Brassmasters Scale Models

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GREAT WESTERN RAILWAY

STELLA 2-4-0
LOCOMOTIVE KIT

Designed by Martin Finney

4MM SCALE
OO - EM - P4

INSTRUCTIONS AND
PROTOTYPE NOTES

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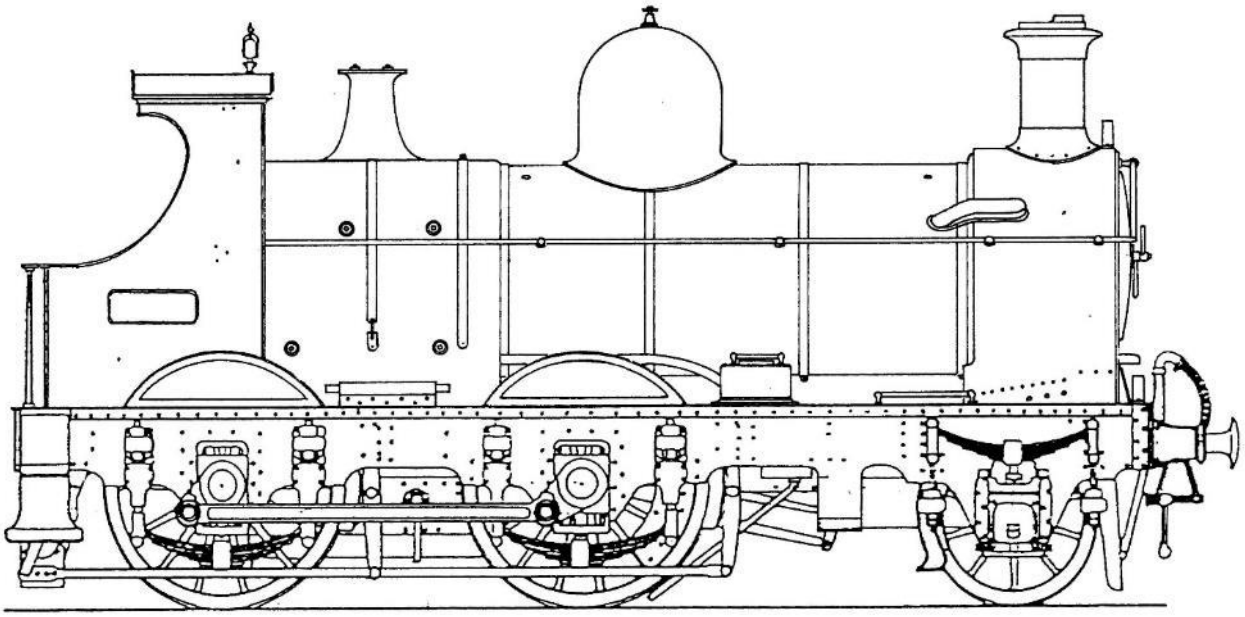


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SECTION 1: BRIEF HISTORICAL DETAILS

In the period 1884-87 Dean carried out an interesting standardisation scheme involving four classes of engine, passenger, 2-4-0, tender and tank and goods, 0-6-0, tender and tank. All had identical cylinders and motion, double frames of a neat and attractive design and coupled wheels of the same size with springs hung underneath the axles. The subjects of this kit are the 2-4-0 passenger engines.

The locomotives were built as follows:

Lot	Numbers	Built	Original condition	Date rebuilt as standard gauge tender
65	3201-3205	1884-85	standard gauge tender	-
64	3501-3510	1885	broad gauge tank	1892
64	3511-3520	1885	standard gauge tank	1894-1895

Hence, from 1895 there were 25 basically similar 2-4-0 tender engines with however significant differences depending on their origin which I have tried to accommodate in the design of the kit. As is usual for Great Western engines the most obvious variation is in boilers. S2 boilers were fitted until the S4 and B4 boilers included in the kit were used from around the turn of the century. For a detailed history of this class, including details of boiler changes, Part Four of 'The Locomotives of the Great Western Railway' published by the R.T.C.S. is essential reading. So, from this kit any of the class can be built from circa 1900 to 1933.

In designing the kit I have used the following Swindon Drawings:

16937	10/1900	Lot 65 Standard boiler No.3 in lot 65 frames
61305		Diagrams E, O & Y Maximum cross section
11385	1885	Lot 67 Arrangement of boiler mountings (2361 class)
114761	4/1940	General arrangement- Dean Goods (2301 class)
11532	8/1940	Arrangement of motion-1700, 2301, 2700 classes

G.W.Engines - Vol 1 by J.H.Russell on pages 151 - 156 has some useful photographs to which I shall refer.

Cabs

The cab sides of Lot 65 had a very large cut-out whereas the new cabs of the rebuilt engines had a smaller cut-out which gave more protection to the crew. With the fitting of Belpaire fireboxes the cabs were raised to allow the spectacle windows to be refitted. Cab roofs were latterly of steel replacing the earlier canvas covered wood.

Tenders

3201-3205 were initially fitted with standard Dean 2500 gallon tenders.
3510-3520 when rebuilt seem to have been given old iron frame Armstrong tenders. From the early years of the century many were paired with Dean 2000 gallon tender originally fitted to 'Dukes' and indeed some kept such tenders until withdrawal. In later years the majority had the Dean 2500 gallon type and at least one (3515) had a tender of 3000 gallons capacity.

Other Variations/Modifications

Steps: many different arrangements, determined by the origin of the engine.

Smokebox: Latterly many acquired new/overhauled smokeboxes with snaphead rivets and some Churchward type smokebox doors without the ring.

Frame patches: fitted to many in later years.

Firebox side brackets were fitted with a cover on some engines in later years.

Lower front wheel splasher: removed around the time of the Great War.

Coupling rods: originally plain but some engines subsequently fitted with fluted rods.

SECTION 2: CHASSIS DETAILS

Note that many of the components for both chassis and body are handed left/right and care must be taken to ensure the correct component is used. I have not always identified left/right components separately but with care and common sense no problems should arise.

Before construction can commence you have to decide which chassis you are going to construct. The options are:

1. Gauge 00, EM or 18.83.
2. Suspension None, sprung, compensated.
3. Pick-ups Scraper, plunger or the 'American' system.
4. Whether you wish to fit the working inside motion.

No pick-up material is provided. The options are:

- Scrapers attached to printed circuit board fixed between the frames.
- Plunger - drill holes P and fit according to the manufacturer's instructions.
- The 'American' system with the wheels on the loco are shorted out on one side and the tender on the other. Bill Bedford produces some etched shorting strips which work well. The drawbar between the loco and tender can be used to carry the current.

The working inside motion can only be fitted to the EM & 18.83 versions of the chassis,

It is not possible to use plunger pickups with the working inside motion because they will foul one another.

SECTION 3: FRAMES

Having decided which chassis to construct you can now start construction by preparing the frames (parts 1 & 2). For a rigid chassis open out the main axle holes to accept 1/8" and 2mm top hat bushes (not provided) and solder them in place. If you are going to fit sprung horn blocks, you should remove the axle holes by cutting up the half-etched lines, leaving a standard 6mm wide slot and then follow the manufacturer's instructions.

To construct the kit as designed with a compensated chassis first remove all the axle holes as described above. Carefully widen the slot in the rear hornblocks (part 11) until the Flexichas bearings are a good fit. I find a significant variation in the bearings and once I have fitted a hornblock to a bearing I mark the bearing and hornblock so that they can be later assembled together. A good fit between hornblock and bearing is essential if the chassis is to run well.

Solder the rear hornblocks (part 11) and leading axle hornblocks (part 13) to the inside of the frames aligning them with the half-etched lines on the frames. The square bearings mean that they do not rotate.

Now open out the following holes in the frames:

B for brake hanger pivots - 0.45mm
R for reversing shaft - 0.9mm
A for compensation beam pivot - 1/16"

Fold the ash pan sides along the half-etched lines.

The last job on the frames is to emboss the rivets marked by the half-etched holes as shown in the diagram. This is done by using either a special rivet embossing tool or by placing the frame on a sheet of lead or thick polythene sheet and carefully embossing the rivet with a scriber.

SECTION 4: FRAME SPACERS AND ASSEMBLING THE CHASSIS

Fold down the small tabs on the front frame spacer (part 9) and solder the 0.8mm steel wire front compensation beam in place.

Fold up parts 7 & 9 making sure the half-etched fold lines are on the inside and that each bend is a right angle. Check that all tabs on the spacers fit properly in their corresponding chassis slots so that the rest of 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. Check that everything is square and that the spacers are hard against the frames. Put an axle (or better, a longer piece of 1/8" rod) 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 checking constantly that the chassis is square and the frames are straight.

SECTION 5: 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 the crankpin holes to a convenient size which is well undersize for the crankpins. Now drill the drill used for the crankpin holes into a small block of wood and leave the drill in the wood with its shank projecting. This projecting shank is used as a mandrill to accurately align the laminations of each rod.

Tin well the front face of the inner laminates and the rear face of the outer laminates and place them over the mandrill. Using plenty of solder and flux solder the two laminates together. 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.

The crankpin holes now need carefully opening out until they just fit, with no free play, the ends of the hornblock alignment jigs (available from London Road Models or Markits).

SECTION 6: FITTING THE FLEXICHAS HORNBLOCKS

Prepare the remaining bearings and front coupled axle hornblocks (part 12) as described in section 3 and slide them over the hornblock alignment jigs with the springs between the bearings. Carefully compress the springs and clip the hornblocks between the frames and place the prepared coupling rods over the ends of the jigs. Solder the hornblocks in place.

Solder 0.45mm wire through frame holes B to form the brake hanger pivots. Fit the guard iron struts (part 6) using 0.45mm wire to represent the bolts and then form the guard irons to shape.

SECTION 7: CHANGING THE PORTESCAP GEARBOX

If you are using a Portescap motor and gearbox, the gearbox side plates will need replacing.

Dis-assembly of the existing gearbox

Remove the two screws which hold the motor to the gearbox and put the motor to one side. Using a 1.7mm drill, countersink the ends of the three brass spacers ensuring that no swarf contacts the gears. Using firm pressure, prise the gear box side plates apart. Note the order of the three gear sets and lift them off their axles, then drift the axles out of the side plates.

Preparing the new side plates (part 26)

Using the diagram, identify the different holes and open out as follows:
Spacer centres: 1.5mm (drill size #53)
Gear axle centres: 1.5mm (drill size #53)
Final drive centre: 4mm

On one side plate, open motor mounting holes to clear the motor mounting screws. On the other side plate carefully open holes enough to enable the steel screws to self-tap a thread. Using a piece of fine emery paper remove all burrs from the side plates, then solder the 1/8" bearings (removed from the old side plates) into the final drive holes ensuring that the side plates present two mirror images.

Reassembly
Place the three brass spacers into their corresponding holes in one of the new side plates. Insert the three axles into their respective holes. The axles should be a tight fit, if not use a small drop of Superglue to locate one end of the axle only, then fit the second side plate temporarily in place to align the axles while the Superglue dries. Place the gear sets back onto their axles and fit the second side plate. Lightly centre punch the spacers to retain them. Attach the motor to the gearbox using the old steel screws.

SECTION 8: FITTING THE COMPENSATION BEAMS

Cut a piece of 1/16" brass rod so that it fits through the holes A and is flush with the outside face of the chassis frames. Cut two pieces, equal in length, of 1/16" bore tube and solder the compensation beams (part 15) to them close to one end. Modify the flexichas bearings on all the axles as shown in the diagram and temporarily fit the beams.

Temporarily fit all the wheels and axles and confirm that the compensation works properly and check that the chassis is sitting level.

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

SECTION 9: OUTSIDE CRANKS AND MECHANICAL TEST

The outside cranks are made from a triple lamination as shown in the diagram. Open the large holes in part 16 to 2.6mm so that the shoulder on the end of the axle is a tight fit. Solder the three laminations together using the 2.6mm drill to align them accurately then open up (0.8mm) and countersink the crankpin hole and solder in the crankpin.

Fold up part 14 and solder in place in the outside frames so that they are flush at the back. Fold up the outside frame axle boxes (part 39), place part 40 in place and solder together. Open out the axle holes to be a sloppy fit on the axle and check that they are an easy fit in the hornguides and ease if necessary. These axle boxes are simply cosmetic.

Permanently fix the wheels to the axles, not forgetting the gearbox on the rear axle, ensuring that the axles extend equally on each side. Place the outside axle boxes on the axles. Solder both the outside cranks to the axles along one side of the locomotive. (The outside crank on the crank axle is at 180o to the inside crank). Solder the other crank to the leading axle at 90o to the first crank with the right hand crank leading. Attach the second rear crank using "Loctite". This allows the crank to be adjusted whilst holding it firmly enough to allow the chassis to be tested.

Attach the coupling rods. Turn the wheels slowly and if any tight spots occur adjust the crank on the rear axle until they run smoothly. Solder the crank to the rear axle. Now connect the motor to your pickups and test run.

SECTION 10: BUFFER BEAM, DRAG BEAM, BRAKE HANGERS AND OUTSIDE FRAMES

Solder the outside frame spacers (part 10) in place.

Emboss the rivets on the buffer beam (part 21) and drag beam (part 41) and attach the rubbing plates (part 42). Solder them to the frames locating the frames in the appropriate half-etched slots. Their upper edge must be .012" above the upper edge of the frames so that they will be flush with the footplate when it is fitted. Any piece of .012" material placed on top of the frames will help ensure correct alignment

Attach the rivet strips (part 43) to top of outside frames and solder the underhung spring hangers (part B4) in place. Align the top of the outside frames with the buffer beam and drag beam and tack solder in place. Fit the axles and outside frame axleboxes and ensure the axles move freely. When satisfied, solder the outside frames to the spacers. Fold angle brackets (part 44) at right angles along the etched line and attach between frames and buffer beam.

Fold up steps and attach to frames and form and fit the vacuum pipe (0.7mm wire) to the left side retaining it with the clips attached to the lower edge of the rivet strip.

Assemble the brake hangers and shoes (parts 58 & 22) using 0.45mm wire. Attach the brake hangers to the pivots already fitted and check alignment carefully ensuring no contact with the wheel treads.

SECTION 11: FINISHING THE CHASSIS

Fix the steam brake cylinders (parts W12 & W13) and sandboxes (part W9) to the frames. Fix the balance weights (parts 23 & 24) in position using photographs as a guide.

The axles are now retained in the hornblocks by using the springs for the leading axle (parts 19 & 20) and for the front coupled axle (parts 17 & 18) and by a piece of 0.45mm wire for the rear axle.

Emboss the rivets in each brake pull rod (parts 59 & 60) and fit them in place. Form and fit the brake pull rod safety brackets (part 61) through the small slots in the ashpan sides and under the pull rods.

Complete the chassis detailing with sand pipes (0.45mm wire), part 57 (if appropriate), centre lamp bracket (on bufferbeam), coupling hook and pocket (parts 25 & 45) and the remaining castings - buffers, vacuum pipe, leading springs, leading axleboxes and underhung springs.

SECTION 12: FOOTPLATE

Fold the edges of the footplate (part 64) at right angles and fold up the top of the reversing lever. Prepare the footplate overlay (part 41) by embossing the rivets under the lamp brackets and temporarily join to the footplate with a screw through the body fixing holes at the front and rear. Now solder together all round and then file the footplate overlay in the splasher openings flush with the edges of the footplate.

Solder the splasher fronts (part 66) in place so that their lower edge is flush with the lower edge of the footplate. If you are building in EM or 18.83 then the rear splasher tops (part 68) inside the cab can be reduced in width, so improving the appearance inside the cab. Curve the splasher tops (parts 67 & 68) to shape by rolling underneath a suitable rod or dowel on a piece of rubber sheet and then solder in place. Solder the splasher backs (part 69), rear body fixing nut, footplate handrails and lamp brackets (use photographs for position) in place.

SECTION 13: FIREBOX & BOILER

B4 BOILER - BELPAIRE FIREBOX

Solder together the two laminations of the firebox front (part 29). The firebox front and rear (part 30) must now be spaced apart by using suitable long bolts and washers through the pairs of holes in both front and rear. I use some old brass chassis spacers joined together with studding. When correctly spaced apart (21.25mm outside) the front will fit in the half-etched recess in the footplate and the cab front (pegged to the firebox rear with 0.45mm wire) will fit in the half-etched slot in the footplate. File a little from the lower edge of the firebox rear former so that it rests in front of this slot.

Emboss the rivets for the ends of the cladding fixing bands on the firebox wrapper (part 105). In pencil mark the wrapper centre on its inside and outside. Using the notch in the top of the formers as a guide centre the wrapper and mark in pencil the position of the top bends. Form the bends over a suitable rod held in a vice. When happy with the forming solder the wrapper to the formers ensuring a large fillet of solder around the front join. Check the fit on the footplate, remove the temporary spacers and cut away the centre of the front and rear held on by the half-etched tags to give clearance for the motor/gearbox. Round the front edges and corners of the firebox with a file using photographs as a guide. Fold the firebox band joining clips (part 109) by bending near the small hole, solder in place from inside and complete with a short piece of 0.3mm wire to represent the tightening bolt. Solder the washout plugs in place (parts 106).

Remove the boiler from part 102 by cutting behind the rearmost boiler band. This is easily done with a sharp knife on a hard surface. Emboss the rivets on the dome boiler band. If you wish to fit the separate washout plugs (part 104) then drill out the half-etched ones before forming the boiler by rolling. Check for fit around the formers (parts 31 & 32). Bend the boiler band joining clips on part 103 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 part 70 and fit the formers so that they are almost flush with the ends. The cut-outs in the formers are to clear part 103 and the etched notch at the top of the rear former must align accurately with the small slot in the wrapper. Solder two short pieces of 0.45mm wire into the holes in the rear former to act as dowels to locate the boiler with the firebox. Check the boiler/firebox fit. Represent the bolts in the joining clips using 0.3mm wire.

S4 BOILER - ROUND TOP FIREBOX

This follows in a similar way as the Belpaire firebox except that boiler and firebox are in one piece and there is no need to use spacers between the firebox formers.

SECTION 14: SMOKEBOX

Fold the smokebox base (part 93) into an inverted tray and solder a 10 BA nut over the hole for the body fixing screw. Early fireboxes have a square front edge whilst later they have a pressed front plate giving a rounded edge. The position of the smoke box door also changed. All smokebox variations are possible with the components supplied.

For a square front edge, use part 94 to the front of the base and for a rounded front edge use part 94 or 95. Emboss the four rivets on the front former and drill through the hole for the steam lance cock if needed. Solder the appropriate front former and rear former (part 96) to the base. Roll the smokebox wrapper (part 97 or 98) to shape and solder in place with its edges flush with the front and back formers.

Round the edge of the second rear former (part 96) and solder to the rear and do the same for the front if appropriate.

If you have fitted inside motion, remove the section between the half-etched lines on the lower edge of the smokebox rear so that it will fit over the cylinder front.

Now similarly round the edge of part 33. Tap the hole in part 32 to 10BA and open out the holes in parts 33 & 96 to clear 10BA so that the smokebox and boiler can be screwed together. Now check fit the boiler/smokebox to the firebox. Remember the bottom of the boiler is horizontal and so parallel to the footplate. When happy with the alignment solder the boiler/smokebox to the firebox and solder the firebox to the footplate.

The firebox side bracket (part 35) or covers (part 36) visible in later years are soldered in place on the firebox sides between the splashers. Fit the reversing lever (part 70) locating it in the slot in the firebox front. Solder the smokebox lamp bracket (part 91), Cylinder cover flap (part 99) and steps (parts 100 & 101) in place. Solder four small knobs in the holes in the smokebox and four medium knobs in the boiler holes. Form the handrail to shape, thread on the front medium knob, and fix the handrail in place checking its location in the holes in the cab front.

SECTION 15: CAB

Emboss the rivets in the cab front (part 72 or 71) and solder in place. Reduce the height of the cab sides to match the cab front if you have built a round top firebox. Attach the cab cut-out beading (part 75), to the cab sides (part 73 or 74) fitting the etched groove over the edge of the cab side. Form and fit the cab side handrails from 0.3mm wire. Assemble the cab seats (part 89 & 90), fitted to some of the class in later years, which are designed to be working. Now remove the seat from the bracket and solder the bracket to the inside of the cab side. Solder the cab sides in position and attach the rear handrails.

Solder part 85 or 86 between the rear edges of the cab sides ensuring the cab roof line will be horizontal. Curve the cab roof (part 76, 77, 78 or 79), solder in place and detail according to the diagrams.

Slightly curve the fall plate (part 88) and hinge to the footplate as shown in the diagram.

SECTION 16: FINAL DETAILING

Attach all the remaining castings using the drawings and photographs as a guide to position.

Using the drawing of the cab interior the backhead can be assembled and the cab interior detailed. Use copper wire of a suitable size for the pipes. Solder the backhead to the cab floor so that they become a removable unit. When removed the gearbox passes through the opening in the cab front to allow the body to be removed from the chassis.

I hope, like me, you enjoy the challenge of building your 'Stella'.

Best wishes

Martin Finney
January 1991

If you have any problem with the kit or any criticisms or suggestions please feel free to contact Brassmasters.

COMPONENT DESCRIPTION - 0.018" BRASS

1 Inside frame - Left
2 Inside frame - Right
3 Outside frame - Left
4 Outside frame - Right
5 Outside frame strengthening plate - (2)
6 Guard iron strut - (2)
7 Frame spacer - Rear
8 Frame spacer - Firebox front
9 Frame spacer - Front
10 Outside frame spacer - (4)
11 Hornblocks - Rear coupled axle - (2)
12 Hornblocks - Front coupled axle - (2)
13 Hornblocks - Leading axle - (2)
14 Hornguides - outside frame - (4)
15 Compensation beam - (2)
16 Outside crank - (12)
17 Spring - Front coupled axle - middle lamination - (2
18 Spring - Front coupled axle - outer lamination - (4)
19 Spring - Leading axle - middle lamination - (2)
20 Spring - Leading axle - outer lamination - (4)
21 Buffer beam
22 Brake shoe - (4)
23 Balance weight - front - (2)
24 Balance weight - rear - (2)
25 Coupling hook
26 Portescap gearbox side - (2)
27 Firebox front - Round top
28 Firebox rear - Round top
29 Firebox front - Belpaire - (2)
30 Firebox rear - Belpaire
31 Boiler former rear
32 Boiler former front
33 Smokebox/Boiler ring
34 Cab pressure gauge - (3)
35 Firebox side bracket - (2)
36 Firebox side bracket cover - (2)
37 Washer - 1/8"
38 Washer - 2mm

COMPONENT DESCRIPTION - 0.012" BRASS

39 Outside frame axlebox - (4)
40 Outside frame axlebox - front - (4)
41 Drag beam
42 Drag beam buffer rubbing plate - (2)
43 Outside frame rivet strip - (2)
44 Angle bracket - frame to bufferbeam - (2)
45 Coupling hook pocket
46 Vacuum pipe union - (4)
47 Step - front - 3511-20 - (2)
48 Stay - front step - 3511-20 - (2)
49 Step tread - front - (2)
50 Step - rear - 3201-5 3501-10 - (2)
51 Step - rear - 3511-20 - (2)
52 Step tread - rear - upper - 3201-5 3501-10 - (2)
53 Step tread - rear - upper - 3511-20 - (2)

COMPONENT DESCRIPTION - 0.012" BRASS (cont'd)

54 Step tread - rear - lower - 3201-5 3501-10 - (2)
55 Step tread - rear - lower - 3511-20 - (2)
56 Step tread - adjacent leading axlebox - (2)
57 Splasher - leading wheels - below footplate - (2)
58 Brake hanger - (8)
59 Brake pull rod - outer - (2)
60 Brake pull rod - inner - (2)
61 Brake pull rod safety bracket - (2)
62 Drawbar
63 Coupling
64 Footplate
65 Footplate overlay
66 Splasher front - (2)
67 Splasher top - front - (2)
68 Splasher top - rear - (2)
69 Splasher back - (4)
70 Reversing lever
71 Cab front - round top firebox
72 Cab front - Belpaire firebox
73 Cab side - 3201-5 - (2)
74 Cab side - 3501-20 - (2)
75 Cab side - cut-out beading - (2)
76 Cab roof - steel - 3201-5
77 Cab roof - steel - 3501-20
78 Cab roof - steel - rear angle
79 Cab roof - steel - rainstrip - (2)
80 Cab roof - canvas covered wood - 3201-5
81 Cab roof - canvas covered wood - 3501-20
82 Canvas covered roof - side moulding --(2)
83 Canvas covered roof - front/rear moulding - (2)
84 Canvas covered roof - transverse strip
85 Support - rear of cab roof - round top firebox
86 Support - rear of cab roof - Belpaire firebox
87 Cab floor
88 Fall plate
89 Cab seat bracket - (2)
90 Cab seat - (2)
91 Lamp bracket - (3)
92 Lamp bracket - buffer beam
93 Smokebox base
94 Smokebox front - early
95 Smokebox front - later
96 Smokebox rear - (2)
97 Smokebox wrapper - flush rivets
98 Smokebox wrapper - snaphead rivets
99 Cylinder cover flap
100 Smokebox step - front
101 Smokebox step - side
102 Boiler/round top firebox wrapper
103 Boiler jointing strip
104 Washout plugs - boiler - (4)
105 Firebox wrapper - Belpaire firebox
106 Washout plugs - Belpaire firebox - (4)
107 Washout plugs - round top firebox - lower - (4)
108 Washout plugs - round top firebox - upper - (4)

COMPONENT DESCRIPTION - 0.012" BRASS (cont'd)

109 Firebox band joining clip - (6)
110 Backhead shelf
111 Gauge glass lever
112 Brake lever
113 Whistle lever - (2)
114 Washer - 10BA
115 Washer - 2mm
116 Washer - 1/8"

COMPONENT DESCRIPTION - 0.020" NICKEL SILVER

117 Coupling rod - outer laminate - fluted - (2)
118 Coupling rod - inner laminate - fluted - (2)
119 Coupling rod - outer laminate - plain - (2)
120 Coupling rod - inner laminate - plain - (2)

WHITEMETAL CASTINGS

W1 Chimney
W2 Inside of dome
W3 Safety valve base
W4 Safety valve springs - (2)
W5 Dome lubricator
W6 Coupled wheel underhung spring - (4)
W7 Buffer - (2)
W8 Sandbox - (2)
W9 Sandbox below footplate -(2)
W10 Smokebox door - later type

W11 Smokebox door - old type with ring
W12 Steam brake cylinder - left hand
W13 Steam brake cylinder - right hand
W14 Steam lance cock
W15 Backhead - Belpaire firebox
W16 Backhead - round top firebox
W17 Combined ejector/brake
W18 Regulator mounting
W19 Regulator handle
W20 Water gauge
W21 Clackbox - (2)
W22 Lever reverse base
W23 Lever reverse handle
W24 Firebox door handle
W25 Sight feed lubricator
W26 Smokebox pipe cover

BRASS CASTINGS

B1 Dome
B2 Safety valve casing - Belpaire firebox
B3 Safety valve casing - round top firebox
B4 Underhung spring hanger - (8)
B5 Leading spring - (2)
B6 Leading axlebox - (2)
B7 Smokebox door handles
B8 Vacuum pipe

OTHER COMPONENTS

1/8" bore Flexichas bearings - (4)
2mm bore Flexichas bearings - (2)
Crankpins, bushes & nuts - (4)
Brass 10BA C.H. screws - (3)
Brass 10BA nuts - (2)

1/16" brass wire for compensation beam pivot
1/16" inside diameter brass tube for compensation beams
Steel wire - 0.8mm for front compensation beam
Brass wire 0.30 mm for fall plate hinges and cab side handrails
Brass wire 0.45mm for brake hanger pivots and handrails
Brass wire 0.7mm for vacuum pipe
Buffer heads, bushes & springs - (2)
Whistles - (2)
Short handrail knobs - (12)
Medium handrail knobs - (5)

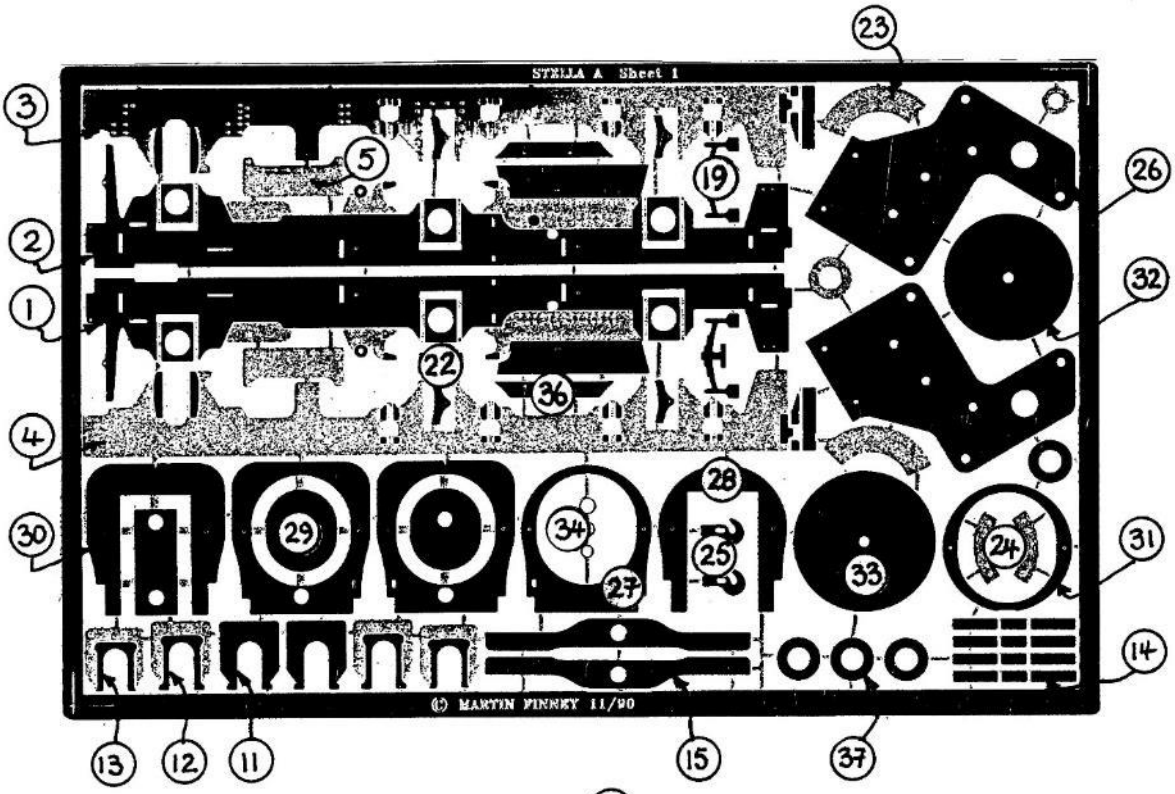
Components not provided

Driving wheels with extended axles
(prototype – 5' 2" diameter 16 spoke outside crank)
- Ultrascale
- Alan Gibson
- Markits

Leading wheels (1 pair)
(prototype -3' 8" diameter 10 spoke)
- Ultrascale
- Alan Gibson
- Markits

Motor and gearbox
- Hi-Level
- Branchlines
- Portescap 1219 (available second hand only)

Suitable pickups


STELLA A Sheet 1
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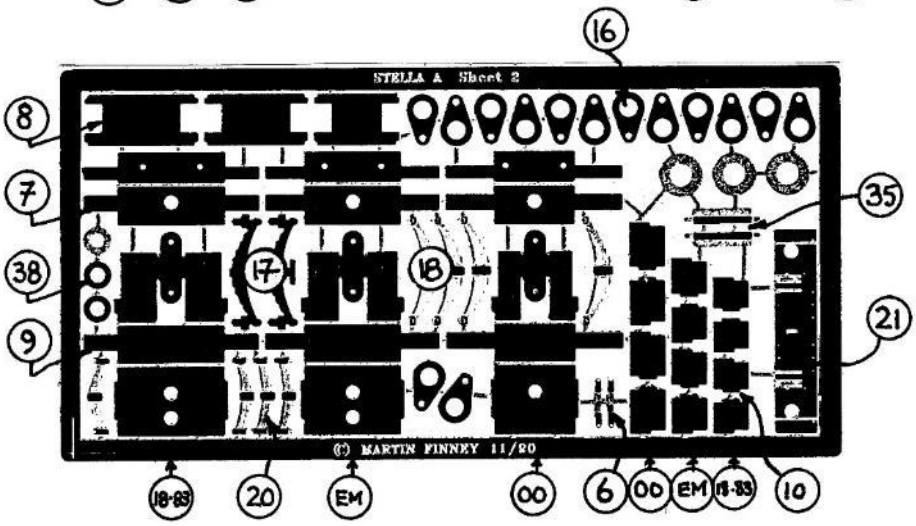
STELLA A Sheet 2
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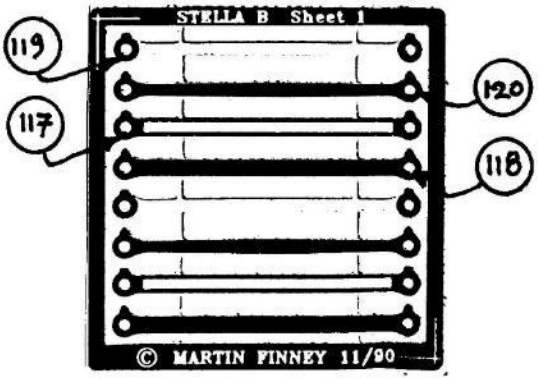
STELLA B Sheet 1
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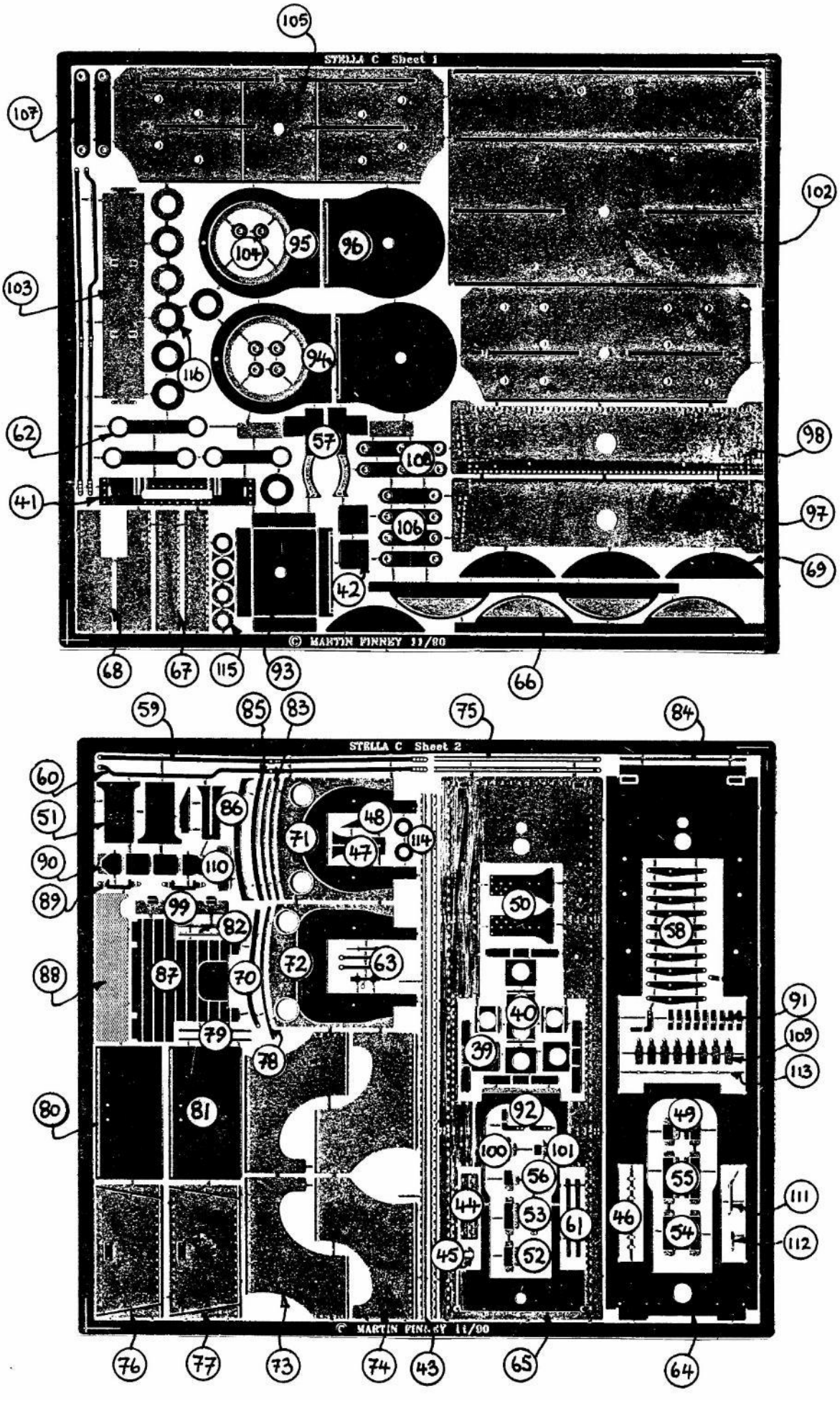
STELLA C Sheet 1
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STELLA C Sheet 2
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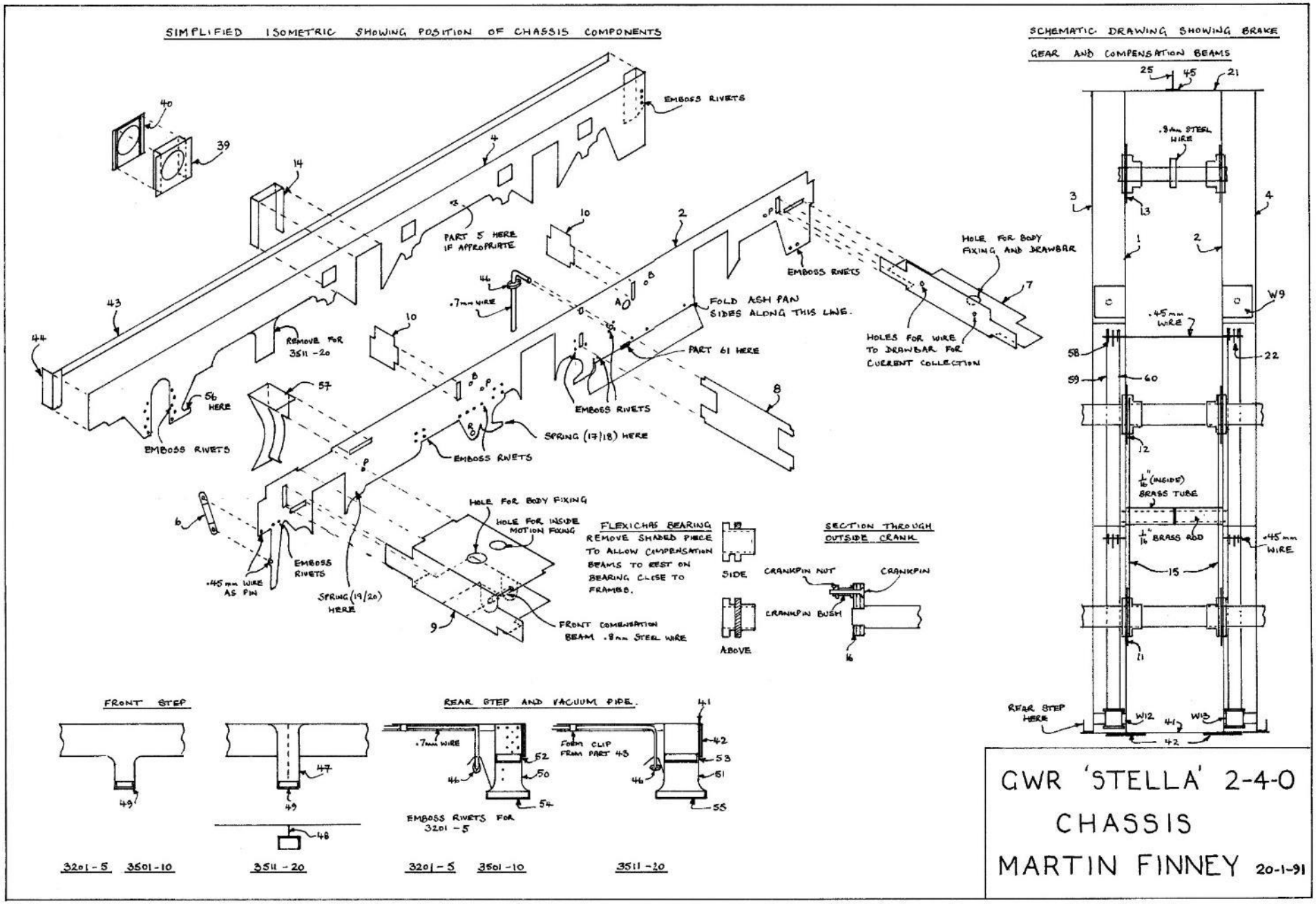
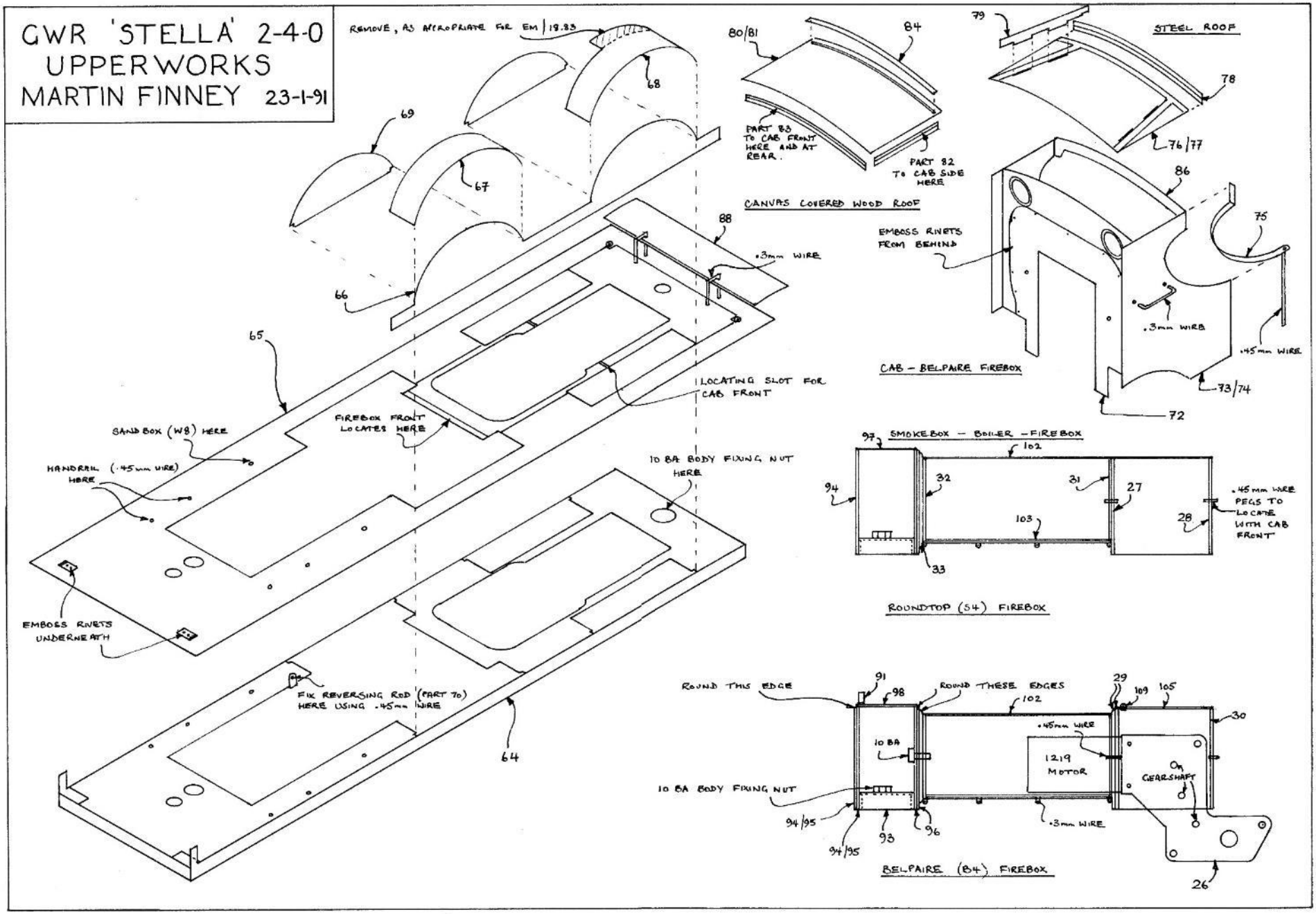
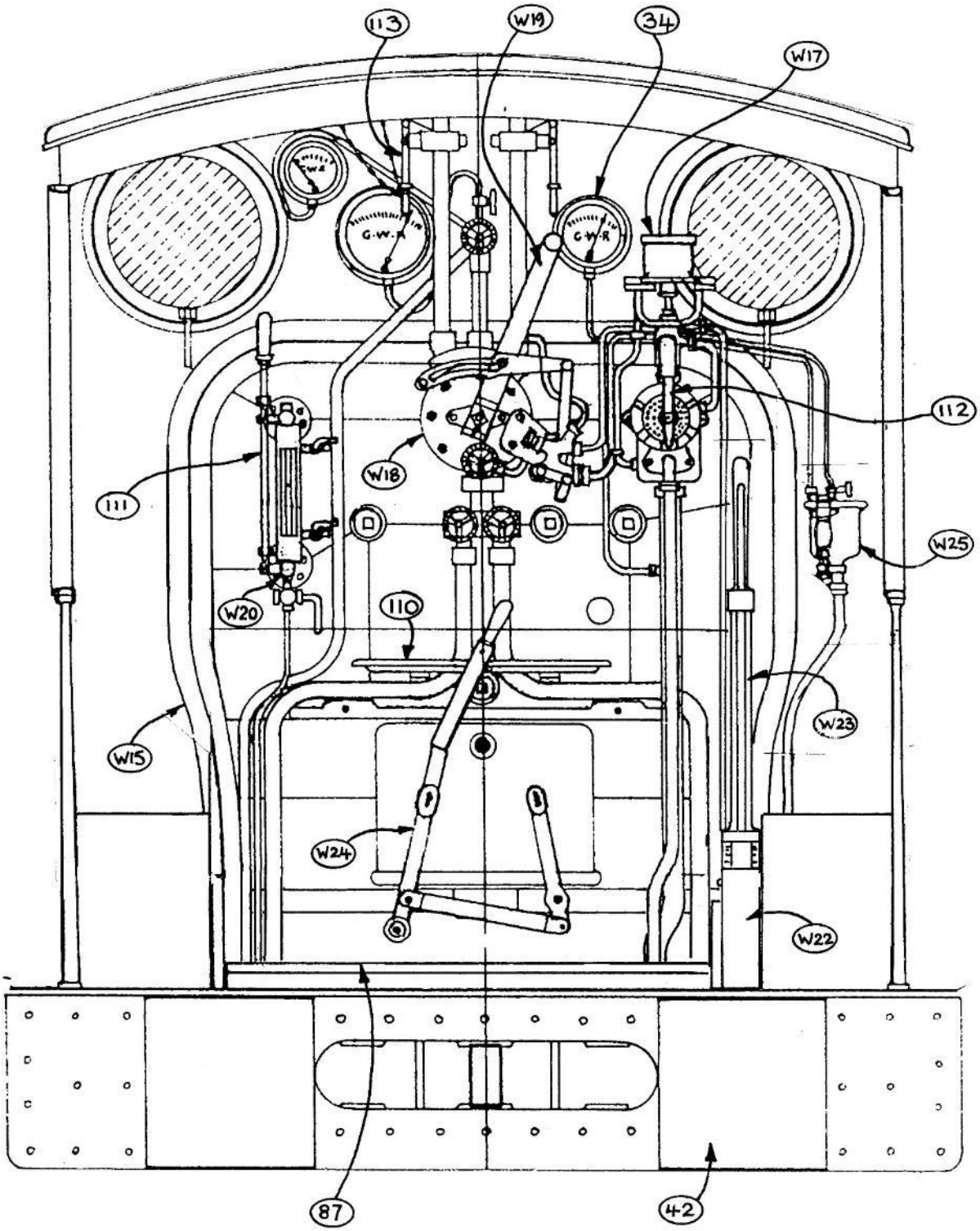

SIMPLIFIED ISOMETRIC SHOWING POSITION OF CHASSIS COMPONENTS
EMBOSS RIVETS
PART 5 HERE IF APPROPRIATE
REMOVE FOR 3511-20
.7mm WIRE
FOLD ASH PAN SIDES ALONG THIS LINE.
PART 61 HERE
HOLE FOR BODY FIXING AND DRAWBAR
HOLES FOR WIRE TO DRAWBAR FOR CURRENT COLLECTION
56 HERE
SPRING (17/18) HERE
HOLE FOR BODY FIXING
HOLE FOR INSIDE MOTION FIXING
EMBOSS RIVETS
.45 mm WIRE AS PIN
SPRING (19/20) HERE
FRONT COMENSATION BEAM .8mm STEEL WIRE
FLEXICHAS BEARING
REMOVE SHADED PIECE TO ALLOW COMPENSATION BEAMS TO REST ON BEARING CLOSE TO FRAMES.
SECTION THROUGH OUTSIDE CRANK
SIDE
ABOVE
CRANKPIN NUT
CRANKPIN
CRANKPIN BUSH
FRONT STEP
3201-5 3501-10
3511-20
REAR STEP AND VACUUM PIPE.
.7mm WIRE
FORM CLIP FROM PART 43
EMBOSS RIVETS FOR 3201-5
3201-5 3501-10
3511-20
SCHEMATIC DRAWING SHOWING BRAKE GEAR AND COMPENSATION BEAMS
.8mm STEEL WIRE
.45mm WIRE
1/16" (INSIDE) BRASS TUBE
1/16" BRASS ROD
.45mm WIRE
REAR STEP HERE
GWR 'STELLA' 2-4-0
CHASSIS
MARTIN FINNEY 20-1-91


GWR 'STELLA' 2-4-0
UPPERWORKS
MARTIN FINNEY 23-1-91
REMOVE, AS APPROPRIATE FOR EM/19.83
68
69
67
66
65
64
88
.3mm WIRE
LOCATING SLOT FOR CAB FRONT
FIREBOX FRONT LOCATES HERE
SAND BOX (WB) HERE
HANDRAIL (.45mm WIRE) HERE
10 BA BODY FIXING NUT HERE
EMBOSS RIVETS UNDERNEATH
FIX REVERSING ROD (PART 70) HERE USING .45mm WIRE
80/81
84
PART 83 TO CAB FRONT HERE AND AT REAR.
PART 82 TO CAB SIDE HERE
CANVAS COVERED WOOD ROOF
79
STEEL ROOF
78
76/77
86
75
EMBOSS RIVETS FROM BEHIND
.3mm WIRE
.45mm WIRE
CAB - BELPAIRE FIREBOX
73/74
72
97
SMOKEBOX - BOILER - FIREBOX
102
94
32
31
27
28
103
33
.45mm WIRE PEGS TO LOCATE WITH CAB FRONT
ROUNDTOP (54) FIREBOX
ROUND THIS EDGE
91
98
ROUND THESE EDGES
102
29
109
105
30
.45mm WIRE
10 BA
12:19 MOTOR
GEARSHAFT
10 BA BODY FIXING NUT
94/95
93
96
.3mm WIRE
94/95
26
BELPAIRE (B4) FIREBOX

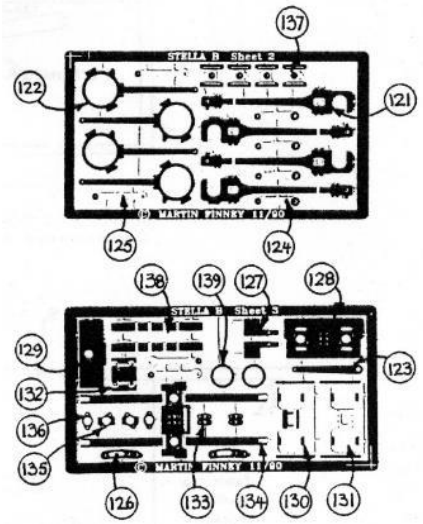

113
W19
34
W17
112
W18
111
W25
W20
110
W23
W15
W24
W22
87
42

ETCHED COMPONENTS - 0.020" nickel silver

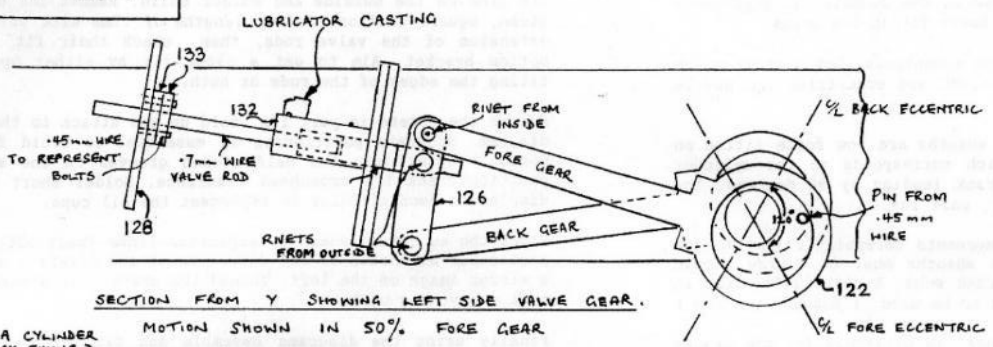
121 Connecting rod - (4)
122 Eccentric sheath - (4)
123 Reversing lever
124 Reversing arm - (4)
125 Lifting link - (4)
126 Expansion link - (2)
127 Valve rod - (2)
128 Cylinder block front
129 Cylinder block mounting bracket
130 Motion bracket - front lamination
131 Motion bracket - rear lamination
132 Valve rod guide box
133 Valve rod gland - (2)
134 Slide bar assembly
135 Piston rod gland inner overlay - (2)
136 Piston rod gland outer overlay - (2)
137 Crosshead face - (4)
138 Crosshead slipper assembly - (2)
139 Washer - to space out eccentrics - (3)

OTHER COMPONENTS (not supplied with kit)

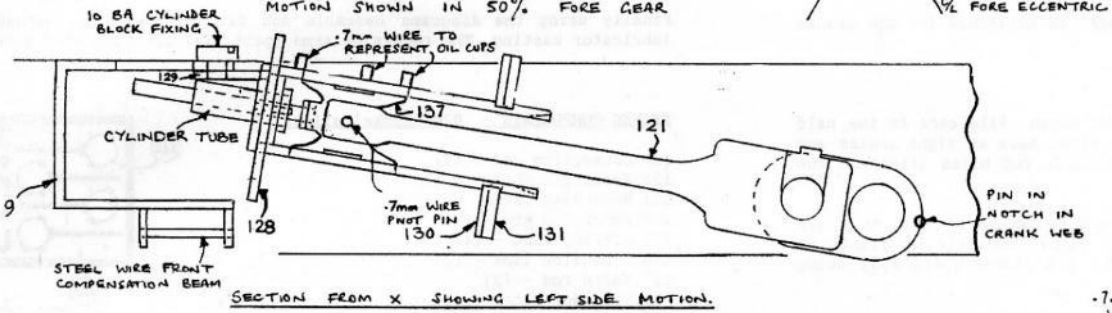
1/16" outside diameter brass tube for cylinders
Steel wire - 0.8mm - for piston rods
Rivets - (6)
Brass wire - 0.7mm - for crosshead pins and lifting links
Brass wire - 0.45mm - for pinning eccentrics to cranks
10 BA screw
Brass wire - 0.9mm - for reversing cross shaft
Cast manganese bronze cranks - (2)
Brass eccentrics - (4)
Lubricator casting



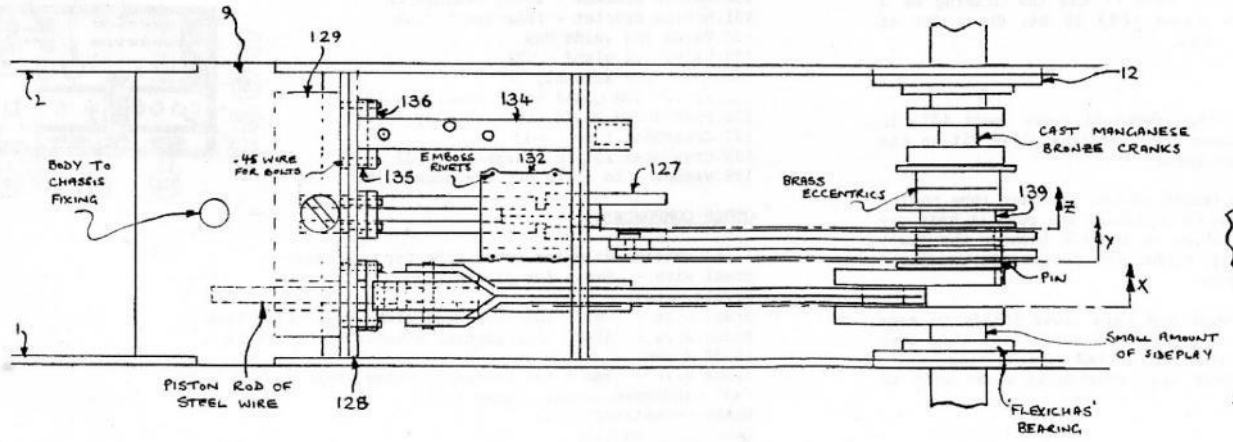
GWR 'STELLA' 2-4-0
INSIDE MOTION
MARTIN FINNEY 23-1-91

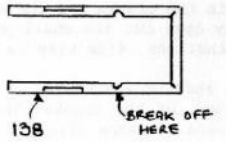


SECTION FROM Y SHOWING LEFT SIDE VALVE GEAR.
MOTION SHOWN IN 50% FORE GEAR

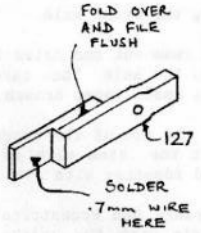


SECTION FROM X SHOWING LEFT SIDE MOTION.

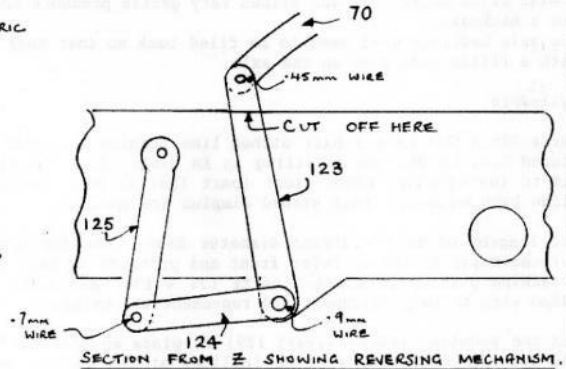




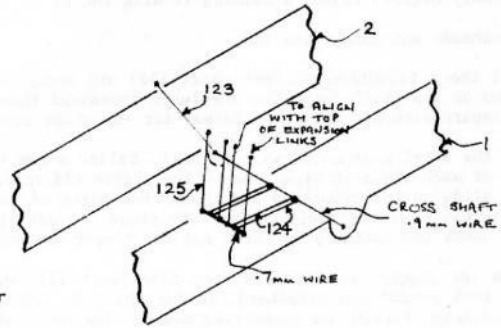
CROSSHEAD SLIPPER



VALVE ROD
LEFT SIDE FROM THE FRONT



SECTION FROM Z SHOWING REVERSING MECHANISM.



SCHEMATIC DRAWING SHOWING THE ARRANGEMENT OF THE REVERSING MECHANISM.