

UNITED STATES PATENT OFFICE.

JOSEPH R. FRANCE, OF NEW YORK, N. Y.

PROCESS OF MANUFACTURING COLLARS, CUFFS, &c., FROM PYROXYLINE COMPOUNDS.

SPECIFICATION forming part of Letters Patent No. 393,750, dated December 4, 1888.

Application filed September 8, 1887. Serial No. 249,141. (No specimens.)

To all whom it may concern:

Be it known that I, JOSEPH R. FRANCE, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented new and useful Improvements in the Process for the Manufacture of Collars, Cuffs, and other Articles from Pyroxyline Compounds, of which the following is a specification.

My invention has for its object to provide for an improved process for the manufacture of collars, cuffs, shirt-fronts, and similar articles from pyroxyline compounds, said articles of manufacture being ornamented by printing thereon any desired set pattern—such as stripes, spots, stars, horseshoes, anchors, and a multitude of other designs or patterns—in various colors, so as to make in celluloid an exact imitation of what has already been made in fancy linen or percale.

Ordinary white collars and cuffs have been successfully made of celluloid and kindred substances; but hitherto such articles with printed or ornamental patterns in imitation of the colored and fancy linen collars and cuffs have not been successfully made, because the printed surfaces were not indelible and would wear or rub off.

I have discovered a new and useful method of producing upon sheets of celluloid ornamental designs in colors which are so incorporated as to be practically indelible and avoid the objections hitherto met with, and these have now become an important article of manufacture, and have become recognized as an article of dress.

In carrying my methods into use I employ "green" or "unseasoned" celluloid or similar pyroxyline compound, which I shall hereinafter more particularly describe, and upon these sheets I print in an ordinary printing-press, with type of wood or metal or electrotype, any desired pattern or design—such as stripes, polka-dots, or other figures—and employ any ink in which chemicals or alcohols having an affinity for celluloid shall have been mixed with a dye in which the coloring-matter will mix with the alcohols or chemicals or solvents contained in the celluloid, and of those also of which the ink is composed.

I am aware that it has been customary, according to one method, to make playing-cards

by printing upon a sheet of celluloid with an ink made of carbolic acid, ether, and alcohol and aniline dyes, the ether and alcohol acting by evaporation as a drier; but in this process dependence is placed upon the atoms of alcohol and ether to attack the surface of the sheet of celluloid and to convert that portion so attacked to an unseasoned condition, so as to carry in the ink or solvent and coloring-matter with it; but in this method the evaporation is so rapid that the solvents have not had time to penetrate the surface, and a superficial print only is obtained.

In the process on which my discovery is based the atoms of alcohol in the unseasoned celluloid act slowly, and having to pass in the process of drying or seasoning from the interior to the exterior of the sheet they act as a mordant or grip, and the coloring-matter, being in solution, sinks in and takes the place of the evaporated atoms, being assisted in part by its affinity for celluloid and in part by capillary force, and the atoms of alcohol below the surface of the unseasoned sheet greedily absorbing any other atoms of alcohol placed upon the surface.

I am aware that in addition to the method of printing playing-cards before named many efforts have been made to print celluloid, and it is common to do so, various ways being employed, one method being by heat and pressure to incorporate with the material an ink in part composed of pigments and collodion; but all efforts to produce indelible results have failed, because on close scrutiny it was found that the ink, pigments, or compound used overlaid the surface, and such a product cannot be used for any purpose where it will be subjected to rubbing or wear, and therefore is not practical for use in articles such as mentioned in this application. The difficulty in these cases has been that the pyroxyline compound employed was what is termed in practice "seasoned celluloid"—that is, celluloid which contains the least percentage possible of solvent—and thus defeated the object sought to be obtained. It will be readily seen that in my method the solvents necessary and the conditions required to produce indelible results are furnished by the celluloid when in its green or unseasoned condition, which is best obtained by using the sheets as soon

as they have been cut from the original cake or block in which they have been made and while containing evenly throughout all their parts a large percentage of the solvents used in their manufacture. At this stage it only requires the application of an ink composed of the same analogous chemicals which shall act as a menstruum to enable the printer to apply the desired color to the surface. This condition of celluloid is what I term "green" or "unseasoned," and being newly-cut and soft is really an unfinished product, and as such is not usually sold on the market, but is in condition to give results not previously attained. As the sheet dries or seasons, which is usually accomplished by the evaporation of the solvents taken off by the air or atmosphere, first from its surface and next by the evaporation of those atoms underlying it, shrinkage of the sheet follows. It is therefore clearly apparent that if before much, if any, evaporation commences coloring-matter—such as a soluble dye dissolved in a solvent—be put upon the surface it will greedily absorb it and the color will enter with the alcohol, which in turn will again be taken off by evaporation, leaving the color chemically incorporated with the sheet; but to accomplish this the sheets must be in that condition in which the surface has been very little, if any, dried off, and therefore I prefer to print the sheets as soon as practicable after they are cut, although it is possible to print them at some time thereafter, if it is done when the solvent has left the surface only and before the solvent lying next the surface shall have passed off. It may, however, be possible to place the seasoned sheets of celluloid in contact with solvents in such manner that the sheets become vaporized and rendered in a similar condition practically as when first cut; but this method will simply convert them again to an unseasoned condition, and will not avoid the principle of my invention. The sheets after being printed are then allowed to season several days, all of which will vary according to thickness required and amount of solvent contained, and which will be known to those practiced in the art, and can be accomplished by any of the ordinary methods. I then place a suitable number of the printed sheets between pieces of muslin and sheets of zinc in a press having steam-tables at top and bottom, and then heat them to a temperature of from 150° to 200° Fahrenheit and subject them

to a pressure of fifteen hundred to two thousand pounds to the square inch. The pressure serves to incorporate any solid matter that may have been used in the ink into the body of the sheet, while the heat renders the surface plastic and flows it evenly together, and at the same time gives the sheet the indentations similar to the muslin between which it is passed. I make no claim to this method of imparting a muslin impression, as it has long been used in manufacturing collars out of pyroxyline compounds. The material is now ready for subsequent uses, and can be cut into imitation percale collars and cuffs and shirt-fronts, or be made into playing-cards, business-cards, and other valuable products. When used for the latter purposes, the printed sheets are heated and pressed between zinc sheets, as described; but the muslin is omitted, so as to give a plain smooth surface.

What I claim is—

1. In the manufacture of celluloid for collars, cuffs, and other articles, the process herein set forth for incorporating the printed figure indelibly in the body or substance of the celluloid, said process consisting in producing the ornamental or other design upon a sheet of celluloid while the latter is in a green or unseasoned condition, and before the solvent or solvents therein contained are evaporated so far as to convert the celluloid to a seasoned condition, the ink, pigment, or compound employed being of a kind that is soluble in the solvent or solvents contained in the celluloid, substantially as described.

2. In the manufacture of collars, cuffs, and other articles, the process herein set forth for incorporating the coloring-matter indelibly in the substance or body of the celluloid, said process consisting in producing the desired figure or design upon a green or unseasoned sheet of celluloid while it still contains a large proportion of the solvent or solvents used in its manufacture with a pigment or dye, or both combined, which combines with or is soluble in the solvents of the celluloid, then seasoning the printed sheets, and finally subjecting them to heat and pressure, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

JOSEPH R. FRANCE.

Witnesses:

G. C. ELLIOTT,

H. E. SCHOONMAKER.