

UNITED STATES PATENT OFFICE.

WILLIAM ELMER, OF NEW YORK, N. Y., ASSIGNOR TO ANDREW MCKINNEY,
OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN WATERPROOFING CLOTH, LEATHER, &c.

Specification forming part of Letters Patent No. 38,784, dated June 2, 1863.

To all whom it may concern:

Be it known that I, WILLIAM ELMER, of the city, county, and State of New York, have invented certain new and useful processes or treatments of fibrous substances—as cloth and other texture, leather, &c.—for the purpose of rendering them more durable and impermeable to water and other fluids; and I do hereby declare that the following is a full, clear, and exact description of the same.

The materials, processes, and chemicals employed are as follows: First, vegetable or woody and animal fibers—as silks, woolens, cottons, leather, gelatinous tissue, prunella, linen, satins, mixed goods, &c.—are first subjected to the action of alumina (or its base salts) or other true mordant. The alumina, however, is in general preferred, and therefore will only be named in connection with the processes detailed in this specification. The processes are varied according to the article under treatment. If the goods have been previously dyed and only one side is to be treated, much care is necessary to prevent the alumina from penetrating through the cloth and depositing on the opposite side. Silks and other thin goods may be protected from solutions through the cloth by employing torrefied starch, gum, or some such substance applied to the surface of the cloth opposite to the side under treatment. Whatever the substance employed, it should be of a nature that admits of its being removed without injury to the cloth, either in appearance or otherwise. The alumina is applied in the form of a solution, one part of alumina (usually the sulphate) to two of ichthyocolla, by weight, each previously dissolved, and afterward mixed so as to form a thick solution or thin paste. The alumina and ichthyocolla combine chemically, forming an insoluble composition which combines chemically with the fiber of the cloth, making the several substances a chemical compound, and, while it renders the material more durable, forms a basis for the subsequent chemical applications. This paste is applied by means of a brush or any convenient method to the fibers of the cloth and worked into the texture. After the ichthyocolla-aluminous application has been made to the cloth it is partially dried at a temperature of about 100° Fahrenheit, and while still in a slightly humid condition a so-

lution of tannin is applied, which has the effect to produce a gum-gelatinous compound, and in a certain degree giving it the character of leather. The tannin is rapidly absorbed by the ichthyocolla-aluminous matter, forming a soluble composition possessing great flexibility. In this process the alumina combines firmly and chemically with the fiber of the cloth and other materials. The cloth is now subjected to the action of steam after the water from the tannin solution has mostly evaporated. It is then passed directly between the metallic rollers under pressure, after which it is again mordanted and carefully dried, at a temperature not above 150° Fahrenheit, in a well-ventilated room from which the sun's rays are excluded. Texture or cloth thus treated, and when properly desiccated, is then subjected to an additional process for the purpose of rendering such fabrics impervious to water. This is accomplished by applying to the tanno-aluminous compound surface an elastic coating—the selenide or sulphide of caoutchouc or gutta-percha; or the two substances may be combined for this purpose.

To prepare the elastic selenide or sulphide of caoutchouc or gutta-percha, (or these two substances combined,) they are first subjected to the action of a solvent capable of liquefying these substances so as to form a perfect solution, which is placed under pressure in a suitable apparatus and heat gradually applied and raised to about 300° Fahrenheit, during which time the liquefied selenium (or other analogous substance may be employed) is admitted into the apparatus in contact with the solution drop by drop, or in very small quantities, and the solution in the meantime is kept in constant motion until the selenide of caoutchouc or gutta-percha is formed. If the solvent employed to liquefy the caoutchouc or gutta-percha contains no oxygen nor hydrogen—as the bisulphide of carbon (CS_2)—then no other substance is needed in conjunction with the selenide; but on the other hand, if solvents are employed containing either oxygen or hydrogen, then upon the introduction of selenide (if the chloride be used) an acid is instantly formed, which to prevent or neutralize will require the presence of an alkali. The elastic selenide is a semi-fluid devoid of all unpleasant odor, and possesses, when evaporated to the solid state, all the character-

istics of vulcanized caoutchouc or gutta-percha. The article thus coated is then passed between metallic revolving cylinders, one of which is heated to a temperature, according to the thickness of the coating, from 250° to 300° Fahrenheit. The heated cylinder is brought in contact as it revolves with the elastic coating, while the cloth side of the article is in contact with the unheated surface. By this method the elastic coating becomes perfectly uniform and unites with the surface to which it is applied, being attracted to this surface by the alumina, which acts by the force of cohesion or true chemical affinity. A paste or thick solution composed of one part, by weight, of alumina and two of ichthyocolla is then applied to the elastic coating, and when partially dried it is placed in contact with a strong solution of tannic acid or other analogous substance for from six to twelve hours, after which it is subjected to the action of steam for about thirty minutes. This process results in an agglutination of the compound employed, forming a membranous coating which possesses considerable elasticity, approximating to that of caoutchouc, while it adheres with great tenacity to the elastic body, completely covering it, so that no odor, appearance, nor feel of caoutchouc or gutta-percha can be detected. In order to maintain the elasticity of this membranous coating, it is necessary to employ the oil of birch and naphtha, (if naphtha be employed,) in the proportions of one part of the former to about thirty of the latter.

In applying the oil to the membranous coating great care is required to have the absorption equal. At the same time a very small portion only is required. If too much is used, the oil might pass through and injure the precious coatings.

After the oils have been applied the surface is left exposed to a dry atmosphere until the naphtha (if naphtha be employed) has evaporated, which leaves a film of petroleum. Thus by these various processes and substances employed texture is added to fibrous tissue and chemically united, forming a compact body possessing great tenacity, flexibility, and at the same time is water-proof.

Wearing - apparel—as overcoats, cloaks, boots, shoes, hats, or any other article of clothing desirable—may by the method herein described be rendered more durable and water-proof, while the external appearance, or the cloth side of such articles, will retain all their original beauty and properties. At the same time the other side will be found to possess all the softness and pliability of the finest kid leather.

Having thus fully described my invention and improvement, what I claim as new, and desire to secure by Letters Patent, is—

Rendering cloth and other textures impermeable to water and other fluids by the application of an elastic coating—the selenide or sulphide of caoutchouc or gutta-percha—and giving increased body and durability to vegetable, woody, and animal fibrous texture—as silks, woolens, leather, gelatinous tissue, prunella, cotton, linen, satins, mixed goods, &c.—by first subjecting such goods or articles to the action of a solution of alumina (or its basic salts) or other true mordants and ichthyocolla, in such proportions and in such manner as to chemically combine the alumina and ichthyocolla and form an insoluble composition which combines chemically with the fiber of the cloth, making the three a chemical compound, and subsequently subjecting the said goods to the series of actions, operations, or processes of the chemical and other agents employed, as fully described in the foregoing specification, so that by these various processes and substances employed texture is added to fibrous tissue and chemically united, forming a compact body possessing great tenacity, flexibility, and at the same time being water-proof, and this I claim whether the precise chemicals before described are employed and in the proportions named or equivalent ones and the processes varied according to the nature of the article under treatment, or other processes, &c., be employed which are substantially the same by which analogous results are produced.

WILLIAM ELMER.

Witnesses:

E. MAHER,

ROBERT J. TRESCOTT.