A METHOD FOR MAKING MOLDS FROM EMBOSSED PAPER

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Abstract. Here is a method for reproducing the three-dimensional surface of embossed paper, such as Braille text. The porous and often fragile nature of the material prevents the use of standard techniques which involve the use of mechanical pressure, heat, or liquid casting materials. Our process involves placing the embossed paper between two thin rubber sheets and drawing a partial vacuum between the sheets, causing them to conform to the paper surface. The rubber film acts as a parting agent, allowing a rubber mold to be built up. The rubber film becomes incorporated into the mold, so that there is no loss of definition due to the finite thickness of the parting agent.

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Thin rubber films are made by spreading diluted, unfilled latex over plexiglas acrylic sheets (in this development we used Chicago Latex no. 800, Chicago Latex Products, 1030 Morse Avenue, Schaumburg, IL 60193). A stiff paper frame is laid over the latex layer before drying, for subsequent ease of handling. The film is washed after drying to remove emulsifying agents and to reduce water permeability. Sheets of 0.04mm thickness are suitable.

The embossed paper is laid between two rubber sheets, and a partial vacuum is applied through tubes placed around the object and between the sheets.

The top rubber sheet is built up by alternately spraying on diluted latex and then sprinkling on dry silica gel (75–450 micrometres particle size). The silica gel dries the latex rapidly and serves as a filler to reduce shrinkage. Casts from the mold can be made using standard techniques. The use of a

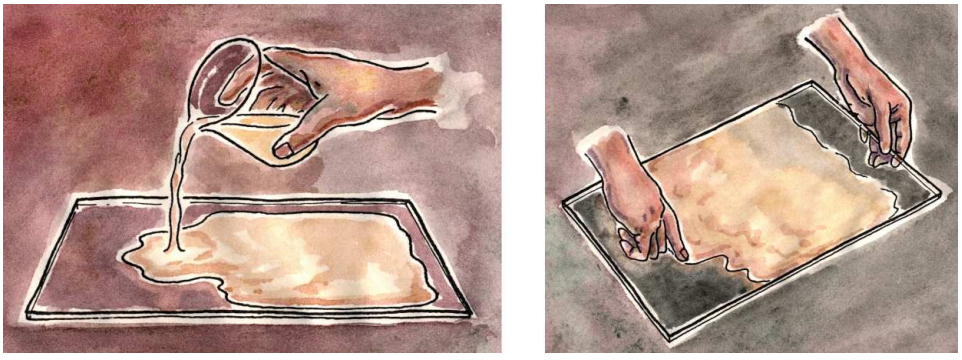

Figure 1. Diluted latex is poured onto a stiff acrylic sheet and spread out with a finger.

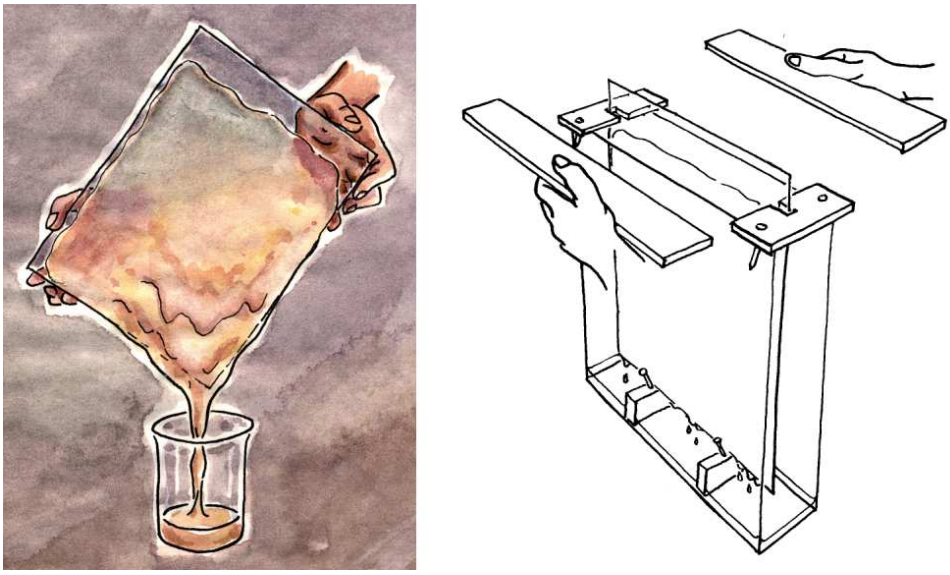

FIGURE 2. Surplus latex is drained away, then the plate is placed vertically in a glass container with a split cover, so that the latex can drain to a thin film before it dries.

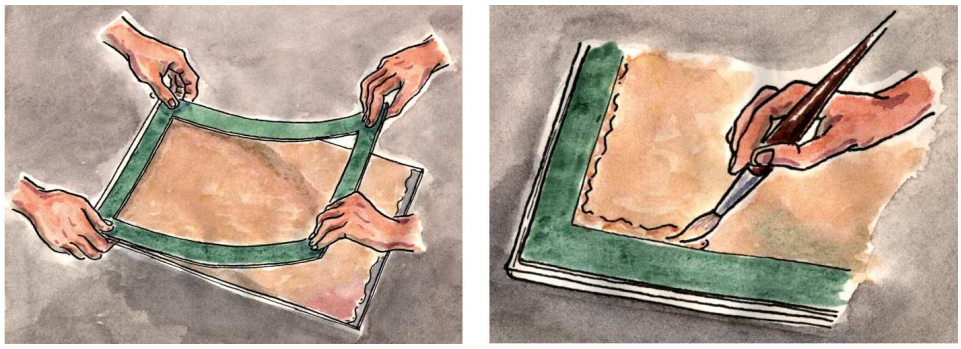

FIGURE 3. When the latex is thin enough, the plate is removed from the container, laid flat and a thick paper frame is laid over it. Extra latex is brushed over the junction between latex and frame to reinforce it.

vacuum limits the pressure involved to less than one atmosphere. Measurements at the paper surface have shown that differences in pressure of 0.1 to 0.2 atmospheres cause the film to conform to the paper. Because rubber films are on both sides of the paper, equal pressure exists on both sides. This results in a compressive force tending to make the paper thinner, but little or no flattening force: embossed features in the paper are being pushed up from below with the same force that they are being pushed down. Tests using a Braille sample prepared from thin brittle paper showed that features as fine as the surface texture of the paper could be reproduced with no damage. We confirmed that there is little water transmission through the rubber film by spreading water over the film and running the vacuum line through an infrared gas analyzer set at the major water absorption frequency.

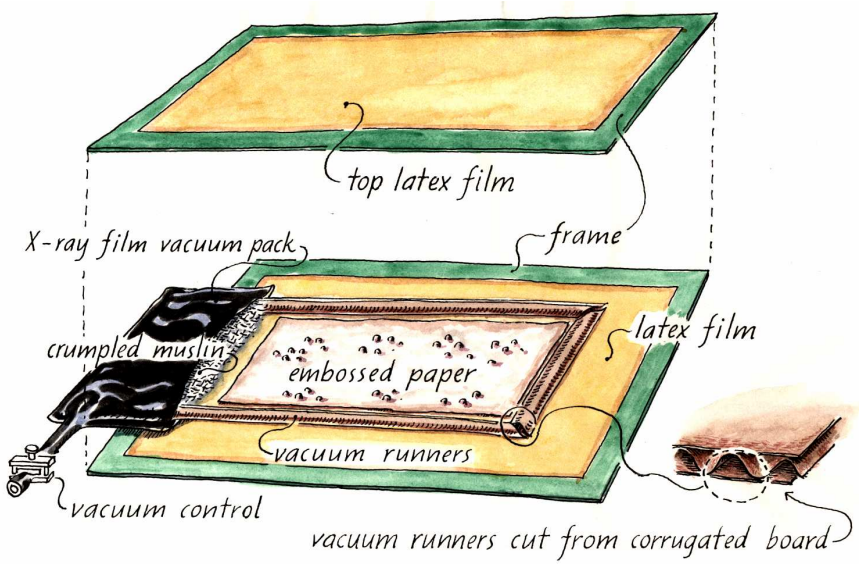

FIGURE 4. The embossed paper is laid on one latex sheet. Then a vacuum system is arranged, with carboard tubes to distribute the air flow from between the layers. The top latex sheet is then laid over.

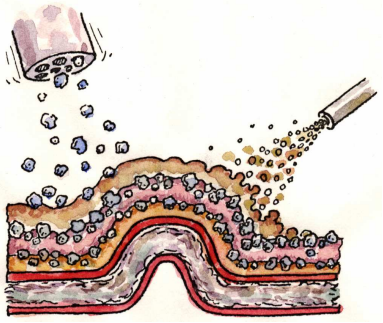

FIGURE 5. After the vacuum has been applied to draw the assembly tightly together, alternate layers of latex and dry silica gel powder are applied to the top, until the top sheet is robust enough to form a mold for casting the replica.

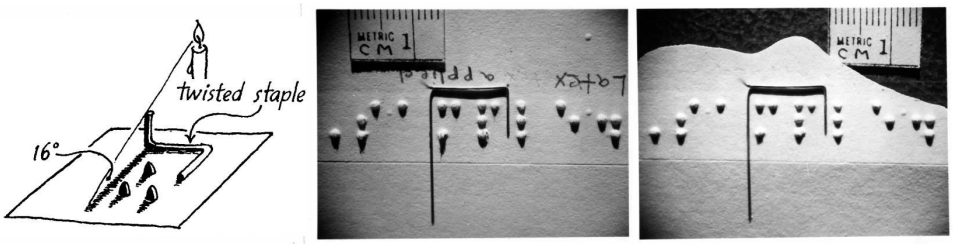

FIGURE 6. The accuracy of the modelling process is demonstrated by these raking light shots of the original embossed paper, in the middle, and the plaster cast made from the mold.

This technique was developed for the exhibit "In Touch: Printing and Writing for the Blind in the 19th Century", which was arranged by Elizabeth Harris of the Department of Cultural History, National Museum of American History. Nikki Horton, an objects conservator in The Conservation Analytical Laboratory, prepared the molds and Susan Wallace of the Exhibits Department made casts from the molds. These casts were exposed to touching by the visitors to the exhibition.