

Fig 1. Round Top Firebox 3232 Class GA.

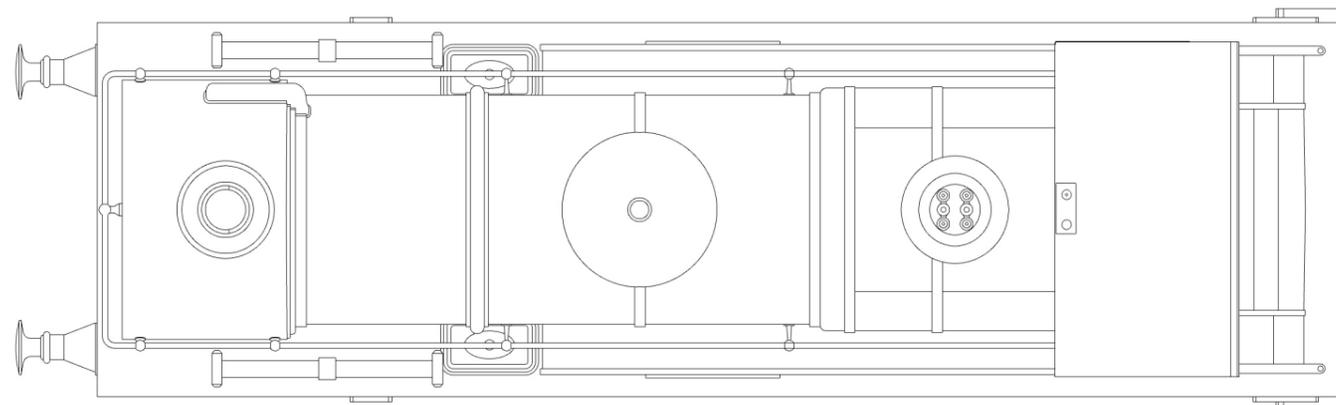
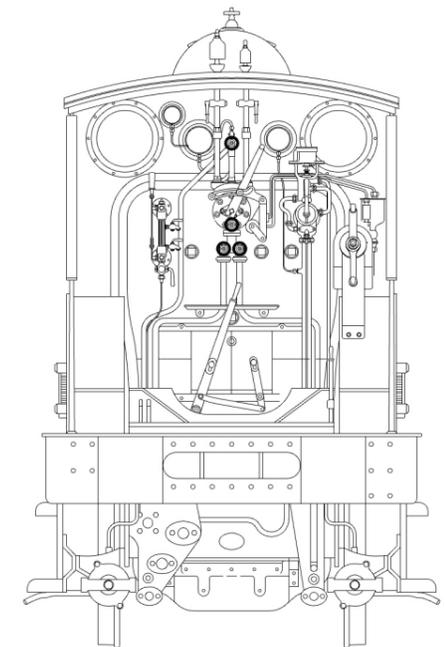
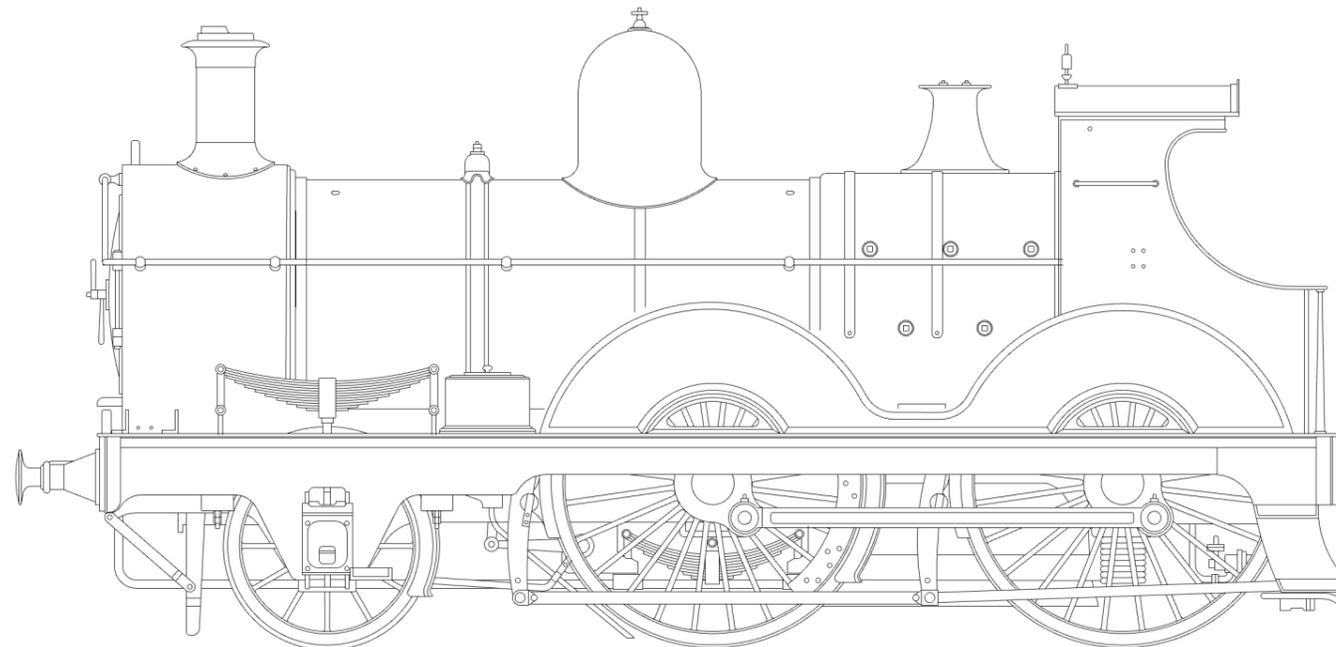
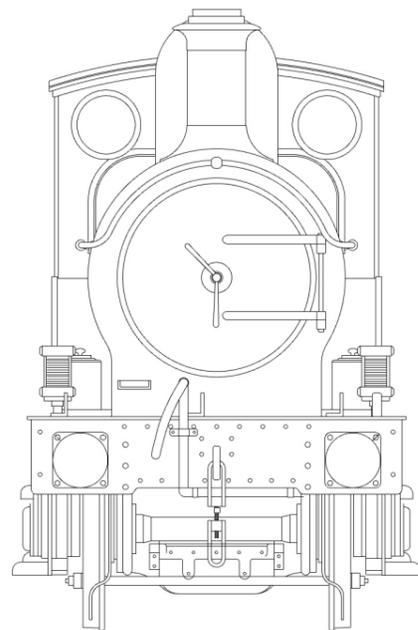


Fig 2. Belpaire Firebox 3232 Class GA (Lot 90)

## INSIDE FRAME CONSTRUCTION

### COUPLING RODS.

The coupling rods are now made so that they can be used as a jig to align the leading coupled axle hornblocks accurately.

First drill out all the crankpin holes to a convenient size which is undersize for the crankpins. Remove all burrs caused by the drilling. Now drill the same drill into a suitable small block of wood and leave the drill in the wood with its shank projecting. This projecting shank is used as a mandrel to accurately align the two laminations of each rod.

Tin well the front face of all the inner laminates and the back face of the outer laminates and place them over the mandrel. Using plenty of solder and flux, solder the two laminates together. You should now have a rod with the bosses on each laminate perfectly aligned. The rods have been deliberately etched too large so that the thin etched edges can be carefully filed so that the 'laminated' effect is lost and the rods appear to be made from one piece of metal.

### FRAMES

Having decided which chassis to construct you can now start construction by preparing the inside frames.(F1 & F2). First open up the following holes in the frames:

- P only if plunger pickups are being used
- B for brake hanger pivots - 0.8mm
- R for reversing lever cross shaft - 1.6mm
- A for compensation beam pivot - 1/8"
- S to fit the steam brake cylinders

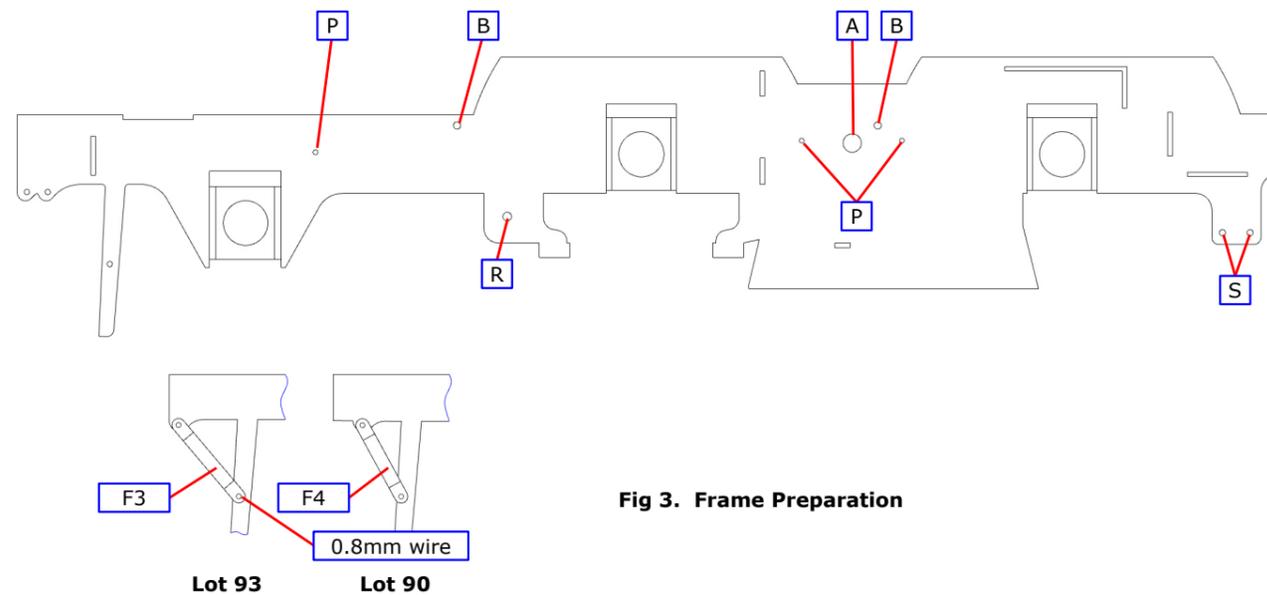


Fig 3. Frame Preparation

Modify the guard iron strut mounting to suit which lot you are building and fit the guard iron struts (F3 or F4). Fold the ash pan sides along the half etched lines to match the centre frame spacer (F6). Emboss the rivets marked by half etched holes as shown on the diagram including the four rivets around the flange to the pipe on the right hand ash pan side. If you are constructing a compensated chassis fix the leading (F8) and rear (F10) hornblocks to the frames.

### FRAME SPACERS AND ASSEMBLING THE CHASSIS

Fold up the front and rear spacers (F5 & F7) and the cab floor front (F11), making sure the half etched lines are on the inside of the bend. Check that all tabs on the spacers fit properly in the frame slots so that the spacer is hard up against the inside of the frames.

Now assemble the frames and spacers. Start by tack soldering the rear spacer to both sides. The cab floor fits in the half etched grooves in the frames and must be fitted at this stage. Check that everything is square and that the spacers are hard against the frames. Put an axle (a long piece of 3/16" rod would be better) through the rear bearings and place the chassis on a piece of graph paper to check that the axle is square to the frames. If all is well solder the remaining spacers to the frames. It is important to check constantly that the chassis is square and that the frames are straight.

Now fit the front coupled wheels hornblocks (F9) using the coupling rods as jigs.

Solder 0.8mm wire through frame holes B to form the brake hanger pivots and remove the sections of wire between the frames.

No.	Description	Sheet	No.	Description	Sheet
M1	Coupling rod outer lamination (2)	1	F5	Front frame spacer	1
M2	Coupling rod inner lamination (2)	1	F6	Centre frame spacer	1
M3	Compensation Beam packing strip	1	F7	Rear frame spacer	1
F1	Left inside frame	1	F8	Leading hornblocks	1
F2	Right inside frame	1	F9	Centre hornblocks	1
F3	Guard iron strut, lot 90 (2)	1	F10	Rear hornblocks	1
F4	Guard iron strut, lot 93 (2)	1	F11	Cab floor front	1
			F12	Compensation beams (2)	1

### FITTING THE COMPENSATION BEAMS

Cut a piece of 1/8" brass rod so that it fits through the holes marked A and is flush with the outside face of the chassis frames.

Prepare two pieces of 5/32" bore brass tube. Each should have a length of 3mm. Open up the hole in each of the compensation beams (F12) to accept the brass tube and solder the beams to the pieces of tube close to one end of the tube. Slide the rod through one frame, through a tube & beam, a paper washer, the two washers, a paper washer, a tube & beam and then through the other frame. Solder securely to each frame. Push the beam into place and then push the paper washer and brass washer in to hold the beam in place. Solder the the washer in place. Repeat on the other side. Remove the rod from between the two beam assemblies to leave space for the motor and gearbox.

The third beam is a piece of 1.6mm steel wire soldered in the half etched groove in the bottom of the front spacer and projecting to the rear. The front of the engine is supported on this beam resting on the leading axle. Fit all the wheels and axles temporarily so that the beams are resting on the axle bearings. Confirm that the compensation works properly and check if the chassis is sitting level.

Make a bracket to support the motor/gearbox from scrap brass and solder it to the rear of the centre frame spacer.

### INSIDE MOTION.

If you are fitting working inside motion then build it next following the separate instructions.

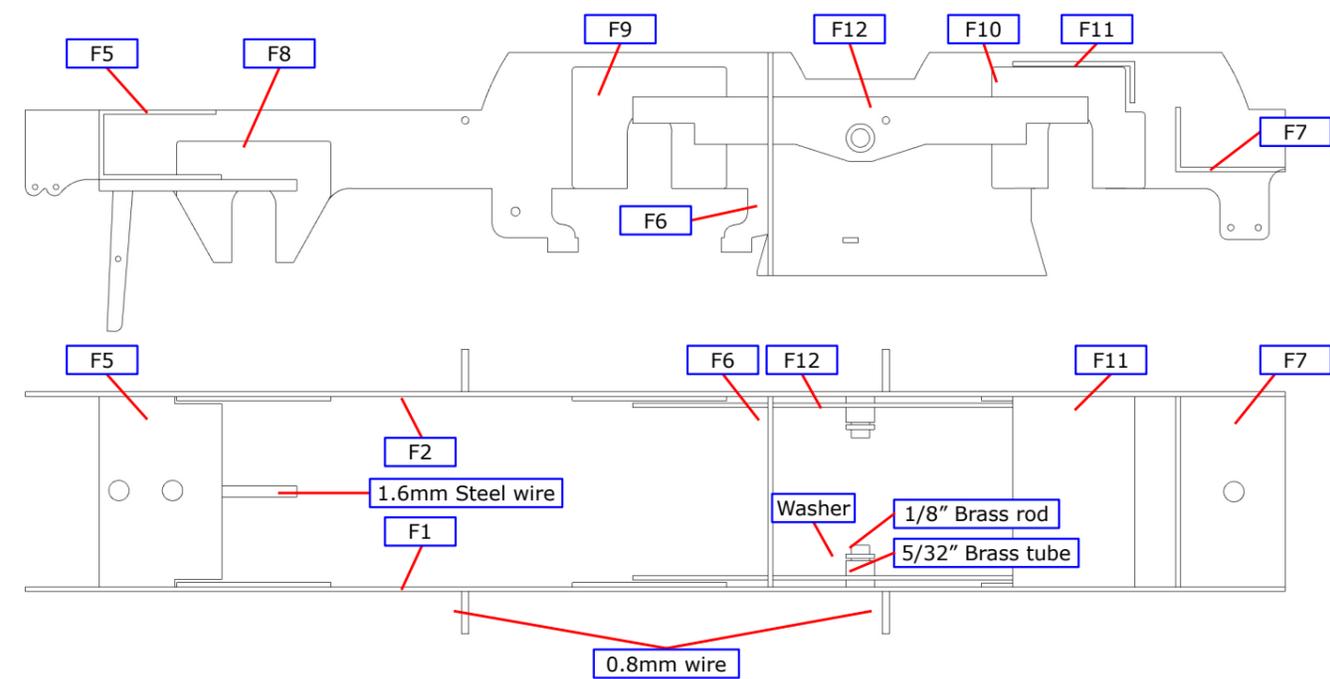


Fig 4. Frame Construction

## BRAKE GEAR AND CHASSIS FINISHING

Secure the balance weights (F32 & F33) in position using photographs as a guide to position.

Attach the left and right steam brake cylinders (BR1 & BR2) to the chassis in the holes S shown in Fig 3.

Assemble the wheels, axles, coupling rods and motor and check that all is well. Retain the rear axle bearings in the hornblocks by using the underhung volute springs (F13). Make a triple lamination of the underhung leaf springs, the outer, middle and inner laminations (F14, F15 & F16) and then secure the leading coupled axle. Use a short piece of 0.8mm wire for the front axle.

Emboss the pair of rivets on each outer brake hanger, left and right (F17 & F19). Assemble the brakes, trapping the brake shoes (F21 or WM1) on a piece of 0.8mm wire between the inner (F18 & F20) and outer laminations. Solder the brake hangers onto the brake hanger wires ensuring alignment and clearance from the wheels.

Emboss the rivets on each outside brake pull rods, left and right (F22 & F24). The inside pull rods, left and right (F23 & F25) should only extend forward to the first brake shaft so shorten them back to this point. Fit the pull rods as shown in the diagram attaching them either side of the steam brake cylinders. Form and fit the brake pull rods safety brackets (F26) through the small slots in the ashpan sides and under the pairs of pull rods.

No.	Description	Sheet	No.	Description	Sheet
F13	Underhung volute springs (2)	1	F23	Left inner brake pull rod (2)	1
F14	Underhung spring outer lamination (2)	1	F24	Right outer brake pull rod (2)	1
F15	Underhung spring middle lamination (2)	1	F25	Right inner brake pull rod (2)	1
F16	Underhung spring inner lamination (2)	1	F26	Brake pull rod safety brackets (2)	3
F17	Left brake hanger outer lamination (2)	1	F27	Wheel spacer washers	1
F18	Left brake hanger inner lamination (2)	1	F28	Washers	1
F19	Right brake hanger outer lamination (2)	1	F29	Vacuum pipe flanges	3
F20	Right brake hanger inner lamination (2)	1	F30	Drawbar, 2 lengths	2 & 3
F21	Brake shoes (4)	1	F31	Trailing axle balance weight (2)	1
F22	Left outer brake pull rod (2)	1	F32	Leading axle balance weight (2)	1

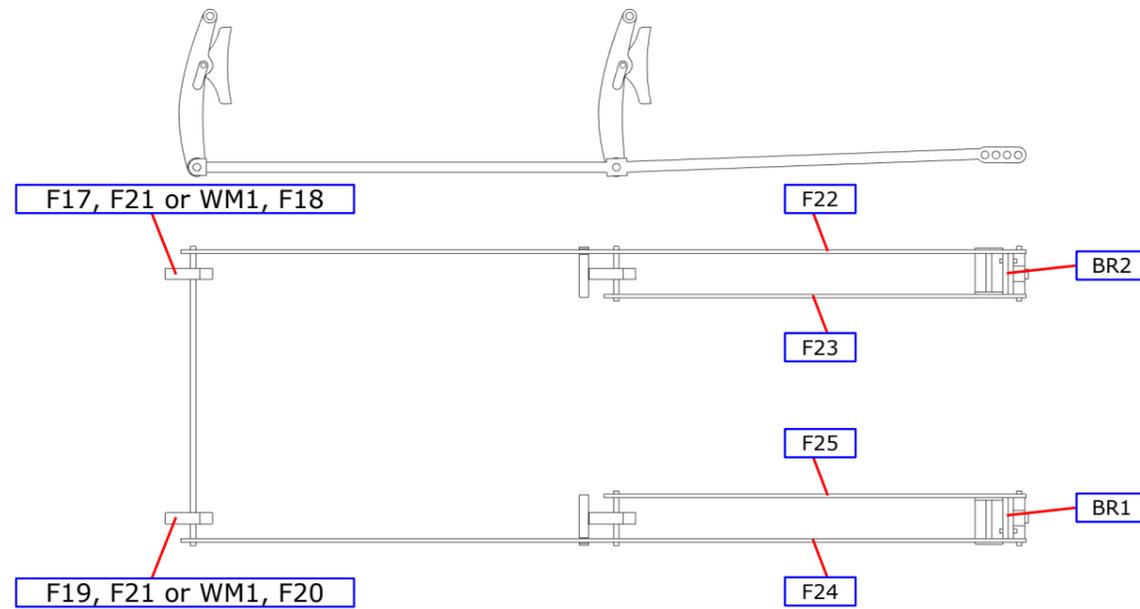
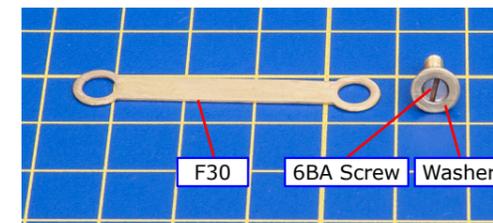


Fig 5. Brake Construction

Fit the sandbox below footplate (WM3) in place and form sand pipes from 1.2mm wire. Finally form and fit the vacuum pipe from the buffer beam mounted vacuum pipe to the rear. It's shape varies between engines so use photographs and the drawings as a guide. The vacuum pipe flange (F30) is threaded on this pipe and fixed to it beneath the front axle.



## FOOTPLATE

For a Lot 93 locomotive file back the lower front edge of the outside frame and valance, left and right (U1 & U2) to the half etched line. Emboss the rivets in the outside frames where appropriate. On the footplate (U3) fold down the footplate edges on both sides and solder the outside frames in place ensuring the frames are flush with the footplate surface.

Emboss the rivets under the lamp brackets on the footplate overlay (U4) and locate over the footplate so that all common holes align. Carefully solder them together, working from the front to the back to avoid buckling. The part of the footplate that forms part of the cab floor must be narrowed if you have used other than the wide chassis spacers. Solder a 6BA nut over the rear hole in the footplate for the body fixing screw.

Emboss the rivets on the buffer beam (U5) and the drag beam parts (U6) and attach the drag beam rubbing plates (U7) to the drag beam. Solder the buffer beam and drag beam to the footplate. Fold up the appropriate frame to buffer beam brackets (U8, U9 or U10) and the frame to drag beam brackets (U11) and solder in place. Add the outside frame and valance strip (U12).

Solder the small splashers fronts, with or without beading (U13 or U14) centrally in the slots in the footplate then curve the small splashers tops, with or without beading (U15 or U16) to the correct radius and solder them in place.

**Splashers With Beading.** Using the number fixing jig (U17) solder the last two digits of your chosen number (U18) to the splashers fronts (U19). Solder the splashers fronts into the footplate slots and to the small splashers. Roll the splashers tops from the etched notch in the middle. The large radius curves are best rolled using a metal rod on a sheet of hard rubber. When you are satisfied with the shape solder the splashers in place. The front edge of the splashers tops, (U21) fit slightly proud of the splashers fronts by the width of the beading. The wider part of the splashers tops will need reducing in width so that the inner edge aligns with the chassis frames.

**Splashers Without Beading.** Using the number fixing jig (U17) solder the last two digits of your chosen number (U18) to the splashers fronts (U20). Solder the splashers fronts into the footplate slots and to the small splashers. Roll the splashers tops from the etched notch in the middle. The large radius curves are best rolled using a metal rod on a sheet of hard rubber. When you are satisfied with the shape solder the splashers in place. The front edge of the splashers tops (U22) fit slightly proud of the splashers fronts by the less than the width of the beading. The wider part of the splashers tops will need reducing in width so that the inner edge aligns with the chassis frames.

Remove the piece of brass in the centre of the footplate which has been holding everything together by cutting along the half etched lines (shown in blue below). Check the fit of the footplate on the chassis and dress to obtain a flush fit.

Solder in place the leading wheel splashers (U23) and fill the small gap with solder.

Fold up the steps (U24, U25, U26 & U27) and solder to the outside frames. These steps are specific for each position. The four holes at rear of each frame correspond to the four rivets attaching the upper steps and should be used to aid alignment. Solder in place the steps adjacent to the leading axle (U28).

No.	Description	Sheet	No.	Description	Sheet
U1	Left outside frame and valance	1	U18	Set of numbers	2
U2	Right outside frame and valance	1	U19	Splasher front with beading (2)	2
U3	Footplate	2	U20	Splasher front without beading (2)	2
U4	Footplate overlay	3	U21	Splasher top with beading (2)	3
U5	Buffer beam	1	U22	Splasher top without beading (2)	3
U6	Drag beam	1	U23	Leading wheel splashers (2)	2
U7	Drag beam rubbing plates (2)	2	U24	Rear step left lower tread	2
U8	Lot 90 riveted frame to buffer beam bracket (2)	3	U25	Rear step left upper tread	2
U9	Lot 90 plain frame to buffer beam bracket (2)	3	U26	Rear step right lower tread	2
U10	Lot 93 frame to buffer beam bracket (2)	3	U27	Rear step right upper tread	2
U11	Frame to drag beam bracket (2)	3	U28	Step adjacent to the leading axlebox (2)	2
U12	Outside frame and valance strip (2)	2	U29	Cab splashers side (2)	2
U13	Small splashers front with beading (4)	2	U30	Lamp brackets (3)	2
U14	Small splashers front without beading (4)	2	U31	Firebox mounting brackets (2)	1
U15	Small splashers top with beading (4)	3	U32	Spring shackle (12)	3
U16	Small splashers top without beading (4)	3	U33	Leading wheel splashers (2)	3
U17	Number fixing jig	2	U34	Cylinder cover	3

Attach the cab splashers side (U29) under the inner of the splashers inside the cab; the inner face should align with the frames. Fix the lamp brackets (U30) in the small slots across the front of the footplate.

Fold up the leading wheel splashers (U23), curving the splashers cover to fit the front, and solder in place under the footplate.

**Final Detailing After the Boiler is fitted.** Emboss the hinge rivets on the cylinder cover (U34) and solder in place on the footplate at the front of the smokebox. If modelling a B4 boiler, add the firebox mounting plates (U31).

Form the spring shackles (U32) to a 'U' shape and solder on a short length of 0.8mm wire. Fix the shackles through the holes in the footplate, tack soldering the wire to the lower footplate edge. Attach the leading axle springs (WM2) and then solder the shackle wires permanently to the footplate overlay and cut off flush with the underside of the footplate. Attach the spring damper castings (BR3). Fit the leading axleboxes (BR4).

Fit the sandboxes above the footplate (WM4). Prepare and fit the buffer stocks (WM5) as shown below. Fit the vacuum pipe (BR5) and the vacuum pipe dummy (BR6).

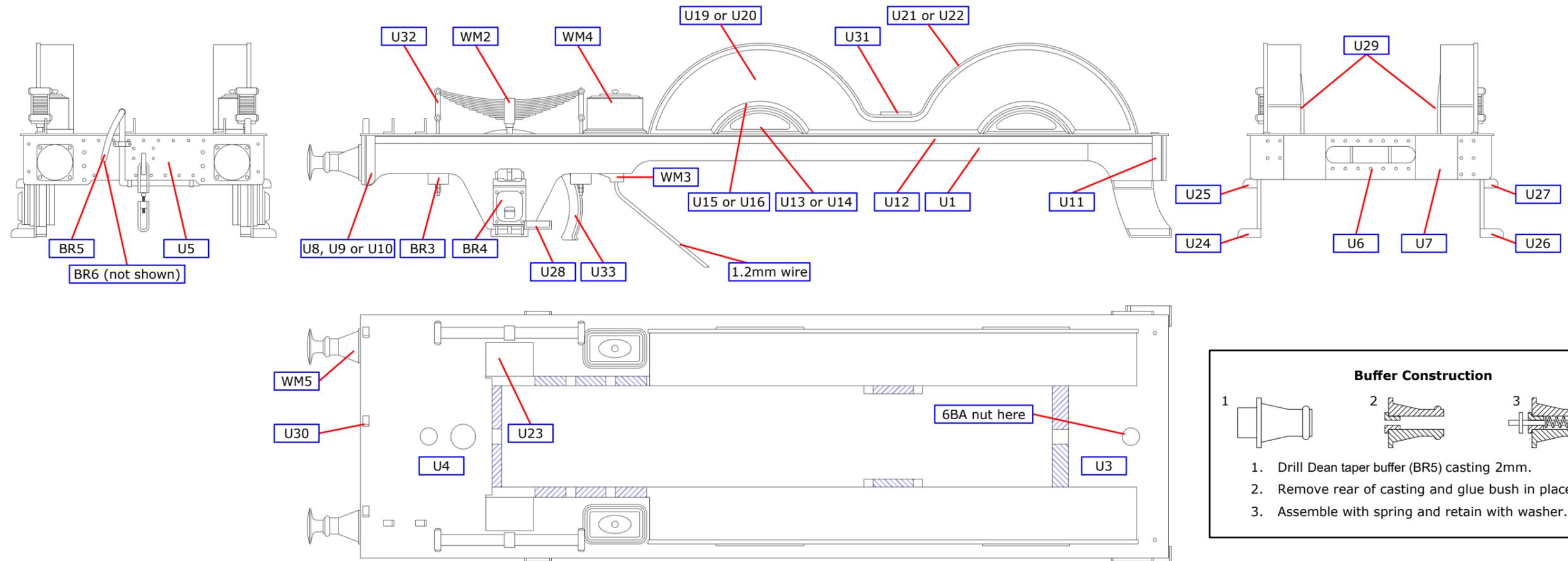


Fig 6. Footplate Construction

## CAB

Prepare the cab sides (C1) by embossing any rivet detail. There are no half etched holes for guidance as every engine seems to be different! The same applies to the horizontal handrails which are absent in original condition. Drill suitable holes and fit these handrails from 0.45mm wire.

Attach the cab side cut-out beading (C2) fitting the etched groove on the edge of the cab side. Solder the cabsides in position. They are correctly aligned when both the cab side handrails and the front edge are vertical. Fit the vertical handrails from 0.8mm wire.

Select the appropriate cab front, round top or Belpaire firebox (C3 or C4). Emboss the rivets on the Belpaire firebox cab front. Attach the cab front overlay (C5) to the top edge of of the round top firebox cab front. Solder the porthole rims (C6) in place and fix the cab front in place set back slightly between the cab sides. Solder the cab roof rear support (C7) between the rear edges of the cabsides.

Select the appropriate cab roof, either canvas covered wood or steel (C8 or C9). Emboss the rivets around the whistle holes on the steel roof. Curve the cab roof. The strengthening rib across the rear of the wooden roof is represented by a piece of 0.8mm wire soldered in the wider half etched groove. Solder the rain strips (C10) into the slots in the steel roof. Solder the cab roof in position. The cab roof rear angle (C11) is soldered to the rear edge of the steel roof to form the strengthening angle.

Solder the cab floor rear (C12) in place. Slightly curve the fall plate (C13) and hinge it behind the floor using 'U' shaped pieces of 0.45mm wire, fitted through the holes on the footplate.

Fit the splashers extensions (WM6) to the rear of the splashers in the cab. The following steps can be done when detailing the backhead. Fit the screw reverser WM7) on top of the right splasher. Fit the screw reverser handle (BR9).

The whistles are easily damaged so fit them just before painting. The large (BR7) goes on the left and the small (BR8) on the right.

No.	Description	Sheet	No.	Description	Sheet
C1	Cab sides (2)	2	C8	Canvas covered wood cab roof	2
C2	Cab side cut-out beading (2)	2	C9	Steel cab roof	3
C3	Cab front round top firebox	3	C10	Cab roof rain strips (2)	3
C4	Cab front Belpaire firebox	2	C11	Cab roof rear angle	2
C5	Cab front overlay	2	C12	Cab floor rear	2
C6	Cap porthole rims, two sizes (2)	1	C13	Fallplate	2
C7	Cab roof rear support	2			

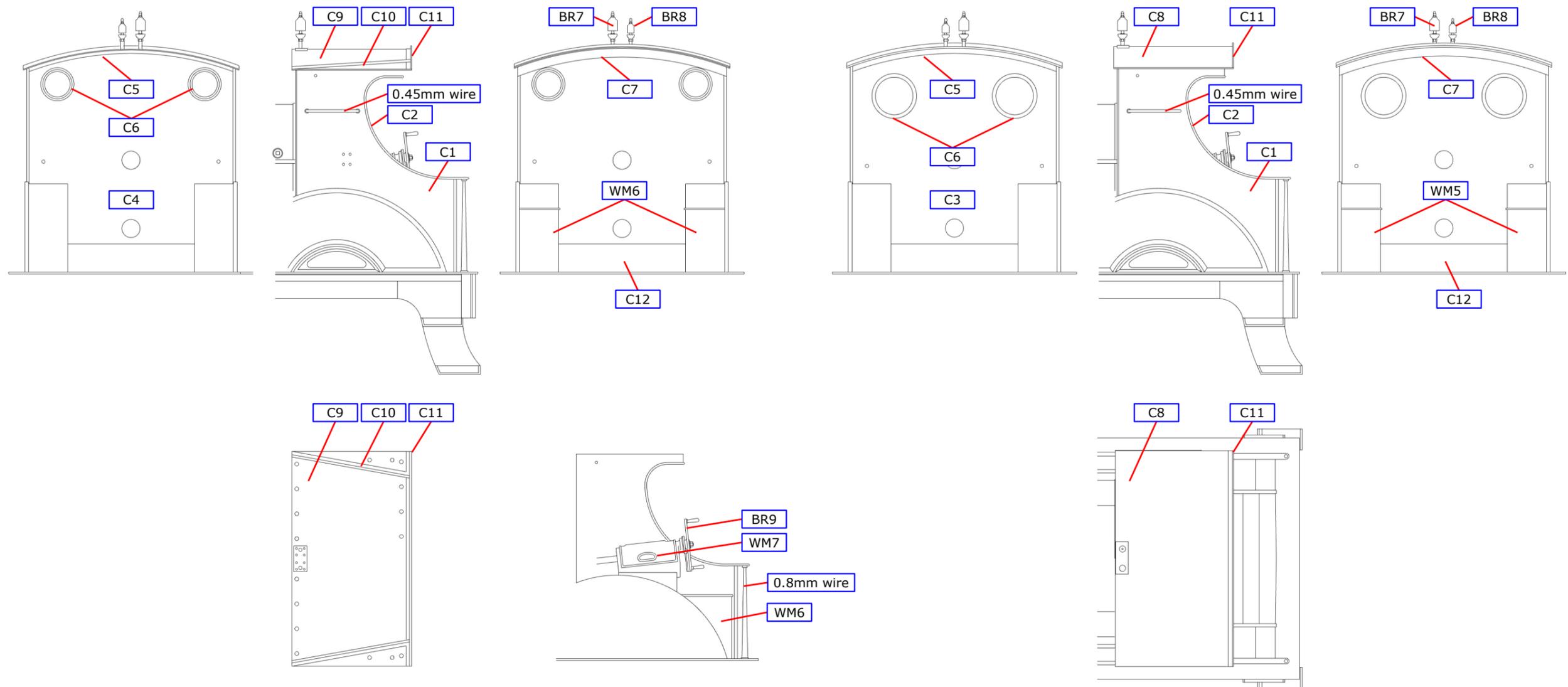


Fig 7. Belpaire Boiler Cab and Steel Roof

Fig 8. Round Top Boiler Cab and Wood Roof

## S4 BOILER AND FINAL DETAILING

**Boiler.** Emboss the rivets as needed on the boiler and round top firebox wrapper (SB1) on the dome boiler band and firebox band. Form the boiler by rolling around suitable sized rod or dowel. Ensure that the fit is correct over the boiler front and rear formers (SB2 & SB3). Solder a 6BA nut over the hole in the centre of the front former to allow the smokebox to be screw fixed to the boiler.

Bend the boiler band joining brackets on the boiler joining strip (SB4) and fit through the small slots from inside the boiler. If the fit is good and the formers fit, then solder the wrapper ends together with the boiler joining strip. The formers are now soldered in place flush with the back and front of the boiler section with the notch on the top of the rear former in line with the mid line of the wrapper. Solder two short pieces of 0.8 mm wire into the two holes in the rear former to act as dowels to locate the boiler and firebox.

**Firebox.** Fit the round top firebox front and rear formers (SB5 & SB6) in place ensuring that the firebox does not become twisted.

**Smokebox.** Fold the smokebox base (SB7) into an inverted tray and solder a 6BA nut over the hole for the body fixing screw. Solder the smokebox front and rear formers (SB8 & SB9) to the smokebox base with their lower edges flush with the bottom of the base. First emboss the lamp bracket rivets on the smoke box wrapper, riveted or no rivets (SB10 or SB11) and then roll to shape and solder in place with its edges flush with the front and back formers. Screw the smokebox to the boiler with the smokebox rear overlay and the smokebox and boiler ring (SB12 & SB13) sandwiched between. The rear plate protrudes slightly and the smokebox and boiler ring was originally polished brass. This can be achieved by putting it on the mandrel of a mini drill and polishing with 'Brasso'. Because it is screw fitted along with the smokebox it can be finally fitted after most of the painting is done.

No.	Description	Sheet	No.	Description	Sheet
SB1	Boiler and round top firebox wrapper	3	SB10	Smokebox wrapper no rivets	3
SB2	Boiler front former	1	SB11	Smokebox wrapper with rivets	3
SB3	Boiler rear former	1	SB12	Smokebox rear overlay	1
SB4	Boiler joining strip	2	SB13	Smokebox and boiler ring	1
SB5	Roundtop firebox front	1	SB14	Angle between firebox and cab	3
SB6	Roundtop firebox rear	1	SB15	Smokebox lamp bracket	2
SB7	Smokebox base	3	SB16	Step on smokebox front	2
SB8	Smokebox front former	1	SB17	Step left side of smokebox	2
SB9	Smokebox rear former	1			

Solder the lamp bracket (SB15) through the slot in the smokebox. Fit the chimney (BR11).

Fix handrail knobs, short on the smokebox sides, medium on the boiler. Form the handrail to shape, thread on the front medium knob, and fix the handrail in place.

Polish and fit the chimney (BR10). Fit the inside of the dome (WM8) and the safety valve base (WM9) ensuring that both are vertical. Polish and fit the dome (BR11) and the dome lubricator (BR12). Fit the safety valves (BR13) to the top of the safety valve base. Polish and fit the safety valve casing (BR14).

Fit the early type of smokebox door with the ring (WM10). Fit the smokebox handles (BR15). Fit the steam lance cock (BR16).

Use the drawing of the cab interior to assemble the backhead and the cab interior detail. Use copper wire of a suitable size for the pipes. Solder the backhead to the cab floor to make a removable unit.

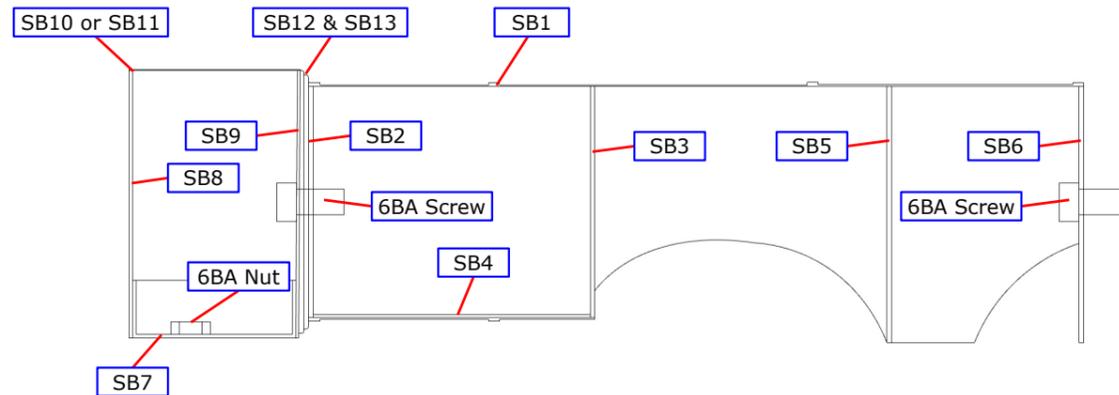


Fig 9. S4 Boiler Construction

**Fitting and Finishing.** The boiler now needs careful fitting to the splashers tops by filing back the splashers as needed. Also check the clearance between the boiler and the driving wheels.

When you are satisfied screw the boiler to the footplate using the body fixing screw at the front and a 6BA screw and nut through the holes in the firebox and cab front. Make sure that all is aligned correctly, with the boiler horizontal before soldering the boiler and firebox to the splashers tops. Fit the angle between firebox and cab (SB14) to represent the angle between the firebox and the cab front.

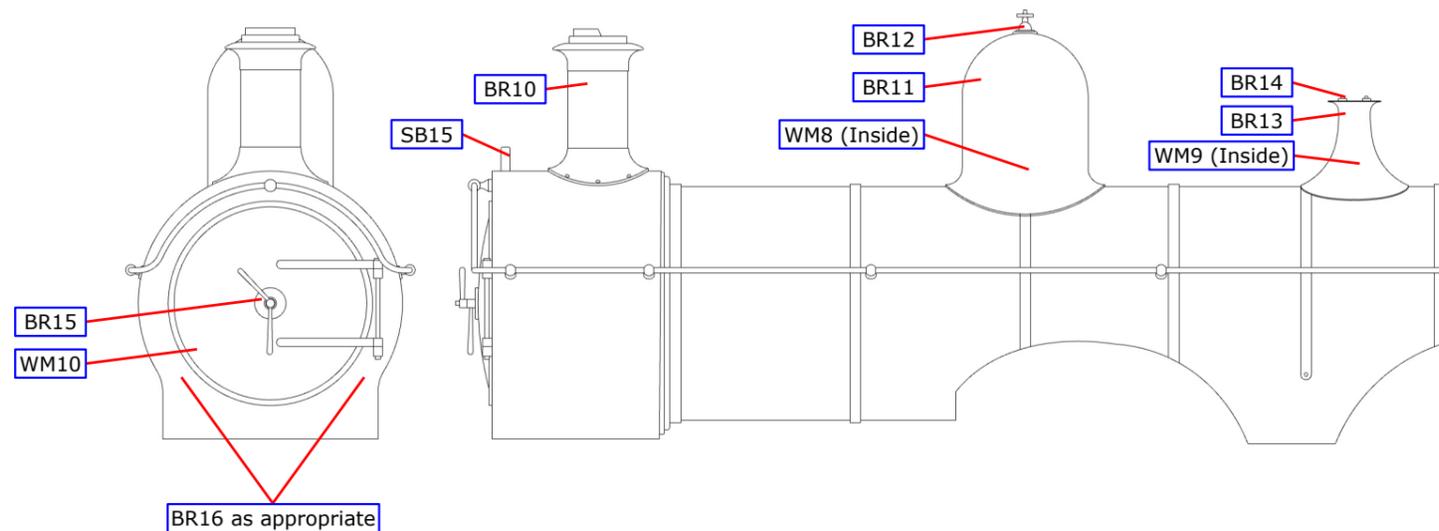


Fig 10. S4 Boiler Detailing

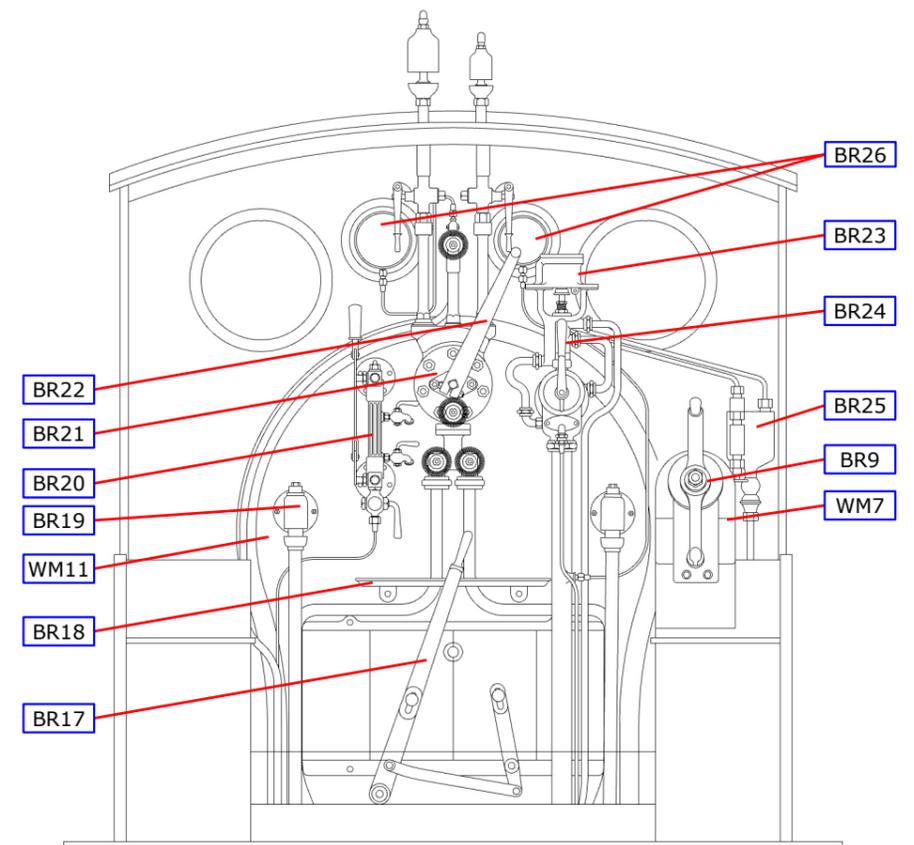


Fig 11. Cab with S4 Round Top Boiler

## FORMING THE BELPAIRE FIREBOX

The photographs show the construction of a 47XX firebox. The construction of the 3232 firebox follows the same procedures.

**Photo 1.** Solder together the three laminations of the firebox front (SB22) and the top portion (SB23) ensuring the holes in the full front align. Clean the cusp off all parts, including the firebox rear former (SB24). Reduce the width of the lower faces of the firebox rear former so that it will fit between the frames in the locating groove in the footplate. Using the small dimples provided mark the centre lines on the outside and the inside of each part. Solder two 4 mm lengths of 0.8 mm wire into the holes on the cab front.

To assemble the firebox two 100 mm pieces of 4BA studding will be required with four brass nuts and four stainless steel nuts. Thread the brass nuts on to the studs.

**Photo 2.** Set the two spacers on to the studs, retain them with the stainless steel nuts. Ensure the length of the assembly over the formers is 37.1mm. Always measure the distance from the bottom of the firebox; even using a steel rule and eyeglass you can get pretty close to this sort of dimension with care. Take your time, measure and check it a few times. It's easier to use a vernier or similar gauge to get a precise measurement and to check that the spacers are parallel.

**Photo 3.** Check that the spacers are square, both front and rear; do this on a decent flat surface. When correctly spaced apart the front will fit in the half etched recess in the footplate and the rear, pinned to the cab front, will fit with the tabs on the lower edge of the cab front in the footplate slots.

**Photo 4.** Tighten the stainless steel nuts up tightly and then solder the brass nuts to the spacers. A good blobby tack, as here, will do fine:

**Note:** From this stage the spacers form a pretty strong assembly. Any attempt to twist the assembly results in one stud tightening as the other slackens. Just make sure the nuts are tightened up and you've checked the assembly is square again before moving on to the next stage.

**Photo 5.** Emboss the rivets for the ends of the cladding fixing bands on the firebox wrapper (SB21).

Align the centre line marks, the top can be formed to a gentle radius. This is a simple rolling job, using a length of dowel and finger pressure. An old round file has a taper that is useful on GWR fireboxes which don't have a constant radius. Ensure that the centre lines are maintained while forming the second shoulder.

No.	Description
SB21	Belpaire firebox wrapper
SB22	Belpaire firebox front former (2)
SB23	Belpaire firebox front top portion

Sheet	No.	Description	Sheet
3	SB24	Belpaire firebox rear former	1
1	SB25	Firebox band joining clip	3
1			

On waisted fireboxes, such as this one, start forming the concave sections; this might be easier to do off the spacers. The final job is to pull in the waisted section, by putting a gentle curve on the sides of the firebox; again this is dowering and finger pressure.

As can be seen, it's not a perfect match to the spacers, but gentle finger pressure is enough to get the wrapper to meet the spacers without distortion.

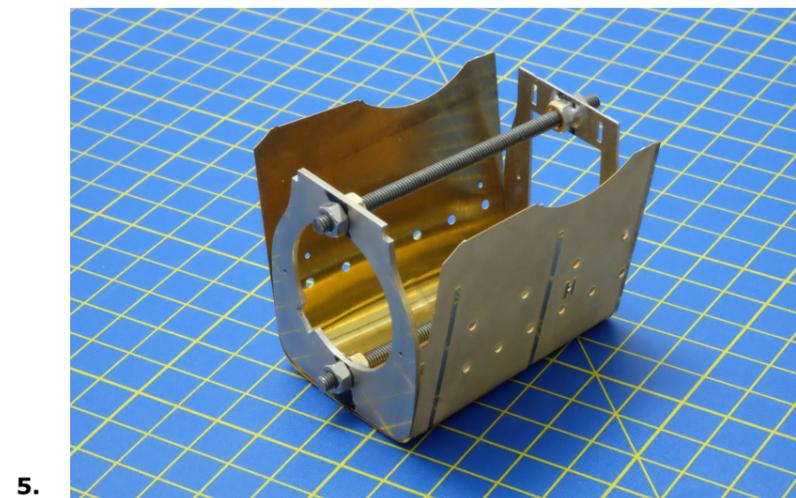
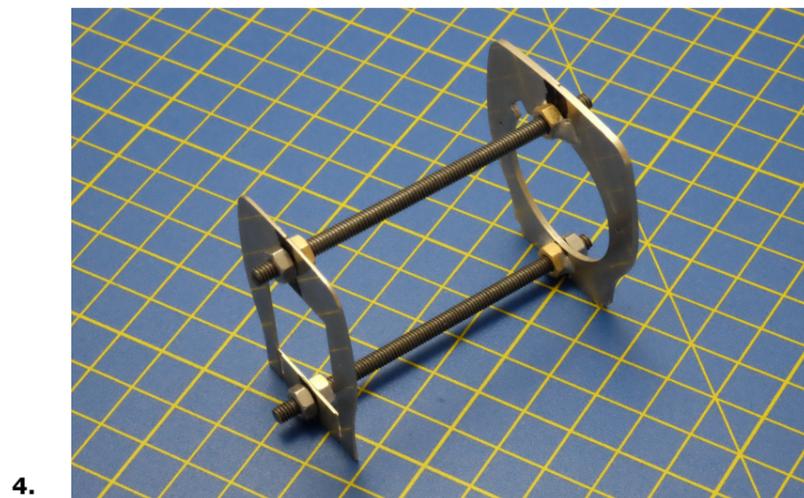
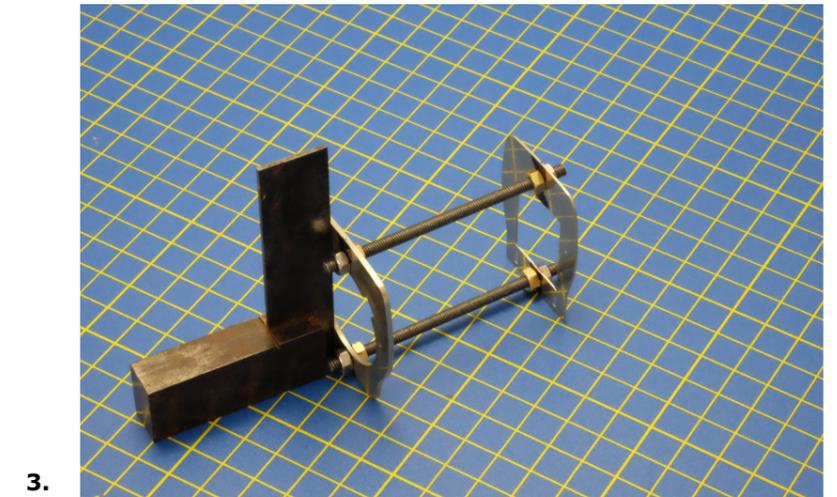
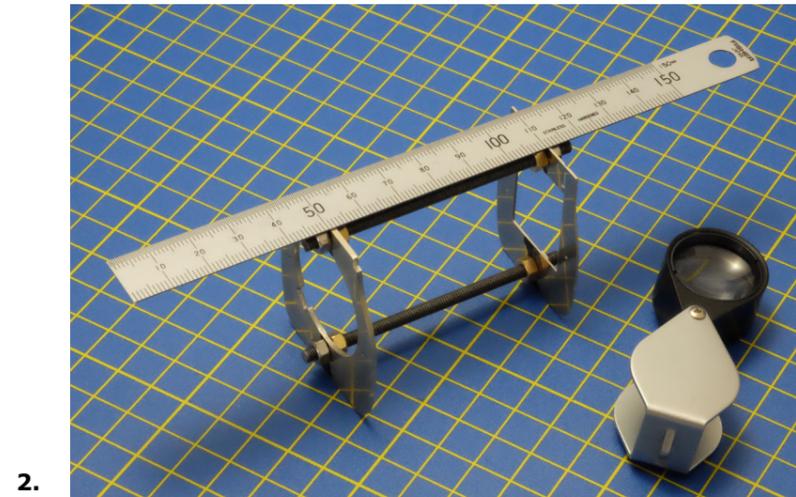
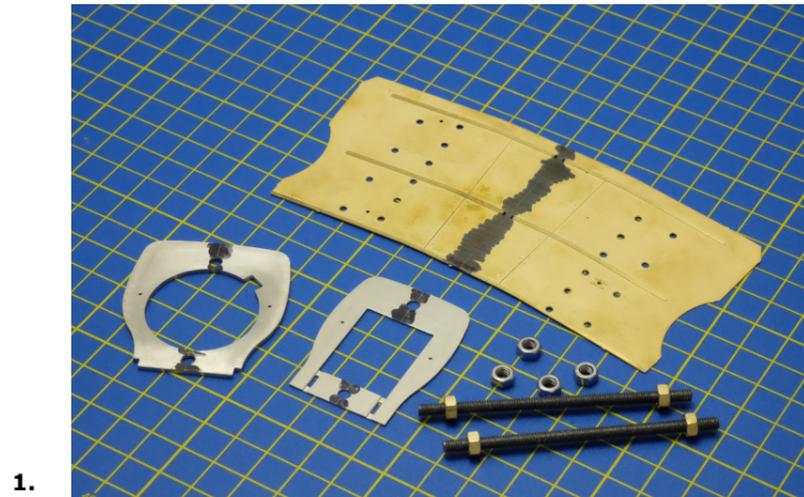
**Photo 6.** Tack the outside of the firebox at the centre and corners, both front and rear. Again, take care and check that the centres retain the alignment that we've worked so hard to achieve. Now work down the spacers alternating tacks left/right and front/rear to even out any expansion of the wrapper. Finally run the seams round at both ends.

With the wrapper now firmly attached to the spacers, the stainless steel nuts can be undone and the studs spun out.

Run an extra fillet of solder into the internal front shoulders of the firebox to support the area which will be filed back. The brass nuts can be heated and removed. Remove the rear scrap section of the spacer.

The base, front and rear are now rubbed down on a sanding board to keep them flat, this will remove the cusps from the wrapper and leave the firebox ready for the final shaping and fitting to the rest of the loco. Round the front edges of the firebox with a file referring to photographs for the correct shape.

Fold the firebox band joining brackets (SB25) into a 'L' shape so that they fit through the slots in the firebox top and solder in place from inside. Complete with a short piece of 0.45 mm wire to represent the tightening bolt.



## B4 BELPAIRE BOILER & FINAL DETAILING

**Boiler.** If you are not fitting top feed remove the boiler wrapper from boiler and round top firebox wrapper (SB1) by cutting behind the rearmost boiler band. This will form the boiler wrapper. Emboss rivets as needed on the boiler wrapper with top feed (SB20) on the dome boiler band and top feed band.

Form the boiler by rolling the appropriate wrapper. Ensure that the fit is correct over the boiler front and rear formers (SB2 & SB3). Solder a 6BA nut over the hole in the centre of the front former to allow the smokebox to be screw fixed to the boiler.

Bend the boiler band joining brackets on the boiler joining strip (SB4) and fit through the small slots from inside the boiler. If the fit is good and the formers fit, then solder the wrapper ends together with the boiler joining strip. The formers are now soldered in place flush with the back and front of the boiler section with the notch on the top of the rear former in line with the mid line of the wrapper. Solder two short pieces of 0.8mm wire into the two holes in the rear former to locate the boiler and firebox.

**Smokebox.** On the smokebox front former (SB8) either emboss all the rivets as on some engines in later years or just the two either side. One of the half etched holes marks the position of the steam lance cock fitted in later years. Drill out this hole if required. Emboss the lamp bracket rivets on the smoke box wrapper, no rivets or riveted (SB10 or SB11)

Fold the smokebox base (SB7) into an inverted tray and solder a 6BA nut over the hole for the body fixing screw. Solder the smokebox front and rear formers (SB8 & SB9) to the smokebox base with their lower edges flush with the bottom of the base. Roll the appropriate smoke box wrapper to shape and solder in place with its edges flush with the front and back formers. Screw the smokebox to the boiler with the smokebox rear overlay and the smokebox and boiler ring (SB12 & SB13) sandwiched between. The rear plate protrudes slightly and the smokebox and boiler ring was originally polished brass. This can be achieved by putting it on the mandrel of a mini drill and polishing with 'Brasso'. These parts can be assembled after painting is complete.

If you have fitted top feed form the pipes from 1.4mm wire.

No.	Description	Sheet	No.	Description	Sheet
SB1	Boiler and round top firebox wrapper	3	SB11	Smokebox wrapper with rivets	3
SB2	Boiler front former	1	SB12	Smokebox rear overlay	1
SB3	Boiler rear former	1	SB13	Smokebox and boiler ring	1
SB4	Boiler jointing strip	2	SB14	Angle between firebox and cab	3
SB7	Smokebox base	3	SB15	Smokebox lamp bracket	2
SB8	Smokebox front former	1	SB16	Step on smokebox front	2
SB9	Smokebox rear former	1	SB17	Step left side of smokebox	2
SB10	Smokebox wrapper no rivets	3			

Fix handrail knobs, short on the smokebox sides, medium on the boiler. Form the handrail to shape, thread on the front medium knob, and fix the handrail in place. Emboss the rivets on the firebox mounting brackets (U31), visible in later years, and fix in place (see page 7).

Fit the inside of the dome (WM7) and the safety valve base (WM8) ensuring that both are vertical. Polish and fit the dome (BR12) and the dome lubricator (BR13). Fit the safety valves (BR14) to the top of the safety valve base. Polish and fit the safety valve casing (BR28).

Fit the smokebox door (WM9). Fit the smokebox handles (BR16). Fit the smokebox pipe cover (WM12) on the right hand side of the smokebox. Fit the steam lance cock (BR16).

Use the drawing of the cab interior to assemble the backhead and the cab interior detail. Use copper wire of a suitable size for the pipes. Solder the backhead to the cab floor to make a removable unit.

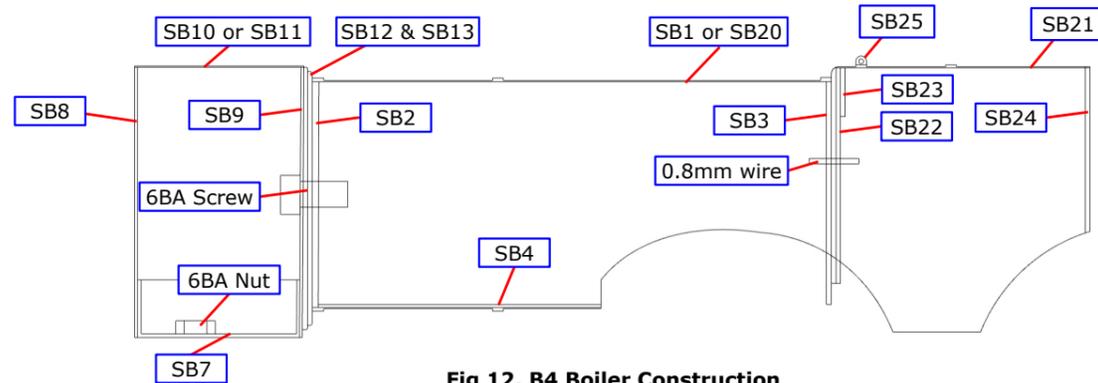


Fig 12. B4 Boiler Construction

**Fitting and Finishing.** The boiler now needs careful fitting to the splasher tops by filing back the splashers as needed. Check the clearance between the boiler and the driving wheels. When you are satisfied, screw the boiler to the footplate using the body fixing screw at the front and a 6BA screw and nut through the holes in the firebox and cab front. Make sure that all is aligned correctly, with the boiler horizontal before soldering the boiler and firebox to the splasher tops. Fit the angle between firebox and cab (SB14) to represent the angle between the firebox and the cab front.

Solder the lamp bracket (SB15) through the slot in the smokebox. Emboss the hinge rivets on the cylinder cover (U33) and solder in place on the footplate at the front of the smokebox. Detail the smokebox by adding the step on the smokebox front (SB16) and the step on the left side of the smokebox (SB17) if appropriate. Fit the chimney (BR11). Fit the smokebox pipe cover (WM12) to the right hand side of the smokebox.

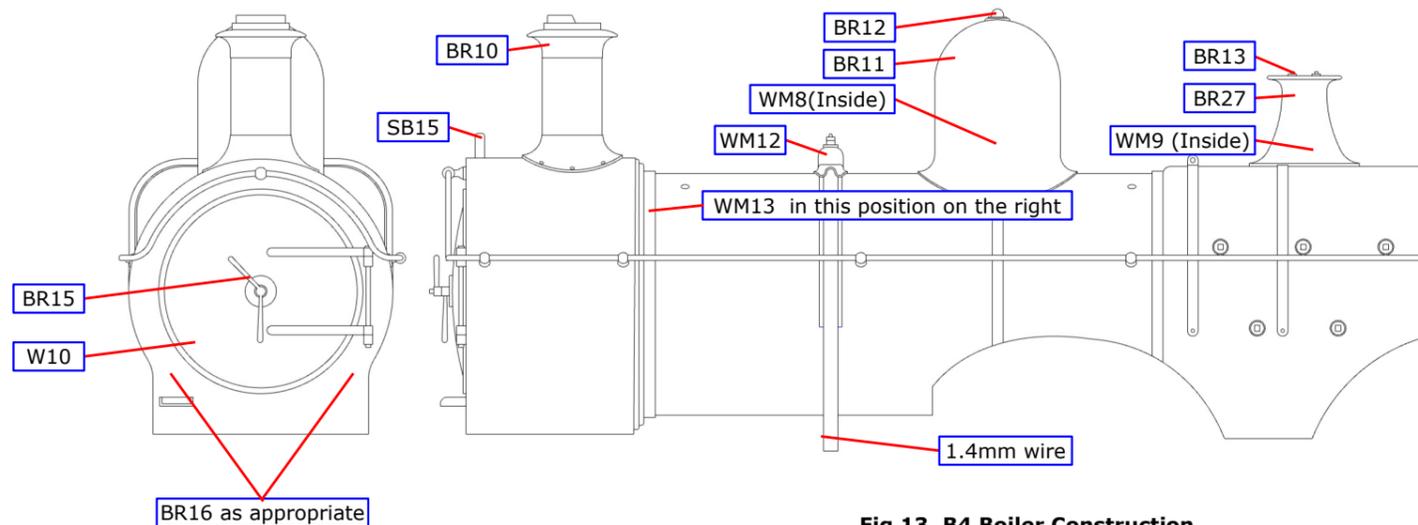


Fig 13. B4 Boiler Construction

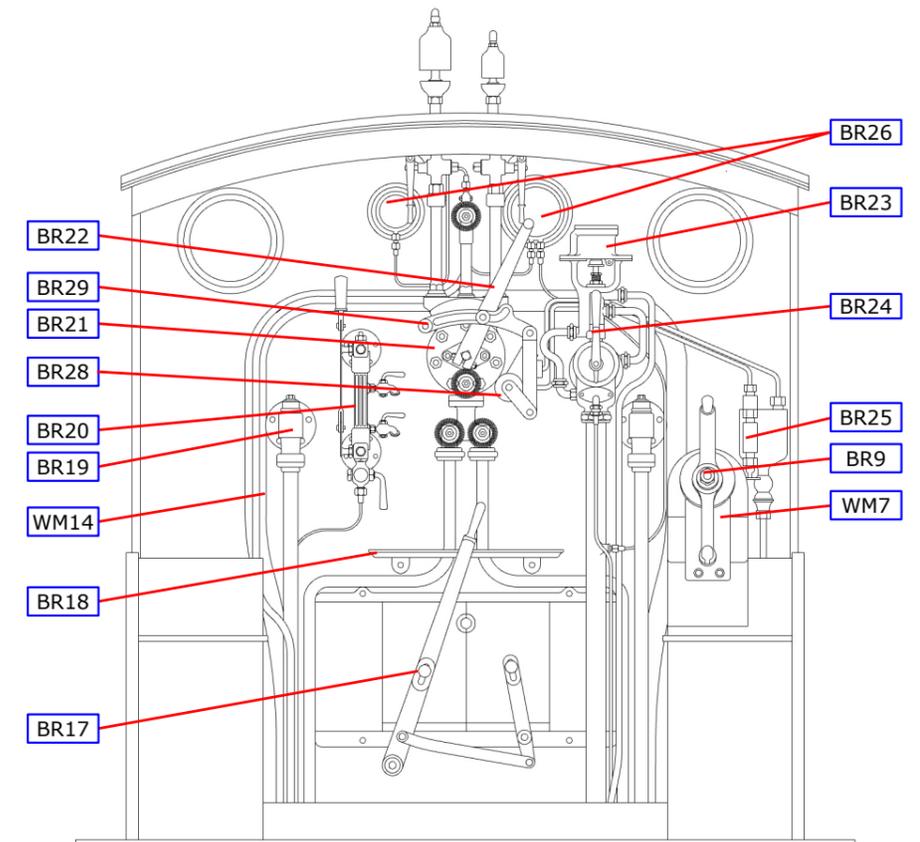
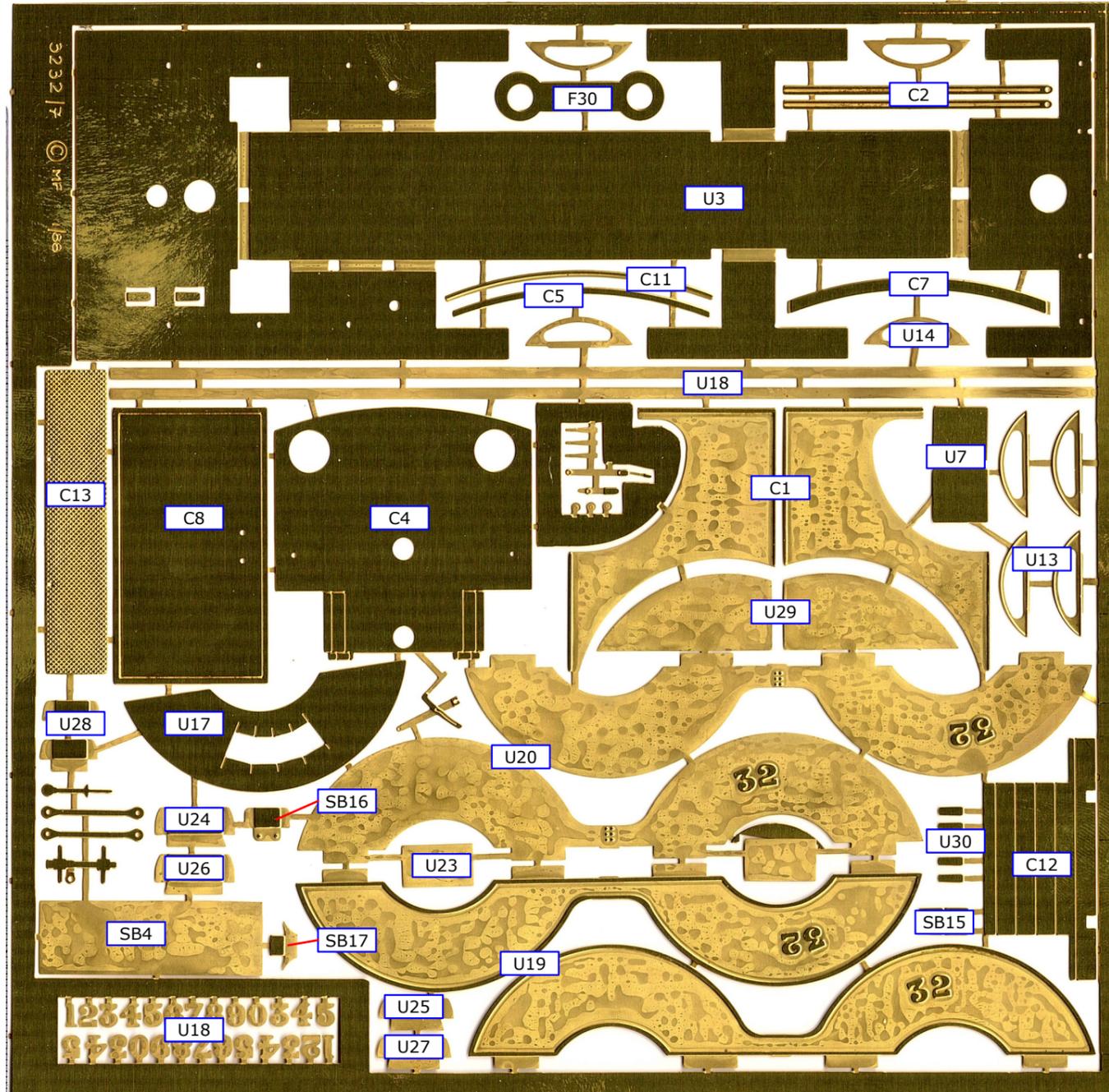


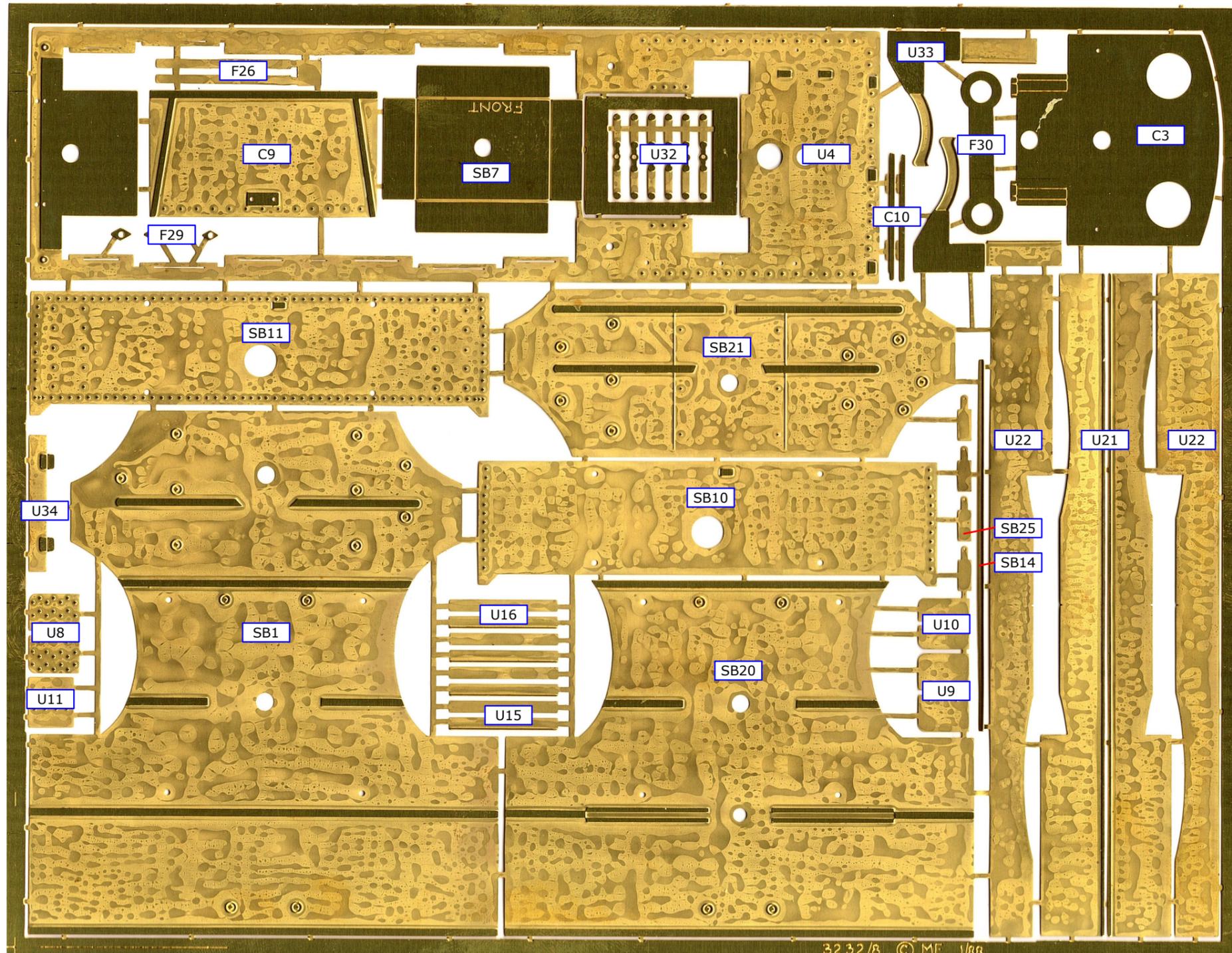
Fig 14. Cab with B4 Belpaire Boiler



ETCH SHEET 2



ETCH SHEET 3



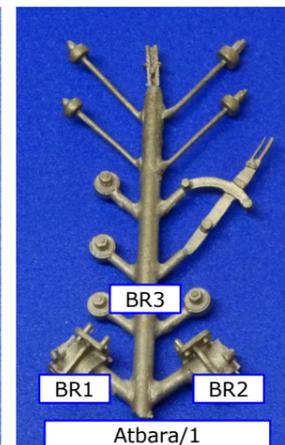
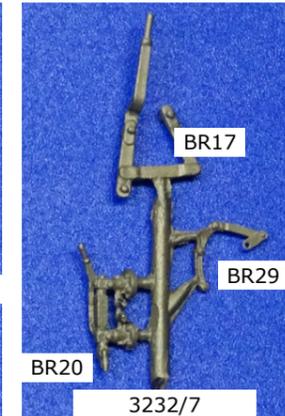
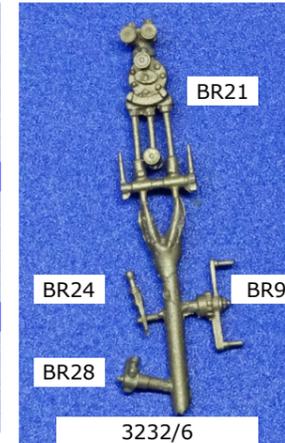
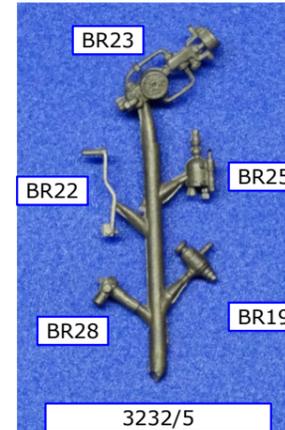
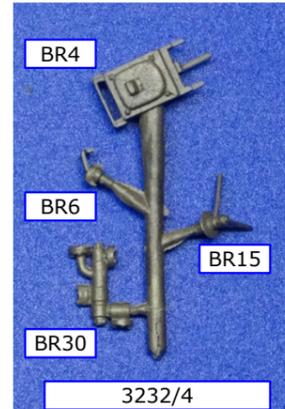
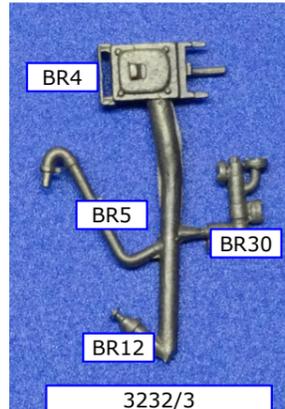
## CASTINGS

### BRASS CASTINGS

CU1	Parallel chimney	Atbara/2
BR1	Left steam brake cylinder	Atbara/1
BR2	Right steam brake cylinder	Atbara/1
BR3	Leading axle spring damper (4)	Atbara/1
BR4	Leading axle box (2)	3232/3
BR5	Vacuum pipe	3232/3
BR6	Vacuum pipe dummy	2251
BR7	Large whistle	47xx/8
BR8	Small whistle	47xx/8
BR9	Screw reverse handle	3232/6

BR10	Chimney (parallel)
BR11	Dome
BR12	Dome lubricator
BR13	Safety valves (2)
BR14	Round top firebox safety valve casing
BR15	Smokebox door handles
BR16	Steam lance cock
BR17	Firebox door handle
BR18	Backhead shelf
BR19	Clackbox
BR20	Water gauge

3232/1	BR21	Regulator mounting	3232/6
3232/2	BR22	Regulator handle	3232/5
3232/3	BR23	Combined ejector/brake	3232/5
Details/1	BR24	Combined ejector/brake handle	3232/6
Duke/6	BR25	Sightfeed lubricator	3232/5
3232/4	BR26	Cab pressure gauges	47xx/8
Duke/3	BR27	Belpaire firebox safety valve casing	1854/2
3232/7	BR28	Jockey valve	3232/5&6
Details/1	BR29	Linkage between jockey valve & regulator	3232/7
3232/5	BR30	Injector (2)	3232/3&4
3232/7			



### OTHER COMPONENTS

3/16" bore bearing - (6)  
 3/16" brass tube - for leading axle - (2)  
 6BA x 1" Cheese head screw (1)  
 6BA x 5/16" Cheese head screw (2)  
 6BA nuts (3)  
 Short handrail knobs (12)  
 Medium handrail knob (1)  
 Variable length handrail knob & flange (4)  
 Vacuum pipe hose  
 4mm studding and nuts for firebox assembly

1/8" brass wire for compensation beam pivot  
 5/32" brass tube for compensation beams  
 Steel wire 1.6 mm Steel wire 1.6 mm for front compensation beam  
 Brass wire 0.45 mm for fallplate hinges and cab side handrails  
 Brass wire 0.8 mm for brake hanger pivots and handrails  
 Brass wire 1.2 mm for vacuum pipe & sand pipes  
 Brass wire 1.4mm  
 Copper wire 1.0 mm & 1.5 mm for backhead pipes  
 Note. Screws may be supplied over-length and may require cutting to length.

**DUE TO SUPPLY ISSUES, SOME PARTS MIGHT BE SUPPLIED AS WHITE METAL**

### WHITE METAL CASTINGS

WM1	4	Brake shoe
WM2	2	Leading axle spring
WM3	2	Sandbox below footplate
WM4	2	Sandbox
WM5	2	Dean taper buffer
WM6	2	Splasher extension
WM7	1	Screw reverser
WM8	1	Inner of dome
WM9	1	Safety valve base
WM10	1	Smokebox door, early type with ring
WM11	1	Round top firebox backhead
WM12	1	Top feed
WM13	1	Smokebox pipe cover
WM14	1	Belpaire firebox backhead

