

SHORT COMMUNICATION:  
A SUPPORT MOUNT MADE FROM NOMEX CARD  
FOR STORAGE AND THREE-DIMENSIONAL DISPLAY  
OF AN INCOMPLETE AND FRAGILE 19TH-CENTURY  
STRAW BONNET

LUBA DOVGAN NURSE

**ABSTRACT**—The aim of this project was to prepare a fragile and incomplete 19th-century straw bonnet for storage and occasional display. When brought for conservation the bonnet exhibited a distorted and shallow shape due to the loss of the crown and previous repairs, the straw was brittle, and the wire was distorted but flexible. The mount solution addressed the problem that arose from the conflicting demand for the bonnet to be stored flat because of the client's storage constraints, while retaining the ability to display the bonnet in a three-dimensional shape. This article discusses the condition of the object before treatment, the treatment undertaken, the method of making the mount from Nomex 410 card (meta-aramid), the functionality of the mount for flat storage, and its assembly for three-dimensional display. The support mount reconstructed the bonnet's original shape and compensated for the missing areas. It enabled the client to store the bonnet flat and to arrange the bonnet safely into shape. The mount eliminated the need to handle the bonnet excessively when arranging it for display.

**TITRE**—Un support de montage en papier Nomex pour l'entreposage et l'exposition 3-D d'un bonnet de paille incomplet et fragile du XIXe siècle  
**RÉSUMÉ**—L'objectif de ce projet était de préparer un bonnet du XIXe siècle, incomplet et fragile, pour l'entreposage et l'exposition occasionnelle. Quand il fut apporté pour la restauration, le bonnet était déformé et aplati à cause de la perte de la calotte et de réparations antérieures, la paille était fragile, le fil métallique était déformé mais flexible. La solution de montage devait résoudre le problème soulevé par la demande conflictuelle pour que le bonnet soit entreposé à plat à cause des contraintes d'entreposage du client, alors qu'il fallait garder la possibilité d'exposer le bonnet en 3-D. Cet article discute de l'état de l'objet avant le traitement, la méthode de montage avec du papier Nomex 410 (méta-aramide) et le fonctionnement du montage pour l'entreposage à plat et son assemblage pour l'exposition en 3-D. Le support reconstitue la forme originale du bonnet et sert à remplacer les morceaux manquants. Il permet au client de ranger le

bonnet à plat, tout en offrant la possibilité de présenter le bonnet sans risque dans sa forme tridimensionnelle. Il élimine la nécessité de manipulations multiples lorsqu'on doit préparer le bonnet pour une exposition.

**TÍTULO**—Una montura de cartulina Nomex como soporte para almacenamiento y exhibición tridimensional de un sombrero de paja del S XIX frágil y con faltantes  
**RESUMEN**—El objetivo de este proyecto fue preparar un sombrero de paja del S XIX frágil y con faltantes para su almacenamiento y exposición ocasional. Cuando el sombrero fue traído para su conservación, exhibía una forma distorsionada y poco profunda debido a la pérdida de la corona y a reparaciones previas, la paja estaba quebradiza y el alambre se encontraba distorsionado aunque flexible. La solución de montaje resolvió el problema surgido de la exigencia conflictiva de tener que guardar el sombrero de forma plana debido a restricciones de espacio de almacenamiento del cliente, y a la vez tener la posibilidad de exponer el sombrero de forma tridimensional. Este artículo discute las condiciones del objeto antes del tratamiento, el tratamiento realizado, el método para construir el soporte de cartulina Nomex 410 (fibra de meta aramida), la funcionalidad del soporte para almacenamiento plano, y su ensamblaje para exhibición tridimensional. El soporte reconstruyó la forma original del sombrero y compensó las áreas faltantes. Al mismo tiempo, eliminó la necesidad de manipular el sombrero excesivamente durante su preparación para exhibición.

**TÍTULO**—Suporte em cartão Nomex para armazenamento e exibição em três dimensões de chapéu de palha do séc.19 incompleto e frágil  
**RESUMO**—O objetivo deste projeto foi preparar para armazenamento e eventual exibição um chapéu de palha do séc.19, frágil e incompleto. Quando trazido para a conservação o chapéu estava distorcido e plano graças à perda da copa e a reparos anteriores, a palha estava quebradiça e o arame distorcido, mas flexível. A solução encontrada para a montagem resolveu o problema criado por demandas conflitantes: armazenar o chapéu de forma plana tendo em vista

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as limitações da capacidade de armazenamento do cliente, embora mantendo a possibilidade de sua exibição em três dimensões. Este artigo discute o estado de conservação do objeto antes do tratamento, o tratamento realizado, o método usado para montagem em cartão Nomex 410 (meta-aramida), a funcionalidade da montagem para o armazenamento plano e para exibição tridimensional. O suporte de montagem recuperou a forma original do chapéu e compensou as partes faltantes. Ele possibilitou ao cliente armazenar o chapéu de forma plana, bem como colocá-lo na sua forma original, em segurança. A montagem eliminou a necessidade de manuseio excessivo do chapéu ao ser disposto para exibição.

## 1. INTRODUCTION

The bonnet (HMCMS: C2005.73.3, TCC 3101.4) is from the Dress and Textile Collection of Hampshire County Council Museums Service. One of the aims of this unique collection of English historic dress, ranging from the 17th century to the present day, is to provide evidence of what was worn, made, and used locally (Hampshire Museums Service collections). The bonnet was part of a group of objects conserved in 2008 by students in the master's program at Textile Conservation Centre (TCC) in the U.K. At that time the TCC was part of the University of Southampton; in 2010, the Textile Conservation Centre Foundation transferred the Centre to the University of Glasgow, where it is now the Centre for Textile Conservation and Technical Art History (The Textile Conservation Centre). The client asked to prepare the bonnet for safe storage and occasional display, stating that retaining the bonnet's original shape was very important, yet expressing a preference for flat storage because of space limitations.

## 2. THE OBJECT

This delicate and incomplete straw bonnet measures approximately 230 mm from the crown to the outer brim and 330 mm from the top of the brim to the neck opening (fig. 1). It is made from two alternating bands of straw work. The knotted structure of the first band is arranged into an open circular design. The second band is made using silk warp and split short straw weft, loom-woven in a symmetrical open work pattern. These two bands are hand sewn into

the bonnet's shape using white cotton thread. A length of the straw band with the knotted circular design is attached along the neckline, forming a neck curtain or bavolet. In addition, on the outside of the bonnet, the seams are covered with a narrow straw band plaited in a zigzag shape, and on the inside, the bonnet's neckline edge is covered with a flat straw plait. The crown, which originally would have been made either of straw work or silk fabric, is missing. The thread-wrapped wire controls the shape of the bonnet. The wire is attached to the bonnet on the inside around the edge of the brim, around the back along the missing crown, and horizontally from the ear toward the crown. A single, short length of silk ribbon is hand sewn to the jaw points of the bonnet and along the lower edge of the straw neck curtain. This style is inconsistent with the expected pattern of wear that would have it attached as a layer underneath the straw curtain to protect the neck of the wearer. The open straw work, the shape of the bonnet, and the presence of the neck curtain are typical of the early 1850s (Buck 1961, 114-116; Moor 1971, 79).

## 3. CONDITION

The bonnet was in poor condition and no longer retained its original shape (fig. 1). Its crown was missing, and the two sides of the bonnet, where the crown was originally attached, were found closed and hand sewn together in black and gray cotton thread in large, uneven stitches. This alteration made the bonnet two-dimensional and shallow. The bonnet was compressed and distorted due to previous flat storage, causing a sharp fold line along the top. The loom-woven bands of the bonnet had some of the short split straws missing throughout, whereas the knotted bands were found mainly intact, with some localized, small areas of loss at the top of the brim. The wire was broken in places and distorted but flexible. The length and position of the ribbon suggested it was added to the bonnet after the loss of the crown, which raised doubts about its authenticity.

## 4. TREATMENT

Before the mount was made, the repair stitches and the ribbon were removed. After testing to confirm the black thread of the wire was colorfast and to determine the humidification method and the materials'

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Fig. 1. Straw bonnet (HMCMS: C2005.73.3, TCC 3101.4) before treatment.

response time, the bonnet was locally humidified and gradually opened over the course of a few days (fig. 3). The treatment removed folds and creases and allowed for a better understanding of the bonnet's original shape, degree of distortion, and flexibility. Metal wire along the brim and near the back of the bonnet—where it was twisted, causing damage to the straw work—was slightly bent to return it to the shape of the straw work. Very little loss of the straw work resulted from the treatment, which suggested the bonnet still retained the flexibility for further reshaping. To retain the flexibility necessary for bending the bonnet into a three-dimensional shape, the unfinished edges of the straw work along the crown area and at the areas of loss were not consolidated. The two areas that originally gave the bonnet its characteristic shape, which are the ties under the chin and the neck curtain along the curve of the neckline, were at risk of further damage to the straw work if bent into shape. Because of the missing crown, the open straw work without any lining to provide extra structural support, and the fragile condition of the chin ties and the neckline,

reshaping the bonnet on its own would not have been safe for its long-term preservation, and a mounting support was required.

## 5. MAKING OF THE MOUNT

The following three requirements guided the making of the mount: (1) enable the client to store the bonnet flat because of limited storage space while retaining the ability to bend it safely into shape, (2) reconstruct the bonnet's shape appropriate for the period to visually infill the areas of loss, and (3) eliminate the need to handle the bonnet excessively when arranging it for display or study. Conservation references relevant to the mounting of costume for display were consulted (Kite 1990; Lister 1997; Wood 2001; Tímár-Balázs and Eastop 2005, 362–368; Flecker 2007). The original shape of the bonnet could not be determined categorically because of the missing crown and the distorted line of the neckline, with the back of the bonnet being open after the removal of previous repair. The solution was to make the

mount true to the current condition of the bonnet and, similarly, not to have the crown, leaving the back of the head open. In addition, an opaque mount was preferred to visually reconstruct those areas of the bonnet that could not be secured into shape because of their fragile condition, such as the chin ties and the neckline, and to compensate for the absence of the original lining that would provide a visual contrast to the open straw work. The pattern of the bonnet was traced and a prototype was made out of a Mylar (polyester) sheet and tried on a small Styrofoam (polystyrene) head form. Published sources containing descriptions and illustrations of the bonnets of the period (Buck 1961; Cunnington 1990; Bradfield 1997) were consulted to confirm the appropriate shape for similar ca. 1840–1850s bonnets. To make the mount, the determined shape of the bonnet was extended in size to give adequate support to the object and for safe handling by the client.

Three main physical properties were sought when considering materials for the mount: (1) resilience (i.e., elastic ability to rebound to its original shape after deflection), (2) bending strength to provide adequate support to the object when on display, and (3) the ease of manufacturing, including covering the mount with fabric. These requirements meant that the materials commonly used for making rigid display mounts for headwear, such as transparent acrylic glass (polymethyl methacrylate), Ethafoam (polyethylene foam), and millinery buckram (cotton or linen fabric impregnated with a starch-based size), were not suitable to solve the problem. Stock materials with required properties available at the TCC at the time of treatment, such as Mylar (polyester sheet) and various types of archival board, were explored. Mylar failed to support the object when bent into shape and had to be strengthened, possibly by using two layers and/or encasing in a thicker fabric. Various types of archival board tested did not regain the original flat shape when unfolded, which potentially could cause further damage to the object and was problematic for the flat storage requirement. Following the suggestion of Gill, a TCC textile conservator and course supervisor, a flame-resistant, chemically inert Nomex (meta-aramid) calendered card of high density, light weight, and high resilience (Nomex 410 card, 0.76 mm thick) was found to be suitable (Gill 2008; Nomex type 410). Gill had previously used Nomex in upholstery and textile

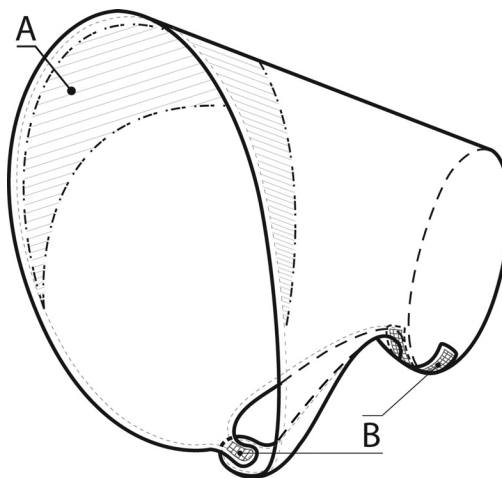


Fig. 2. Diagram of the mount. A indicates a narrow piece of Nomex 410 card positioned underneath the brim of the main mount to provide a way of stretching the cover fabric on the inside. B indicates cotton flaps with Velcro strips as fasteners. Image courtesy of Olya Mikhailiova.

conservation treatments (Gill 2000, 2004, 2007). Before use in conservation treatment, the material was tested using the Oddy test by Wyeth at the TCC in 2000 (Gill 2000). The author repeated the test in 2009, and both times the results confirmed it was suitable for use in conservation.

The card was cut to shape and its sharp edges filed using fine sandpaper (fig. 2). To provide cushioning for the straw work against its dense and smooth surface and to create a visual contrast to the open straw work, the mount was covered in scoured, undyed, down-proof cotton. Two pieces of fabric were cut on the bias, for the reverse and obverse of the mount, to help the fabric conform to the shape of the mount when bent. The first piece was stretched over the outer side of the mount, with its edges folded and secured in a few places on the obverse with double-sided tape. To provide a way of stretching the second piece of the fabric on the inside of the mount in a neat fashion because the inner side of the mount would be visible when the mount is bent into shape, a narrow piece of Nomex card was positioned underneath the brim of the mount and secured in place with the double-sided tape. The second piece of bias-cut fabric was then positioned over the reverse of the mount, and its edge along the brim was tucked between the main mount and the narrow card, creating a seamless

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Fig. 3. Bonnet, arranged on the mount for flat storage. Courtesy of Mike Halliwell, Textile Conservation Centre.

appearance (figs. 2–4). Then the rest of the seams were folded inside, and the two cotton pieces were stitched together along the mount edge using tunnel stitch with polyester thread; the stitching did not go through the Nomex card. To secure the mount in a three-dimensional shape, long cotton flaps with Velcro strips (hook and loop fastener, polyester) were attached to the mount in two locations: one at the back underneath the crown and the other under the chin. The soft “loop” side of the Velcro was positioned on the side of the mount that houses the bonnet to prevent the straw catching it (figs. 2–4).

## 6. MOUNTING THE BONNET

The bonnet was positioned on the flat mount and secured in six places by large and loose stitches using polyester thread of a brown shade that, while blending with the straw work, can be determined easily and removed if necessary. Located on the top of the head, around the strong areas with metal wire, these loose stitches (fig. 3) accommodate bending of the bonnet into shape without stress (fig. 4). This attachment of the bonnet to the mount is reversible

and minimal, and it eliminates the need to handle the bonnet excessively when arranging it for display. The fragile and weak areas of the bonnet (i.e., the chin ties and the neckline) were not attached to the mount. When in a three-dimensional shape, these areas are allowed to hang loosely. When bent to shape, the mount requires some sort of rigid support mechanism underneath it, for example, a pole or a mannequin head. A small Styrofoam (polystyrene) head form was used during this project. The mount is positioned over the head, bent, and secured by the two Velcro fastenings, under the chin and at the back of the crown. No additional attachment to the head was necessary (fig. 4). For this type of mount, which is flexible and can be bent easily, it is important that the correct size of the support mechanism is used to retain the appropriate shape of the bonnet and to minimize any further mechanical damage to the straw work. To prevent the card bouncing back when returning the mount to the flat position, it should be opened in a controlled manner by undoing the Velcro fastenings one at a time and supporting the mount while doing it. To ensure the bonnet’s safety, mounting instructions were provided to the client.

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Fig. 4. Bonnet, arranged on the mount into a three-dimensional shape for display. Courtesy of Mike Halliwell, Textile Conservation Centre.

## 7. DISCUSSION AND CONCLUSION

The mount reconstructs the bonnet's original shape and compensates for the missing areas. It allows the client to store the bonnet flat and retains the ability to arrange it into shape without the need to handle it excessively. The project illustrates the challenges of mounting fragile textile objects that are seemingly flat on three-dimensional display. The importance of providing conservation documentation and mounting instructions to the client to mitigate the risk of object damage during the exhibition installation and dismantling is evident. The inert chemistry of Nomex 410 calendered card, confirmed by the Oddy test, and its properties, such as smooth surface, light weight, elasticity, bending strength, and ease of manufacturing, are attractive to conservation and expand the choice of materials available for mount making.

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## SOURCES OF MATERIALS

Down-proof Cotton  
Whaleys (Bradford) Ltd.  
Harris Court  
Great Horton  
Bradford  
West Yorkshire  
BD7 4EQ  
United Kingdom  
[www.whaleys-bradford.ltd.uk](http://www.whaleys-bradford.ltd.uk)

Mylar, sold as Melinex in the United Kingdom  
(polyester)  
PSG Group Ltd.  
49-53 Glengall Road  
London  
SE15 6NF  
United Kingdom  
[www.psggroup.info](http://www.psggroup.info)

Nomex 410 (meta-aramid) card  
Katko Ltd.  
Finway Road  
Hemel Hempstead  
Hertfordshire HP2 7PT  
United Kingdom  
[www.katco.uk.com/nomax.htm](http://www.katco.uk.com/nomax.htm)

Velcro hook and loop fasteners (polyester)  
INDIGO Industrial Supplies Ltd.  
Unit 3b, Sopwith Crescent, Wickford Business Park  
Wickford,  
Essex SS11 8YU  
United Kingdom  
[www.indigoshop.co.uk](http://www.indigoshop.co.uk)

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With a background in design and weaving of historic reproduction silk fabrics, LUBA DOVGAN NURSE received a master's degree in history of textiles and dress in 2006, followed by a master's degree in textile conservation in 2008 from the Textile Conservation Centre, University of Southampton. Following graduation, she worked in the United Kingdom as a freelance textile conservator, and as an Andrew W. Mellon Fellow in textile conservation at the National Museum of the American Indian (2009–2011) and at the Metropolitan Museum of Art in the Arts of Africa, Oceania, and the Americas department (2011–2012). She is currently a contract textile conservator at the Conservation Centre, Vejle, Denmark. Address: Konserveringscentret i Vejle, Maribovej 10, Vejle 7100, Denmark; lubadnurse@gmail.com

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