UNITED STATES PATENT OFFICE.

JOHN EDWARD THORNTON AND CHARLES FREDERICK SEYMOUR ROTHWELL, OF MANCHESTER, ENGLAND.

SUBSTITUTE FOR CELLULOID, &c., AND PROCESS OF MANUFACTURING SAME.

SPECIFICATION forming part of Letters Patent No. 654,688, dated July 31, 1900.

Application filed August 26, 1899. Serial No. 728,646. (No specimens.)

To all whom it may concern:

Be it known that we, JOHN EDWARD THORNTON and CHARLES FREDERICK SEYMOUR ROTHWELL, subjects of the Queen of Great Britain, residing at Manchester, in the county of Lancaster, England, have invented certain new and useful Improvements in an Article to be Used as a Substitute for Celluloid, &c., together with a Process of Manufacturing the Same, of which the following is a specification.

This invention relates to a process of manufacturing and to a substance of a transparent nature which may be used as a substitute for celluloid, glass, ivory, or other substances or may be applied to various purposes to which such substances are at present applied or to other purposes for which it may be found suitable.

It consists, essentially, of a process for manufacturing and of a transparent substance prepared or obtained by treating or dissolving the aluminium salts of fatty acids with a suitable volatile solvent—such as benzol, coal-tar, naphtha, benzolin, or other similar light hydrocarbon—and drying or solidifying the same in the presence of heated air.

In carrying out the invention we take the aluminium salt of one or more of the fatty acids in powdered form and treat or dissolve the same with a volatile solvent until the material assumes the consistency of a heavy plastic mass. We find it advantageous to mix two or more fatty-acid salts and also to add thereto an aluminium salt of resin acids, and for the purpose we prefer to employ aluminium oleate, aluminium stearate, and aluminium resinate. The following formula may be taken as an example of suitable proportions of the materials: aluminium oleate, six parts; aluminium stearate, four parts; aluminium resinate, one part; benzol, one hundred parts. The materials are well and thoroughly mixed in a kneading-machine until a homogeneous viscous solution or mass is obtained. The mixing may be done cold or at the ordinary temperature; but it is preferably and more rapidly effected at a temperature of from 30° to 50° centigrade. The material in the viscous state is then spread out into thin sheets or films, molded into blocks or other form, or rolled into sheets, as may be found best for the purpose to which it is to be applied. For the production of flexible transparent films, such as employed for photographic purposes, this viscous mass or solution is flowed or spread out onto flat slabs or tables of glass or other hard even material, sufficient of the volatile solvent having been added to reduce it to the desired consistency to spread itself into a very thin film or layer.

For the manufacture of molded blocks or slabs or for the production of thin sheets or films by rolling out the material the same quantity of the aluminium salts may be used with a less quantity or proportion of the solvent, using only sufficient of the solvent to enable the powdered salts to be mixed or blended into a homogeneous mass in the kneading-machine. The proportion of the solvent may be from twenty to twenty-five parts, by weight, the quantity being as small as practicable to reduce so far as possible contraction during drying. After the spreading or molding of the substance or compound thus formed it is dried at a temperature of from 40° to 55° centigrade in a current of warm or heated air, which carries off the volatile solvent. For the treating of fabric or paper to render such waterproof the viscous mass may be applied by means of a spreading-machine, or the compound may be reduced to a liquid state by the addition of a greater proportion of the solvent and applied thereto by a roller or other suitable form of machine. A harder and less flexible material may be made by increasing the proportion of the resinate or stearate of aluminium or by the substitution of palmitate of aluminium for the stearate. The molded blocks may be further pressed into any desired form or shape by means of suitable dies, or the material may be cut, turned, or otherwise manipulated when solid.

In the preparation of this new compound or substance it is preferred to use the salts of oleic, stearic, or palmitic acid, to which may be added a small quantity of the salts of resin acid. Instead of these, however, any other fatty acids occurring in natural oils or fats may be combined with the aluminium and used as a substitute.

The physical properties of the substance as

to flexibility, hardness, and the like may be modified by using various proportions or mixtures of the salts indicated.

This substance we find will be cheaper to produce than celluloid, will not ignite on heating, does not expand, contract, or cockle when placed in water and dried, may be made flexible or brittle, as desired, and is a non-conductor of electricity applicable for insulating purposes.

This new compound or substance is applicable for the following among other uses: (*a*) the preparation of photographic films, either flexible or stiff, as a base for the sensitive coating; (*b*) surfacing paper or other material for photographic purposes; (*c*) surfacing or sizing of printing, writing, packing, and other papers; (*d*) waterproofing paper or fabrics or as a coating or casing for such materials; (*e*) a transparent sheet, like paper, on which to print in colors transparent designs for decorative purposes, show-cards, or the like; (*f*) a substitute for celluloid and similar materials or compounds; (*g*) a substitute for glass and glass plates for many purposes; (*h*) in films or sheets for waterproof packing material; (*i*) substitute for leather; (*j*) preparation of cloth for bookbinding, upholstery, tracing, and similar purposes; (*k*) preparation of paper for bookbinding, tracing, and similar purposes; (*l*) manufacture of sanitary wall-paper; (*m*) mixed with coloring matters or dyes or with pigments or lakes it may be used as a substitute for ivory, bone, jet-amber, stained glass, or the like.

For photographic films the compound or substance is prepared as before described and when dry washed with a solution of silicate of soda and then coated with the sensitive gelatin emulsion.

Fabrics, paper, or other materials are coated with the compound or substance either in a plastic or liquid state before drying. When in a plastic state, it is spread over the surface of the fabric or paper by an ordinary spreading-machine provided with gages or "doctors," and when in a liquid state it may be applied to the surface by means of an engraved roller or the fabric or paper may be passed through the solution. Fabric, cloth, or paper so treated may be ornamented by engraved or embossed rollers or plates applied to the surface with a certain degree of pressure while the material is still plastic. When dry, the surface may be ornamented further by printing a design or pattern thereon.

What we claim as our invention, and desire to protect by Letters Patent, is—

1. The method of producing a flexible transparent substance by treating the aluminium salt of a fatty acid with a quantity of volatile solvent and drying and hardening the same substantially as described.

2. The method of producing a flexible transparent substance by treating aluminium oleate with a quantity of a volatile solvent and drying and hardening the same.

3. The method of producing a flexible transparent substance by treating aluminium oleate with benzol and drying and hardening the same.

4. As a new article of manufacture a transparent substance consisting of the dissolved and hardened salt of aluminium and a fatty acid substantially as described.

5. As a new article of manufacture a transparent substance comprising aluminium oleate dissolved in a volatile solvent substantially as described.

6. As a new article of manufacture a transparent substance comprising aluminium oleate treated with benzol.

In witness whereof we have hereunto signed our names in the presence of two subscribing witnesses.

JOHN EDWARD THORNTON.
CHARLES FREDERICK SEYMOUR ROTHWELL.

Witnesses:
I. OWDEN O'BRIEN,
B. TATHAM WOODHEAD.