



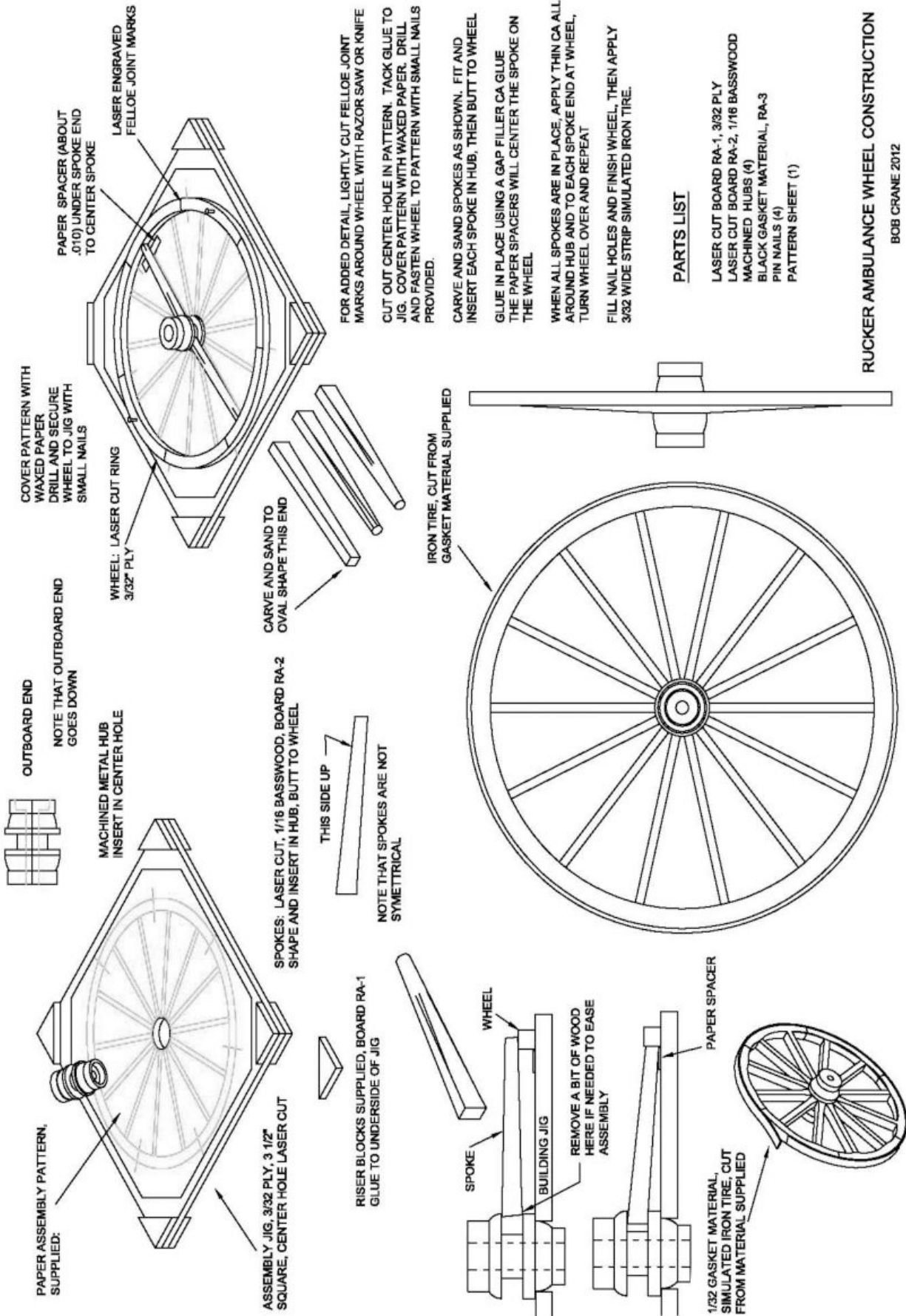
## **RUCKER AMBULANCE**

The carnage of the Civil War prompted innovations in the care of the wounded. Significant among those developments was in the transport of casualties from the battlefield. The most serviceable ambulance wagon of the war was designed by Brigadier General D. H. Rucker, and built at the Government repair shops at Washington. It could accommodate patients either seated or lying on litters. When not lying on the bed of the wagon, the bottom two litters, longitudinally hinged, could be bent at right angles to become the bench seats. Hinged to wagon sides at their outer edge, the upper platform halves would then drop down to become the seat backs. When raised upward, the seat backs in the middle of the carriage and are supported there by iron posts, hinged to their under surfaces. The posts fit into sockets in the floor. The resulting platform then supports two additional stretchers, which ordinarily are suspended from the roof. The space between the upper surface of the lower and the lower surface of the upper stretchers was ventilated by louver openings on each side of the body of the ambulance wagon. The body rested on platform springs designed to damp both fore-and-aft and side-to-side jostling, and the suspension included a horizontal draught spring under the fifth wheel to reduce the jerk normally imparted when the team started to pull. A water cask was contained under the driver's seat. Though somewhat heavier than other ambulance designs, at 1,120 pounds, the added weight improved its stability. General Ulysses S. Grant used a Rucker to transport his personal effects during his campaigns.

**General Notes and Painting:** Use 5-minute Epoxy or cyanoacrylate (Super Glue) to attach metal parts, carpenter's glue to assemble of wood parts. You will need fabric glue for the canopy. Dry fit all parts before gluing and painting. Use a #11 hobby knife, needle files and sandpaper to clean mold marks from castings and to adjust the fit where necessary. Holes may need to be drilled out. The ambulance and wheels were painted olive drab (the underside is black or O.D.) with metal fittings, including the wheel tires, and the platform and 5<sup>th</sup> wheel painted black. The upholstery is leather brown. The second area, from the front, both sides, within the side frames should be painted white before applying the red-cross decals. The third areas from the front, both sides, get the "U.S." decals. The protruding water keg is light brown with a black band. The spigot is brown. To achieve an even finish overall, use a primer coat.

**Hint:** To avoid squeezing out unsightly glue beads when laminating wood parts, first paint both surfaces to be glued with carpenters glue thinned about 1/3 with water. Let this dry completely, then use the same thinned glue mixture on one surface and join the parts.

**Wheels:** Note that the front wheels are smaller and have fewer spokes than the rear ones. Assemble them according to the drawings, using the provided jigs. DO NOT yet attach the axle nuts (laser-cut gasket material) within the hub recesses. Set them and the six washers aside until near the end of the project.



COVER PATTERN WITH  
WAXED PAPER  
DRILL AND SECURE  
WHEEL TO JIG WITH  
SMALL NAILS

PAPER SPACER (ABOUT  
.010) UNDER SPOKE END  
TO CENTER SPOKE

LASER ENGRAVED  
FELLOE JOINT MARKS

WHEEL: LASER CUT RING  
3/32" PLY

CARVE AND SAND TO  
OVAL SHAPE THIS END

THIS SIDE UP

SPOKES: LASER CUT, 1/16 BASSWOOD, BOARD RA-2  
SHAPE AND INSERT IN HUB, BUTT TO WHEEL

RISER BLOCKS SUPPLIED, BOARD RA-1  
GLUE TO UNDERSIDE OF JIG

WHEEL

SPOKE

BUILDING JIG

REMOVE A BIT OF WOOD  
HERE IF NEEDED TO EASE  
ASSEMBLY

PAPER SPACER

1/32 GASKET MATERIAL,  
SIMULATED IRON TIRE, CUT  
FROM MATERIAL SUPPLIED

FOR ADDED DETAIL, LIGHTLY CUT FELLOE JOINT  
MARKS AROUND WHEEL WITH RAZOR SAW OR KNIFE  
CUT OUT CENTER HOLE IN PATTERN. TACK GLUE TO  
JIG. COVER PATTERN WITH WAXED PAPER, DRILL  
AND FASTEN WHEEL TO PATTERN WITH SMALL NAILS  
PROVIDED.

CARVE AND SAND SPOKES AS SHOWN. FIT AND  
INSERT EACH SPOKE IN HUB, THEN BUTT TO WHEEL  
GLUE IN PLACE USING A GAP FILLER CA GLUE  
THE PAPER SPACERS WILL CENTER THE SPOKE ON  
THE WHEEL

WHEN ALL SPOKES ARE IN PLACE, APPLY THIN CA ALL  
AROUND HUB AND TO EACH SPOKE END AT WHEEL,  
TURN WHEEL OVER AND REPEAT  
FILL NAIL HOLES AND FINISH WHEEL, THEN APPLY  
3/32 WIDE STRIP SIMULATED IRON TIRE.

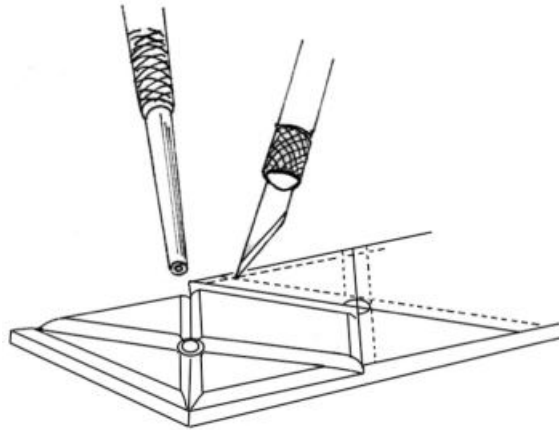
**PARTS LIST**

- LASER CUT BOARD RA-1, 3/32 PLY
- LASER CUT BOARD RA-2, 1/16 BASSWOOD
- MACHINED HUBS (4)
- BLACK GASKET MATERIAL, RA-3
- PIN NAILS (4)
- PATTERN SHEET (1)

**RUCKER AMBULANCE WHEEL CONSTRUCTION**

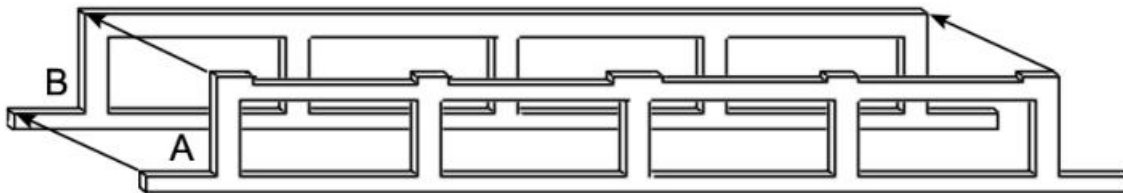
BOB CRANE 2012

**Upholstery:** Simulate the tufted seat cushions by carving and sanding the lightly burned lines on the seat back and folding litter padding parts. Firm pressure with a nail set, as indicated in the drawing, will help simulate button tufting. Paint and set aside.

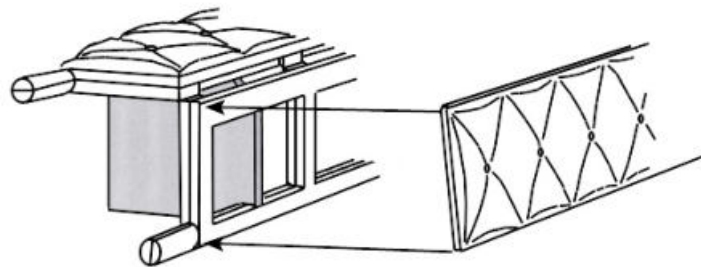


**Litters and tailgate:** Center and glue the tops to the litters. Sand the handles to a round cross section. Glue the tailgate frame to the tailgate surface. Paint litters and set aside.

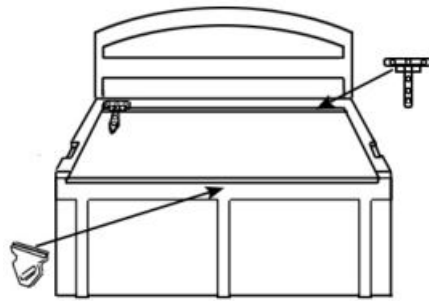
**Folding Litters and seat backs:** Laminate the A and B halves of the folding litters. Sand the extended handles to a round cross section.



Hold two of the subassemblies together, B side to the outside, A side to the inside, (handles down) so the sandwich appears to have four mortises. Open out the handle sides to form a right angle and glue in four supports, one centered in each of the open areas. Glue a hinge barrel into each of the four mortises. Repeat for the remaining two laminations, which now form the bench seats and risers. Paint the folding litters and the seat backs. Glue the padding to the backs, benches and risers, and a hinge barrel into the four mortises created on the seat backs. Set aside.

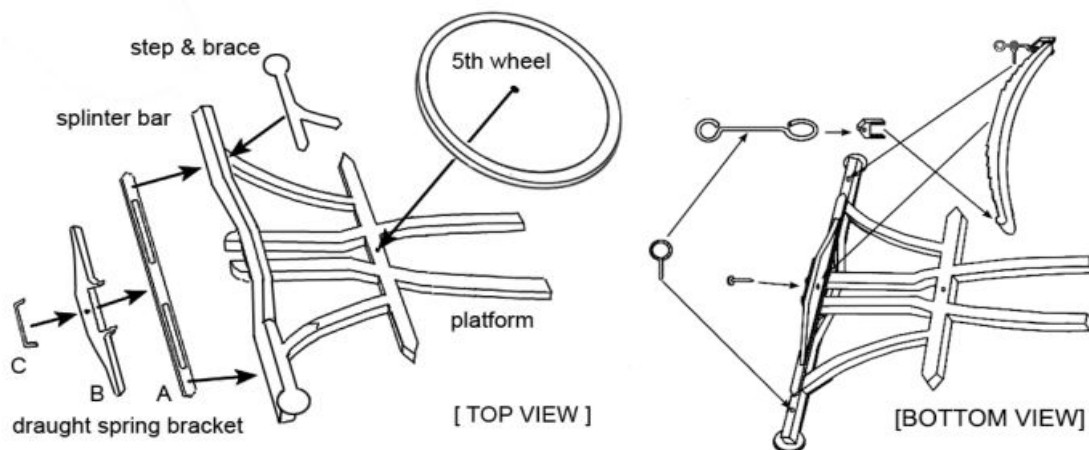


**Seat box:** Cut a piece from the provided 1" x 3/4" basswood to the exact width of the floor. Be certain that the cut is square. Glue the seat box frame to a 1" side, then glue the seat box back to the opposite side with the straight bottom edge flush with the bottom of the seat box and the sides flush with the ends of the basswood block. Glue the U-shape part of the seat box lid to the top of the basswood block so the long side is flush with the back piece and the ends of the notched arms are flush with the top of the box frame piece.



Round one long edge of the lid rectangle and glue this within the U-shape piece so the rounded edge protrudes past the frame piece on the box front, leaving a gap of at least 1/64", but not more than 1/32", between the rectangle and the U-shape piece. Glue two T-hinges to the top and the hasp to the front, as indicated in the drawing. Set aside.

**Platform and 5<sup>th</sup> wheel:** Assemble the platform and 5<sup>th</sup> wheel as indicated in the drawing. The splinter bar abuts the curved platform arms and rests atop the hounds (narrow fork). The 5<sup>th</sup> wheel consists to two identical parts. Center one of them around the burn hole in the platform cross piece. Part B of the draught spring bracket fits inside the slots in part A. Part C is glued against the outer face of Part B, with the ends against the flange formed by part A. Glue the completed bracket to the underside of the hounds. The pins of part B will rest against the outer sides of the hounds.

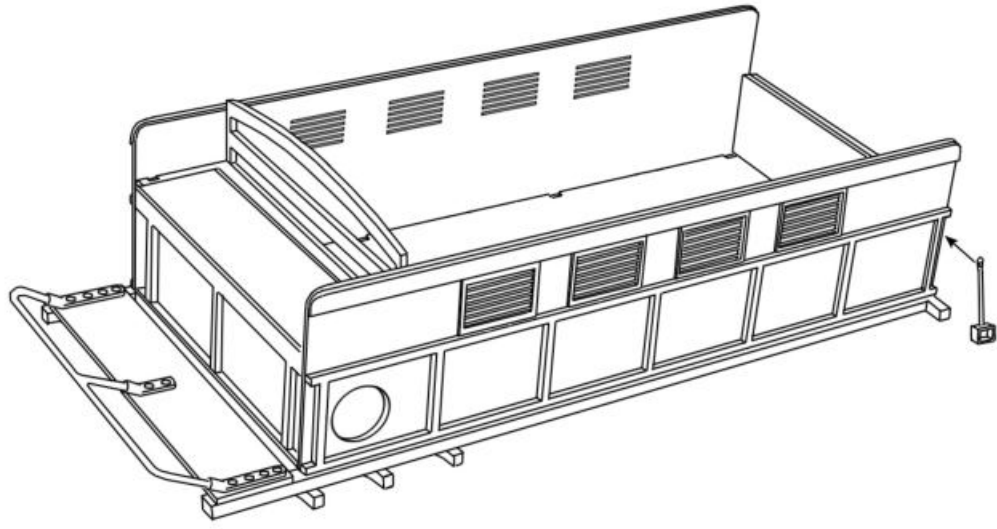


On the underside of the platform assembly, glue the draught spring to its bracket, per the drawing. Use a piece of scrap 1/32" plywood to raise it up from the hounds, then remove this shim when the glue is dry. Drill through the hole in the bracket, into the draught spring and insert a pin nail cut to about 1/4".

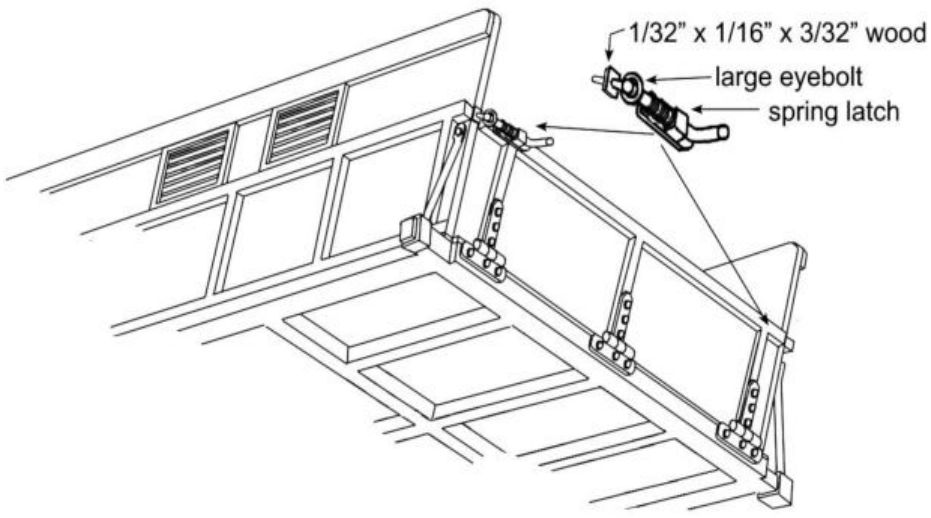
Make the draught rods by bending a second, approximately 1/16"ID, loop in two large eyebolts, perpendicular to the existing loop. This should leave an approximately 3/16" shaft between the rings. Insert a cast, rod bracket in each large eye, then glue the brackets to the ends of the draught spring. Lay the rods perpendicularly across the splinter bar, mark the spots, then drill holes to fit two small eyebolts. **DO NOT DRILL THROUGH.** Cut two small eyebolts so the rings will lie against the splinter bar when they are in the holes. Slip one of these eyebolts on each of the draught rods, then glue the small eyebolts into the holes. Paint black and set aside.

**Wagon box:** Orient the left and right sides: louvers toward the top, circular cutout on left front. Glue the side frames to the outsides. Glue the louver frames to the outsides. Glue a 3/16" x 1/32" basswood strip to the outside sides, flush with the sides' top edge. Round over the top corner to match the sides and cut flush with the sides' ends. Center the floor on the bottom frame within the sides and front and rear cross frames - scored planking up - so the floor end without adjacent notches is to the front, and glue in place.

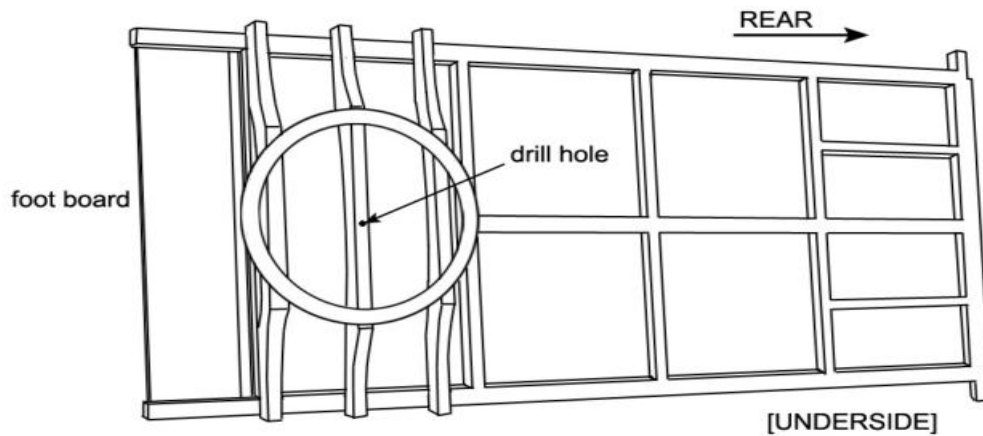
Glue the seat box assembly to the floor with the seat box frame verticals flush to the front edge of the floor. Glue the sides to the floor sub assembly, atop the bottom frame.



Glue the laser-cut footrest atop the protruding front of the bottom frame, spacing it about 1/8" from the front edge of the floor. Cut one bracket for footrest and brake shoes so that it only has two simulated bolt heads on the tab. Glue two uncut brackets to the ends of the footrest bar, per the above drawing, and glue this subassembly atop the laser-cut footrest. Slide the cut bracket onto the center prong of the footrest bar and glue it into place. Glue the tailgate frame (open end to the bottom) to the tailgate, then glue this atop the floor rear, between the sides, frame out. Be careful not to cover the rectangular cutouts in the floor. Slip the cast rear side braces over the protruding bottom frame rear cross member and glue in place so the tail lies against the side, NOT THE SIDE FRAME. Drill the two centerline holes (platform support sockets) in the floor into the frame, then glue a brass eyelet into each.

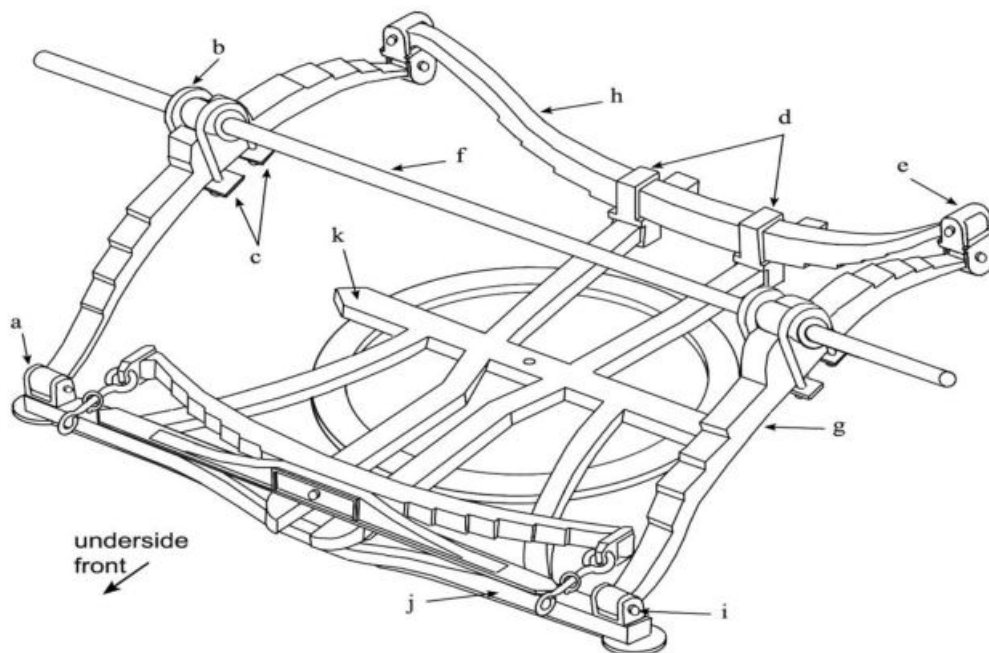


Create the rings for the tailgate spring latches, using small bits of wood and large eyebolts, per the above drawing, BUT DO NOT YET GLUE. Drill into the side panels to accept the eyebolt tail. Hold this mini assembly and the spring latch together and position the latch so the bolt would engage the ring and clear it if retracted, then glue the latch in place. This will automatically align the eyebolt at its proper height. Slide the wood part against the side, then glue in place.

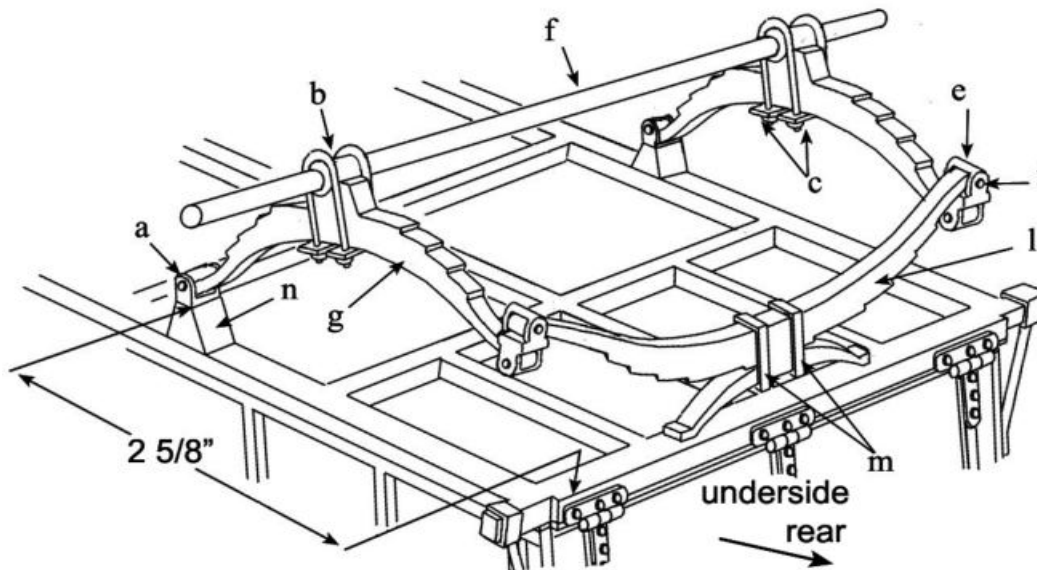


Glue on the front chair, flush with the outer edge of the front cross member of the bottom frame, centered out-to-out on the width. Glue on the rear chair, 1 3/8" out-to-out from the front chair. Center the center chair between them. Center and glue the second half of the fifth wheel atop the chairs. Lay the platform subassembly atop this with the fifth wheel components in contact and use the laser-cut hole to mark where to drill for the pivot pin (1/2" wire brad). Cut the brad to about 3/8" long.

**Front suspension:** Cut the 3/32" brass rod into two 4 3/8" lengths to make the axles ("f" in the drawing below). On each of two of the laser-cut side springs(g) position an axle hanger(b), held in place with two U-bolt clips(c). Slide these over an axle to square them up, then glue each spring together with its hanger and clips. Trim off the excess U-bolt lengths so they just protrude through the false nuts on the clips. Glue two side spring fasteners(a) to the splinter bar(j) about 1/32" in from the ends. Cut six pin nails to about 1/4" length. They should just protrude to the other side when slipped through the small holes in the spring fasteners and spring unions(e). Slide the rectangular opening on the front cross spring hanger(d) onto the front cross spring(h) per the drawing, then slide the square openings onto the wide fork of the platform(k). Without the axle in place, attach the side springs to the cross spring using the spring unions and secure them with the cut pin nails. Set the other end of the side springs into the fasteners on the splinter bar and pin them in place. A spot of glue on each pinhead should keep them in place while still allowing free movement of the pinned joints. Slide the axle in place to stabilize the subassembly.



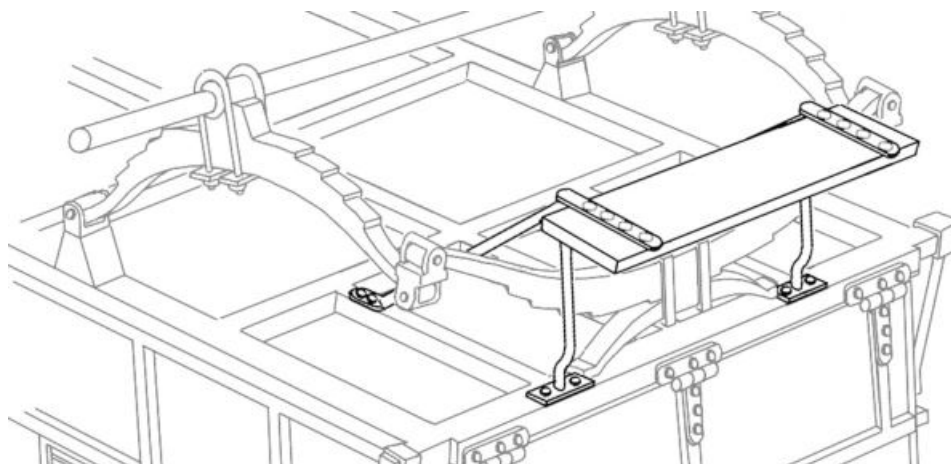
**Rear suspension:** Begin by laminating four 1/32" x 1/16" x approx. 3/8" wood strips(m) to both profile sides of the rear cross spring and bracket(l) to simulate the straps that join them. Note that the laser cut part includes the tops and bottoms of these straps. Sand the strips flush to them. Next glue the cross spring bracket to the bottom frame per the drawing below. It is centered side-to-side, and the inside edge is flush to the inside edge of the frame cross member.



Make the riser blocks(n) from 3/16" x 1/4" basswood. Cut them so the two 1/4" sides taper from 1/4" at the base to about 1/8" at the top (when oriented per the drawing). Glue a side spring fastener to each. Prepare the side springs(g), axle hangers(b) and U-bolt clips(c) the same way you did for the front suspension. As before, pin the side spring subassemblies to the fastener(a) subassembly at one end and the cross spring at the other. Let the riser block find its natural place on the bottom frame rails. This will be approx. 2 5/8" between rear edge of the fastener and the outside edge of the bottom frame. ONLY THEN glue the risers in place. Slide the rear axle in place.

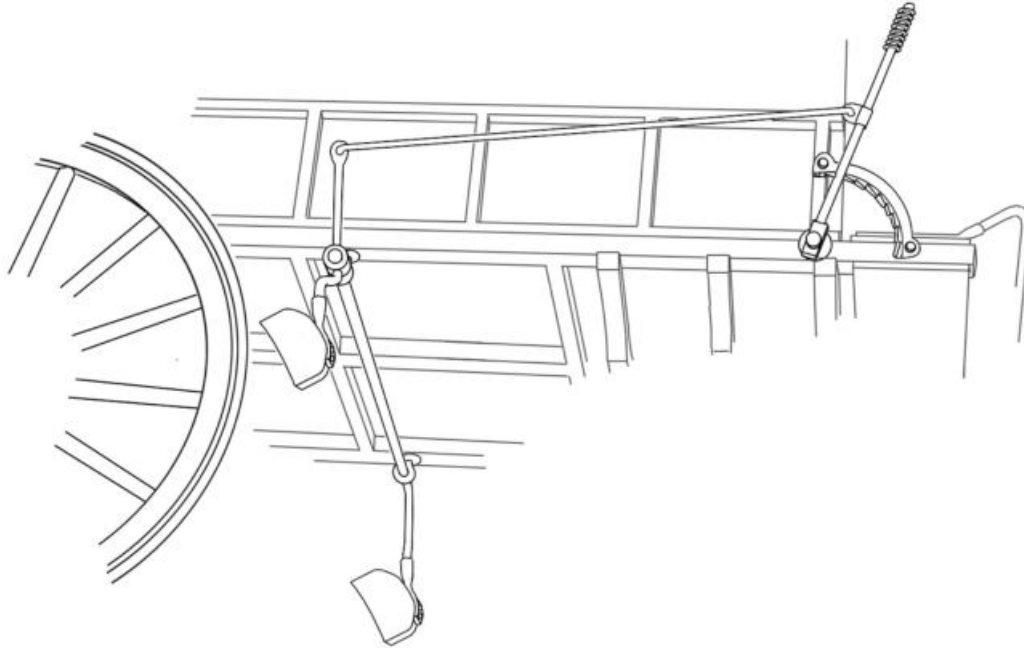
Insert the cut brad and pin the platform subassembly to the center chair. Slip the wheels on, smaller ones to the front, and turn the wagon right side up. The loose spring junctions will allow the wagon to rest evenly on all four wheels. With the wagon in this position you can, if desired, more securely glue the pinned parts of the suspension.

**Rear step:** Check the spacing on the rear step brackets against the laser-cut rear step, then glue the brackets in place, centered side-to-side and flush with the outside edge of the bottom frame cross member, per the drawing. Glue the step to the brackets.

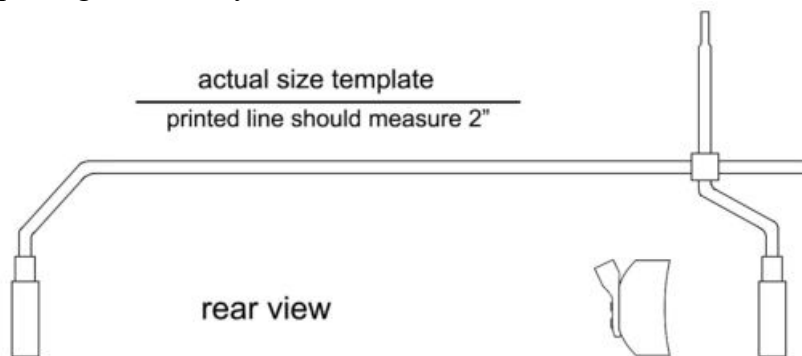


**Brakes:** On the right side of the wagon, drill a hole  $15/16$ " back from very front of the bottom frame protrusion, centered between the bottom frame bottom edge and the side frame bottom top edge. Attach the brake ratchet with pin nails and glue so its arc forms a quarter circle centered on the hole you just drilled. Glue on the brake lever, positioned into the second notch from the top of the ratchet quadrant. This will set the model with the brakes disengaged.

[If you want your model to have the brakes set then follow the succeeding instructions but only glue on the fixed components of the brakes assembly. After the model is finished move the brake lever forward to engage the brakes, adjust the fit of the shoes against the wheel tires, then glue the parts in place.]



Cut the two remaining brackets for footrest and brakes so they have only two simulated bolt heads. Bend to fit the laser-cut brake shoes and glue in place. If the brackets are a bit wider than the brake shoes, sand the strap flush. Drill a  $5/64$ " hole on each rail of the bottom frame, back  $3\ 3/4$ " from the front end of the rails. Place a brake shaft eye in each hole, then thread through them the  $1/16$ " brass rod to check their alignment. If square, glue in the eyes.

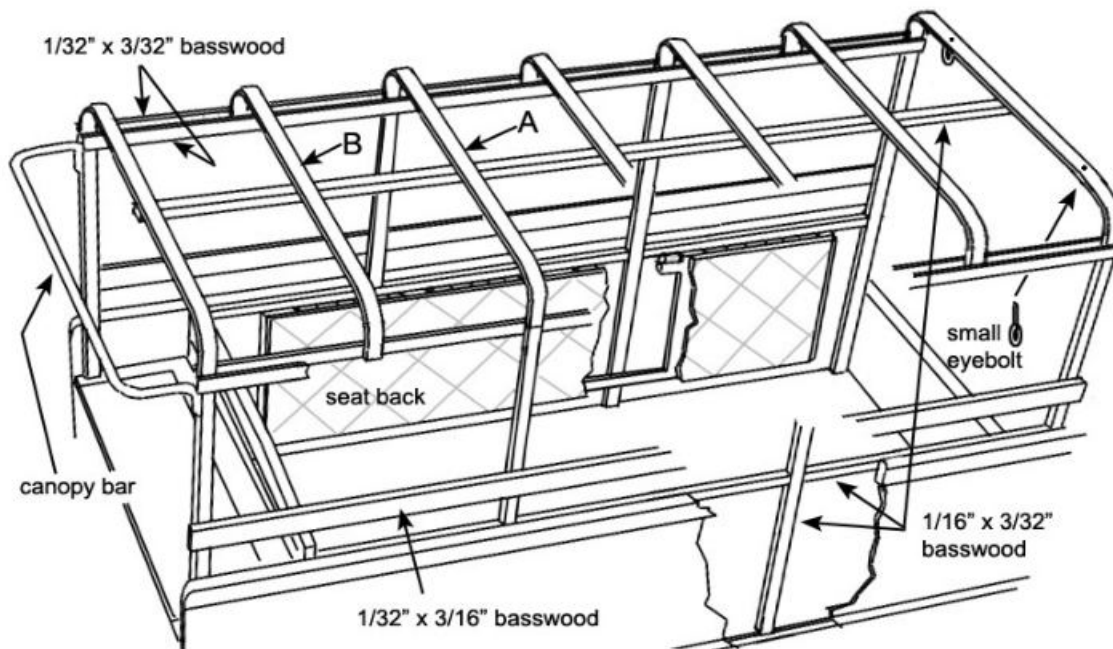


Bend the  $1/16$ " brass rod per the actual size template. Likewise bend the cast brake arm. Slide on the brake arm then cut the arm extension and the brass rod so everything aligns with the drawing when the brake shoe brackets are glued on. DO NOT yet glue the brake arm to the brass rod. With the rear wheels in place, slide brass rod through the brake eyes and slip on the brake arm, letting the shoes fall against the tires. Make any needed adjustments and mark the rod where it just protrudes from the arm. Disassemble, cut the rod, then reassemble.



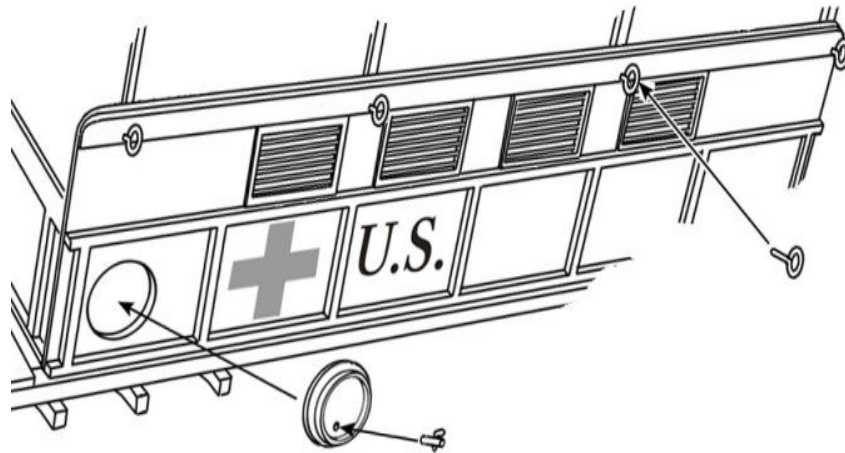
With the wagon right side up, let the brakes fall into the neutral position, arm vertical, and glue the parts in place. Make a right angle bend close to one end of the 1/32" brass rod. Slip this through the eye in the top of the brake arm then hold it against the center eye on the brake lever. Mark it and make a second right angle bend in the same plane as the first one. Trim the excess so the two bends just protrude through the eyes and glue it in place to make the connecting rod.

**Canopy frame, seats, etc.:** Make the stakes from six 3 1/8" and two 2 1/16" lengths of 1/16" x 3/32" basswood. Socket the six into the rectangular cutouts in the floor and glue them to the sides at right angles to the floor. Similarly, glue the two shorter lengths into the cutouts in the seat box lid. Fill in between the bed stakes only with appropriate lengths of 1/16" x 3/32" basswood flush with the tops of the sides, the 3/32" dimension against the sides. Note that the forward most fill in only extends as far forward as the seat box back



Cut four lengths, about 6 1/4", of 1/32" x 3/32" basswood and glue these to tops of the stakes, right and left sides, so they extend half their wider width above and below the stake ends forming pairs of rails. Cut two 6 1/4" lengths of 1/32" x 3/16" basswood and glue these on the outsides of the stakes, leaving a 1/4" space between their bottom edge and the top edge of the wagon sides. Note that four of the laser-cut bows are marked "A" and three are marked "B". The tails of the A bows are slightly shorter. These are glued atop the stakes, between the rails. Sand the rails flush with the end bows. Next glue a 6 1/4" length of 1/16" x 3/32" basswood to the center of the undersides of the A bows. Sand it flush with the end bows. Follow this by gluing the B bows equidistant between the A bows. Drill two holes through the rearmost bow about 15/16" to either side of center. Glue a small eyebolt into each from underneath and cut the tails flush with the bow top.

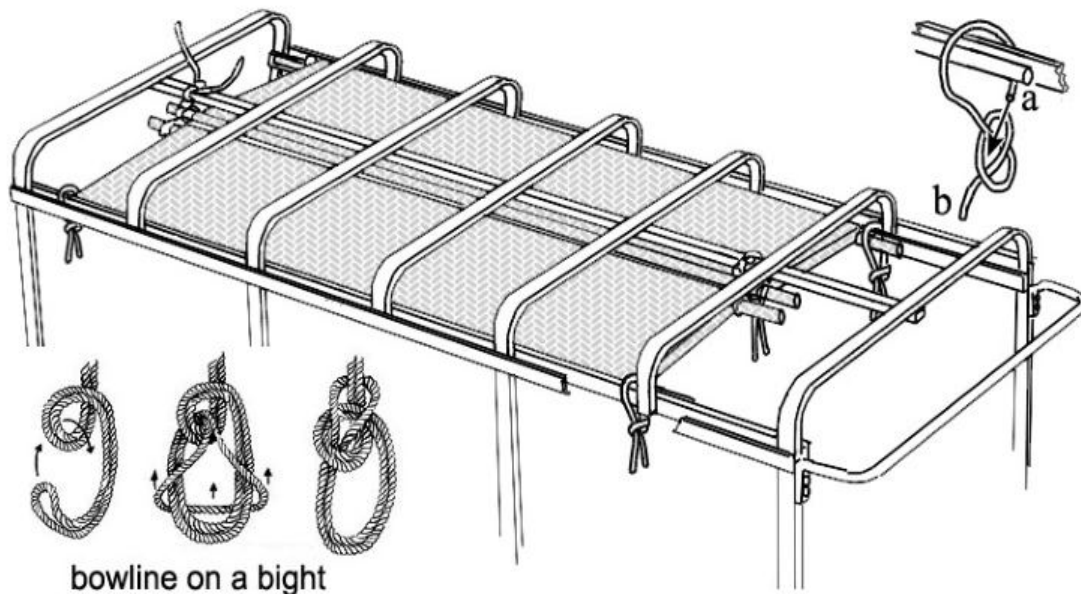
The seat backs are glued to the two center stakes, centered front to back within the wagon box, so the edge with the hinge barrels touches the bottom edge of the fill-in pieces between the stakes. The folded litters, which form the seats are then glued to the floor, up against the seat backs and centered on them. Glue on the canopy bar, aligning the bar bottom with the top rail bottoms.



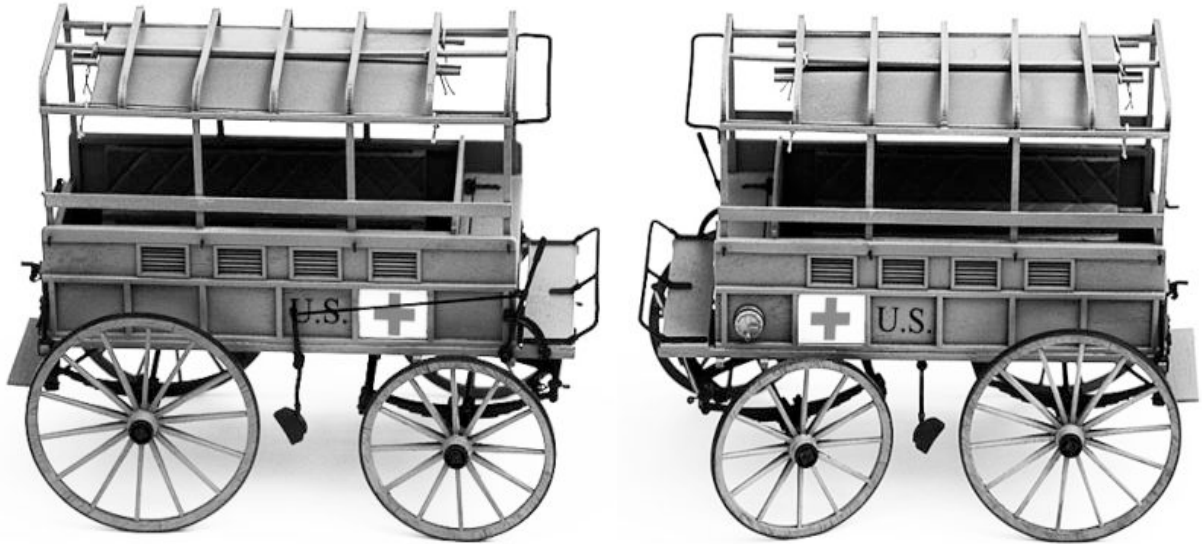
Install the water keg and spigot in the left side cutout. Per the above drawing, drill for and glue in four large eyebolts on the right and left sides, centered on the stakes. Apply the decals to both sides as indicated above. The background within the frame for the red cross is first painted white.

**Install the wheels:** Slip two of the wheel washers from the dark gray gasket material onto each end of the front axle, before sliding on the wheels. This should bring the wheels into alignment with the rear wheels. Use a third washer only if necessary. Make sure the axles are centered side-to-side, then double the gasket material wheel nuts and push them onto the axle ends and into the hub recesses. Secure the nuts with glue. The wheels should still turn freely, though this is not necessary in a static model.

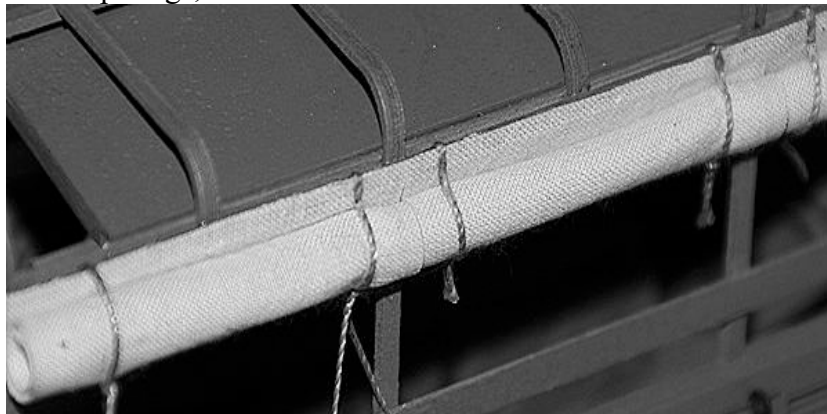
**Hang the fixed litters:** Tie a bowline on a bight in about 6" of the provided twine, pulling it tight around the shank of a 5/64" drill. Then separate the loops and insert the litter handles, plank side up. Repeat for the other end. Pull the handles up to the center rail, secure with a half hitch then drape the free ends down between the litter handles. This will give a realistic drape to the line. Secure the outer handles to the inner top rails with a slip knot to get a similar effect. Start by tying a very loose half hitch in another 5" of twine. Bring the "a" end (see drawing below) up between the top rails, over the litter handle, then through the loop to follow the "b" end. Pull the knot tight and slide up the knot to secure the handle. Repeat for the other three handles. This allows the free ends to hang realistically. Lock the knots with super glue then trim the tails to about 3/8".



**Canvas top:** If you like the look of your model so far, with the canopy structure visible, you can stop here. Otherwise, proceed with attaching the fabric cover.



For each cut line you lay out on the fabric, run a bead of fabric glue, smooth it into the cloth and allow to dry before actually making the cuts. This will prevent frayed edges. Cut with a straight edge and sharp knife just to the inside of your pencil lines to avoid unsightly marks on the finished product. Cut two side panels 6 3/16" long by 1 3/4" high. Cut two equidistant slits starting 1/8" from the top, all the way through the bottom. Glue the top edge of each to the outside top rails with the top edges flush. For each side panel section cut two 5" lengths of twine. Drape these over the top of the outer rail, between it and the inner rail, located approximately 1/4" in from the stakes. Roll up each panel and secure with the twine using the same knot used to secure the outer handles of the fixed litters. (See the photographs below.) Adjust the knots so they are directly under the top rails, and glue the twine in place (white glue is okay) against the outer surface of the outer top rail. Squeeze the twine flat against the rail into the glue. Flat tweezers, or stamp tongs, will facilitate this.



Cut the top and rear panel using the provided full-size pattern. Stretch the fabric in both directions to improve the fit. Hold the rear panel part in place against the outside of the rearmost bow and use a pin to mark the centers of the two small hanging eyebolts. Reinforce the pinpricks with drops of fabric glue then poke an awl or similar through the spot, large enough to pull through another 5" length of twine. Fold up the rear panel to get it out of the way. Clamp the rear edge of the top to the upper rails with the rear edge flush to the end of the rails and the bottom edge flush to the lower edge of the top rails. (An alligator clip with the teeth flattened works well for this.) Stretch the top forward so there is a slight gap, about 1/16", between the front stake and bow and the wings, which will be wrapped around the canopy bar.

Fabric glue the top to the outer rail from the front bow to the second bow, bottom edge flush with the rail bottom, over the side panels and twine, on one side and let dry. Stretch the fabric across to the other side and repeat the process. Continue side-to-side to the rearmost bow. Adjust the rear flap and top if needed so there is no gap in the cover when you glue the rear panel to the rear face of the rearmost bow. Apply fabric glue to the seam. Roll up the rear panel, run the twine through the fabric and the small eyebolts and tie up the panel as you did for the sides. For the driver's canopy, start from the center of the canopy bar and work toward the radius corners, rolling and gluing the fabric to the bar. Stop at where the bar starts to turn. Wrap and glue the wings to the bar sides, again stop at the turn. Fold the sides under the front with a little glue in the fold, then glue the resulting tab up under the canopy bar to finish the corners.



  
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