MALLARD

Pity the poor people who peddle their products at model railway exhibitions. They often have a small stand, maybe an uncomfortable chair and just a counter to separate them from the great unwashed, of which only a small proportion would ever come close to buying anything. In the meantime, they have to put up with an endless stream of inane questions, leavened with an occasional sane conversation from the odd enthusiast. Of course, one wouldn't expect this to be so much of a problem at a 'specialist' exhibition.

However, on 29th April 1995, at the Staines Finescale Show, poor Martin Finney had to endure a father and son act. Gracing the table of his display was a most exquisite, two-thirds completed model of a 7mm scale A4.

'Alexander, have a look at this A4 — it's just like our one at home' (cringe from Mr. Finney).

'It's a lot bigger though, isn't it? How many motors would it have?' (Mr. Finney looks up to the ceiling).

'Only one', embarrassed father says to son (but read on!).

'Those are beautiful wheels', as father points to the set of stainless steel Alan Harris wheels under the engine. 'How much do they cost?'

'About £300' replied Mr. Finney, in best Rolls Royce salesman style, along the lines of 'if you have to ask, you can't afford them.'

Dr. TIM WATSON is best-known for his work in 2mm scale — and for his tendency to take years to complete a single model — but the Finney kit of a mighty A4, plus a little encouragement from us, proved too hard to resist. Tim built the model as 'Mallard' — with some amazing refinements of his own.

Conversation then began to rise above this rock-bottom opening as it moved to the subtleties of shape inherent in Gresley's masterpiece, the A4. Father was surprisingly knowledgeable about this, as he had spent 12 weeks hewing a 2mm scale model from a Lone Star push-along toy. Final comments covered the problems of how to reproduce the almost trivial, but ubiquitous, tarpaulin that linked loco and tender – seemingly the only thing Mr. Finney had not really considered. The father agreed to send him some thin rubber sheet that he had used successfully for this purpose in the junior scale.

At about this time, I was just finishing off my article on the 12 year-long construction of a Baldwin 2–6–0 and was in conversation with this magazine's editor about what would be next. I nonchalantly mentioned the 12 week hack of the Lone Star body and the topic swung inevitably towards A4s. We had both seen the masterpiece at Staines, so by a contorted route I ended up changing scales and building one as a review. 'You won't take 12 years, will you?' was the editor's closing question.

Now, this type of journalism is not represented strongly in my c.v. of model railway articles. The only other review I have written was for a whitemetal kit, a GEM 3F 'Jinty' in 2mm scale (GEM was once described as the Krupps of North Wales by Roy Dock). Neither the engine nor the text could rate as a major tome. Simple reviews that open with the description of whether or not the finished product fitted the box are not for me. Equally, some reviews can be quite wicked, although this might serve the purpose of giving the hobby's manufacturers a necessary kick. I can recall a comparative review of an English OO and an American HO kit by the late Geoff Pember, who described their construction as if they were being built by a father and son – 'little Johnny' – as novices. Our home-grown product did not fare at all well and I wondered how our modern kit purveyors had improved in the intervening years. However, I did not consider such an approach to be appropriate for something considered as state-of-the-art and well into a three figure value – unless, of course, 'little Johnny' was rather spoilt!

So the kit and bits (AGH, Alan Harris wheels) arrived just as we were about to go on the family summer holiday to the sun-baked Cornwall beloved of GW holiday posters. I generally take a modelling project on holiday with me. My 'portable' modelling kit is quite extensive (toolmaker's cabinet, modelling board with lights and a briefcase for little extras). My wife is not mightily impressed when we come to load up the caravan prior to departure, but it does keep me amused on wet days. Logically, the kit is in two parts, engine and tender, and so the latter was left behind for future times.

SETTING UP THE CHASSIS

In fact, before we left, I had just sufficient time to make up the frames, hornways and coupling rods and get the engine up on its legs. The axleboxes were made to slide easily in the hornways and pop-marked with •, ••, or ••• on their bottoms to indicate which axle they related to. I made up some jigs on the lathe to locate the coupling rods in relation to the hornways which were supposed to match exactly the axlebox distances to the coupling rod spaces.

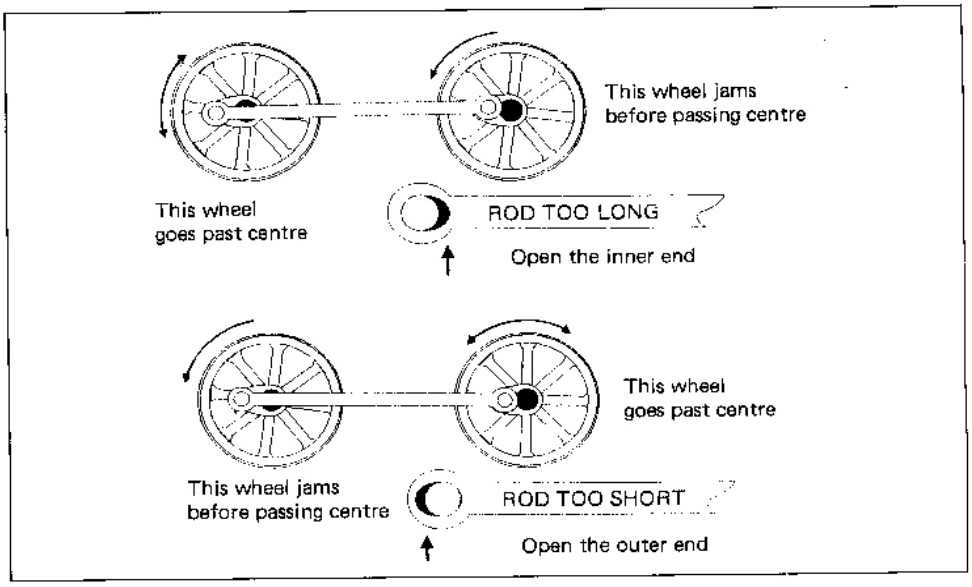
The metals from which etched kits are made is not always ideal for bearing surfaces, sometimes being quite soft. Therefore, some phosphor-bronze bushes were made to fit the crankpin holes in each rod. These also helped to locate the various laminations together, in which they were a tight fit. Bushes were also made for the big end bearings, as these components were also going to be the main wearing parts in the motion. The photographs of the big end assembly show the principle quite nicely.

The frames were carefully soldered up as per the instructions and the great moment arrived for the test on a piece of track . . . The whole assembly limped along with a wooden leg! This was not how it was supposed to be; all the other articles I had read inferred that this construction system was foolproof. Very cautiously, I eased some of the coupling rod holes in the way I normally do, but

would commend this description by a 2mm wizard, John Greenwood, of how he does it. I have tweaked rods many times in the past on 2mm scale locos, but John's description puts it into words more elegantly than I can.

'Having put the quartered wheels in the chassis, I test that each half coupling rod will go round on its own, by which I mean that it can be pushed along and not lock or bind at full front or back positions. In fact, I very rarely find that they will go round at first, as if I have drilled vertically, there is virtually no working clearance in the holes. So I ease the holes a very small amount with the point of a fine round file, turning it anti-clockwise from each side of the hole. If this is not enough, then I work out whether the holes are too close or far apart, as in the drawing, and then elongate a hole in the necessary direction by using the drill like a file, working the spiral flutes in and out, pressing *gently* in the required direction, rather than enlarging the hole all round. When each half rod will go round on its own, I try each pair of rods in turn four-coupled, and as each rod went round solo, it can only be the quartering that is wrong if there is a bind now, and I can only say that I adjust it by trial and error and experience. When one end works four-coupled, I take the rods off, marking them left and right so I can put them back in their original positions, and then try the other pair, but do not adjust the common axle, or that will upset the quartering of the first end. When both ends run four-coupled, I fit all the rods and try the chassis six-coupled, and it should work by now. My acceptance test is that the chassis should roll downhill on a bit of track under just its own weight without the wheels skidding – well, not much anyway. I do this at each stage just described.'

Where I had gone wrong with the massive A4, I don't know. Perhaps I was expecting too much. The quartering on Alan Harris's wheels was as near perfect as I could tell. Perhaps the fit of the rod bushes was just a bit too tight. Fitting the bushes into the etched holes could have drifted the dimensions of the rods slightly, although I took great care to ream up the sizes of the holes to accept the bushes. Maybe my jigs were not as perfect as they should have been, even though they had been made with collets. Perhaps I hadn't set them up with the hornways pushed quite tight enough between the frames by the compression springs. Whatever the cause, there can be no doubt that unless a loco moves freely under its own weight on a slightly tilted track, it will not behave itself later. No amount of 'running in' will accommodate for any stiffness at this stage.



Read the instructions!

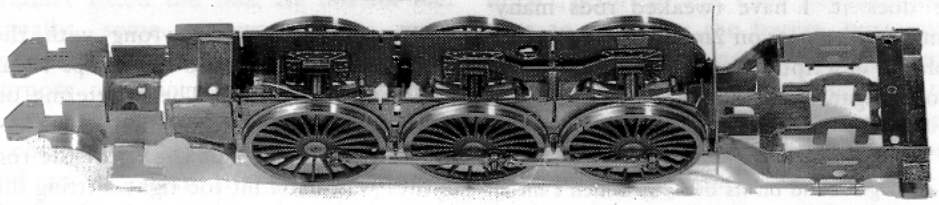
Many dentists that I know (and I'm sure people in other jobs as well) tend to follow the approach: 'If all else fails, read

the instructions'. As I was reviewing the kit I thought that I ought to be a good boy and not follow my professional instincts. The instructions that accompany the kit are very well-written and complete, but they don't suffer fools gladly. I spent a whole week, before we went on holiday, reading them on my daily commuting journey and checking them against the extensive drawings and keyed etch drawings that are provided. For this purpose it was more convenient to reduce the large A3 size drawings to A4 (appropriate really) to make them more manageable for confined spaces such as Thameslink trains and caravans. It would be helpful if the parts list indicated on which etch sheet the components were located, as 'chase the component' is a game developed to a fine art by Mr. Finney.

At this point, a word of caution: if you are a reader who might be building one of these beauties, I would suggest that you take particular care over deciding what chassis spacers you use. The kit provides a variety of spacers to suit various standards from ScaleSeven to fairly coarse O gauge. Now, being a new boy on the 7mm block, I didn't know what clearances I would need between the wheels and frames. My reading of the instructions was that the narrow spacers should be used if the engine is to be used on tight radius curves.

ScaleSeven was not really an option because I wanted the model to be put through its paces on the 5ft radius MRC test track. It would also probably end up being used (inappropriately, but almost inevitably) on the Club's Happisburgh layout. Doing my sums and harking back to my roots, I figured that 16ins would be a very tight curve for a 2mm scale Pacific and so opted for the narrow spacers, to give as much clearance as possible. Not being a seasoned 7mm modeller, what I hadn't really appreciated was that there is a tremendous amount of slop, or should I say clearance, between wheel and rail in the finescale standards. This allows quite large locomotives to squeal their way round sharp curves.

However, the die was apparently cast and I was happy enough with what I had produced; construction proceeded. Unfortunately, the more that was made, the more apparent it became that the only limiting factors for going round a bend were the clearance between the outside frames and the rear wheels in the radial



Cartazzi truck and the wet steam pipes at the front. The clearance between the driving wheels and the frames was almost irrelevant for curves; the narrow-gutted chassis I had constructed for the model made it look as if the two had fallen out with each other! Resolution of this dilemma was achieved by a conversation with Martin at the Watford Finescale Show. He kindly sent me another set of frames and these were cosmetically placed over the top of the originals. They were secured with Araldite and the line can be seen in some of the photos. So I am now the proud builder of the only double-framed A4 in existence!

The thickness of the new frames, over the top of the old, was just right. The spokes of the wheels barely clear the metal – this sort of thing is *so* noticeable in the dolls' house scales. All of the carefully embossed rivets were now properly visible as the spokes breezed past, with the ambience of the model improved hugely.

In fact, there are an awful lot of rivets on this locomotive and so some sort of decent riveting tool is a necessity to punch through the quite thick metal in which some parts of the kit are etched. Many years ago I purchased a riveter consisting of a U-shaped frame with a point and anvil. The sum total of its use up until this project was, first, the motion support bracket bolts on a Johnson Single and secondly, the firebox stay bolts on a Baldwin 2–6–0 in 2mm scale, indented way back in 1938 at the Model Engineer Exhibition. After a lazy youth, it certainly earned its living with the big A4. Consistency of rivets was achieved by driving the indentor with an Eclipse sprung centre punch to give a wallop of known magnitude. I spent a riveting few hours at the 1996 MEE using the A4 tender to demonstrate this technique on the MRC stand. It was amazing how many questions it elicited from the public, with bemused looks from the big boys, who of course use the real thing to hold their models together.

Anyway, back to sunny Cornwall. It is a credit to the kit that it can be made with simple hand tools on a rather rickety table, and construction of the chassis progressed. The twin compensation beams are fitted easily between th middle and last axle with a steel rod acting as a centre pivot on the front axle. The vertical level of this rod determines the sit of the locomotive and is straightforward to adjust using the frame tops as the measured reference point: it is an almost identical system to the third point of the compensation – suspension which I made for a Kirtley 0–4–4 (featured in a frighteningly early MRJ) and this has certainly had no problems with wear. Martin suggests that the loco can be made with a rigid chassis if required, but I can see no earthly reason for doing this when compensation is so easy to achieve with the (admittedly extra) bits that are available.

To jump ahead a bit, when the loco was up and running, I wondered whether springing might perhaps be more appropriate for this scale, to give more of glide in the way the engine rolls along the track. The compensation works of course, but it seems a bit lumpy. Now that I have some expertise in this model engineer's scale, and if I were scratchbuilding, I would probably use springs. For review purposes and because I could have made a novice's hash of it, I didn't. Making a return from these philosophical interludes, I would suggest that the rear frame extensions for the Cartazzi truck are best riveted *after* they are bent to shape.

One of the most useful references I had for the construction of the model was the superb article by John Hayes (MRJ Nos. 66 & 67), describing the building of the Finney A3 kit in P4. There are many components that are obviously common to both, as they were in the real thing. I found John's cool,

measured approach very helpful for many aspects of the construction. As you are doubtless aware by now, this article is not a simple rewrite of the instructions, nor will it plagiarise John – well, not too much, anyway.

WHICH A4?

I think that it is very important to get as much information as possible on a particular locomotive, if a convincing model is to be made. There are, of course, many books on the A4s. Martin lists a few in his introduction, but the RCTS *Locomotives of the LNER*, Vol. 2A and *Yeadon's Register of Locomotives* I found most useful. Even studying these cannot beat a good close-up examination of the real thing. About the time I was starting the model, there was a steam special, near to home, using *Union of South Africa* and *Sir Nigel Gresley*. Predictably, we went for a ride and took lots of photographs. Unfortunately, circumstances dictated that I took photos of the left side of one loco and the right of the other. Perhaps my model should therefore be called *Union of Sir Nigel Gresley*.

Choosing the correct loco to model at the appropriate time period is quite an interesting exercise. Engine selection is limited to some extent by the type of tender behind it, as Martin provides the converted tenders from the A1s. This is not such a limitation if one is flexible about time period, because the tenders did chop and change. I was rather taken by *Sir Nigel* in British Railways blue, lined white - blue - black - blue - white, with black wheels. This elegant ensemble made me think quite long and hard about making the model 'as currently preserved' (other interested parties also liked the BR blue because it would match the sitting room carpet). It is great to see preserved engines at work, but there are often many changes with bits and pieces added, or some important items removed. In the case of *Sir Nigel*, not just the BR-fitted AWS and speedometer have been added but an extra front pipe and electric lamps. The tender water scoop has been removed and the front bogie goes around naked without its dust shields.

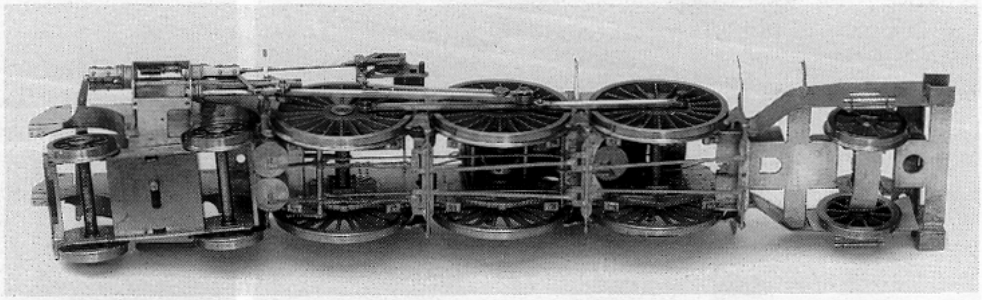
One has to go back to the postwar period to find an A4 with clean lines. As with many things, I have strong views about A4 aesthetics. Once the skirts were removed, the design became unbalanced, especially with the single chimney. I don't think the big red wheels looked right in unfrocked condition either. The double chimney helped to redress this imbalance and restore the critical front end proportions. Unlike my 2mm scale model, where the fully streamlined condition hid a multitude of sins, I was not going to put all that effort into making fully detailed 7mm scale valve gear, only to cover it up with valances.

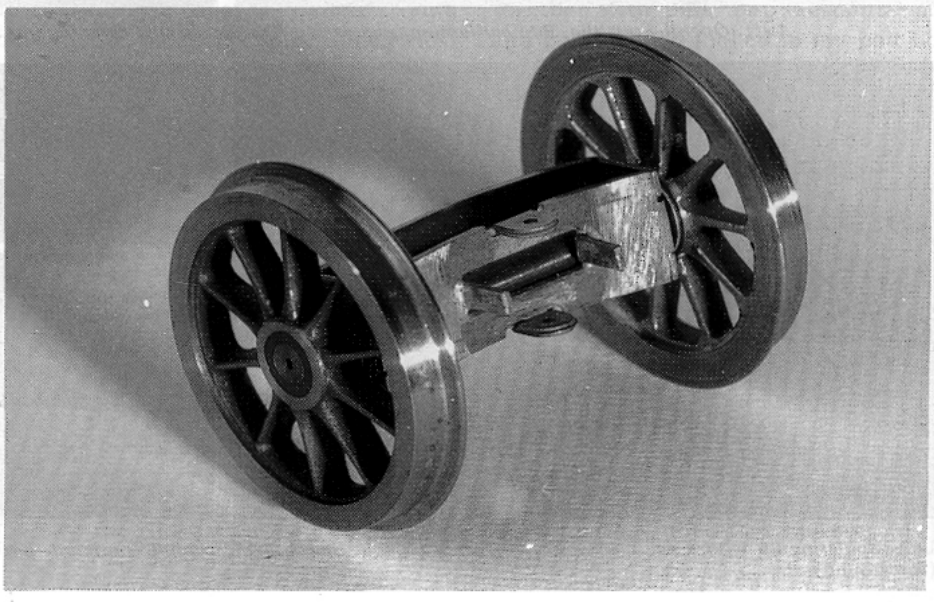
The condition in which I was interested could be served by the three locomotives involved in the Locomotive Exchanges of 1948, namely *Mallard, Seagull* and *Lord Farringdon*. Names are also, of course very important. Nautical birds do not appeal to me, but when significantly younger I had a pet duck called 4468. I always felt that *Lord Farringdon* was an impressive handle. All of these fine engines spent much of their time at Top Shed, not that we have any intentions of making a 7mm scale model of Belle Isle in the MRC. Close scrutiny of *Yeadon's Register* showed that indeed any of these engines could be the appropriate choice, with the correct combination of colour, chimney and tender. They had the advantage also that in the early 50s the front bogie was completely sheeted over at the front. Spring and axlebox detail visible on the present-day *Sir Nigel* therefore would be unnecessary (these bits are obviously not provided in the kit). The only extra detail that would need to be modelled would be the Flaman speed recorder as these were refitted, after the war, to the locomotives involved in the Exchanges. It should be apparent which engine I plumped for.

Bogies, trucks and things

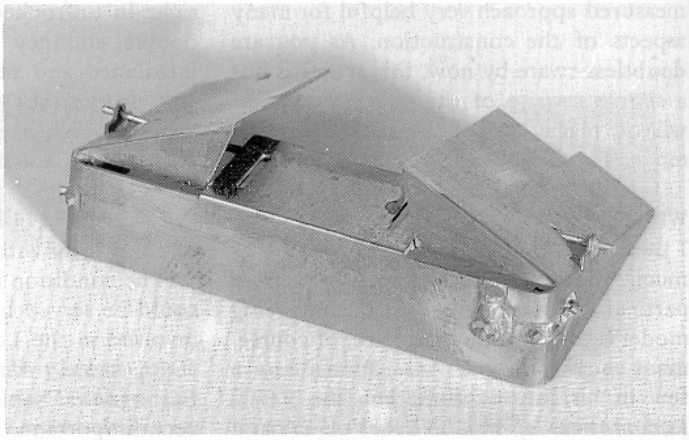
The bogie was the next part of the project, and the ScaleSeven spacers were used with minimal clearance behind the wheels. Martin suggests that two 0.8mm brass wires can be used to both steer and give vertical springing to this assembly. I found that it was better to separate the two functions by using a compression spring (removed from a ball-point pen) for the vertical movement. At the other end of the engine the Cartazzi truck works in a radial manner, with a simple piece of brass wire to centralise and lightly spring down the truck. Again there is no need to use the alternative narrow spacers provided in the kit for the curved axlebox assembly; lateral movement is limited by the outer frames only.

Martin's instructions are very good and well supplied with profuse drawings. However, certain structures are really





quite awkward to visualise from the drawings and descriptions. One such is the ashpan. Photos of the real thing will obviously help, but I mused for a little while about how it all folded up. The photos of the separated assembly may give you some assistance. There are some dinky little castings provided for taps, etc, and 1mm square wire for the washout plugs in the ash box. To be to scale, these should be smaller than this and so the wire should be filed down a bit. The large U-shaped supports around the ashpan will need to be shortened a little when the body is finally offered up to the chassis, at a much later stage of construction.

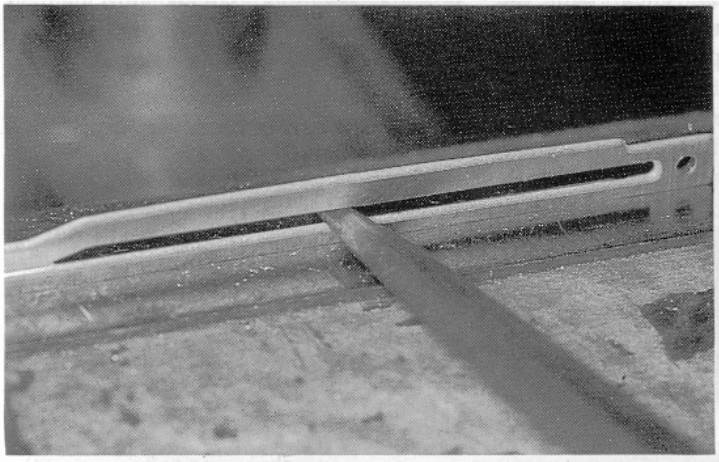


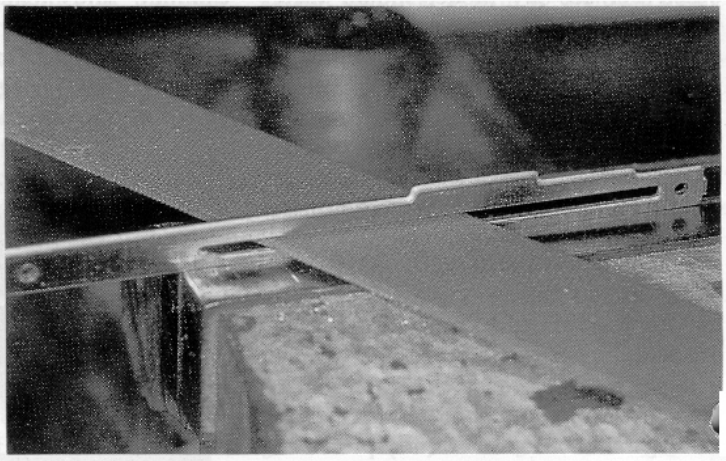
The ashpan.

With much of this kit, one ends up with quite complicated structures fabricated from flat sheet. Careful removal of the etched cusp by filing the edges of the thicker components will guarantee a superb fit of *all* components in this kit. Many times during our holiday I called my wife over to marvel at the superb fit of the made-up sub-assemblies. When making kits, part A has to fit not only part B, but also part Z. I wonder how many other kits there are on the market that allow this, with all the style and panache of this excellent product? However, with Martin's kits you must read the instructions carefully because they don't take prisoners. If you decide to race on ahead, without following the order of construction, you might end up embarrassed. When scratchbuilding, one at least has the indulgence of being able to make it up as you go along – any mistakes are yours alone.

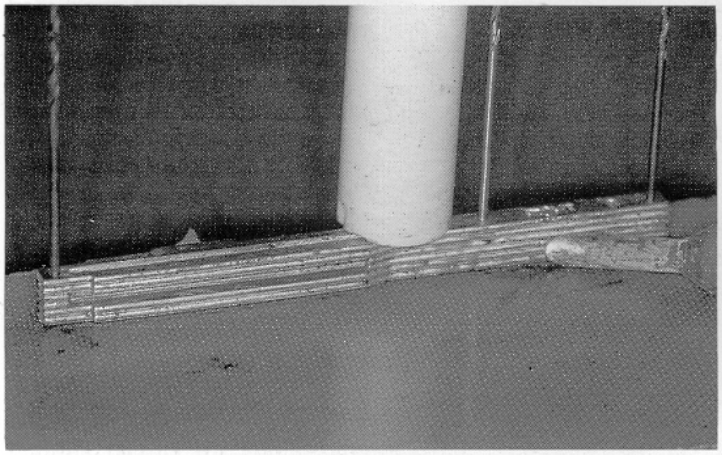
Valve Gear

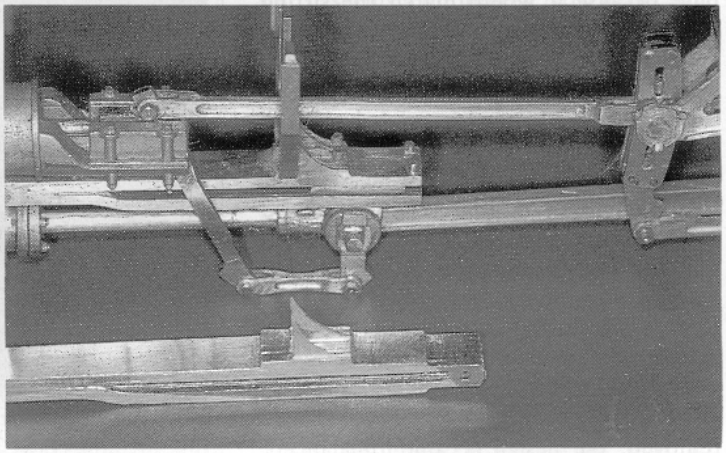
My goal for the holiday session was to get at least one side of the valve gear completed. This was achieved with ease and was a most satisfying experience as each bit added to the wonderful lolloping geometry of working Walschaerts valve



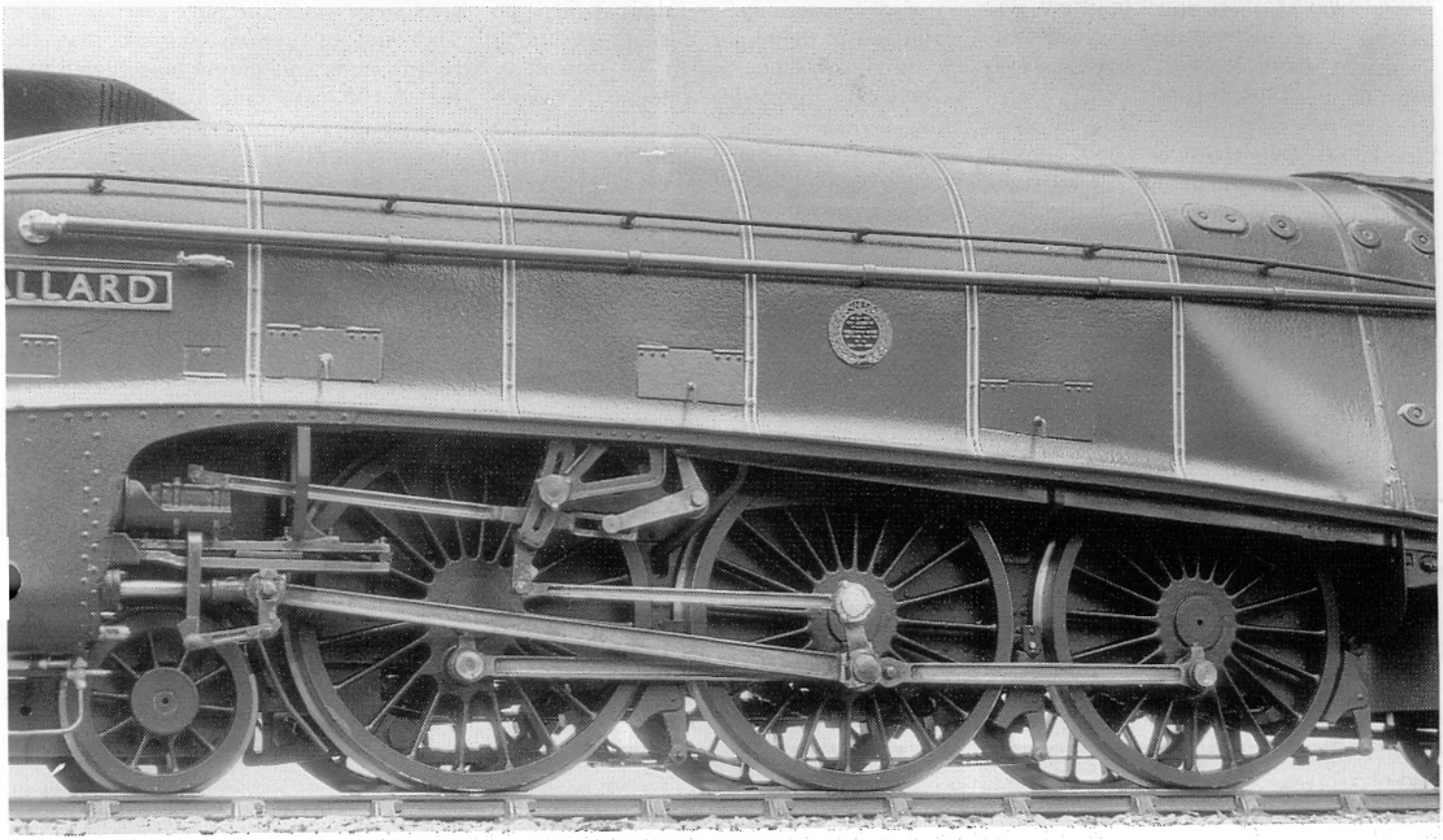


Left: *Opening out the slide bar laminations with a fine file.* Right: *Opening out some more, prior to soldering up.*





Left: *Soldering up with a jig. The white stuff is 'Macor', a finger-saving ceramic material.* Right: *The slidebar as modified* (back) *and as supplied* (foreground).



gear. I would again suggest that you read John Hayes' article for his view on how to do it. Careful cleaning up of the laminated components is essential to give the best appearance, as can be seen in the photographs; it is also important not to be too mean with the solder. The cylinder assembly and motion support bracket all hang together very well, with an internal strip and screw to fix them relative to each other — Martin obviously took note of John's review.

Slidebars: There is sometimes a natural tendency for etched 7mm scale kits to be enlarged versions of their smaller brethren. Occasionally, etch technology gets pushed a bit too far in the process. The slidebar assembly illustrates the point — as for the 4mm A3 version, it is soldered up as a series of laminations. These are well thought-out and easily self-aligning, using the jig holes provided, to produce a nicely functional assembly with the T-slot for the crosshead. Learning from a fairly tedious clean-up on the first side, I took the precaution on the other of removing the etch cusps on the sliding or inner face of each component *before* soldering up the laminations.

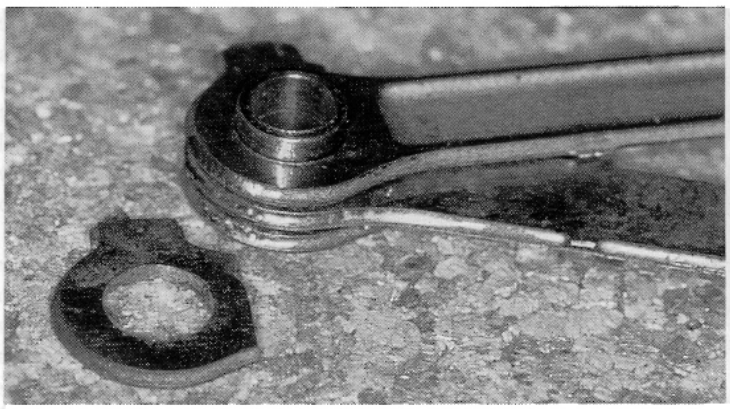
On the real thing, there are a significant number of bolts used to attach the slidebars to the motion support bracket that cannot be reproduced by the etch construction process. The bolts can be added with a little extra effort by drilling a few holes and filling with short lengths of wire, as should be apparent from the photographs. At the same time, the shape of the bracket on top of the slidebars needs to be modified at the front because it ought to be triangular in plan view, rather than rectangular. Elsewhere around the cylinder block are some superb lost wax castings so perhaps the slidebars would be good candidates for this treatment (as would the laborious-to-make springs). I suppose such an improvement would, of course, increase the cost of the kit.

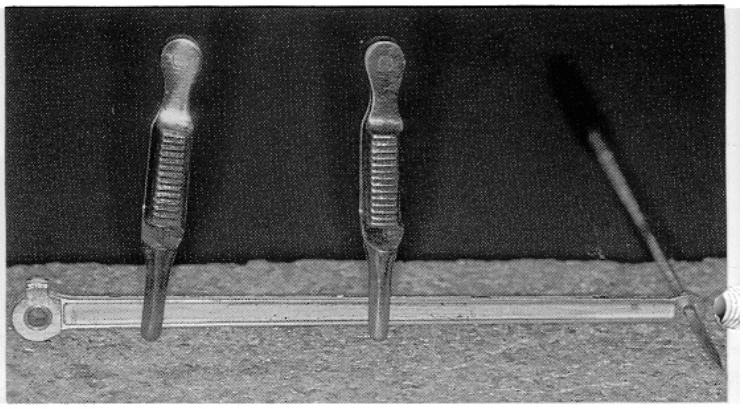
The crosshead needs to be a nice free sliding fit in the slidebars before fitting them to the cylinders. By a clever piece of design, the slidebars are positively located in both the front and rear faces of the fold-up cylinder block. In order to get a free sliding assembly, I found it necessary to slightly drift the hole for the piston stuffing box (nice name that) a bit closer to the slidebars using a needle file, otherwise things would have been slightly out of line.

Making the joints — pin or bolt? The joining of the links which make up much of the valve gear is well described in the kit instructions, and uses pins soldered through the forked joints (John Hayes also described his method of doing it). I made up one joint in this way but then had a close look at the real thing. Much of the readily visible gear is not held together with pins, but substantial nuts and bolts. I then looked in my bolt box, to find that 16BA is dead scale for the job, substantially reduces the work involved and looks just right (see photos). It also allows one to dismantle the gear for maintenance or painting. Being brass, they might wear and are not quite the correct colour, but a bit of chemical blacking would soon lose that and if they wear out they can be replaced. I am very fortunate, because I have at least three lifetimes' supply of 16BA nuts and bolts. They were purchased at a very reasonable price at the MRC in Keen House, originating, I suspect, from the late G. P. Keen's workshop (I believe he was something to do with GKN, the screw makers). In the

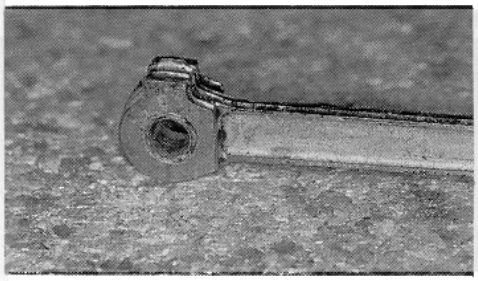
outside world, these small bolts are now getting rarer by the day and wickedly expensive, but as long as I can still get the taps, I'll be all right (Jack!).

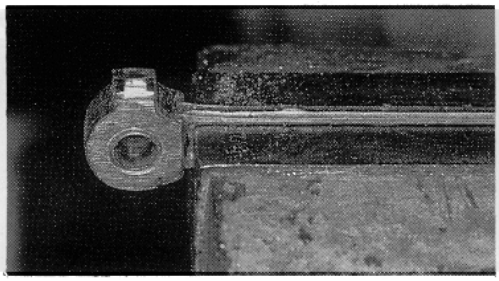
Crankpins: Alan Harris wheels consist of a steel crankpin drilled and tapped 10BA for the plain-headed cap bolt which retains the rods. The bearing surface is provided overlong, so that it can be trimmed to the required length (including a small washer, which is provided). Obviously, the middle axle has to have a long crankpin to accommodate both the rods and the big end, finishing with the return crank. The return crank in the kit appears very thin, but this is as they were in reality, because of the high strength steel from which the valve gear was made. The kit instructions suggest that the return crank can simply be soldered to a bit of 10BA studding, but I didn't think this would be strong enough. I therefore chose to drill and tap my return crank 10BA for the crankpin screw — rather like a drawing pin in shape — which was then threaded through the return crank,

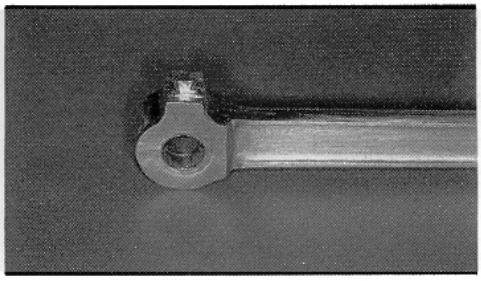




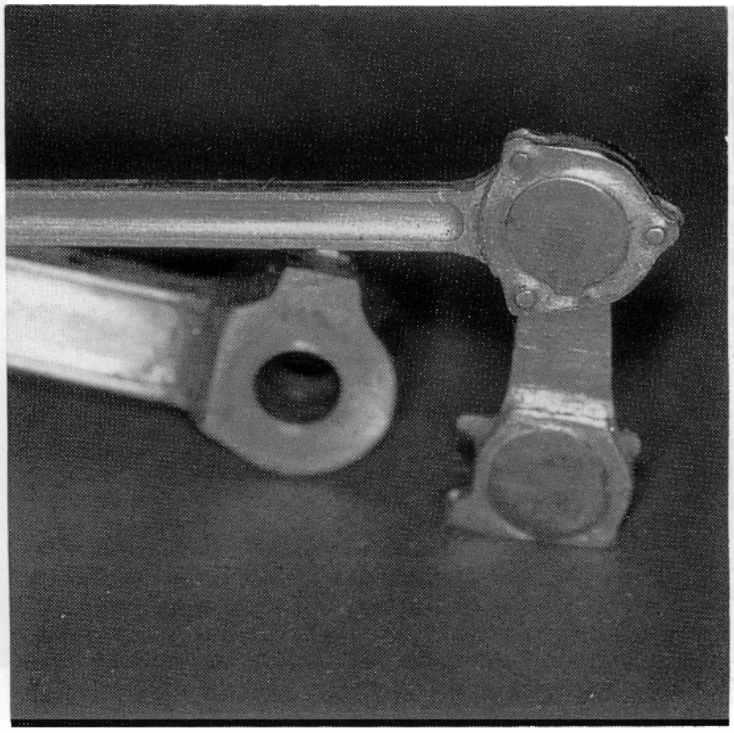
Left: *Components of the connecting rod big end. The phosphor-bronze bush helps to locate everything.* Right: *Soldering components held together with clips and an old broach.*

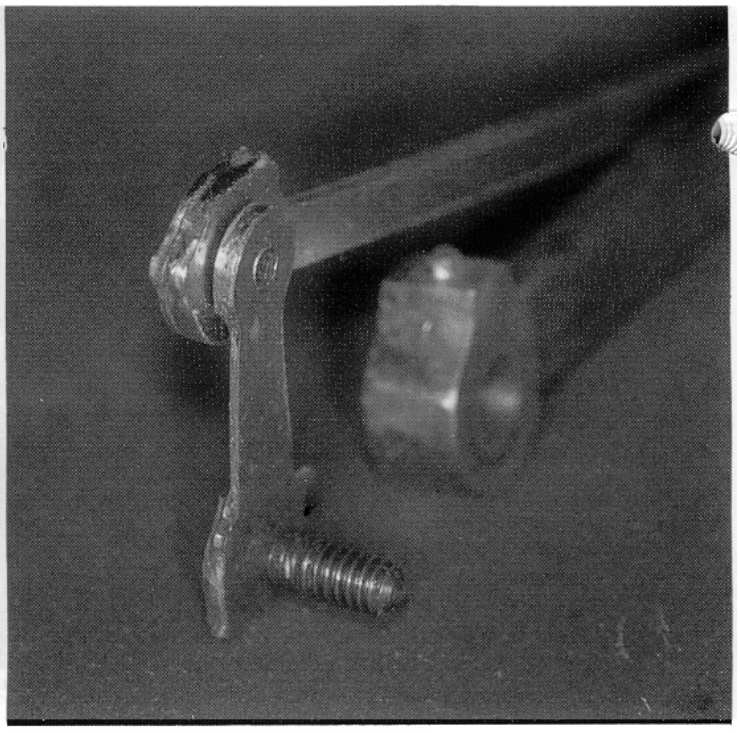




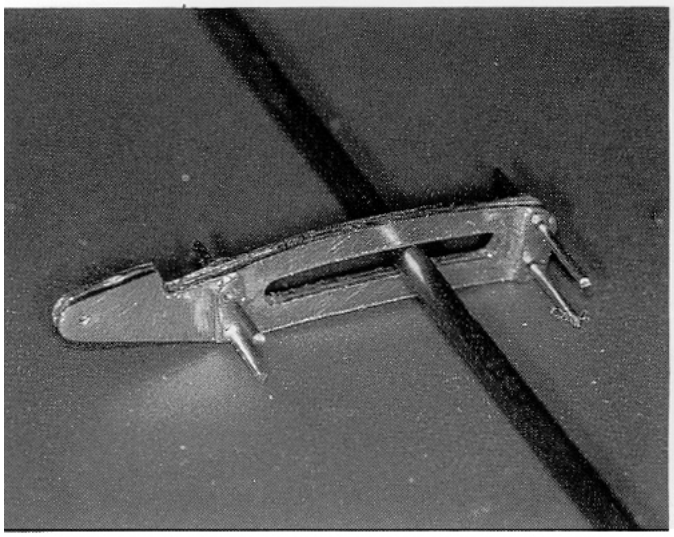


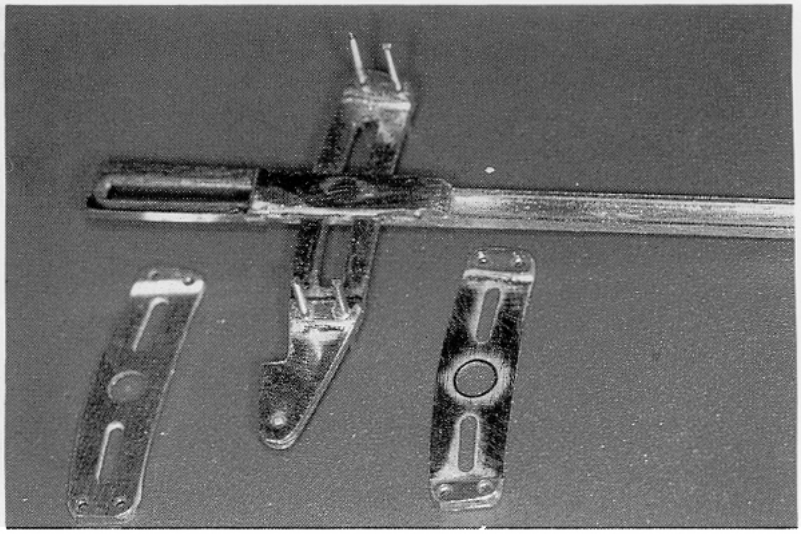
Left: *Make sure there is plenty of solder on the connections.* Centre: *Filing up the end and the oil pot.* Right: *The finished big end.*



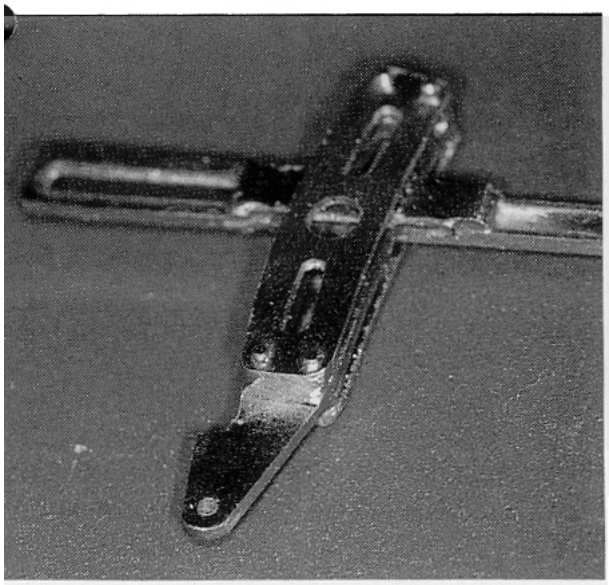


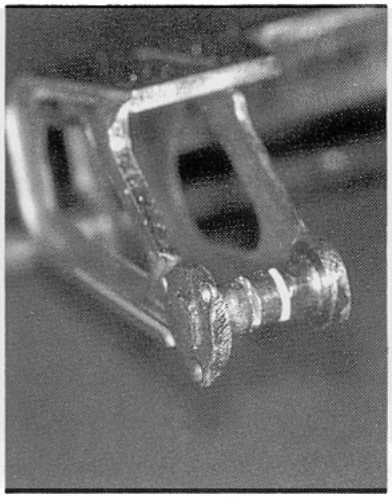
The return crank from the front (left) *and behind* (right).

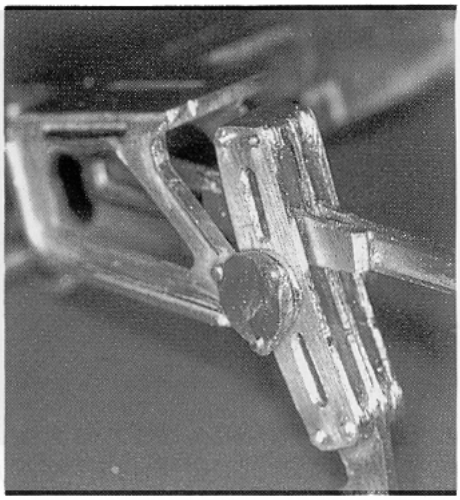




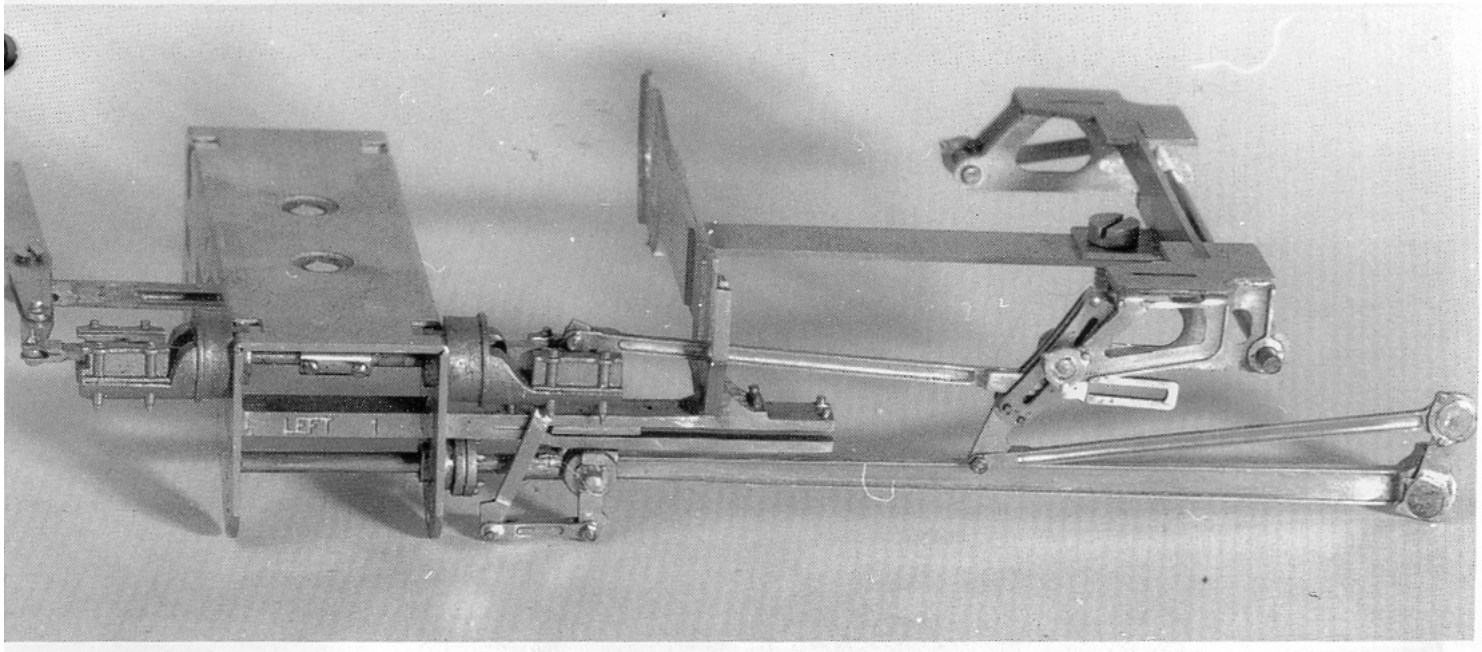
Left: *Make sure all parts are parallel.* Right: *The pin for the radius rod must be filed flush to stick between the outer laminations.*

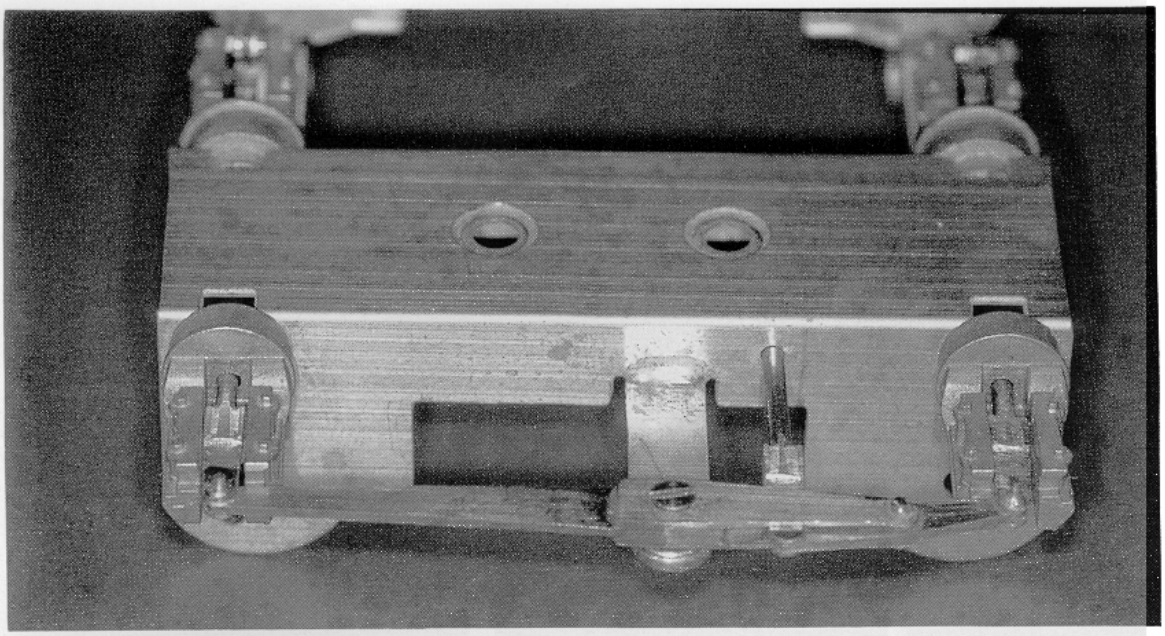




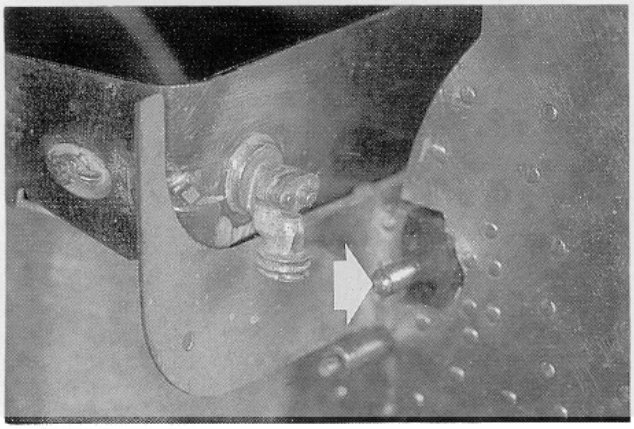


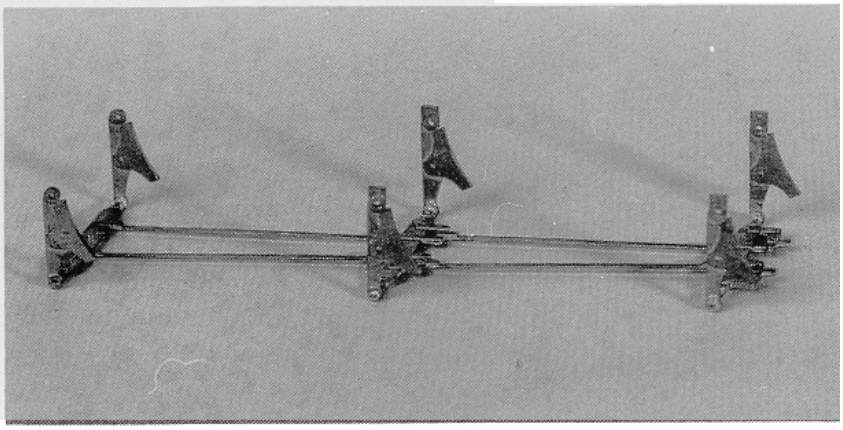
Left: *The completed assembly.* Centre: *It is easier to solder the pivot across and cut it afterwards.* Right: *The two stubs of the pin must not interfere with the free movement of the radius rod.*



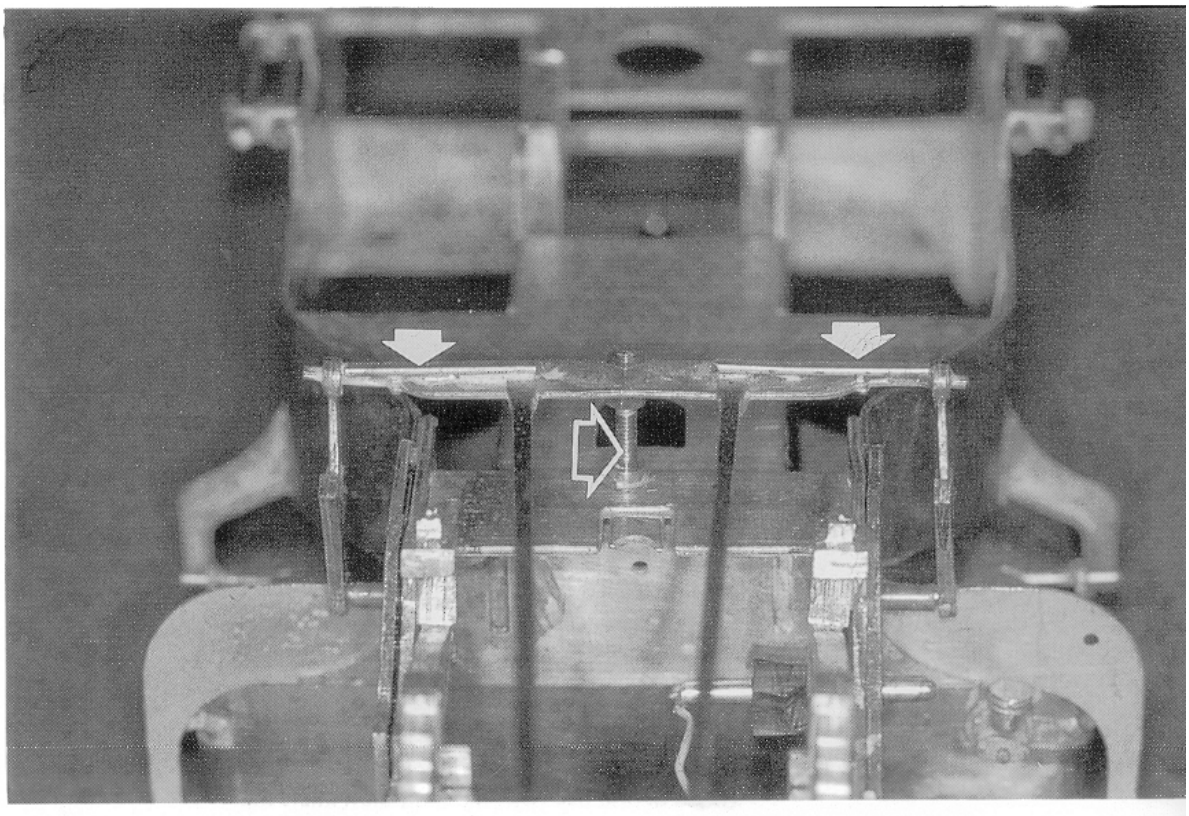


The 2:1 lever on the front of the cylinder assembly.





Left: *One of the pick-up plungers (arrowed) in front of the base of the firebox.* Right: *The brake gear.*

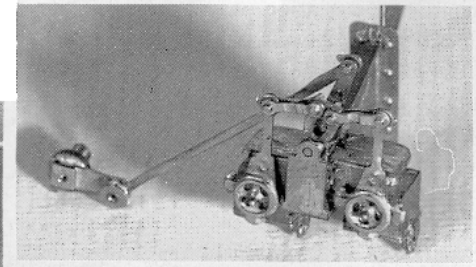


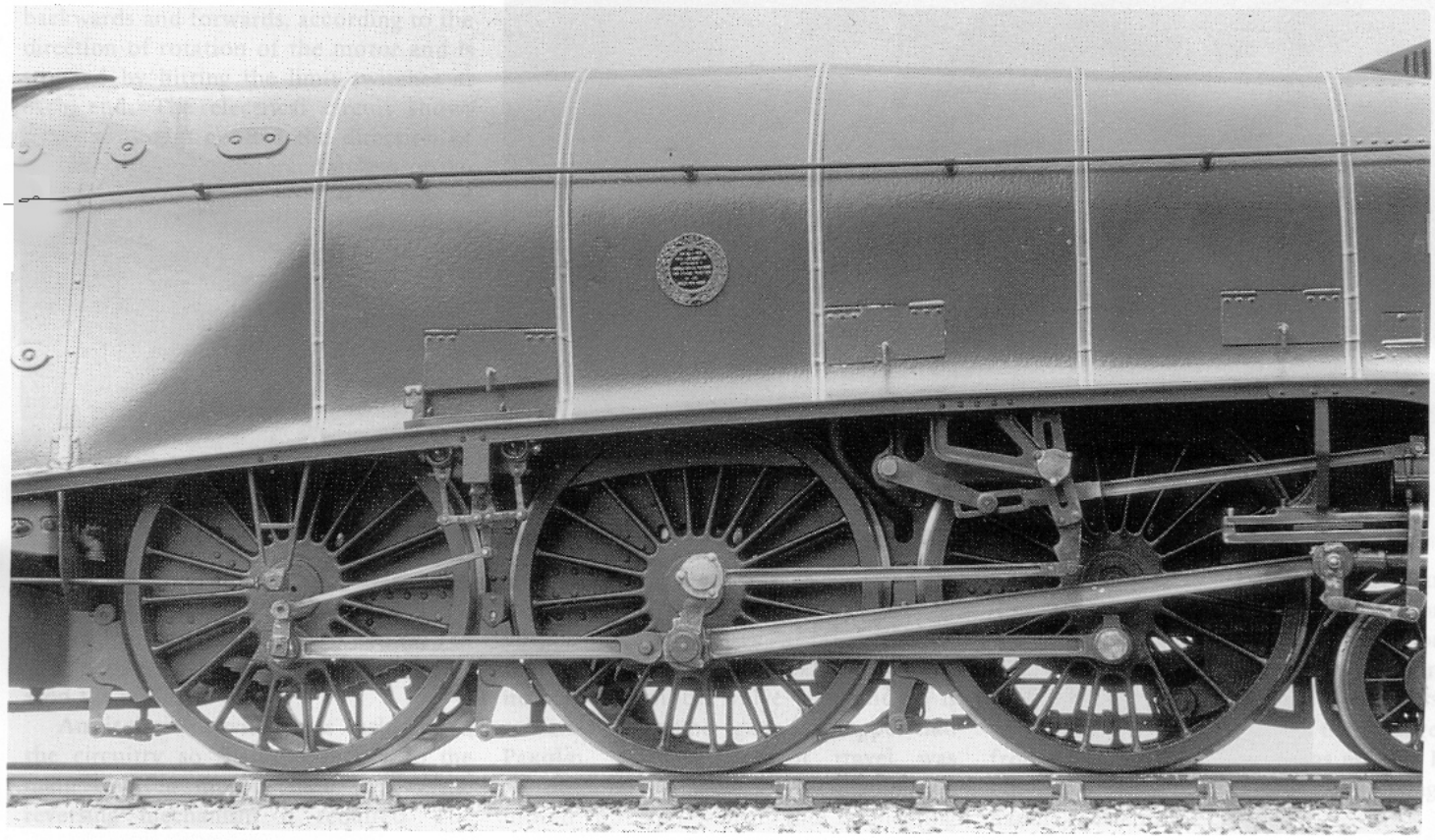
The open arrow is pointing to the support for the brake gear, whilst the solid arrows indicate the strengthening bars.

with the head of the drawing pin on the outer surface. Once the angle was correct relative to the main crank throw, the two components were soldered together. The cap of the original crankpin was then thinned to a minimum thickness, so that it gave sufficient clearance for the rotating eccentric rod. Appearancewise, this is not quite correct, but it does give a decent surface area for the soldered joint.

Lubricator linkage: Etch processes can make some parts of the valve gear links appear a bit flat. This is not immediately apparent until, once again, the real thing is examined. The most obvious culprits in this kit are the union link and parts of the lubricator linkage. Filing a thinner section into the centre of the links will produce a much better appearance, as can be seen in the photographs.

The lubricator linkage can be made either fixed or moving. It was seeing this hypnotic little assembly at Staines that was one of my initial attractions to the kit. The mechanism is not difficult to put together, bearing in mind that it is equivalent to overscale valve gear in 2mm scale! Assembly has to be with pins and solder, rather than nuts and bolts and so any oil which is used as an anti-flux will lubricate it as construction progresses. The bracket to which the two lubricators are attached may be left removable from the frames for easier painting, rather than fixed, as Martin suggests in the instructions. Movement of the lubricator drive-rod is derived from a return crank on the back axle. This is soldered to the head of the crankpin, whilst the actual pivot is made with a small iron rivet. In my excitement at getting the linkage working, I straight away took the chassis up the club and gave it a spin on the test track. It obviously thought it was *Mallard* going down Stoke Bank, because the riveted joint seized up and seriously twisted the drive rod. So make sure you put a bit of oil on yours before running at 126 mph!





Propulsive power

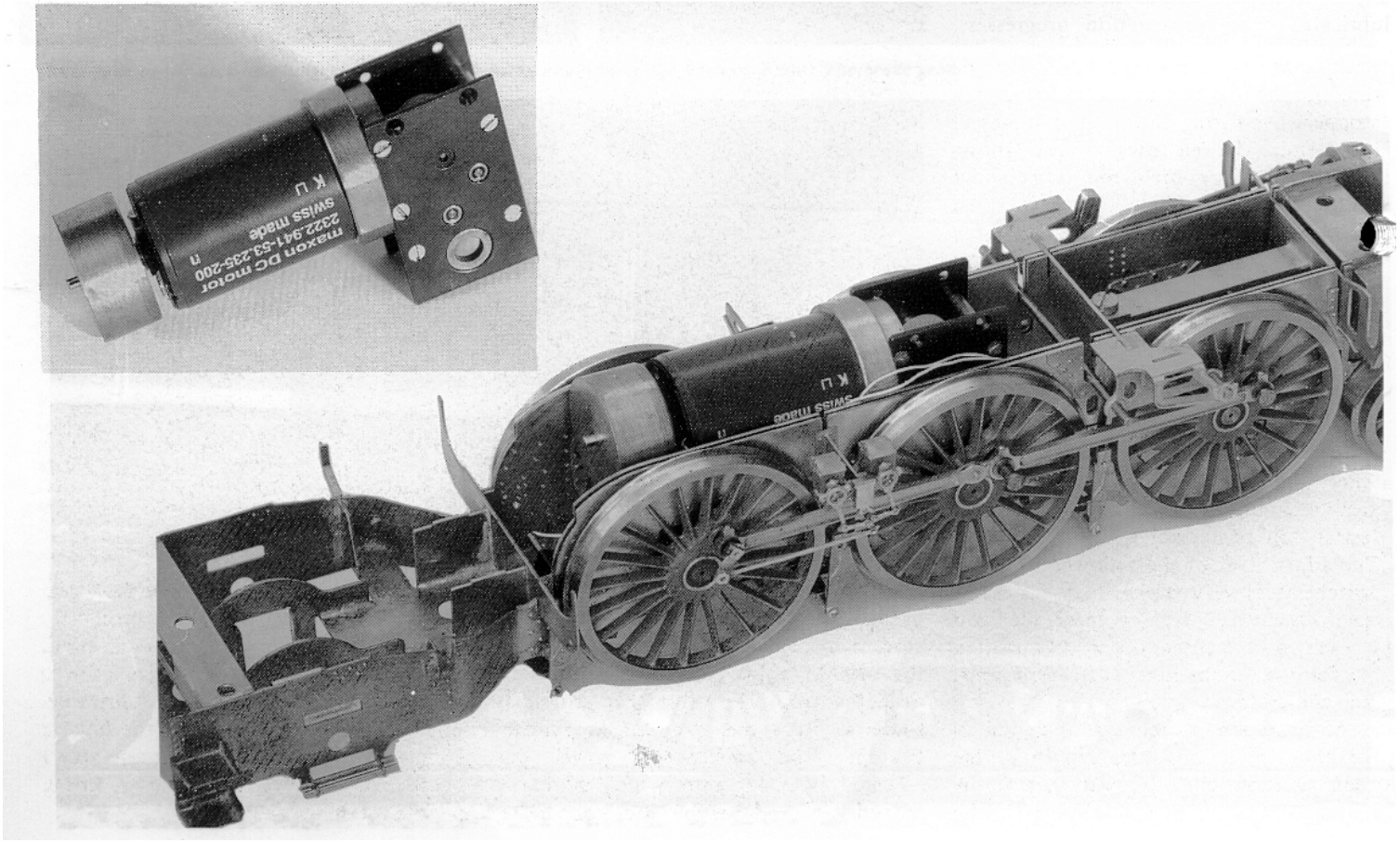
The editor asked if I would be 'doing special things' to the model to make it different. I don't think he meant by that to convert it into No. 10000, even in rebuilt form, so the only other area for significant variation was in the mechanicals. As provided, the kit will easily take the Portescap RG7 gearbox (or just about any other propulsion unit you might care to use). It has always struck me that the designer of these beautiful pieces of engineering missed a great opportunity by omitting a flywheel in the system. My experience in 2mm scale has shown that fitting flywheels to non-magnetic locking, low-inertia motors will give vastly superior performance. Surely a massive 7mm scale Pacific should have loads of momentum?

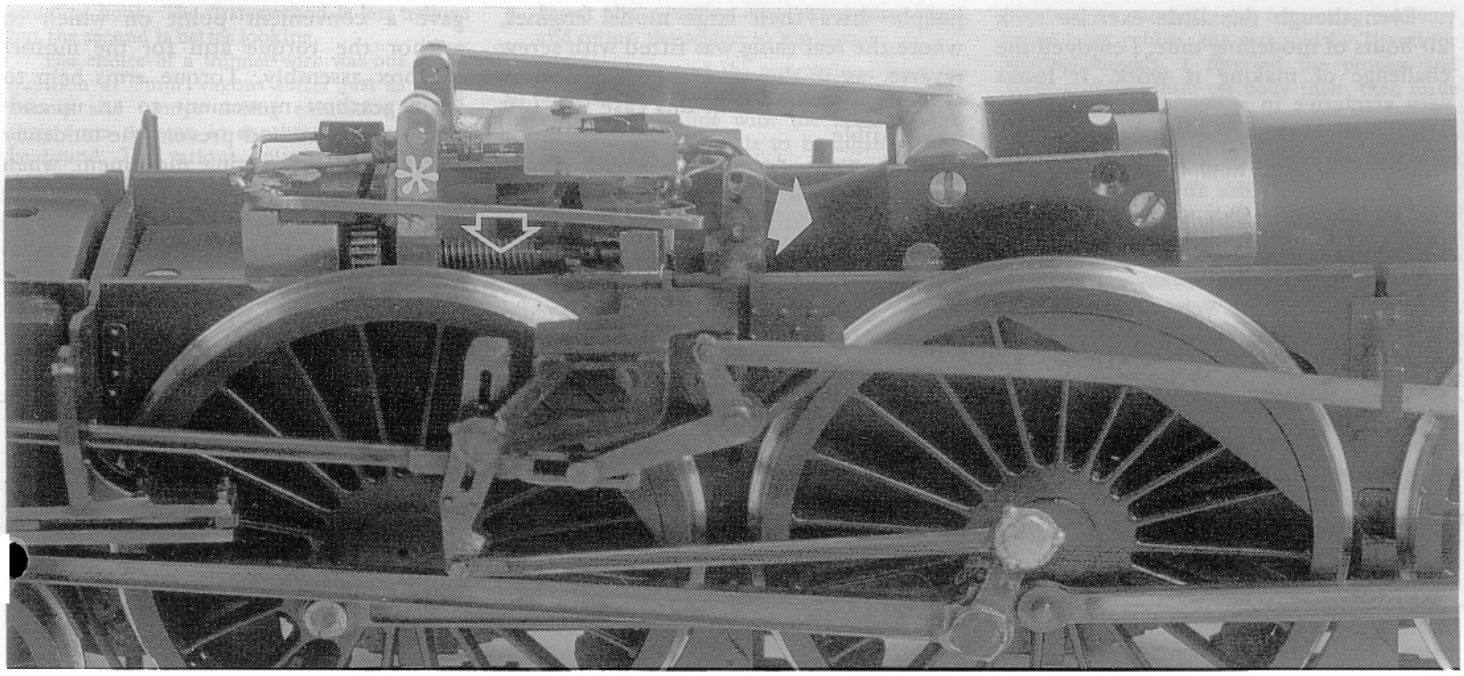
A double-ended motor was an obvious requirement, if the RG7 gearbox was going to be used. Portescap turned out to be singularly unhelpful in this area, even though they do make double-ended motors. Maxon were much easier to deal with, and so a suitable motor was purchased. All that then had to be done was to work out how the two components would be united. This was not very difficult to achieve, with an intermediate collar that was made to fit the Portescap motor mounting plate in one direction and the Maxon motor in the other. The bevel gear on the motor needed to be mounted in a collet and the hole drilled out in small increments to the larger size of the Maxon shaft.

The Maxon motor is much beefier than the Portescap and by my calculations from its data sheet would only give 120 mph on a full 18 volts. However, when we got the chassis going round the MRC test track it was clocked at 125 mph using a Gaugemaster controller. It was quite frightening at this speed. What was particularly impressive was that even without any extra weight, the unfinished engine took about 6ft to stop from full speed – that's how big O gauge engines should behave, in my biased opinion. I haven't yet tried it fully weighted, nor with a train behind it, but it certainly encourages a bit of respect from the driver. The flywheel does, of course, seriously confuse feedback controllers.

Picking up: This is commonly observed at King's Cross. Just up the road at the MRC, split frame pick-up is almost a 7mm scale standard for locos on Happisburgh. Now to reorganise the kit to achieve this seemed like rather more work than I was prepared to undertake. Martin suggests the American approach of tender one side, engine the other. This is all very well, but sans tender the engine won't run. I therefore made some spring plunger pick-ups for the three driving wheels on the insulated side as per Tony Reynalds' MRJ article on his Castles. The performance with these is quite satisfactory, and of course with the model complete, the tender also contributes to the collection of juice.

Making the valve gear work: It seemed a shame to have all this wonderful valve gear and not be able to show *how* it works, *how* it causes the loco to run forwards or backwards. The idea of motorising the reversing linkage is nothing new – the earliest reference I know to it (in the UK) was an article in the S Scale MRS newsletter, by John Noble, who very elegantly fitted it to an S scale tank engine. This was achieved with split frame electrical pick-up, an option which I had not pursued in this project. The design therefore required an electrically insulated servo system.



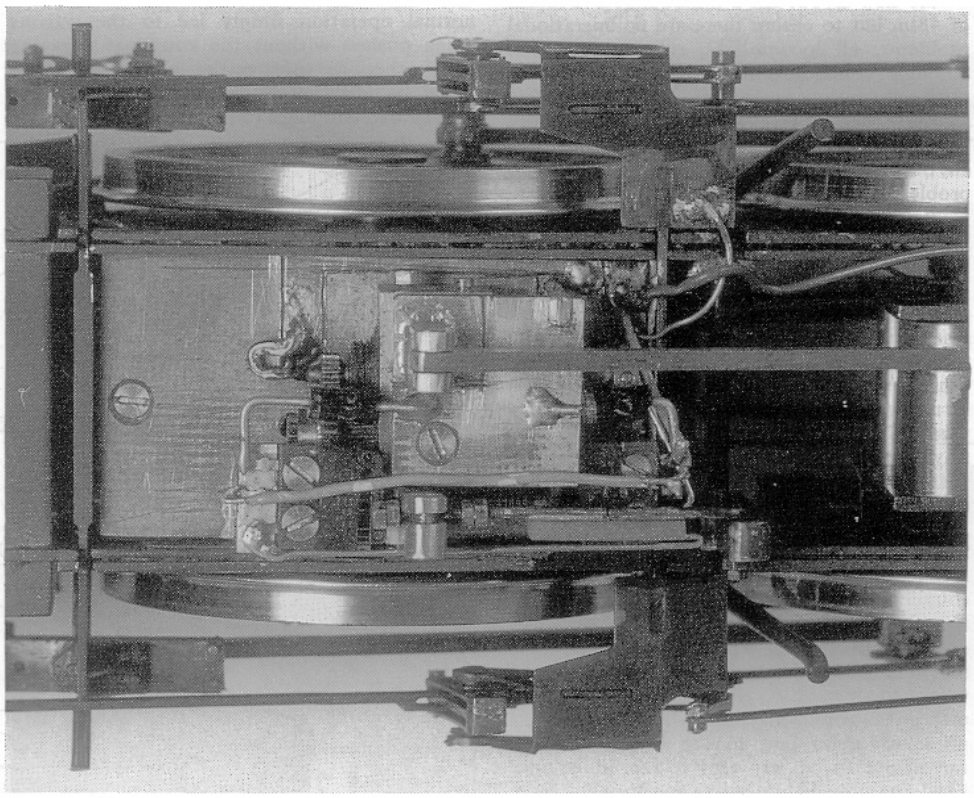


The reversing gear, showing the lead screw (open arrow), follower (*) and direction of movement (arrowed).

The late Denys Brownlee sketched out the electrical requirements (as shown in the diagram) and I started to acquire the necessary components. The main requirements were sub-miniature micro-switches, two diodes and a motor. The motor chosen was a small 12V Portescap 8 x 16mm which drives a 6BA lead screw. The follower on the lead screw moves backwards and forwards, according to the direction of rotation of the motor and is stopped by hitting the limit switches at each end. The electrical circuit shows how the diodes control the direction of rotation of the main traction motor, so that the engine can only go forwards or backwards when the valve gear is in the correct position.

All the foregoing sounds deceptively simple. Having made up the motor/lead screw with a single stage gear reduction, Denys quite rightly commented that the little man in the cab would have had his arms flailing round at propeller speed. Another stage was therefore added to the gear train, but even this is probably a bit fast if you turn up the controller speed. The adjustment of the follower and limit switches was very tricky – it was essential to include a piece of unthreaded rod at each end to protect the screw thread in the follower if the limit switches did not stop the motor in time.

An isolation switch was included in the circuitry so that the supply to the main traction motor could bypass the reversing mechanism if required. The



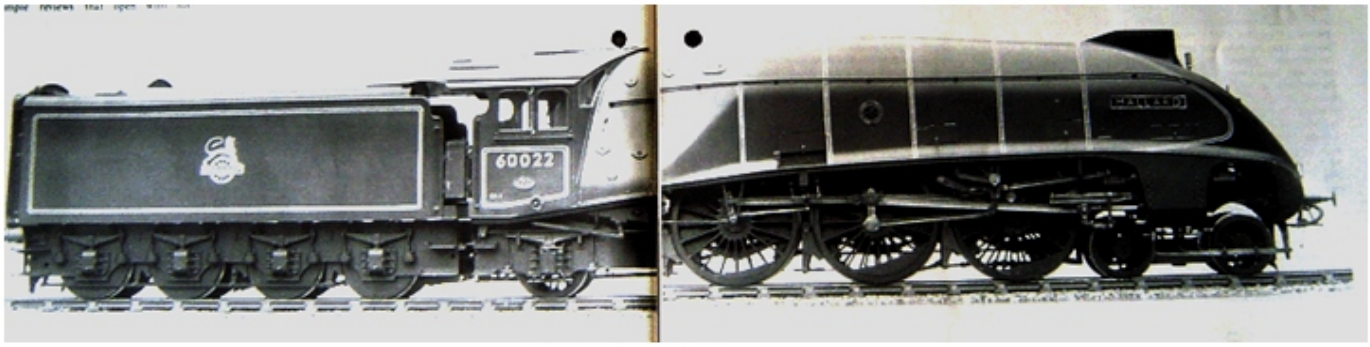
mechanics of the connection to the cross bar of the reversing gear was achieved with a linkage to the crossrod between the sets of valve gear. This had to be insulated from the valve gear and so is soldered to some gapped copper-clad Paxolin. The amount of travel was adjusted by using nuts which could be moved up and down the connecting linkage. Needless to say, *all* the valve gear components must move very freely for the mechanism to work at all. Minor modifications are needed to give a slot in the bracket (common to the lubricators on the RHS) through which the linkage from the cab passes. There was no way I could see how to make the reversing handle rotate in the cab!

Even though this little exercise took 20 hours of modelling time, I enjoyed the challenge of making it work. It looks very attractive in action and the slightly noisy gears (sounding like an early Farish engine) draw attention to the feature – well, that's my excuse anyway.

The circuitry is such that the main traction motor can get a bit of a kick when starting, having changed direction into full gear. This is very much down to driver training and encourages patience whilst the gear shifts up or down. Many people drive their large model engines, where the real thing was fitted with screw reverse, as if they are shunting engines with lever reverse – in this case it is just not possible.

If I were doing it again I would probably use a lower voltage Portescap motor with integral gearbox, to make it quieter, whilst the whole assembly would be more elegantly arranged. With a little more forethought, it could undoubtedly be made to fit between and below the top of the frames. The reversing mechanism gave a convenient point on which to anchor the torque arm for the motor/gearbox assembly. Torque arms help to limit gearbox movement to an up-and-down direction and prevent the tendency for a violent swinging movement when changing motor direction. In fact, the reversing mechanism makes it impossible to flick immediately from forwards to backwards, using a switch, and is therefore a good safety feature to protect the traction gearbox.

Concluded in the next issue.



NB (from MMRS team)
In the original magazine this picture spanned two pages and it has not been possible to make a good copy. Please accept our apologies