

UNITED STATES PATENT OFFICE.

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MANUFACTURE OF PLASTIC COMPOUNDS FROM PYROXYLINE.

SPECIFICATION forming part of Letters Patent No. 245,952, dated August 23, 1881.

Application filed April 13, 1881. (Specimens.)

To all whom it may concern:

Be it known that we, SAMUEL J. HOGGSON and GEORGE C. PETTIS, of the city of New Haven, in the county of New Haven and State of Connecticut, have invented a new and Improved Plastic Compound from Pyroxyline, of which the following is a specification.

This invention relates more particularly to the class of compounds of which nitro-cellulose, nitro-glucose, and other derivations of niter form a part; and it further consists of gums, resins, balsams, pigments, dyes, oils, &c., as first invented by Alexander Parkes, of Birmingham, England, in 1856, and manufactured there under the name of "parkesine," but now manufactured in the United States under the name of "celluloid;" and it is well known that the manufacture of the compound, in whatever form it has been heretofore mixed, has been attended with anxiety and danger; and the object of our invention is to make a compound suitable for all the uses for which the above has been used, and at the same time free from danger, both in its manufacture and subsequent use.

There are three features to our invention:

The first feature is the reconversion of pyroxylinized matter or soluble cellulose into a less explosive product.

The second feature of our invention is a pyroxyline compound having alum as a base or principal ingredient.

The third feature of our invention consists in using as an ingredient in a pyroxyline compound the flour of steatite as a lubricator, and to facilitate the manufacture of articles therefrom.

To enable others skilled in the art to understand our invention, we will now fully explain it.

We first take cotton, paper, rags, or any other matter composed of vegetable fiber, but prefer paper-pulp in the state known to paper-makers as "half-stock," in suitable quantity, and subject it in any suitable vessel to a bath of nitric and sulphuric acids, either hot or cold, or of sulphuric acid and niter, or any of the well-known baths of the above with nitrate of potassa or soda, which will render said fiber susceptible of conversion into collodion by the action of any of the well-known solvents, such as alcohol, ether, camphor, wood-naphtha, and others. This is more fully described in United

States Patent No. 216,474, granted June 10, 1879, to Victor Tribouillet and Louis A. De Besaucele, of Paris, France, and United States Patent No. 237,279, granted to Hoggson and Pettis, February 1, 1881. When said fiber has attained the condition of pyroxyline it is transferred to a water bath, in which it is washed until every trace of the acid is removed, and when thus perfectly freed from acid, as our first improvement we next treat it in a bath containing in solution hydrochlorate of ammonia, muriate of ammonia, or any of the ammoniacal salts.

We prefer to use for our purpose a salt consisting of about two volumes of muriatic-acid gas and two volumes of ammonia condensed into a solid. This salt is very difficult to powder in the ordinary way, but may be readily effected by making a boiling saturated solution of the salt and stirring it as it cools, which may thus be made to granulate, and in this state, after having been drained from the remaining solution and dried, may be easily powdered, and on dissolving will now, as an amide of hydrogen, evolve from 20° to 30° of cold, and at the same time assimilate with and replace the hyponitric acid in the prepared pulp or pyroxyline. In order to make this plain to all, we would further explain that in forming xyloidine or pyroxyline by any of the usual methods hyponitric acid replaces respectively one, two, or three equivalents of hydrogen in the starch or lignine, thus rendering it exceedingly explosive; but when treated by our improved process the ammoniacal salt, as an amide of hydrogen, restores or reinstates it in a great extent to its former harmless condition, as a carbonic oxide cannot burn in an ammoniacal atmosphere. Pyroxyline prepared or treated in this way we term "rehydrogenized" or "reinstated" pyroxyline.

In the ammoniacal bath we use of the salt different proportions dissolved in water, but prefer to use a solution of one pound of salt to one gallon of water; but other proportions may give equally good results. A stronger and warm solution will work quicker than a weaker and cold solution; but in either case the result may be good, and when the pyroxyline or soluble vegetable fiber is thoroughly impregnated with said ammonia in solution it is now pressed or rolled, and may be

dried with impunity in any convenient manner, as it is free from danger as an article of manufacture, and when dried it is treated with any of the solvents herein mentioned, either in the liquid or solid form, or others, to form it into a plastic compound or homogeneous mass, to which we now add, as our second improvement, sulphate of alumina or any of the isomorphous salts known as "sulphate of alumina," "muriate of alumina," "potash-alum," "soda-alum," "lithia-alum," "magnesia-alum," and other octahedron salts decrystallized either by precipitation or heat, and ground to a fine powder and mixed with or without other ingredients, as are best adapted to the subsequent uses of the compound.

We find in practice that alum makes an excellent base for a pyroxyline compound, as it is inexpensive and of a beautiful white, which may be tinged to any shade of color by the addition of gums, resins, pigments, dyes, oils, or other coloring-matter, and by varying the proportions of the ingredients the compound may be made to resemble ivory, horn, bone, wood, cloth, leather, and metals, being susceptible of a very high polish. Alum seems to be a natural base for pyroxyline compounds, as it works in any proportion, either hot or cold, from that of a light solution suitable for waterproofing fabrics to a heavy gelatinous wax-like mass, which may be flowed, dipped, brushed, cast, molded, pressed, turned, rolled, stamped, or formed into or onto any useful or ornamental article for which it is suitable; and we further find that alum, to a great extent, prevents the formation of gas or air-bubbles in the compound. When the compound is intended to be pressed in molds or dies, then we add, as our third improvement, the "flour of steatite" as an ingredient, which acts as a lubricant, and by the use of which we are enabled to remove the article from the die or mold in much less time and without its adhering to the same, or the use of pressing-jackets for the articles of porous material, as has been heretofore used.

We are aware of English Patent No. 2,249, of 1860, and of United States Patents Nos. 91,377, 97,454, and 161,175, and do not wish to be understood as claiming anything therein described.

Having thus described the nature of our invention and improvements, what we claim, and desire to secure by Letters Patent, is—

1. The new material herein described as "re-hydrogenized pyroxyline," when treated with hydrochlorate of ammonia, muriate of ammonia, or any of the ammoniacal salts or their equivalent, as herein set forth.

2. The method or process herein explained of treating pyroxyline or soluble fiber with ammoniacal salts or their equivalent to render it less explosive, as written substantially in this specification.

3. The new soluble material, as herein explained, consisting of reinstated pyroxyline and sulphate of alumina, or any of the alumina salts, as hereinbefore written and described.

4. A pyroxyline compound having for a base sulphate of alumina, to which are added gums, resins, balsams, oils, pigments, dyes, or other coloring ingredients, as herein specified.

5. A compound of sulphate of alumina, or any of the octahedron or isomorphous salts, in combination with pyroxyline, for the purpose herein described and specified.

6. The composition or compound consisting of vegetable fiber converted into pyroxyline, and then by the aid of ammoniacal salts in solution, or their equivalent, reconverted into its former state so far as to render it harmless as an article of manufacture, as herein described and set forth.

7. A plastic compound consisting of pyroxyline, aluminium salts, and any of the known pyroxyline solvents, such as alcohol, ether, camphene, camphor, wood-naphtha, or their equivalent, either in the liquid or solid form, and used either hot or cold, substantially as herein explained and written.

8. Pyroxyline solvents to which are added in any proportion pyroxyline, ammonia, alum, flour of steatite, or their equivalent, substantially as herein described, and for the purposes herein set forth.

9. The fluid compound of pyroxyline, ammoniacal salts, aluminium salts, and pyroxyline solvents, as written and described in this specification.

In testimony that we claim the foregoing as our invention and improvements we have hereunto set our hands, this 12th day of April, 1881, in the presence of two subscribing witnesses.

SAMUEL J. HOGGSON.
GEORGE C. PETTIS.

Witnesses:

W. J. HOGGSON,
G. P. STEPHAN.