

De Winton "Chaloner"

Ref. 16L001 (Change of address - October 2011)



INTRODUCTION

Prototype Information

The Union Iron Works was established on the slate quay near Caernarfon Castle in the early 1840s. J P DeWinton became a partner in 1861 and within nine years had started producing his well known locomotives. Prior to this, the firm had produced a variety of non-railway steam engines, mainly for marine use, boilers, compressors, and specialist equipment for the local slate quarrying industry. Locomotives were never a major part of the business, (only 60 being produced up to about 1897). The works, which did not officially become DeWinton Ltd until 1892, closed in 1901/02. The buildings still survive, only slightly altered from their locomotive building days, opposite where the new Welsh Highland Railway station has been built.

Most DeWinton locomotives were built for the local slate quarries, and were four coupled, vertical boiler types, with vertical cylinders connected to one of the axles. A water tank was situated at the front, and a coal bunker, doubling as driver's seat, was at the rear. There were exceptions: early examples had one cylinder and double flanged wheels, some had a geared final drive, and two had horizontal boilers.

'Chaloner'

The subject of our kit was built in 1877 for the Pen-y-Bryn Slate Quarry in the Nantlle Valley, Caernarvonshire (Thomas Chaloner Smith was one of the directors). By 1883 the quarry was absorbed into the massive Dorothea Quarry. 'Chaloner' was sold for £150 in December 1882 to the Pen-yr-Orsedd Quarry located further up the Nantlle Vale. There it worked with nine similar DeWinton

locomotives, being the last one in use in 1952. In 1960 it was bought by Alfred Fisher of Hertfordshire, and, after restoration at his home, it became the first working steam locomotive on the Leighton Buzzard Narrow Gauge Railway in Bedfordshire (at that time it was called the Iron Horse Preservation Society). It still sees regular use, although it is too small for use on its own on regular passenger trains, and has even been on tour. The principal alterations since preservation are a taller chimney, and the fitting of a large mechanical lubricator on top of the cylinders. A new boiler was fitted in 1992/3.

The nameplate currently carried has been fitted since preservation: there seems to be no evidence that a nameplate was previously carried, probably the name was just painted on. Other Pen-yr-Orsedd DeWinton locomotives had sheet brass plates with the name engraved, like the manufacturer's plate; these were probably fitted from new. No two DeWintons were exactly the same; it is said that it is possible to identify most by counting the rivets on the frames! 'Chaloner' represents the most common type, with straight frames, 6" x 10" cylinders and running on (approx.) 2ft gauge track.

The other well known DeWinton still in existence is 'George Henry' (from Penrhyn Quarry, and now at the Narrow Gauge Railway Museum, Tywyn). This is the same age but has 6" x 12" cylinders, and frames 'bent' around the larger diameter boiler.

DeWintons known to be still in existence:

Former location	Gauge	Name	Date	Current location
Penmeanmawr Quarry	3'-0"	Penmaen	1878	Penmaenmawr Granite Quarry (b,c)
		Watkin	1893	Penrhyn Castle Museum, Bangor
		Llanfair	1895	Welsh Highland Railway, Dinas Junction
Penrhyn Slate Quarry	1'-10 ³ / ₄ "	GeorgeHenry	1877	N.G. Railway Museum, Tywyn
		Kathleen	1877	Vale of Rheidol Railway, Aberystwyth
Pen-yr-Orsedd Quarry	2'-0"	Chaloner	1877	Leighton Buzzard Narrow Gauge Rly.
		Gelli	1893	Private property (b,c)
		Pendyffryn	1894	Brecon Mountain Railway (b)

Note that: (a) = in working order; (b) = not on public display; (c) = incomplete

In addition, two other locomotives should be mentioned. Firstly, the Brecon Mountain Railway has in store, but not on public display, a 2'-0" gauge 'scale model' of one of the 3'-0" gauge Penmaenmawr DeWinton locomotives, built in 1905 by the quarry engineer, Mr Redstone, for a private line in the garden of the Darbyshire family, who owned the quarry. Also, Allan Keef Ltd, of Ross-on-Wye, have a full-size replica 'DeWinton' locomotive, based on Chaloner, but named 'Taffy'. This is the personal property of Mr Keef, and has toured various railways since completion.

Further reading

Industrial Locomotives of North Wales - Industrial Railway Society, 1992

Vertical Boiler Locomotives - R.A.S. Abbott - Oakwood Press, 1989

Narrow Gauge Railways In N. Caernarvonshire (3 volumes) - J I C Boyd - Oakwood Press, 1981/6

Model Information

This kit will enable you to build a model of a typical DeWinton locomotive, incorporating all details visible from normal viewing angles. It is based on a detailed study of the actual locomotive 'Chaloner' (courtesy of Alf Fisher and the Leighton Buzzard Railway), but represents the locomotive in its mechanical condition circa 1950. Those wishing to build the locomotive in its current preserved condition will need to modify the chimney, and make a mechanical lubricator and nameplates. The finished model is capable of doing work comparable with the prototype i.e. two or three slate wagons, but should not be overloaded.

HEALTH AND SAFETY

Resin

The main castings are made from Polyurethane Resin, which should not cause any safety problems in normal use. Do not subject the material to excessive heat such as flame or soldering iron as, apart

from damage to the fine detail, unpleasant fumes will be given off. For the same reason, do not use a power drill or other power cutting tools, as heat will be generated. When filing or sanding (e.g. to remove moulding 'pips') do not breathe in the fine dust, ideally you should wear a suitable dust mask and use 'wet and dry' paper (used wet) to prevent dust being caused.

White metal

All white metal contains lead in small quantities. Always wash your hands after touching white metal, and do not allow children to play with it.

Glass Fibre Pencil

Whilst not dangerous or harmful, the fibres can be very irritating if they stick in your skin. If this proves to be a problem it is advisable to wear gloves. Damage could be caused if fibres flick into your eyes, so it is necessary to wear safety spectacles. Do be careful not to rub your eyes when using glass fibre.

Other Tools and Adhesives

Be careful with sharp tools such as knives and drills, and carefully observe Health and Safety instructions on adhesives and paints, particularly spray paints.

PREPARATION NOTES

Cleaning Up Resin Mouldings

All moulding sprues and 'pips' should be removed, using a scalpel, then finished off with a file or 'wet and dry' paper. If at any stage during assembly you damage the resin parts the following tips are offered for their repair:

- If the part breaks 'cleanly' and will fit back together properly, it can be stuck with a cyanoacrylate or superglue type adhesive.
- Other damage, such as gouges or holes drilled too deep, are best repaired with car body filler.
- Badly damaged breaks are better joined with epoxy and the resulting cracks repaired with filler.

Cleaning up Lost Wax Brass Castings

As required remove pieces from sprues with a piercing saw and finish off with a fine file. Parts may need straightening; this is easily achieved with the fingers. Remove any blemishes with a file and finish with a quick polish with a glass fibre brush.

Preparing the White Metal Castings

Clean off moulding 'pips' and parting lines with a scalpel blade or file. Use an old file specially reserved for this job, because it will be spoilt for any other use. Finish off with your glass fibre pencil.

TOOLS NEEDED

The following tools are needed, most of which will already be in the toolkit of the average modeller.

Piercing Saw or Nippers	for removing lost wax castings from their sprues
"Stanley" type knife	for removing etched parts from the frets
Assortment of small files	for finishing removal of pips, tabs, and general cleaning up
Soldering Iron, Solder & Flux	for the majority of brass to brass fixing
Cyanoacrylate (Loctite Superglue or similar)	for quick fixing of parts where strength is not important
2-part Epoxy Glue (Araldite or similar)	for fixing resin to resin or two dissimilar materials, such as resin to brass. (Could also be used as a substitute for the soldering if required). The 5 minute setting variety is OK for most of this work, but the 24 hour setting version is better if you have the patience to wait for each bit to set!
Glass Fibre Pencil	
Abrasive Rubber Block	for cleaning all materials (but particularly etched brass parts)

	prior to soldering or glueing and prior to painting.
Assortment of small drills Pin Chuck (or similar)	for forming or enlarging various holes. The following sizes of drill will be needed: 0.7mm 0.8mm, 1mm; 1.2mm; 1.3mm; 1.6mm, 2mm, and 3mm
Taper Reamer or Broach	Useful for slightly enlarging holes in etchings, particularly the crankpin holes in coupling and connecting rods. A round file will do the job, but either of these will do it much easier and better, and will come in very useful on future projects too.
Blue Tack (or similar)	For holding parts in place while you solder them, or while the epoxy is setting.

Etched Components

Remove components from the sheets by cutting through the small tabs with a Stanley-type knife, or a small chisel blade, whilst resting on a fairly hard surface like a piece of MDF. Be careful to avoid distorting the part you are removing and any adjoining parts, and finish off with a fine file.

The coupling rods fold up several times, concertina-like, so make sure, by studying the instructions, that you cut out parts by removing only the tabs and not the fold joints! As a general rule, where components form a right angle, the fold line is on the inside, but where it folds back on itself (i.e. to 180°), the line is on the outside. Before you do any folding or assembly work, clean any edges or surfaces to be soldered with the glass fibre brush or abrasive rubber. This is in addition to using a liquid flux immediately before the soldering operation.

It is possible to complete the whole chassis without soldering (although soldering is recommended, both for strength and longevity); use 24 hour Araldite (not the 10 minute version) and leave a generous miniscus on the joints.

PAINTING AND FINISHING

You will probably find it easier to paint some parts before you begin, or during, the construction. DeWinton locomotives were often fitted with painted coupling rods, usually in red. These should be primed and painted before they are fitted for the final time. Some items, such as the copper piping are best left off until the painting is complete. Also, any of the brass castings that you wish to leave in polished metal should be added later.

The secret of good painting is preparation. Make sure that all parts are thoroughly clean, dry and free of any grease. Metal parts should be cleaned with the glass fibre brush as the slight scratching helps the paint to key. Everything should be washed with a mildly abrasive kitchen cream cleanser, such as Jif (or Cif as we now have to call it). Use an old toothbrush to work into the corners and crevices. You may need to repeat if the foam goes grey the first time. When it is clean, rinse in clean water. Once thoroughly clean and dry do not handle the model except with surgical gloves or tissue paper/kitchen roll. Leave to dry, at least overnight, before applying the primer. Cover with a clean cardboard box or similar to prevent dust settling.

The resin and white metal parts only need a light mist coat from a car aerosol spray, but brass should be covered more thoroughly. In fact, an etching primer is best; this is available from good model shops. Read the manufacturer's recommendations on the minimum drying time. If you are going to follow a car aerosol spray primer with the same maker's matt black top coat, ten minutes may be sufficient. However, with many paints you will find that at least 24 hours should elapse before the top coat is finally applied.

The cast gauge glass (B8) will look much better if the face of the pressure gauge is painted white. An imitation of the indicator arrow and markings can be added with a fine black pen, you could even include the red 'working pressure' mark if you have a suitably fine red pen. A very realistic looking gauge glass may be made by cutting away the centre portion, and replacing it with a small, rectangular, piece of polished acrylic.

Once the painting is done any remaining items should be fixed in place. Note that the 0.050" (1.27mm) copper pipe runs from A to A. The 0.030" (0.75mm) copper piping connects points B to B and C to C.

The final job (optional) is to give everything a coat of rust, dust, dirt and grime! There are now several very good books available on the subject should you wish to go further.

Two Rail or Battery Propulsion

As supplied, and assembled as described in these instructions, the model is designed for two rail electrical pick-up. However, the motor is a low power consumption 'coreless' type, which is also very suitable for battery power. The front water tank is designed to hold a 9V 'PP3' battery, and there is part made (from the underside) hole in the coal bunker to take a standard 'miniature' switch. Use a double pole, centre off switch here, wired up to the motor and battery to give a simple forward/off/reverse system. If you want radio control with battery power, or some form of electronic speed control, you will need to consult specialists in those fields; there may be room inside the bunker and the boiler for this sort of equipment.

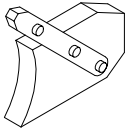
Whether you intend to use two rail or battery propulsion, please note that the motor supplied is suitable for scale length trains (a few slate wagons) running at a scale speed. It will not last long if you overload it by trying to pull long heavy trains at high speed!

LIST OF PARTS

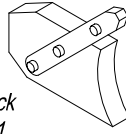
Material	Part No	Description	No Per Kit
Etched Brass	16L001A	Chassis	1
Etched Steel	16L001B	Coupling Rods	1
Etched Phosphor Bronze	16L001C	Pickup Wiper	1
Resin Castings	—	Footplate.....	1
	—	Water Tank	1
	—	Coal Bunker.....	1
	—	Vertical Boiler/Cylinders	1
	—	Rear Buffer Beam 'Plough'	1
	—	Firebox Bottom	1
Castings	—	Brass Castings (Packet)	1
	—	Nickel Silver Castings (Packet)	1
	—	Whitemetal Castings (Packet)	1
Miscellaneous Parts	—	Pre-assembled cranked axle and wheels	1
	—	Pre-assembled gearbox axle and wheels	1
	—	Faulhaber motor (with mounting plate)	1
	X49601	Hornblock/Axlebearing	4
	X720053E	Moulded nylon outside cranks.....	4
	—	12BA steel screws (crankpin)	4
	—	12BA nuts (crankpin)	4
	—	12BA steel washers (crankpin)	4
	X720055	Crankpin bush (brass)	4
	—	12BA short brass screws (crosshead/exp. link).....	6
	—	8BA screws (body mounting)	3
	X010045B	Threaded insert (body mounting)	3
	1213	0.020" (0.5mm) brass wire x 6"	2
	—	0.060" (1.5mm) brass rodding x 6"	2
	—	Insulated wire (red/black) x 12"	1 of each
	—	10BA brass csk screws (connecting rods)	4
	—	10BA short brass screws (motor mount)	2
	—	10BA brass nuts (motor mount)	2
	—	14BA brass screws (eccentrics & reverser)	9
	—	14BA brass nuts (reverser).....	1
	—	Brass tube 1.6mm (0.065") x 2"	1
	—	0.050" (1.27mm) copper wire x 6"	1
	—	0.030" (0.75mm) copper wire x 6"	1
	—	Steel 'Plug Gauge' (see step 6)	1

White metal Castings

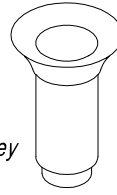
WM1 brake block (lefthand) x 1



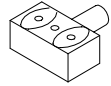
WM2 brake block (righthand) x 1



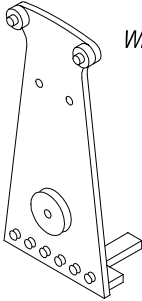
WM3 chimney x (1)



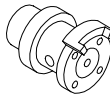
WM4 safety valve base x (1)



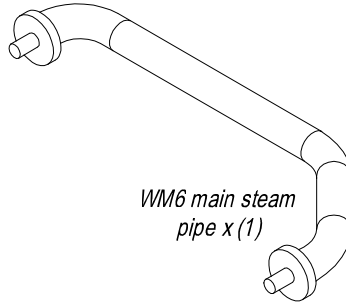
WM8 reverser upstand/ quadrant x (1)



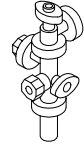
WM5 regulator valve x (1)



WM6 main steam pipe x (1)

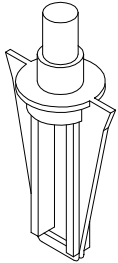


WM7 injector body x (1)

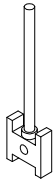


Nickel Silver Castings

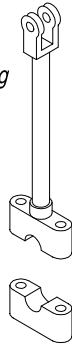
N1 slidebars x (2)



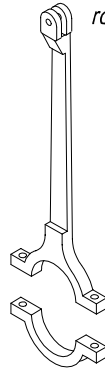
N2 piston/crosshead x (2)



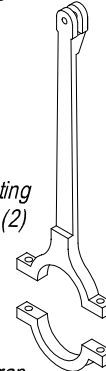
N3 connecting rod x (2)



N5 valve connecting rod (lefthand) x (2)



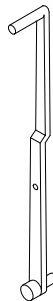
N6 valve connecting rod righthand) x (2)



N8 expansion link x (2)



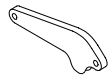
N4 con. rod strap x (2)



N7 retaining strap x (4)



N9 expansion link pull rod x (2)



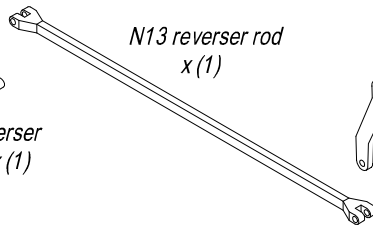
N10 valve head x (2)



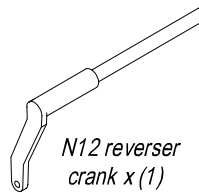
N11 reverser lever x (1)



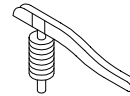
N13 reverser rod x (1)



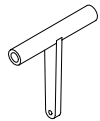
N12 reverser crank x (1)



N14 safety valve arm x (1)

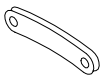


N15 reverser 'T' crank x (1)

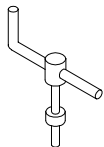


Brass Castings

B1 reverser lever retainer x (1)



B2 brake handle x (1)



B3 regulator handle x (1)



B4 safety valve columns x (2)



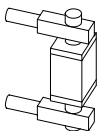
B5 injector handwheels x (2)



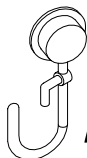
B6 lubricator x (2)



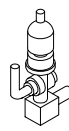
B7 gauge glass x (1)



B8 pressure gauge x (1)



B9 whistle x (1)



B10 coupling bracket (front) x (1)



B11 coupling bracket (rear) x (1)



ASSEMBLY INSTRUCTIONS

Step 1: Get Chassis Running (without valve gear)

Fold down the sides of the etched underframe and the small tabs that hold the axle bearings. Solder a 10BA nut over the two smaller holes to the rear (marked 'R') of the etched cross member, making sure that the threads are clear and that a 10BA screw will fit. Slide the cross member into the underframe and solder in position.

Place a square axlebearing onto the protruding axle of each pre-assembled wheelset. Then slide the axlebearings into the underframe, as shown in fig 2. The cranked axle goes to the front (shorter overhang), and it doesn't matter which way round it goes. The gearbox axle goes to the rear, with the brass 'tail' pointing forward.

Fit the water tank and bunker to the chassis. The rear 'plough' locates on the lugs on the underside of the chassis. Epoxy the threaded inserts into the resin cast body. You will need to open out the holes with a 3mm / (No 31 drill). The 8 BA screws thread into the inserts and secure the underframe to the body.

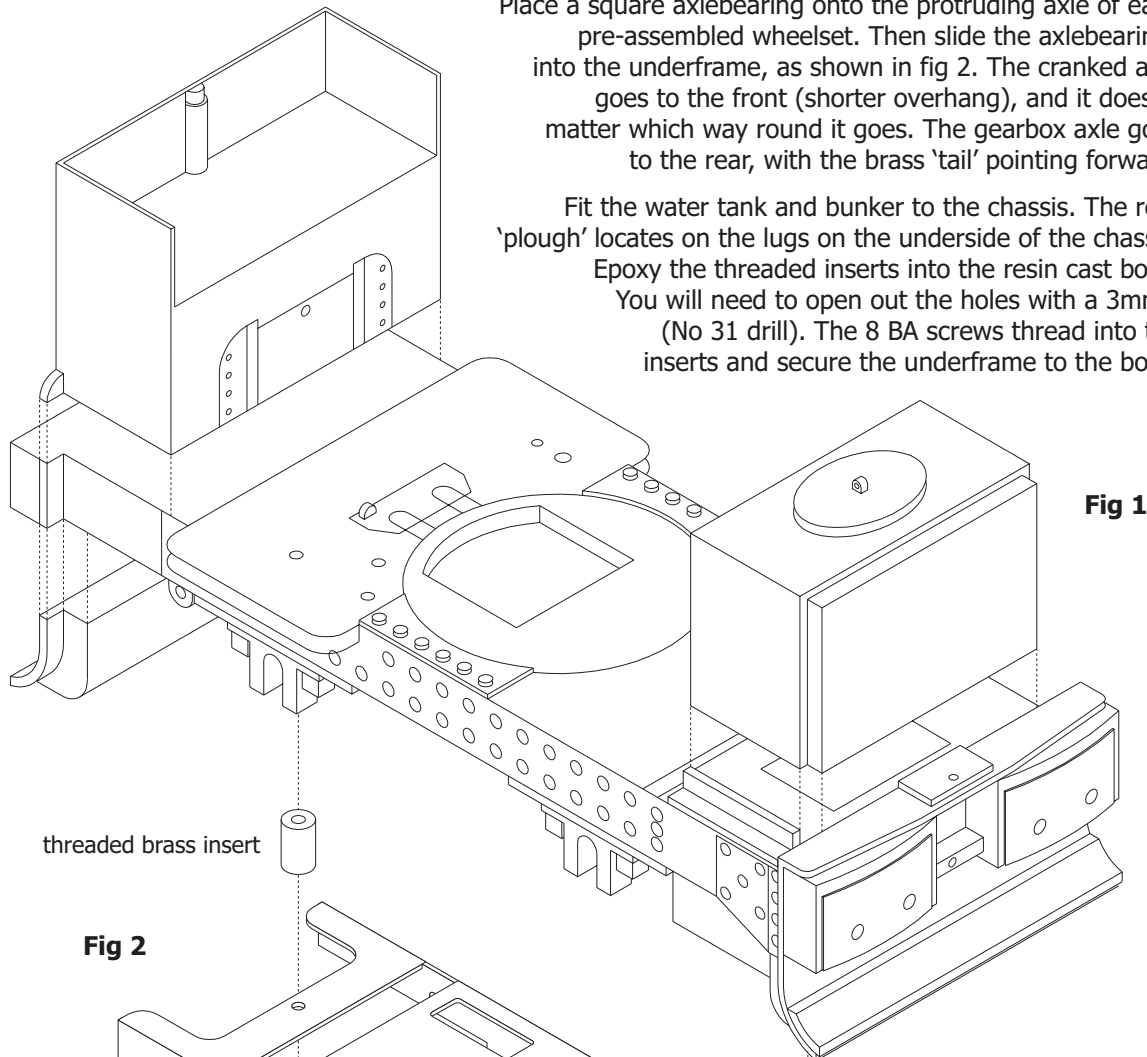


Fig 1

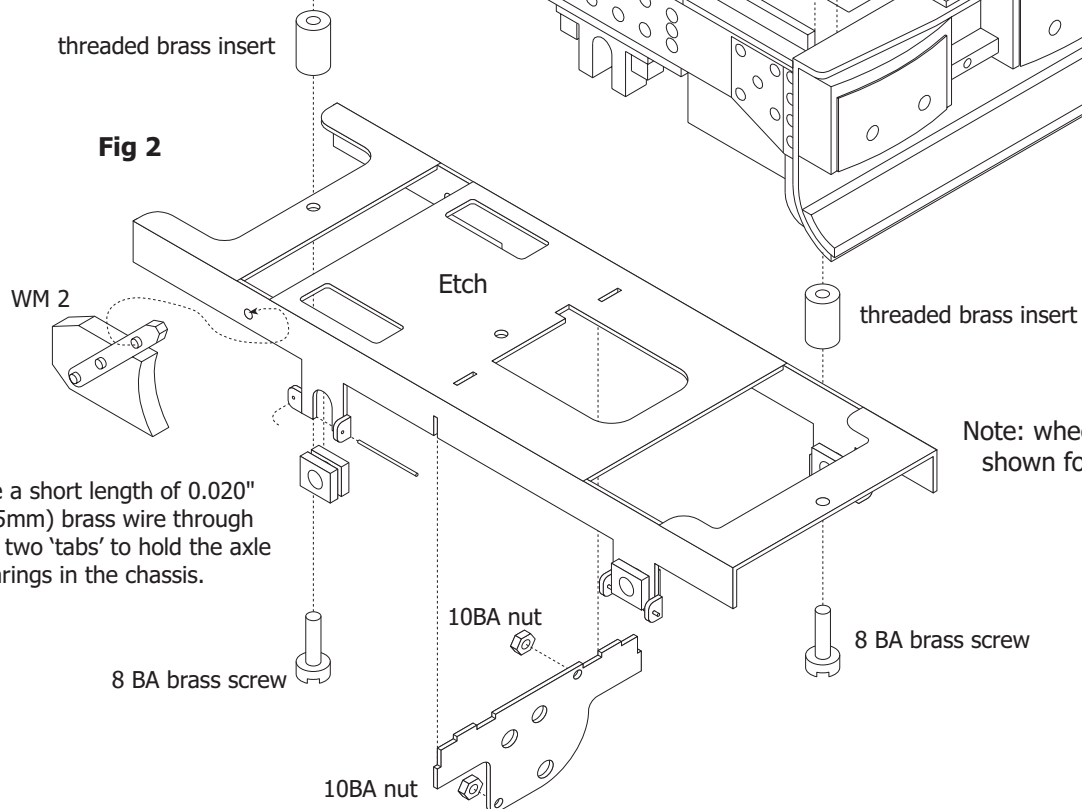


Fig 2

Use a short length of 0.020" (0.5mm) brass wire through the two 'tabs' to hold the axle bearings in the chassis.

Note in fig 2 how the brake block castings are located in the frame. These are positioned inside the frame and should NOT touch the wheels. A short will occur if both blocks do touch the tyres. You could stick a small piece of insulating tape on the blocks or make the blocks out of wood. If you decide to do the latter use the etched parts for the mounting arm as shown in fig 3.

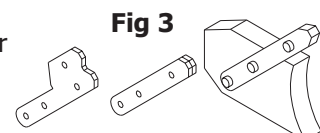


Fig 3

Step 2: Assemble the Coupling Rods

Take the coupling rod etch (16L001B) and carefully remove the two rods. Notice in figure 4A how the individual pieces are left joined by the half etched tags. Make sure that both sides of the parts are clean and free from grease. Fold up the rods as shown having first 'tinned' the mating surfaces with solder.

Solder the pieces together and then carefully clean up with files. You will need to use a flux suitable for steel, i.e. Fry's 'Fluxite'. The notes on 'Painting and Finishing' on page 4 point out that the coupling rods were often painted red on these engines.

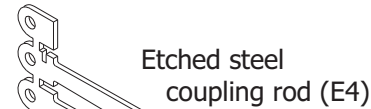


Fig 4 A

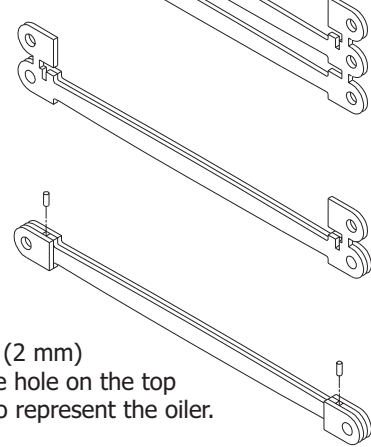


Fig 4

For extra realism fit a short (2 mm) length of brass wire into the hole on the top of each coupling rod boss to represent the oiler.

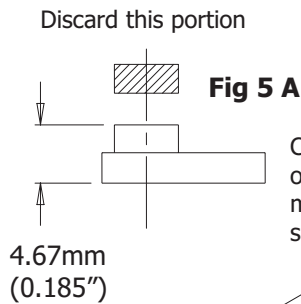


Fig 5 A

Carefully cut the boss on the outside cranks to match the dimension shown in Fig 5A.

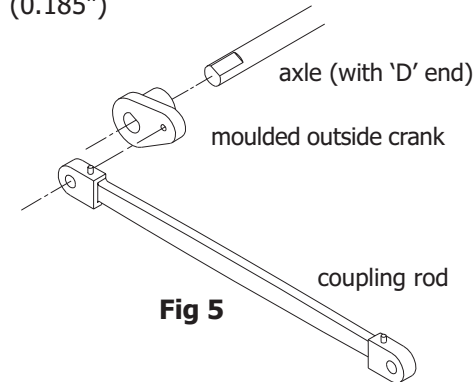


Fig 5

Prepare the outside cranks as shown on the left and fit a 12BA screw into each crank from the rear. Slide on a crankpin bush with flange to the crank. The coupling rod will fit around the bush and be held in place by a 12BA washer and nut.

Push the cranks onto the ends of the axles. The 'D' on the axle will locate in the 'D' hole in the four cranks. This will automatically set the quartering. Fit the axles into the chassis and retain it with the short lengths of 0.020" (0.5mm) brass wire as in figure 1A. Repeat with the other axle then move to the notes below to fit the ashpan.

Step 3: Fit 'Pick-ups' to the Ashpan

The resin ashpan fits underneath the etched chassis and is held in position by an 8 BA screw in a brass insert epoxied into a hole which needs enlarging to 3mm. The ashpan traps the motor and gearbox when in situ. The ashpan also holds the two phos. bronze wipers that collect the current from the back of the driving wheels. Refer to figure 6 and prepare the wipers. You will need to carefully bend the 'wiper' portion to get them bearing gently on the tyre rim.

Fit the ashpan to the chassis now. You should also put the cranked axle and gearbox into the chassis then fit the coupling rods. This is in preparation for the first running of the loco.

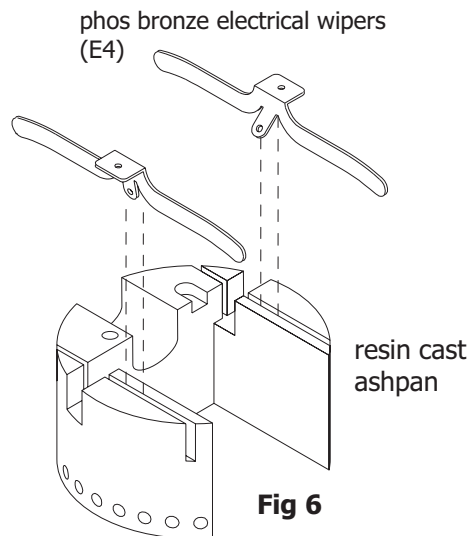


Fig 6

Solder a length of the insulated wire to each of the wipers (on the small soldering tag). Bend the parts as shown above and position over the small peg. Place a small square of insulating tape over the wiper to isolate them from the metal chassis.

Step 4: Fit Ashpan and Slidebars

Note in figure 7 how the ashpan is being fitted to the underframe. For clarity the wheels and gearbox are not shown. Give gearbox a little run to make sure all is well so far.

Now to fit the slidebars and connecting rods. Refer first to figure 8 and drill the cylinders, from below as shown. For the shallow hole use 1/4" (6.35mm) dia. for the slidebar casting. The longer hole should 1/8" or 3mm dia., sufficient to allow for the piston travel. If you have a look at figures 12 & 13 (next page) you'll note that the two holes between the slidebars need to be drilled 0.050" (1.4mm) or no. 54 drill for the valvehead castings.

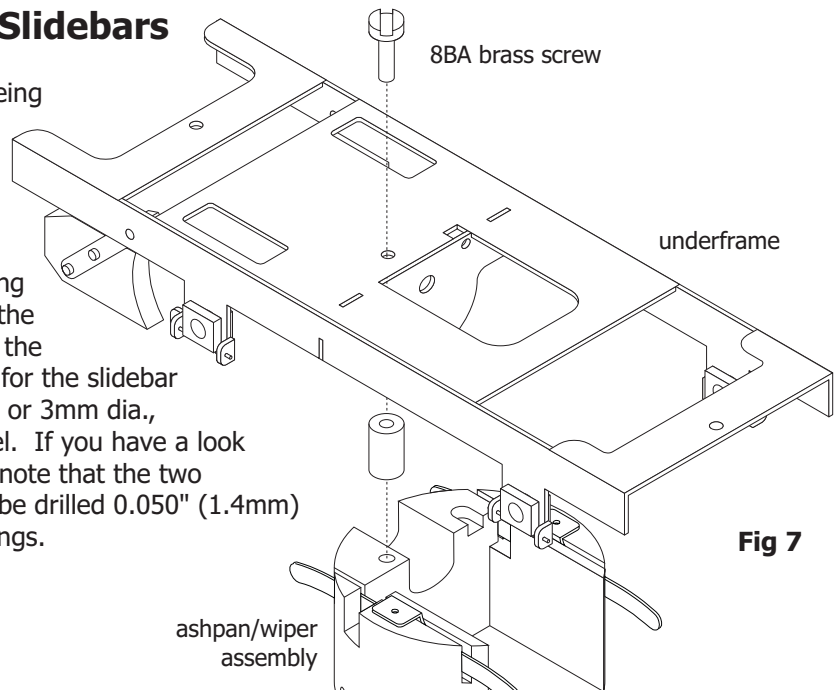


Fig 7

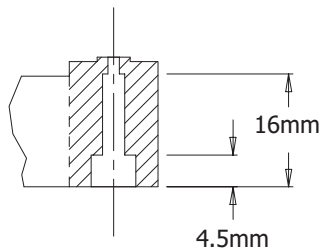
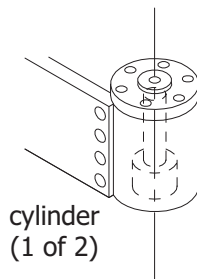


Fig 8



cylinder (1 of 2)

Carefully remove the two portions shown. Polish the sliding surfaces to ensure that the crosshead casting (N2) is free to travel.

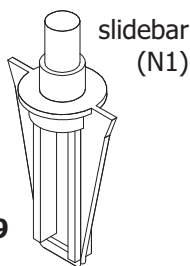
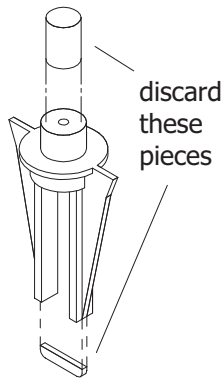


Fig 9



discard these pieces

Fig 11 shows how the 'big end' of the connecting rod is linked to the cranked axle. It should be free to revolve around the journals.

For clarity the wheels are not shown and part of the cranked axle has been cut away.

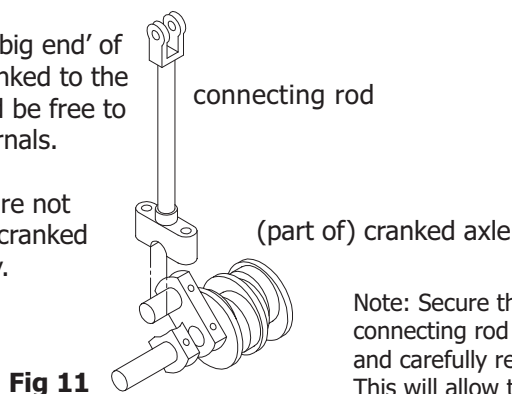


Fig 11

This shows the overall assembly of the slidebars and the connecting rods. Take your time and make sure that the parts are free to move. Try not to get the moving joints too loose or 'sloppy'.

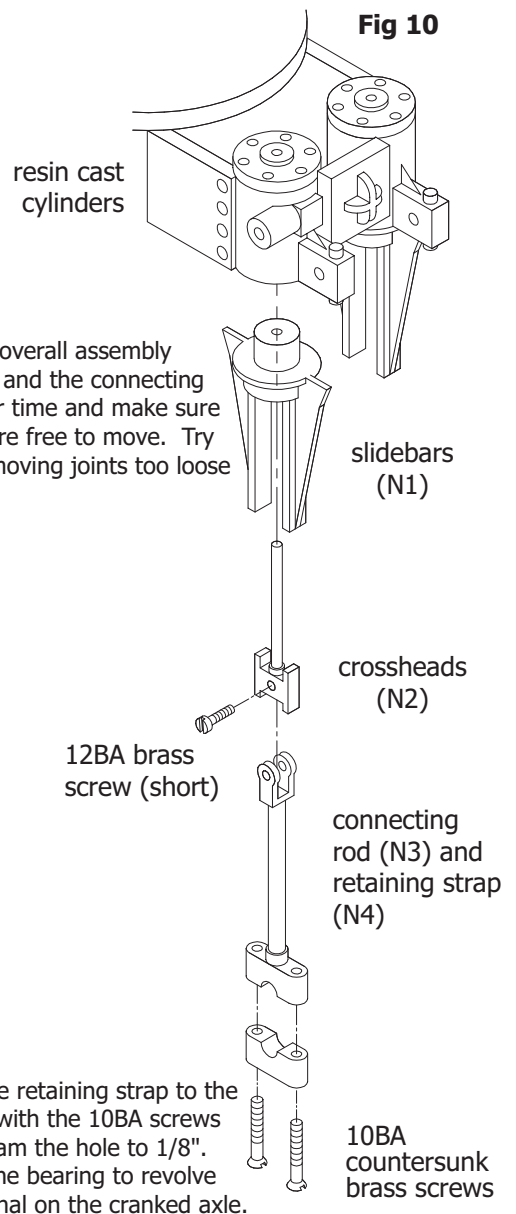
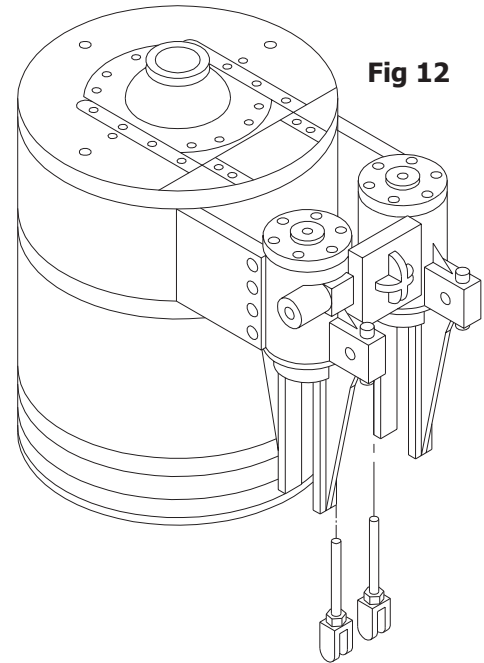
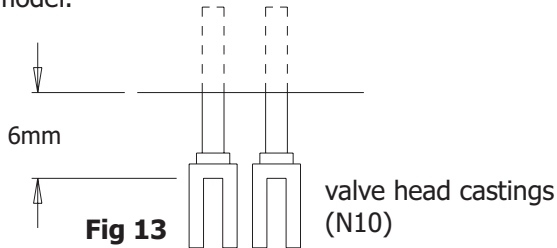


Fig 10

Note: Secure the retaining strap to the connecting rod with the 10BA screws and carefully ream the hole to 1/8". This will allow the bearing to revolve around the journal on the cranked axle.

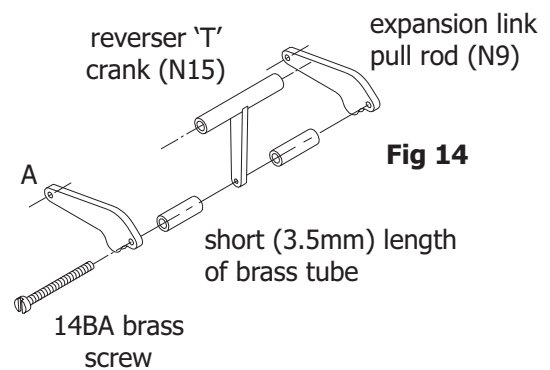
Step 5: Assemble the Valve Gear

The next few steps are rather complicated so study the figures carefully and take one step at a time. If you have not done so already, drill the two holes between the slidebars to accept the valve heads (N10), they should protrude 6mm below the cylinder block as shown in figure 13. The expansion links (N8) will rest between the 'forks'. Rather than being moved by the expansion links (as on the prototype) the valve heads are static on this model.



We now move to the linkages that (on the prototype) allow the steam engine to 'run in reverse'. These are shown in figure 14 on the right. The 'T' crank will pivot on the reverser crank (N12) as shown on the next page. At this point, cut the two lengths of brass tube and slide the pieces onto the BA screw.

The other end of the pull rod (indicated with an 'A') will be connected to the expansion links (N8). Move onto the next step and prepare the valve connecting rods.



expansion link (N8)

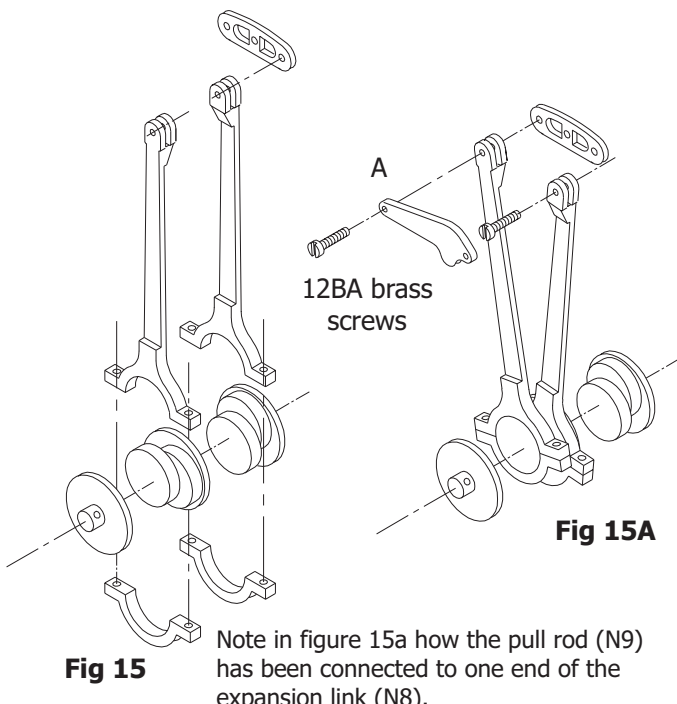


Fig 15

Note in figure 15a how the pull rod (N9) has been connected to one end of the expansion link (N8).

Step 6: Fit the Valve Connecting Rods

Take the (four) valve connecting rods and study them very carefully, also look at figures 15 & 15a. The parts look the same but in fact there are two different types. The top forks shown in figure 15 illustrate how one is opposite handed. Carefully assemble a pair as in figure 15a; the other pair should be an exact mirror image of this.

We have shown the eccentric in an 'exploded' layout, this is to make clear that you are starting with the pair of rods that revolve on the eccentrics on one side of the centreline. Using the 14BA screws, fit a retaining strap to the 'big end' of one of the rods (DON'T fit it onto an eccentric yet). Carefully open up the eccentric hole until it is a sloppy fit on the small steel 'plug gauge' (supplied). When you are happy with that undo the retaining strap and then reassemble the rod onto a slip eccentric. If it is a tight fit, open the hole a bit more. The castings will probably need to be thinned to rotate freely on the eccentrics. Repeat this with the other three rods.

You will also need to file the forks at the top of the rods to allow clearance for the expansion links.

Step 7: Adding Detail to the Superstructure

Start adding the detail to the boiler as shown in figure 16. The resin boiler should be glued to the main part of the superstructure before you add the detail. It is best to remove the chassis while you work on the superstructure.

Fix the reverser quadrant (WM8) to the resin footplate in the locating holes. Then carefully add the linked parts for the reversing gear. This does get a little awkward because the 'T' crank was earlier connected up to the top ends of the valve gear rods.

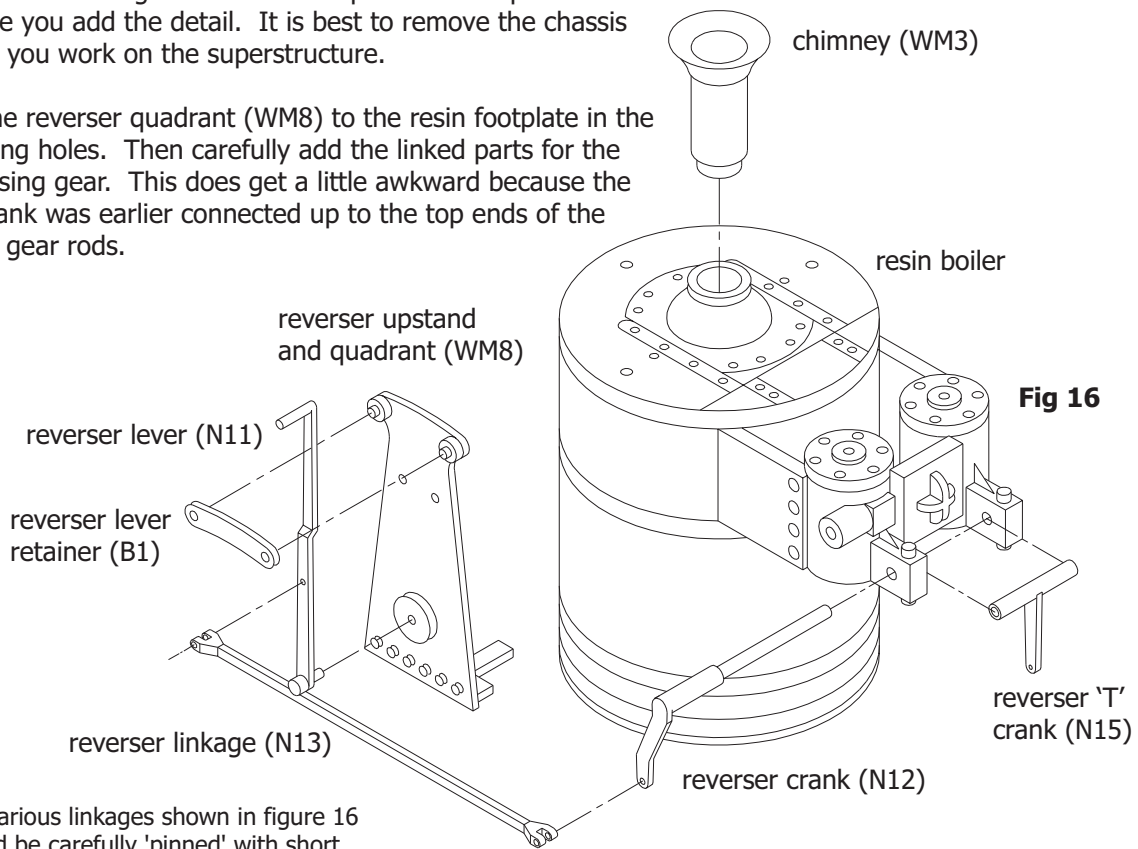


Fig 16

The various linkages shown in figure 16 should be carefully 'pinned' with short lengths of 0.020" (0.5mm) brass wire.

Take the various components shown on the left and polish the brass columns. The arm (N14) could also be given a bit of a clean. Assemble the bits as illustrated and put them to one side ready to fit onto the boiler.

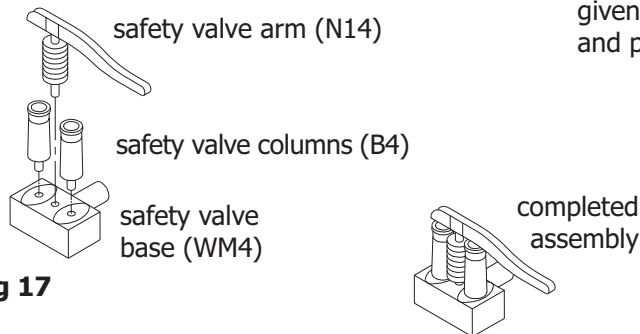


Fig 17

Use the 0.060" (1.5mm) brass rod to form the hand rail to the shape shown on the right. Take your time and try it occasionally on the resin cast vertical boiler.

Keep this to one side and fit it when the other 'fittings' have been added to the boiler. You may wish to leave the hand rail off until the model has been painted. In which case polish up the handrail and fit it later.

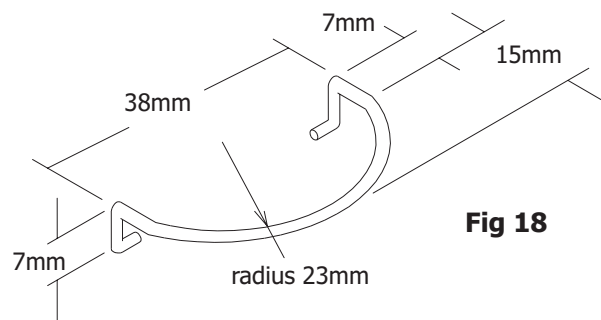


Fig 18

grab handle for the boiler

Step 8: Adding the Final Detail

Now add the rest of the detailed fittings as shown below. The main steam pipe (WM6) fits into the resin boiler, just in front of the cylinders. The other end locates into the side of the regulator valve (WM5). So fit the valve to the boiler first. Leave the handrail off until other detail is fitted.

In figure 21 there are locations indicated with a letter, 'A', 'B' etc. These show where copper piping will be fitted. Use the copper wire supplied. 0.050" wire runs from A to A. The finer 0.030" wire connects B to B and C to C. This 'plumbing' is better added once the model has been painted.

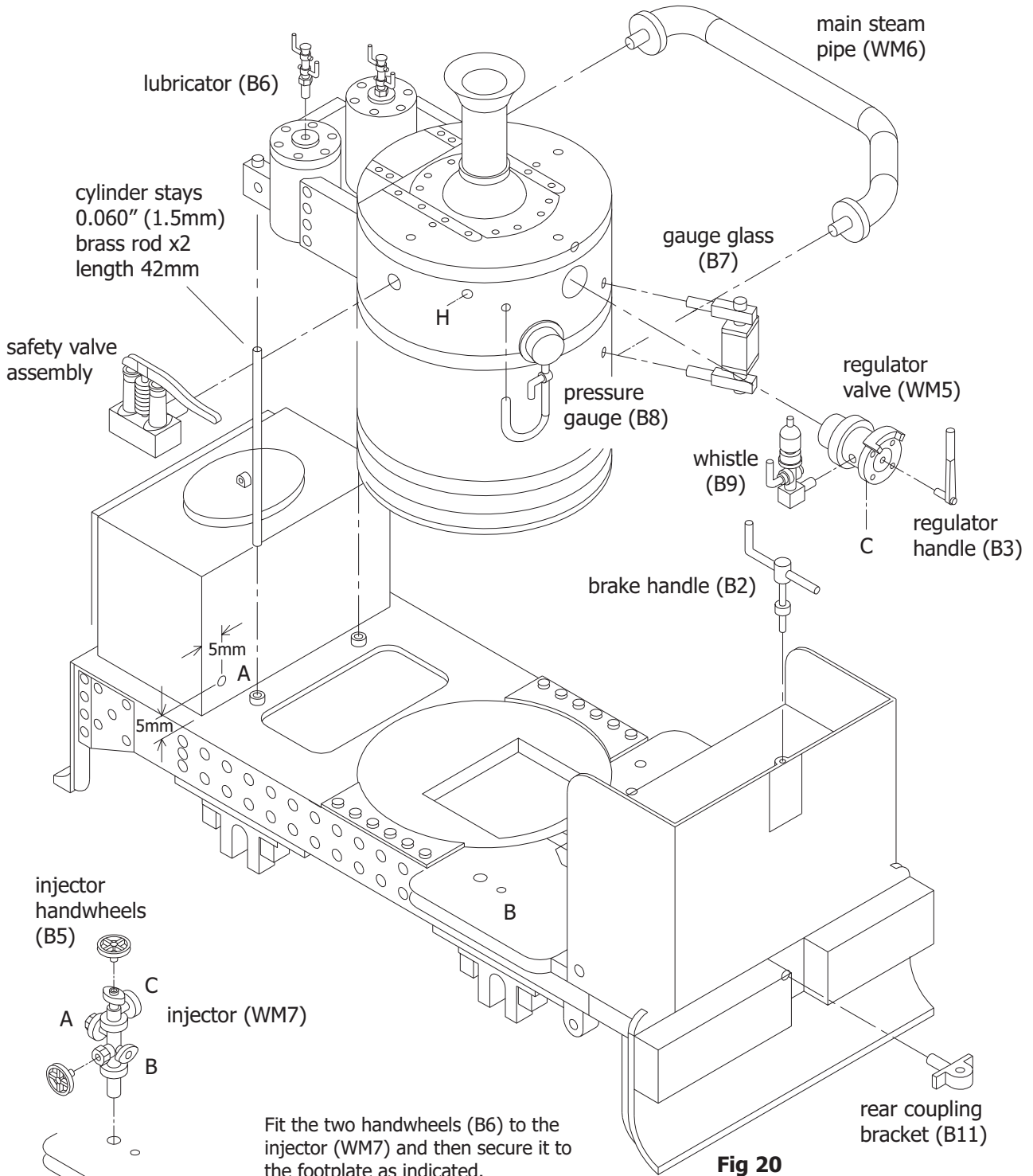
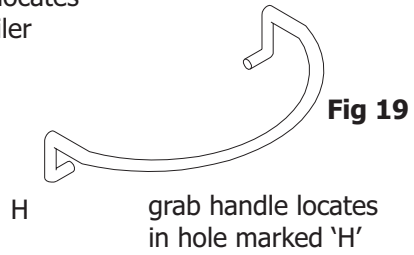


Fig 20

Fit the two handwheels (B6) to the injector (WM7) and then secure it to the footplate as indicated.

Fig 21

