

Brake Links

Nelson Riedel Nelson@NelsonsLocomotive.com

Initial: 9/17/03 Last Revised: 06/05/2004

After finishing the steam brake cylinder I was in Kosova for a month. I got to thinking about the brake linkages on the long flights. The initial plan was to link the steam brake to the front and middle truck and use the rear truck for only a park brake. However, I had made the rear part of the cylinder twice the cross sectional area of the front part because I liked the look of the cylinder on Cass No. 5. Most the weight will be on the rear truck (the engineer) so I decided it'd be a good idea to also connect that truck to the steam brakes. It wouldn't be a problem to combine the park brake and steam brake functions on that rear truck (that's a common practice on autos). However, I couldn't figure out how the middle and rear trucks were linked to the rear brake piston on the prototype. On a previous trip to Cass I had taken photos of these linkages but couldn't figure out the linkage configuration from the photos.

Besides the brake linkage I also wanted to take photos and measurements of the reverse handles and the blowdown valves ---- couldn't find the blowdown valves on any of the photos I'd taken previously. That was enough of an excuse to make another trip to Cass.

Upon arrival in Cass I wanted to check out Cass 5 first but it was on a run up the mountain so I checked out the linkages on Cass No 10 --- a yet to be restored Class C that is a close match to my shay. I liked the reverse handle arrangement and will copy it very closely. Found the blowdown valve ---- in the mud ring in the middle of the back side --- no wonder I didn't have photos of it. I didn't like the brake linkages on Cass 10 because the arrangement on the trucks were different than Kenneth's design that I'd already built.

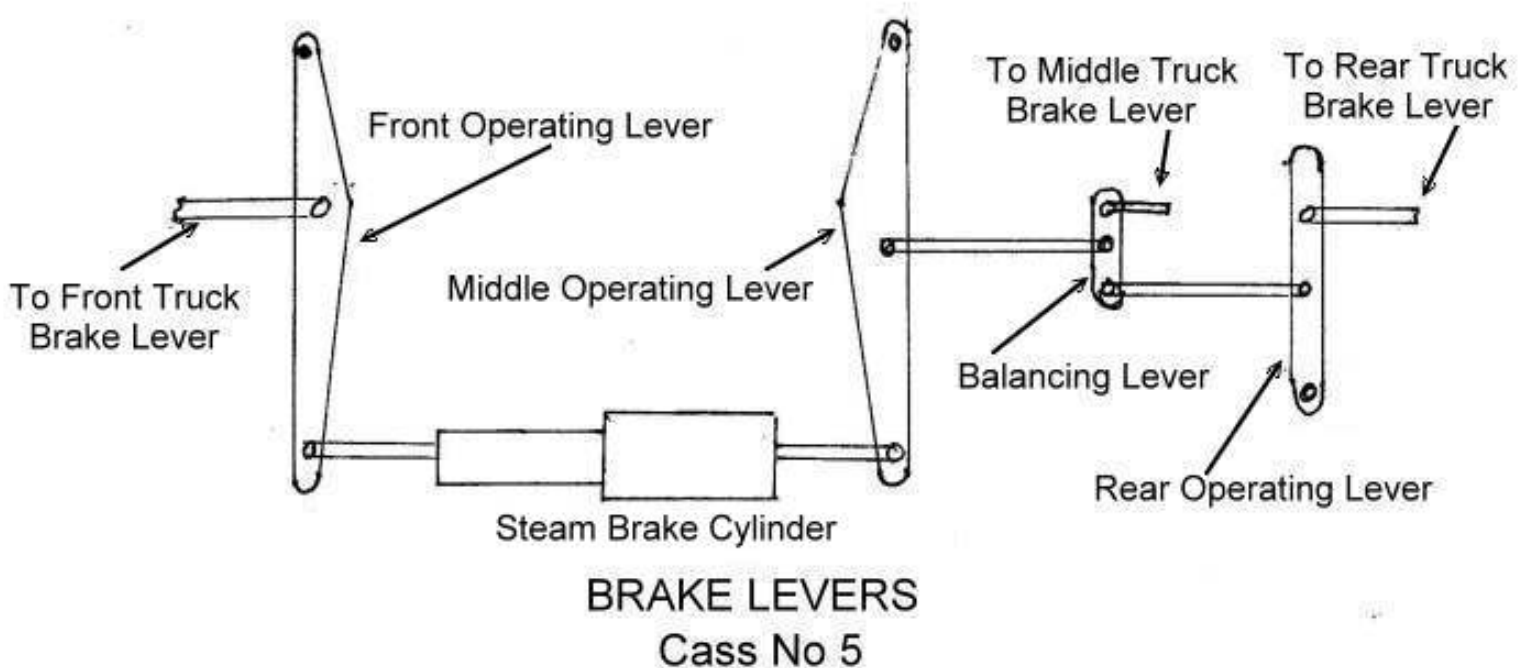
Cass 10 Brakes: I've included this photo of the brakes on Cass 10 as a comparison to Kenneth's design. There are two identical brake levers, one on each side of the spring planks connected by links between the spring planks. The connecting links serve as the lever pivots and are free to slide to front and rear as

Brake Links

necessary to equalize the braking force on the two axels. There is a link from the bottom of the levers to the brake beams. The top of the inside lever is linked to the operating lever, which connects to the steam cylinder. The top of the outside lever pushes against the pivot block, which serves as a stop. This is a design improvement over the earlier version that Kenneth used since fewer parts are required.



Cass 5 Brakes: I was relieved when I was able to examine Cass No 5 later in the day; the arrangements on the trucks is identical to Kenneth's drawings. After studying the linkage to the rear truck I realized why I couldn't understand my previous photos --- they were photos of at least two different arrangements on different locomotives --- sort of apples and oranges. This time I made a sketch first and then took photos to back up the sketch.



I made up the names for the levers that might disagree with the names on some Lima documentation you may have. Please don't get upset. Instead, send me a copy and I'll fix up my sketch. The front linkage in the sketch is identical to that shown on Kenneth's Drawing 32-2. The middle operating lever is the mirror image of the front operating lever. There is a short balancing lever just ahead of the pivot block of the middle truck to equalize the forces applied to the middle and rear trucks. The rear operating lever is at the very rear of the main frame with the link to the rear truck passing under the middle of coupling between the main frame and the tender frame. The position of the lever at the rear and the link under the middle of the coupling is to minimize the effects of curved track on the link adjustment.

This shows the clevis between the piston rod and the front operating lever. The arrangement for the middle operating lever is identical.



This is the middle operating lever. The link is to the balancing lever.

Note the blowdown valve on the left side of the photo. I had to crawl under the locomotive to take these photos. It had steam up so it was hot. Worse, I got oil and grease all over myself. It's amazing how it takes 50 paper towels to soak up a half teaspoon of black oil.



Brake Links

This is the balancing lever. It's located about 18 inches in front of the middle truck pivot block.



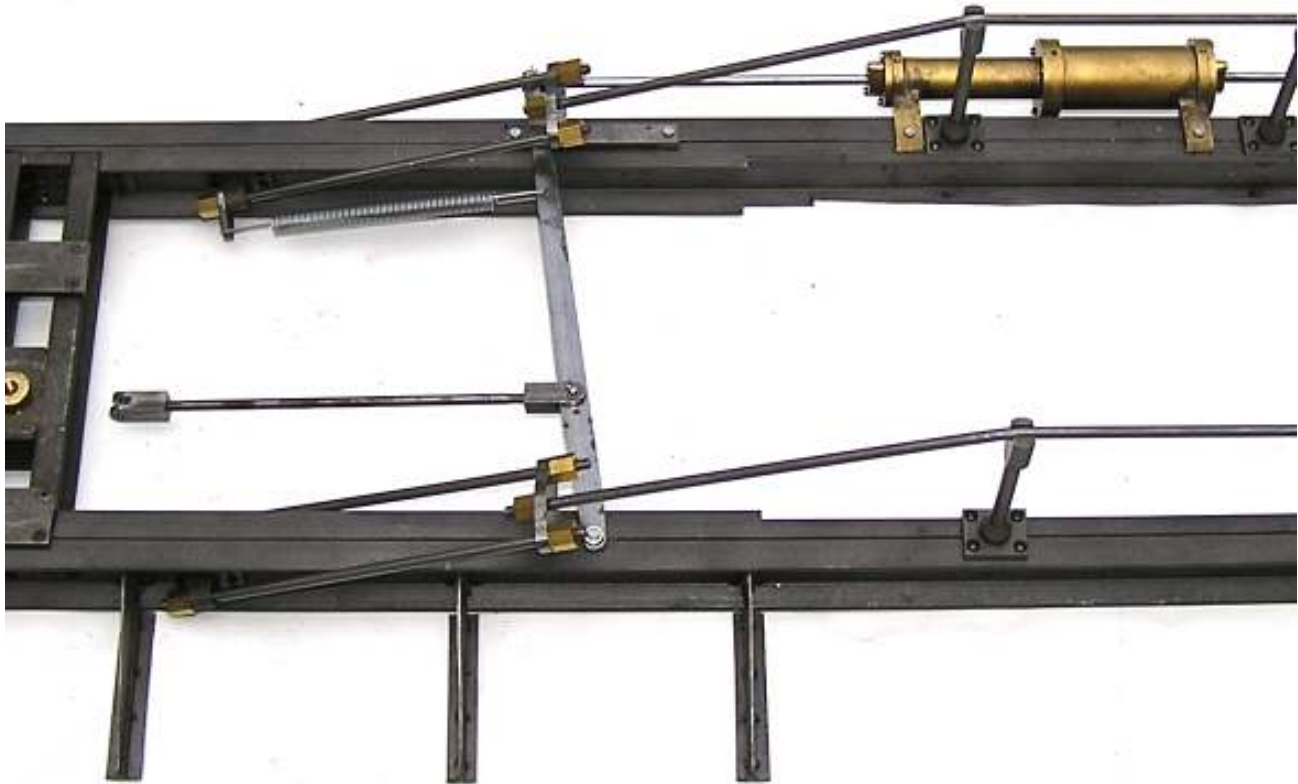
This is the rear operating lever. It's located a foot or two in front of the rear frame cross member.



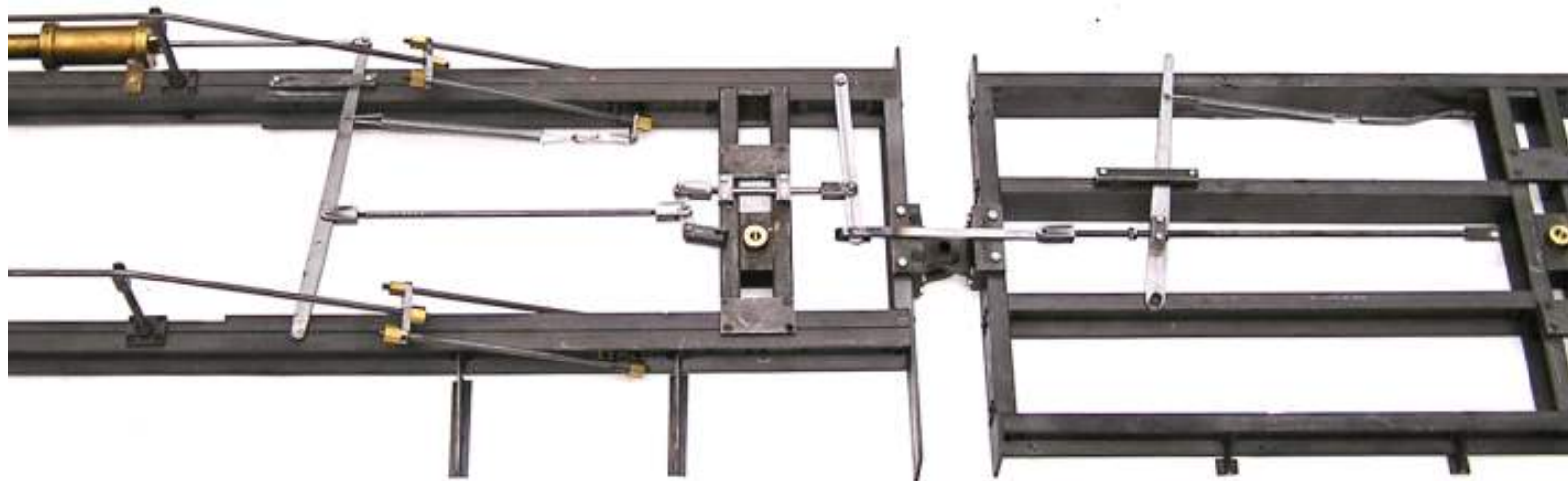
Another shot of the rear operating lever taken to the left of the shot above showing the pivot that is attached to the left frame I beam.



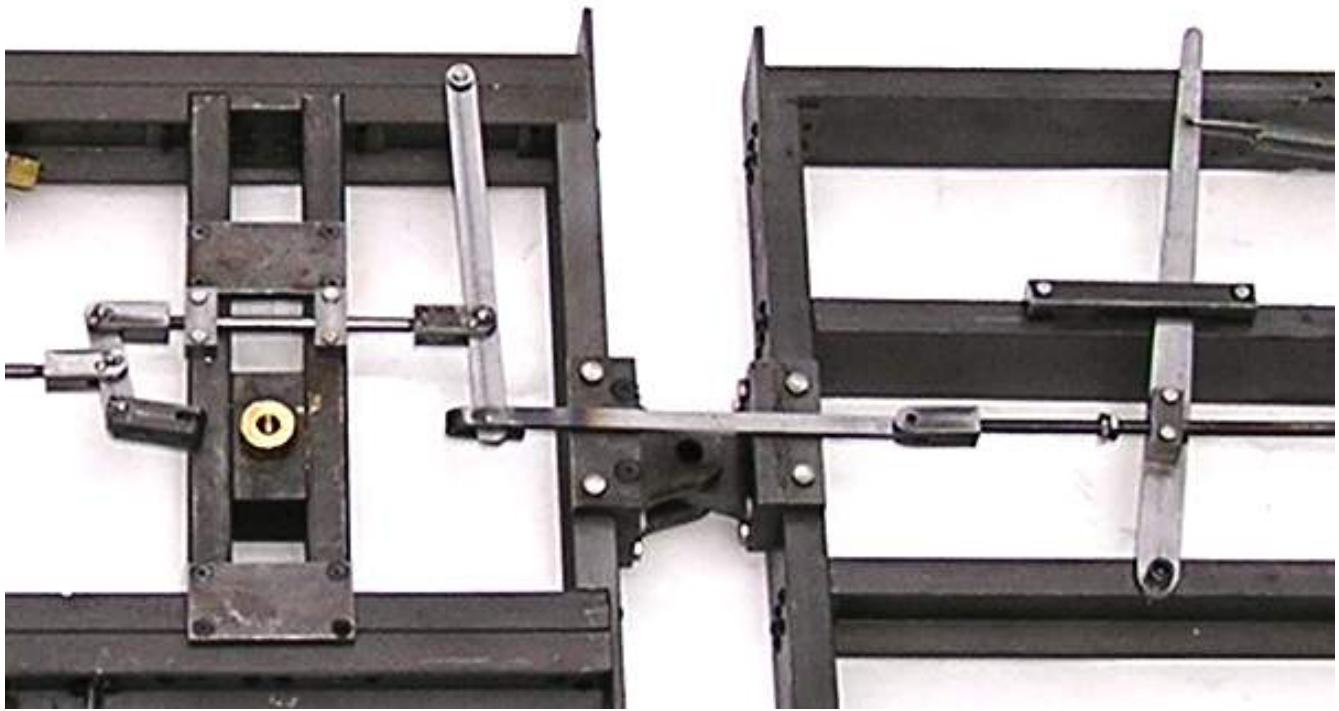
The next photo shows the underside of the front brake linkage. This exactly matches Kenneth's Drawing 32-2.



This sketch shows the underside of the linkage to the middle and rear brakes.



This next photo is a closer view of the linkage between the middle and rear truck. The link connecting the balancing lever and the rear operating lever is retained and supported by two U shaped brackets screwed to the center truck bolster. The link in turn supports the balancing and rear operating levers. A similar bracket is screwed to the park brake lever. The rod to the rear truck is free to slide through this bracket when the steam brakes are applied. When the park brake lever is pushed forward it pushes against the pair of nuts which in turn applies the brake to the rear brakes. The two nuts are the park brake adjustment.



There is very little clearance between the frame and the top cross bars of the middle truck. The link that passes under the coupling between the two frames is fabricated from 1/8" X 1/4" bar stock. The front is heated and bent into a loop with a rounded front edge to minimize the possibility that it will catch on the truck top cross bars.

I followed Kenneth's clevis design for the brake links. However, the 3/8" bar stock is out of scale for the end of the steam cylinder rods. The earlier photo shows a much smaller clevis. For the steam cylinder clevis I started by heating 1/8" by 1/4" bar stock red hot and bending a loop as shown on the right..



The end was drilled and tapped 6-32. The loop was cross drilled and then the sides thinned with a file. The last step was to cut the ends and round the ends with a file. The finished clevis is shown on the right.



The next step is to make the brake valve, sometime in the future

[Shay Home](#)
[NLW Home](#)



