. (The filler coat 15 is normally advantageous but not essential.) The surfacing must be sufficiently flexible to serve as a wrapping 13 about a drum 10, e. g., of 10 inches or more in diameter, or used as a belt 21 without cracking, while being mechanically flexed. Such surfacing should also be hard enough to present a firm surface to the work and be sufficiently unaffected by the heat encountered during use so as not to become soft and/or sticky. Likewise the coating must be one that does not become brittle and break up when subjected to heat during the finishing operation. In order to produce the compact surface desired, which is free of protuberances and particles and is substantially smooth, it is necessary to achieve two conditions, viz: (1) there must be enough of the surfacing medium present, in addition to such amounts as may be absorbed by the backing, to form a continuous, but not a thick film, and (2) the coating material, as applied, may advantageously be liquid enough to "flow out" after being spread on the backing, thus producing directly the relatively smooth, compact surface desired. Where certain protuberances or roughness exists after the coating operation, one effective way to correct this condition is to pass the coated sheet between heated, smooth-surfaced calender rolls.

Example 1

The backing 14 is preferably a rope cylinder paper (e. g., of a weight of the order of 130 lbs. per ream of 24" x 36" sheets) having a thin, flexible, glassy-smooth surfacing in the nature of heat-resistant and heat-hardenable resinous material prepared and coated, for example, as follows: a solution in the approximate proportionate parts of 80% resin solids, such as "Bakelite" (a phenol-formaldehyde resin made from approximately 94 parts phenol and 80 parts of 37½ formaldehyde), to 20% solvent, preferably ethylene glycol monoethylether (or other solvents such as alcohols, ketones or mixtures thereof, and the like, which are good solvents for the resin and neither vaporize so rapidly as to prevent the resin to "flow out" properly during coating, nor so slowly as needlessly to delay the coating process) is coated on the paper by use of a conventional coating apparatus which spreads and smooths a relatively thin film over the surface of the backing filling its voids. This coating is then set up by running the material into an oven and allowing it to dry (e. g., at about 80° C.) until danger of adhesion is past, whereupon the coated material is rolled into loose coil form, and the resinous material is further set up for a period of approximately 16 hours, more or less, at substantially 100° C. This period of heating is controlled in proportion to the degree of heat used for curing, as for example boosting the curing temperature to 160° C. will reduce the curing time substantially, e. g., to a period of from 1 to 4 hours, dependent upon the nature of the resin and the nature of its catalyst. The application of a single coating having the viscosity of an 80% solids composition, when sufficient to seal the pores and cover the fibres of certain backing sheets with a smooth film, may be sufficient for sheets of such porosity without the necessity of applying further coatings. However, the presently preferred commercial practice consists in applying two coatings of phenol-aldehyde resins, with at least partial curing of the first coat before application of the second coat.

The first coat may be 12 grains of phenol-aldehyde solution of 50 percent concentration per 4" x 6" area of paper or backing sheet, and the second coat may be 5 grains of 50 percent phenol-aldehyde solution for the same area.

Example 2

When a less viscous coating is applied to backing sheets of such porosity, its absorption into the backing often necessitates the further application of additional coatings until the desired smooth surface is procured, as for example a coating of 50% resin solids may be applied and set up for ½ hour at 100° C. followed by an additional coating of 60% resin solids set up for one hour at 100° C. to prevent running, and cured in coils for 16 hours, more or less (sometimes up to 48 hours), at 100° C.

It has been found that economical coatings may be applied in varying solid percentages from 90 to 50%, dependent upon the porosity of the backing material which controls the smoothness of the film in proportion to the viscosity of the coating material and the number of coatings applied. In the event that some slight running or roughness of surface is present, the coatings may be smoothed down by passing the coated sheets through heated smooth-surfaced calender rolls; also the coatings may be smoothed by suitable sanding and polishing after the material has been properly set up and, where desired, an additional very thin coating of less viscous material may be applied.

Example 3

Further examples of suitable coatings which may be used for leather working requiring less heat resistance and waterproofness than that of pressing or burnishing are those secured by application of commercially prepared sodium silicate solutions. For example, when coating a 130 lb. rope cylinder paper with a single surfacing, a fluid composition of 38.4% solids consisting of 9.1% sodium oxide and 29.3% silicon dioxide to 61.6% solvent, as water, will fill the pores and properly coat the backing, the solids content, however, may vary in proportion to the porosity of the backing material used, and the number of coatings to be applied, for example solutions comprising from 6.4% to 36.9% sodium

oxide to from 24.7% to 23.8% silicon dioxide. Likewise, mixtures of varying percentages to the solvent give solutions of a desired viscosity and produce relatively thin, glassy-like coatings on the particular backing to which the material is aplied. This coating material is preferably dried at normal room temperature or mild heat, with the backing placed in a horizontal position, whereupon, after sufficient curing, the coated material is ready for use. This sodium silicate coating may be rendered more heat-resistant by treating the solution with modifiers, such as precipitated chalk ($CaCO_3$), calcium silicate, sodium fluosilicate, zinc oxide, etc.

I have further found that the porous sheeting may be sized and its voids filled with a material as disclosed in Example 3, and a resin coating in the nature of phenol-aldehyde applied, as described, forms a smooth compact surfacing which is both heat-resistant and waterproof. Further the void-filling materials may vary in composition from the surfacing film and consist of such materials as casein, glue, varnishes, shellac, or mixtures of the same, as for example glue and resin in the nature of phenol-aldehyde and the like, all of which are provided with a surfacing of the herein described characteristics.

The preceding examples illustrate several methods and materials for making my improved leather working product which, to improve the finishing of leather, must possess the characteristics of smoothness and resistance to oils and heat to give the leather surface a smooth grained appearance without spotting or leaving deleterious impressions.

Accordingly, a tough paper material as illustrated possessing uniform strength along and across the sheet is preferred.

However, suitable cloth material as "Drill" or "Jeans," and the like, may be substituted so that when coated with a heat- and oil-resistant surfacing as resin in the nature of phenol-formaldehyde, urea-formaldehyde, furfural-phenol, glyptol, and the like, which may also be employed with paper sheeting, there is provided a tough semi-flexible resilient sheeting capable of withstanding the rigid requirements of leather working. Vinyl resin coatings may also be employed where high temperatures are not encountered in use.

Any of the surfacing materials hereinabove mentioned may or may not be colored or shaded with suitable dyes or pigments as lamp-black, burnt umber, zinc oxide, titanium oxide, chrome oxide, barium chromate and the like, for marking or decorative effects as desired.

To provide a stronger sheeting, the reinforcing member 28 as shown in Figure 6 is a cloth material and the adhesive 27 is preferably heat or solvent activated in character and comprised of resinous or glue material. The adhesive 27, when formed of animal glue, may be a composition comprising approximately

	Per cent
Glue	49
Water	51

prepared by warming and mixing, and may be coated onto the reinforcing sheet material, with subsequent adherence of the coated sheeting to the glue coated side of the reinforcing material. The laminated structure is thereafter loosely rolled and stored under conditions to properly set up the glue. The type of glue or protein, or the like,

used as a laminating adhesive, may be of many specific materials. For example, casein glue, blood albumen glue, etc., may be used. Further, the adhesive material 27 may be, for example, an intermediate phenol-formaldehyde composition bodied up to a viscous solution and finally set up after lamination of the coated and reinforcing sheetings.

Where the reinforcing member 28 is employed it is preferably presized for further securing its adherence to the coated sheeting and for strengthening the tear-resistance of the structure. In the glue lamination illustrated, a 29% glue sizing solution is used with or without an insolubilizing treatment for the adhesive or sizing glue as by formaldehyde, or by inclusion directly in the glue of such insolubilizing agents as various copper salts or the like. For the resin adhesive, a size in the nature of a phenol-formaldehyde resin, thinned with 35 percent of such thinner as ethyleneglycol, monoethylether, alcohol, or the like, is coated over the reinforcing member 28 and set up by evaporation of the solvent.

In burnishing or polishing natural or artificial leather, and sheet materials of generally comparable character, the surface temperatures produced by friction may vary within a substantial range, depending upon the machine speed and other conditions of polishing. Likewise the jaws or platens of the plating apparatus may be heated. Where the polishing surface, i. e., the surface coating, of the burnishing and plating sheet consists of a heat-convertible synthetic resin, such as a phenol-aldehyde resin, it may be used under a wide range of conditions and will withstand any temperature likely to be encountered in practice. The quality of the leather plated in accordance with my invention is improved in that oils in the leather are not absorbed by my leather working material, as happens when ordinary paper is employed as the working sheet.

What I claim is as follows:

A leather working sheet for burnishing and plating leather comprising a flexible base provided with a smooth coating of semi-flexible siliceous material.

BERT S. CROSS.

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