Brassmasters Scale Models

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L&SWR/SOUTHERN RAILWAY
DRUMMOND 4,000 GALLON
'WATERCART' TENDER KIT

Designed by Martin Finney

4MM SCALE
OO - EM - P4

INSTRUCTIONS AND
PROTOTYPE NOTES

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SECTION 1: BRIEF HISTORICAL DETAILS

The tenders which form the subject of this kit are the distinctive Drummond 4000 gallon double bogie type often referred to as Watercarts. A total of 126 tenders were built at Nine Elms Works as follows:

Built for locomotive class	Locomotive numbers	Date built	Fitted with exhaust steam heaters	Front handrail stanchion spacing
T9 4-4-0	300 - 304	12/1900 - 1/1901	No	Wide
T9 4-4-0	305,307,310-314	2/1901 - 5/1901	No	Wide
E10 4-2-2-0	369 - 373	4/1901 - 7/1901	No	Wide
T9 4-4-0	313,314,336-338	5/1901 - 10/1901	No	Wide
T9 4-4-0	Between 113 & 773	4/1902 - 6/1907	No	Narrow
C8 4-4-0	290 - 299	9/1902 - 3/1907	No	Narrow
S11 4-4-0	395 - 404	6/1903 - 12/1903	No	Wide
L12 4-4-0	415 - 434	6/1904 - 3/1905	Yes	Wide
F13 4-6-0	330 - 334	9/1905 - 12/1905	Yes	Wide
L11 4-4-0	174,175,407-413	5/1906 - 8/1906	Yes	Wide
E14 4-6-0	335	11/1907	Yes	Wide

For a detailed history of this class I suggest you refer to the following definitive books by the late D.L.Bradley:

Part two of 'The Locomotives of the L.S.W.R.' published by the R.C.T.S.
LSWR Locomotives - The Drummond Classes published by Wild Swan.

Other valuable sources of information and photographs are:

The Drummond Greyhounds of the LSWR - D.L.Bradley - David & Charles
A Pictorial Record of Southern Locomotives - J.H.Russell - OPC

Drummond Locomotives - Brian Haresnape & Peter Rowledge - Ian Allan

Locomotives Illustrated No. 44 - The Drummond 4-4-0s and Double singles of the LSWR - Ian Allan

Southern Steam Locomotive Survey - The Drummond Classes - Bradford Barton

Variations/Modifications incorporated into the kit

Water Feed: The last 25 tenders were fitted with Drummond's exhaust steam heaters which were inside the well of the tank and were supplied with exhaust steam from the locomotive. The tank was clad with false plates, to prevent heat loss and blistering of the paintwork. Whilst the system did give a slight improvement in both coal and water consumption it was expensive to maintain and this was one of Drummond's frills which his successor, Robert Urie, removed. The cladding seems in virtually all cases to have **not** been removed.

Front side plates: From 1913 onwards plates were added underneath the front handrail stanchion supports. On the tenders with narrow spaced stanchions the lower edge of these plates was on top of the sandboxes, whereas on the tenders with wide spaced stanchions the plates went outside the sandboxes down to the front platform.

Lamp brackets: The tenders were built with Drummond's socket style brackets. The SR standardised on a design with the socket in the lamp. Many tenders had the Drummond brackets adapted to accept the standard lamps, but gradually many the tenders were fitted with new brackets of standard design.

Couplings: Most of the tenders appear in their early years to be running with a single long coupling link, although some had three-link couplings. Later, the tenders were equipped with screw couplings together with a hook to carry

the coupling when it was not required.

Widening of front platform: after 1923 the front of the platform was widened to 8' 1" to match the platform of the wide locomotives.

Coal shovelling plate: this was added from an unknown date; certainly by WW2.

Coal Rails: From circa 1936 onwards the coal rails were backed by metal sheeting to stop the loss of small coal.

SECTION 2: CONSTRUCTING THE CHASSIS

Note that many of the components 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.

Start by embossing the rivets in the frames (parts F1 & F2). Fold up the appropriate (for the gauge being modelled) stretchers (parts F3 & F4) with the fold lines on the inside and solder in place in the chassis slots, **with the larger of the slots in their upper edges on the left side**, checking that the chassis is straight and square.

For EM and P4 widen the gap between the inner edges of parts F5 & F6 by snapping of the unwanted material along the half-etched lines. Solder the drawbar pin (0.9mm wire) in place on part F5 before soldering parts F5 & F6 in place. Solder pieces of 0.9mm wire into the half-etched slots in part F4 for the rear bogie bearers.

Emboss the rivets in the bogie frame overlays (parts B2 & B4). Open up the holes in parts B1, B2, B3 & B4 to 1.2mm to fit the brake hanger pivot tubing. Fold up the appropriate (for the gauge being modelled) bogie stretchers (parts B5 & B6) and solder in place between the bogie frames. Cut the brake hanger pivot tubing to length. (For P4 long pieces 20.3mm - short pieces 4.7mm - other gauges accordingly shorter). Solder the brake hanger pivots (1.2mm tube and 0.8mm wire) in place.

Now thread the frame overlays over the brake hanger pivots and solder in place. **They only require soldering around the edge.** Attach the axlebox castings (part W1) and ream the axle holes 2mm. Fit the wheel sets. Wheel side control is limited by using the washers part B19.

Assemble the brake hangers (part B10) and attach the hangers to the pivots. Check the clearance between the brake shoes and the wheels making any necessary adjustments. Solder the two laminations of part B12 together before soldering it to the cross shafts (part B11). The 0.45mm holes through the pull rods and cross shafts must remain clear. Now solder this assembly in place as shown in Fig. 5.

Make up the bogie pivot screws as shown in Fig.4. The 3/32" tubing is 0.8mm long for the front screw and 1.5mm long for the rear screw.

The remaining work on the chassis, as shown in Fig. 3, is best left to a later stage but I will describe it now. Proceed by fitting the components in the following order:

- W3, F7, F8 and 0.45mm wire pipe
- BR6 - modify to make a left and right pair
- BR2 and 0.8mm wire vacuum pipe - note that the mounting spigot on BR2 does not line up with the hole in part F2. Remove the spigot and solder directly to part BR6
- F9 & F10 and 0.7mm wire steam pipe
- W2, B15, B16, B18 and 1.2mm wire cross shaft - B16 and B15 are joined by a short .45mm wire pin. Do not attach part B14 at this stage.
- B17 and 0.45mm sand pipe.

SECTION 3: CONSTRUCTING THE HANGING PLATES/BUFFERBEAM/DRAGBEAM ASSEMBLY

First emboss all the rivets on parts H2, H3, H4, H5, H6 & H7, as appropriate. Fold up the edges of part H1 and solder the hanging plates in position ensuring they are flush along their top edge. Solder part H6 to the front bufferbeam (part H5) before soldering both bufferbeams in place. Solder the buffer housings in place in the rear bufferbeam. Fold up the steps (parts H3 & H4) and solder in position. Lastly attach the remaining components as shown in Fig. 6.

SECTION 4: CONSTRUCTING THE TANK

For a tender with wide front stanchion spacing drill new 0.45mm holes in the front platform, using the drilling jig (part T17), as shown in Fig. 9. Solder part T16 over these new holes.

If appropriate, (see Section 1) file off the front platform side extensions as shown in Fig.8.

Solder the four 12BA nuts over the four holes near the corners of part T1. Check that the hanging plate assembly can now be screwed under part T1. Similarly solder the two 10BA nuts over the holes for the bogie pivot screws.

If appropriate, (see Section 1) emboss the tank cladding rivets in part T2 before forming the corners over a 1/8" rod. Locate the tabs along the lower edge of part T2 into the slots in part T1 and solder in place.

Emboss the rivets in the tank top (part T3) before forming the bends over a ¾" rod. The edge of part T3 has a small rebate which sits on the top of the tank sides as shown in Fig. 7.

Fit the tank top over and between the sides and carefully solder in place. I found the top was retained in the slots in the sides at the front without the need for soldering.

If appropriate, fold up the edges of the shovelling plate (part T5) and solder in place below the coal hole in part T4. Solder part T4 in place between the front edges of part T2. Emboss the rivets in the brackets attached to part T6 and fold them down. Now solder part T6 in place with the brackets fitting in the etched slots on the inside of the tank sides.

Form the corners in the coping plates (part T7) over a 1/8" rod. Solder the coping plates into the rebate between the tank side and tank top, as shown in Fig. 7. Use the jigs (part T32) to determine the correct angle for the coping plate. The two halves are joined at the rear with the aid of part T27 or T31. For a tender without cladding, the lower part of the coping plate is represented by part T8 as shown in Fig. 8. Again, this is joined at the rear and an even height above the platform can be attained with the aid of part T32.

Emboss the rivets on the coal rails (part T9 or T10), fold over the stanchions through 180^{o} and solder to the back of the coal rails. Be sure to strengthen all the bends in the stanchions with a small fillet of solder. Solder the stanchions in place in the etched slots in the tank top.

The right side sandbox (part W4) must have the rear part of the inner edge of its lid filed away to clear part W6. Fit parts W4 in place followed by part T11 or T12 and part T13. For a tender with narrow front stanchion spacing reduce the width of the footplate to the half-etched lines. The appropriate remaining components can now be fitted as shown in Fig. 8 and Fig.9.

Final assembly involves attaching the bogies and the remaining brake pull rods as shown in Fig. 3. Whilst the bogies are not internally compensated they rest under the chassis in contact at three points. The rear bogie rests on the two bearers already fitted and the front bogie rests on the washers (part B8) shown in Fig.4, effectively on one point. The number and thickness of this washers can be varied until the tender is level. I found two full thickness and one half thickness washer was required.

The flexible joins between parts B12, B13 & B14 can be made with short lengths of soft copper wire, the ends of which can be bent over to retain them in place. A suitable source of such wire is fuse wire.

I hope you enjoy building and using your tender as much as I have enjoyed researching and designing it. If you have any problems with the kit or any criticisms or suggestions please feel free to contact Brassmasters.

Martin Finney

ETCHED COMPONENTS

FRAMES

F1. Frame - left
F2. Frame - right
F3. Frame stretcher/bogie pivot - front - three widths
F4. Frame stretcher/bogie pivot - rear - three widths
F5. Frame stretcher - front
F6. Frame stretcher - rear
F7. Vacuum reservoir strap - (2)
F8. Vacuum pipe flange - (2)
F9. Steam heat pipe bracket
F10. Steam heat pipe flange - (2)

BOGIE/BRAKE GEAR

B1. Bogie frame - rear bogie - (2)
B2. Bogie frame overlay - rear bogie - (2)
B3. Bogie frame - front bogie - (2)
B4. Bogie frame overlay - front bogie - (2)
B5. Bogie stretcher - rear bogie - three widths - (2)
B6. Bogie stretcher - front bogie - three widths - (2)
B7. Washer - front bogie pivot - full - (2)
B8. Washer - front bogie pivot - half
B9. Washer - bogie retaining - (2)
B10. Brake hanger lamination - (16)
B11. Brake cross shaft - (4)
B12. Pull rod lamination - bogie - (4)
B13. Pull rod lamination - between bogies - (2)
B14. Pull rod lamination - front - rear section - (2)
B15. Pull rod lamination - front - adjuster - (2)
B16. Pull rod lamination - front - front section - (2)
B17. Brake linkage lamination - cross shaft to hand brake - (2)
B18. Brake linkage lamination - cross shaft to vacuum cylinder - (2)
B19. Washer - bogie wheel side play

HANGING PLATES / BUFFERBEAMS

H1. Base
H2. Hanging plate - (2)
H3. Upper step - (2)
H4. Lower step - (2)
H5. Front bufferbeam
H6. Front buffer base plates - (2)
H7. Rear bufferbeam
H8. Coupling hook lamination - (2)
H9. Coupling link
H10. Screw coupling - four parts
H11. Screw coupling hook
H12. Steam pipe valve handle

TANK

T1. Platform
T2. Tank sides / back
T3. Tank top
T4. Front division plate
T5. Coal shovelling plate
T6. Toolbox support plate
T7. Coping plate - (2)
T8. Coping plate - vertical section - (2)
T9. Coal rail - (2)
T10. Coal rail - sheeted in - (2)
T11. Footplate support - narrow engines
T12. Footplate support - wide engines
T13. Footplate
T14. Handrail stanchion bracket - narrow engines - (2)
T15. Handrail stanchion bracket - wide engines - (2)
T16. Handrail stanchion flange - wide engines - (2)
T17. Handrail stanchion jig - wide engines
T18. Front side plate - narrow engines - (2)
T19. Front side plate - wide engines - (2)
T20. Hand brake hand wheel lamination - (2)
T21. Fire iron cruciform
T22. Fire iron cruciform bracket
T23. Fire iron bracket
T24. Cab weather sheet bracket - (2)
T25. Lamp bracket - LSWR - rear platform - (3)
T26. Lamp bracket - LSWR - tank rear/tank top - (3)
T27. Lamp bracket - LSWR - tank top - mounting bracket
T28. Lamp bracket - LSWR/SR - rear platform - (3)
T29. Lamp bracket - LSWR/SR - tank rear/tank top - (3)
T30. Lamp bracket - SR - rear platform - (3)
T31. Lamp bracket - SR - tank top
T32. Jig for aligning coping plate - (2)

WHITEMETAL CASTINGS

W1. Axlebox/Spring - (8)
W2. Brake cylinder
W3. Vacuum reservoir
W4. Sandbox/Toolbox - (2)
W5. Toolbox - (2)
W6. Brake column

BRASS CASTINGS

BR1. Vacuum pipe
BR2. Vacuum pipe drip trap - front
BR3. Steam heating pipe
BR4. Front buffer - (2)
BR5. Water filler
BR6. Feed water isolating valve - (2)
BR7. Bucket cock

OTHER COMPONENTS

10 BA x ½" screw - (2)
10 BA nut - (2)
12 BA x 3/32" screw - (4)
12 BA nut - (4)

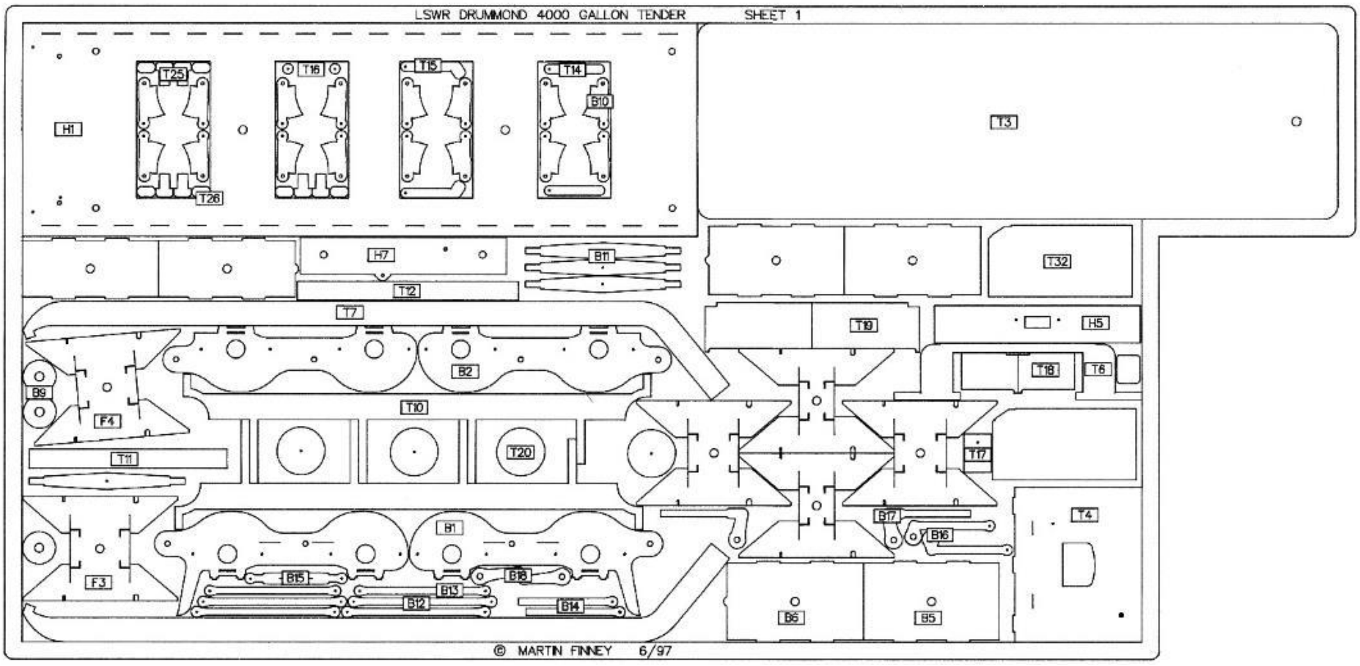
Brass tube - 3/32" outside diameter - for bogie pivots
Brass tube - 1.2mm outside diameter - for brake hanger pivots

Brass wire - 0.3mm - for fire iron cruciform
Brass wire - 0.45mm - vacuum tank pipe, handrails & sand pipe
Brass wire - 0.7mm - steam heating pipe
Brass wire - 0.8mm - for brake hanger pivots and vacuum pipe
Brass wire - 0.9mm - for rear bogie bearers & drawbar pin
Brass wire - 1.2mm - for brake cross shaft

Buffer housing, head and spring - (2)

Components not provided

Bogie wheels- 3' 7" dia. 10 spokes with axles


LSWR DRUMMOND 4000 GALLON TENDER
SHEET 1
© MARTIN FINNEY 6/97

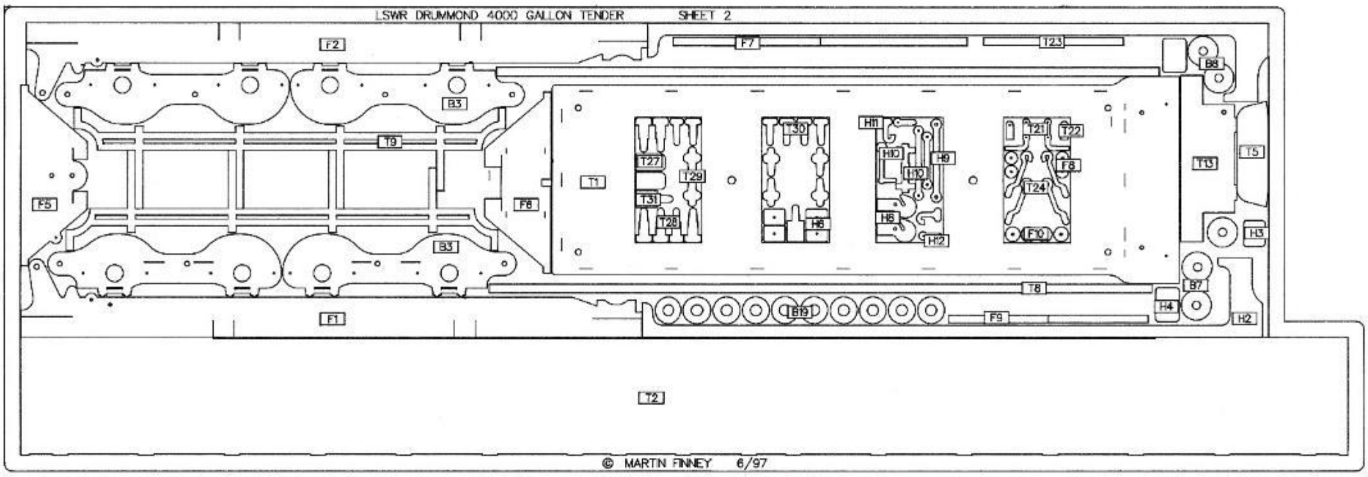

LSWR DRUMMOND 4000 GALLON TENDER
SHEET 2
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FIG. 2

CHASSIS AND COMPENSATION ARRANGEMENT

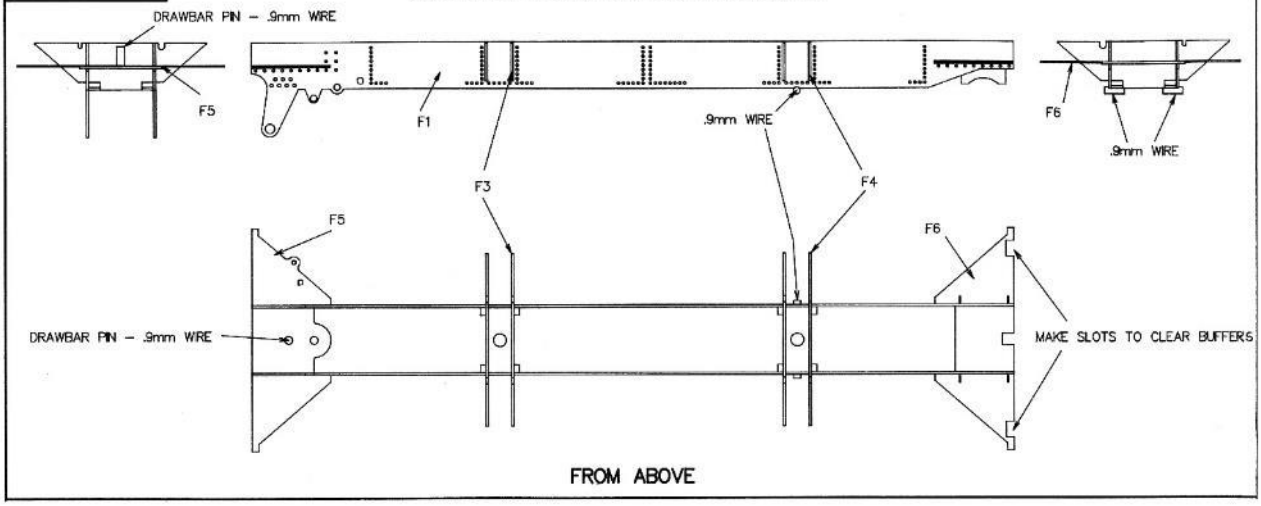


FIG. 3

CHASSIS DETAIL

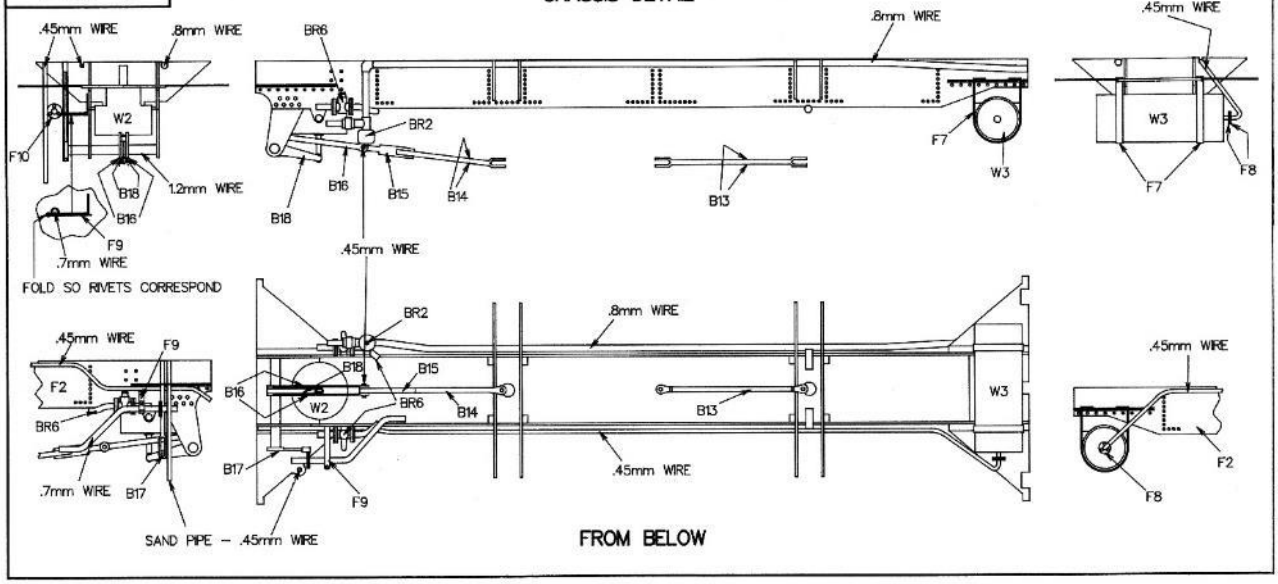


FIG. 4

BOGIE ARRANGEMENT

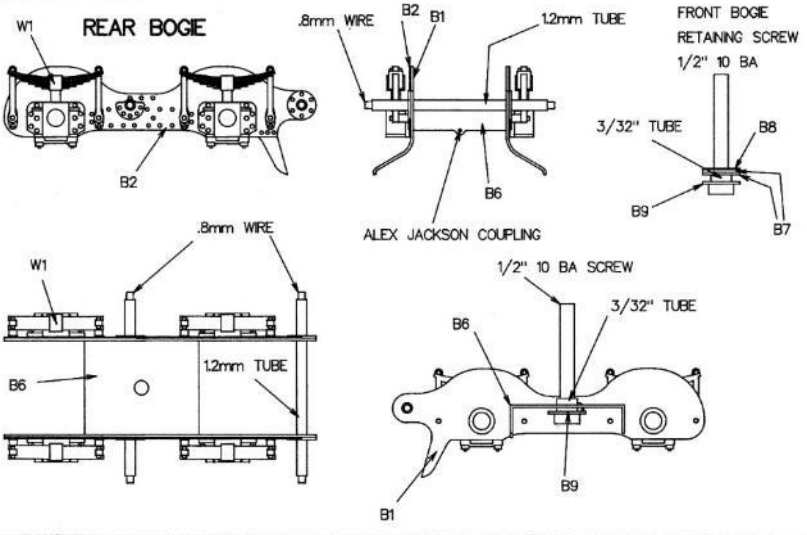
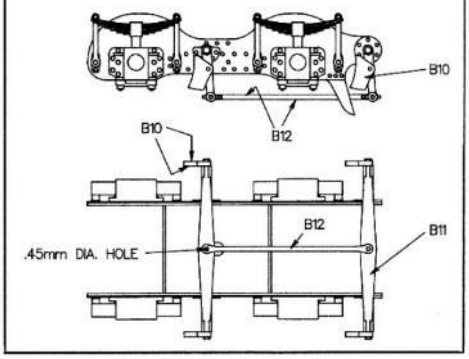


FIG. 5

BOGIE BRAKE GEAR



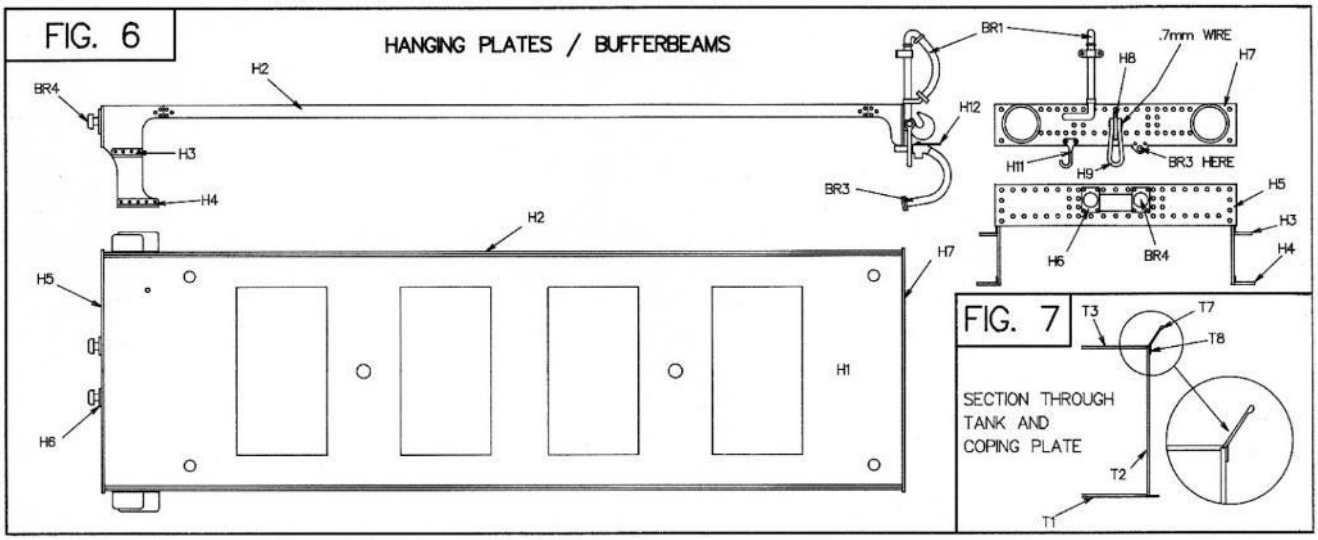


FIG. 6
HANGING PLATES / BUFFERBEAMS
BR1
.7mm WIRE
H8
H7
H2
BR4
H12
H3
H11
BR3 HERE
H4
BR3
H9
H5
H3
H6
BR4
H4
H2
H7
H5
H1
H6
FIG. 7
T3
T7
T8
SECTION THROUGH
TANK AND
COPING PLATE
T2
T1

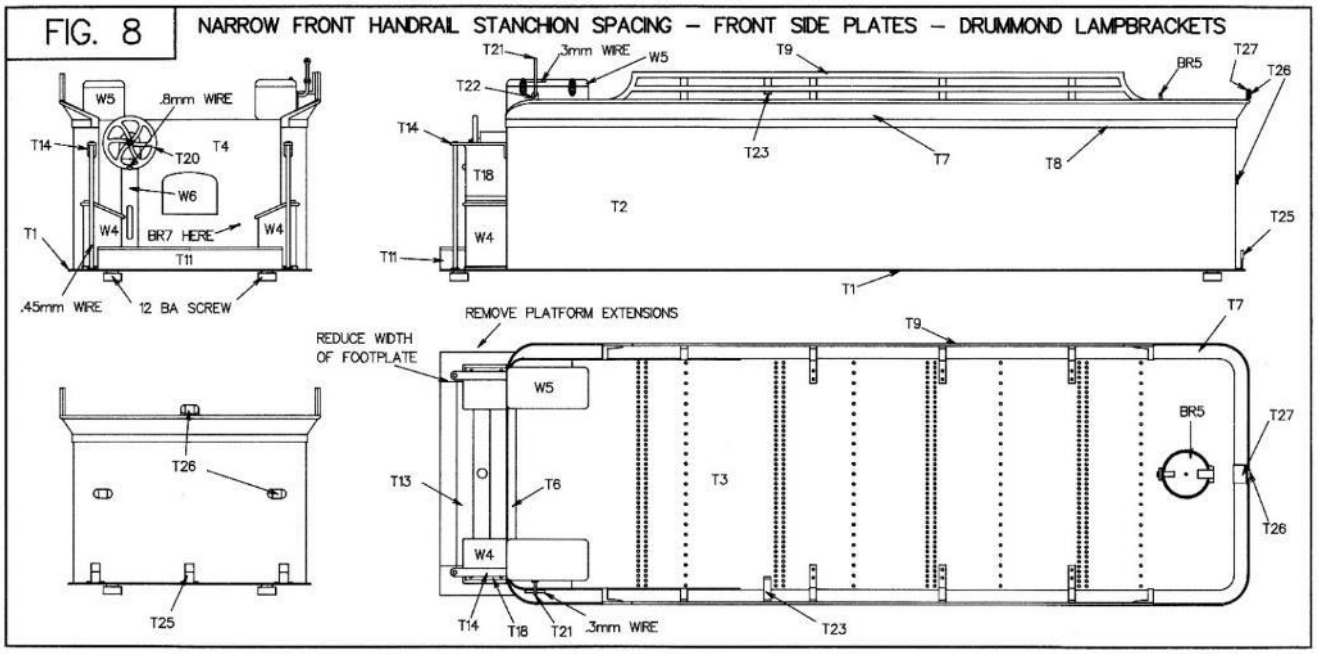


FIG. 8
NARROW FRONT HANDRAIL STANCHION SPACING – FRONT SIDE PLATES – DRUMMOND LAMPBRACKETS
T21
.3mm WIRE
W5
T9
BR5
T27
T26
T22
T14
T23
T7
T8
T18
T2
T25
W4
T11
T1
W5
.8mm WIRE
T14
T20
T4
W6
T1
W4
BR7 HERE
W4
T11
.45mm WIRE
12 BA SCREW
REMOVE PLATFORM EXTENSIONS
REDUCE WIDTH
OF FOOTPLATE
T9
T7
W5
BR5
T27
T26
T13
T6
T3
W4
T26
T14
T18
T21
.3mm WIRE
T23
T25

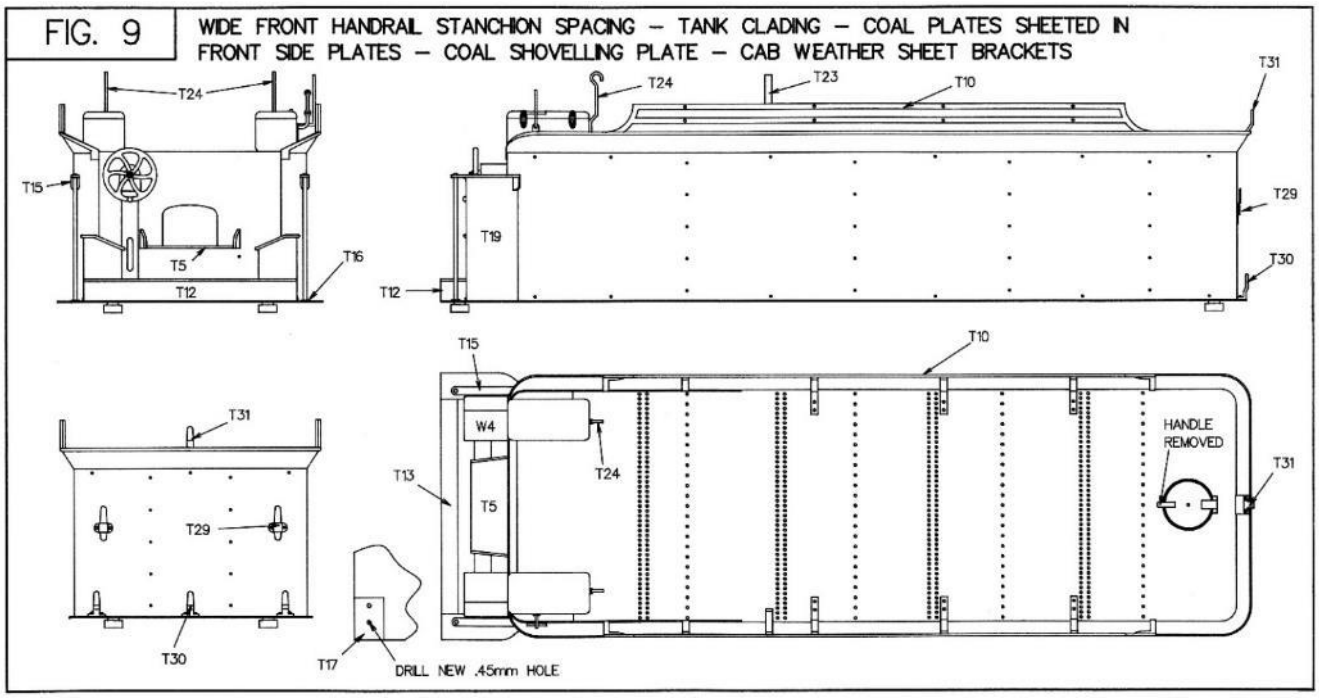
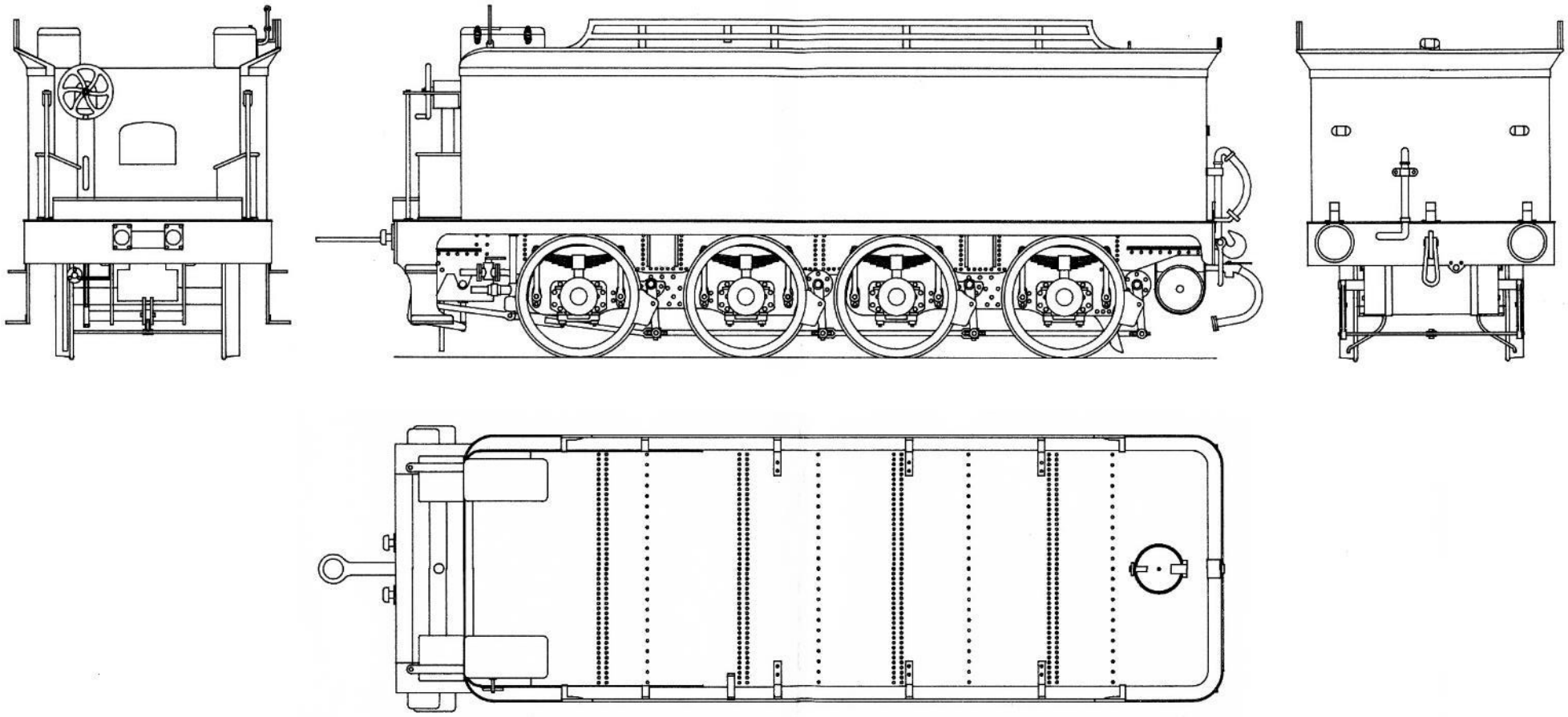


FIG. 9
WIDE FRONT HANDRAIL STANCHION SPACING – TANK CLADING – COAL PLATES SHEETED IN
FRONT SIDE PLATES – COAL SHOVELLING PLATE – CAB WEATHER SHEET BRACKETS
T24
T24
T23
T10
T31
T15
T29
T19
T5
T16
T30
T12
T12
T15
T10
T31
W4
T24
HANDLE
REMOVED
T13
T5
T31
T29
T30
T17
DRILL NEW .45mm HOLE



ORIGINAL CONDITION – NARROW FRONT HANDRAIL STANCHION SPACING – NO FRONT SIDE PLATES – DRUMMOND LAMPBRACKETS
NARROW FRONT PLATFORM – FLUSH RIVETS ON BUFFERBEAMS AND HANGING PLATES