UNITED STATES PATENT OFFICE.

CHARLES DEPOULLY AND PAUL DEPOULLY, OF PARIS, FRANCE, ASSIGNORS TO THE SOCIETY GILLET ET FILS AND THE SOCIETY C. GARNIER & CIE., OF LYONS, FRANCE.

PROCESS OF CRINKLING SILK.

SPECIFICATION forming part of Letters Patent No. 574,401, dated January 5, 1897.

Application filed July 6, 1895. Serial No. 555,158. (No specimens.) Patented in France August 21, 1894, No. 240,879, and in England March 15, 1895, No. 5,533.

To all whom it may concern:

Be it known that we, CHARLES DEPOULLY and PAUL DEPOULLY, of the city of Paris, France, have invented an Improved Process of Producing Crinkled Effects on Silk and Mixed Silk and other Threads and Fabrics, (for which we have obtained Letters Patent in France for fifteen years, dated August 21, 1894, No. 240,879, and in England for fourteen years, dated March 15, 1895, No. 5,533,) of which the following is a full, clear, and exact description.

It has been found that silk filaments, whether in the form of threads, hanks, or fabrics, when subjected to the action of acids under certain conditions become shortened, the effect being dependent upon the degree of concentration of the acid employed, the temperature of the bath, and the duration of the immersion or impregnation, and it is only by suitably regulating these several factors—viz., concentration, temperature, and time—that the desired result can be attained in practice.

In carrying our improved process into effect we operate in the following manner: The silk threads or fabrics in any condition—viz., raw, ungummed, or boiled off—are immersed in the acid bath until the desired shortening effect is obtained, and then washed. The density of the acid, the temperature of the bath, and the time of immersion are determined according to the magnitude of the effect it is desired to produce, these conditions varying according to the nature of the acid employed. The degree of concentration of the acid proper to produce the required effect upon the silk should be carefully determined for each acid, as it is only susceptible of variation within very narrow limits. Thus, for example, an active acid will not produce a useful effect if of too low a density, whatever may be the temperature and period of immersion. On the other hand, an acid of too high a density would either burn the silk or fail to produce any useful effect, according as the temperature is too high or too low.

As examples of the extreme limits of deviation allowable in the case of sulfuric, hydrochloric, nitric, and ortho phosphoric acids, we may mention the following:

Sulfuric acid: Density at 15°, 1,375 to 1,400; temperature of the bath, 15° to 37° centigrade; period of immersion, five to fifteen minutes.

Hydrochloric acid: Density at 15°, 1,130 to 1,145; temperature of the bath, 5° to 35° centigrade; period of immersion, one to fifteen minutes.

Nitric acid: Density at 15°, 1,270 to 1,330; temperature of the bath, 5° to 45° centigrade; period of immersion, one-half minute to fifteen minutes.

Orthophosphoric acid: Density at 15°, 1,450 to 1,500; temperature of the bath, 25° to 45° centigrade; period of immersion, two minutes to fifteen minutes.

The process may, as before mentioned, be applied to silk, whether in the form of threads or fabrics. In the first case the crinkled thread which results from the action of the acids may be used in the manufacture of fabrics either alone or mixed with other textile fibers.

In the case of fabrics the contraction of the silk threads interwoven therein enables varied effects to be obtained, according to the mode of combination of the silk and other threads in the warp and weft.

In the case of fabrics made wholly of silk the effect produced on the fabric, and consequently its final aspect, may be varied by the application of reserves upon the fabric either by printing or otherwise.

For fabrics of mixed silk and other threads the effect would vary according to their relative disposition in the fabrics, but in any case it is the silk threads only which are shortened by the process herein described, the other threads, such as cotton, wool, &c., preserving their original length and forming a crinkled surface.

Instead of steeping or immersing the fibers or fabrics in an acid bath the acid may be applied by printing any suitable pattern upon the fiber, thread, or fabric with an acid mixed with any suitable thickening material, the impression being applied upon those parts which are to be contracted. The printed

fibers or fabrics are thereupon immediately subjected to the action of heat until the desired contraction is obtained, after which they are washed and dried. The temperature and period of heating, as well as the strength of the acid employed in the mixture, would vary according to the nature and quantity of the thickener employed and the strength and composition of the fabric. To the printing mixture may be added metallic salts or coloring-matters, for example, in the following proportions: A printing mixture containing five per cent. of gum tragacanth and forty-five per cent. of real orthophosphoric acid printed on silk tulle and afterward subjected to a temperature of 38° centigrade for from three to seven minutes gives good results. With the same composition a good effect is obtained on foulards when exposed to a temperature of 43° centigrade for from five to twelve minutes. With a composition containing thirty per cent. of gommel in sixty per cent. of real orthophosphoric acid silk tulle should be subjected for from five to ten minutes to a temperature of 40° centigrade, and foulard for from seven to twelve minutes to a temperature of 43° centigrade.

The printing operations above described may be applied either upon the fabric or warped threads or thread in hanks, whether composed entirely of silk or of silk and wool, silk and cotton, or silk combined with any vegetable textile material.

We are aware that heretofore it has been proposed to use slightly-acidulated water under different conditions from those herein described for the purposes of scouring, softening, or purifying silk, and such process we do not claim, since the conditions presented and the results attained therein are essentially different from the process herein described and claimed.

We claim—

1. The herein-described process of contracting silk fabric for the production of crinkled effects by subjecting threads or fabrics to the action of an acid of a density sufficient to contract the silk fibers herein specified.

2. The herein-described process of contracting silk fabric for the production of crinkled effects thereupon, which consists in subjecting silk which has gum contained therein to the action of an acid of a density sufficient to contract the silk fibers substantially as herein specified.

The foregoing specification of our improved process of producing crinkled effects on silk and mixed silk and other threads and fabrics signed by us this 20th day of June, 1895.

CHARLES DEPOULLY.
PAUL DEPOULLY.

Witnesses:
CLYDE SHROPSHIRE,
ALBERT MOREAU.