

STEPHENSON'S LINK VALVE GEAR – GWR HALL 4-6-0

This kit is designed to accurately produce in 4mm scale a working model of the Stephenson's link valve gear. For reasons of practicality two significant deviations from the prototype have been made.

Firstly, the link block hangers have been omitted and instead the motion is suspended from the reversing shaft. So there are no separate link blocks and the motion is permanently fixed in full forward gear.

Secondly, the rock shafts which transfer the motion over the frames from the inside to the outside are omitted and the drive for the valve rods is instead taken directly through a slot in the frames.

Please study the assembly diagrams carefully and note that, as for the coupling rod crankpins, the right side eccentrics lead the left by 90° and that the left side of the motion is a mirror image of the right.

ASSEMBLY

Eccentrics

First ream out 1/8" the axle holes in the eccentrics and check the fit of the eccentric rods (part 158) on the eccentrics.

Using the diagrams sort out the correct expansion link lamination (part 159) for each expansion link and then solder the links and part 160 together to make the two expansion links. Use the two 0.45mm pieces of wire which represent studs to ensure accurate alignment.

Drill all the rivet holes 0.8mm and rivet the eccentric rods and the link hangers (part 162) to the expansion link with all the rivet heads on the inside, using the longest rivet for the link hanger. **A good fit with no slop is essential.** Drill the upper holes in the link hanger 0.7mm so that the 0.7mm pivot wire is a good fit.

Rockshaft -Extension rods

Drill the rivet hole in the rock shaft lever (part 163) 0.8mm. Solder a short piece of .020" steel wire through the front end of the extension rod (part 164) and trim to 4mm in length. Cut the 1mm tubing in half and thread the lower end of the rock lever and a piece of the tubing over the steel wire from the extension rod. The wire is now soldered inside the tube without soldering the rock arm! To do this file a small slot in the tube as shown and carefully solder through the slot. Again **a good fit and no slop is needed.**

Now rivet the extension rod to the expansion link.

Axle

Fit the expansion link assembly together with the eccentrics to the axle, pinning the eccentrics together with a piece of 0.45mm wire. Be sure you have chosen the correct eccentrics for each side by carefully studying the drawing. Space the eccentrics on the axle centrally so that the pairs of eccentrics are at the following centres:

18.83 - 4.5mm EM - 3.25mm 00 - 2.5mm

Now very carefully either solder or superglue the eccentrics to the axle.

Reversing Shaft

Solder the reversing arm laminations to the .9mm wire reversing shaft so that the reversing arms are at the following centres:

180.83 - 3.0mm EM - 1.75mm 00 - 1.0mm

and trim the wire at the left end so that the reversing arms are centred between the frames and enough wire projects through the right frame to later fit part 73. Open the hanger pivot holes in the reversing arms (part 161) to 0.7mm so that the 0.7mm wire is a force fit. Temporarily tack solder, to one frame only, the reversing shaft in place.

Testing

You are now ready to test the valve gear between the frames. Insert the axle with its bearings, which will need filing back on their inner faces, and the brass tubes through the frame slots. Temporarily suspend the extension rod/rock shaft lever by inserting a piece of wire through the frame brackets and a piece of tubing cut to fit between the inner faces of the rock levers. Temporarily suspend the expansion links from the reversing arms with 0.7mm wire pins.

If you have been careful in ensuring good, tight fits between all components you should now have a working valve gear which does not flop about !

Finishing

When satisfied, the valve gear is **permanently** fixed by riveting the rock levers to the frame brackets and permanently fixing the reversing arm pivot pins and to the frames.

Lastly, trim the brass tubing so that the 2.5mm pin in the end of the valve rod fits into the tube with the valve rod parallel to the frame. This enables the valve rods to be separate, removable components and means the cylinders too can be removed.

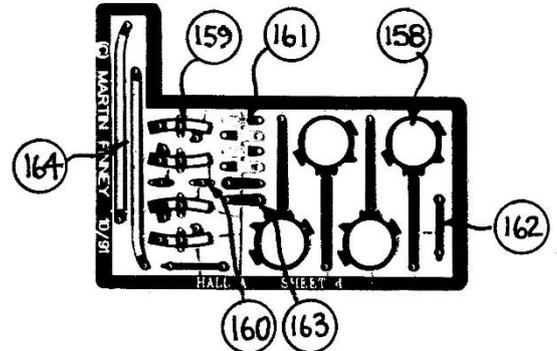
Martin Finney 10 Heathfields Way Tel. 0747-53813

Shaftesbury

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ETCHED COMPONENTS - 0.020" nickel silver

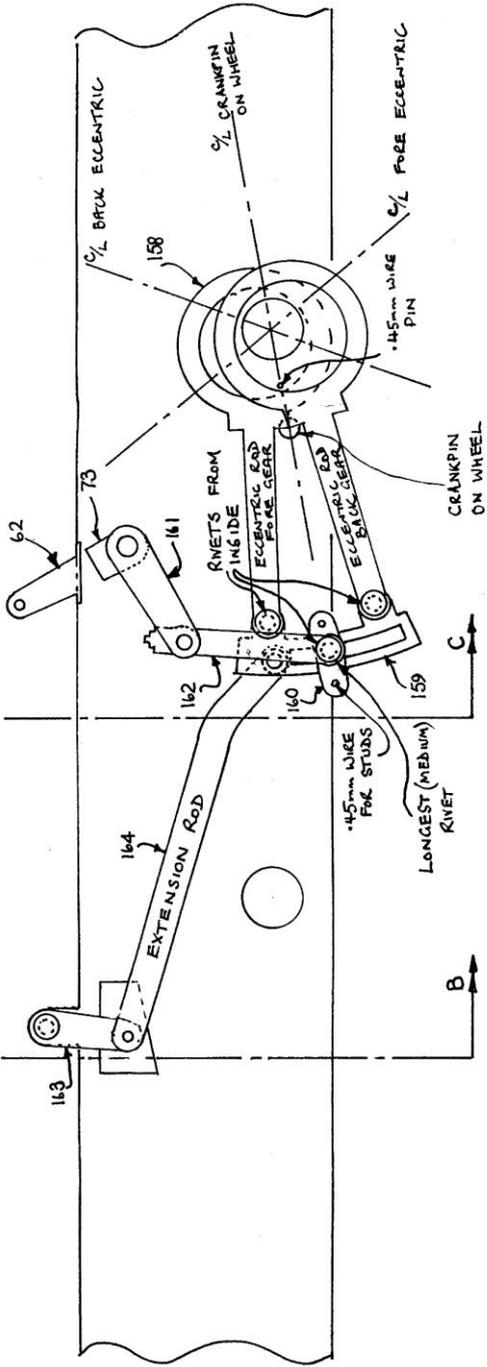
- 158 Eccentric rod/sheath - (4)
- 159 Expansion link lamination - (4)
- 160 Expansion link hanger pivot - (2)
- 161 Reversing arm lamination - (4)
- 162 Link hanger from part 161 - (2)
- 163 Rock shaft lever - (2)
- 164 Extension rod



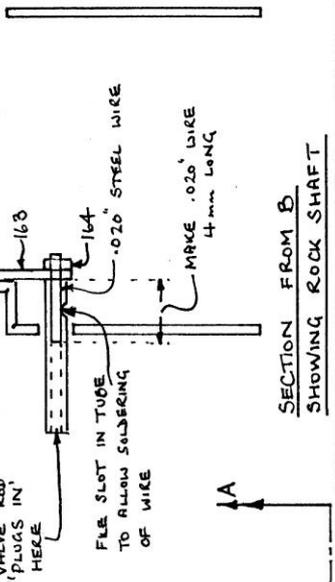
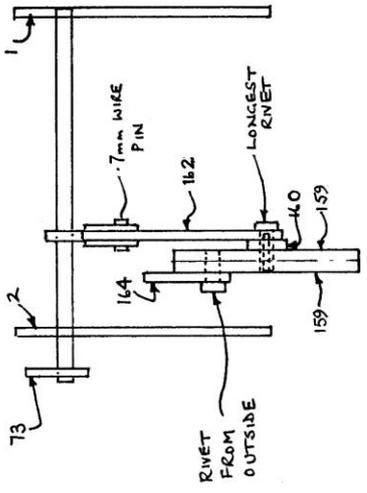
OTHER COMPONENTS

- Brass tube - 1mm - for rock shaft
- Rivet - short - (8)
- Rivet - medium - (2)
- Steel wire - .020" - for rock shaft
- Brass wire - 0.7mm - for link hanger pivot
- Brass wire - 0.45mm - for pinning eccentrics together
- Brass wire - 0.9mm - for reversing shaft
- Brass eccentric - (4)

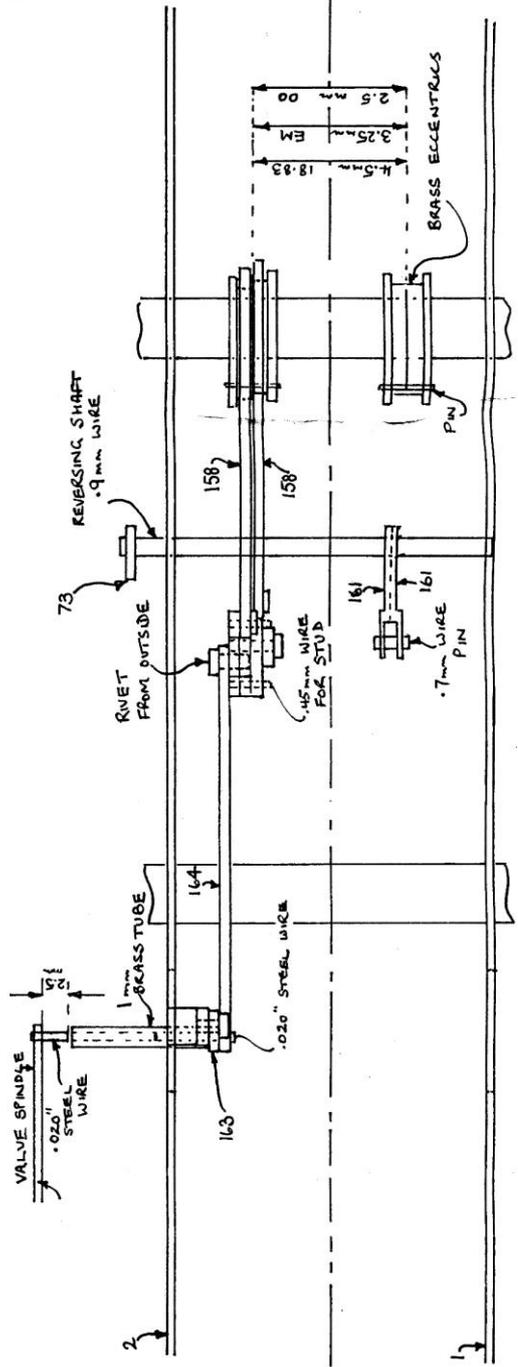
SECTION FROM A SHOWING RIGHT SIDE VALVE GEAR IN FULL FORWARD GEAR



SECTION FROM C SHOWING EXPANSION LINK AND LINK HANGER



SECTION FROM B SHOWING ROCK SHAFT



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 VALVE GEAR
 MARTIN FINNEY 15-1-92