SHELBURNE MUSEUM
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www.shelburnemuseum.org
802.985.3346

**Department of Preservation and Conservation**
**Examination and Treatment Report**

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| **Acc. No.:** | | **Conservation No.:** | 09-06-2545 |
| **Cat. No.:** | FC-7.6 | | |
| **Owner:** | Shelburne Museum | **Date Examined:** | June 2-3, 2009 |
| **Title:** | Carousel Horse | | |
| **Structure:** | Painted wood, leather straps, iron stirrups and fasteners, glass eyes, natural horsehair | | |
| **Artist/Country:** | Gustav Dentzel workshop, Philadelphia, PA | **Date Completed:** | July 30, 2009 |
| **Signature/Date:** | c. 1902 | **Conservator:** | Diana Dan Larrabee |
| **Accessories:** | | | |
| **Labels/Legends:** | A rectangular white tag tied to the proper right iron staple for the stirrup has the inscription Dentzel Carousel FC-7.6 written in black and blue ink on one side and a smiley face drawn on the other side in blue ink. | | |

**Digital Photographic Documentation:**

| File Name | Description of Image |
|---|---|
| CO2009062545A1 | Before Treatment, Romance (Right) Side Overall |
| CO2009062545A2 | Before Treatment, Plain (Left) Side Overall |
| CO2009062545A3 | Before Treatment Romance (Right) Side Detail of Label |
| CO2009062545B1 | During Treatment, Detail of Neck and Large Gouge |
| CO2009062545C1 | Before Compensation, Romance (Right) Side Overall |
| CO2009062545C2 | Before Compensation, Plain (Left ) Side Overall |
| CO2009062545D1 | After Treatment, Romance (Right) Side Overall |
| CO2009062545D2 | After Treatment, Romance (Right) Side Overall |
| CO2009062545D3 | After Treatment, Romance (Right Side) Detail of Label |
| CO2009062545D4 | After Treatment, Detail of Neck and Large Gouge |

**Reason for Treatment:** Reduce discolored linseed oil coating applied as a misguided maintenance measure, as part of the Adopt-a-Carousel-Animal program.

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**EXAMINATION**:

The object is a hollow bodied, wooden carousel horse that is one of forty animals belonging to a 1902 Gustav Dentzel Carousel purchased by Electra Havemeyer Webb in the early 1950s. Webb's purchase included all of the carousel's 40 carved wooden animals, the chariots, the carousel organ, its associated painted decorations, the rounding boards that decorated the exterior of the carousel, and the painted textiles that enclosed the carousel's mechanism. Though Mrs. Webb intended on building a functioning carousel, it was never re-assembled. Additionally, the mechanism and the carousel armature are no longer in existence.

The animals on the carousel were placed in groups of three in a line across the carousel's platform. Tigers, giraffes, goats, deer, lions, and horses are among the animals represented. It is generally believed that similar animals, such as all three giraffes, were placed together.

The right side of the carousel horse, which faces outward to the spectator, is termed as the "romance" side. The left side is termed as the "plain" side. Typically, the "romance" side has more ornamentation and more detail in the rendering of the musculature of the horse. The romance side of the horse is embellished with a painted eight-pointed yellow star with a small dot in the center of the saddle flap. Unidentified remnants, possibly some sort of adhesive, located on the circular shape of the bridle suggest that a glass jewel similar to those of the other carousel horses may have either fallen off or have been removed. These adhesive remnants have been covered with a layer of darkened linseed oil indicating that they were there prior to an application of linseed oil. Except for the eight-pointed yellow star and the unidentified remnants of a possible adhesive, the plain side and the romance side are the mostly the same in relief decoration. The final carving work has been attributed to Daniel Mueller, the Dentzel workshop's master carver. Dentzel animals are noted for being the most realistically carved American carousel animals.[1] This particular carousel horse is one of the smaller animals in the menagerie.

The horse is a "prancer", a term that describes an animal with at least two of its feet lifted off the ground. On this horse, the two front legs are lifted high in the air. The proper right foot extends outward past the proper left foot, which curls inward towards its body. The hooves have no horseshoes and are realistically rendered. The horse is relatively small in size and is probably from the innermost row on the carousel.[2] It measures approximately 52 inches in length from the front proper right hoof to the tail, 12 inches in width, and 51 inches in height from the ground to the top of the ear. The horse is chestnut brown with patches of white in the body and at the socks of the horse. This coloring is referred to as a red roan.

The horse is mounted to a rectangular beige platform measuring 49 ½ inches long, 14 inches in width, and 2 inches in depth. A painted beige pole is used to anchor the horse to the platform. The top part of the pole is painted red and has a metal cap that screws onto the top. The pole enters from the underside of the belly through an oval opening that appears to be composed of 2 circular openings, the original circular opening for the carousel pole and a new circular opening, possibly created for the new armature. The pole exits from the horse's back between the front of the saddle and the base of the mane.

The horse is composed of multiple pieces of wood, which were selected based on the wood's working properties, hardness, and grain direction. The pieces were carved individually, laminated, and most likely assembled using glue and dowels.[3] The inside of the horse's body is hollow. It is possible that the legs were replaced when worn or updated to suit current fashion. Many animals had their legs altered so that one or more feet were in the air, creating a more dynamic pose.

The head is cocked to the right. The face has an amused and curious expression, as seen in the raised eyebrows and eyelids of the widening eyes, and partly open mouth exposing the large, white carved teeth. Two forelocks of the main fall around the outside of the ears and curve inward towards the face. The dark brown mane is carved in high relief, entirely combed over to the romance side, and falls in three groups of wavy hair. The nostrils are slightly flared. The area around the eye is painted pink. Its glass eyes are yellow with black pupils. The tail is approximately 28 inches in length.

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[1] Richard Kerschner and Nancie Ravenel, "Here We Go "Round" Again: Cleaning Linseed Oil from Carousel Animals at the Shelburne Museum," JAIC, Vol45 (2006), 202-203.

[2] Animals in each group of three are arranged hierarchically with the biggest, most ornate animal on the outside, and the plainest, smallest animal on the inside.

[3] Wood was often basswood, pine, or poplar according to Frederick Fried, "Last Ride for Carousel Figures?" *Historic Preservation*, Vol 29, No 3 (July/Sept 1977), 25.

The horse has an English saddle, girth, saddle flap, bridle, stirrups, martingale, and reins.[4] The canticle and panel of the saddle are carved in high relief. The seat has a light warm tan coloring with painted embellishments of a red line, yellow line, and an outer edge of dark red. The lower left and right parts of the saddle skirt are decorated with a painted red line and two carved lines of red and green that measure a ½ inch in thickness and that run the outline of the lower part of the saddle. The saddle flap is red with yellow and dark red measuring a ½ inch and carved in relief. The girth matches the saddle flap in design and relief and is red with carved out yellow lines along the outer edges.

The stirrups and reins are constructed out of iron and leather. The stirrups are attached to the saddle flap with an iron staple. The stirrup on the plain side is two inches shorter than the stirrup on the romance side. The reins are attached to the bridle with iron rings.

## CONDITION

*Structure*
The carousel horse is overall structurally stable. The metal and glass components are also structurally stable. There are small nicks, scratches, and indentions throughout the wooden body due to use. The areas with the more prominent signs of wear are around the stirrups, the iron rings for the reins, saddle, and along the edges. A large crack running horizontally along the proper right side of the saddle seat creates an opening in the body. This crack is not associated with the joints. Deep scratches form horizontal V shapes in the lower part of the saddle, the saddle blanket, and in the mane on the romance side of the horse.

A gouge is located near the martingale on the plain side of the horse. The gouge exposes the wood and ground layer and has resulting cracks on both sides of the indention. A smaller gouge or associated loss can be found on the left side of the larger gouge.

A large piece of the wooden body is missing from the belly, coinciding with the one of the circular openings of the oval shaped opening created for the mounting pole. The loss measures around 2 ½ inches from the farthest points in length by 2 inches from the farthest points in width, forming a U shape that wraps around the front side of the pole. This loss appears to be recent, as the exposed wood is not covered in darkened linseed oil.

Some of the joints are slightly separated, causing the paint to crack. The maintenance linseed oil accentuates these cracks and allows grime and dust to accumulate. More significant separations of the joints are seen in the back legs of the horse in the knees and just under the rump.

There are 2 holes, one on each side of the horsehair tail, which probably formerly contained nails which held the tail of the horse's body.

*Ground Layer*
A white ground layer can be seen along the areas of losses in the paint layer. These losses are located in the prominent areas of wear previously mentioned.

*Paint Layer*

[4] See Appendix 1 to reference the terminology.

The paint layers are generally stable, except in certain localized areas on the hooves. Damages are more prevalent on the romance side of the horse. The hooves, which have been overpainted in black, show signs of lifting paint. Scratches and abrasions in the paint layer can be seen throughout the body and are mostly due to use around the iron parts of the stirrups and reins and along the edges of the piece. The paint layer in the saddle seat has been worn down revealing some of the wood grain.

One major loss in the paint layer on the romance side is located near the leather strap of the stirrup and near the lower edge of the saddle flap. The loss measures 2 inches in height and 1¼ inch in width from the farthest points of the loss. The exposed wood is covered with a thick layer of linseed oil indicating that this is not a recent loss.

*Surface Coatings*

The object is covered with numerous layers of misguided maintenance linseed oil, which has darkened over time. The romance side exhibits more applications of the linseed oil than the plain side, making the paint layer harder to read. Large drips of the linseed oil are located mostly in the lower parts of the belly and along the inner sides of the legs. Additional drips are seen on the head on the plain side of the horse. The linseed oil remains tacky in the thicker areas of application and in places in which the linseed oil has pooled in the crevices. The linseed oil has allowed dust and grime to accumulate on the surface.

*Other materials, stirrups, reins, and eyes*

The leather reins and stirrup straps are cracked, dry, brittle, and stiff. Though they have patches of white mold growth, the leather remains intact.

The iron rings, staples, and stirrups are stable, but have evidence of minimal corrosion. In some areas, linseed oil was splattered on the metal during the misguided maintenance.

The horsehair tail is unstable and brittle. Strands of hair are actively becoming detached. Due to the uneven amounts of exposure to light, the dark browns of the horsehair have faded to reds and light browns on, the top and the proper right side of the horsehair tail.

**TREATMENT PROPOSAL**

1) Document and photograph the condition of the animal before, during, and after treatment.
2) Vacuum all loose surface dirt.
3) Remove leather elements where possible.
4) Remove horsehair tail and remove debris from inside of the hollow body. Vacuum and wash tail. Remove tail from horse while painted surfaces are being cleaned.
5) Conduct cross sectional analysis of the paint layers.
6) Determine solubility of the linseed oil, and test gels and solvents for its removal. Previous documented cleaning methods will be used to inform treatment.
7) Remove/reduce the linseed oil coating.
8) Consolidate small section on proper left hoof.
9) Apply a protective varnish over the surface of the horse.
10) Remove surface grime on glass with an ethanol/water mixture.
11) Vacuum and repair leather elements.
12) Clean and wax iron elements.
13) Fill and inpaint areas of loss or abrasion as necessary after consultation.
14) Write treatment report and photograph after treatment.

**TREATMENT REPORT**

1) Began written and photographic documentation.
2) Remove particulate material from surface with a soft brush and Miele Black Diamond vacuum.
3) Remove tail from horse. Wrapped the base of the tail with a piece of black cotton twill tape[5] to reduce the risk of further hair loss. Used tweezers to aid in insect removal, spider web removal, and to detangle hair. Used a Dahlia Spray mister with deionized water to wet small sections of the tail. White paper towels were used to blot the tail dry. The wooden pole and dermis were shielded from the water with Mylar. The tail was reinserted after varnishing.
4) Take three representative cross sections near areas of abrasion. Sample 1 was taken from the reddish brown neck area of the horse near the large gouge near the martingale on the PL side. Sample 2 was taken from the dark red edge of the upper left edge of the saddle blanket on the PL side. Sample 3 was taken from the underside of the PR hoof near the gouge in the wood. See the discussion in Appendix 3.
5) Began testing with aqueous cleaning gels and solvents. Primarily used Pemulen and Carbopol gels containing, TEA, TRIS, and deionized water followed by a solvent, such as acetone, ethanol, or 1:1 mix of acetone: ethanol. The recipes and the buffers are listed below. Testing results were recorded in the Appendix 2. The data is organized and divided into colors and colors in certain sections of the horse. At the bottom of each table, a summary categorizes the gels according to strength of the gel and/or solvent on that color. Photographic documentation, labeling these test areas, follows each table. Thicker applications of maintenance linseed oil and linseed oil drips were reduced with either a weaker gel or a solvent, such as acetone, ethanol, or 1:1 mix of acetone: ethanol.
6) During the cleaning process a paper label was revealed on the circular portion of the bridle on the Romance Side. It appears to say 1 (?) 9 (?) 05[6], and there is a little upside down crescent shape with an additional crescent shaped flourish extending from the upper right of that shape. Photo documentation was taken of this label.
7) Cleaned glass eyes with a 1:1 mix of Ethanol: Deionized water
8) Cleaned iron stirrups with petroleum benzene. Polished iron components with Butchers Boston Polish, Amber Paste Wax.
9) Consolidate small section on PL hoof with a 5% B-72 in Acetone.
10) Vacuumed the leather components with the Miele Black Diamond Vacuum and a stiff bristle brush.
11) Varnish with a 3:1 satin:glossy Golden MSA varnish with ultraviolet light stabilizers (UVLS) diluted with Petroleum Benzine to a workable viscosity (1 part Benz: 1 part Varnish)
12) Photograph both sides of horse before doing selected filling and inpainting.
13) Fill large gouge in the neck area of the horse near the martingale. The fill material is Modostuc by Plasveroi bought from Peregrine Brushes and Tools. Inpaint the disturbing losses in the white areas of the horse's body. Inpaint the fills. Inpaint using Golden Acrylics. These areas were selected with the consultation of Associate Curator, Kory Rogers.
14) Carried out post-treatment and photographic documentation.

[5] Black twill tape was found bleed dye, so it was left to soak in deionized water overnight and then rinsed several times until water came through clear. It was allowed to dry and then wrapped around the tail again.

[6] The (?) indicates that the identity of the written symbol is not completely clear. For example 1(?) means that it may or may not be a 1.

**MATERIALS**

Recipes for solutions used for cleaning.

<table>
<tr><th>Gel/ Emulsion</th><th>Recipe</th><th>Clear with Buffer then water</th></tr>
<tr><td>A-Pem</td><td>1 g Pemulen<br>20 mL of 2% Tris(hydroxymethyl)aminomethane (Tris) in deionized water<br>1 mL triethanolamine (TEA)<br>100 mL deionized water<br>pH 7.5</td><td rowspan="4">General Buffer<br>5 g TEA<br>100 mL deionized water<br>add 5% citric acid till pH is 7.5</td></tr>
<tr><td>B-Pem</td><td>1 g Pemulen<br>5 mL TEA<br>5 mL 2% Tris in deionized water<br>100 mL deionized water</td></tr>
<tr><td>C-Pem</td><td>1 g Pemulen<br>10 mL TEA<br>10 mL Benzyl Alcohol<br>100 mL deionized water</td></tr>
<tr><td>D-Pem</td><td>1 g of Pemulen<br>10 mL TEA<br>3 mL Ethanol<br>100 mL of deionized water</td></tr>
<tr><td>E-Pem</td><td>1:1 mix<br>1 g Pemulen TR2<br>3 mL TEA<br>100 mL deionized water<br><br>1 g Pemulen<br>1 mL TEA<br>20 mL Tris<br>100 mL deionized water<br>pH 7.5</td><td>Buffer 1<br>Concentrate (5x)<br>3.03g Tris<br>12 mL 10% acetic acid<br><br>Buffer 2<br>Concentrate (5x)<br>9g TEA<br>6 drops glacial acetic acid<br>100 mL deionized water</td></tr>
<tr><td>A-Carb</td><td>1 g Carbopol<br>5 mL TEA<br>5 mL 5% solution of citric acid<br>100 mL deionized water</td><td rowspan="2">General Buffer<br>5 g TEA<br>100 mL of deionized water<br>add 5% citric acid till pH is 7.5</td></tr>
<tr><td>B-Carb</td><td>Mix of<br><br>1 g Carbopol<br>5 mL TEA<br>5 mL of 5% solution of citric acid<br>100 mL deionized water<br><br>Carbopol 934<br>in deionized water<br>ammonium hydroxide<br>pH 11<br><br>mix to pH 8.5</td></tr>
</table>

*Purchased materials:*

Acetic Acid: Lab Supply, source unknown
Acetone: J.T. Baker Inc., Phillipsburg, NJ 08665
Acryloid B-72: Conservation Materials, 240 Freeport Blvd., Box 2884 Sparks, NV 89431
Bipax: Tra-bond, BA-F113, Tra-con, National Starch and Chemical Company, 1-800-872-2661
Butchers Boston Polish, Amber Paste Wax: The Butcher Company, Marlborough, MA 01752
Carbopol 934: Conservation Materials Ltd., Sparks, Nevada, USA 89431
Citric Acid: Amend Drug & Chemical Co., Irvington, NJ 07111
Denatured ethanol: Fisher Scientific, Fair Lawn, NJ
Golden Acrylics, Blick Art Materials, Galesburg, IL 61402-1267
Golden MSA (Mineral Spirit Acrylic) Varnish with UVLS (Satin and Glossy): Blick Art Materials, Galesburg, IL 61402-1267
Modostuc by Plasveroi: Peregrine Brushes & Tools
Pemulen®TR 2: Protameen Chemicals, Totowa, NJ 07511
Sodium Hydroxide: Sigma-Aldrich, Inc. St. Louis, MO 63103, USA
Triethanolamine: Fisher Scientific, Fairlawn, NJ
Tris(hydroxymethyl)amino methane: Sigma-Aldrich, St. Louis, MO 63103
Twill Tape: Talas, NY10011
U.S.P. Sterile Absorbent Cotton: Moore Medical Corp, New Britain, CT 06050

**TOTAL TREATMENT TIME: (30 days)**

Conservator's Signature: _____ Date: _____

Approved by:
Director, Preservation & Conservation: _____ Date: _____

Curator: _____ Date: _____