Defiant's Tenders

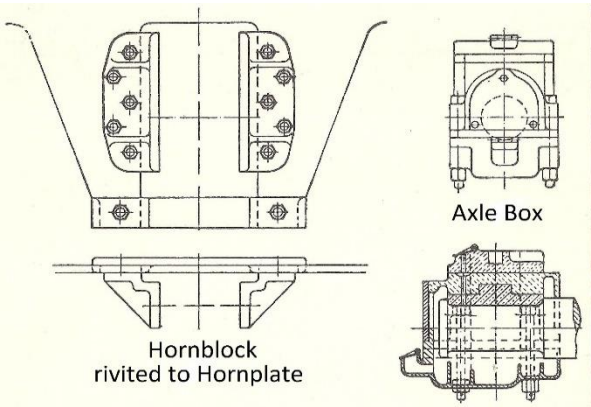
With work about to start on Defiant's Tender, I thought it would be worth researching the tenders that have been paired with this locomotive. It may come as a surprise to some to find that tenders did not stay with the locomotive that they were first paired with. Tenders were frequently interchanged, most often when locomotives went for overhaul. The list below gives details of all the tenders known to have been paired with locomotive No.5080:

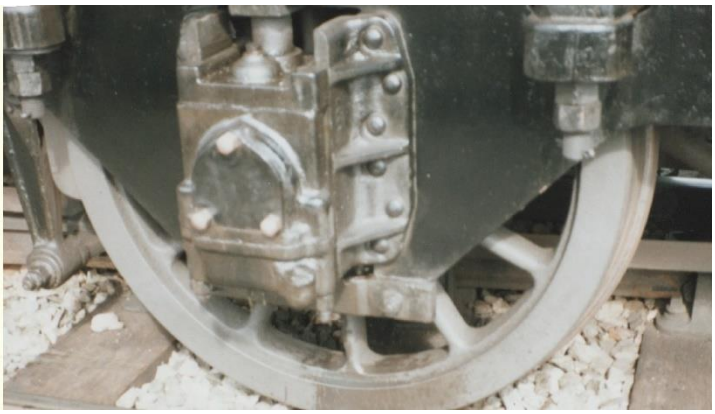
Date	**Number**	**Type**	**Lot Details**
May 1939	No.2782	4000 gallon Collett late Pattern	Lot A148 (1/39-9/39)
Locomotive Renamed 'Defiant'			
3rd January 1941	No.2697	4000 gallon Collett late Pattern	Lot A140 (5/36-8/36)
24th November 1941	No.2630	4000 gallon Collett late Pattern	Lot A128 (7/32-10/32)
2nd May 1942	No.2620	4000 gallon Collett late Pattern	Lot A128 (7/32-10/32)
19th February 1943	No.2774	4000 gallon Collett late Pattern	Lot A148 (1/39-9/39)
22nd April 1944	No.2654	4000 gallon Collett late Pattern	Lot A136 (8/34-12/34)
31st July 1944	No.2620	4000 gallon Collett late Pattern	Lot A128 (7/32-10/32)
7th February 1946	No.2624	4000 gallon Collett late Pattern	Lot A128 (7/32-10/32)
20th November 1947	No.2548	4000 gallon Collett early Pattern	Lot A121 (4/30-1/31)
13th September 1949	No.2618	4000 gallon Collett late Pattern	Lot A128 (7/32-10/32)
15th July 1950	No.2622	4000 gallon Collett late Pattern	Lot A128 (7/32-10/32)
29th August 1950	No.2704	4000 gallon Collett late Pattern	Lot A141 (2/37-6/37)
5th July 1951	No.2645	4000 gallon Collett late Pattern	Lot A131 (4/34-7/34)
30th May 1952	No.2720	4000 gallon Collett late Pattern	Lot A141 (2/37-6/37)
16th March 1953	No.4051	4000 gallon Hawksworth Pattern	Lot A188 (5/48-8/49)
11th July 1953	No.4127	3800 gallon coal weigher (Hawksworth)	Lot A192 (3/52)

5th September 1953	No.4051	4000 gallon Hawksworth Pattern	Lot A188 (5/48-8/49)
28th April 1954	No.2895	4000 gallon Collett late Pattern	Lot A170 (4/42-7/42)
19th March 1955	No.2669	4000 gallon Collett late Pattern	Lot A138 (5/35-7/35)
15th March 1957	No.2543	4000 gallon Collett early Pattern	Lot A120 (3/30-11/30)
7th September 1957	No.2912	4000 gallon Collett late Pattern	Lot A173 (1/43-4/43)
1st January 1959	No.2928	4000 gallon Collett late Pattern	Lot A176 (1/44-9/44)
15th May 1959	No.4046	4000 gallon Hawksworth Pattern	Lot A187 (10/47-4/48)
17th February 1961	No.2822	4000 gallon Collett late Pattern	Lot A158 (4/40-7/40)
7th September 1961	No.2550	4000 gallon Collett early Pattern	Lot A121 (4/30-1/31)
Preservation at Tyseley			
Ex Tyseley Steam	(No.2715	4000 gallon Collett late Pattern	Lot A141 (2/37-6/37)
Crane tender either	(No.2894	4000 gallon Collett late Pattern	Lot A170 (4/42-7/42)
July 1986	No.2782	4000 gallon Collett late Pattern	Lot A148 (1/39-9/39)
April 1990	No.2621	4000 gallon Collett late Pattern	Lot A128 (10/32-12/33)
August 1990	No.2788/2782	4000 gallon Collett late Pattern	Lot A148 (1/39-9/39)
???? 2021	No.2788	4000 gallon Collett late Pattern	Lot A148 (1/39-9/39)

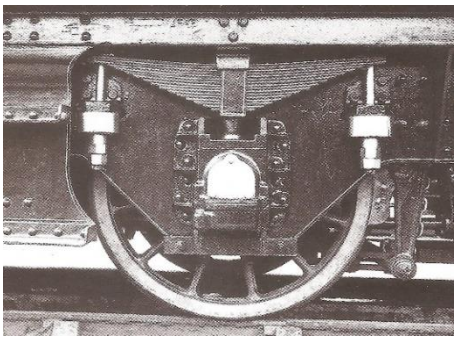
This list contains three basic types of tender. Details of the construction and components will be described first, as these are essentially the same. Differences between the various tender types will then be discussed.

Tender Chassis – These tenders are termed 'flush bottom' tenders with the water tank and coal space built up from a standard chassis. The chassis is constructed from two parallel vertical plate frames. These have Hornplates below them with guide slots cut out for each axle. To maintain moderate individual axle weights the tender chassis has three equally spaced axles. The wheelbase spacing is 7 feet 6 inches. Each axle has a pair of 4 foot 1½ inch diameter wheels. A two piece Hornblock is riveted either side of the guide slots in the Hornplate to prevent sideways movement of the axle box, but this can slide freely up and down in the space between. The drawing and photograph shows details of the Hornblock and Axle Box.





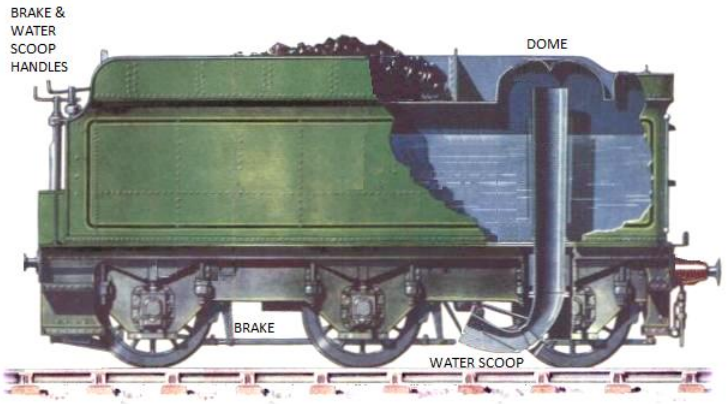
Each axle box is held vertically in position by a leaf spring above it. This spring being attached at either end to a bracket on the hornplate by a hanger. The hangers consist of suspension bolts fitted with shock absorbing rubbers, which are protected within steel cups. This arrangement is designed to extend the life of the spring plates by relieving them from hard shocks.



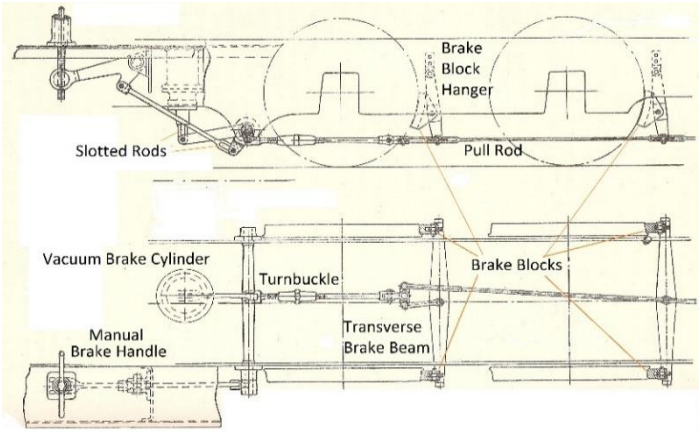
The cast iron axle box supports the axle journal in a gun-metal bearing. This can be accessed by undoing the three bolts and removing the front cover. The bearing sits in a keep with a sliding block above it. This allows the bearing to be removed and replaced without taking the wheels from under the tender. There is an oil filling point at the top of the axle box and a sponge in the keep to continuously lubricate the journal of the revolving axle.

Between the two vertical plate frames is a second inner ladder type frame with drag boxes located at either end. The drag box at the rear have a standard screw link coupling and buffers. The forward drag box, at the locomotive end, has three forged steel coupling bars with elongated holes at each end. This drag box has large diameter pins which locate through the elongated holes to connect the tender to the locomotive. Normally only the larger centre coupling bar takes all the load of the train, but the coupling bars on either side can take this load in the event of the centre coupling bar failing. The photograph shows a centre coupling bar. This forward drag box only has short buffers and the locomotive has corresponding bearing plates. This combination allows the tender to be close coupled to the locomotive.

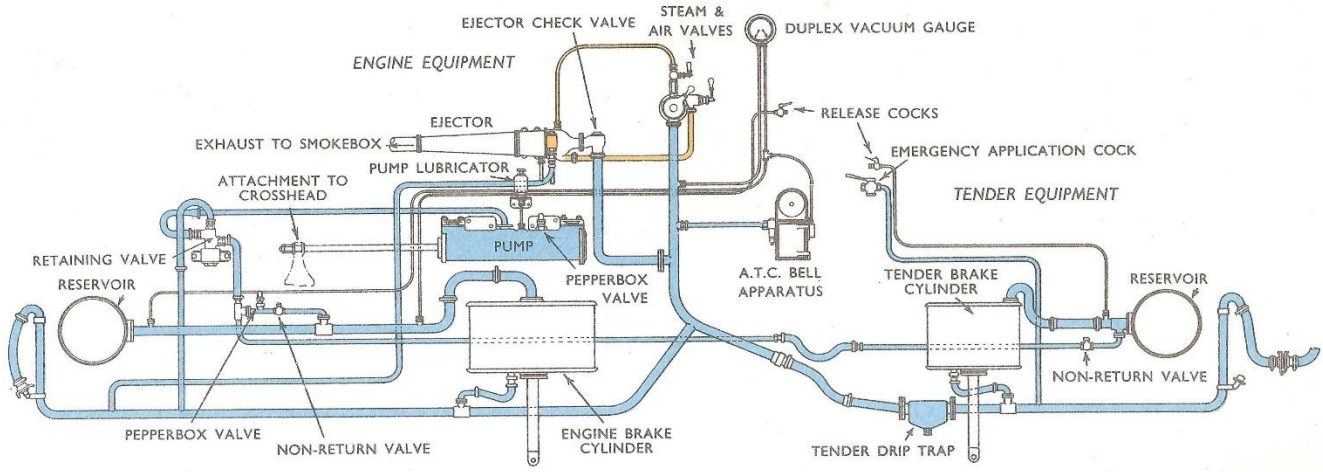
Fuel and Water - The main purpose of a tender is to carry the fuel and water required for a journey. Coal is piled up in a space with a sloping bottom in the centre of the tender. The slope helps to bring the coal forward to the front of the tender from where it can be shovelled by the fireman. A pair of stable doors prevents the coal from spilling on to the footplate, but these can be opened in turn as the quantity of coal left reduces. The water tank wraps around the sides, under the slope and at the back of the coal space. Plates extend across the tender at intervals to provide both physical support and act as washplates (preventing surges of water when braking). Large holes are cut through these plates to allow water to circulate and to permit staff to access the interior of the tank when necessary. There is a water level gauge on the right hand side of the tender (behind the driver). Adjacent to this is a screw handle for raising and lowering the retractable water scoop below the tender (see diagram). When lowered this scoop can pick up water from a water trough positioned in the centre of the track. It allows the water in the tender to be refiled, so that trains can undertake long non-stop runs. A dome over the top of the inlet pipe prevents the pressure of the inrushing water damaging the tank. The water filler cap is directly behind the dome, with inspection hatches covered by plates on either side.



Tender Brakes - All six tender wheels are fitted with brake blocks. These are suspended from hangers attached to the vertical plate frames and can be operated by either the train's vacuum brake system or a manual screw handle on the left hand side of the tender (behind the Fireman). An elevation and plan drawing shows the mechanical arrangement of the brakes on the first two pairs of wheels beneath the tender. The brake blocks are connected to three transverse beams, which are connected at the centre to a pull rod. The use of these beams ensures that equal force is applied to each brake block, so that the blocks wear evenly. As the brake blocks wear the clearance to the wheel tyres can be maintained by shortening the pull rod using a turnbuckle in the pull rod. Slotted rods are provided in the linkages to the vacuum cylinder and manual brake handle so that these can be operated independently.



This schematic drawing shows the Great Western Railway's typical vacuum brake arrangement as found on their larger tender locomotives. The equipment on the tender is shown on the right of the drawing.



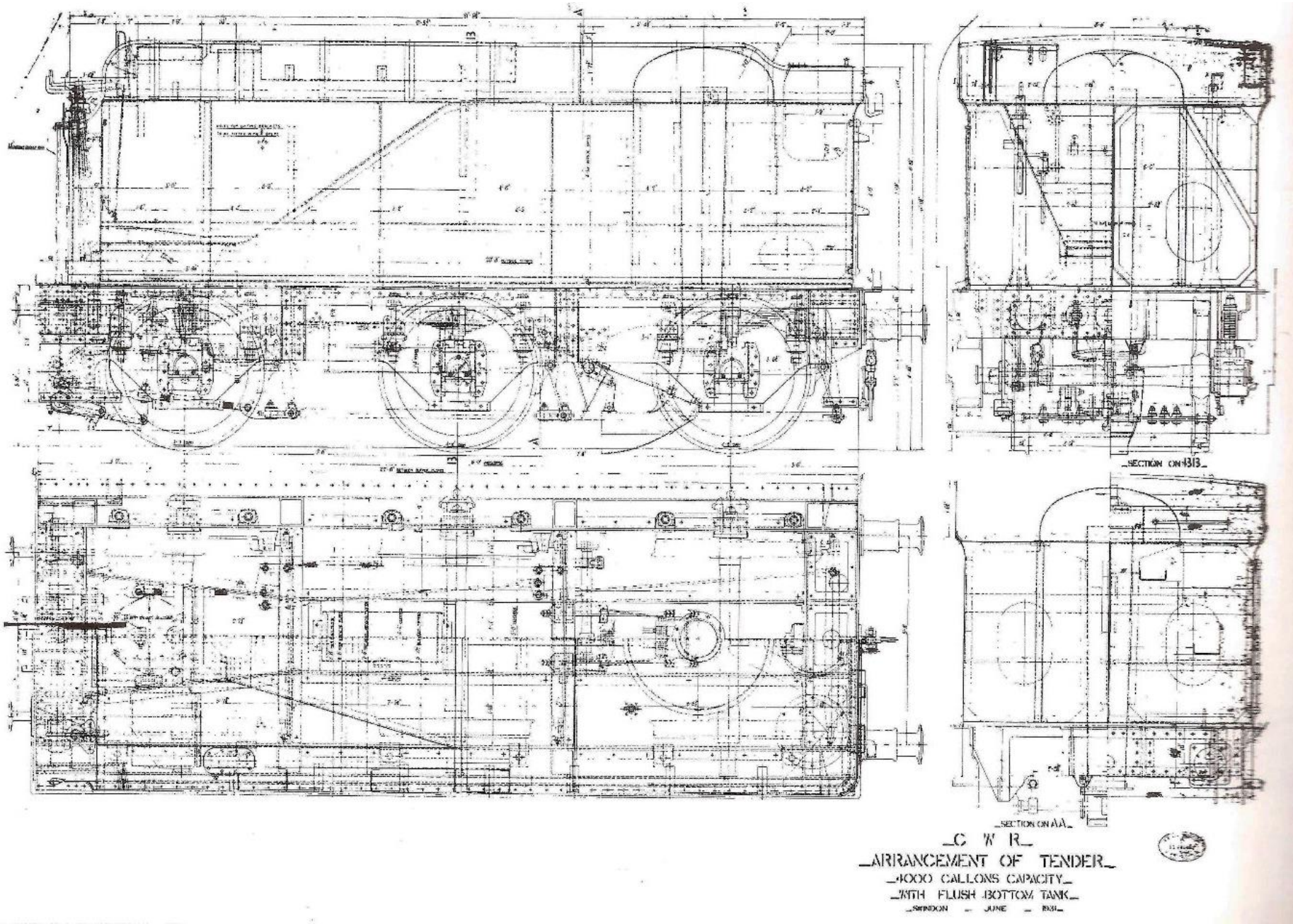
Vacuum brakes provide a failsafe system, which operate the brakes when air enters the system. The vacuum is initially created by passing steam through a multi cone ejector and subsequently maintained by an air pump. The vacuum charges a number of reservoirs and holds the pistons in all the brake cylinders under the locomotive, tender and other fitted rolling stock. The vacuum can be destroyed deliberately by letting air into the system or by the accidental parting of a vacuum fitted train. Loss of vacuum pressure causes the pistons in the brake cylinders to move, which mechanically operates linkages to the brakes.

4000 gallon Collett Pattern

Charles Collett was the Great Western Railway's Chief Mechanical Engineer from January 1922 until 1941. He was a talented technical engineer who; improved the existing designs introduced by his predecessor (George Churchward) and reduced manufacturing and maintenance costs by standardisation. 481 tenders of this design were produced at Swindon Works from September 1926 until July 1946. The Collett tenders built prior to March 1931 have been marked 'early Pattern' in the table above. These had narrower Hornplates which were found to be susceptible to cracking. All the Collett Pattern tenders were designed to carry six tons of coal and 4000 gallons of water. The tender tanks were riveted (except the last five built in 1946, which were welded). All the tenders had a high full length solid fender. This was the logical development that had seen coal rails fitted to the top of early tenders to increase their coal carrying capacity and then subsequently these rails being replaced with solid fender pieces. These tenders weighed 46tons 14cwt (full) and 22tons 10cwt (empty).

The photograph shows 4000 gallon Collett late Pattern tender No.2621 attached to 4-6-0 Castle Class No.7029 'Clun Castle' at Stratford on Avon.

The drawing below is dated June 1931 and shows the standard 4000 gallon Collett late Pattern Tender. This has the wide hornplates which were introduced on tender lot A123 (March 1931).



C W R

ARRANGEMENT OF TENDER

4000 GALLONS CAPACITY

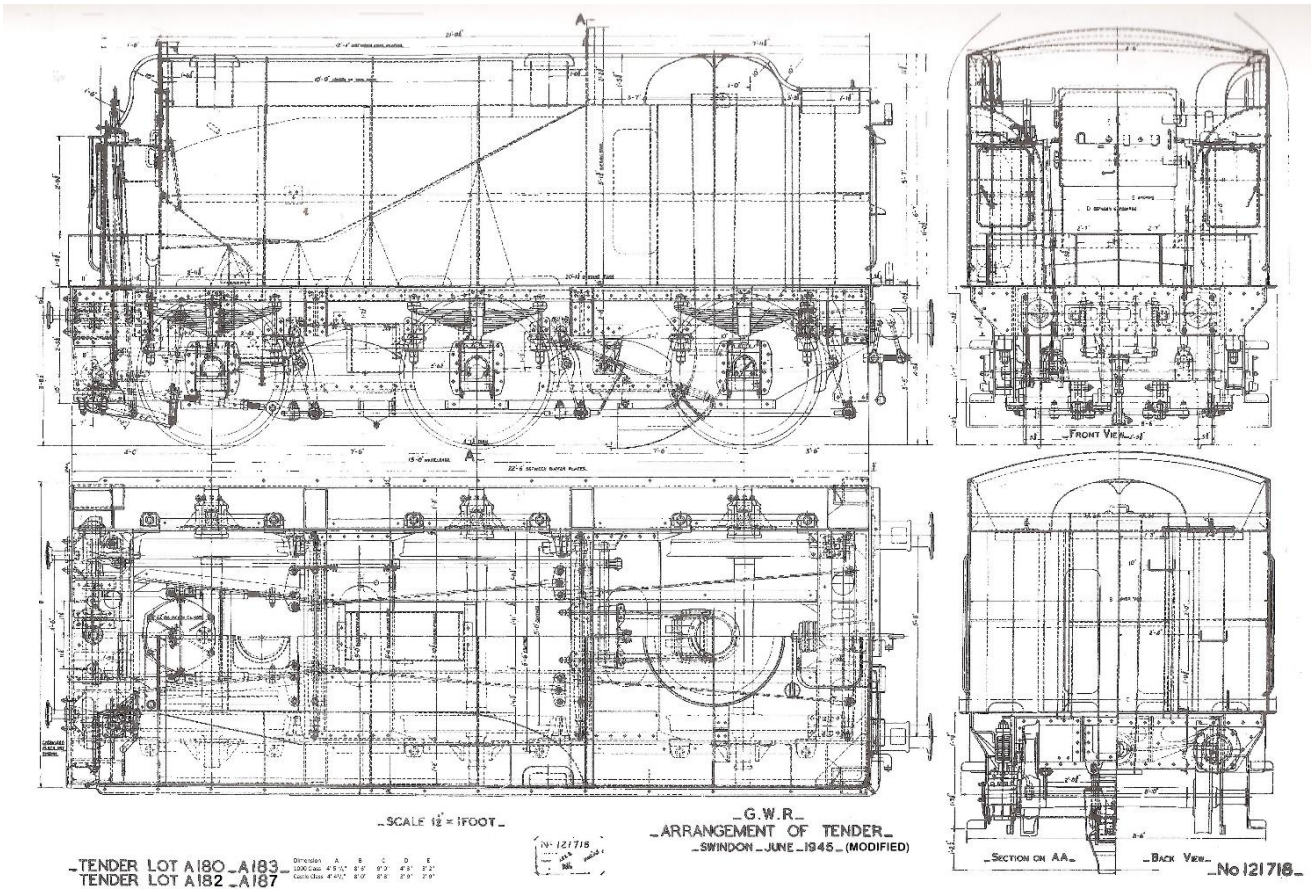
WITH FLUSH BOTTOM TANK

SWINDON - JUNE - 1931

4000 gallon Hawksworth Pattern

When Chief Mechanical Engineer Charles Collett retired in 1941, he was replaced by his assistant Fredrick Hawksworth. Hawksworth increased superheat temperature and championed new production techniques. In particular welded construction, which had proved to be quicker and less labour intensive than riveting. To achieve this, designs were simplified and seam welding introduced. One of the most obvious features was the incorporation of the tender's fender into the steel side sheet resulting in these tenders having straight slab sides.

The photograph shows 4-6-0 Castle Class No.5080 'Defiant' on a northbound express at Patchway Station in the summer of 1960. Attached is Hawksworth Pattern tender No.4046 (Lot A187). The reporting number 'M95' indicates that this is the 07:30 SX Penance (SO Newquay)) to Manchester (London Road).



The drawing is dated June 1945 and shows the 4000 gallon Hawksworth Pattern Tender designed for 10XX (County Class) locomotives. This tender was eight foot six inches wide, which matched the width of the cabs of the County Class locomotives. The Castle Class locomotives were six inches narrower, so an eight foot wide tender was also produced. This drawing has been modified to show both dimensions. The modification reduced the tender's capacity from seven to six tons of coal, but maintained the water capacity at 4000

gallons. These eight foot wide tenders weighed 47tons 6cwt (full) and 23tons 5cwt (empty). A total of 107 eight foot wide Hawksworth Pattern tenders were produced at Swindon Works from October 1946 until February 1951. Like the Collett Pattern, they were flush bottom tenders with a retractable water scoop. The chassis, wheels and wheelbase being identical to the Collett late Pattern tenders.

3800 gallon coal weigher (Hawksworth Pattern)

Only two tenders of this type were produced at Swindon Works:

No.4127 built in March 1952, condemned August 1962

No.4128 built in February 1952, condemned August 1958

They were designed to carry six tons of coal and 3800 gallons of water. They were based on the 4000 gallon eight foot wide Hawksworth Pattern tender, but some water capacity was sacrificed to allow the fitting of weighing apparatus under the coal space. This allowed the consumption of coal to be accurately measured so that the locomotive's efficiency could be determined. These tenders usually only stayed with a locomotive for a few months at a time. These tenders weighed 49tons 18cwt (full) and 26tons 10cwt (empty). Tender No.4127 was photographed at Tyseley Shed (paired with 2-6-0 No.6316) on 3rd May 1953.

Tenders during Preservation at Tyseley (4000 gallon Hawksworth and Collett Patterns)

Locomotive No.5080 'Defiant' was withdrawn from service in April 1963 and in October 1963 was sold for scrap to Woodham Brothers in Barry Docks, South Wales. After almost eleven years, the locomotive was acquired for preservation by the Standard Gauge Steam Trust at Tyseley. It was originally intended to use the locomotive as spare parts for the Trust's flagship locomotive No.7029 'Clun Castle'. No.5080 'Defiant' left Barry in August 1974 with no tender, but in the company of GWR prairie tank No.4160, which had also been purchased for preservation. Travelling to Tyseley by rail, No.5080 suffered from a hot axlebox and both locomotives were detained in Gloucester Yard for several weeks (The photograph shows both locomotives in a siding at Gloucester). After this experience British Railways refused to move any further ex-Barry locomotives by rail.

Eventually No.5080 'Defiant' arrived at Tyseley (see photograph), where the locomotive was placed in storage. It was later coupled to a 4000 gallon Collett Pattern tender that had been allocated to the Tyseley Steam Crane and was now surplus to British Railways requirements. This tender is believed to have come from locomotive No.7929 'Wyke Hall', which was allocated to Tyseley Shed until withdrawn in August 1965. No.7929 'Wyke Hall' was photographed after the locomotive's final Light Overhaul at Swindon (in November 1964) with a 4000 gallon Collett late Pattern tender. This is thought to be either tender number No.2715 or No.2894 (from tender lots A141 and A170 respectively). Unfortunately records were not always kept for tender swaps

in the last days of western steam. This tender was eventually stripped for assessment during autumn 1995 for use with No.5043 'Earl of Mount Edgcumbe', but the tender tank was found to be beyond repair and was eventually scrapped around the end of 1995. Two steel sections with blue paint and the BR crest from each side were saved (British Railways painted the 'King' class locomotives in a Light Blue livery in the mid 1950's). The wheels, spring gear and brake gear were reused on the Hawksworth tender for No.5043 'Earl of Mount Edgcumbe' and the tender frame is being used to recreate a 3,500 gallon Collett Pattern tender for new build locomotive No.6880 'Betton Grange'.

Fortunately another 4000 gallon Collett late Pattern tender had come to Tyseley with the Cowans Sheldon 30 ton Steam Crane No.139. This crane had been allocated by BR(western region) to Breakdown duties at Newport Ebbw Depot, before being transferred to Worcester Depot in 1972. When the crane was withdrawn in 1976, the surplus elements of the breakdown train were moved to Bescot Depot from where they were purchased in March 1977. This included the tender, which was initially ear-marked for coupling to No.7027 'Thornbury Castle'. The tender was however switched to No.5080 'Defiant', when it was decided to overhaul this locomotive first. It was found that the frame was in good order and little work was necessary mechanically. This tender had had a lot of preparatory work undertaken on it for use on No.7027 'Thornbury Castle'. The tank was removed for examination and a new section fitted in the front of the tank. The water scoop was not fitted, as no water troughs remained on the British Railways network. No tender serial number could be located during the overhaul, which is why it was decided to fit a replica number plate to the rear of the tender bearing the number 2782, in remembrance of the first tender paired with locomotive No.5080.

The tender suffered on the afternoon of Friday 13th April 1990, when No.5080 'Defiant' was being moved by BR personnel to be examined prior to main line activities. While traversing a switch, the points moved causing the tender to be derailed. Although rapidly remounted, the tender had sustained damage to the keeps, drag-box and draw-bar. As this tender needed to be withdrawn for repair, 4000 gallon Collett Pattern tender No.2621 (which normally operates with No.7029 'Clun Castle') was substituted for a period.

In 1997, the brake gear on the tender was overhauled and some minor modifications / repairs made to the tender. These allowed the tender to used behind No.7029 'Clun Castle' for 'Drive a Loco' experiences, while this locomotive's tender was under repair. During this work the number 2788 was found stamped on some of the tender's original brake hanger brackets, this prompted further investigation and the number was also found stamped on the edge of the front tender dragbeam. This confirmed the real identity of the tender, as tender No.2788, which was also part of the same Swindon build lot (A148) as tender No.2782, The tender numberplate was therefore swapped to give the tender its original identity back.

In late 2020, No.5080 'Defiant's' tender was photographed by Michael Whitehouse adjacent to the Tyseley Locomotive Workshop prior to the start of renovation work. It is good to know that other than a few steel

patches that have been put in the coal space towards the end of No.5080's boiler ticket, the tender remains largely in its original condition.

Robert Ferris – Volunteer Archivist
(November 2021)

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