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# The Prospectus

**September 2022**



David Scott and Nigel Penford hard at work on club-house improvements. Photo John Billard

**KNUCKLE JOINTS  
MERLINS EXPLAINED  
IRONCLADS  
PLASMA WORK  
ROB ROY  
NEW CLUB EVENTS  
IN 1962**

## **THE VIEW FROM THE CHAIR**

**John Billard**

It has been raining as I write and let's hope this continues despite coinciding with a hose pipe ban which will not help maintenance of our lovely site so carefully looked after by our parks and gardens team.

The trustees met on the 15th August with an agenda dominated by the need to improve site security and to recover our losses. Great progress is being made and all members owe a debt for the efforts of our Wednesday Warriors. Following a suggestion by Steven Millward we are putting up steel cladding and it has been suggested that the whole building could be done in this way. That will be a later decision. We now have CCTV installed in the clubhouse further lighting ordered and our coal supply has been moved to a safe place and we are improving our locks and security in other ways.

In the meantime our programme of private parties has continued although a welcome break from this is now taking place not least to give Peter Culham and his colleagues a rest. But not for long as he is about to issue tickets for our Santa weekends in December. This will be for three days for which we know there is a demand. This our flagship event with the public and without doubt this is the best pre Christmas occasion in Reading after the department stores gave it up some years ago.

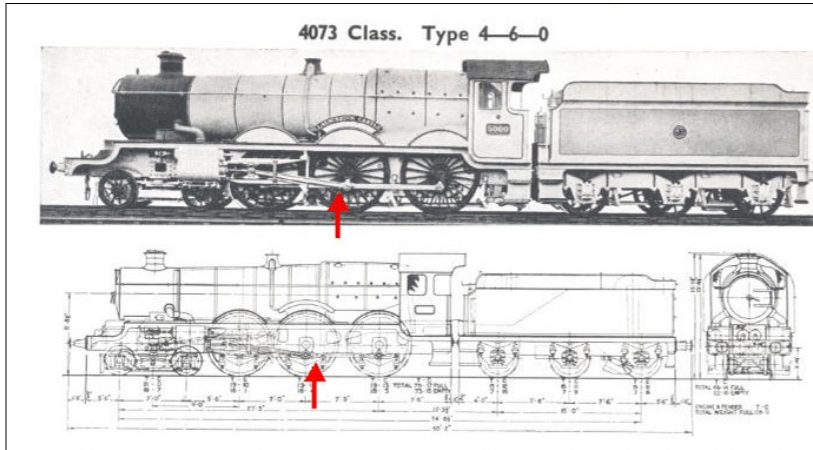
We report that our financial position remains sound because of the careful management by Jim Brown assisted by Stuart Kidd. At the moment we have about 77 members. Not bad but we could do with more. The trustees are considering restructuring our membership system to make it easier to join and renew.

With insurance claims to be dealt with, protection against burglaries, and the drought it has not been an easy few months for us. We are grateful for all the support that members give us to keep things running as well as they do.

## **GWR Locomotives: Coupling Rod Knuckle Joints Part 4 by Alec Bray**

With the two-cylinder 4-6-0s, there was a clear design change between classes: there was no such simple story for the four-cylinder 4-6-0s. The change happened during the 1932 builds, and there seems to be no secondary source documentation about this! The only way to check was to search through photographs of "Castles" and record the position of the knuckle joint for each individual locomotive – although it is of course possible that some "Castles" had the knuckle joints position changed between build and photograph (and in some photographs it is impossible to determine the knuckle joint location!).

Some "Castles" have had the knuckle joint changed in preservation: for example, 5080 "Defiant" is fitted with a set of early rods (knuckle joint leading



crankpin), because its original coupling rods were stolen in a robbery at Tyseley in the 1980s and a spare set from a local heritage collection was fitted to it some 25 years ago.

The Great Western Drawing Office (and the locomotive works) had been designing and building four-coupled locomotives since Swindon Works had been set up, and so were used to long coupling rods from the driven axle (the leading driving wheel axle on a 4-4-0) to the rear driving wheel axle - and perhaps they just kept on doing the same sort of design work when a leading pair of driving wheels were added to make a 4-6-0, although the rods were some 12 inches shorter.

A possible explanation for the change in location of the knuckle joint may be to do with maintenance. With the knuckle joint to the rear of the driving wheel crankpin, it would be easier to remove the rear half of the coupling rod (otherwise it would probably be necessary to remove the connecting rod before splitting the knuckle joint). This however does not explain why the Moguls had rear knuckle joints right from the start, whereas the early series of ten wheelers had forward knuckle joints. In any case, why would the rear coupled axle be dropped rather than any other axle in the couple wheel set? In any case, it seems that coupling rods were usually re-metalled as a complete set, requiring the removal of both parts of the coupling rod.

Another suggestion may be that having the knuckle joint behind (trailing) the centre driving wheel crank made the two parts of the coupling rod rather more equal in length (given the wheelbase between the three coupled axles), but this does not work for all locomotive types (for example, the 1901 class).

There is no mention of the change of location of the knuckle joints for any of the modern passenger classes in the RCTS publication about the locomotives of the GWR [8], but for both the Stars and Castles, it is reported that

spring equalising beams were discontinued from about 1930 "...as more flexible springs were adopted...". This change in springing may have required a change in the coupling rod knuckle joint location, which seems – from photographic evidence currently available – to have happened during the build of the 5013 class, which introduced a number of changes to the Castle class, including changes to the locomotive springing. However, 5017 (originally "St Donat's Castle") and 5020 ("Trematon Castle") were both completed in July 1932 – but photographic evidence shows that one had the knuckle joint on the front part of the coupling rod, the other had it on the rear part! (But, of course, although a photo shows the position of the knuckle joint on the day of the photograph, it does not mean that there had been no change in the knuckle joint between build and the day of the photo!)

As regards the two-cylinder locomotives, the Saints' spring compensating gear was removed from about 1931. The first Halls had spring compensating beams, but "...4981 onward were without them and they were gradually removed from the earlier engines..." (page H30). This does not explain, however, why some Halls (4953 "Pitchford Hall" for example) finished their days with the knuckle joint still in front of the driving wheel crankpin. There does not appear to be any connection between the position of the knuckle joint and any other improvements in locomotive performance.

The story so far seems to be that GWR express passenger and mixed traffic 4-6-0 locomotives were originally designed with the knuckle joint ahead of the centre driving wheel crankpin (and hidden behind the connecting rod) but some of these locomotives at some stage of build or repair had sets of coupling rods fitted with the knuckle joint to the rear of the centre driving wheel crankpin, on an extension of the front coupling rod. In any case, there was a change of design around about 1931/1932 for all 4-cylinder ten-wheelers – and for all *new* designs of two-cylinder ten wheelers, so that the knuckle joint followed the driving wheel crankpin. If there was an engineering reason for the change of position of the knuckle joint, or a (fundamental) policy decision for the change, it would be expected to apply to all locomotives of a class. It clearly did not in the case of the 4-cylinder locomotives, and did not apply to 2-cylinder locomotives built to the then current design: most locomotives ended their days with the style of coupling rod they were built with – as Didcot's own 5900 "Hinderton Hall".

Collett was the GWR Chief Mechanical Engineer from 1922 to 1941. He inherited a superb roster of locomotives from G. J. Churchward, and his main task was to improve on and develop further from these locomotives -which he did but without departing too far from the Churchward design – and so the coupling rod knuckle joints on the 4-6-0s remain in front of the connecting rod crankpin.

The "King" class 4-cylinder 4-6-0s locomotives were designed in 1927 and had the knuckle joint following the connecting rod crankpin. However, alt-

though Collett was nominally in charge of the design, a great deal of the detailed design work was undertaken by F. W. Hawksworth, the chief designer. Then, in 1932 he was appointed Assistant to the Chief Mechanical Engineer, following the departure William Stanier to the LMS. Soon afterwards Hawksworth became Principal Assistant to Collett and ultimately Collett's eventual successor. All the 2-cylinder 4-6-0s developed when Hawksworth was CME had the knuckle joint following the connecting rod crankpin.

There does not seem been any definite reason for the change in knuckle joint location – other than to provide some element of standardisation across *all* locomotive types, otherwise it is likely that the change would have been applied to all members of each affected class.

Most of the other six-coupled GWR-designed locomotives – including the smaller 4-6-0s – had the knuckle joint after the driving axle crankpin, but there were some interesting exceptions. The 56xx 0-6-2T tanks and the 1366 0-6-0T tanks had the knuckle joint before the driving axle crankpin. What was the reason for this? (Both were GWR-ised versions of absorbed locomotives!) *(to be concluded)*

*Reference*

8. *The Railway Correspondence and Travel Society (RCTS) "Part 8 Modern Passenger Classes" The Locomotives of the Great Western Railway The Railway Correspondence and Travel Society, 1968*

## The Rolls Royce Merlin engine 724 – 1C

Visiting a friend's workshop recently I was pleased to see this. The intention is to refit it into a car designed and built by his late brother. Technical details follow.

Acknowledgements to Robert Jameson and photo John Billard



## **Rolls Royce Merlin engine 724 – 1C**

The Merlin was the first production engine to produce more than one BHP per pound weight. 168,176 were built, the engine illustrated in 1950 the last year of manufacture and fitted to a BOAC Argonaut. It suffered a forced landing cracking the reduction gear housing but still managed to fly home from Hong Kong.

It can produce over 2,000 BHP giving 3,501 pounds foot of torque, the equivalent of 149 Austin Sevens.

Crossover exhaust to prevent nervous passengers from becoming alarmed by the sight of flames from the exhaust, also quieter.

Fitted with intercooling and warming as well as a heated Corliss throttle valve.

Tandem rotor centrifugal blower spinning at 17,370 and 21,180 rpm at 3,000 crankshaft rpm.

Petrol injection oil dilution system for cold starting.

Indirect drive to propeller reduction gear via a quill shaft to ensure correct meshing over full width of gear teeth to compensate for crankcase distortion under load.

Single point fuel injection.

Fuel demand 165 gallons per hour £1,567 per hour at pump prices.

A Spitfire will travel at 7 mpg in cruise.

Weight 1,790 lb, 811 kg, including reduction gearing.

Double end crankshaft oil feed.

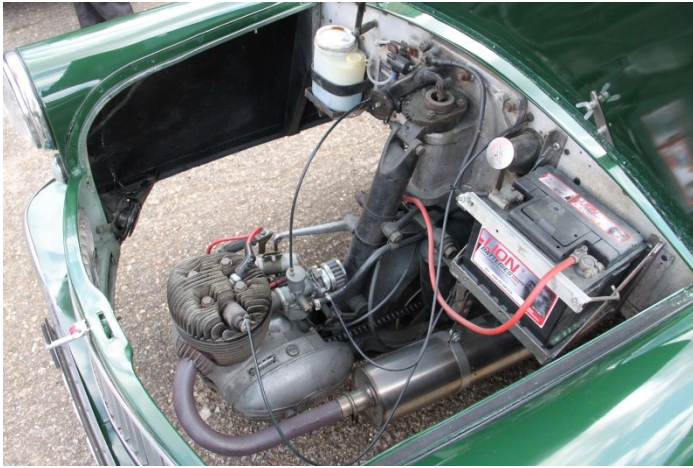
Vernier camshaft adjustment.

Sodium cooled exhaust valves.

Automatic boost control.

Water jacketed supercharger rotor volutes.

Over 14,000 components.



By contrast to the Merlin, here is the 122 cc Villiers engine fitted to a Bond MiniCar. Photo David Scott

The Merlin-engined car is expected to do 3 mpg.

## IRONCLADS?

The London and South Western Railway built some carriages with steel sheeting over a wooden frame known as “Ironclads”. Taking that as a cue RSME is cladding the clubhouse in steel as a security measure. To be known as “Ironclad House”? Below an aforesaid carriage (*photo internet*), *bottom left*



*left* a suitably clad Stephen Millward cutting steel, *below*, a cheerful Nigel Penford installing iron and insulation.



## ALAN THATCHER REPORTS

Some time ago we reported on Alan's plasma cutter that he built for his home workshop. Here we have some recent examples of his work.



Support brackets for a 1931 Riley car done by cutter + CNC



*Left* A replacement wheel nut on the left that has been made by Alan, plated and will be engraved.



*Right*, a special spanner made from 10 mm steel using the plasma cutter + CNC

Photos  
Alan Thatcher





## IN SHOPS THIS MONTH

### A Rob Roy Overhaul

John Billard

It was our LittleLEC in June that started this. Having watched the competitors streak round like electric mice I thought "I have one of these!". This was my first attempt at model engineering started in 1978. It ran well for many years when I



Photos John Billard



was a Bracknell member but was set aside eventually although I did fix a boiler problem with the help of Les about 14 years ago.

If this was going to be a project the first thing I had to do was check the boiler again. Having done a complete strip down I was

very pleased to find that it held full pressure and with fittings attached I did my own unofficial test up to 120 psi. *See top left.*

So far so good. While I was about it I remembered that the blow down valve was in a very awkward place on the back head so I decided to fit an extension that was more accessible. The picture *above* just about shows it hidden behind the footstep. The valve was taken from an old LBSC design in his *Shop Shed and Road* book first published in 1950.

I should have said earlier that applying compressed air to the cylinders showed that it still ran like a good one. So reassembly is now taking place. I have found it quite interesting looking at my skills as they were back then but I have to say I am now having to keep up the standard!

There is a little way to go yet but I hope that I will be able to have this little engine back in steam fully certificated quite soon. At least it will be easier to move around than my 5 inch gauge engines and it will be just as much fun!

## CLUB VISIT TO THE FARNBOROUGH WIND TUNNELS

Mike Manners is very kindly organising a visit for RSME members and friends to the wind tunnels at the former Royal Aircraft Establishment at Farnborough.

**The dates selected are either 22 September or 27 October. Please state your preference.** Tours are limited to 15 and it is on a first come first served basis.

Please contact Mike if you are interested. His details are [michael.manners2@ntlworld.com](mailto:michael.manners2@ntlworld.com) or by post to 257 Loddon Bridge Road, Woodley, Reading, Berks, RG5 4BL.

## THURSDAY NIGHT TALKS

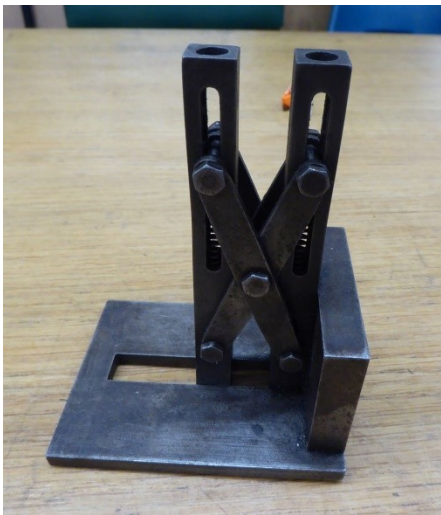
We are starting on 15 September with a talk and presentation by the editor titled

**Sixty Years Ago—Some photographs of the end of the railway steam age**

Following the series in issues of Prospectus, the editor shows more of his photos and how he obtained them. Primitive cameras, developing films under the stairs, his first published picture (in Railway Magazine), successes and disasters, and it all started on paper round money. Don't miss it!

**15 September in the Club House from 8 pm**

Do you have a talk that you could give? Contact the editor.



## MYSTERY OBJECT

**Found in the club workshop and nicely made—what is it?**

**Answers to the editor please.**



## SIXTY YEARS AGO

Photos by John Billard  
September 1962

A busy month for me, visits included Willesden, Old Oak, Paddington, The Isle of Wight, and Hayling Island, and Eastleigh. I include three Southern views this time.



*Above* 6002 King William IV enters Paddington just days before withdrawal. *Left* Southern W class 2-6-4 tank 31924 on ECS duties at Waterloo.



The Hayling Island branch just before closure with Terrier 32640 in charge. In 60 years some fashions have not changed!



A visit to Eastleigh shed on the 22nd produced the last surviving in BR service King Arthur 30770 *Sir Prianus*. Nicely smartened up it lasted a few weeks more until November.

## DIARY

### September

Sunday	4th	Public running	12 noon
			Setting up from 0930 onwards
Saturday	10th	Club running	10.30 onwards
Thursday	15th	Club House Talk	20.00
			See page 10 for details
Tuesday	20th	Club running	10.30 onwards

### October

Sunday	2nd	Public running	12 noon
			Setting up from 0930 onwards
Saturday	8th	Club running	10.30 onwards
Tuesday	18th	Club running	10.30 onwards

## SANTA SPECIALS 2022

For the forthcoming season Santa specials will be held on three days, Saturday 10 December, and Saturday/Sunday 17/18 December. Tickets will be on sale to the public this month.

It is likely that the 4th December public running will not be held. Consideration is being given to having a members club running on that date. Watch for further announcements.

Note from the Editor. Thank you to all contributors. Please remember that the copy deadline is now 20th of the month and material, unless previously notified, can be held over if received after that date.

Please provide photographs as separate files and not embedded into the text.

Opinions expressed in PROSPECTUS are the personal views of the contributor and cannot be taken as reflecting the views of the trustees or editor.

**The deadline for the October issue is 20 September**

Contributions may be submitted in hard or soft copy to the editor.

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*Please write for Prospectus. Photos welcomed.  
Comments by RSME members on any subject appearing in  
Prospectus are welcomed by the editor.*