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ETIENNE SARDOU, OF MARSEILLES, FRANCE.

CHEMICAL PROCESS FOR THE ETCHING OF RUBBER PRINCIPALLY FOR THE OBTENTION OF IMPRESSION PRINTS.

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This invention relates to a process of etching rubber, the object of the invention being to provide a chemical process by means of which non-porous impression sheets which will not swell in use and which can readily be engraved to the required depth in a few minutes are provided.

I am aware that attempts have been made to engrave rubber prints by the use of a fatty acid and also by burning or cutting the design into the rubber by the use of very sharp blades. These operations, however, not only consume considerable time and are therefore expensive, but the prints thus obtained must be retouched, since they cannot be finished by the use of fatty acids and are weak and porous, because the fatty acid softens them so that when colors containing oil and varnish are applied thereto the prints are destroyed. Attempts have also been made to produce prints by vulcanizing a rubber sheet in a mold. This method, however, requires the use of a metal original engraved in relief, and the rubber must be vulcanized for each print.

In carrying out the present invention, the rubber sheets or foils may be prepared according to any of the usual methods, and may be composed of rubber, sulphur and any suitable filling material. The filling material, however, must be such that it will not hamper the chemical process, and silica-containing or fat-containing fillings must be avoided. The rubber sheet or foil is then vulcanized on to a sheet of paper which has been rendered moisture-resisting by being saturated with a fatty substance, or reinforced by the incorporation therein of threads all running in the same direction.

After the usual normal vulcanization is completed, the sheet must be superficially super-vulcanized in order to eliminate porosity and the liability of swelling, and also to increase the polish without destroying its elasticity. This may be accomplished, for instance, by the action of ultra-violet rays, or by the action of sulphur chloride, etc.

The transfer of the designs on to the rubber sheets may be accomplished in any well known manner, for instance, by drawing the same directly thereon, or by lithographic transfer or photography. The sheet is then covered with an impalpable stratum of fatty and resinous substances, such for instance as yellow wax, Palestine bitumen, or the like and the surface is wiped so that the impalpable powder adheres only on the lines of the design, whereupon the sheet is heated to the melting point of the substances forming the coating. The sheet is then engraved or etched by bringing the rubber surface thus prepared into contact with a mixture of the following ingredients:

Nitric acid (36°)_____50 centigrammes
Potassium bichromate_____2 to 5 grammes

The surface of the rubber is subjected to a water solution of the above ingredients for about ten minutes, whereupon all of the uncovered parts will be etched, leaving in relief only the covered parts. After this preliminary engraving, the sheet is rinsed in acetone or alcoholic soda to dissolve the remaining nitrated rubber. The first etching obtained is usually not sufficiently deep for printing purposes. The etching may be completed in the following manner:

The sheet is stretched on a smooth metal cylinder and is inked by means of an equally smooth inking roller. Ink will be collected only on the portions in relief, but by exerting some pressure on the roller the ink will be forced also into the depressions. The sheet is again covered with an impalpable stratum of material as hereinbefore described, again wiped and subjected to the acid bath.

Prints prepared as above described may be mounted on metal rollers of rotating printing machines and inked by mean of perfectly smooth inking rollers. It is to be understood that the etching process herein described is equally applicable for etching rubber for any purpose whatsoever.

Having thus described my invention, what I claim is:

1. The process of etching rubber sheets which consists in subjecting said sheets to a superficial supervulcanization, reproducing the desired design thereon, covering the lines of said design with an impalpable pulverulent mixture of fatty and resinous substances, and subjecting the surface of the sheet to the action of a solution of nitric acid and potassium bichromate.

2. The process of etching rubber sheets which consists in subjecting said sheets to a superficial supervulcanization, reproducing the desired design thereon, covering the

lines of said design with an impalpable pulverulent mixture of fatty and resinous substances, subjecting the surface of the sheet to the action of a solution of nitric acid and potassium bichromate, rinsing the sheet in acetone, inking the design, and repeating the treatment with fatty and resinous substances and with the solution of nitric acid and potassium bichromate.

3. The process of etching rubber sheets which consists in subjecting the same to the action of ultra-violet rays, reproducing the desired design thereon, covering the lines of said design with an impalpable pulverulent mixture of fatty and resinous substances, and subjecting the surface of the sheet to the action of a solution of nitric acid and potassium bichromate.

4. The process of etching rubber sheets which consists in subjecting the same to a superficial supervulcanization, reproducing the desired design thereon, covering the lines of said design with an impalpable pulverulent mixture of fatty and resinous substances, and subjecting the surface of the sheet to the action of a solution containing nitric acid of 36° concentration and potassium bichromate in the approximate proportions by weight of ½ and 2–5.

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

ETIENNE SARDOU.