Device to Rotate Rail Cars

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I have had several requests to provide more info about the device I built to rotate my passenger cars to make it easier to work on the trucks and brakes.

The device described here was made specifically for my (Mountain Car) passenger cars and my engine stand. The design would have to be changed to adapt to your cars(s) and engine stand, but this will present the general idea and you can adapt it to your needs.

I do not provide dimensions for most items as these will be dictated by your car dimensions, center of gravity, items projecting out the end (such as the diaphragms on my cars), etc.

How It's Used

This is what it looks like just before lifting the car to rotate it:

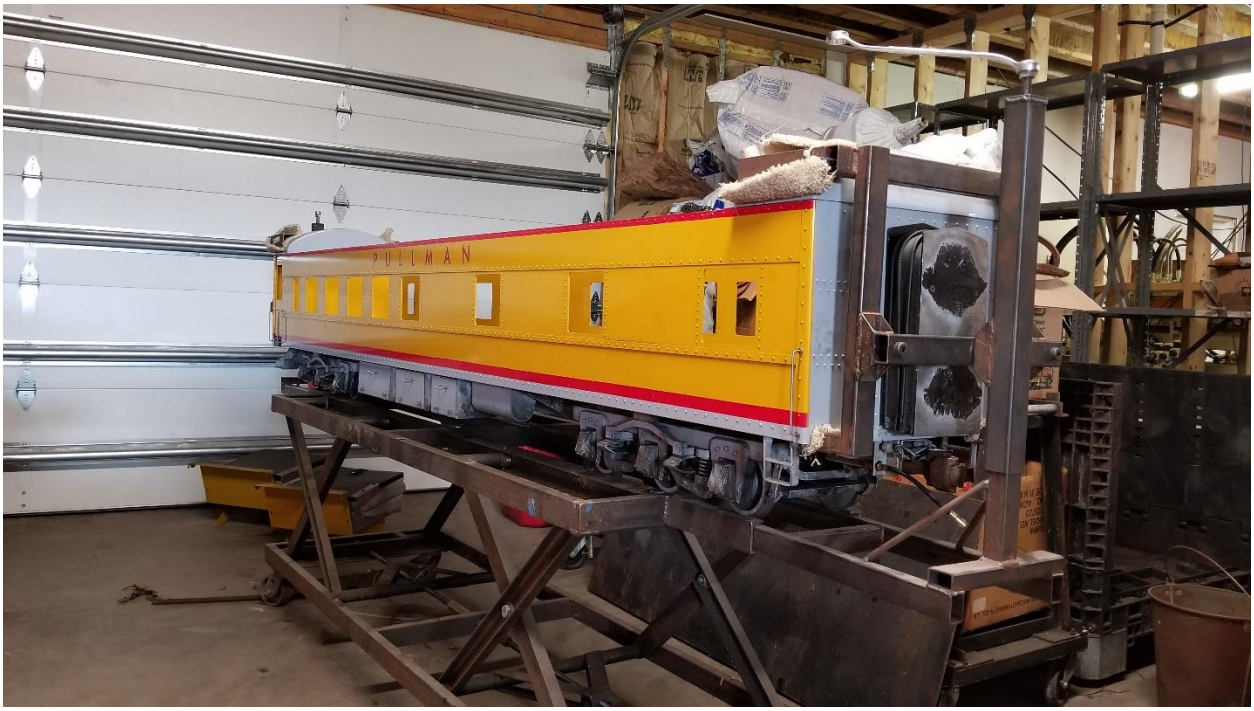


Figure 1 - Initial position of car

This shows the car after it has been lifted and ready to rotate:

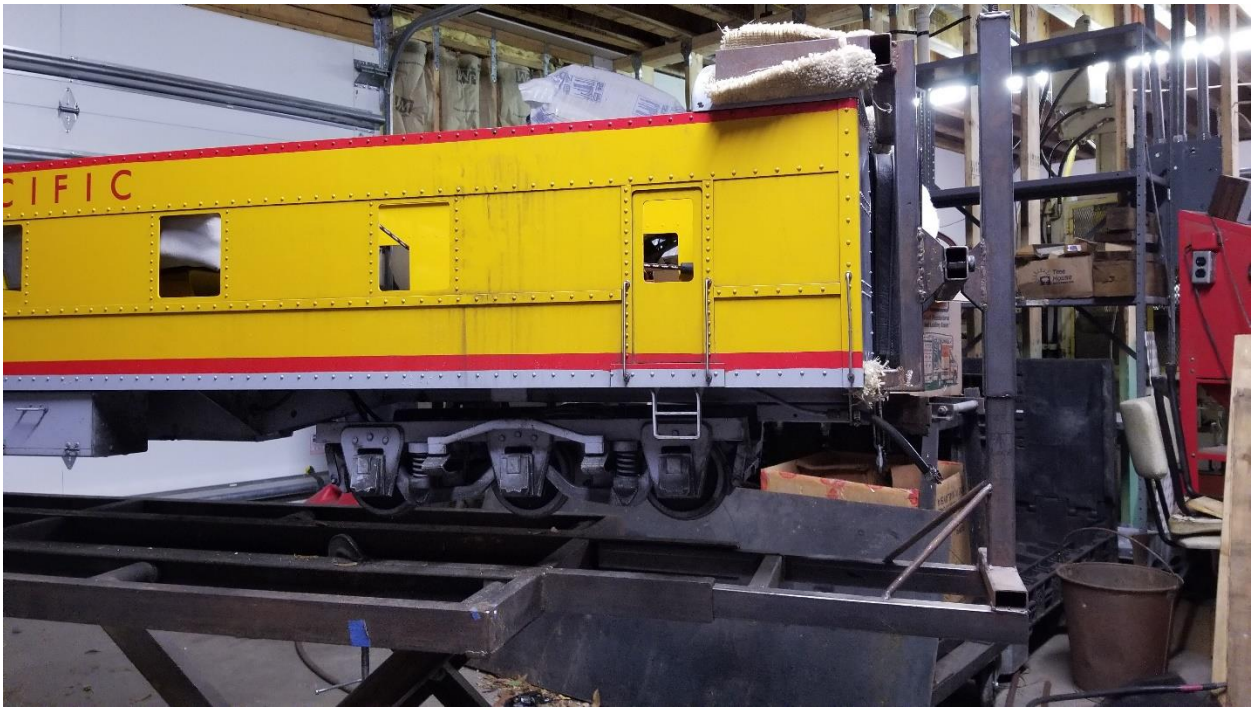


Figure 2- Car after lifting, ready to rotate

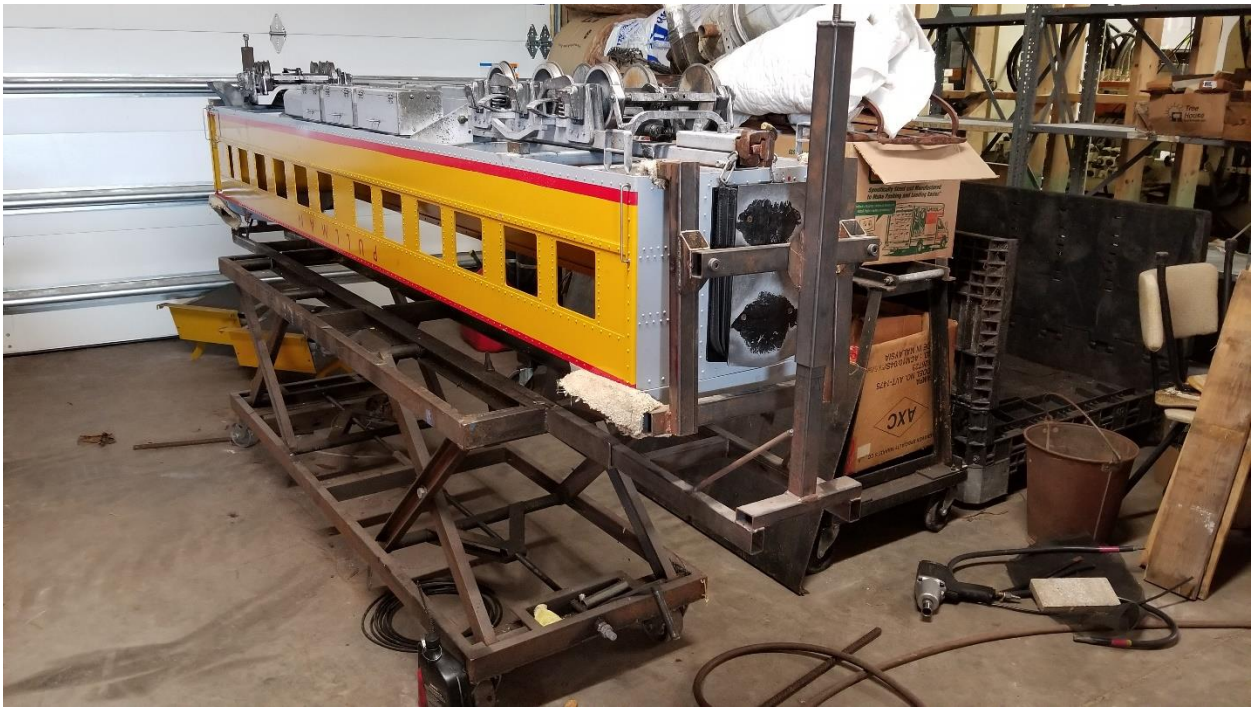


Figure 3 - Rotated

This shows the final position ready to work on the brakes, etc.:

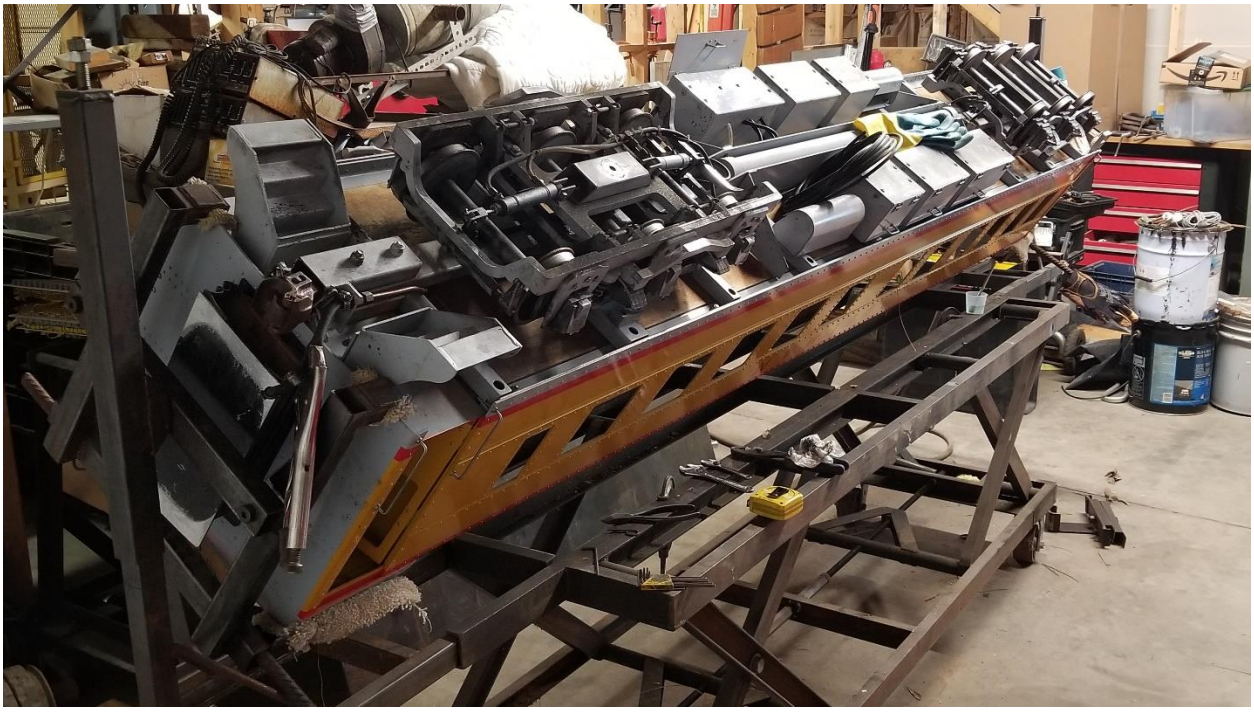
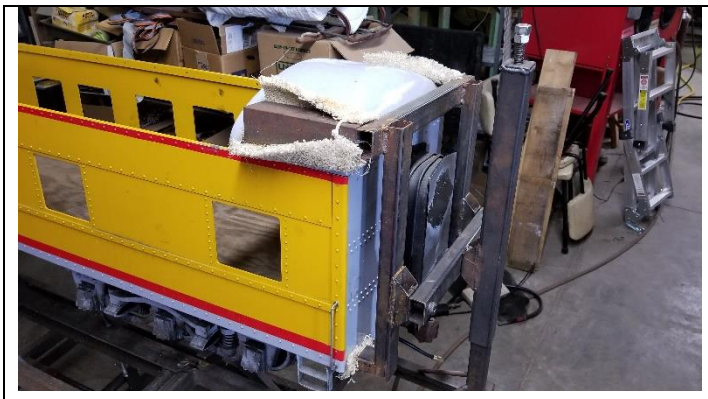


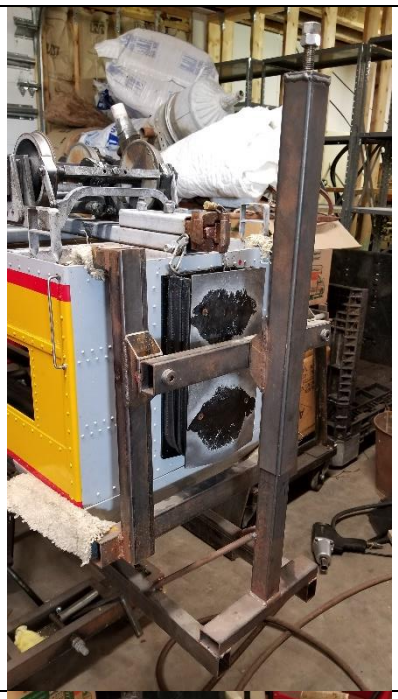
Figure 4 - Tilted and ready for work

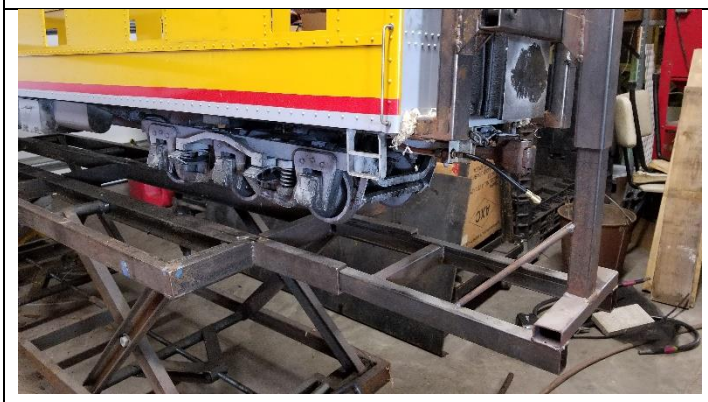
Note: In this photo there is rebar through one of the cross tubes at each end to keep the car from rolling back over. Later I just lowered each end so that the cross tube hit the brace for the vertical lift tube. This was easier, and I didn't have to worry about walking into the rebar (note the glove over the end of the rebar on the far end 😊).

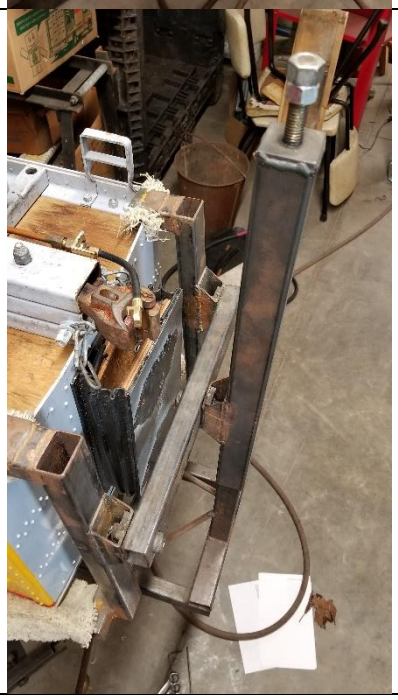
That's how it's used. Now for some construction details.

General layout:









Specifics

There are two members that slide into the ends of my engine stand. The engine stand uses 2” channel iron for ‘rails’ and 1 ½” x 1” box slides easily into the rails.

On these two horizontal members I have welded two cross pieces. One is welded between the horizontal members about mid-length to hold separation and one is welded on top at the outer end to support the ‘lift tube’. I also welded two (3/8” round) members as supports for the lift tube.

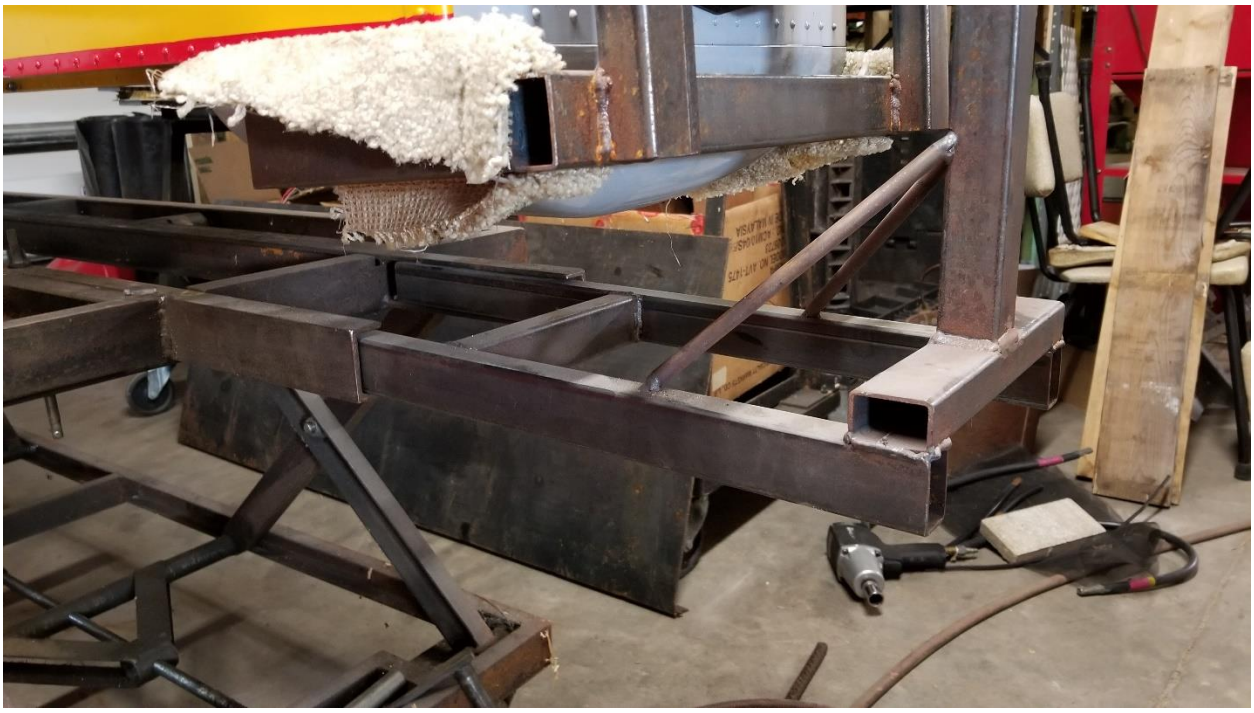


Figure 5 - Base to hold the lift tube

The lift tube is a section of 1 ¼” square tube welded to the base. A section of 1 ½” square tube slides down over the 1 ¼” section.

There is a piece of ¼” thick plate welded to the top of the 1 ¼” section. This is drilled and tapped ½” x 13.

The upper end of the 1 ½” section is capped by another piece of ¼” plate. This is drilled to ½” so that a piece of ½” x 13 all-thread can pass through it.

This piece of all-thread has two nuts locked together about 2” from one end and then this end is passed up through the 1 ½” section and then through the cap.

Two more nuts are locked on the end of the all-thread so that the all-thread is captured in the 1 ½” section but free to turn. *(note: When I originally built it I think I put a thrust bearing on it before installing it in the 1 ½” section but I didn’t take it apart and I do not recall for sure).*

This assembly is then placed over the 1 ¼” section and the all-thread is threaded into the tapped plate at the top of the 1 ¼” section.

Turning the exposed double-nut raises and lowers the car with the inner two nuts lifting on the bottom side of the plate at the top of the 1 ½” section.

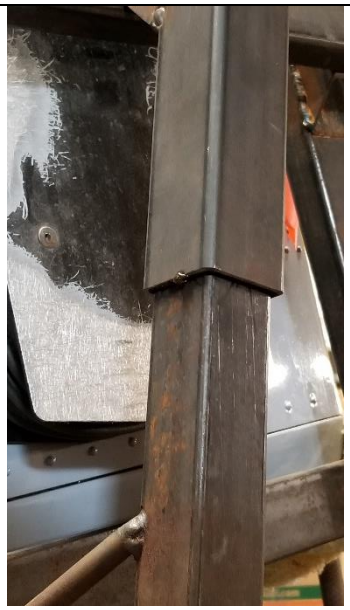


Figure 6 - Lift tube sections

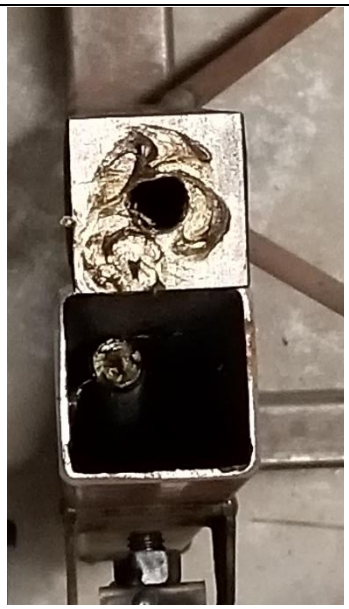


Figure 7 - Tapped hole at top of bottom section and captured all-thread in the top section

This shows a mark I have placed on the lift tube to denote how far to lower the car so that the cross pieces hit the 3/8” braces in the work position (either way) to prevent the car from rolling completely over. There is another, similar mark above it to indicate at what point the car clears and can be rolled into position initially or back over when work is completed.

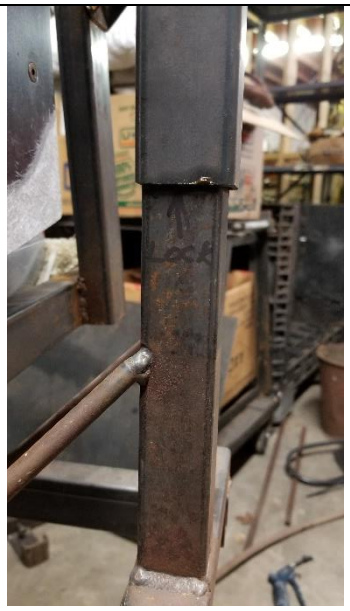


Figure 8 - "lock" mark

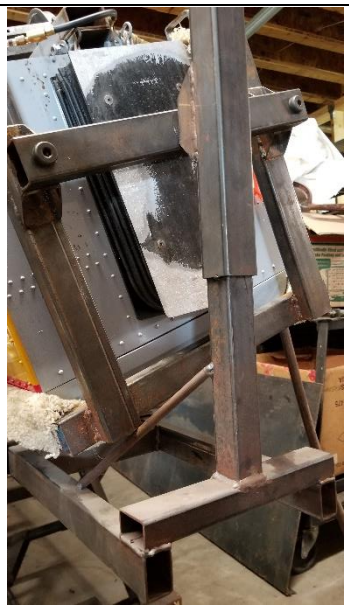


Figure 9 - cross piece hits support

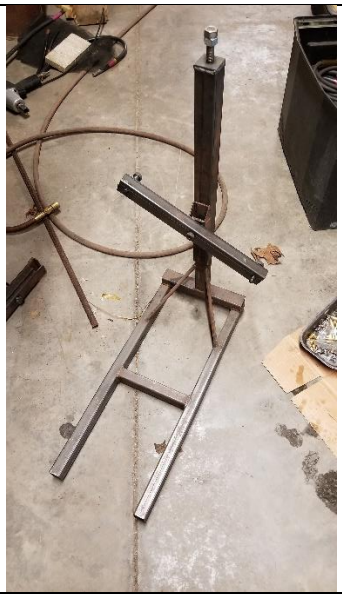
Pivot

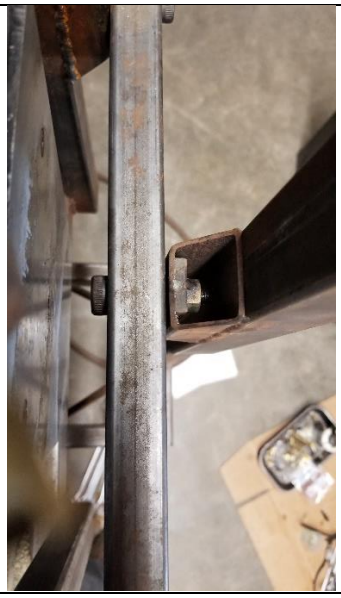
At this point you will have to decide at what level you are going to pivot the car. Ideally the pivot should be located so that it is at the center of gravity of the car. This makes it easy to rotate the car. Because of the way my end clamps attach to the car, my pivot point is somewhat high which makes rotating the car a little more difficult but not a big chore.

The pivot is formed by welding a section of 1 ½" square to the lift tube. It is located so that it can engage with the car end clamp when the car is on the rails and the lift tube is almost all the way down.

Inside this is a piece of ¼" plate with a nut welded on the back. The ¼" plate is drilled to accept the end of a ½" shoulder bolt that is used as the pivot.

The pivot passes through a piece of 1 ½" x 1" rectangular tube that serves as a cross piece. The car end clamp is attached to this with two more ½" shoulder bolts (hey, I had them around, so I used them 😊).



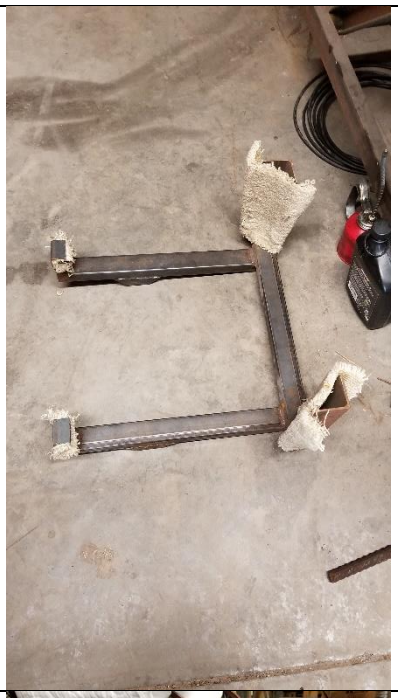


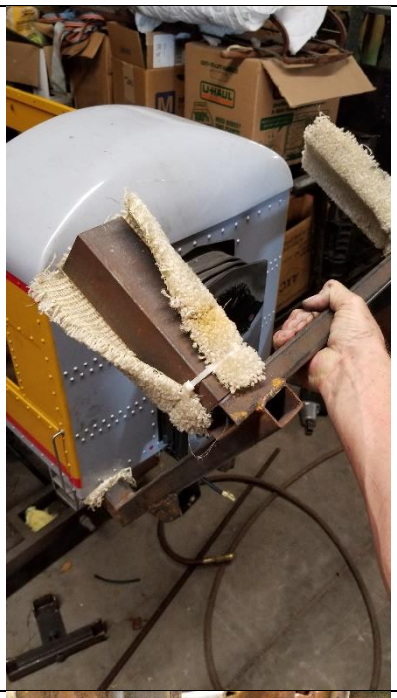
Car Clamp

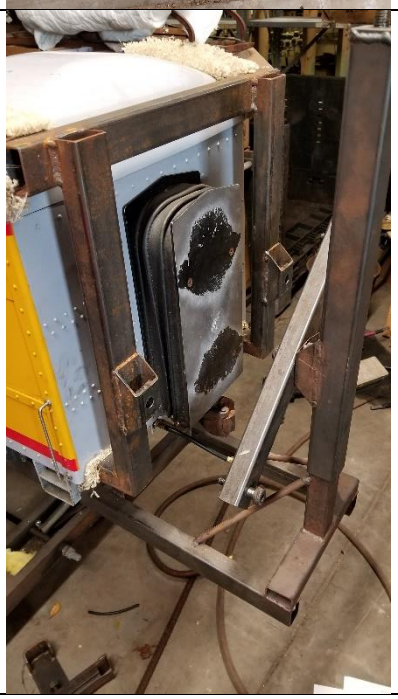
The car clamp will have to be designed for your cars. Mine has two padded (old carpet) lips that hook under the bottom edge of the car and two sections of 2" angle iron that then slide onto the roof with a good snug fit (remember – you don't want the car to drop out of the lips when you flip it over).

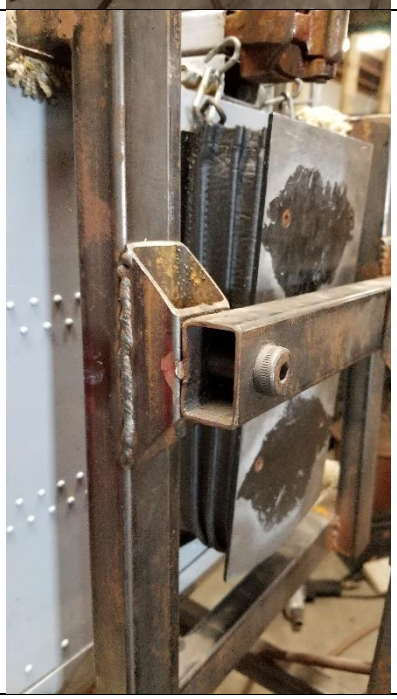
My clamp also had to be extended out from the car end to clear the diaphragms.

After the end clamp is placed on the car the lift tube cross piece is bolted to the clamp (same shoulder bolt arrangement as the pivot).









The car is then raised to the “rotate” mark using a wrench on the all-thread (if you use an air driver be sure it does not ‘impact’ or it may unlock the two nuts on the end of the all-thread.

After both ends are at the “rotate” mark, the car is rotated to vertical (upside down) and the lift tubes lowered to the “lock” marks.

That’s about all there is to it …

Chuck Hackett