

GWR 2251 CLASS INSIDE MOTION

ETCHED COMPONENTS

- IM1 Connecting rod (4)
- IM2 Connecting rod small end washer (4)
- IM3 Eccentric sheath (4)
- IM4 Reversing lever for lever reverse
- IM5 Reversing lever for screw reverse
- IM6 Reversing arm (2)
- IM7 Lifting link (4)
- IM8 Expansion link (2)
- IM9 Valve rod (2)
- IM10 Cylinder block front
- IM11 Cylinder block mounting plate
- IM12 Motion bracket front lamination
- IM13 Motion bracket rear lamination
- IM14 Valve rod guide box
- IM15 Valve rod gland
- IM16 Slide bar assembly

- IM17 Piston rod gland inner overlay
- IM18 Piston rod gland outer overlay
- IM19 Crosshead face (4)
- IM20 Crosshead slipper (2)
- IM21 Eccentric spacer washer (3)

OTHER COMPONENTS

- 3/32" outside diameter brass tube for cylinder tube
- 1.25mm Nickel silver wire for oil cups, valve rods, crosshead pins and lifting links
- 1.6mm Nickel silver wire for piston rods
- 0.7mm Brass wire for pinning eccentrics together
- 0.8mm Brass wire for stuffing box studs
- 1.6mm Brass wire for reversing shaft
- Brass eccentrics left (2)
- Brass eccentrics right (2)
- Rivets (6)
- 6BA screw

Most of the drawings to describe this build are on the reverse side of this piece of paper. Study the diagrams carefully.

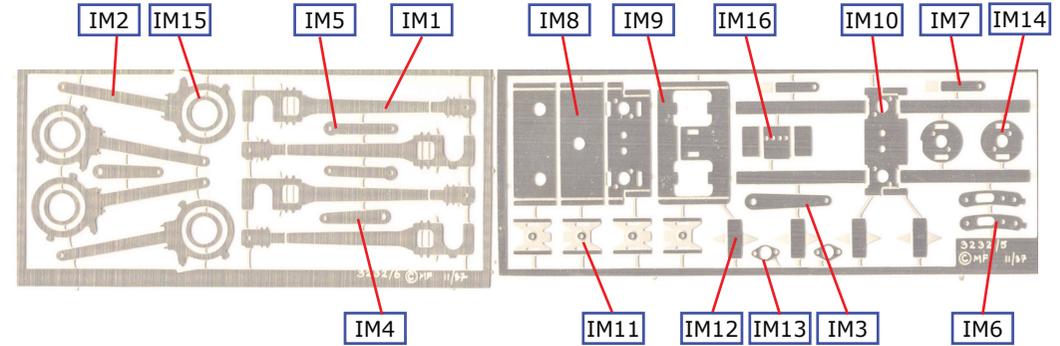
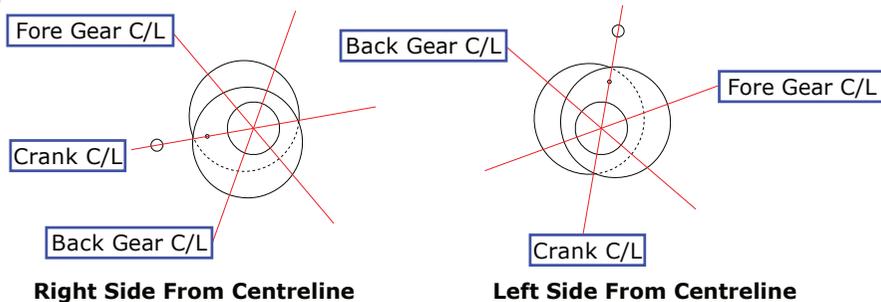
CRANK AXLES AND ECCENTRICS.

This uses solder and pin construction. Use 60/40 cored solder with plenty of La-Co flux paste and a micro flame to generate enough heat. Use a sacrificial cheap brush and brush more flux round the axle whilst hot. More solder is good! Either solder the complete assembly in one go or assemble and then solder the left eccentrics to the left crank followed later by the right side. Solder each side in place on the axle separately.

Eccentrics. Ream out the holes in the eccentrics so that they are a tight fit on the axle. Then carefully open out the small holes in the eccentrics, so that the 0.7mm wire fits in the holes. Check the fit of the eccentric sheaths on the eccentrics. Drill a 3/16" hole in a small block of wood leaving the drill in the hole to act as a mandrel to align the eccentrics. Assemble the eccentric sheaths, eccentrics and 0.7mm wire pin in pairs over the mandrel and solder the wire pin to both eccentrics. Cut the wire flush with the face of the eccentrics.

Cranks. Completely drill a hole on each side through the cranks down the narrowest part from top to bottom, either 0.7mm or 0.8 mm depending on width of crank.

Assembly. Fit the eccentrics to the crank axle using the drawing to ensure correct orientation. The eccentric should be fixed at 6 mm centres for finescale and 8 mm centres for S7. It is probably easiest to mark the inner alignment of the eccentrics on the axle. Space the eccentrics on the axle so that pairs of eccentrics are at the correct centres and they are in the correct position with respect to the cranks.



Allow everything to cool and then re-drill through the holes in the cranks, this time going through the axle. Add a pin through each of the holes, then add more flux and solder pins in place. Check all joints are properly soldered, clean up and cut through the axle.

CYLINDERS

The cylinder block (IM8), motion bracket (IM9) and slide bar assembly (IM10) have a half etched line running down the two edges; file back to the line if you have not used the widest spacers.

Bend the slide bars to right angles and fit into the cylinder block so that the valve rod holes align and that the three half etched holes for the oil cups are upper most. The small holes for the gland studs do not align. To correct this drill new 0.8mm holes through the motion bracket to create new holes in the slide bar assembly. Now bend the cylinder block with the etched lines on the inside.

Fit lengths of 3/32" outside diameter brass tube to the cylinder block so that they flush at the back and protrude 2.5mm at the front. Detail the cylinder fronts by adding the cylinder covers (IM14) and then the piston rod glands (IM13) over the tube. Details with 0.8mm wire to represent the studs. Solder short lengths of 1.25mm nickel silver wire through the holes in the top slide bar to represent the oil cups.

Tap the small hole in the cylinder block spacer (F6) 6BA and check the fit of assembly between frames, attaching it with the 6BA screw.

CROSSHEADS AND CONNECTING RODS

Drill a 1.0mm hole in a small block of wood and leave the drill in the wood to act as a mandrel when assembling the crosshead. Thread a crosshead face (IM11) face down on the mandrel. Push the spike of a slide shoe through the slot in the face with the raised half etched surface towards the inside of the crosshead. Repeat with the other slide shoe. Thread the other crosshead face over the assembly. Test for a sliding clearance with the slide bars; there should be no slop. When satisfied solder the crosshead faces to the slide shoes through the slots. Remove the spikes and clean up. Repeat for the other crosshead.

Cut the 1.6 mm nickel silver piston rod wire in half. Solder a 2 mm length of the cylinder tube to the end of each piece of wire. Insert the piston rod into the cylinder and push it half way in, slide on the crosshead and insert the piece of tubing on the rod between the small projections at the front of the crosshead. Carefully solder the rod to the crosshead and check the assembly for free but not sloppy movement.

Form the joggle in the connecting rods (IM1) with the fold lines inside to make the fork around the crosshead. Solder the rods together after fitting them over the cranks. Attach the connecting rods to the crossheads using 1.0mm nickel silver wire wire as pins. Now fit the crank axle and cylinder assembly and check that everything works with no binding.

MOTION BRACKET AND VALVE GEAR.

Check the fit of the valve rods (IM7) in the small rectangular holes in the motion bracket. Aim to get a close fit by either opening out the hole slightly or by filing the edges of the rods. Solder a length of 1.25mm nickel silver wire to the valve rods and form the joggle close to the end of the rod. Now shape the motion bracket to allow the valve rods to slide through.

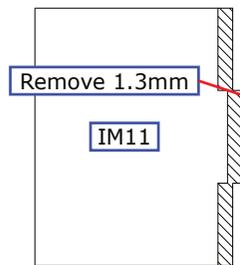
Fold up the valve rod guide (IM16) and attach it to the motion bracket by fitting the small tab into the half etched slot. Accurate positioning is necessary to ensure that the valve rods slide easily. Solder the guide to the bracket. Attach the lubricator casting.

Fit the motion bracket into the half etched slots in the slide bars ensuring that the crossheads have clearance; solder together.

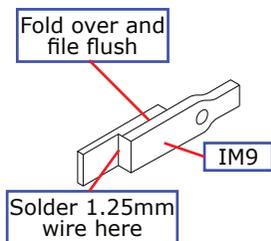
Rivet the eccentric sheaths, the expansion links (IM6) and the valve rods together paying particular attention to the direction of the rivets - the fore gear eccentric sheath rivet head is on the outside, the back gear eccentric sheath and valve rod rivet head is on the inside. Make the right side a mirror image of the left. Thread the crank axle assembly into the cylinders and check that everything works.

REVERSING MECHANISM

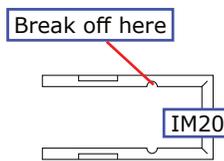
The cross shaft is made from 1.6mm nickel silver wire. The reverser lever (IM3) sits at the right end of the shaft. The reversing arms (IM4) are soldered back to back and then threaded onto the shaft so that they align with the jointed faces of each pair of eccentrics; they should be set as shown. Solder all the arms in place on the shaft. Thread a length of 1.25mm NS wire through the reversing arms and thread a lifting link (IM5) either side of each reversing arm. Solder the wire in place and then solder each lifting link in place so that the link is vertical with the bulbous top set either side of the top of the expansion links. Solder the reversing shaft in place.



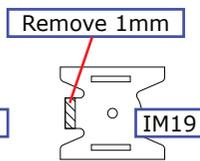
Modification to Cylinder Block Mounting Plate



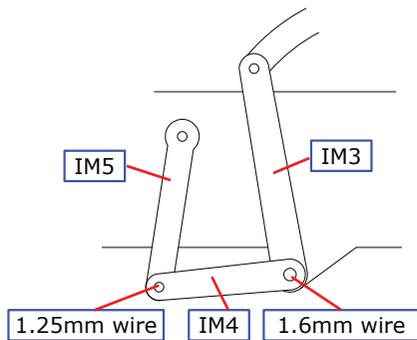
Valve Rod



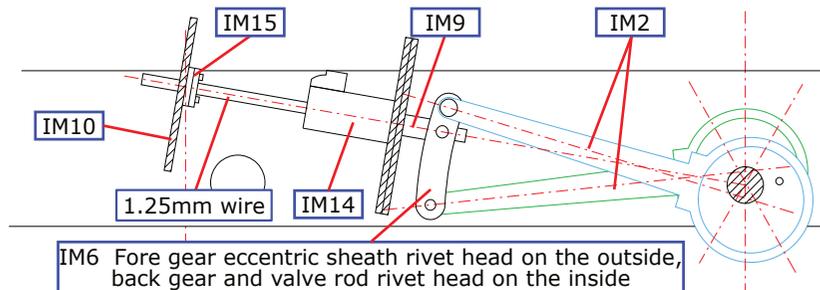
Crosshead Slipper



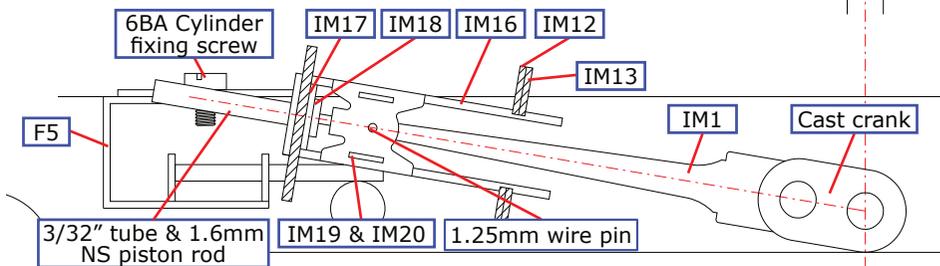
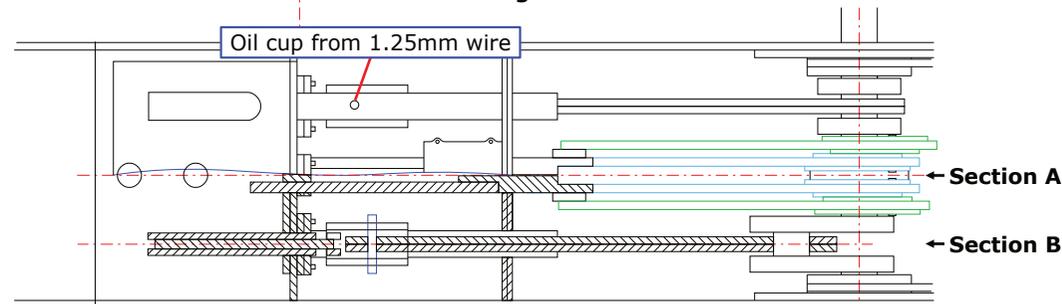
Modification to Crosshead



Reversing Mechanism



Section A Showing Elevation of Left Valve Gear



Section Showing Elevation of Left Motion