UNITED STATES PATENT OFFICE.

JULIUS HACKENBERG, OF HOBOKEN, NEW JERSEY, ASSIGNOR TO HIMSELF, AND CHARLES H. GRAEF, OF EDGEWATER, NEW YORK.

PROCESS OF PRODUCING DESIGNS IN RELIEF UPON THE SURFACE OF OBJECTS MADE OF VULCANIZED RUBBER, &c.

SPECIFICATION forming part of Letters Patent No. 304,640, dated September 2, 1884.

Application filed June 17, 1884. (Specimens.)

To all whom it may concern:

Be it known that I, JULIUS HACKENBERG, of Hoboken, New Jersey, have invented a process of producing designs in relief upon the surface of objects made of vulcanized hard-rubber stock, celluloid, lignoid, xylonite, horn, tortoise-shell, or other similar materials, of which the following is a specification.

It is the object of my invention to produce ornamental designs upon the surface of an object made of vulcanized hard-rubber stock or of celluloid, lignoid, xylonite, horn, tortoise-shell, or other similar materials, in such a way that the subsequent heating of such object will not obliterate the design by causing the surface which has been operated upon to resume its original shape. My invention, therefore, is peculiarly applicable to the manufacture of bracelets, combs, and other curved objects, which, after being operated upon for the production of the ornamentation, require to be heated in order that they may be bent to the desired shape.

My process may be employed upon any material which is rendered soft and compressible by heat, and which, after being compressed and cooled, will for a greater or less time retain its compressed form, and which, upon being reheated, will resume its original form. These characteristics are common to vulcanized hard-rubber stock, celluloid, lignoid, xylonite, horn, tortoise-shell, and a variety of other materials, in dealing with either of which the various steps of my process are substantially the same. For example, in manufacturing objects from vulcanized hard-rubber stock, I first form my stock into blanks of the required dimensions. Thus, in making a bracelet, my blank may be a flat strip of suitable width and length, or it may be a round bar or a tube of vulcanized hard rubber. I proceed by heating the blank sufficiently to make it slightly soft, so that it will be readily compressible, and then indent its surface according to any prescribed design. The blank may be heated upon a steam-table or in hot water, or in any other convenient way. The indentations in the surface which is to be ornamented may be conveniently made by a die upon the face of which there is formed an ornamental design in relief. If the blank is a round bar or a tube, the die may be impressed upon it with sufficient force to flatten it, and thus indent so much of its surface as it is desired shall receive ornamentation, or the blank may be rolled over the face of the die if its entire surface is to be ornamented. The blank, having been subjected to the action of the die, is allowed to cool. The action of the die produces upon the surface of the blank a series of indentations, exhibiting in reverse the design formed in relief upon the face of the die. I next grind, scrape, or shave the surface of the blank upon which the design has been indented, and thus remove portions of the material from the projecting parts between the indentations in the said surface. I then reheat the blank in any convenient way—as, for example, by placing it upon a steam-table—until it has become sufficiently soft to enable it to be bent, if bending is required to give its finished shape. The effect of reheating the blank is to cause the indented or compressed parts of the blank to expand, and as nearly as possible to resume their original shape. In so expanding they rise above those parts of the surface of the blank from which the material has been ground or shaved off, and there is then presented upon the surface of the blank a permanent embossed design or configuration in relief, which is substantially the same as the design existing in relief upon the face of the die by which the indentations were made.

When it is desired to produce figures which are curved in their cross-section, the grinding, scraping, or shaving operation, after the indentation of the blank, is continued until the surface of the blank is rendered smooth, or nearly so. This removes portions of the compressed material, the quantity removed being inversely proportional to the extent of the compression. Thus, for example, if a plano-concave groove has been impressed in the surface of the blank, and the surface then ground down to a plane even with the deepest part of the groove, the result of the expansion of the material when reheated will be the formation

of a projecting rib, the surface of which will be plano-convex.

I claim as my invention—

The herein-described process of producing a permanent embossed design upon the surface of an object made of vulcanized hard-rubber stock or of celluloid, lignoid, xylonite, horn, tortoise-shell, or other similar material, which consists, first, in heating a blank of the desired dimensions until the material of which the blank is composed has become sufficiently soft to be readily compressible; secondly, in indenting the surface to be ornamented according to any prescribed design; thirdly, after the indented blank has become sufficiently cool, in grinding, scraping, or shaving off portions of the material from the indented surface of the blank; and, finally, in reheating the blank, and thus causing the indented portions of the blank to expand, whereby the surface of the blank is made to present a design the configuration of which, in relief, is substantially the same as that of the design existing in relief upon the face of the die or other instrumentality by which the indentations were made.

JULIUS HACKENBERG.

Witnesses:
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