

UNITED STATES PATENT OFFICE.

MARSHALL C. LEFFERTS, OF NEW YORK, N. Y., AND JOHN W. HYATT, OF NEWARK, NEW JERSEY, ASSIGNORS TO THE CELLULOID MANUFACTURING COMPANY, OF NEW YORK, N. Y.

PRINTING ON PYROXYLINE COMPOUNDS.

SPECIFICATION forming part of Letters Patent No. 348,222, dated August 31, 1886.

Application filed December 24, 1885. Serial No. 186,641. (Specimens.)

To all whom it may concern:

Be it known that we, MARSHALL C. LEFFERTS, of New York, county of New York and State of New York, and JOHN W. HYATT, of Newark, county of Essex and State of New Jersey, both citizens of the United States, have invented certain new and useful Improvements in the Art of Printing by Means of Plates upon Surfaces of Celluloid, &c., of which the following is a specification.

The invention relates to an improvement in the art of printing, and more especially by means of engraved plates; and has for its object the employment of such plates in connection with a surface of celluloid or analogous compound of pyroxyline. In printing by means of plates upon such surfaces it has heretofore been found to be impossible to obtain a permanent or satisfactory impression. By means of our improved process we are enabled to not only obtain a permanent impression, but to produce the most desirable results with the greatest ease.

The distinctive novelty of our process consists in subjecting the pyroxyline compound to the action of heat and pressure while in contact with the engraved plates, as hereinafter more fully described.

In carrying out our process, it is desirable that the ink used be of such a nature that it will exert under heat and pressure a softening or penetrating action upon the pyroxyline surface, so that the coloring matter it contains will be forced into or effectually attached to the material. Any ink that contains a solvent of pyroxyline may be used, but we recommend the employment of an ink in which the coloring matter is in the form of a pigment and which also contains a binding agent for holding the particles of pigment together. The printing is performed by preference with an ordinary engraved plate and one having a highly-burnished surface, and we have found it is practicable to make use of plates in which the lines are of the most delicate character and also plates having plain surfaces, the design being transferred or applied thereto in any suitable manner. If an engraved plate is to be used it will be inked and made ready in

any convenient way according to the method of the engraver's art, and, when desired, placed in contact with the pyroxyline surface to be printed and the latter subjected to heat and pressure, the heat to be from 180° to 230° Fahrenheit and the pressure sufficient to cause the material to flow into the engraved lines, which will be continued usually for about a minute, the heat and pressure being preferably applied to the material through the plate.

In printing upon sheets or other thin pieces of material we place the sheet to be treated in what is known as a "steam-table press" with the surface of the sheet that is to receive the impression in contact with the ink-surface of the plate and apply the heat and pressure as aforesaid. If the sheet of material is exceptionally thin it will be desirable to back it up with a layer or layers of blotting-paper or other elastic material, for the purpose of preventing or correcting inaccuracies which are likely to be caused by any inequalities in the plate or the sheet, and to prevent the sheet from adhering to the backing a layer of any non-adhesive substance—such as metal or tin foil—may be interposed.

In treating thick sheets or pieces of material there is danger of the heat and pressure causing the material to flow, which will cause the impression to be blurred or distorted. This danger we obviate by using a die or mold which conforms in shape to the thick sheet or piece which is to receive the impression, in which the material is closely and compactly fitted, so that its shape will not be affected by the heat and pressure and the displacement of the surface to be printed upon prevented. Any die or mold which will prevent a change in the surface which carries the impression may be made use of.

The printing may be accomplished in any other substantial manner, the essential consideration being the use of heat and pressure, substantially as hereinbefore described. By applying heat the surface of the pyroxyline compound is softened, and by means of the pressure exerted thereon the material is caused to flow into the engraved lines in the plate. By such means we are enabled to produce

upon the material used results in every way equal to those produced upon paper.

We do not limit our claim to a process in which any particular mechanism is used, nor to the employment of any particular degree of heat and pressure; but

What we claim is—

1. In the art of printing from engraved plates upon celluloid or other pyroxyline compounds, the process, hereinbefore described, of producing a permanent design or picture upon such material, which consists in subjecting the pyroxyline surface to the action of heat and pressure while in contact with the engraved plate.
2. The improvement in the art of printing

with engraved plates on surfaces of celluloid or other pyroxyline compounds, which consists in, first, inking the plate with an ink containing or consisting of a solvent of pyroxyline and a pigment, and, second, in subjecting the material to heat and pressure while in contact with the inked plate.

Signed at Newark, in the county of Essex and State of New Jersey, this 22d day of December, A. D. 1885.

MARSHALL C. LEFFERTS.
JOHN W. HYATT.

Witnesses:

ABRAHAM MANNERS,
GEORGE COOK.