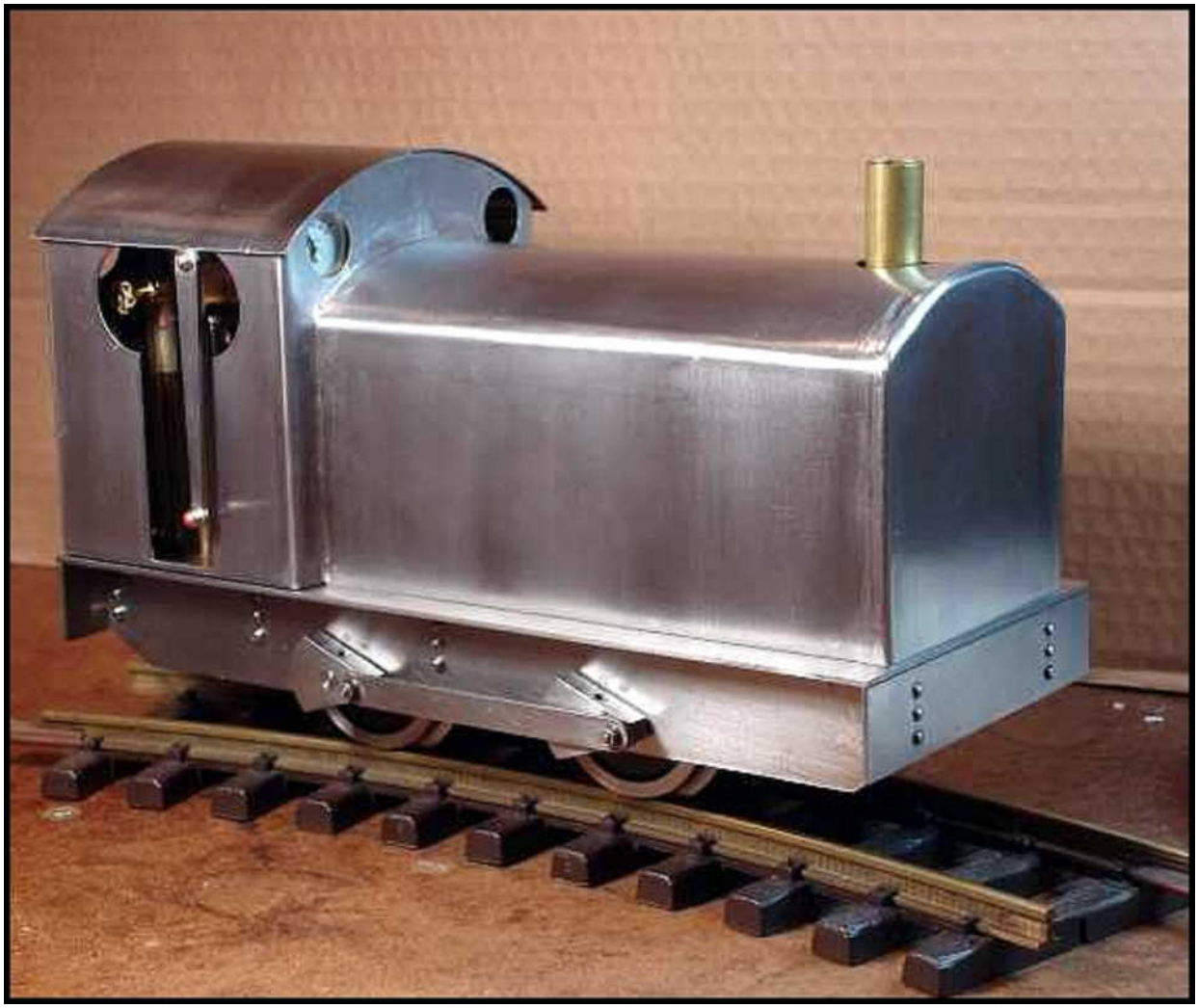
Scratch Built: LBSC 1930's Diesel

BY

MLS-DeWinton Dave

(Live Steam/Topic: LBSC 1930's Diesel)



Dear All,
Here is my tribute to L.B.S.C. (Pen name of **Lillian "Curly" Lawrence** 1883-1967). Two and a half years in the making. I bought a bundle of old magazines from the 1930's and a construction article caught my eye.

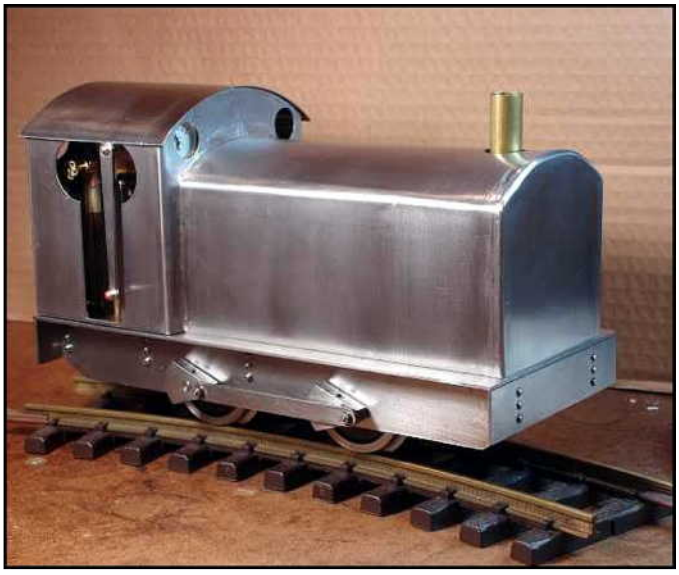
The article starts with:
"THE success of the Diesel locomotive on intermittent shunting work and short branch-line operation has inspired many small locomotive builders to attempt a small edition; but owing to the fact that Nature cannot be "scaled," it is impossible to make a little Diesel which will operate like a big one with crude oil as fuel. You could not get the compression, even if the fuel were injected correctly. However, there is no need to let that fact deter you, as we can build a locomotive which looks like a Diesel, and operate it by steam; so here is a short description of such a locomotive, suitable for gauge 0, on which it will do all that" Sister Diesel" does on 4 ft. 8.5 gauge."

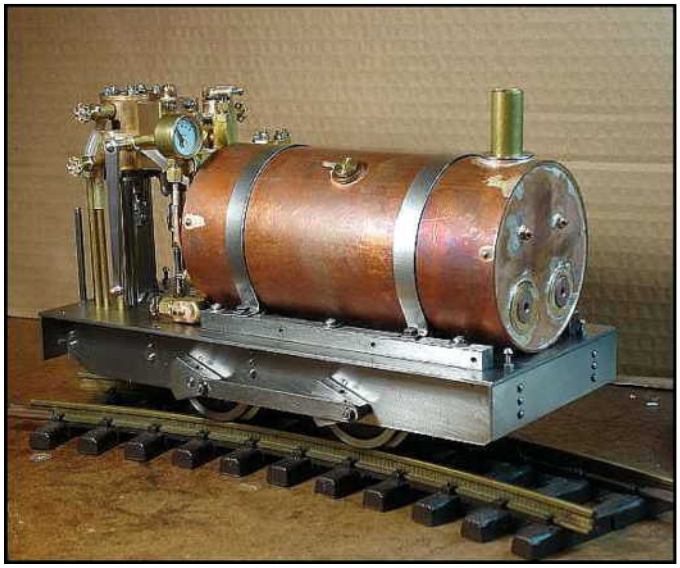
I thought the loco would be a quick build, but was wrong. I scaled the plans up from O gauge to Gauge 1 then added a little to make it look right with my LGB stock. It seems to run nicely at a G-scale scale speed of 10 mph.

This loco was built as a tribute to LBSC, but the cylinder is pure K.N. Harris :-). It has a built-up cylinder block with all the porting and dimensions to K.N. Harris' book, the slip exocentric is to his dimensions too. The exhaust sounds nice and snappy. As this needed to be a fairly high-speed motor (by my standards), I opted for a reduced piston stroke but an increased bore. I raised the cylinder as high as could be to reduce angularity and do away with a crosshead. I fitted screw-down drain cocks to the cylinder as per K.N. Harris' recommendations. The loco was built using 6 mm bore x 13 mm OD ball races, I have a plentiful supply of them, so 6 mm silver steel was used for the shafting. The loco is worm driven and I made my own on my lathe, it was a real mission, but enjoyable. I thought the motor would guzzle steam at a great rate with the 12:1 gearing (nearly twice that of a RH loco with wheels the same diameter) so I made the boiler as big as possible. As the motor exhaust doesn't go up the funnel a smokebox wasn't needed. The boiler is a twin flue gas fired affair with two short poker burners and a central internal uptake flue with water all around it.

The bodywork is all 0.6 mm steel, and it's almost a one-piece lift off structure now, is quite rigid. It's all soft soldered together; I am a fan of soft soldering now that I have a 80 W iron and the right flux.

Fully dressed.

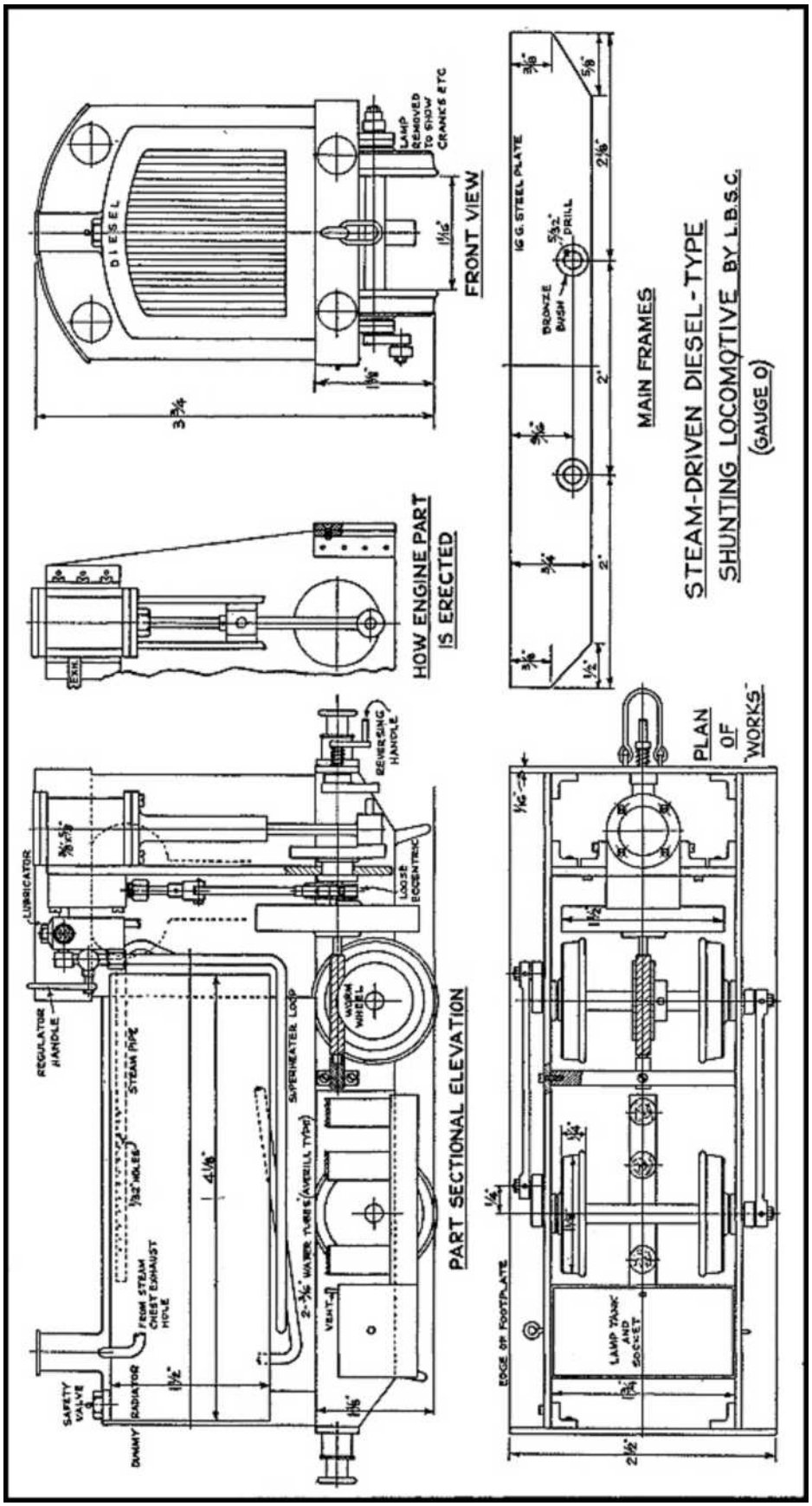




With the top off;

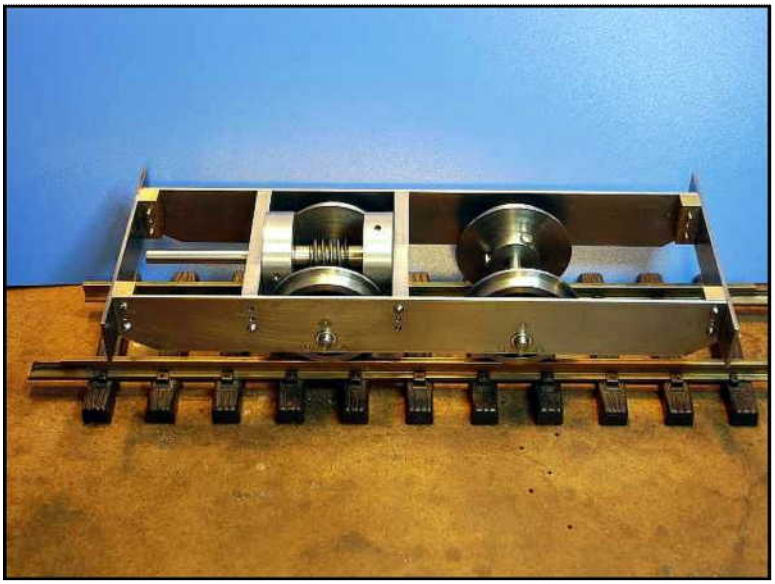
The bodywork lifts off to reveal the works. At the moment I can't bring myself to paint it, and have been contemplating naming the loco "Silver Lady".

Here is the drawing from the plans.



Please email me if you would like a PDF copy of the plan and original instructions, it's only two pages in all.

Worm and wheel.



Rolling Chassis.

Cylinder assembly.

Boiler internal assembly.

Boiler in the pink.

Check out the video to hear the lovely exhaust note.

Comment Bob Sorenson:

Dave: The boiler design is great. No wasted space in a firebox. That's "all business" on the front end. I see what you did with the cylinder. Nice way to get the passages in.

LBSC is my favorite. His designs always work.

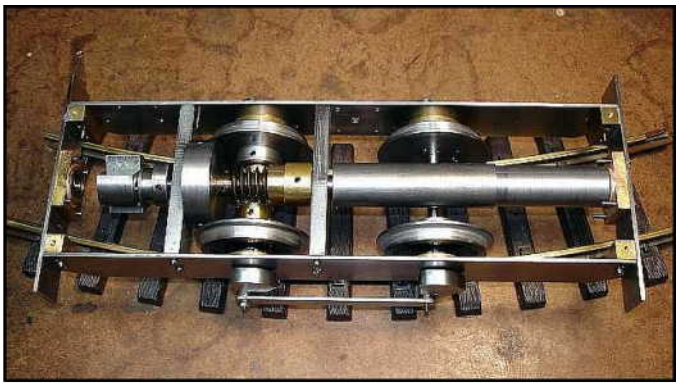
Comment Henner Meinhold:

Hi Dave, the sound is really more diesel-like than the "angry bee" sounds of a model gas engine. Your soft soldering looks very good. I wish I could do that. Strange enough I am more comfortable with silver solder. What is your trick? BTW, my friend David built something similar to what you did. May be he replies too.

Hi Henner, the trick is a very active flux. I'm using a local flux called "**Duzall**" that doesn't even need the parts to be degreased. As soon as I paint it on the metal brightens. The whole job needs a good wash in warm soapy water afterwards to wash all the flux off otherwise it will rust. A powerful enough soldering iron is needed for these larger jobs, my 80-Watt iron seems sufficient. I'm using large sticks of plain solder.

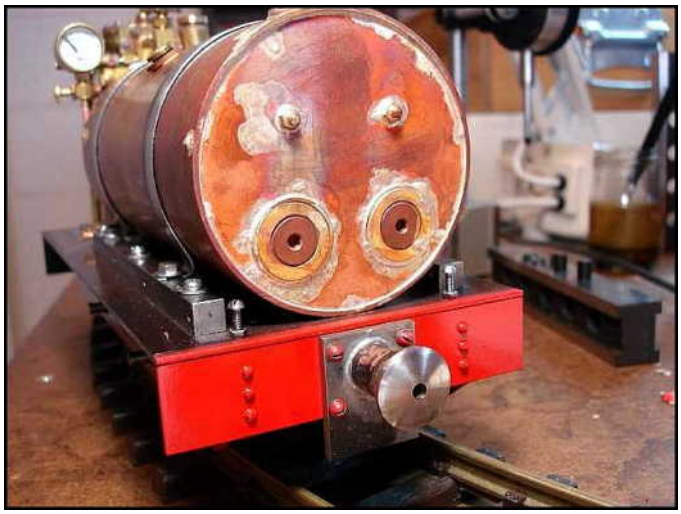
I have progressed the loco a little further. The rear "crank handle" location for starting the loco meant starting was difficult with gas lines and car couplings getting in the way. I use an Allen key, and had attached a brass hex socket to the end of the crankshaft.

As I'm no longer considering an onboard gas tank I decided to extend the crankshaft all the way to the front of the loco, I also wanted more flywheel effect so I made it out of 3/4" steel. It is supported with yet another ball race here is a photo:



As starting could be quite difficult I decided that an electric starter would be useful. To test the idea out I used an existing motor gearbox that I'd previously powered the chassis with, here's a photo:

An added complication with my starting arrangement is the central single buffers. The hole just clears the Allen key, here's a photo:



The loco had a couple of runs today, the starting is nice and easy now, and perhaps the engine can run a little slower with the new crankshaft extension. On one occasion I coupled all our rolling stock, the coupling rods were off but as the loco is heavy there was no wheel slip. The motor is so punchy that our wooden bridge flexed up and down with the power strokes, talk about rail hammer! The loco was putting out a lot of power and the water consumption was phenomenal. With the 12:1 reduction gearing there are about 9700 power strokes per circuit of our railroad. I've even run the boiler dry a few times now; just promptly turn off the gas and no harm done. There's still plenty more to do.

> ***Comment Henner Meinhold:***
> *Dave, the idea with the electric starter is brilliant! You could use a slip eccentric and run the loco in both directions. Off topic: I got the new book about the deWintons written by the owner(s) of Chaloner and I am hooked.*

Hi Henner, The loco does have slip eccentric valve gear. On its first run the loco snagged an obstacle and started reversing all on its own, quite extraordinary I thought :-) I had read of someone doing end-to-end running with a slip eccentric loco by stretching an elastic cord at each end of the line. I didn't believe it, now I do. I'm glad you like the new book.

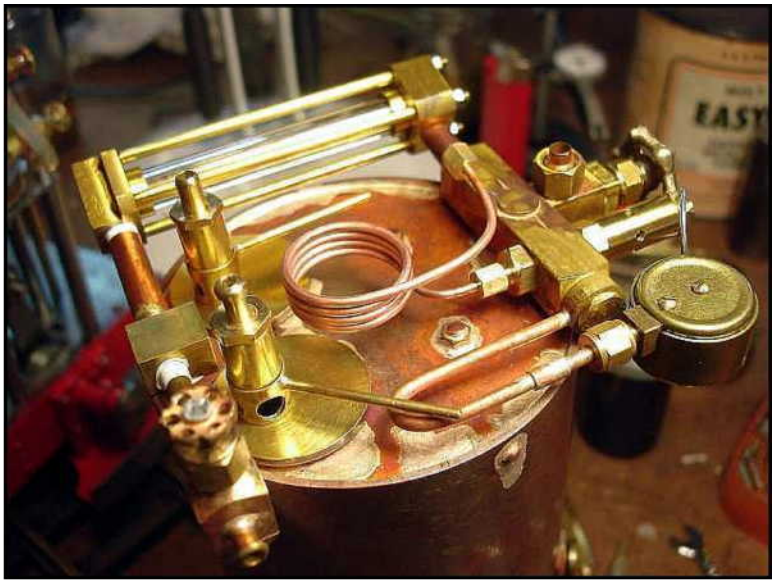
I recently checked the valve events using Charles Dockstader's simulation application. The cut-off is approx 50%. I think this explains why an electric starter is beneficial. I used the eccentric from LBSC's G1 Girton design. A mix of KN Harris and LBSC!

(24 Oct 2011) I have progressed the loco some more. The running to date showed that the lubricator wasn't working; it wasn't delivering nearly enough oil. It is a metered dead-leg connected direct to the steam chest. I have used this type successfully when connected in the steam line between the throttle and motor, but this set-up is different. I decided to run a small 1/16" steam line to the bottom of the lubricator body, to deliver drops of water there. The steam line is a whole 12" length of K&S copper tube coiled - so hopefully water comes out.

The loco was run this morning, what a transformation. The loco ran with much less throttle and three laps of our 60 yd layout used up the whole oil supply - about 3mL. The loco was a lot happier with oil. The three laps used half the boiler water. I timed a lap at 7 minutes, previously it was running at about 5 minutes - we try to run as slowly as possible.

Since the last update a new safety valve has been made, and two new full-length burners, with a reduction in the air inlet holes to reduce howl.

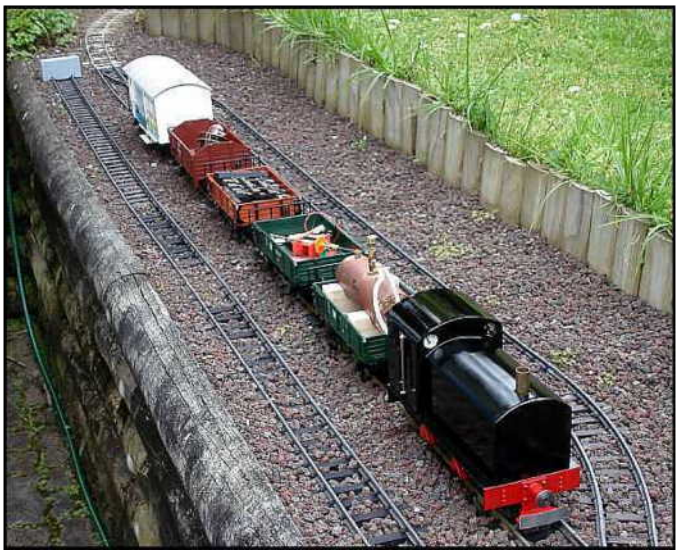
Backhead showing the copper coil.



Lubricator with new steam feed valve at the bottom.

We gave it a good run yesterday, and the boiler heat helped cure the paint. The engine sounds even snappier now that it's getting plenty of oil. There's oil on the track now, it eases the curves nicely :-)

Building up pressure before the start of the run.



The loco is as good as finished now. Painted in NZR gloss black - automotive engine enamel.

Comment Bob Sorenson:

Hey Dave: Looking sweet!! Did you make those sporty looking knobs on the lubricator??

Thanks Bob: No, I bought the hand wheels from a local supplier.

Comment Bob Sorenson:

I saw a jig somewhere to make handles like that. Darn if I can remember now. I'll look.

Comment Henner Meinhold:

One trick is to make a bundle of 1/16" (or smaller) tube, secure it with wire wrapped around, silver solder the lot and then part off individual wheels. Works pretty good. Try to avoid the $^&%$ brass from K&S if possible.

Comment Phippsburg Eric:

Not liking K&S, Henner? I find it OK for most stuff if you can work within its sizes and strengths. It is not easy to find anything else ... have you a source?

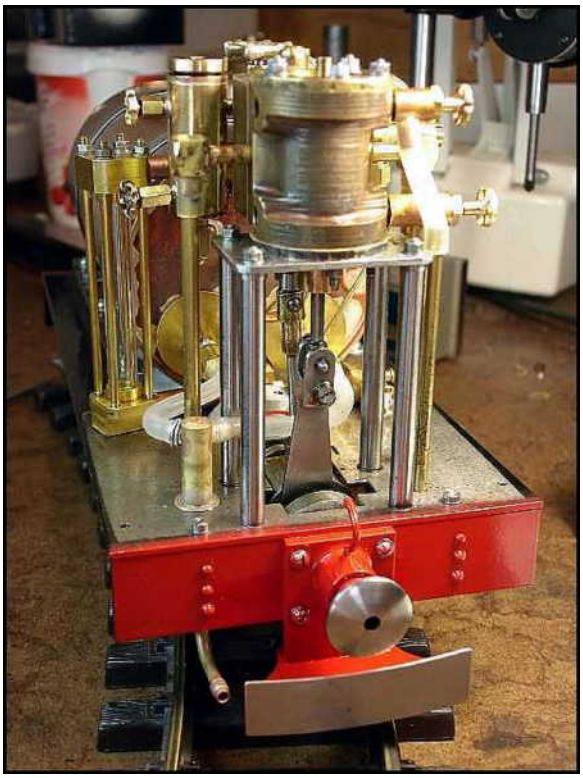
That's an excellent idea Henner. I don't have any problem with K&S brass myself; it probably bears well against free machining brass. Its so accurate folks use it to sleeve down cylinders.

Comment Bob Sorenson:

K&S tubing is a nightmare. I'd rather drill solid rod then use that stuff.

Some new videos

I made a 1-into-2 gas manifold, there's the tube under the buffer beam, which I connect the external gas tank to.



I have recently painted all the exposed steel of the chassis with steam oil for protection from rust. There is a piece of .008" card insulating the boiler from the chassis now too. The bodywork has been left bright on the inside to reflect heat back at the boiler shell, and it doesn't get too hot to the touch.

The back-head only has two bushes, and the water gauge shares the bush with the regulator. This isn't ideal, the water gauge only reads true when the motor isn't running. When running, the water level displayed is artificially high.

I modeled the water gauge on the one detailed in Larry Herget's excellent coal fired Ruby write-up a few years back.

(22 Jan 2012) I had to rebuild the motor... When I tried running the loco there was a large leak to exhaust.

The valve rod had corroded and the slide valve was no longer seating properly. The piston rod was also corroded. I had used steel to make these parts, as I had got away with it on my DeWintons. Luckily there was no damage to the valve or port face.

This loco with its water gauge plumbed into the throttle manifold can run very wet, and the lubricator was not effective initially. On light throttle settings the water gauge works fine and the loco is economical with water. On heavy settings the water level rises to the top of the gauge and is positively pumped out through the throttle. The boiler can be emptied in a very short time when this happens, as in this case when there was the steam leak to exhaust, the loco only traveled about 20 yards!

I bought a length of 1/8" 304 stainless from my wholesaler for the new rods. I had to make a new piston too as there is no way that the new rod would have been concentric or square when screwed into the original piston. A new piston blank was screwed then glued onto the new rod, and turned in situ.

The loco had a really good run yesterday morning with plenty of plodding low speed, and no stalling. The slowest timed lap of our 60 yd circuit was 7' 50", which depending on scale works out to be between 5 and 8 mph.

Here are some clips from the run:


~
LBSC's 1930's steam
Diesel
More short clips from a
morning run
~
0:01 / 2:01