(No Model.)

D. M. HAINES.

MANUFACTURE AND MOUNTING OF RELIEF MAPS.

No. 581,716. Patented May 4, 1897.

Fig. 1.

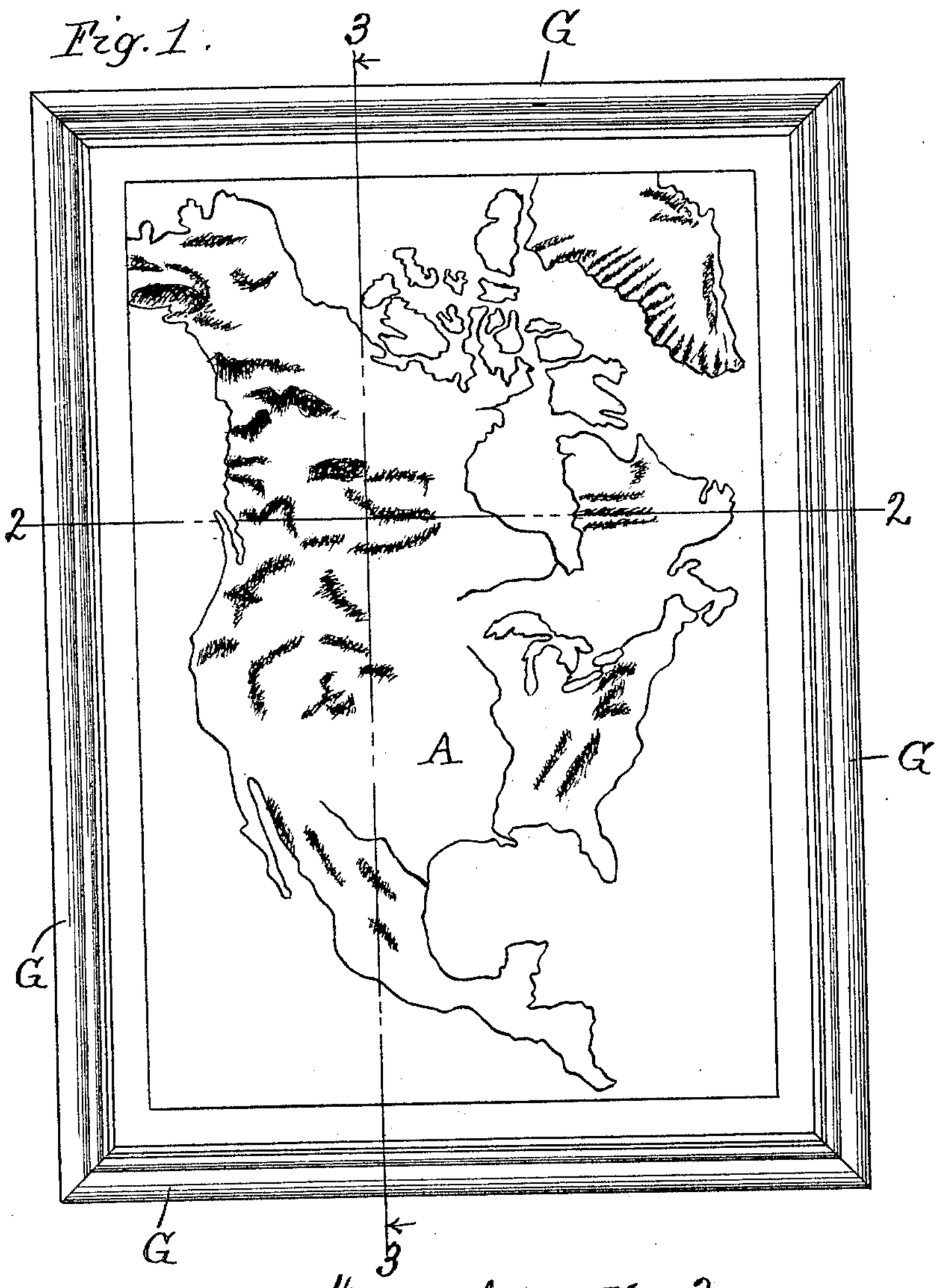


Fig. 3.

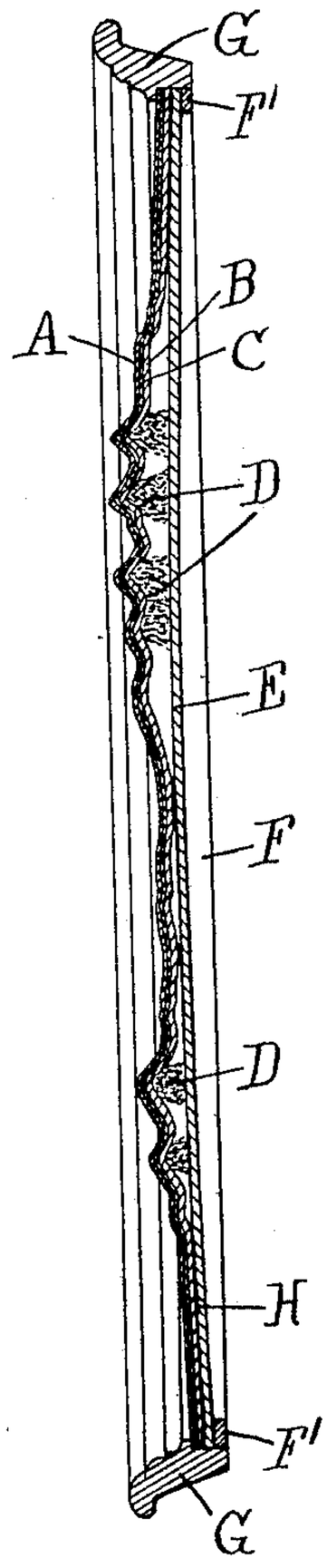


Fig. 2.

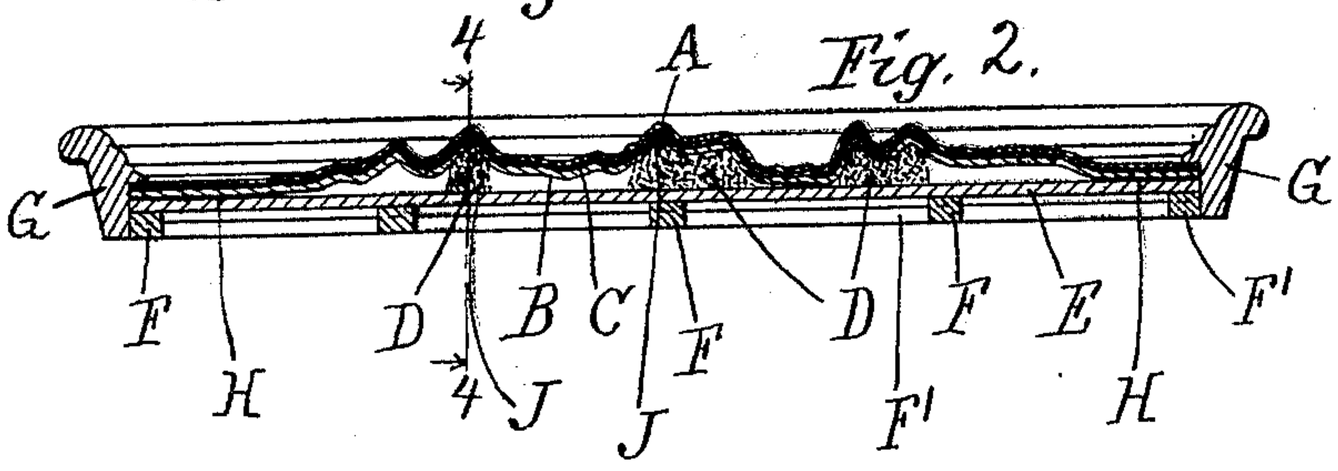
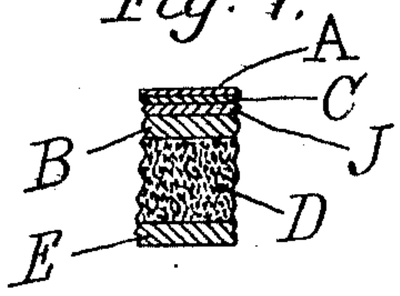


Fig. 4.



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UNITED STATES PATENT OFFICE.

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MANUFACTURE AND MOUNTING OF RELIEF-MAPS.

SPECIFICATION forming part of Letters Patent No. 581,716, dated May 4, 1897.

Application filed November 6, 1894. Serial No. 528,037. (No model.)

To all whom it may concern:

Be it known that I, DANIEL M. HAINES, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in the Manufacture and Mounting of Relief-Maps, of which the following is a specification.

My invention relates to improvements in manufacturing and mounting relief-maps, and has for its object to provide and set forth certain improvements and improved methods for manufacturing relief-maps, and particularly for mounting the same.

So far as is possible I have illustrated my invention in the accompanying drawings, wherein—

Figure 1 is a plan view of a relief-map. Fig. 2 is a cross-section through the same on the line 2 2 of Fig. 1. Fig. 3 is a longitudinal section on the line 3 3 of Fig. 1. Fig. 4 is a cross-section on line 4 4 of Fig. 3.

Like parts are indicated by the same letter in all the figures.

A represents the surface map; B, the base; C, the intervening mucilage by which they are securely held together; D D, bodies of filling; E, the back; F F, supporting-ribs; G G, the parts of the frame; H, mucilage between base B and back E; F′ F′, molding.

Returning now to a general discussion of my invention I submit the following: In my manufacture of relief-maps I first have or print a series of maps on suitable material. I prefer certain kinds of cardboard with a fibrous surface, though of course I may use and have used many other materials. Thus I may use parchment, vellum, silk, linen, or cotton cloth, aluminium, sheet-zinc, wood-pulp board, strawboard, or other material. The material used is preferably such as will admit of a certain amount of stretching or distortion without rupture or with the least possible tendency to rupture, so that the printed map may be made to conform to a proper relief-surface. This map, which is in fact the map proper or surface of the relief-map, is placed between the two parts of a suitable mold and under great pressure is forced into a shape which conforms to the desired relief.

I associate with the map a base, preferably of considerably greater thickness, and this base is united by mucilage or the like to the map proper before the latter is put into the mold or else it is run through the same mold and given the same shape as the map. In the latter case the base and map are then brought together with mucilage between them, so that the result in either case is a printed surface map with a base, the two united by mucilage and forced into a relief form, such as is desired to make the map a suitable relief-map when completed. If the two parts are united after they have each been separately reliefed, they should be placed together with mucilage between them and then run through the relief-mold.

If the map so formed is of such a nature that there are relatively great elevations thereon, and therefore relatively deep recesses on the obverse side, these may be filled with any suitable material, so as to give them support and strength. I have used kamptulicon, cork or sawdust, linerusta Walton, linoleum, gypsum, &c., these substances being mixed with cement, plaster, glue, or paste. This map is then preferably placed face downward with the filling in the elevations, and the back of cardboard or the like is placed thereupon so as to bear upon such filling and upon the edges of the relief-map. This back has preferably secured to it, before it is so placed upon the map, a series of ribs which are convex—that is, the surface of each of such ribs which bears against the back forms an arc of a circle when viewed in longitudinal section. These ribs are secured upon the back, and the back, with the ribs attached, is secured, as last above suggested, on the map. The whole is then placed in a suitable wooden frame, the ribs projecting toward the rear or back and the relief-map constituting the front. The rim of the frame is deep enough to bring all the surface of the map below the plane through the exterior edge or surface of the sides of the frame.

In the development of the industry of manufacturing relief-maps by cheaper processes, so as to render them easily accessible to the public and to produce them at a price which makes it possible for all to enjoy the advan-

tages, it has been found necessary to resort to various expedients for the purpose of cheapening and simplifying the method of production and for the purpose of securing light-weight and durable maps.

The map proper is necessarily, or at least most advantageously, printed upon a finished surface of a comparatively thin sheet, but this surface must be mounted or supported upon a suitable base, since it is to be forced into an irregular shape. The base itself should be of material which will easily conform to the mold without rupturing, and therefore a sort of pulp, substantially as desirable. On the other hand, the map-surface itself should be of such a nature as to be capable of more or less stretching. The two parts, the map proper and the base, joined together by mucilage either before or after they have been pressed into relief form, constitute when so assembled a relief-map such as it is the object of my invention to produce. This map is sufficiently rigid and strong to sustain itself under ordinary pressures and conditions, but since the high altitudes project considerably it is desirable to furnish them with some kind of support, and this is done by the filling, which is in a pasty or plastic condition, and is forced into the high altitudes, and generally fills up the back portions of the map wherever there is unusual danger of projecting portions being injured. There must of course be a back for the map so formed, and this I provide. It preferably consists of heavy cardboard, since that is sufficient for the purpose and is light. It must, however, have a rigid support, and this is obtained by the ribs. These ribs are convex, as suggested, and hence when they are secured to the back the latter is convex. This convex surface is brought against or toward the map and its filling, and on account of this convexity I find that the map is less liable to injury from warping and less liable to get out of shape than if the surface of the back were a plane surface.

In some cases some portions of the devices and processes above referred to may be omitted—as, for example, I have pressed the map-paper into relief form and instead of applying a base thereto, as above described, I have filled up the reverse side of the relief with various substances until I have secured a product which could properly be attached to the back. I also find it important in some instances with certain maps to strengthen the paper by securing at those points where, by reason of great and sharp elevations or depressions, the paper is likely to be strained a reinforcing part of muslin and the like, which while permitting the paper to give away at such point will not permit it to part entirely or permit the map-paper to be punched into holes by the operation of relieving. I have shown this feature in Fig. 2. I have indicated the strips of muslin or the like by J. Mucilage or the like is also of course interposed between the base and the back at the points where they come together, as indicated at H.

With certain kinds of paper and with certain kinds of maps it may be necessary to treat the map-paper and the base so as to permit them to more easily and readily stretch or give without being ruptured, although, as above described, the use of muslin at the threatened points will in part obviate the necessity of such special treatment.

In Figs. 2 and 3 I have indicated the supporting-ribs F as running vertically or longitudinally; but they may also be arranged to lie in the opposite direction or crosswise, and indeed this latter is the preferred form as I think ordinarily, though of course the general method of construction and operation is substantially the same in either case.

I claim—

1. The combination of a relief-map with a back having a convex surface toward the map.

2. The combination of a relief-map with a back having a convex surface toward the map, and a series of ribs having convex surfaces on the back.

3. The method of producing a relief-map which consists in taking a printed map-surface, then applying to the same sections of a stretching fabric at the points of greatest elevation, then reliefing such map, and then suitably backing and supporting it.

4. The combination of a printed relief-map surface of material capable of stretching with a base of flexible material capable of conforming to a mold, the relief-map surface being provided at the points of the greatest elevation with sections of stretching fabric, a back having a convex surface toward the back, a series of ribs having convex surfaces on the back.

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