

# Building the 1869 Allerton Steam Pumper Model

**MODEL TRAILWAYS KIT NO. MS6006**



## **Technical Characteristics:**

Scale 1:12, 1" = 1 foot

Length: 14-1/4"

Width: 5-3/4"

Height: 9"

Kit design, plans, instructions, photography, and prototype model by Ken Foran, 2014



## History of the 1869 Allerton Steam Pumper

Throughout the mid-19<sup>th</sup> century the City of Wooster's Fire Department was made up of several independent fire companies. In the spring of 1869 Relief Company No. 4 opted to purchase a steam fire engine; the fire company raised funds for the purchase and the City of Wooster agreed to provide funds to aid the purchase. In the summer of 1869 a contract was made with the Allerton Iron Works Manufacturing Company of Naugatuck, Connecticut to purchase "a second-class steamer and 2,000 feet of India rubber hose, with patent couplings," to be delivered to Wooster for the sum of \$6,000.00 - approximately equivalent to \$103,500.00 in today's money. The steamer was delivered in September, 1869.

The 1869 Allerton steamer remained with Relief Company No. 4 until the City of Wooster re-organized the fire department in 1888 as a paid fire department with volunteer support. The independent fire companies were disbanded and much of the equipment was used by the new fire department, including the 1869 Allerton steamer. It remained in use by the City into the 20<sup>th</sup> century. At the start of 1919 the fire department's horses were replaced with motor vehicles but the horse-drawn steamer remained at the station and on the apparatus roster as a back-up pumper until the mid-1930s.

By the 1950s the steamer was completely removed from service and put into storage and, eventually, almost completely forgotten – out of sight, out of mind. Many firemen of that era and later believed the steamer fell victim to the scrap metal drives of World War II. Actually the steamer was quietly sold by the City of Wooster to a scrap dealer who then sold it to a fire apparatus collector who lived near Pittsburg, Pennsylvania.

In 2001 the son of the collector, Charles Panella, contacted a Wayne County resident about selling the 1869 Allerton steamer. Representatives of the Wayne County Historical Society and local officials met with Panella, confirmed that the steamer was indeed Wooster's. Panella wanted to see the steamer return to its original home and despite higher offers from fire museums sold the steamer to the historical society for \$50,000.00.

On March 30, 2001 the 1869 Allerton steamer returned to Wooster. It was delivered by truck to the Wooster Fire Department for cleaning and preparation for being once again horse-drawn and paraded to its exhibit space at the Wayne County Historical Society.

The Allerton Iron Works manufactured steam fire pumpers only from 1867 to 1871; Relief Company No. 4's steamer was the 12<sup>th</sup> unit produced by the company. It is the only known Allerton steamer still in existence – unfortunately it is no longer operable. The steamer did not carry water, instead it used a coal-fired boiler to draw water from wells, cisterns, and et cetera located around the city and reported pumped 350 gallons per minute.

Douglas C. Myers, Historian Wooster Ohio Fire Department.

## Before You Begin

At 1" = 1' 0" (1:12) scale, it is relatively easy to build and obtain precise detail. Laser-cut parts offer a simple building method. Britannia (white metal) fittings, and brass photo etch parts eliminate creating parts from scratch. Before starting the model, carefully examine the kit and study the plans and the instruction manual. First, determine if all the listed parts are present using the Materials List and Plan Layouts. Handling them will produce a better understanding of the kit's requirements. Try to visualize how every piece will look on the completed model. Also, try to follow the building sequence and what must be done first, or ahead of time and what can be done simultaneously if you wish. For example, you may want to skip to the wheel construction as you are working on other parts or waiting for glued assemblies to set.

## The Plans

Plan sheets are provided for reference and part identification and may not be true to scale due to reproduction. These drawings show elevation views, a parts color guide, a wheel build pattern, clear parts and a perspective view illustrating the parts and their placement or relationship to each other. Review and study the plans and assembly instructions prior to starting the build to better understand how the parts will come together and the build sequence.

## Make Allowances during the build.

Try to be exact when following the instructions, but use common sense. Adjustments may be necessary to compensate for small differences in how your model is shaping up and how the parts are relating to each other. An old saying in the model building craft is that "if it looks right, it is right."

## Kit Lumber

Laser cut basswood spokes and plywood rims are supplied in the kit. A word about laser cutting: a common misconception is that the parts should punch out of the carrier sheet. This is not so. Laser cut parts are retained in the carrier sheet by small bridges of uncut wood called tabs. Tabs can be oriented parallel to the grain or perpendicular to the grain. It is always better to cut through these tabs rather than try to punch out the parts by breaking the tabs. This is particularly true of laser cut plywood. Plywood tabs are much more difficult to laser cut than basswood. You may have to cut through not only the tabs but portions of the part outline that did not cut completely through the sheet. Turn the sheet over and cut from the backside to release the part without damage.

## Britannia Metal Fittings

There are very many Britannia (white metal) parts in this kit. First, remove any mold joint flash with a #11 hobby blade using the back edge as a scraper, then file or sand with fine sanding stick or sandpaper. **Important: Always dry fit parts together first to determine if holes need to be drilled further or if mating surfaces are flat to each other.** Once parts have been dry fitted wash parts in dishwashing liquid and warm water to remove traces of mold release agent and the body oils your fingers deposit. Allow the parts to dry thoroughly before applying primer and painting. Try to avoid painting, whenever possible, surfaces to be glued together, or locating pins that insert into holes. Due to the molding process used; some deformed parts may be received. These can be straightened by gently and slowly reforming with your fingers. Check with the plans and photographs to verify the reforming of the part (s); every effort was made to reproduce the parts accurately but some deforming may occur during shipping due to the weight of the parts.

## Wheel Hubs and Axles

The wheel hubs in the kit are precision machined. The axles are cast Britannia metal. It is important to check the fit of the hubs on the axle shafts at the outset before beginning the kit. Being cast, the axle shafts will likely have a tiny bit of flash, or parting line mismatch preventing a smooth running fit on the hubs. Use a sanding stick to work the axle shafts until the hubs fit and run freely. The axle shafts can be easily bent, so work very carefully. If you should happen to bend an axle shaft, it can be straightened, also avoid painting the axle shafts where the hubs will ride.

## Working with Photo Etched parts

This kit has brass and stainless steel photo-etched parts. Use care when cutting the parts from the sheet. File perimeter tabs areas smooth after being cut from sheet. The brass buckets have a bend line half etched in them for bending reference.

## Glues

Five-minute epoxy provides extra strength for some situations. Super glues, such as Jet, Flash, or Zap, produce quick adhesion. For most applications, the medium viscosity, gap-filling variety is best. The thin type is recommended for filling a narrow crack and wicking into laminate joints. The instructions will refer to super glues as CA (cyanoacrylite).

A word about gluing laser cut parts. Laser cutting burns through the wood and leaves a charred surface. This charred surface does not make good strong glue joints. It is recommended to lightly sand or scrape away the loose char before gluing. It is not necessary to remove all the char, unless a finished wood surface is required. In some cases simply scraping with the back edge of a # 11 blade is sufficient.

## Building Tips and Suggestions before Starting to Build

- Locate and purchase (1) spray can each of Krylon Gold Foil and Copper Foil paint. Also (1) spray can of Krylon White Primer; Banner Red; Satin Black, Satin Clear; small spray can of Gunmetal. For use read 10 & 11. Note White Primer is needed for the Foil paint colors to have their plated look.
- Read assembly instructions and review the plans to understand and familiarize yourself with various parts and components and how they relate to each other.
- Verify that you have all the tools and materials needed to start the build. See materials and suggested tool list.
- Try to follow the suggested build sequence outlined in the assembly instructions.
- Pay attention to steps that are **BOLD** face type. These are critical actions to avoid problems with assembly or when extra care is needed.
- Clean excess residue from laser cutting from surfaces and edges of wood parts.
- Cast white metal parts are delicate due to replicating in 1/12th scale. Extra care and caution is required when cleaning, filing parting lines and adjusting to dry fit.
- Due to the molding process used; some deformed parts may be received. These can be straightened by gently and slowly reforming with your fingers.
- Prime, paint and dry fit all cast parts prior to assembling. Keep primer and paint to a minimum to keep fine details crisp. When dry fitting parts if excess paint is an issue scrape

off paint as needed for a good fit. Fill any casting voids with putty if required and then sand and prime.

- **Foil Paints:** Most people are not familiar with the use of Krylon Foil Paints so a couple of tips are in order. Parts that are completely painted with Foil paint should be painted and then set aside for at least 24 hours prior to handling. **Multiple color parts require more attention.** Always paint the **solid colors first** (Satin Black; Red; Etc). Once these colors are completely dry then mask the painted area and **spray the Foil color last.** Then set aside for 24 hours and avoid handling the Foil painted areas when removing masking tape. Patience and planning ahead can set the priority of painting parts. **Masking off Foil Paints will mar the finish.**
- **Spray Can Use:** A tip for using spray cans is to warm the spray cans under running warm water; then shake the can to feel for the temperature change and repeat heating steps until no difference in temperature can be felt. Dry the can completely of any water before spraying. The heating does two things; it better atomizes the paint than when cold and it slightly increases the pressure within the can for better paint application.
- Take your time and enjoy the build process as much as the finished model.

**Building Strategy –** Before starting to build think about which build strategy would be best for you to follow. One approach is to clean, file, dry fit and paint all parts before starting assembly; the other approach is to clean, file, dry fit and paint sub assemblies as needed. The following instructions will work for either approach. Perhaps the deciding factor is really how much space you have to work in and being able to organize all the parts at once. Regardless of the approach the following instructions will address sub-assemblies of components to be worked on and then set aside for later assembly.

#### **Additional materials that will be needed:**

- Weldwood Glue.
- CA adhesive and glue dispenser
- Fine sand paper or sanding sticks.
- 1 Bottle MS4975 English Oak stain
- 1 Bottle of Leather Brown paint for seat
- 1 Bottle of Gunmetal Grey
- 1 spray can of Krylon Banner Red
- 1 spray can of White Primer
- 1 spray can Krylon Gold Foil
- 1 spray can Krylon Copper Foil
- 1 spray can of Satin Black spray paint.
- 1 spray can of Satin Clear
- 5 minute Epoxy Glue

#### **Suggested tool list:**

- Xacto blade holder and #11 blades
- Small needle nose pliers
- Small end cutters
- Tweezers – straight and bent
- Medium size Mill bastard file
- Assorted needle files
- ScotchBrite pad
- Sanding stick 120/240
- Pin vise for drill bits
- Drill Bits 1/32"; 1/16"
- Assorted small spring clamps
- Several round toothpicks
- Masking tape- low tack
- Small touch-up paint brushes
- Q-tips for staining
- Photo etched parts cutter
- Pencil



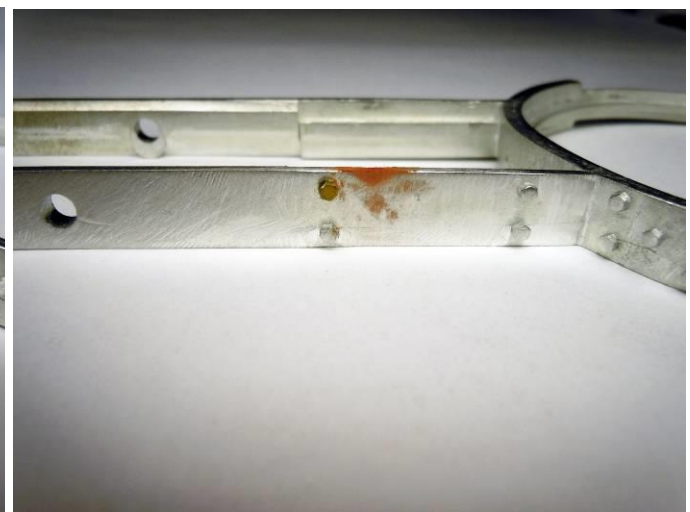
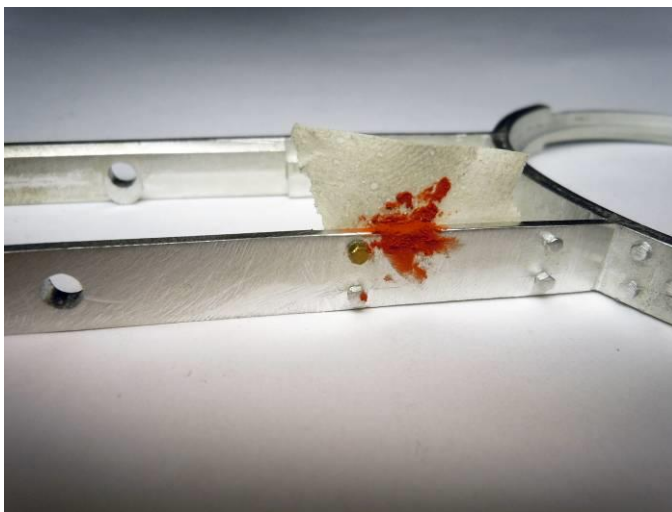
## 1869 Allerton Assembly Instructions

### Main Frame:

Straighten the rear boiler ring on the Main Frame section, if necessary by indexing the Boiler Cap Ring as a guide to straighten and true to round the boiler ring. You may wish to true the other Boiler Ring at this time as well; along with the Boiler Ring at the front of the Coal Bin. These rings **must be as close to round as possible** since the boiler walls will index and be glued into them later.



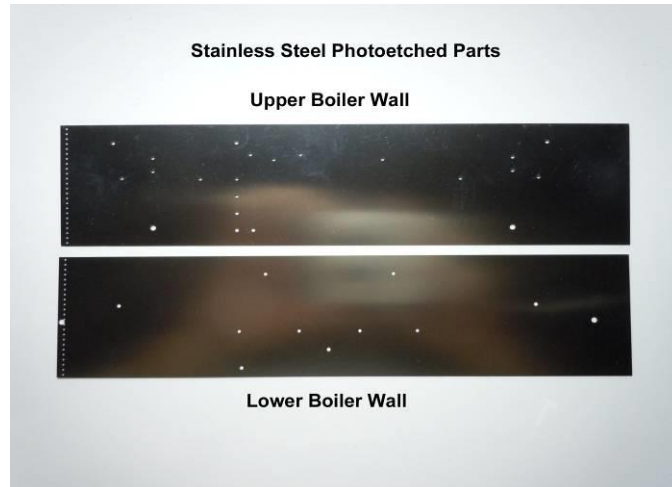
Sand, file and clean up all areas on the Main Frame. Fill any voids with putty if required. In pictures below there was a small void on the top edge of the frame filled with putty then sanded smooth. A bolt head location was drilled and a 00-90 brass bolt head glued in place to replace the imperfect bolt head that did not completely form. These are minor imperfections that cannot be avoided sometimes due to the casting process to make the parts.



Before priming and painting the frame; pre-form the Boiler Walls first to avoid damaging paintwork to parts if done later.

## Forming the Boiler Walls:

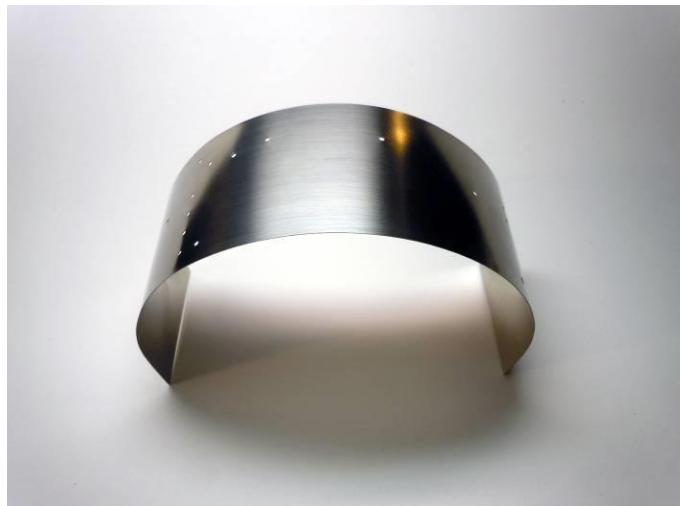
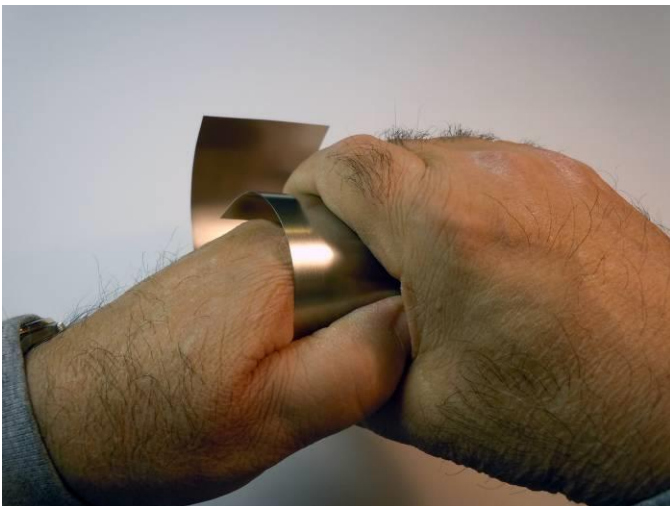
Trim and file smooth the tabs and edges of the upper and lower Photo etched stainless steel Boiler Walls. Lay the Walls on a flat surface and scrub the outer surface (with rivet pattern etched into) with a Scotchbrite pad in a horizontal direction to simulate a brushed surface.



Select the Lower Boiler Wall and using your fingers slowly and carefully form the wall into a circle. Be careful not to crease or kink the wall; especially when working over the holes. The goal is to form into an even circle where the ends overlap and the end that has the rivets etched in is on the outside.

When working with these stainless steel parts be careful not to cut yourself, be patient and work slowly for the best results.

As the circle develops slowly squeeze into a smaller circle to relieve any built in stress in the metal.



Continue forming until a circle is formed to the point that the wall can be held in one hand.

Then release and form the two ends along the edge to eliminate the flat spot at the end. **This is a very important start to assure a good fit into the frame and coal bin rings.**





Once both ends have be worked with the thumb then form back into a circle and slowly squeeze with both hands to make as tight a circle as you can to relive the stress in the metal as seen below. Keep checking on the "flatness" of the ends that overlap and adjust as needed.

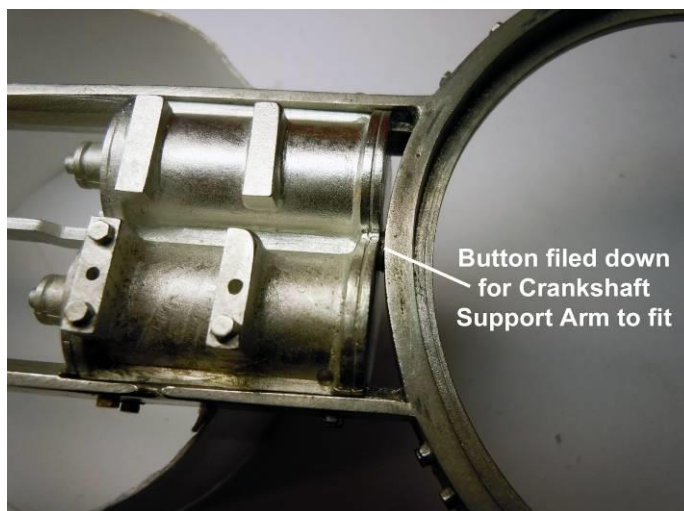
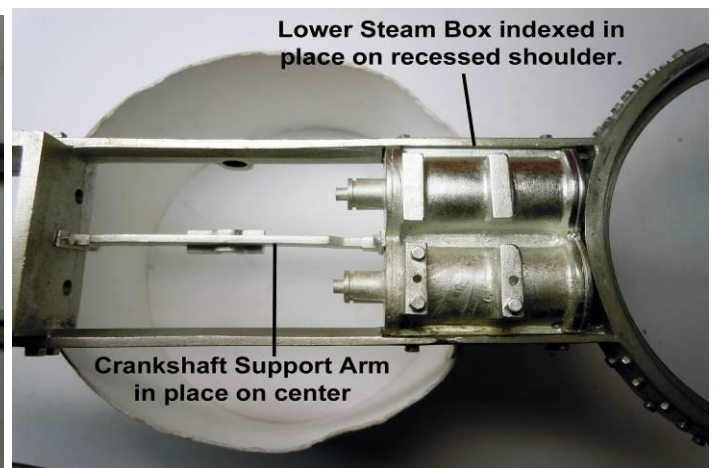


Now **dry fit** the bottom edge (verify which is the bottom edge on the plan sheet by looking at the hole pattern) of the Boiler Wall to the inside wall of the Coal Bin while aligning the center of the axle hole with the center rivet located on the edge of the Coal Bin floor joint. Next add the Boiler Top Ring as a sizing fixture to set the required size to the top edge. Once the wall is seated top and bottom clamp with a small deep C clamp and add CA carefully along the inside seam without gluing the Top Ring or Frame ring and let the CA set. Once completely set remove from Top Ring and Frame, but **do not release** the C clamp yet and yes the Top Ring will stay with the clamp, now add CA to the top and bottom edges to finish up the joint being glued completely. Once the CA glue joint has set, carefully release the C clamp and set aside for later use.

Repeat the same process to form the Upper Boiler Wall this time using the Main Frame Ring and the Boiler Top Ring. Set the wall aside with the other for later use. Forming these walls now will avoid scraping and scratching painted surfaces had they been done later in the build.

## Main Frame:

Next locate the Lower Steam Box part and the Crankshaft Support Arm. Turn the Main Frame upside down and index the Lower Steam Box part into the recessed shelf that it will rest upon. Note the round button on the rear wall that will rest against the boiler ring; this button will be filed down to adjust the fit of the Crankshaft Support Arm on center between the Lower Steam Box front wall and the Water Box Rear wall. **Do not Glue these parts in place yet!**

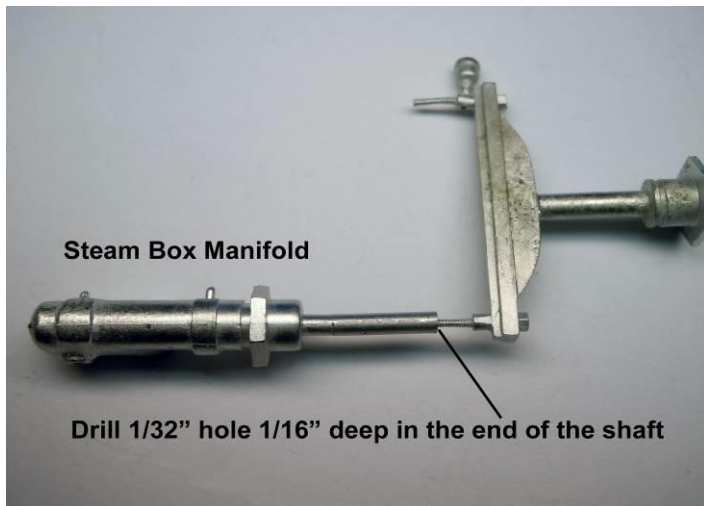


**IMPORTANT:** File and adjust the button until a loose slip fit is attained. Paint will later tighten up this fit. Avoid excessive paint build up on the walls that the ends of the Crankshaft Support Arm rest onto. Do not paint the ends of the Crankshaft Support Arm where glue will be later applied.

On the Main Frame, prime the entire frame part using white primer; then paint the Banner Red frame area first. Once dry then mask the Red areas and paint the Gold Foil ring and set aside to dry. Plan ahead and clean other parts while waiting for parts to dry.

Prime and paint the Lower Steam Box Satin Black. Drill out holes to clean for Acorn Nuts, then dry fit them. Then prime and paint Gold Foil, the four (4) individual Acorn Nuts. When dry, glue the individual Acorn Nuts into the holes along the front top edge of the Steam Box adding the glue from the inside of the box. Carefully paint with Gold Foil just the front edge of the two round ends where the pushrods attach.

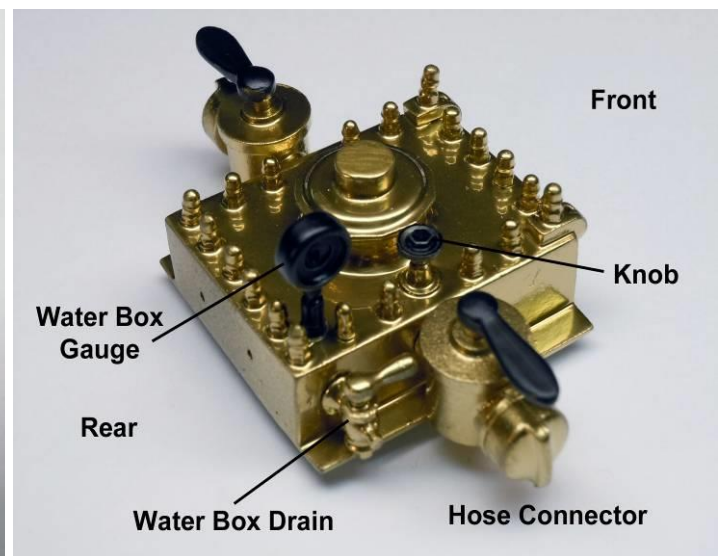
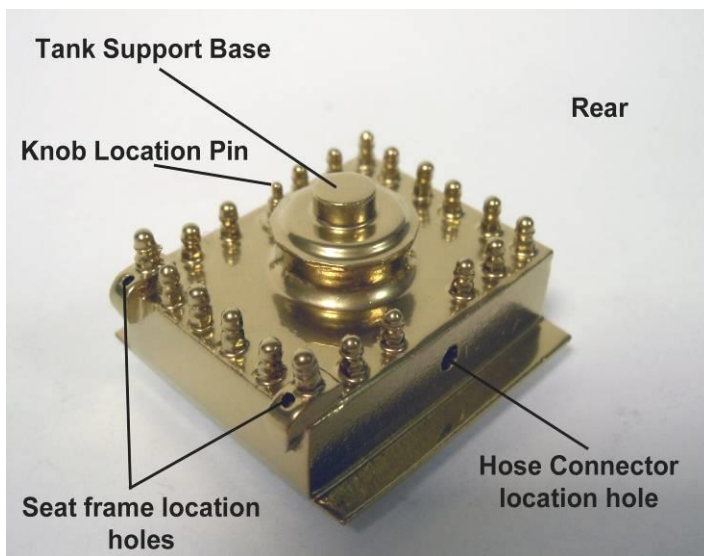
Locate the Steam Box Manifold and carefully drill a 1/32" hole into the end of the shaft to a depth of 1/16". Once the hole is drilled, then paint Gunmetal and set aside to dry. Locate Manifold Petcock and prime and paint Gold Foil set aside to dry and once dry glue into hole located in bottom of Steam Box Manifold with handle facing to the rear. (See Photo) Do Not Glue Manifold to Steam Box until later.



**Paint and set aside the following parts for the Front Upper Water Box Assembly:**

- Upper Half Water Box; Tank Support Base and Water Box Drain – Gold Foil
- Left and Right Water Box Hose Connectors – Gold Foil bodies with Satin Black handles
- Water Box Gauge and Water Box Knob – Satin Black

When Gauge Satin Black is dry; paint the front recessed center of the gauge white. When the white paint is dry add the small decal gauge instrument face. When decal is set glue gauge to locator pin. (See pictures below.)

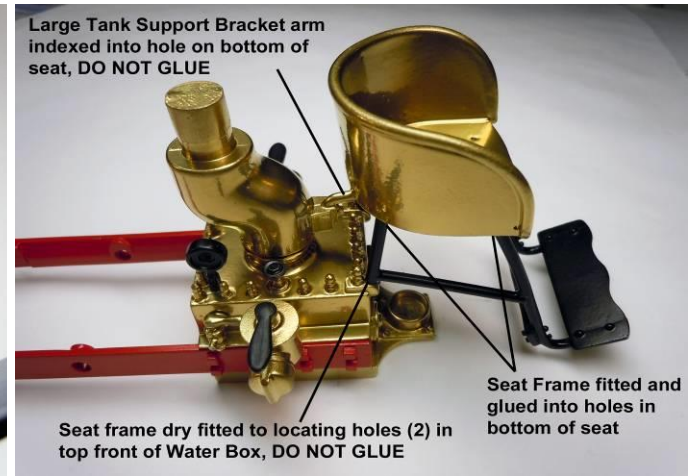


Set assembly aside for later use.



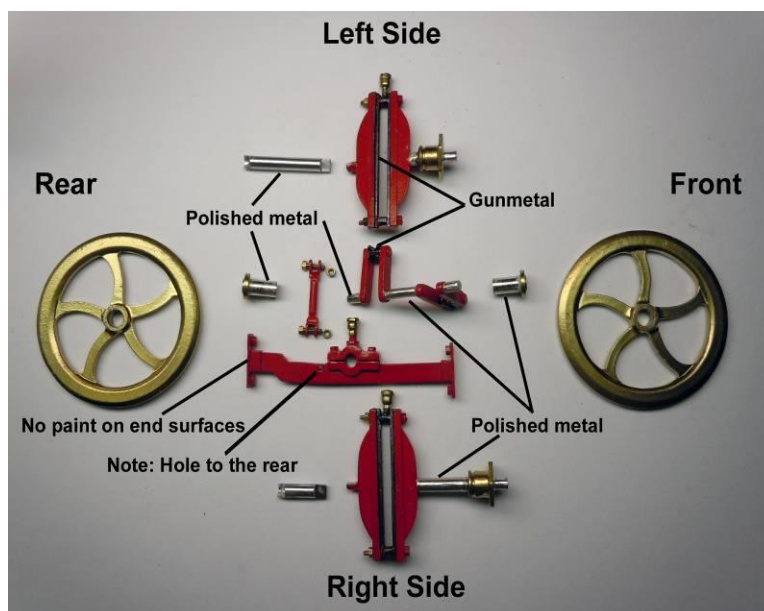
## Building Seat Structure:

Carefully dry fit (**DO NOT GLUE IN PLACE**) the Painted Upper Half of the Water Box in place on the Main Frame. Clean, adjust and dry fit of the Seat Support Frame to the Upper Half Water Box locating holes; as well as, the Seat Holes in the bottom of the Seat and the Large Tank Support Bracket arm. Once satisfied with fit paint both Seat and Large Tank Support Bracket Gold Foil and Seat Frame Support Satin Black. When parts are completely dry glue Seat Support Frame into holes (4) in bottom of seat and set aside for later use.



## Paint and set aside the following parts for the Flywheel Assemblies:

Left and Right Flywheels – Gold Foil  
Crankshaft – Red; Gunmetal and Polished metal  
Left and Right Crankshaft Sleeves – Gold Foil and Polished metal  
Crankshaft Support Arm and Crankshaft Clamp – Red; Gold Foil Oiler  
Adjustment Arm Link – Red. Brass bolt (1) 00-90 x 3/16" and nut (1) 00-90 size.  
Push Rods 1 long; 1 short – Polished metal  
Left and Right Slide Assemblies – Red; Gold Foil; Gunmetal; Polished metal

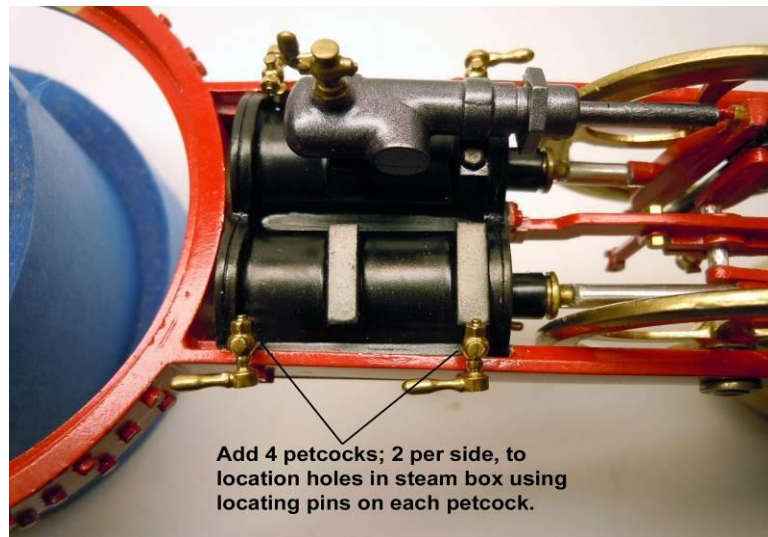


**Set all parts painted Gold Foil aside to dry for 24 hours prior to handling.**

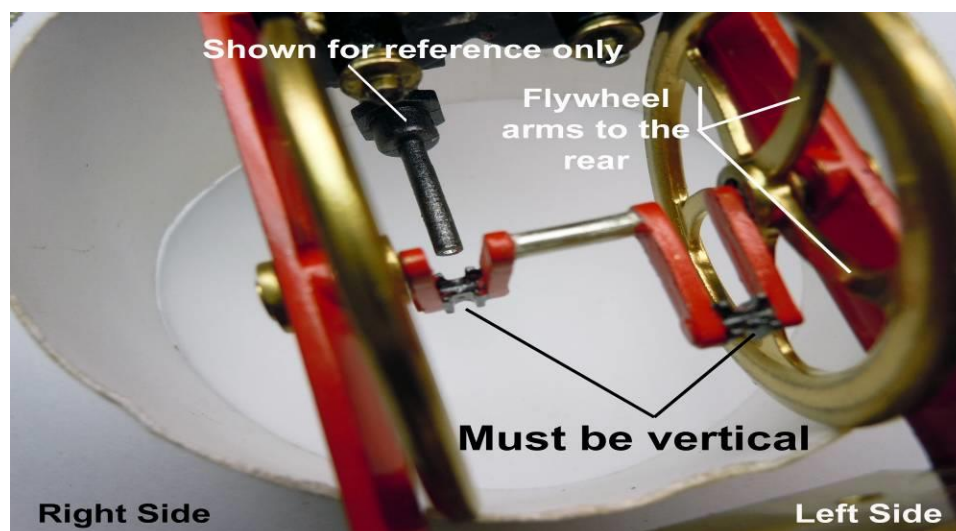
## Assembling the Flywheels to the Main Frame:

**IMPORTANT:** this assembling is critical; study the photos because the crankshaft can be installed backwards

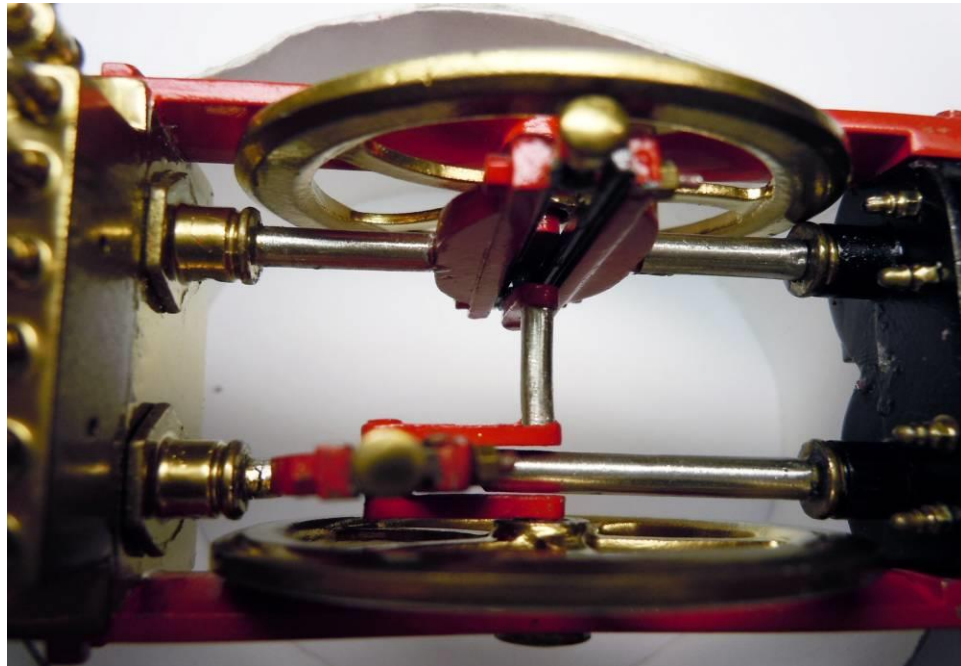
1. Glue the Satin Black Lower Steam Box in place on the Main Frame. Make sure it is **fully seated** in the recessed shoulder and the adjustment button touches the Boiler Ring. Use the Crankshaft Support Arm if necessary as a location gauge.
2. Once the Steam Box is in place glue four (4) petcocks; two (2) per side in the location holes in the Steam Box as shown in the picture below.



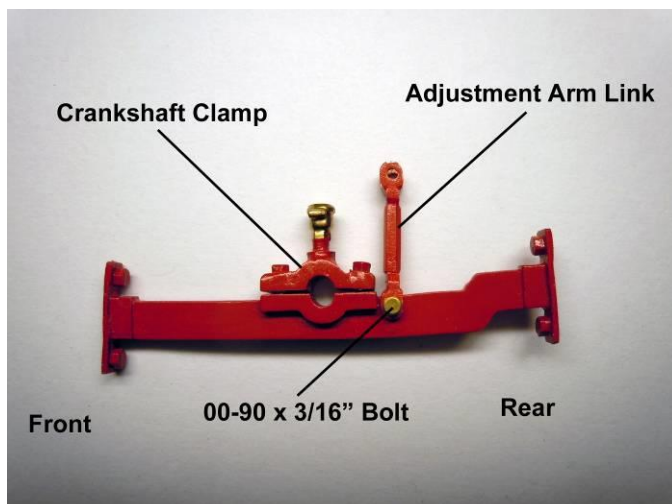
3. Set the Left and Right Crankshaft Sleeves into their respective holes and align flush with the inside of the Main Frame surface.
4. Carefully index the Crankshaft polished ends into the Left and Right Flywheels. The Flywheel arms should point to the rear. (See previous picture) Note the correct Crankshaft orientation in picture below. The Gunmetal painted slides on the Crankshaft **MUST orient vertically** and then carefully insert polished end with flywheel into the hole in the sleeve on one side and gently press the sleeve onto the crankshaft end. Repeat indexing the other side. Once completed the assembly should look like the picture below. **DO NOT GLUE ANY PARTS YET!**



5. Now index the front half of the Left and Right Slide Assemblies into their respective holes one at a time in the rear wall of the Water Box. Use care when indexing the Slide surface into the vertical guide on the Crankshaft. Slight rotation of the Crankshaft may be needed to assure a positive fit. This may require holding the Crankshaft sleeves in place with one hand while indexing parts with the other hand.
6. Check your assembly to make sure all parts are assembled and oriented correctly. Now carefully add a drop of CA glue to the underside of the Left and Right Crankshaft Sleeves on the outside of the frame to hold the sleeves in place.
7. Carefully add the Rear Half of the Left and Right Slide Assemblies indexing the bolt holes onto the bolt shafts on the front half and adding 00-90 nuts to the top and bottom bolt shafts.
8. Now add and glue the Long (Left side) and Short (Right side) Polished Pushrods as shown in the picture below. Note that the half round ends mate to each other.



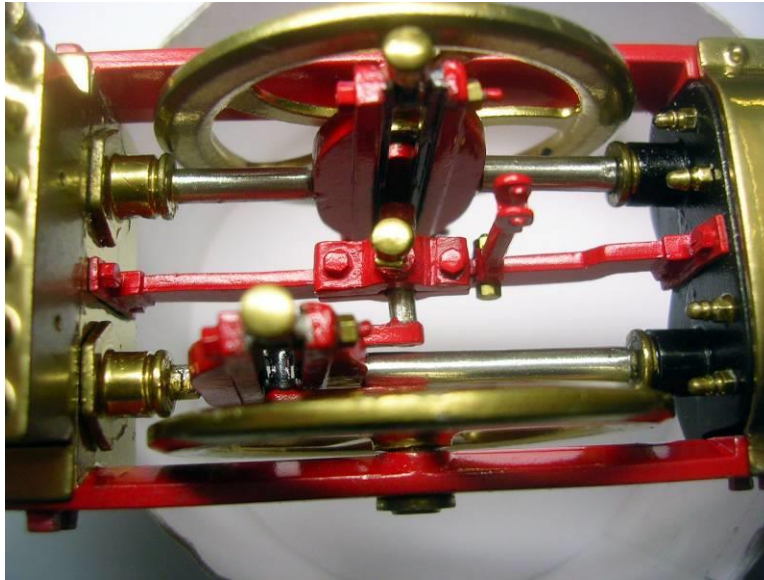
9. Add the Adjustment Arm Link to the Crankshaft Support Arm using (1) 3/16" x 00-90 Bolt and nut as seen below.



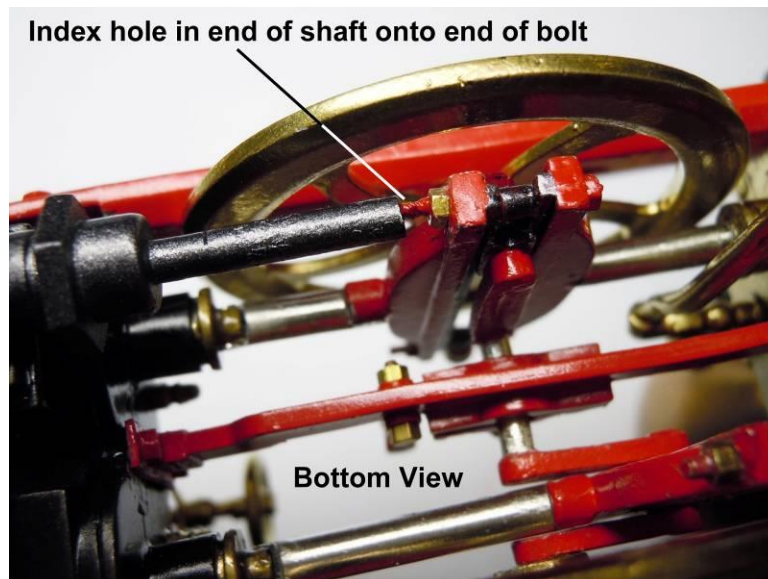
**Note:** The Link is towards the rear of the Pumper. Make sure the end mating surfaces to the walls are clean of any paint.



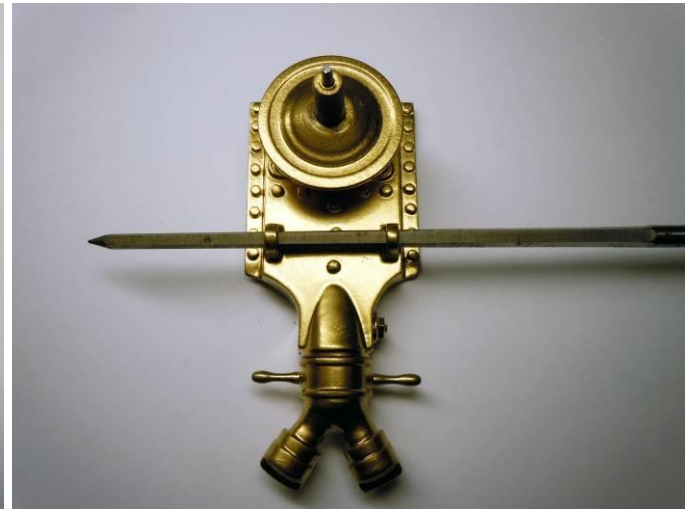
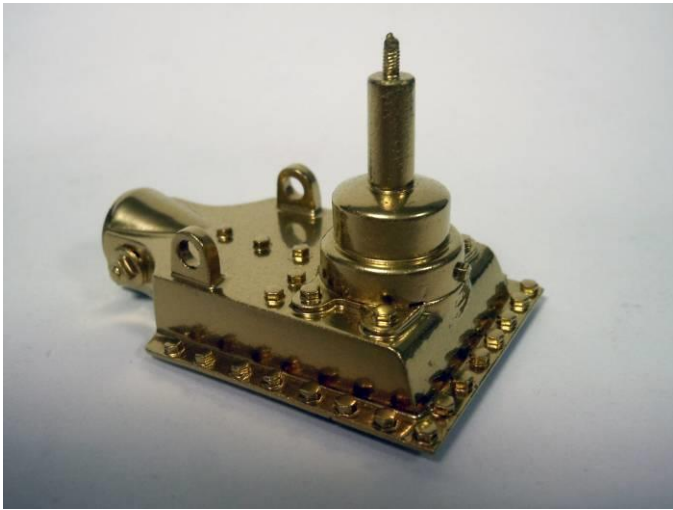
10. Add the Crankshaft Support Arm from the bottom side of the Main Frame on centerline and very carefully move into place touching the polished center section of the Crankshaft. Check centered location as seen in picture below and add a drop of CA glue to the bottom edges of the end of the arm. Then turn Main Frame right side up and glue Crankshaft Clamp with Oiler in place as shown in picture.



11. Now center and align the Slide Assemblies to look correct and in position. Then carefully add CA glue to the holes inside the Water Box to secure the hex shapes in place on the rear wall of the Water Box.
12. Carefully add the painted (Gunmetal) Steam Box Manifold using the locating pins into the holes on the Steam Box and index the 1/32" hole in the end of the shaft to the bolt end at the bottom of the Right Side Slide Assembly.

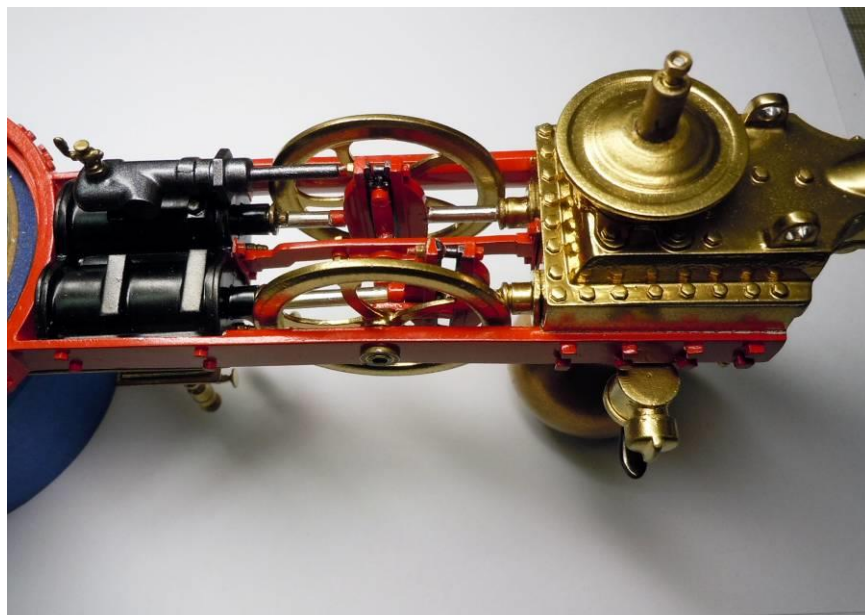


Paint and let dry the Lower Half of the Water Box. **Do not paint the threads on the axle shaft.** Then glue the front Hose Inlet in place; make sure the handles are parallel to the ground. Then slip on the round Front Axle Grease Trap and glue in place. Once completely dry, ream excess paint and dry fit the Brake Crossover Bar. Once finished reaming the holes glue in place the Hose Inlet with the handles parallel to the ground as seen in picture below.

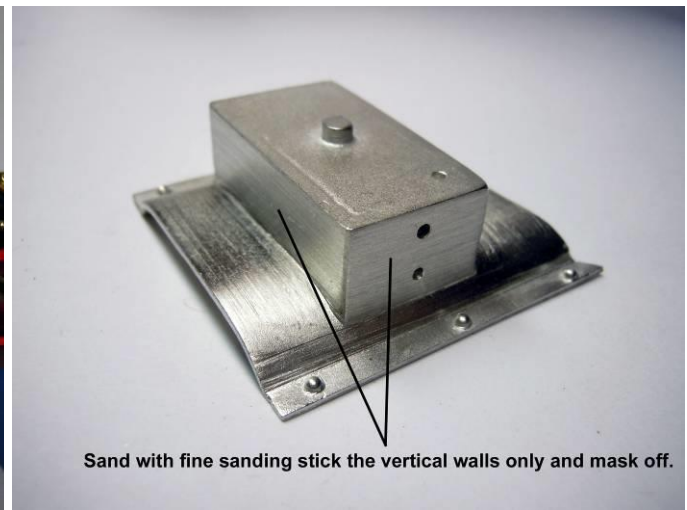
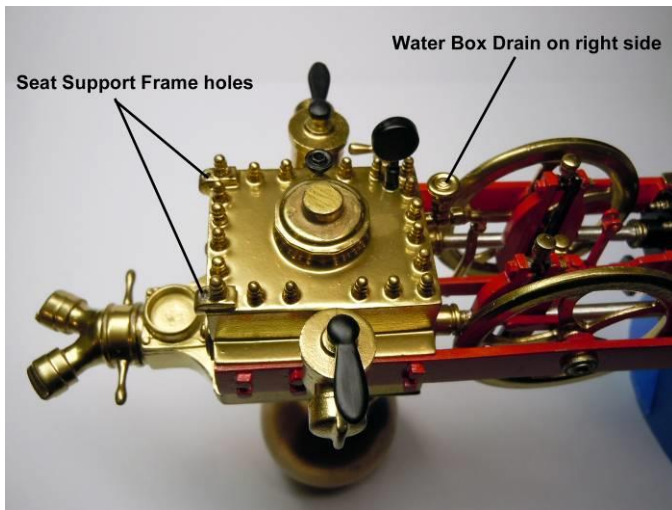


Dry fit the painted Brake Crossover Bar; it should slip fit without removing any paint from the Bar. Use a ream to remove excess paint and or material and work the ream from both sides to attain an even fit. When satisfied with the fit remove the Brake Crossover Bar and set aside for later assembly.

Carefully glue the Lower Half of the Water Box in place on the Main Frame. **Be extremely careful applying CA glue it can damage the Foil paint finish.**



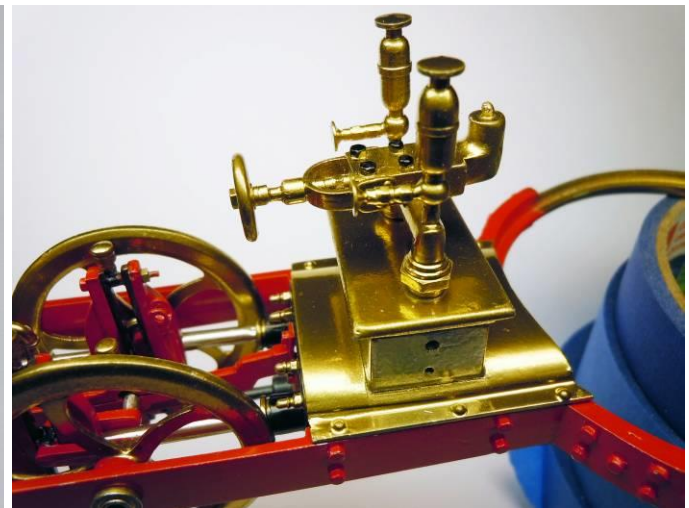
Carefully glue the Upper Half of the Water Box in place on the top of the Main Frame. Once the Water Box glue has set add the Water Box Drain to the locator hole on the right rear wall of the Water Box.



Locate the Steam Box Cover and sand the vertical walls only with a fine sanding stick with the sanding marks being horizontal. Then mask off the walls and paint the rest of the cover with Gold Foil paint.

Also paint with Gold Foil the Manifold Top Cover; the Manifold and Manifold Shut Off. Glue the Top Cover in place; note that the Top Cover underside has a hole and pin and can only be glued in place one way.

Then glue the Manifold Shut Off in place to the Manifold; also paint the six (6) nuts Satin Black. Make sure the parts index to each other properly before gluing. Glue the Manifold Assembly to the Top Cover indexing into the two holes in the Cover.

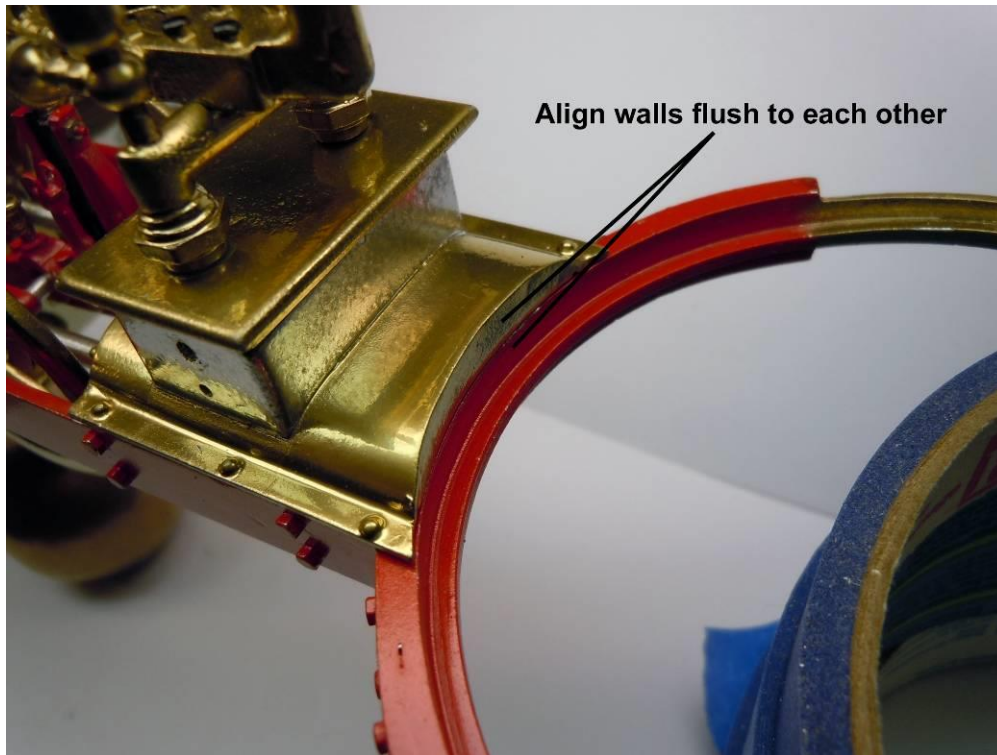


**IMPORTANT:** Let all the glued parts set before proceeding to the next step.

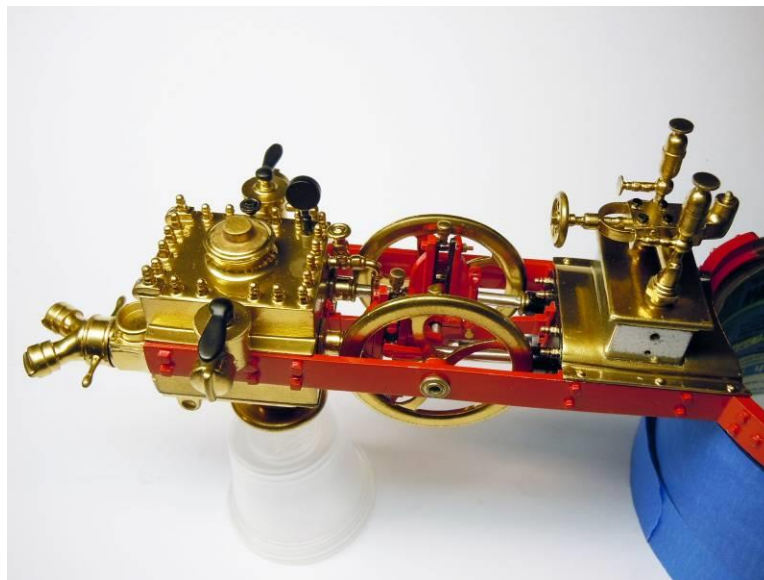
Dry fit the entire Manifold Assembly to the Main Frame.



**IMPORTANT:** The two walls; the rear wall of the Steam Box Cover and the wall of the Boiler Ring must match. Later the Stainless Steel Boiler Wall will rest against these two surfaces. Once comfortable with the assembly fit glue the Manifold Assembly in place to the Main Frame.



Here is an overall view of what should be built so far.

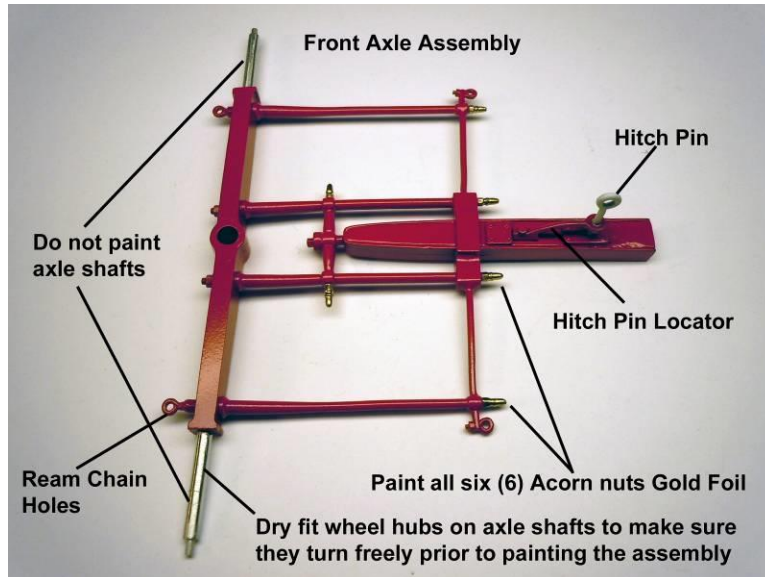


### **Front Axle:**

Clean, file and sand all parting lines on Front Axle Assembly. Carefully ream small chain holes (2) on the back of the axle. Dry fit the Wheel Hubs to the unpainted axle shafts to make sure they turn freely when inserted on the axle shafts. Ream and dry fit the Hitch Pin Locator and Hitch Pin to Front Axle Assembly.

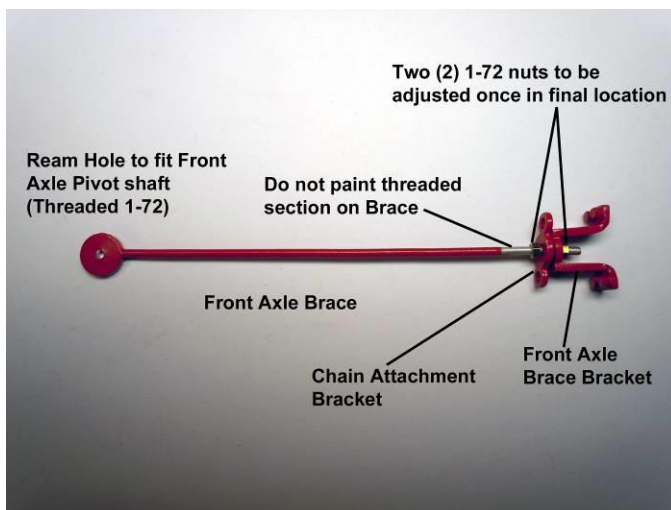
Prime and paint the following parts; Front Axle Assembly, Hitch Pin Locator and Hitch Pin. Once all are dry use the Hitch Pin to align the Hitch Pin Locator to the hole in the Axle Assembly and glue the locator only in place.

The Hitch Pin is shown in picture below as primed for clarity of seeing the parts. Paint all the Acorn Nuts six (6) with Gold Foil paint and set assembly aside for future use.



Clean, file and dry fit the Front Axle Brace, Front Axle Brace Bracket and Chain Attachment Bracket with (2) 1-72 nuts.

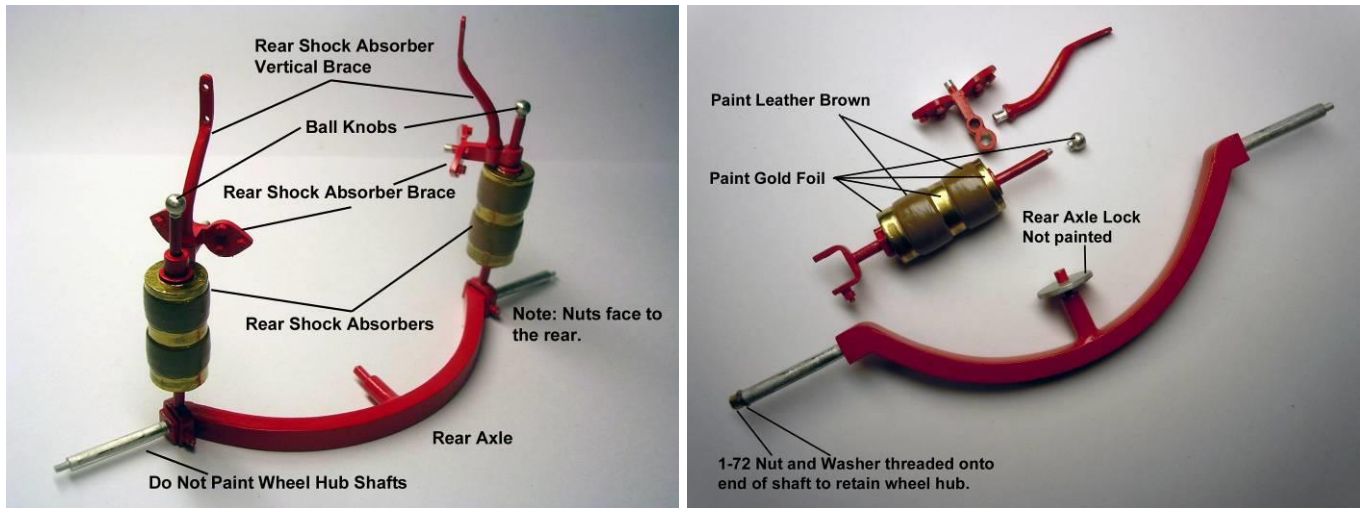
Ream the Brace hole to slip fit on the threaded portion of the Front Axle Pivot. Then carefully and slowly thread on the 1-72 nut without cross threading the threads. Then paint all parts red except **Do Not Paint** the threaded section on the Brace. (See Photos below)



## Rear Axle:

Clean, file and dry fit all the following components for the Rear Axle – Rear Axle (1); Rear Shock Absorber (2); Rear Shock Absorber (2); Rear Shock Absorber Ball Knob (2); Rear Shock Absorber Vertical Brace (2).

Once all parts are dry fitted then prime and paint as indicated in picture below. Do Not Glue any parts yet and set aside for later use.



### Boiler Smoke Stack:

Clean, file and dry fit all the following components for the Boiler Smoke Stack – Boiler Top Ring (1); Smoke Stack Section (1); Boiler Top (1); Boiler Cap Ring (1); Boiler Top Ring (1)

As with the Main Frame ring if truing to round is necessary on the Boiler Top Ring; use the Boiler Cap Ring as a fixture to make round prior to priming and painting. Dry fit all parts prior to priming and painting and allow for paint thickness or clean paint from mating surfaces. Some parts may be tighter than others due to variation in shrink rate based upon the mass of the part.

Once satisfied with all fits prime and paint as indicated in the pictures below and set aside to thoroughly dry prior to handling later.



### Coal Bin:

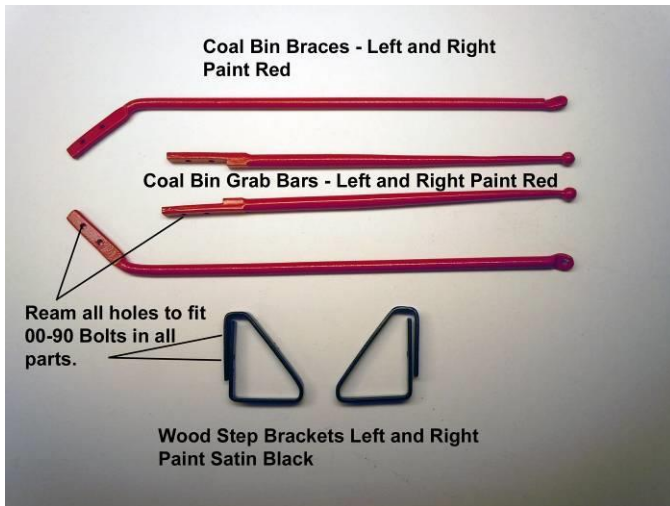
Clean, file and dry fit all the following components for the Coal Bin – Coal Bin (1); Coal Bin Grab Bars (2); Coal Bin Braces- Left and Right (2); Wood Step Brackets (2). Bolts 00-90 x 3/16" Prime all parts then paint the Grab Bars and Coal Bin Braces Red. Ream holes of excess paint for 00-90 bolts.



Mask off the areas on the Coal Bin not to be painted Red and paint the top and bottom Red first and let completely dry.

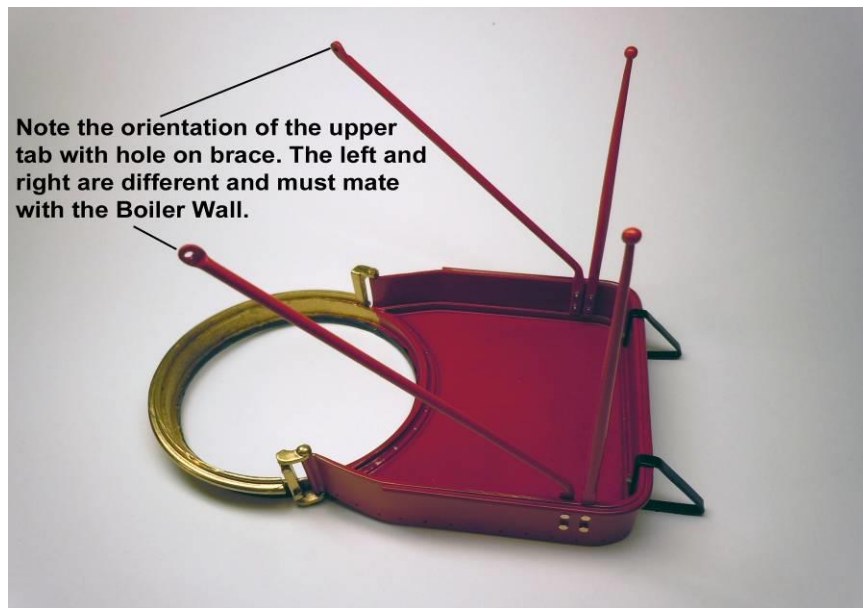
Mask off the painted Red areas and then paint the brackets and ring Gold Foil. Let dry; then paint the surface with the rivets below the Gold Foil ring Satin Black with a suitable brush completely around the band.

Now paint the two Wood Step Brackets Satin Black. Let all parts dry completely before assembling.



First, carefully spread the vertical arms of the Wood Step Brackets and gently slip over the top edge of the Coal Bin and align the bolt holes. Now insert the 00-90 x 3/16" bolt from the rear into the holes and add the nut from the inside of the bin. **DO NOT OVER TIGHTEN** or you can break the bolt.

Once the Wood Step brackets are bolted in place now add the two Grab Bars and note that the bar indexes onto the top edge of the Coal Bin and bolt them in place using 00-90 x 3/16" bolts and nuts.



Now add the two Coal Bin Braces and **NOTE:** the left and right orientation of the tabs that mate with the Boiler Wall. Using 00-90 x 3/16" bolts and nuts bolt the braces in place. These braces will need adjustment once the Upper Boiler Wall is added.



**Stained Laser cut Wood Step with four (4) brass pin heads glued and trimmed in place then added to the step brackets with the pin heads centered on the brackets.**

Trim, clean and stain the laser cut Wood Step. Glue four (4) pins in place and trim and file flush with the bottom surface of the wood step. Then slip the step into the brackets and align the pin heads with the center of the brackets. Once the step is located, glue in place from the bottom side of the step.

Set Coal Bin assembly aside for later use.

## Painting Parts:

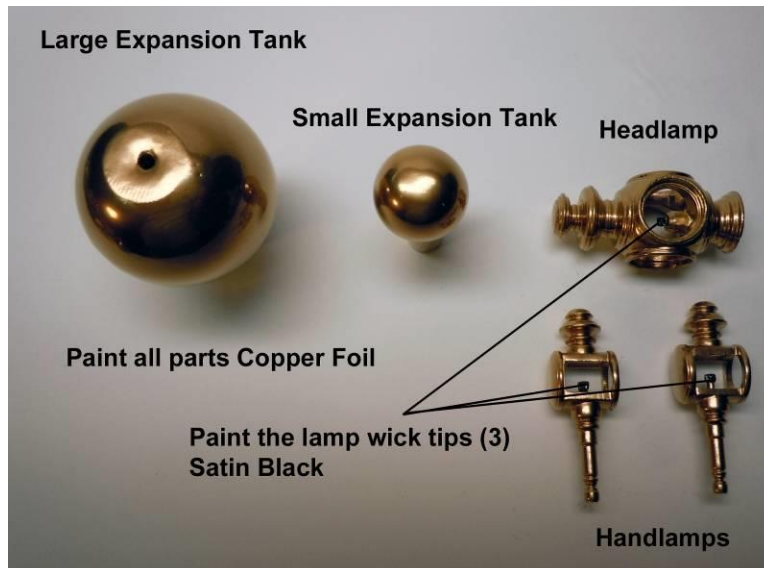
Now it would be a good time to prime and paint the balance of parts if not painted already and set them aside to thoroughly dry before handling for assembly. They have been organized into like groups to be painted. Prime all parts with White Primer which really enhances the plated effect of the Foil paints. Make sure the primer is completely dry before painting with Foil paints.

Paint all parts the Foil Paint color first and let completely dry (24 hours); then add the second color as needed. Set all parts aside to completely dry and set before assembly.

### Copper Foil Parts:

Clean, file, prime and paint Copper Foil dry fit all the following components – Large Expansion Tank (1); Small Expansion Tank (1); Headlamp (1); Hand Lamps (2). Dry fit the Headlamp into the hole on top of the Large Expansion Tank.

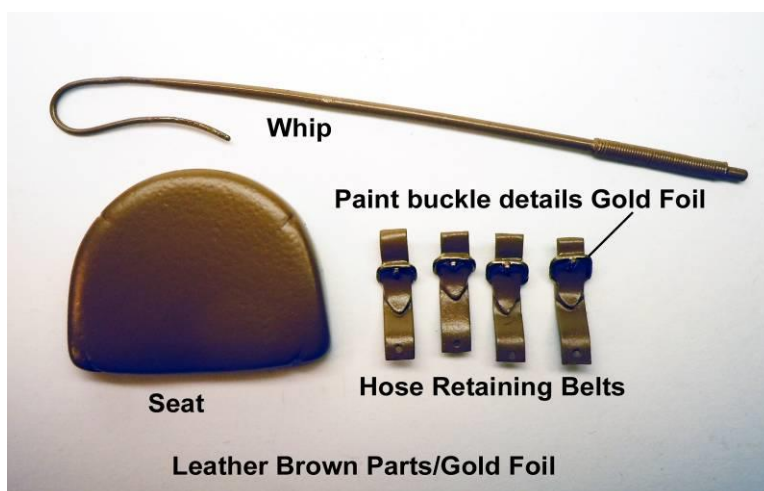
When dry paint the wicks Satin Black for the Headlamp and Two (2) Handlamps. Then set aside all parts for later assembly.



### Brown Leather / Gold Foil Parts:

Clean, file, prime and paint Flat Leather Brown the following components – Whip (1); Seat (1); Hose Retaining Belts (4). Dry fit Hose Retaining Belts holes onto Front and Rear Hose Support Brackets posts; ream to fit if necessary.

When Hose Retaining Belts are fitted and Leather Brown paint is completely dry; paint the buckle details Gold Foil with a very fine brush. Then set aside all parts for later assembly.

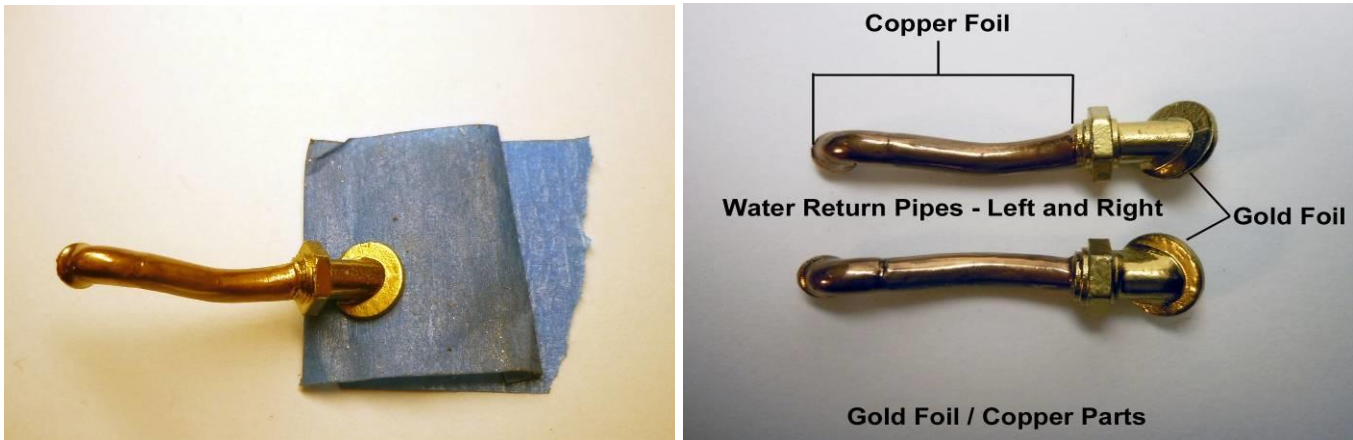




## Gold Foil / Copper Foil Parts:

Clean, file, prime & paint Gold Foil the following components –Water Return Pipes -Left(1) & Right(1).

These parts can be stuck to a piece of doubled over masking tape for ease of handling and painting as shown below. After priming mask off the portion to be painted Copper Foil and then paint the rest with Gold Foil.



Once the Gold Foil is completely dry remove masking tape and paint the Copper Foil area that was masked off using a quality brush. **Masking off Foil Paints will mar the finish.**

A second coat of Copper Foil may be needed to remove any brush marks. Then set aside all parts for later assembly.

## Gold Foil / Satin Black Parts:

Clean, file, prime and paint Gold Foil the following components – Boiler Pressure Gauge(1); Pressure Release(1); Main Drain(1); Center Pressure Release(1); Adjustment Arm(1); Adjustment Arm Knob (1); Left Flywheel Arm(1) and Link(1); Right Flywheel Arm(1) and Link(1).

**NOTE:** The threaded ends of the Flywheel arms index into the holes of the links. The holes in the links may need to be carefully drilled to enable the slip fit.

Once all the parts are painted Gold Foil; let them dry completely and then with a quality brush, paint the identified areas on each part Satin Black. Then set aside all parts for later assembly.

Paint the boiler pressure gauge instrument face flat area white as shown in the picture below.



## Gold Foil Parts:

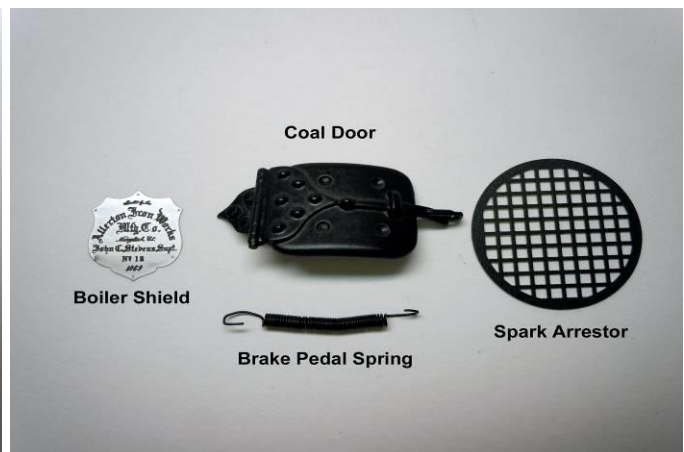
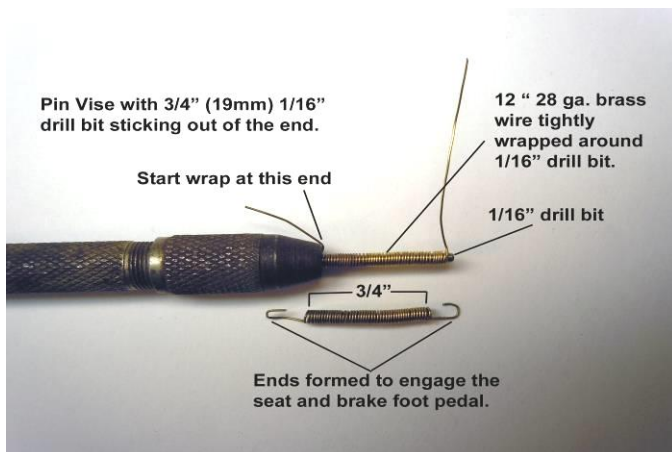
Clean, file, prime and paint Gold Foil the following components – Hose Nozzles(2); Steam Whistle(1); Hub Caps(4); Front Hose Support Brackets(2); Rear Hose Brackets(2); Boiler Water Sight Gauge Top (1) and Bottom(1); Whip Holder(1); Front Hose Nozzles(4); Rear Hose Nozzles(4); Valves(4); Steam Box Petcocks(4). Then set aside all parts for later assembly.



## Satin Black Parts:

Clean, file, prime and paint Satin Black the following components – Boiler Coal Door(1); Spark Arrestor(1); Boiler Shield(1); Brake Return Spring(1) Brake spring to be fabricated.

Fabricate Brake Return Spring using 12 inch long piece of 28ga. Brass wire wrapped tightly around a 1/16" drill bit held in a pin vise with 3/4" of the drill bit sticking out. Once tightly wrapped remove wire coil from drill bit and form the two ends carefully with small needle nose pliers to engage the holes in the seat rim and brake foot pedal. Dry fit to make sure they fit in holes then paint with Satin Black paint and set aside for later use.



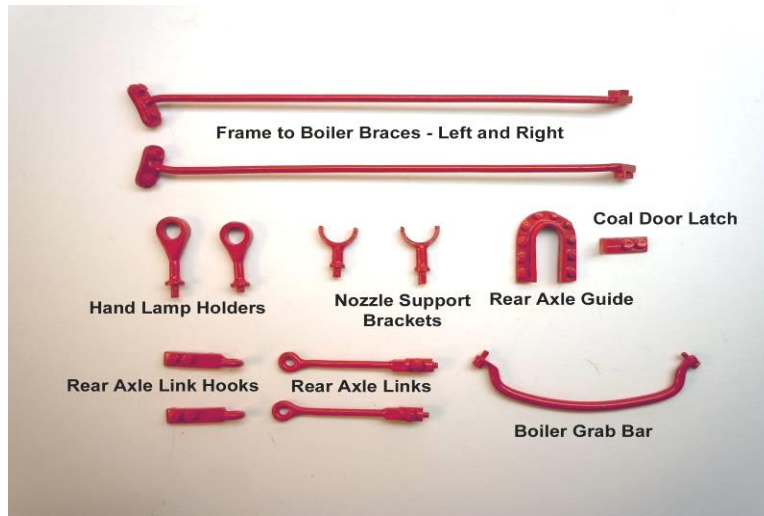
Paint the Coal Door and Spark Arrestor. Then with a small brush fill the lettering in the Shield with black paint and allow paint to dry. Sand off the excess paint on the surface so that just the lettering is black paint filled.

Then set aside all parts for later assembly.

## Red Parts:

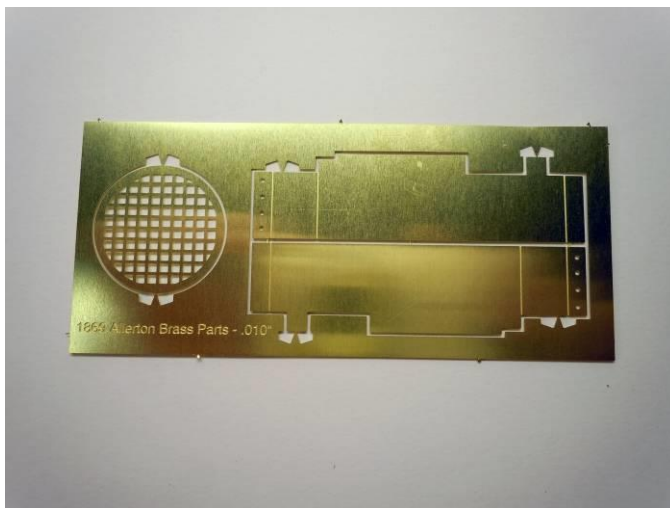
Clean, file, prime and paint Red the following components – Frame to Boiler Braces – Left(1) - Right (1); Hand Lamp Holders(2); Nozzle Support Brackets(2); Rear Axle Guide(1); Coal Door Latch(1); Rear Axle Link Hooks(2); Rear Axle Links(2); Boiler Grab Bar(1); Coal Bin Buckets- Left(1) - Right(1) to be fabricated; length of Chain; Jump Rings(4).

Dry fit the Hand Lamps into the Hand Lamp Holders and Rear Axle Links onto the Rear Axle Hooks. Ream the holes in parts, if necessary prior to painting Red. Then set aside all parts for later assembly.



## Coal Bin Buckets:

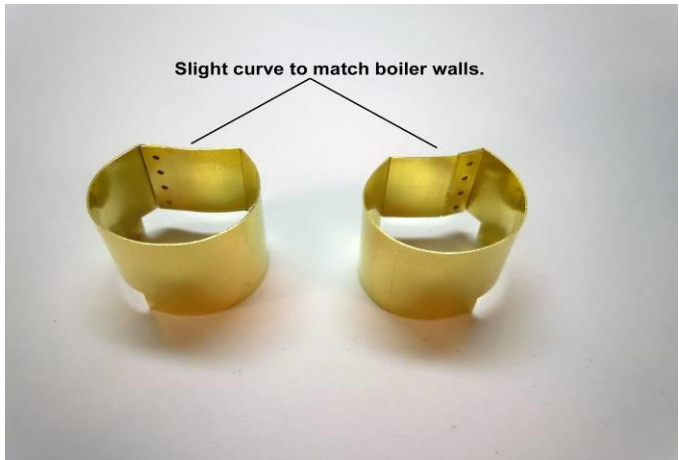
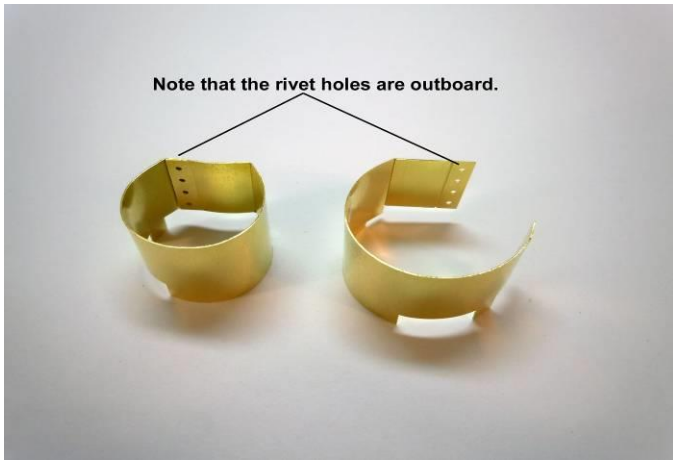
Cut the two Bucket parts from the Photo etched Brass Parts sheet and file clean the edges where the tabs attached. There is a left and right Coal Bucket



Now slowly form the center area of the buckets into a circle using a round object as a forming mandrel. Note in the picture below that the rivet pattern is located outboard or opposite each other. Once the circle is formed glue the rivet section to the inside of the end aligned with the half etched line.

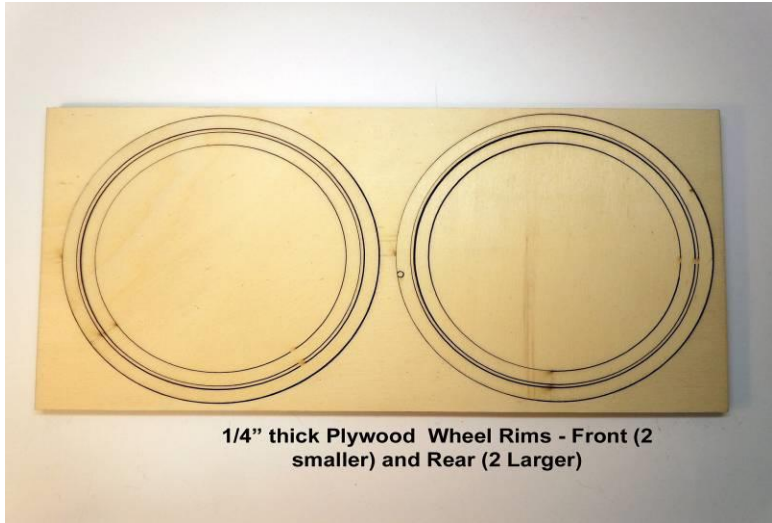
Once glue has set completely, form a very slight concave on the flat surface to mate with the boiler wall. Then when both are formed, prime and paint them Red. Then set aside for later use.



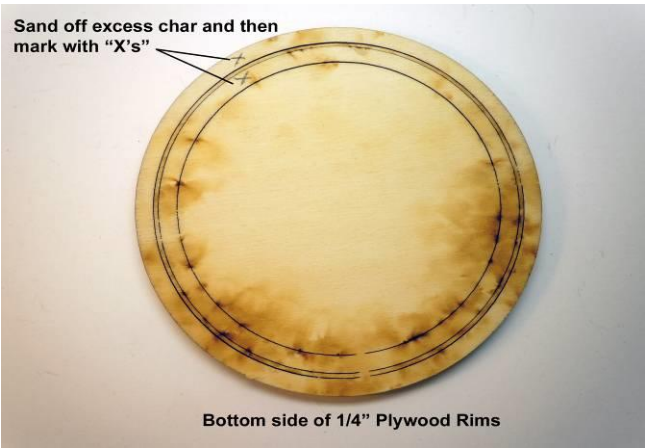
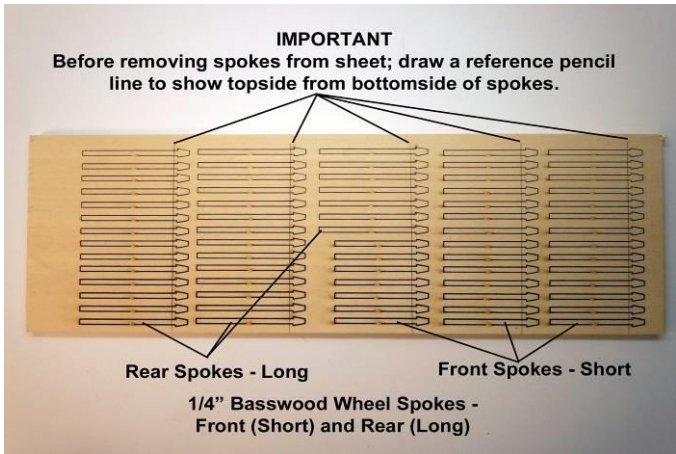


**Wheel Assembly:**

Locate and sand the bottom sides of the Plywood Wheel Rims Sheet and the Wheel Spokes Basswood Sheet to remove any excess charring from the laser cutting operation. This is easier to do before removing all the parts from their carrier sheets.

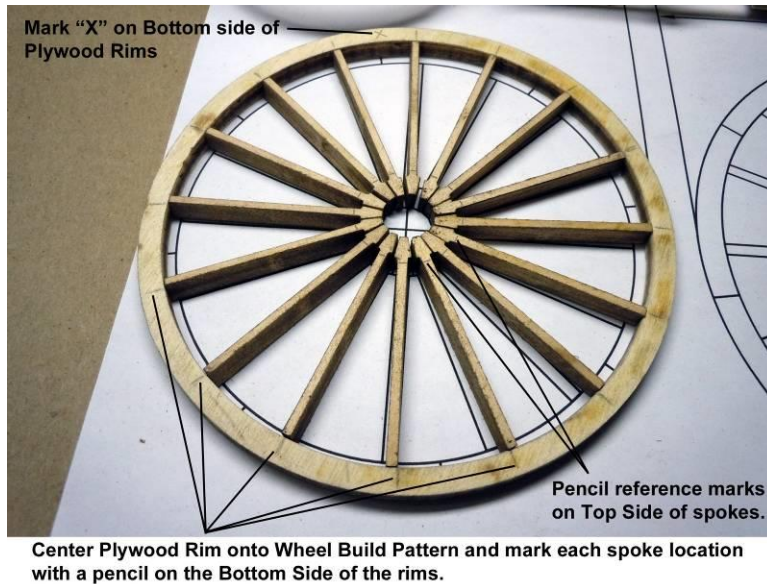


Once sanded, mark the Basswood Spokes as indicated in picture below with a reference pencil line. **This is important** for later on in being able to identify the top side from the bottom side when inserting the spokes into the wheel hubs and rims. Now mark an "X" on the bottom side of the Plywood Rims.



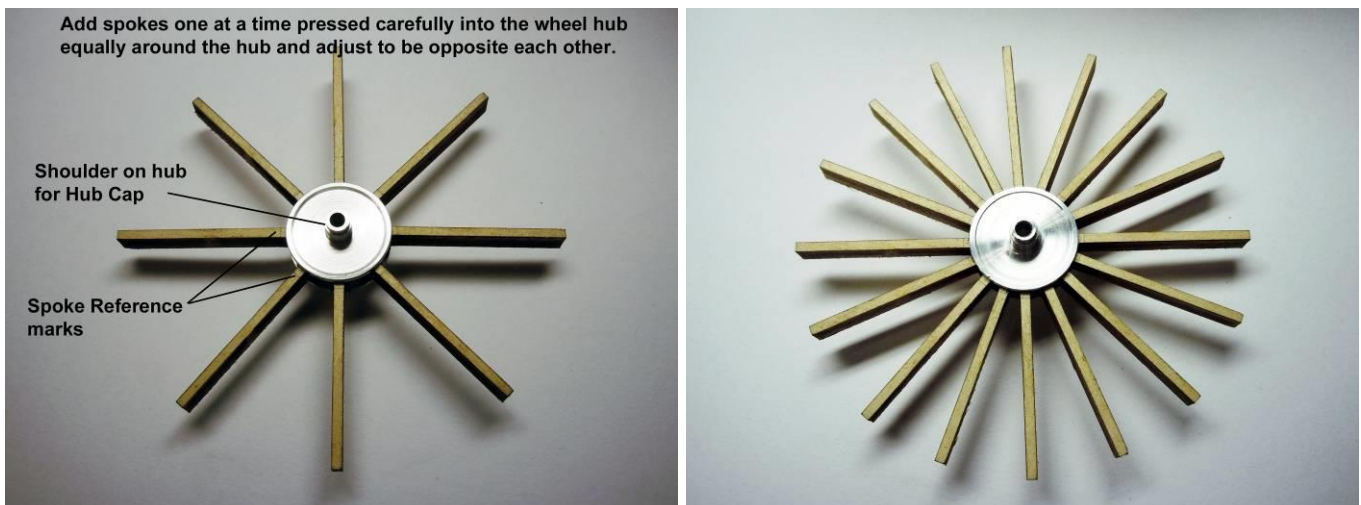
Remove only the parts needed to build one wheel at a time cutting them from their carrier sheets using a sharp Xacto blade. For each wheel build front or rear, the following are needed – Metal Wheel Hub (1); 1/4" Plywood Rim (1) and 1/4" Basswood Spokes (16). Scrape and sand excess charred material from all edges of all parts. **NOTE: Do Not Sand off Reference Pencil Lines or "X's"**. The back flat edge of a Xacto Blade is a very effective scraping tool to remove the char. The outer edge of the 1/4" Plywood Rim needs to be sanded square; a very slight angle results from the laser cutting operation and sanding square will enable the Tire (Gasket Material) to lay flat when added later.

Once Rim and Spokes are ready to assemble; locate the Wheel Build Pattern a printed sheet and lay it on a flat building surface. Take the Plywood Rim and lay the Rim on the pattern centering the Rim on the correct size wheel perimeter drawing; now mark the center of each spoke location in the bottom side of the Plywood Rim as seen in photo below.



The photo above shows how the Spokes with the reference marks and the Rim with the "X" will index to each other once the Spokes are added to the metal hub. The slight angles formed with the laser cutting on the end of the Spokes will mate flush with the angle on the inside of the Rim.

Add the Spokes to the metal Wheel Hub one at a time carefully pressing them into the Wheel Hub. They must be spaced equally and opposite from each other. In the photo below; note that the shoulder on the Wheel Hub for the Hub Cap is up.



Once all the Spokes are pressed in place into the wheel Hub adjust for equal spacing and seated against the inner Hub wall. Carefully fit the Rim with the reference marks aligning on center with the end of the Spokes and Rim mating surfaces matching. Adjust any spoke spacing carefully at this time and then using CA glue all the spokes in place to the Rim and Wheel Hub.



Once CA glue has set mask off both sides of the Wheel Hub and prime both sides. When primer is dry add new reference pencil marks on both sides of the spokes 1/4" from the edge of the Wheel Hub. These will be used as reference point when carving taper to the side of the Spokes.

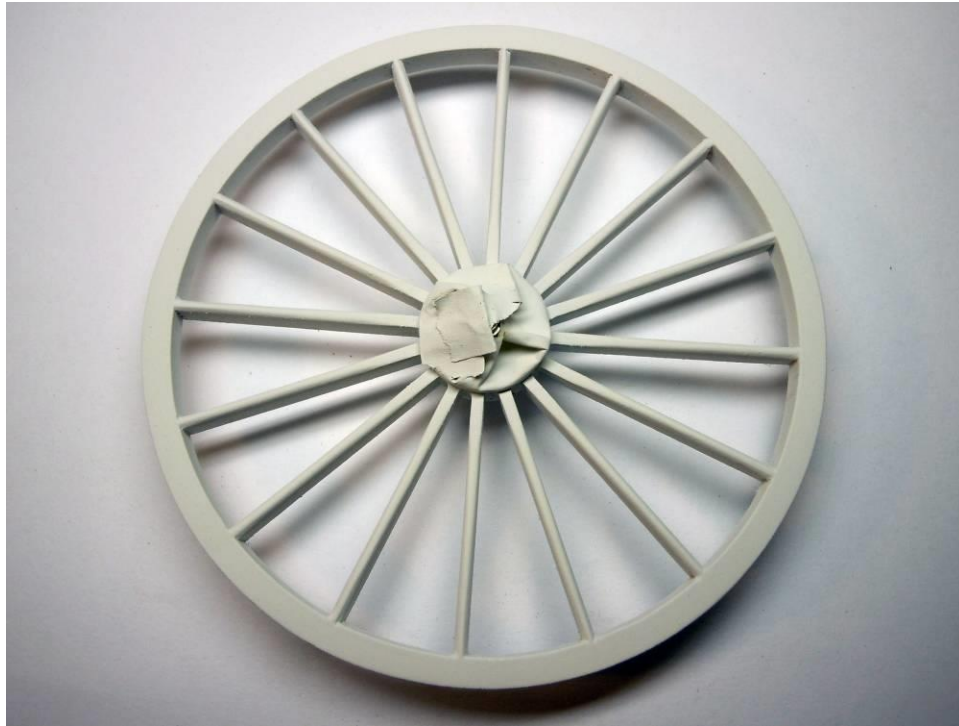
Once primed add new reference marks on both sides of the spokes 1/4" from the edge of the hub. These will be used as cut to lines for carving the taper on the spokes.



Using a sharp Xacto Blade carefully and slowly carve a chamfer starting at the reference mark towards the Rim on each side of the Spoke using the Rim to hold in one hand. Be careful not to cut away too much wood; it is better to use several small cuts in a slicing action than to carve all in one cut. Carve one side of the wheel completely starting on the inside of the wheel to get the feel of the carving required and then move to the outside which is more visible on the finished model. Then finish sand and file with small needle file to final shape on both sides of the Spoke which should be an oval cross section at the Rim tapering to a rectangle at



the reference mark. Prime and sand again if necessary to achieve the final shape of the Spokes. Also any gaps between the spokes at the Hub can be filled with filler putty using a round toothpick and carefully sanded as needed.

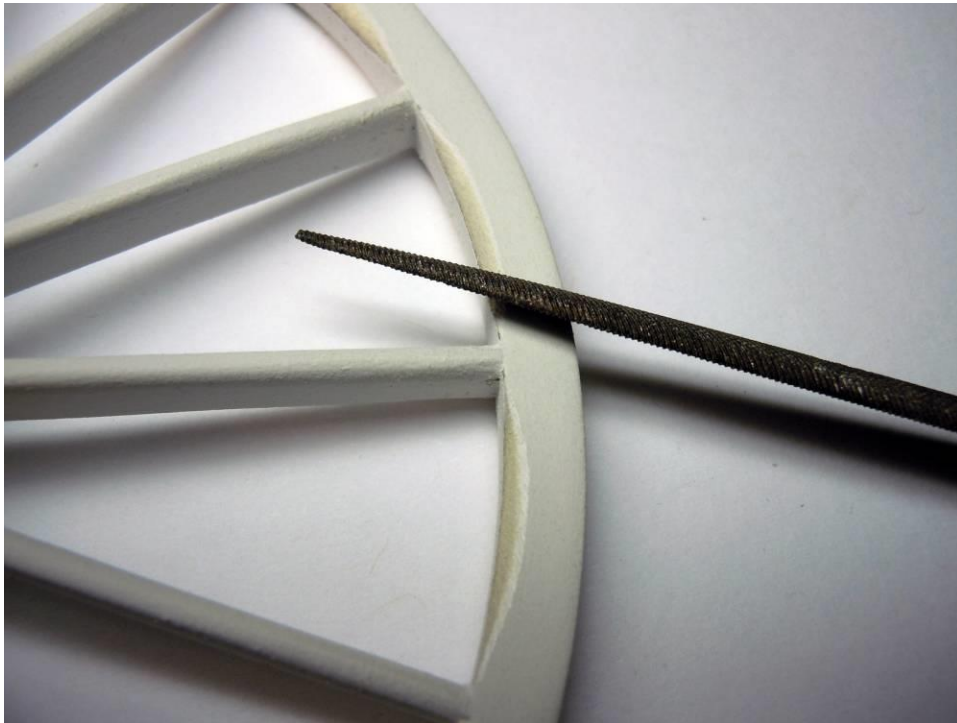


This shows the final shaping of the spokes.

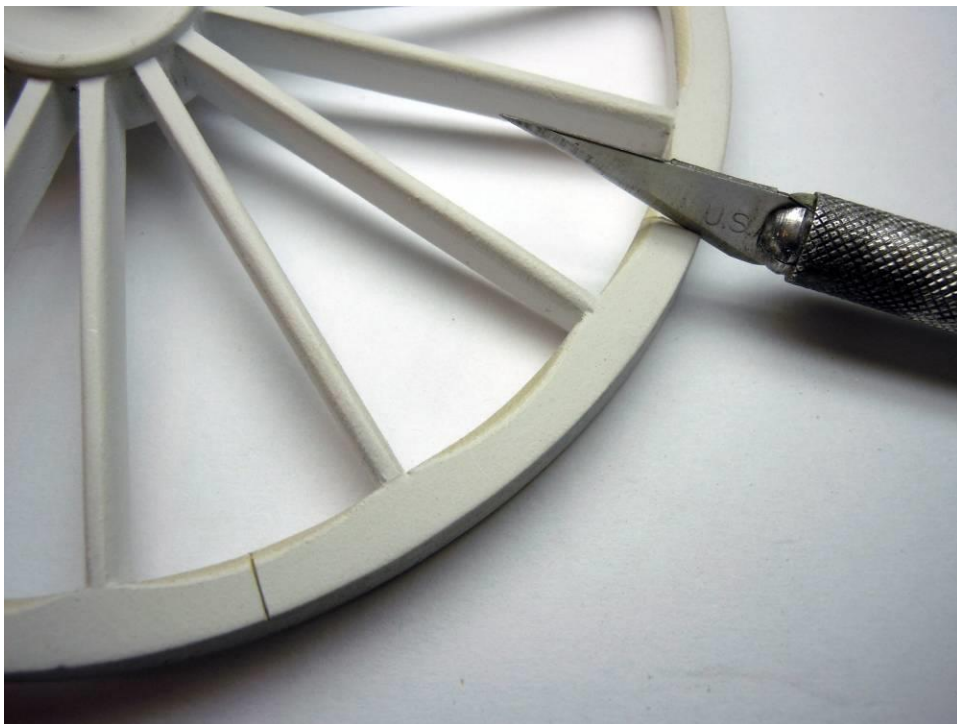
Next is the carving and shaping of the Plywood Rim. Using a sharp Xacto Blade slowly and carefully carve with a slicing action a tapering arc between the Spokes on each side of the Rim.



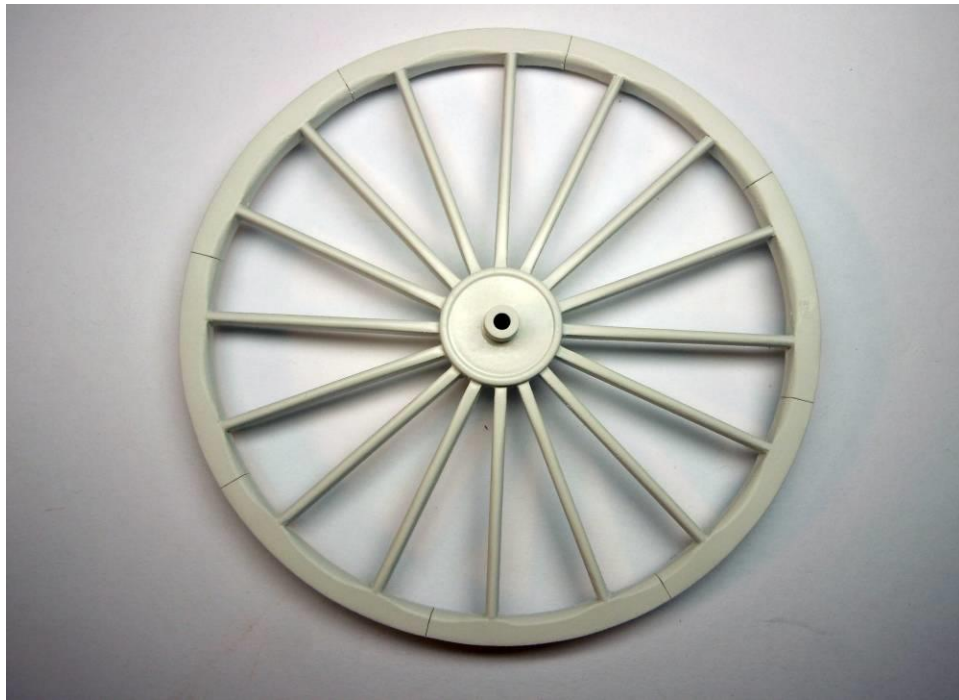
Once all the Rim arcs are carved evenly on both sides of the rim then slowly and carefully file and blend the surfaces of wood and primer.



When finished blending all surfaces apply a coat of primer to all surfaces and set aside to dry completely.



Now with a sharp Xacto Blade press a score line from Rim edge around to the center of the inside of the Rim on center between two spokes and repeat between every other Spoke then turn the wheel over and do the same but matching the on the first side. These represent the joint lines of the Rim sections. When all cuts are completed sand lightly to remove ridges on cut edges.



Prime and sand until satisfied with the completed wheel finish on both sides. Allow primer to thoroughly dry. Dry fit and adjust if necessary, the press fit of the Hub Cap onto the Wheel Hub shoulder.

Once dry then paint the entire completed wheel Red. Mask off Wheel Hub shoulder if necessary to avoid excess paint build up. The goal is for the Hub Cap to be a press fit onto the Wheel Hub.

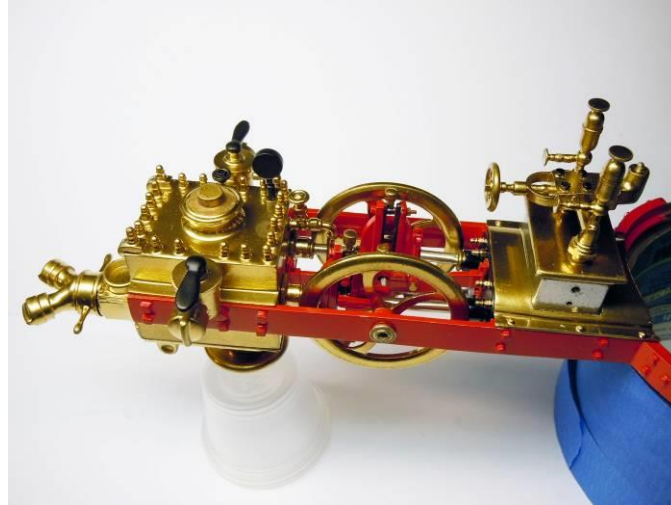


Now repeat and build the other three wheels and set aside for assembly later.



At this point all wheels should be built and all parts painted for final assembly. Below is a picture of where the Main Frame sub assembly should be at to this point. Larger, heavier parts have been set aside so the Main Frame will be easier to work with and lighter moving forward in the Pumper assembly.

When handling the Main Frame try to avoid hand contact with the Gold Foil painted parts and hold using the painted red frame when adding parts moving forward.



## Front Axle Assembly

Carefully with a firm grip on the red section of the Main Frame lift and turn the Main Frame upside down and slip the Front Axle Assembly onto the Pivot Shaft. Then slip the Front Axle Brace in place on the Pivot Shaft and add the 1-72 Nut to hold the Front Axle and Brace in place. This step is easier to accomplish while the Main Frame unit weighs less and is easier to handle.



Now slip on the front Wheels and rest the Main Frame ring on a suitable prop parallel to the ground. The Front Axle brace should be centered towards the rear of the pumper. Since the front Wheels are just slipped on for now be careful when handling so the Wheels do not inadvertently come off and cause damage. Later, the Front Wheels will be removed to add Brake Linkage.

## Assembling Boiler Walls:

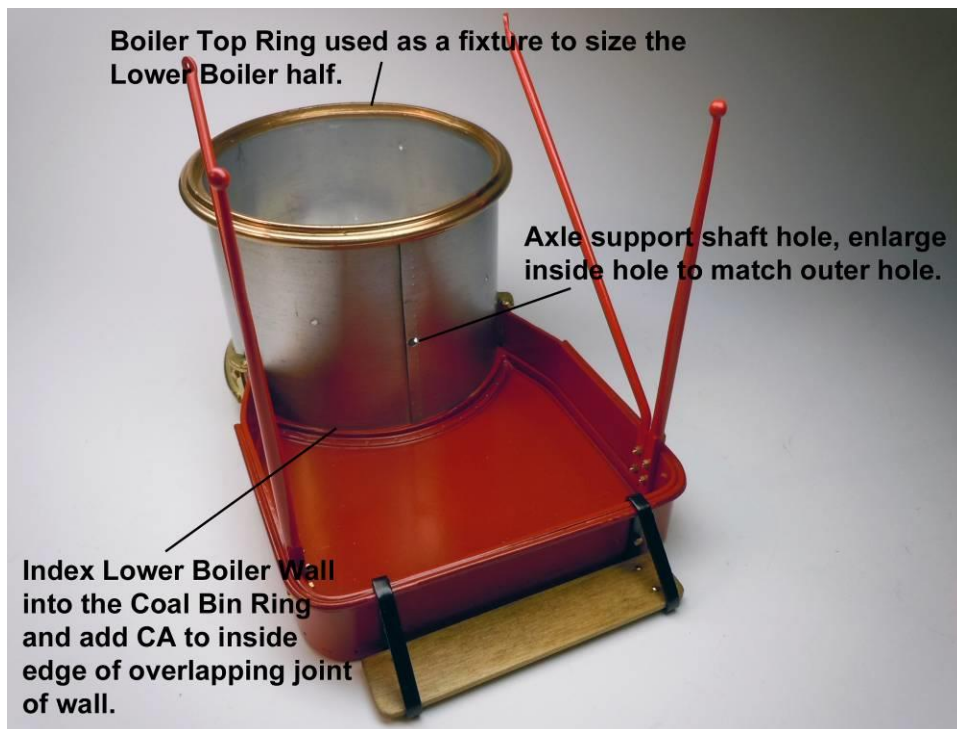
The Upper and Lower Walls were formed earlier. Now using the Lower Boiler Wall **dry fit** the bottom edge (verify which is the bottom edge on the plan sheet by looking at the hole pattern) of the Lower Boiler Wall to the inside wall of the Coal Bin while aligning the center of the axle support shaft hole with the center rivet located on the edge of the Coal Bin floor joint. **This Alignment is Important for the correct alignment of the rear axle.**

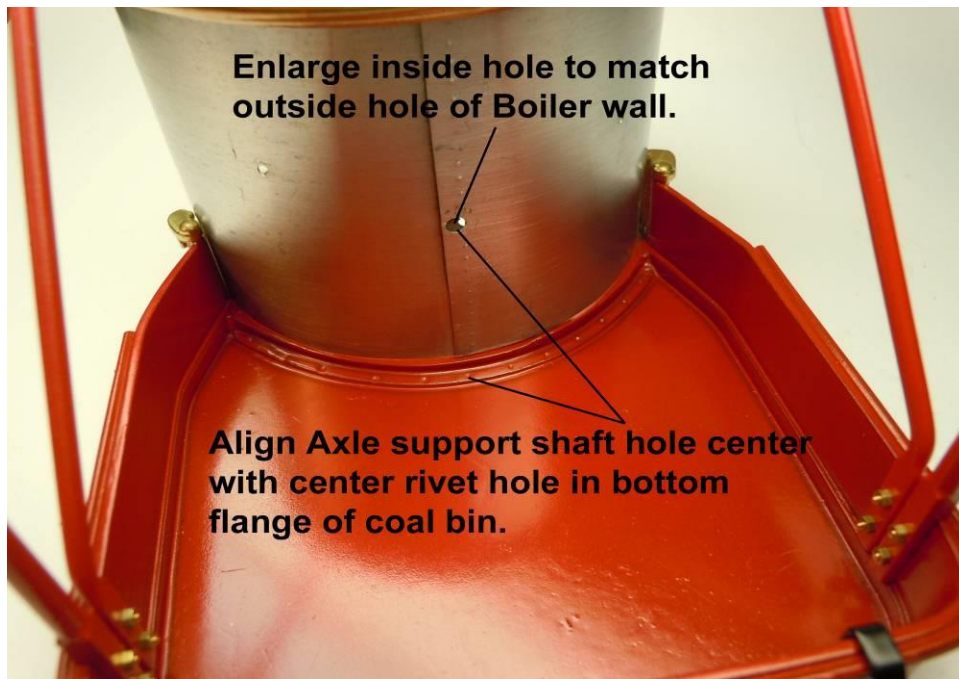
Next add the Boiler Top Ring as a sizing fixture to verify the required size to the top edge and protect it. Once satisfied with the location and alignment of the Lower Boiler Wall using CA apply the glue from the inside around the joint at the base of the Wall and Frame and let set.

Once set reinforce the joint with 5 minute epoxy glue around the inside for an even stronger joint at the base and up the vertical joint that was already glued.

In looking at the Rear Axle support shaft hole drill and file using a round needle file the inside surface hole to match the outside hole as needed.

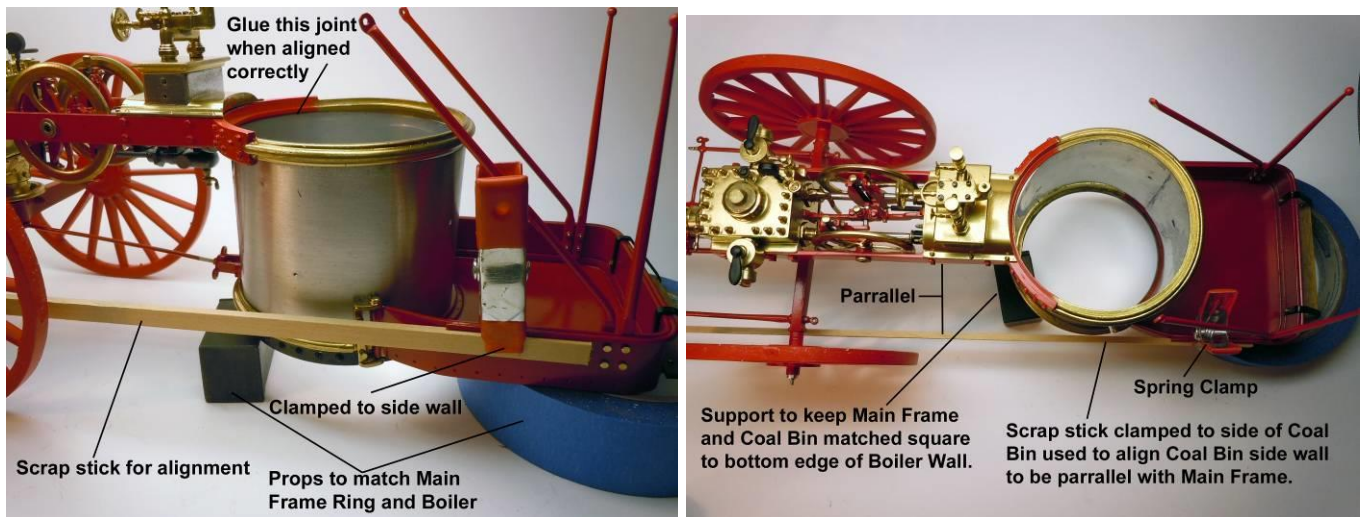
Due to variations in shrink rate and cooling it is almost impossible to have the holes line up perfectly, so even drilling the inside wall may also be necessary which is why the Top Ring is in place to help strengthen if drilling is needed.





Now remove the Boiler Top Ring and carefully dry fit the Main Frame ring to the top edge of the lower Boiler Wall that was glued to the Coal Bin. Adjust the Coal Bin with Lower Boiler Wall so that the side Main Frame rails are parallel to the side walls of the Coal Bin. Use a scrap piece of wood stock clamped to the side of the Coal Bin Wall to visually adjust the Coal Bin Wall to be parallel to the Main Frame as shown in photograph below.

The alignment of the Main Frame and Coal Bin is very critical for the fit of many of the remaining parts.

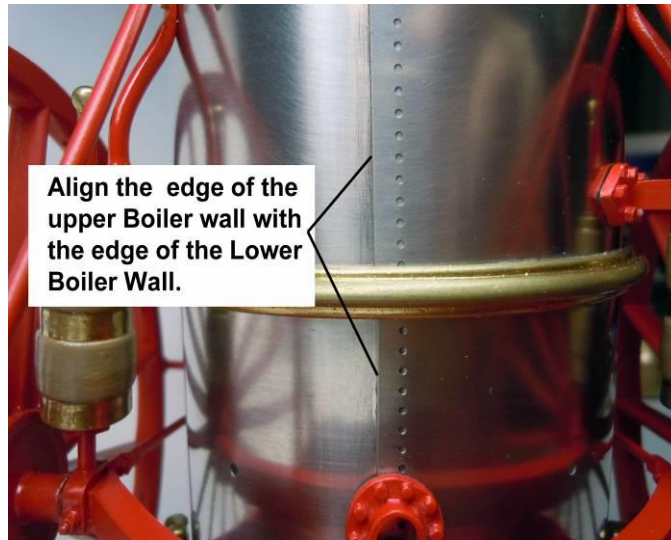


Once satisfied with dry fit and alignment add CA adhesive to the inside of the joint between the upper edge of the Boiler Wall and the Main Frame ring. Let the CA joint set completely and then reinforce the joint with 5 minute epoxy glue around the inside for an even stronger joint.

**Use extreme care** in handling and positioning the assembly due to the increased weight of the parts until all the epoxy joints are fully cured.



Once the Lower Boiler Wall and epoxy joints are set; align the Upper Boiler Wall (that was built earlier) joint line with the Lower Boiler Wall joint line in the Main Frame ring and CA glue the Wall to the ring and let set. **IMPORTANT: Determine which edge is the top edge and the bottom edge before gluing in place.**



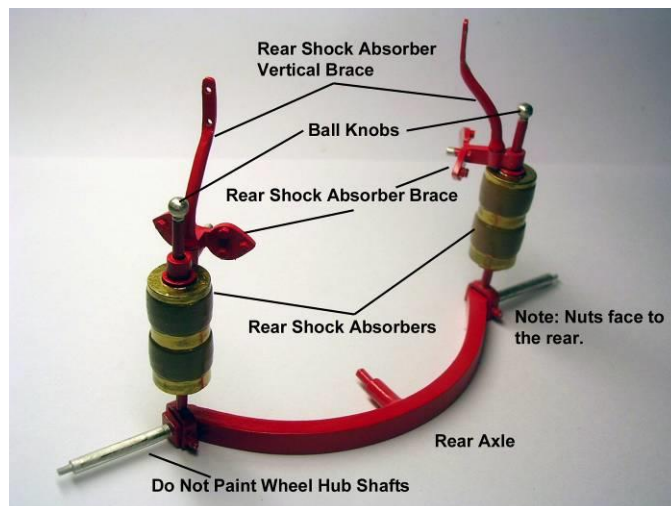
Then dry fit the Boiler Top Ring (Copper) to the top edge of the Upper Boiler Wall and CA glue in place and let set. Once the CA adhesive is set reinforce both upper and lower joints with 5 minute epoxy the same as the Lower Boiler Wall.

Add the Boiler Cap Ring to the Boiler Top Ring and glue in place.

Set the assembly aside to assure all the glue joints are cured completely.

## Rear Axle:

Gather the following painted components to assemble the Rear Axle to the Boiler. - Rear Axle (1); Rear Axle Lock (1); Rear Shock Absorbers (2); Rear Shock Absorber Braces (2); Ball Knobs (2); Rear Shock Absorber Vertical Braces (2); 00-90 x 3/16" Bolts(4); 00-90 Nuts (4).





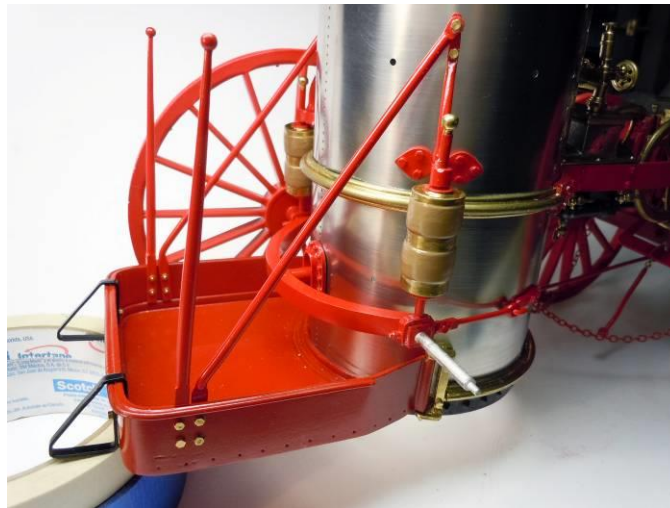
With the Pumper assembly setting flat on a smooth build surface insert center Axle support shaft into Lower Boiler Wall hole and then slip Rear Axle Lock onto the end of the shaft. **Note:** shoulder of shaft to fit flush against the Boiler Wall. Tack the Axle support shaft with a drop of CA adhesive.

Carefully dry fit the Rear Shock Absorbers with the Rear Shock Absorber Braces on the shafts; in place on the ends of the Rear Axle and glue in place with CA. **Note: the nuts on the brackets face to the rear of the Pumper.**

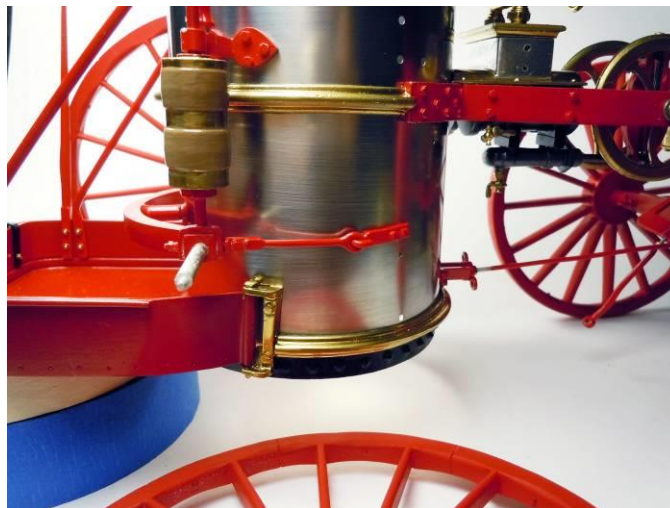
Fit the Brace locating pins into their respective holes and glue in place with CA added to the pins from the inside of the Boiler.

Insert the Vertical Braces into the hole in the Axle Braces and using the lower hole in the Vertical Brace add a 00-90 x 3/16" bolt and nut; bolt the Vertical Braces in place.

Adjust the Axle to be parallel to the ground and glue the joints where the Vertical Braces inserts into the Axle Brace and the Brace fits onto the Shock Absorber Shaft. Let all the glue joints set.



Adjust the Coal Bin Braces to align with the top holes of the Vertical Braces and bolt them in place with a 00-90 x 3/16" bolts and nuts. Once the Coal Bin Braces are bolted in place they will help reinforce the strength of the assembly.



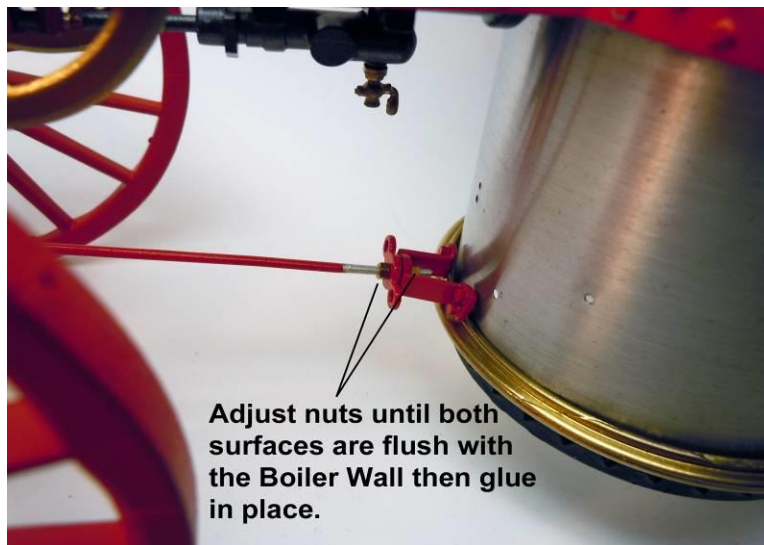
Add the left and right side Rear Axle Links and Rear Axle Link Hooks by inserting the Hook into the hole on the end of the link and then insert the locating pin on the end of the link into the hole on forward side of the Shock Absorber Bracket on the opposite side of the nuts and glue in place; then with the Axle Link parallel to the ground glue the Hook surface to the Boiler Wall as in the picture above with a drop of CA added to the underside against the wall.

Add the Rear Axle Guide and glue in place centered vertically on the axle support shaft. Next glue the Boiler Coal Door and Door Latch in place between the bottom edges of the Axle Guide and the Coal Bin ring. First locate and glue the Coal Door in place **on center**; then position the latch on the tang of the door and glue. **Keep in mind the buckets will go on either side of the door and latch.**



## Front Axle Brace

Move the Front Axle to one side to allow better access to the area where the Front Axle Brace mounting plate will attach. Carefully adjust the two nuts on the Front Axle Brace plate so that the mating surfaces match the wall of the boiler and glue on the centerline of the Boiler Wall resting on the top edge of the Coal Bin ring. Let the glue set and adjust the nuts if necessary to be flush with the plate walls. See picture below.

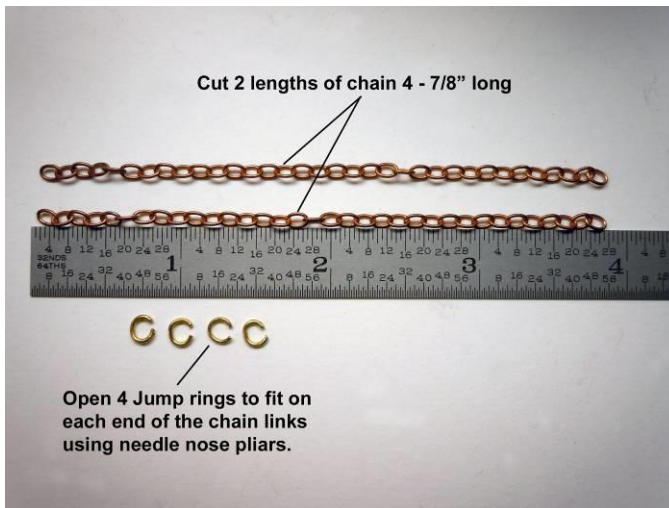


## Chain:

Two lengths of chain were used to limit the travel of the front axle and prevent the wheel rim hitting the main frame.

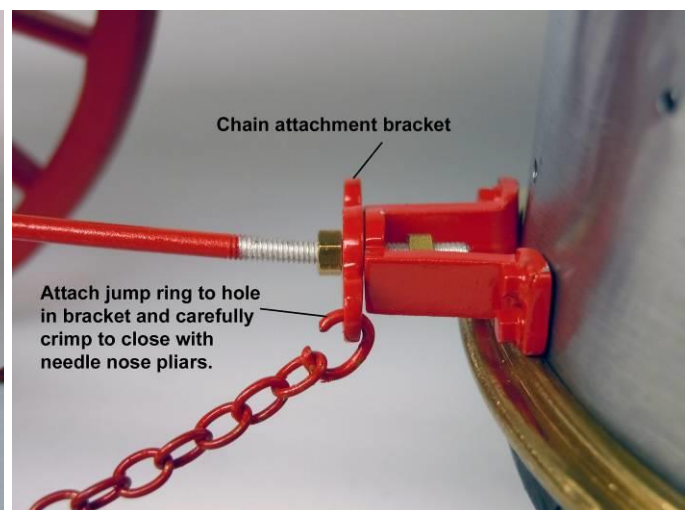
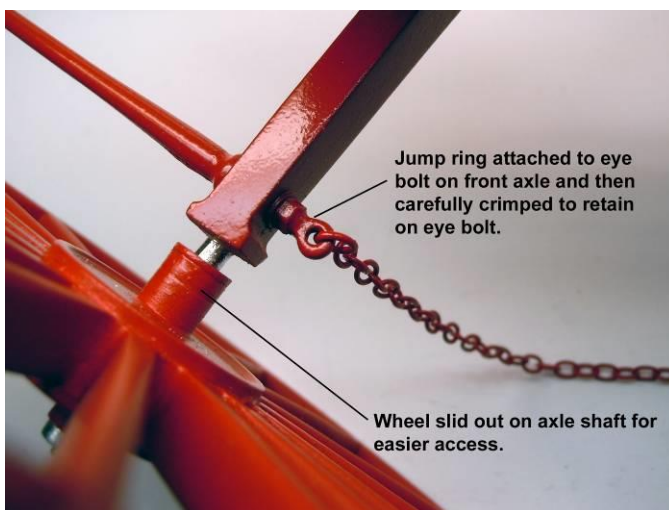
Cut two lengths of Chain 4-7/8" (98mm) Long. Then using small needle nose pliers; open the 4 Jump Rings enough to fit on the Front Axle eye bolt and the Chain Attachment Bracket.

Then touch up the paint on the 2 Chain lengths and the 4 jump rings Red and allow to dry.



When completely dry attach the Jump Ring on one end of the Chain to the Front Axle eye bolt and carefully crimp close the Jump Ring using small needle nose pliers enough to retain the Jump Ring and Chain on the eye bolt as seen in the picture below.

Then attach the other end of the Chain with the Jump Ring into the hole in the Chain Attachment Bracket and carefully crimp close the Jump Ring using small needle nose pliers enough to retain the Chain and Jump Ring on the bracket as seen in picture below.



Now repeat the process to add the Chain to the other side and touch up any paint chipped off during the crimping of the Jump Rings.

The picture below shows the left side Chain in place.





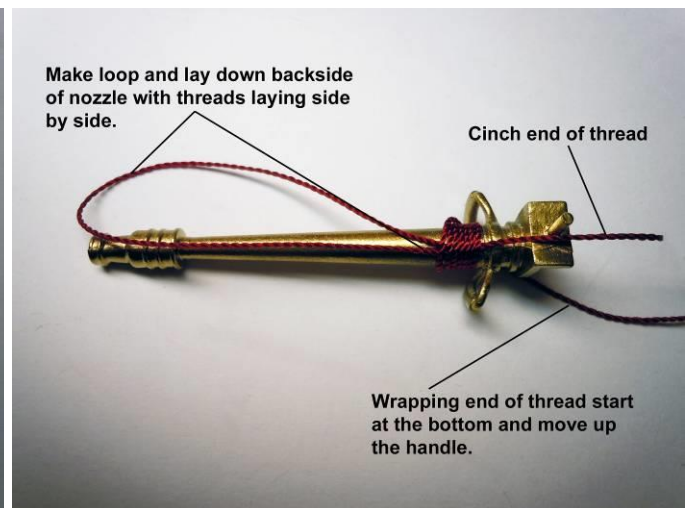
## Rear Wheels:

Once the axle chains are in place the rear wheels can be slipped onto the rear axle shafts; however do not add the retaining washers and nuts yet.

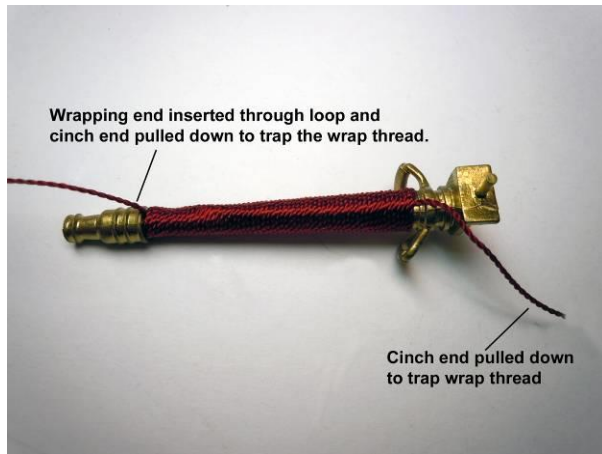
All wheels will need to be removed at one point or another for easier access to add remaining parts. **Be careful in handling the pumper from this point forward to make sure the wheels Do Not inadvertently fall off while adding additional parts.** Remove wheels only as needed to add parts and replace when finished. The use of a shim may need to be used when one wheel is removed so as not warp the axle shafts.

## Hose Nozzles:

Here is a picture of the before and after wrapping of the Hose Nozzle. Take a 36" piece of the red thread and form a loop in one end and lay the loop on the back side of the Nozzle as shown below. Now, using the "wrap end" of the thread; starting at the bottom and wrap the thread around the handle area of the Nozzle trapping the looped thread sections under the wrapping thread. As you wrap up towards the top keep the looped threads together side by side down the center of the handle area on the backside of the Nozzle. The locating pin is the backside.



Once at the top insert the end of the “wrap thread” through the loop end and slowly pull down on the cinch end until the “wrap” end is trapped at the top of the Nozzle. Then with a sharp Xacto blade carefully cut off the excess ends of the thread.

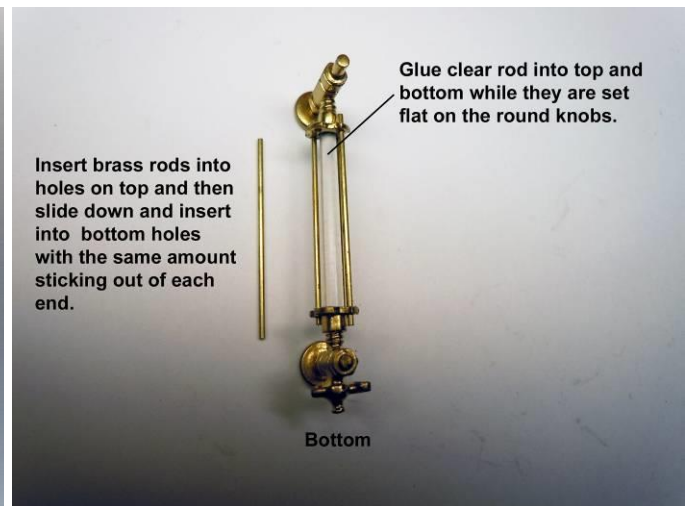
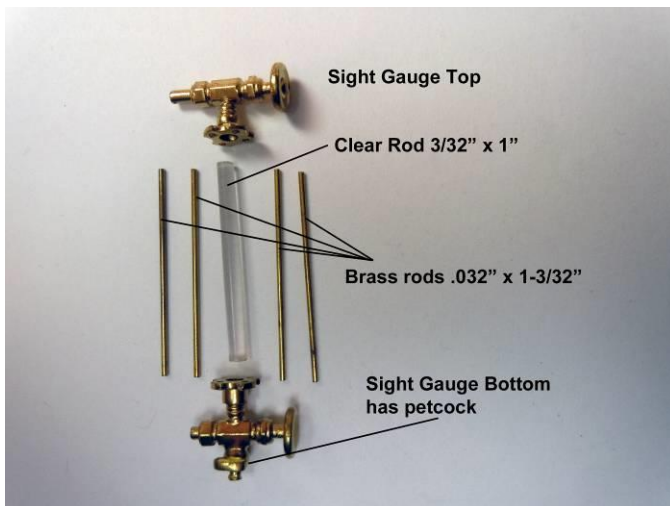


Now wrap the second nozzle and set aside for use later.

### Boiler Water Level Sight Gauge:

Gather the following parts: 3/32” x 1” clear plastic rod (1); 1-3/32” x .032 Brass rod (4); Sight Gauge Top (1); Sight Gauge Bottom (1).

Index and glue one end of the clear rod into the Top part of the Water Level Sight Gauge; then dry fit the Top location pin into the hole location in the Upper Wall of the boiler; now index the Clear Rod end into the Bottom part of the sight gauge and indexing the Bottom locating pin into the lower hole for the sight gauge and carefully glue the Clear rod to the Bottom part of the sight gauge. Let the glue set and then remove Sight gauge from the Upper Boiler Wall.

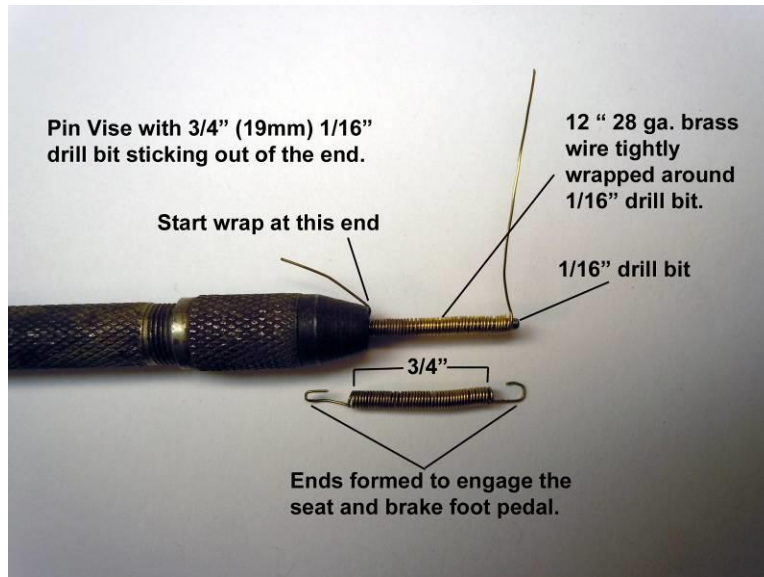


Insert each Brass rod into the holes on the Top part and slide it through the hole on the bottom part with an equal amount of the rod sticking out of the Top and Bottom parts. Glue the brass rods in place by adding glue to the underside of the Bottom part. Set assembled Sight Gauge aside for later use.

### Brake Spring:

To make the Brake Spring first insert a 1/16" drill bit into a pin vise with the smooth end sticking out 3/4". Now hold one end of the 12" x .020 brass wire with about 1/4" on the end of the pin vise and wrap the wire tightly around the 3/4" section of the drill bit forming a coil. Carefully bend the wire 90 degrees to the wrap and then form a small "U" hook on each end of the coil using small needle nose pliers. Dry fit the hooks into the holes on the Brake Pedal Arm and the lower right corner of the Seat.

When satisfied with dry fit hen paint the spring Satin Black and set aside for later assembly.



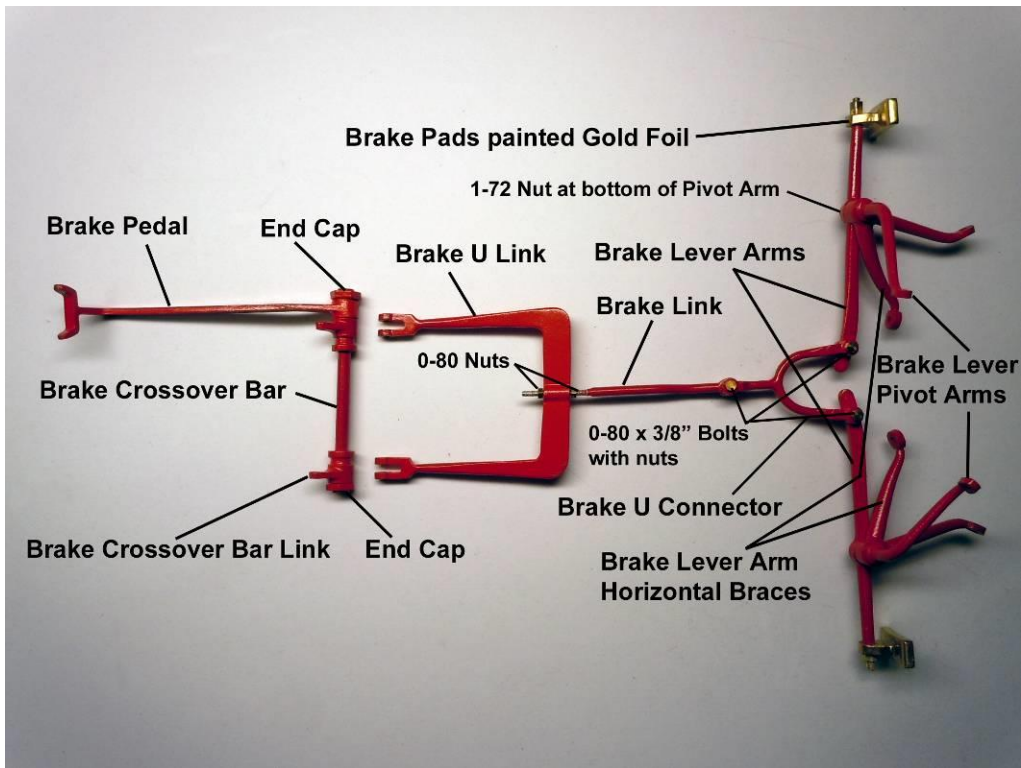
## Brake System:

Clean, file and dry fit all the following components for the Brake System – Brake Pedal (1); Brake Crossover Bar (1); Brake Crossover Bar Link (1); End Caps (2); Brake U Link (1); Brake Link (1); Brake U Connector (1); Brake Lever Arms (2); Left and Right; Brake Lever Pivot Arms (2); Left and Right; Brake Lever Pivot Arm Horizontal Braces Left and Right (2); 00-90x 3/16" Bolts (6); 00-90 nuts (6); 0-80 x 1/4" Bolts (5); 0-80 nuts (9)

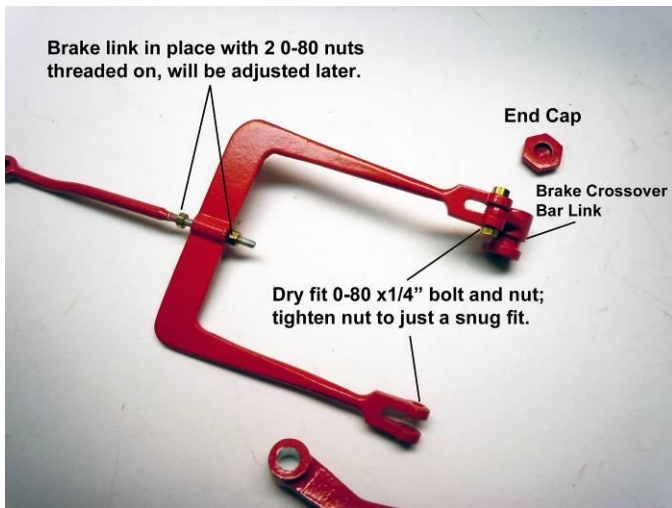
**Do Not Paint** the threaded section of the Brake Link (1) and Brake Lever Pivot Arms (2).

All parts need to assemble freely once painted so ream or drill out holes using a #52 drill bit for 0-80 Bolts, nuts and interlocking parts. When satisfied with all dry fits; prime and paint all parts as indicated in the picture below or plans. After painting, check fits of holes and ream of excess paint if necessary. Just the brake pads and nuts on the ends of the Brake Levers are painted with Gold Foil. Let parts dry completely.

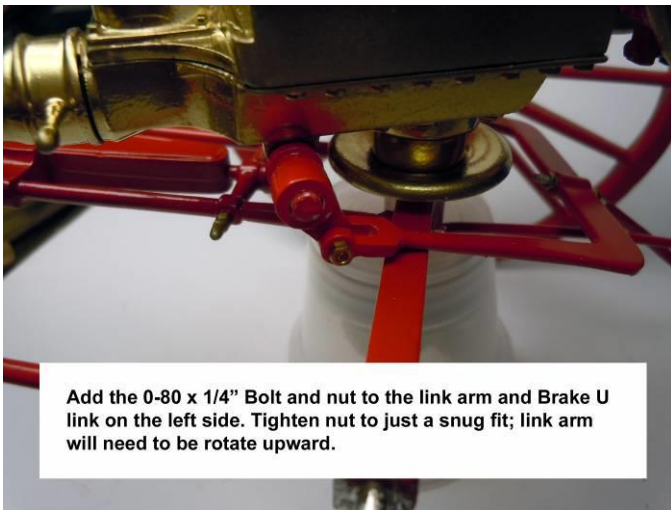




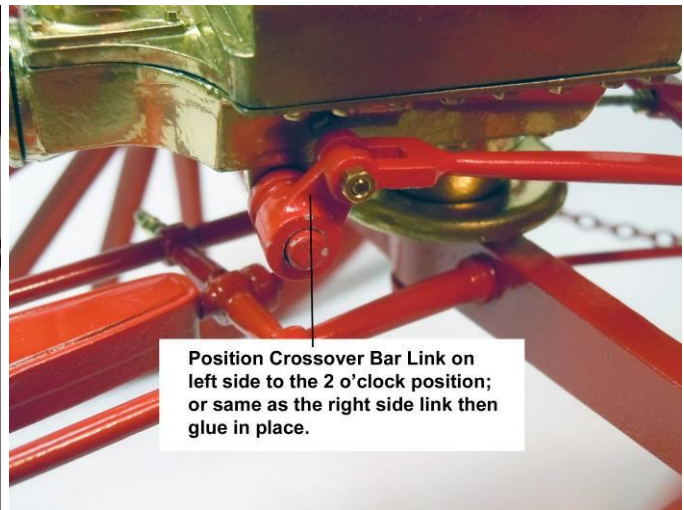
Shim the Pumper Assembly enough at the Front Axle Pivot resting on the 1-72 nut so that the right and left wheels can be removed as needed for easier access.



Insert the end of the Crossover Bar from the right side into the pivot point holes on the bottom of the Water Box with the link arm pointing down. The dry fitting of these was done earlier when working on the Water Box Lower Half. Now carefully fit the Brake U Link from the rear of the axle and above the Boiler Brace and engage the link and insert the 0-80 Bolt from the inside into the holes. Once the Bolt is in place add the Nut to just a loose snug fit that will still allow the Crossover Bar to rotate. **(Do not over tighten)**

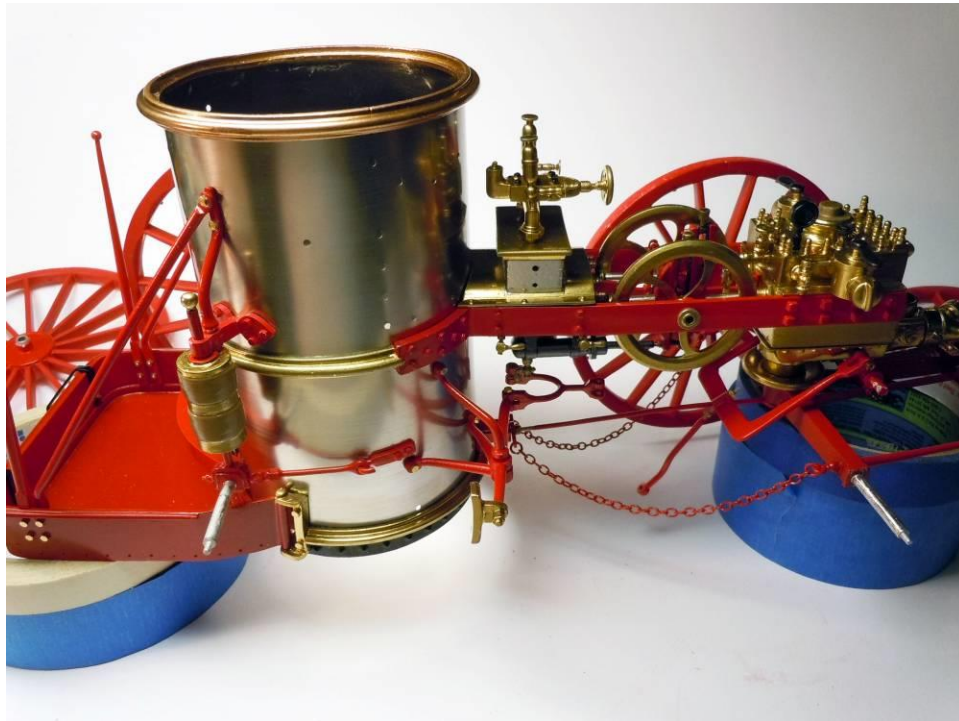


Add the 0-80 x 1/4" Bolt and nut to the link arm and Brake U link on the left side. Tighten nut to just a snug fit; link arm will need to be rotate upward.



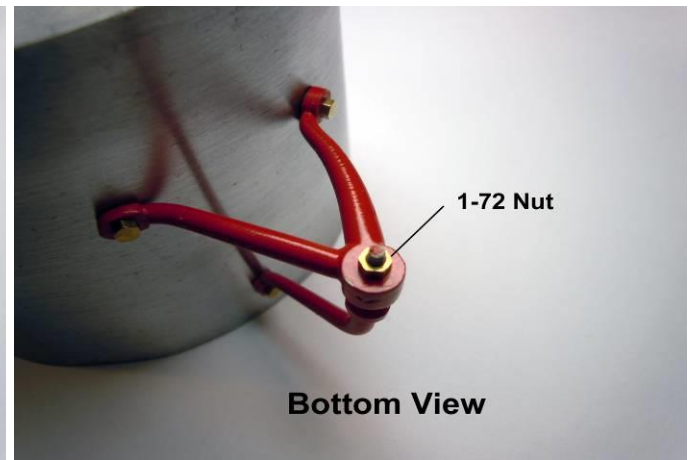
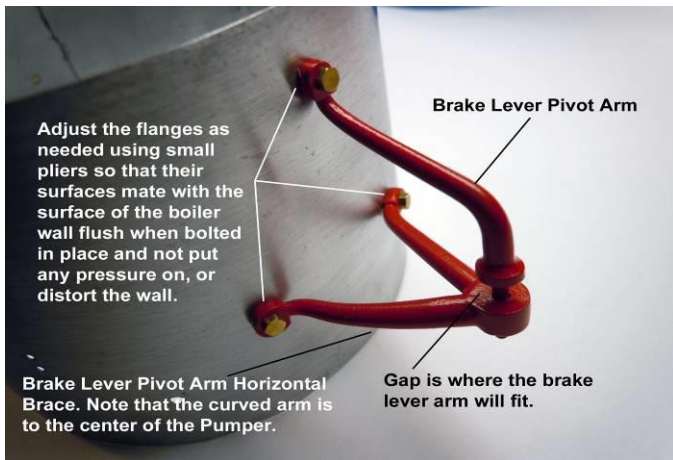
Position Crossover Bar Link on left side to the 2 o'clock position; or same as the right side link then glue in place.

Now repeat adding the Bolt and Nut to the left side as seen in the picture above. Once both Bolts are in place then rotate the Crossover Bar with link arm and the left Link arm to the position shown in picture above (2 o'clock) or match the right side link and glue in place. Replace the Front Wheels as each side is finished. Shim the Pumper Assembly enough under the front of the Coal Bin to enable the Front and Rear Wheels to be removed. Make sure the Pumper Assembly is stable once shimmed. It is much easier to add the Brake linkage with the wheels removed.

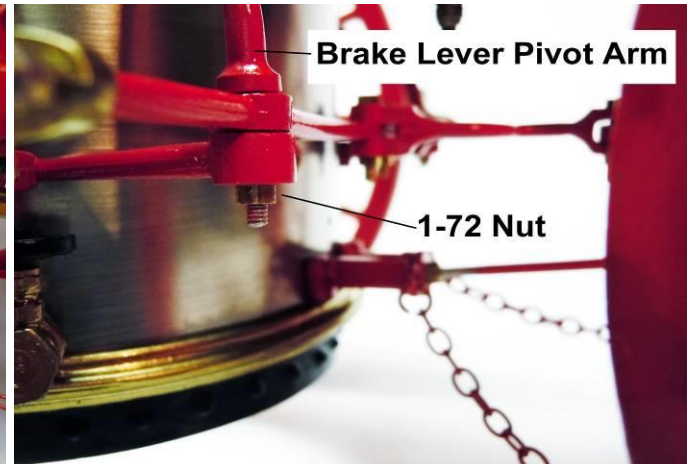
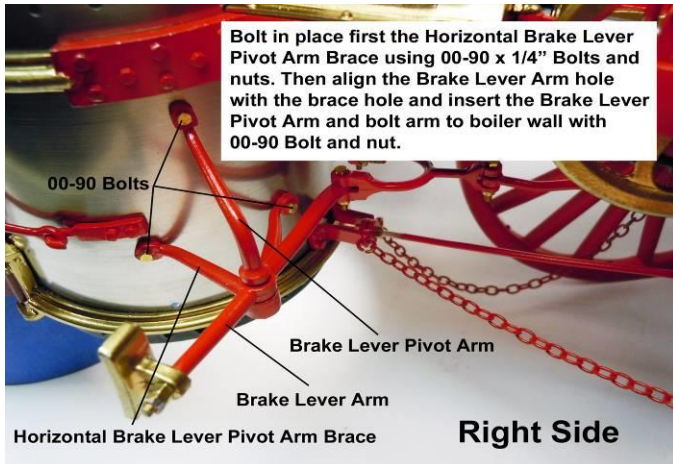


Starting on the right side Check the hole locations for the Brake Lever Pivot Arms and Brake Lever Pivot Arm Horizontal Braces. With small pliers adjust the flanges with the bolt holes to mate flush with the Boiler Wall and check fit with 00-90 x 3/16" bolts. Also test fit the 1-72 nuts onto the Brake Lever Pivot Arm. See pictures below for clarity.

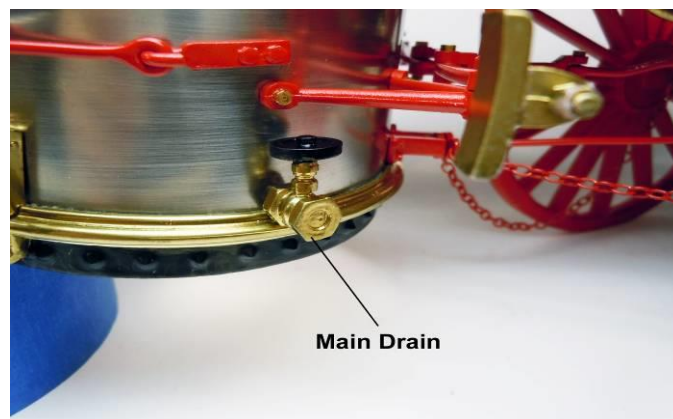




Once satisfied with dry fits and adjustments to the flanges, bolt the Brake Lever Pivot Arm Horizontal Brace in place with 00-90 x 3/16" bolts and nuts in place on each side of boiler wall. Note the curved arm is to the center of the pumper. Next align the Brake Lever Arm hole with the hole in the Horizontal Braces and insert the Brake Lever Pivot Arm. Then with 00-90 x 3/16" Bolt and Nut bolt the arm to the Boiler Wall. Very carefully thread the 1-72 nut to the bottom of the Brake Lever Pivot Arm as seen in picture below.



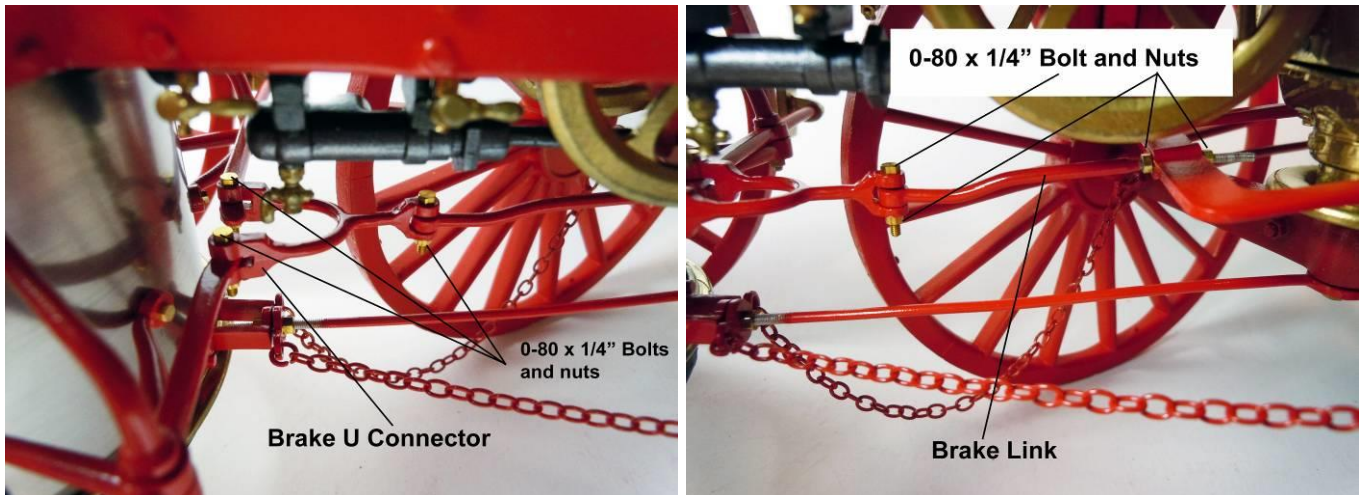
While the wheels are off the right side add the Main drain to the hole in the Boiler Wall as shown in the picture below.



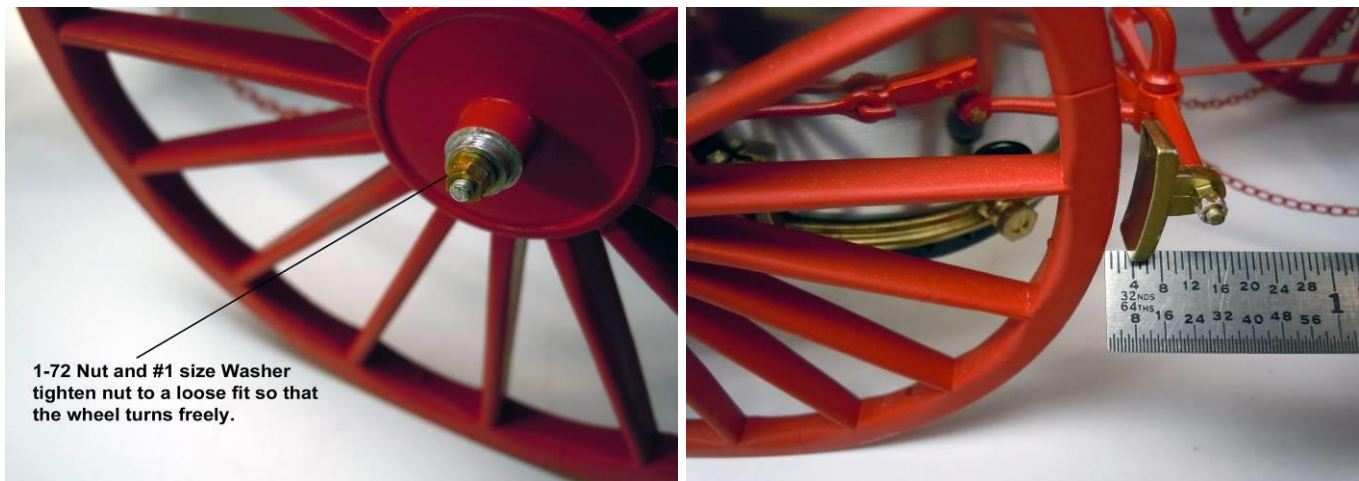
Replace the Wheels on the right side and then repeat the procedure for the Pivot Arm structure on the left side. Leave the Wheels off until completion of the next step.



Once both sides are completed now add the Brake U Connector by aligning holes in the ends of the Brake Lever Arm with those on the double end of the Brake U Connector and insert 0-80 x 1/4" Bolts and nuts. Then align the single end of the U Connector with the hole in the Brake Link and bolt with a 0-80 x1/4" Bolt and Nut. The Brake Link nuts can be adjusted by turning the nuts down the shaft towards the rear of the Pumper as seen in the picture below.



Once all the brake linkage is in place, replace the wheels and add #1 washer and 1-72 nut to the end of each axle shaft; make sure each wheel can turn freely on the axle shaft.



Check the rear wheel brake pad clearance which ideally should be 3/32", remember the Tire still needs to be added later on. If adjustment is needed very carefully bend the Brake Lever arm in the direction needed. To adjust put a finger on the inside end of the lever and with the other hand slowly bend as needed to attain the 3/32" clearance.

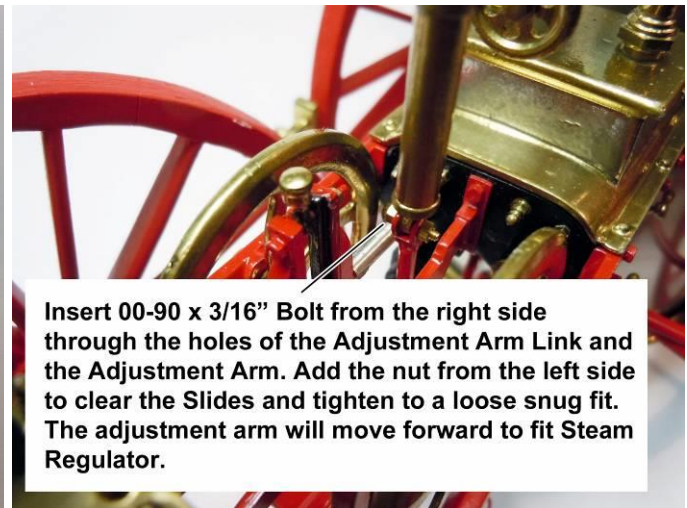
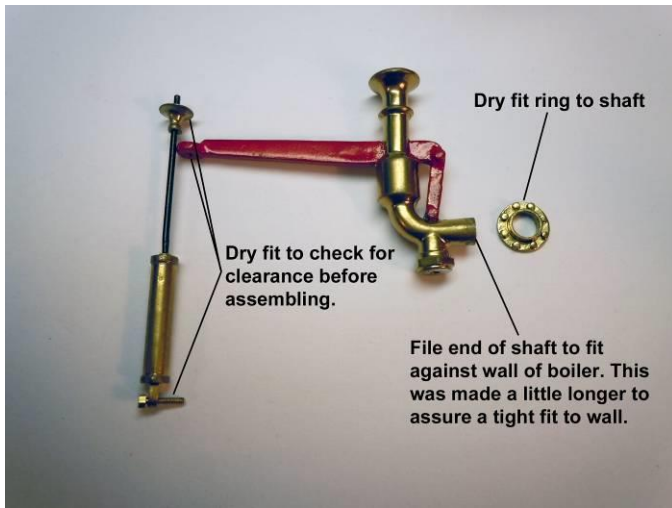
## Steam Regulator:

Clean, file and dry fit all the following components for the Steam Regulator – Steam Regulator (1); Mounting Plate (1); Adjustment Arm (1); Adjustment Arm Knob (1); 00-90 x 3/16" Bolt (1); 00-90 Nut (1).

**Important:** The Mounting Plate ring must slide on the shaft of the Steam Regulator.

The Steam Regulator shaft was purposely made slightly longer for adjustment to fit flush with the Boiler Wall and perpendicular to the manifold when in place. Attach the Adjustment Arm to the Adjustment Arm

Link with a 00-90 x 3/16" Bolt and Nut through holes in both parts as seen in picture below. Tighten the nut to a loose snug fit so the Adjustment Arm can move forward slightly to allow for clearance when fitting the Steam Regulator in place.



File the end of the shaft on the Steam Regulator and dry fit to Boiler Wall by slipping the round end over the Adjustment Arm shaft (satin black), move forward to clear the Copper boiler top and index on locating pin on Manifold and check for it to be perpendicular to the Manifold. **The Steam Regulator should not tilt forward.** File shaft until perpendicular; then slip the Mounting Plate ring on the shaft as shown below away from the Boiler Wall. Glue in place by adding a drop of CA onto the locating pin and fit in place and with the Mounting Plate ring away from the wall add a drop of CA to the end of the shaft touching the wall. Let set then add another drop of CA on the top of the shaft and slide the Mounting Plate ring forward to be glued in place.



Here is an overall view of what should be built so far.

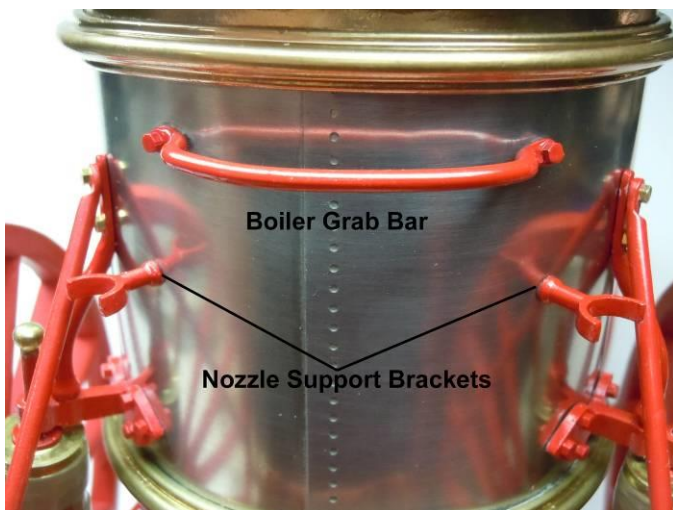




### Rear Boiler Wall:

Locate the Boiler Grab Bar and index the locating pins into the two holes in the rear of the Boiler Wall and glue in place.

Glue the two (2) Nozzle Support Brackets into their respective holes in the rear Boiler Wall parallel with the ground as seen in the picture below. Once the glue for the brackets has set, then locate into their respective holes the locating pins for the Hose Nozzles and center the top of the Nozzles in their Support Brackets as see below.



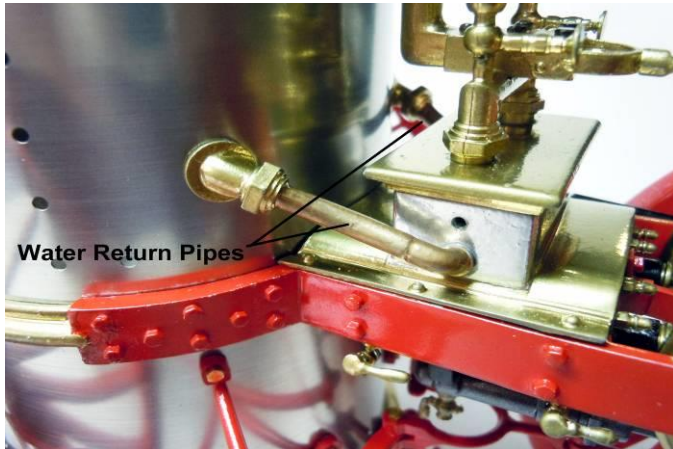
Now add the photo etched Boiler Shield. Very carefully form a slight curve in the shield to match the Boiler Wall. Once formed then glue in place on the Boiler Wall with the top of the Shield aligned horizontally with the Hose Nozzle Support Brackets.



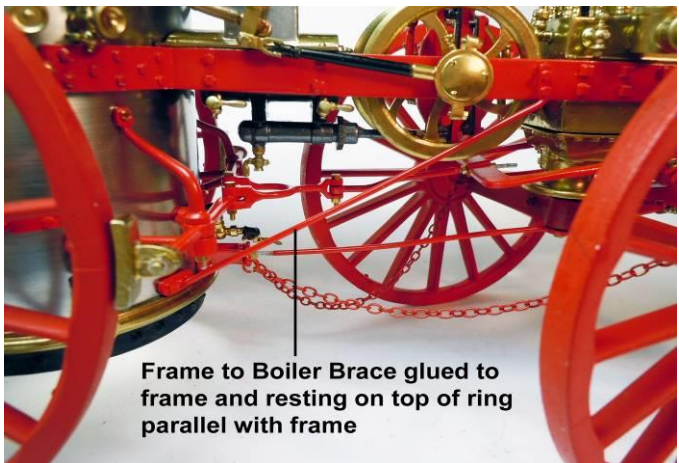
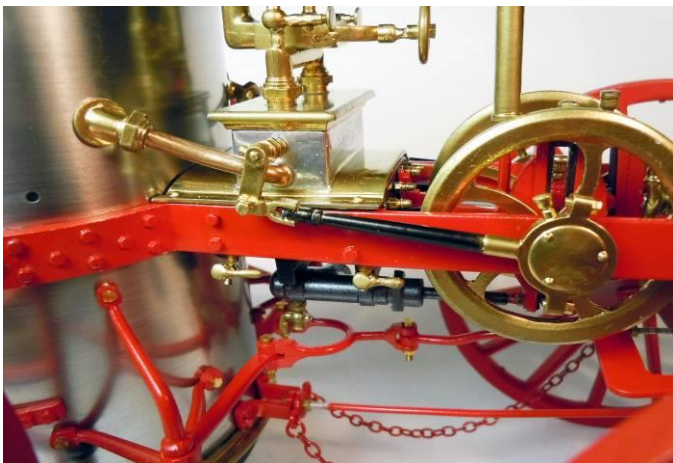


## Frame Parts:

Dry fit left and right Water Return Pipes into the lower small hole in the Manifold side. Align the boiler end as seen in the picture below. Glue both the left and right Water Return pipe in place by adding a drop of CA to the locating pin and inserting into small hole.

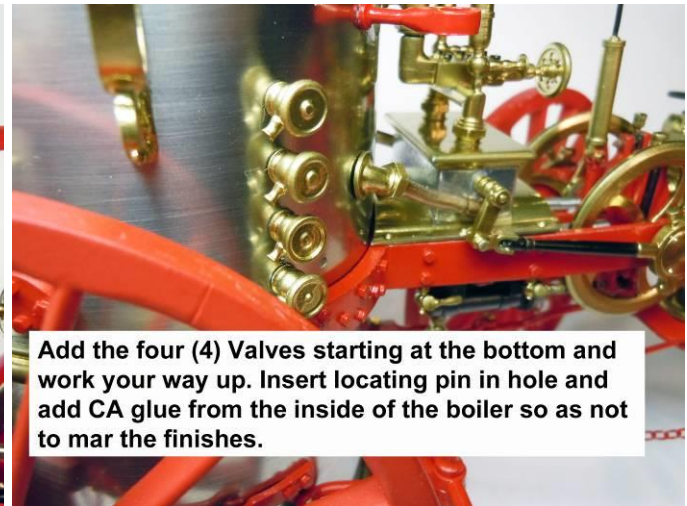
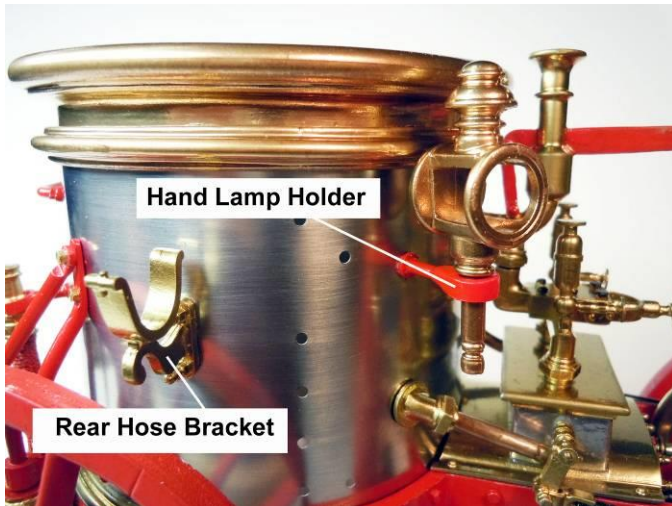


Next add the left and right Flywheel Arms and Arm Links. **IMPORTANT** The threaded end of the Flywheel Arm must be inserted into the hole in the Arm Link before gluing in place. **Note:** The Oiler Cup faces up. Place a drop of CA on both locating pins and then carefully insert the pins into their respective holes in the Manifold side and Flywheel Sleeve.



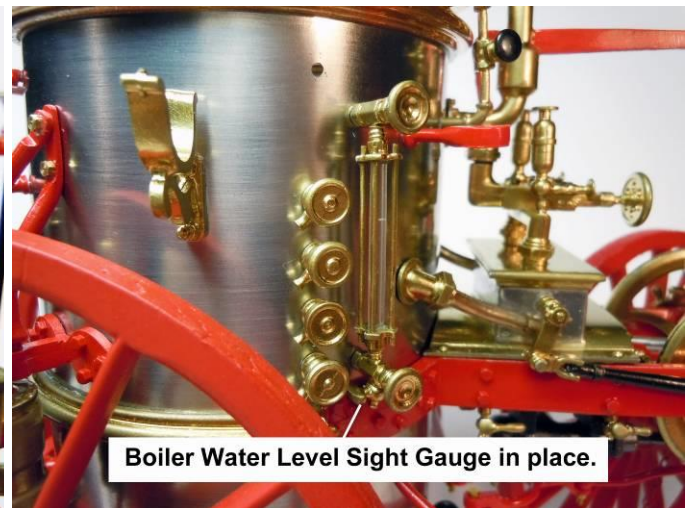
Dry to the left and right side of the Main Frame and Boiler the Frame to Boiler Braces. The frame end with the two nuts should be vertical while the boiler end rests on the boiler wall on top of the ring parallel with the frame. Adjust carefully as needed if parts do not mate flush. Once satisfied with dry fit then glue in place on the left and right sides.

On both side of the boiler add the Rear Hose Brackets and Hand Lamp Holders into the holes on the Boiler as indicated in the picture below. Test fit the Hand Lamp to make sure it is vertical in the Holder and adjust if necessary.



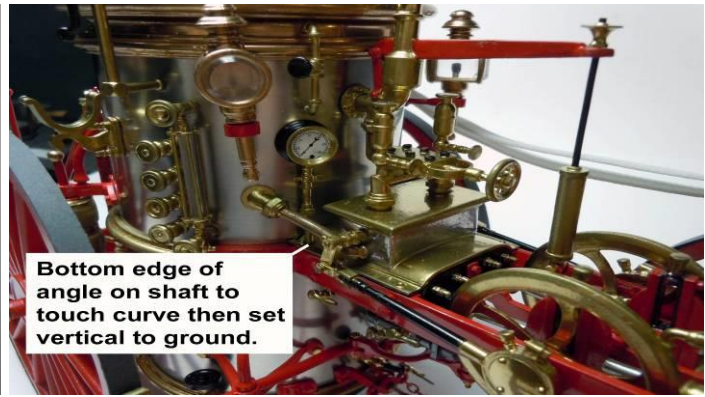
Add the Valves; four (4) of them from the Boiler bottom up. Look close and locate the one with the smallest center bump and glue in place with the drain spout at an angle to the left as seen in the picture above. Now add the next three (3) Valves with the drain spout in the same position as the bottom one.

Dry fit the Pressure Release by inserting the bottom locating pin in the hole just to the right of the Hand Lamp Holder and the top pipe should sit flush on the flat surface of the Boiler Cap Ring. Adjust as necessary then glue in place by adding glue to the pin from the inside of the Boiler. Note the center section of pipe should be vertical and parallel to the Boiler Wall.

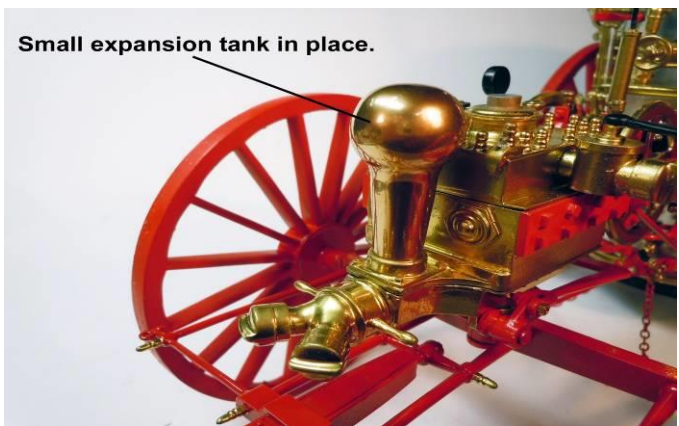
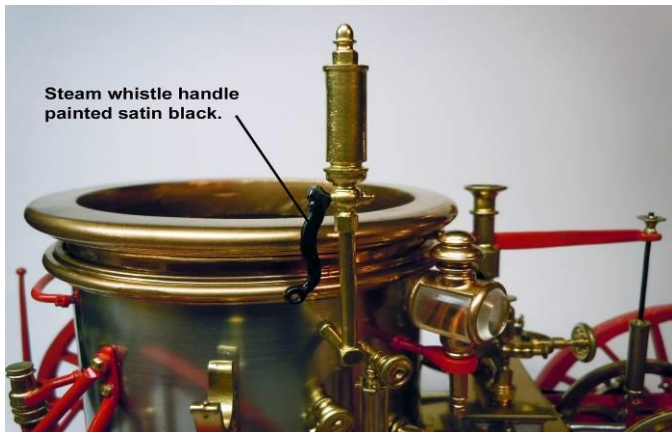


Next, glue the previously assembled Boiler Water Level Sight Gauge into the holes in the boiler wall as shown in the picture above. Now carefully apply the instrument face water slide decal to the painted boiler pressure gauge. Once the decal has set then locate and glue the Boiler Pressure Gauge onto the Boiler as shown in the picture below. Note: the bottom angled shaft is to touch the curved surface; and then set vertical to ground.



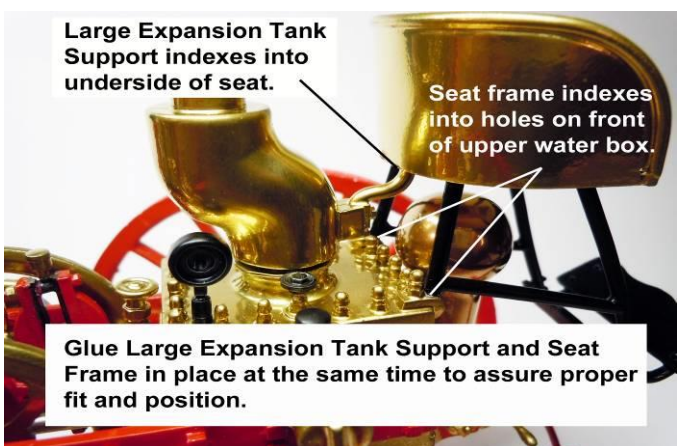
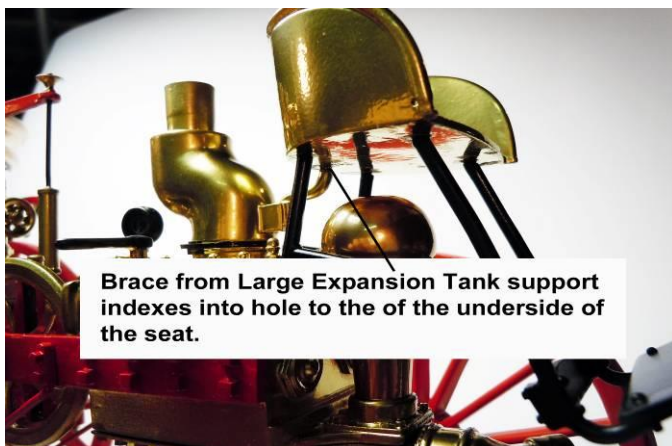


First paint the handle only of the Steam Whistle Satin Black; once the paint is dry insert it into the hole in the Boiler Wall above the Valves by adding the glue from the inside of the boiler to the location pin on the Steam Whistle. Make sure the Steam Whistle is vertical from the front and side views as seen in picture below.



Glue the Small Expansion Tank in place by adding glue into the bottom edge in the location hole. The Small Expansion Tank **MUST** be in place prior to adding the seat structure. Be **very careful** with the use of CA glue, it can ruin the finish of the Foil paint colors.

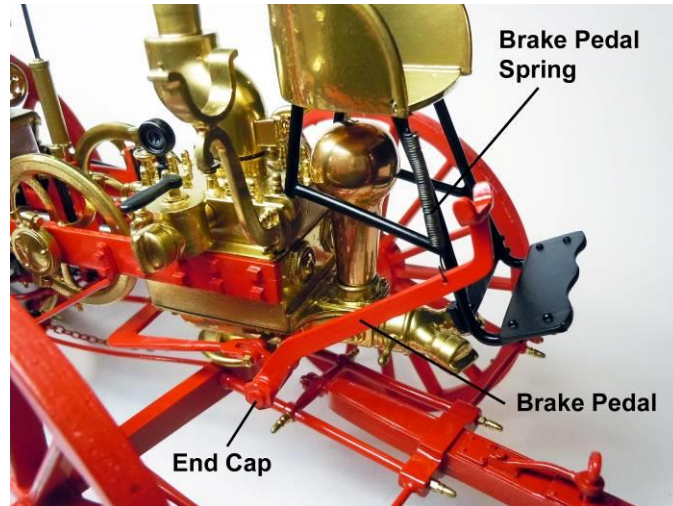
Now add the Large Expansion Tank Support and Seat with Seat Frame structure. These joints need to be extremely strong to carry the weight of the Large Expansion Tank so use 5 minute Epoxy applying it to the boss for the tank, the center rear hole in the Seat the brace indexes into and the two holes that the Seat Frame index into. It is easier to index the brace into the bottom of the Seat and then add both at the same time to their respective locations.





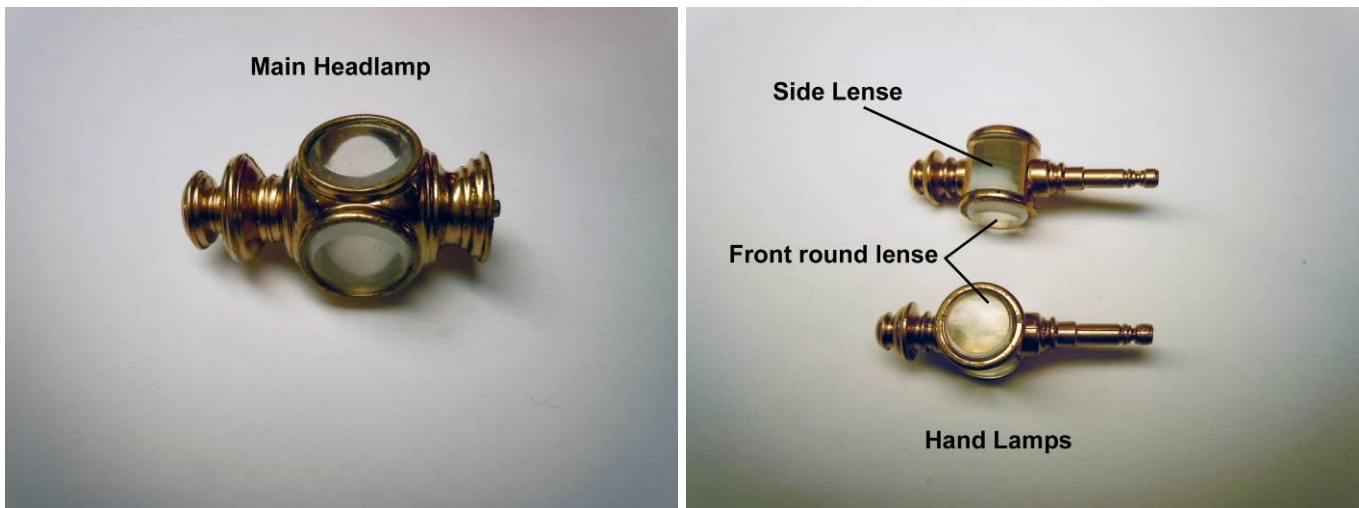
## Brake Pedal:

Attach the Brake Return Spring to the hole in the Foot Pedal by inserting the hooked end into the hole from the inside position of the Brake Pedal. Then engage the other end into the hole at the lower right corner of the Seat. Next slip the bottom end of the Brake Pedal onto the crossover bar. Now glue in place the End Caps (2) on the ends of the crossover bar.



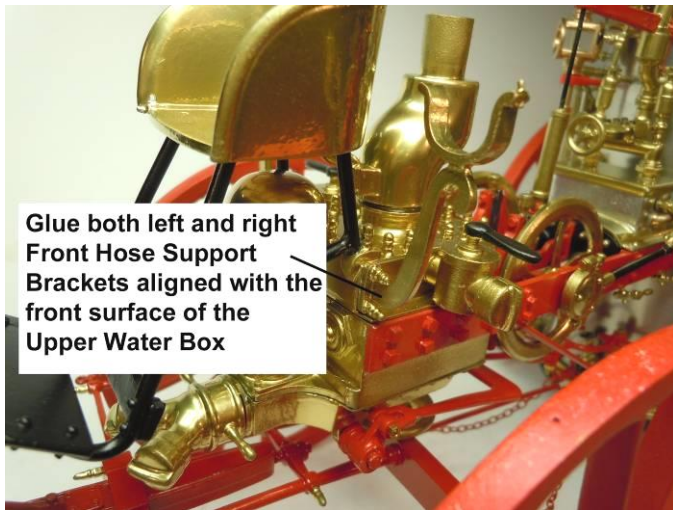
## Head Lamp and Hand Lamps:

Dry fit and file to fit the four (4) laser cut large round clear plastic Headlamp Lenses into Headlamp. An option is to file a bevel around each of the Lenses and polish clear with plastic polishing compound. Repeat the same for the Hand Lamps; but the side rectangular Lenses need to be filed to fit the curved contour of the lamps and polished clear. When satisfied with dry fit glue in place.

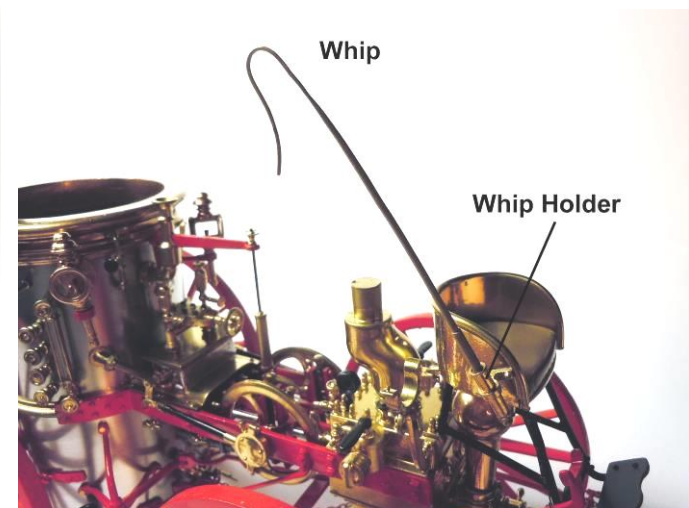
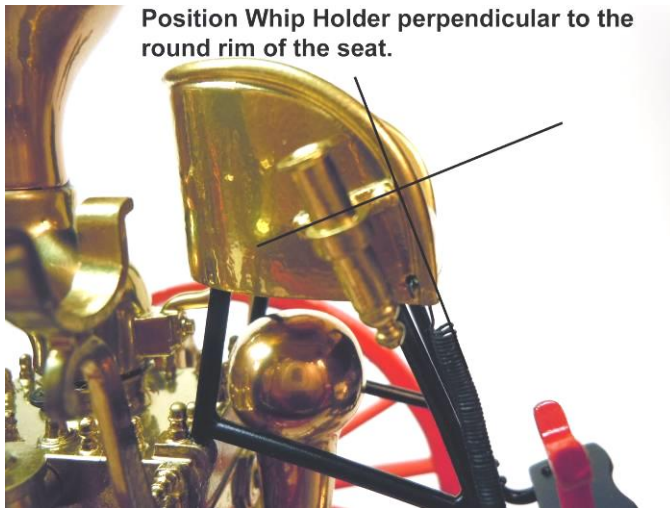


Place Hand Lamps into holders later once model build is complete.

Glue the left and Right side Front Hose Support Brackets in place being flush with the front edge of the Upper Water Box.



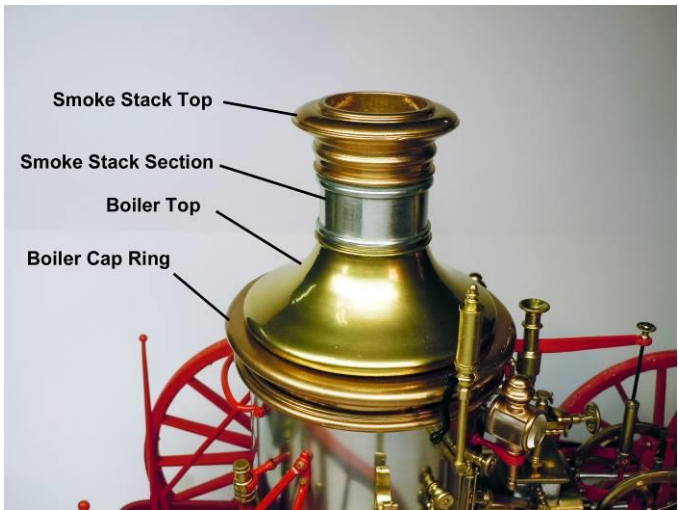
Index and with 5 minute Epoxy glue the Head Lamp into hole on top of large Expansion Tank. Once glue has set, index the Large Expansion tank onto boss on the Support Bracket and make sure that the Head Lamp faces forward as seen in the picture above.



Glue the Whip Holder to the right side of the Seat perpendicular to the Seat rim as shown in the picture above. Then set Whip in holder and adjust the angle of the whip to hang down as it would in real situation. Set aside until the model build is complete.

### Smoke Stack:

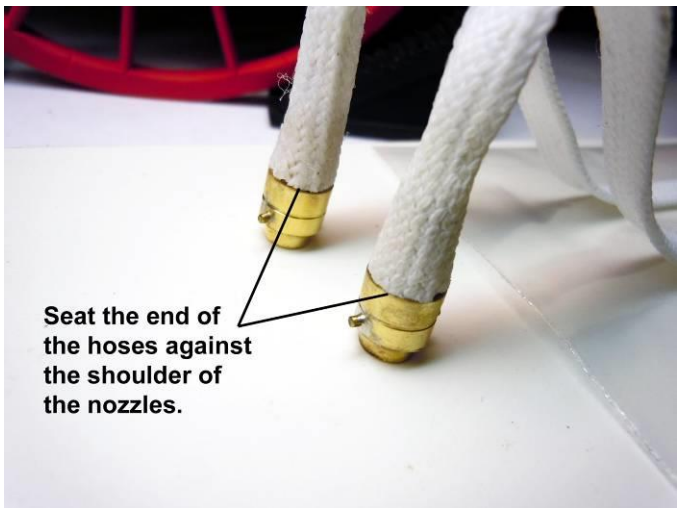
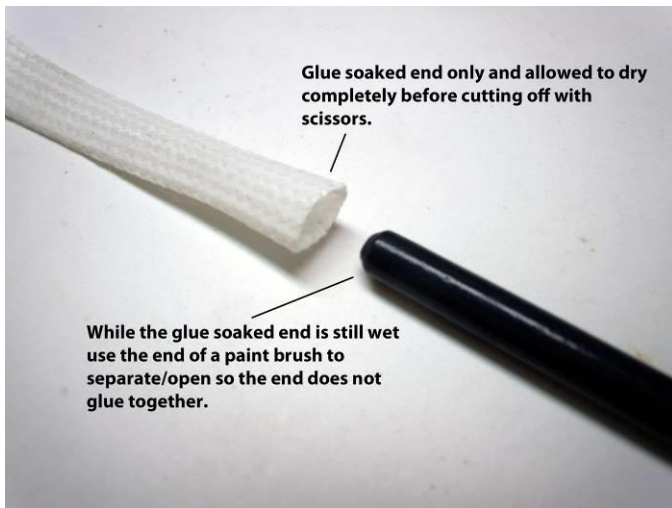
Center the satin black Spark Arrestor on the top of the Smoke Stack section and glue in place. Then glue the Smoke Stack Top to the Smoke Stack section. Set aside for next step.



Glue the Boiler Top to the Boiler Cap ring; then glue the Smoke Stack section with the Smoke Stack Top to the Boiler Top.

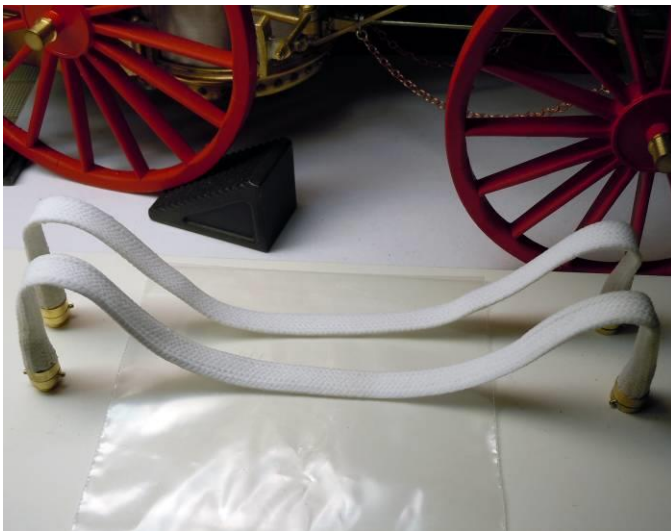
### Hoses:

Cut the white shoelaces to the same length of 10 inches. Then just a touch of glue on the end to prevent fraying and while still wet with the glue spread open the end with the round tip of a paint brush to prevent the sides from sticking together.

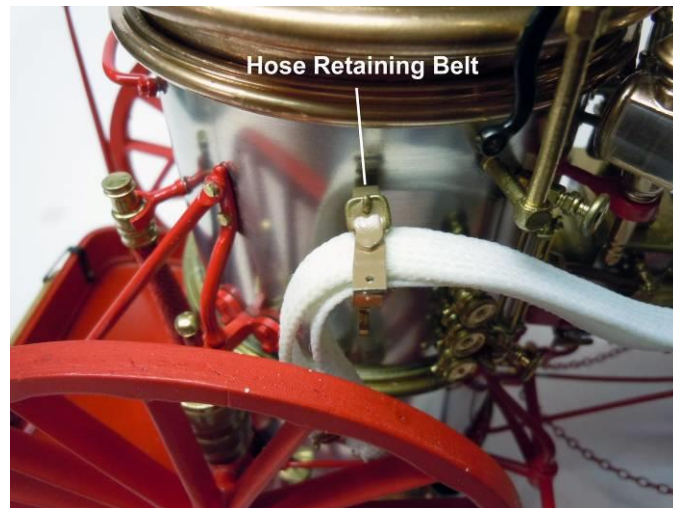


Using the round end of the paint brush open the ends and insert the Front and Rear Hose Nozzles and glue in place with CA glue. Make sure to seat the end of the hose up against the shoulder on the Nozzle as seen in picture above. Let the CA glue set. Now mix a couple of ounces of water and white glue in a ratio of 50/50 and mix completely. Lay each hose flat with the nozzles in place on a piece of wax paper and brush on the mixture of water and white glue until both sides are soaked. As each is finished set on a piece of wax paper next to the pumper and prop the ends and form curves where the Hose Support Brackets are as seen in the picture below. Repeat for all Hoses and when nearly dry but still pliable form to final fit on the Hose Support Brackets setting one on top of the other; two (2) hoses per side and then let completely dry.





Also while the hoses are setting in the Hose Support Brackets carefully pinch them together to form the half round to fit into the brackets. When enough clearance is obtained glue the Hose Retaining Belts in place by indexing the holes onto the pins on the top of the Support Hose Brackets.

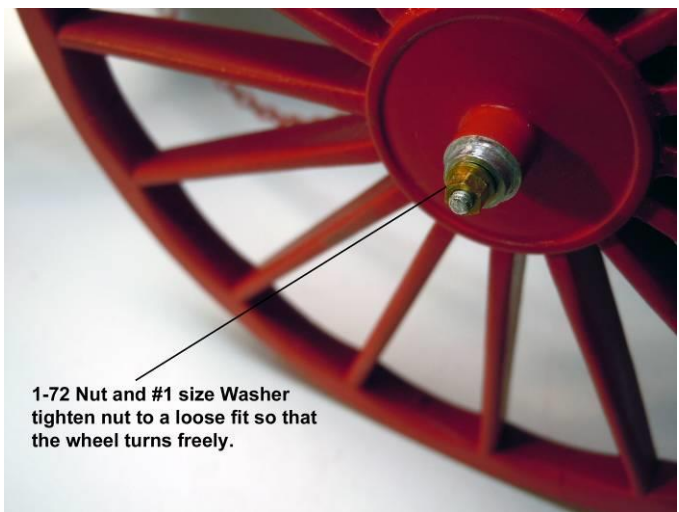
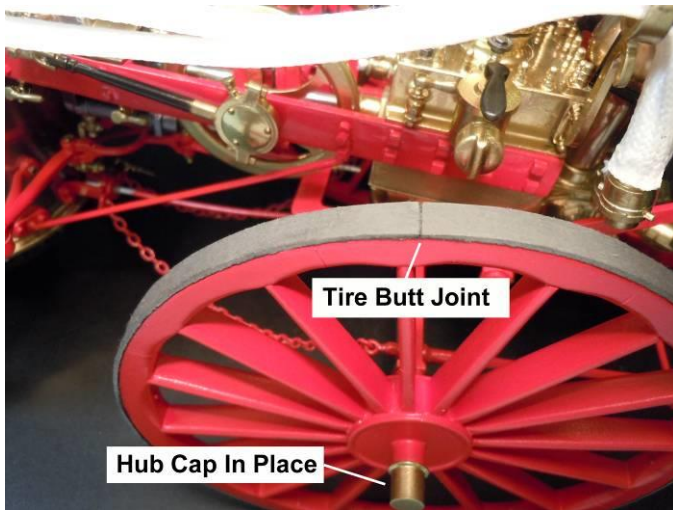


## Wheel Tires:

The wheel Tires are the four (4) laser cut gasket strips. Two (2) long strips for the rear wheels and two (2) shorter strips for the front wheels.

Tires will be applied one at a time to the wheels with three remaining wheels are still on the Pumper. Use a prop to carry the weight while the wheel is removed.

Remove one (1) Wheel from the pumper and one (1) Strip at a time from the carrier gasket sheet and clean the edges. Carefully glue in place on the Wheel Rim flat surface; when applying the CA to the Rim flat it is better to apply a little at a time using a glue applicator rather than the tip of the CA glue bottle. Just work slowly around the perimeter and if you discolor the facing edge of the rim do not worry. Mate and cut the ends flush with a butt joint. Care **must** be taken to **not cut too short** with a resulting gap in the tire.



Once the Tire is in place and the CA set; apply 3/4" masking tape centered on the perimeter surface of the Tire. Then mask off the Hub Cap location to avoid paint build up as seen below. Now lightly spray both sides of the wheel with Krylon Satin Clear paint and when dry this will cover up any marred surface discolored with CA during the Tire fitting.

Once the Tire fitting is complete replace the Wheel; add the #1 Washer and 1-72 Nut; **do not over tighten the Nut**. Press on the Hub Cap.

Repeat the process for the other three Wheels one at a time.

Now place the Whip in the Whip Holder and the Hand Lamps in their Holders; the model build is now complete.



Reference Photos:

