

MODEL ENGINEER

Vol. 187 No. 4153

£2.10

MODEL
ENGINEERING
IN COLOUR

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GOOD BUILDING

SOMETHING
FOR EVERYONE

READING SME

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COMPRESSED AIR

In the home workshop

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Building a 5in. gauge Bulleid pacific



THE MODEL ENGINEER EXHIBITION

29th December 2001 - 1st January 2002

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* THIS MEASUREMENT
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in 3in., 4in., (and other) Scales
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On the cover ...

With its 'trade mark' finish of natural
 wood and bright steel to identify his
 workmanship, this 1:12 scale model of
 Martin's Side Delivery Hay Rake is one of
 a series of very elegant miniature farm
 implements built by Brian Young, a
 stalwart member of The Guild of Model
 Wheelwrights. Modelled on a full size
 original built c1930, this exhibit earned
 for its builder a coveted Gold Medal at
 the 1999 Model Engineer Exhibition.
 MEX 2001 will be at Sandown Park
 Exhibition Centre, Esher, Surrey
 29 December 2001 - 1 January 2002
 (Photograph: Gary Sinfield)

KEITH'S COLUMN: SAINT CHRISTOPHER

Fabricating the crossheads and
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Newstrade Executive, Daniel Webb, will be pleased to assist readers
 experiencing problems in obtaining copies of Model Engineer or any other Nexus Special Interest magazines.
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Model Engineers' Workshop is ideal for enthusiasts who operate a home engineering workshop for both model construction or to support an engineering related hobby. The magazine covers machine and hand tools, accessories and attachments, materials and processes, and provides guidance on the selection, commissioning and use of tools and equipment. The essential guide for any workshop.

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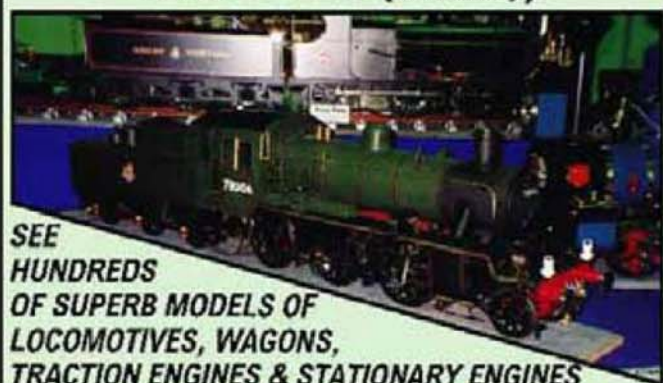
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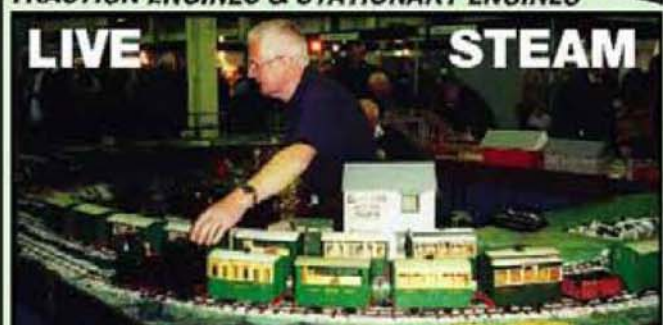
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SMOKE RINGS

With the Editors

In this issue

While endeavouring to maintain a balance in these pages, and conscious of the fact that the hobby of model engineering embraces more than the building and operation of miniature steam locomotives, I am aware that many readers enjoy features relating to the latter. I hope that these readers will enjoy this issue which has been compiled with rather more locomotive content than in recent months.

The new series by Captain Peter Lewis which begins in this issue and describes the construction of *General Steam Navigation*, his 5in. gauge Bulleid pacific locomotive to Keith Wilson's original design for *Ariel* published in these pages commencing in 1964 will, I hope, be useful to the many other builders of this locomotive who may have encountered problems. The resources of the model engineering press normally preclude the level of checking and design appraisal characteristic of manufacturing industry and despite best efforts, drawings can be published which contain errors.

When made aware of these errors, we bring them to the notice of readers and update drawings as appropriate at the earliest opportunity. However, it is evident that there are those who resolve problems as they proceed and choose, for whatever reason, to make no note or keep no record of the errors encountered and their solution. It is very unusual to have access to such a comprehensive record as that prepared by Captain Lewis and I am grateful for the opportunity to present the information in what I hope will be seen as a positive contribution to the original series.

Peter's locomotive has been completed and painted and has been giving a good account of herself for some time, so others can be confident that his recommendations have been proved effective.

On learning of my intention to publish the series, Keith Wilson wrote to me as follows:

"Readers should know that I approve of it, and indeed have pestered you for its publication."

"This article illustrates (among other matters), the enormous difficulty of getting feedback from readers who spot mistakes in published articles; it is a very rare phenomenon. To check one's own design is largely futile; even to actually make the item concerned, for the mind takes over and an error will often be corrected without the person concerned realising it. I write from experience."

"As a matter of interest, I understand that errors are still coming to light in some of Curly's old designs. One of Curly's faults was that he could never bring himself to admit any errors, going to quite strange lengths to cover things up. He was not unique in this denial of errors."

"I am not wishing to make excuses, but I did the best I could with a design that I didn't want to do (Lawrie twisted my arm a bit—and I wasn't the only one), and on the information that I had available at the time. After the first article appeared, a friend from the Torquay area contacted me and offered the entire set of drawings for the 'other one', hence some West Country details appearing in Merchant Navy guise."

"Being compelled to sell up in Devon didn't help much, and a stroke which left me half paralysed a couple of years later added much fuel to the flames. Trying to use a centre-punch to mark centres with only one hand presents problems,

marking out is difficult, and assembling even such a simple thing as a nut onto its bolt takes time (and how!). Drawing boards, pencils, rules, etc.; just think of some two-handed jobs for yourselves."

"It is my firm belief that these articles will help all those good folk who are making, or want to make, Ariels for themselves and I am extremely grateful to Peter Lewis for his criticisms and articles. I have seen photographs of his General Steam Navigation and consider that he has a very fine locomotive."

Elsewhere in this issue we have a response to Ted Jolliffe's *Postbag* request for information on the construction of steam raising blowers, and a report prompted by the recent official opening of a new Reading SME ground level track in Prospect Park. Ongoing series include Keith's current description of his *Saint Christopher*, further details from Neville Evans of his very popular Jones Big Goods/Loch 4-4-0 locomotives and Geoff Dowden's brake van all of which could be plenty for loco buffs to be getting on with!

International Woodworking and Turning Exhibition

Essential details for prospective visitors to this year's event are that it will be held in Hall 10 at Birmingham's National Exhibition Centre, 5-7 October, open 10am-5.30pm Friday/Saturday and 10am-5pm Sunday. Admission prices on the door/in advance: Adult £7.50/6.50, Senior citizen/Student £5.50/4.50. Discounts available for group and college bookings. Advance Ticket Hotline: 01353-654422.

Billed as the leading annual international event for woodworking and turning, there will be plenty on hand to interest everyone from the complete novice to the most accomplished craftsman with an urge to create beautiful and useful objects in wood, whatever their ability.

With the emphasis on woodturning, a packed schedule of things to see and do will include opportunities to learn new skills from the experts at a range of demonstrations and Masterclasses throughout the show. Visitors be able to ask questions and to 'have a go'. This year's Masterclasses will include wood machining, routing, carving and wood finishing plus the return of the popular 'hands-on' opportunity with woodturner Jamie Walwyn and his wife Charmaine.

Several special charity events are planned for the exhibition including the turning of a huge platter up to 7ft. across by craftsman Fred Woods, and a Celebrity Challenge in which leading wood turners will produce a range of pieces to be auctioned later for charity.

Prominent once again will be a display of entries to the exhibition's woodworking and turning competitions. Sponsored by leading suppliers to the woodworking enthusiast and professional, these competitions regularly draw entries of the highest standard.

Visitors will be able to watch the latest tools and equipment put through their paces, with expert guidance on hand to discuss specifications and technique and to give advice on the correct tool for the craftsman's needs. There will be opportunities to pick up bargains from the many trade stands at the show. With many special

Tuesday 11 September 2001

As the last few details of this issue were being prepared for production, news has been breaking of the terrorist attacks on America.

A great many readers of this magazine live in the USA. It is therefore inevitable that some will be directly and personally affected by the loss of so many thousands of innocent lives and the horrors which have been presented to us by way of innumerable images of destruction and carnage.

I am sure that all reading these words would wish me to convey our most profound and heartfelt condolences to those whose depth of suffering at this time we cannot possibly imagine.

offers on tools, materials and equipment from leading manufacturers and distributors plus a range of specialist suppliers, the exhibition is an ideal opportunity to stock up with woodworking requisites: many such items can be difficult to locate on the high street or through DIY outlets.

For on-line information visit www.nexusonline.co.uk/iwte

Midlands Model Engineering Exhibition

To be held at the International Exhibition Centre, Donington Park, Derby, 20-25 October and sponsored by *Engineering in Miniature*, this year's exhibition will be open daily 10.30am-5.30pm and until 8pm on Wednesday. Admission Adults: £7.50, Senior Citizens: £6.50, Children: £4.50, Family ticket (2A+3C): £19.50. Tickets can be purchased in advance saving £1 per ticket.

Visitors to this event, which attracts modellers both from the United Kingdom and overseas, can view models including steam locomotives up to 7¹/₄in. gauge, working models illustrating the history and development of the locomotive, scale model steam road vehicles with models of steam wagons and traction engines alongside all types and varieties of stationary engines.

Model traction engine enthusiasts will be in steam outside the hall each day while two large scale live steam railway layouts operate inside the hall with radio controlled scale steam locomotives. The model boating pool will again be in operation with members of local clubs participating with models ranging from steam launches to warships.

The exhibition enjoys the support of model engineering and marine modelling clubs from a wide area plus numerous individual entries bringing the number of models on display to nearly one thousand. Over fifty leading suppliers will be present from which visitors will be able to purchase materials, plans, parts and tools to build anything from a grandfather clock to a scale steam operated model railway locomotive. Two workshops will be staffed by leading experts able to explain the intricacies of machining, advise the uninitiated on where to start, or maybe simply re-kindle an earlier interest in this fascinating hobby.

For further information contact Meridienne Exhibitions Ltd, The Fosse, Fosse Way, Leamington Spa, Warwickshire CV31 1XN; tel: 01926-614101; fax: 01926-614293 or e-mail info@meridienne.co.uk

POST BAG

Safety first

SIRS, - I have enjoyed Marcus Rooks' description of his elegant steam toy *Dreibelner* and *Troica*, a construction which possesses in abundance those rare attributes Charm and Fun. However, I am deeply disturbed that he considers a safety valve to be unnecessary, on the grounds that "... any excess pressure will blow the port faces apart to release the steam." Indeed it will, but how much excess pressure?

I have some four decades practical experience of oscillating steam engines by Bowman and Mamod, and of my own construction, and at normal operating pressure (as set by the safety valve) there is negligible steam loss from between the port faces; the engine would not work if it were otherwise. Assuming that no safety valve is fitted, at what pressure would the port faces separate?

The standard Mamod cylinder-holding spring, which I presume many constructors will use, requires (by direct measurement of a Mamod engine) a force of 18 ounces to separate the port faces. From the published dimensions of the port face of *Dreibelner*, a force of 4/11 x 18oz. = 6.55oz. acting at the position of the steam port will separate the port faces. The steam must act upon a circular area of port face $\frac{3}{64}$ in. diameter = 0.00173sq.inch. Therefore the engine will 'blow off' at 6.55 / (0.00173 x 16) psi. = 237psi if nothing sticks ...

On the whole I think that fitting a safety valve is a Good Thing, especially if using a boiler of wafer-thin vintage brass. Have fun, but stay safe.
Alan P. Cox
Lancashire.

Marcus Rooks replies:

Concerning the fitting of a safety valve to *Dreibelner*, it seems that by consensus it would be better if one were fitted rather than not. I would not like safety to be compromised in the pursuit of authenticity.

Since the publication of my article on *Dreibelner*, some readers have taken the trouble to write to me regarding the wisdom of not fitting a safety valve. In this day and age of safety first they are probably correct and for any readers building *Dreibelner*, I would suggest that the standard Mamod safety valve could be fitted; even better if one could be machined which is in a little more harmony with *Dreibelner*.

While on the subject I am sitting at the keyboard with photographs of

old stationary engines fitted with oscillating engines but

no safety valves; it would appear that when constructed such an arrangement was deemed acceptable. I have to confess that all the literature I have read clearly states that the pressure is relieved by the lifting of the port face, which has been my experience, in fact usually too easily! However, Mr Cox's letter is typical of those providing quite compelling evidence that the pressure required to do this may be excessive. There seem to be some discrepancies along the line; can anyone give a definitive answer to this conundrum?

Going back a century or so I wonder what the HSE would have made of Schoenner's safety valve? This Hi-Tech device was a cork bunged into the top of the boiler; even I dread to think where it would have ended up had it lifted!

Hot air engine identified

SIRS, - The photograph of Mr. Charles Atkins' hot air engine (*M.E.* 4149, 29 June 2001) was of great interest to me as I have had an identical model for about 50 years and was told at that time that it was over 40 years old. The only remedial work I've done to it over the years has been to repair the by-pass pipe and make a new flame shroud, but it still runs perfectly.

The accompanying photographs are of the wooden case which I think is the original. Inside the bottom of the case are wooden guides into which the model slides to hold it firmly in transit.

I had never seen this model before, but I visited the excellent Kew Bridge Steam Museum about a year ago and there in a glass case was this same model with the information I had always sought:

GEORGES CARETTE
NUREMBURG 1905.

I hope this information satisfies Mr. Atkins curiosity.

Doug Williams
Vale of Glamorgan.

Warm workshop

SIRS, - I read with interest the article by Reg Harbron on *Economical Workshop Heating* in *M.E.* 4150, 13 July 2001.

Having had to make do with a workshop shared since 1948 with my wife's and my own cars, when I retired I had to set about creating a new one. I decided on a wooden structure with an outer skin and roof of Colt tiles which must have air both sides. The structure is 8ft. to the ceiling and is constructed on



Mr. Williams' Carrette hot air engine and wooden case.



a 3 x 2in. frame. I lined it with 1in. thick expanded polystyrene and an inner skin of hardboard. The floor is 1in. thick plywood on top of a layer of high-impact polystyrene. The ceiling is also skinned with hardboard and insulated with polystyrene and the windows are double glazed in wooden frames.

My heating is thermostatically controlled and adjusted to 50deg. F. I believe condensation starts at about 45deg. F. I have a booster heater for a quick warm-up, which only takes a few minutes to reach a comfortable temperature.

After 15 years of use, I am convinced that the most important element of the construction is the insulation, and mine cost a mere £30. The external temperature has to drop to freezing before the heating comes on. My 254 lathe, Fobco drill and milling machine are all in first class condition.

Stephen Haynes
Worcestershire.

Insolence of office

SIRS, - Keith Wilson's report of his encounter with the young 'Safety Officer' (*M.E.* 4151, 27 July 2001) reminded me of a similar experience recalled by Mike Hibbins in a letter to *Postbag* (*M.E.* 4104, 8 October 1999) who, on attempt-

ing to run his traction engine at a certain club, was thwarted by a club official who managed to dream up every conceivable objection.

In Hamlet's famous soliloquy in which the character wonders whether to end it all, Shakespeare goes through many of the aspects of life which cause frustration and distress, one of these being "... the insolence of office."

It seems that this type is still with us even in our gentle hobby.

G. E. Hobbs
Berkshire.

Big Bertha

SIRS, - I was interested to read Mr. Ellis' letter (*M.E.* 4146, 18 May 2001) because I too am interested in the Lickey banker as well as the Somerset & Dorset Railway for which the Midland built their other big engine, the 7F 2-8-0.

In connection with and regarding the rumour of the survival of *Big Bertha's* cylinder, I understand that No. 88, the 7F owned by the S&D Museum Trust, actually has a brake hanger stamped 2290.

Incidentally, the Trust also has a 3 1/2in. gauge 7F in the Museum at Wakeford station on the West Somerset Railway.

N. H. Pankhurst
Berkshire.

SEQLEC 2001

Applications for entry are now welcome for the
Eleventh 7¹/₄in. gauge Locomotive Efficiency Competition
which will be hosted by

EAST HERTS MINIATURE RAILWAY

at their track at the Van Hague Garden Centre, Ware on

SATURDAY 13 OCTOBER 2001

Please call Derek Brown on 01780-753162 for an Official Entry Form

All visitors will be very welcome,

model engineers and their families particularly so

(Please note that it may be necessary to restrict the number of entries.)

Intricate

SIRS, - In *M.E.* 4146, 18 May 2001, David G. Ellis asks for information concerning the renowned Lickey Banker, which was completed by the Midland Railway at Derby in December 1919. With one brief exception, its working life was spent in assisting both passenger and goods trains up the two-mile incline between Bromsgrove and Blackwell. It was withdrawn in May 1956, being replaced by BR 2-10-0, No. 92079.

The exception was when the engine was tested on haulage of heavy coal traffic between Toton and Brent Sidings. E. S. Cox, who took part as one of the dynamometer crew, recorded that 2290 was not suitable for this kind of work.

Mr. Ellis should contact Philip Atkins, Librarian at the National Railway Museum York, to find out what drawings are available. Also, he will need expert advice about the problems likely to arise with a live steamer. Martin Evans is surely the man for this. One such problem is whether to adopt the highly unconventional piston valve arrangement used on this engine.

Each cylinder block was cast as a right- and left-hand pair, but only two piston valves were employed. Steam was supplied by a system of crossed ports, passing to the front of one cylinder and to the rear of its neighbour at the same time. Only two sets of Walschaerts valve gear were therefore required, and no rocking levers. It's still a somewhat intricate arrangement in 3¹/₂in. gauge.

Robert Mills
West Midlands.

Icing sugar

SIRS, - Recently the writer was faced with an unforeseen problem and came up with a novel solution.

An expensive plastic 'leatherette' label had to be affixed to a specific position on a model. As purchased, the self-adhesive transfer had a special backing which had to be peeled off before contact adhesion.

Because of other considerations, before fixing, it was essential to make minor adjustments to the final position of the leatherette without its protective backing and without its adhesion to the substrate. Much thought provided a simple solution to the problem. The bared adhesive backing was covered with icing sugar, applied with a brush and the excess gently rubbed off. The resulting surface was completely non-sticking and smooth.

The dusted sheet was positioned as required and the outline marked with a fine needle. Upon its removal the leatherette was placed under running tap water to dissolve the sugar and then allowed to dry without touching the surface. *Hey Presto!* The adhesive backing was fully recovered and the leatherette stuck in position as normal.

Perhaps *M.E.* readers may see other applications for this idea.

R. F. Cane
Tasmania.

Valve gear design

SIRS, - I was interested in the letter from Mr. R. G. Taylor (*M.E.* 4146, 18 May 2001) and his reference to William Adams' 4-4-0 express engines, and Martin Evans' series on the Adams T6. I had long thought these engines very pleasing visually and I decided to research and build a class T3 some two years before Mr. Evans' series appeared. I chose a T3 because there is a preserved example in the National Railway Museum at York which, being but an hour's drive away was fairly readily available for reference. I had therefore designed and built the motion before the series began.

Since I decided at an early stage to substitute launch links instead of the locomotive links of the prototype, I did not experience Mr. Taylor's problems since, with launch links, the eccentric throw is exactly half of the valve travel which can be calculated ultimately from the size of the cylinder bore and the cut-off required.

My reasons for choosing the launch link was partly because of the simplicity of design, but partly because I doubted whether locomotive links long enough to achieve easy reversing would fit into the space beneath the boiler.

The generally accepted formula for models that steam port area should be no less than 1/10 of cylinder area, and steam port width 1/10 of cylinder bore results in a valve travel in excess of the prototype. I do not pretend to understand steam technology, but it seems that the lower boiler pressures and lower piston speeds of our models make it desirable to reduce steam velocity through the ports by increasing port width and therefore valve travel.

Using the guidelines quoted above, I calculated the valve travel on my model to be 0.636in. (very similar to Martin Evans' design), which scales at 7.187in., the actual valve travel on the prototype being only 3.875 inch. It is quite clear, therefore, that the link on the model will have to be significantly longer than scale if I am to avoid excessive link swing.

The question of link swing was addressed in Mr. Ashton's excellent little book, already referred to in Mr. Taylor's letter. It contains a formula for determining the die block travel necessary to ensure easy reversing. I adhered to this formula, but even so found it not particularly easy to reverse the motion if one of the links was at its maximum inclination to the vertical. Perhaps my engine being new and unused is a little stiff in the joints, but I would not wish to reduce the link slot to less than the 13/4in. arrived at using the formula. This would imply a locomotive link of about 2¹/₄in. between eccentric pin centres, and rather longer overall. This is significantly longer than scale and fuelled my doubts about fitting it into the space available.

If Mr. Taylor wishes to pursue the use of locomotive links, he will find a useful discourse on the subject with drawings and calculations in two articles by Mr. R. W. Dunn in *M.E.* 23/30 January 1947. Doubtless there are other articles and publications which deal with this subject.

The diameter of the eccentric sheaves has no effect on the valve events and should simply be sufficient to accommodate the chosen axle diameter and the throw previously determined. In my case this worked out at 1¹/₁₆in.; the prototype sheaves were 17in. diameter which scales at just over 1¹/₂in., which again demonstrates the increased throw on the model compared with the prototype.

Locomotive links with their greater throw would require a greater diameter sheave.

Ron Ransome
Cleveland.

Fillers

SIRS, - In *M.E.* 4145, 4 May 2001, Mr. J. Dadswell described a problem with voids in his project. These can be repaired with either metallic or ceramic filled machinable putties. I do not know what brands are available in England, but in Canada a product called 'Fluid Film Red Hot 2000' is available. It is a ceramic putty for filling cracks and voids in cast iron and steel which is good to 2000deg. F. It is supplied in a 20g tube which, once opened must be used entirely. It is easy to use as it cleans up with water. This company also makes a product with steel filler that withstands 500deg. F.

Devcon and other companies make similar products for the maintenance and repair trades with steel, aluminium, titanium, stainless steel, and pure nickel nuclear grade compounds for use in reactors and refineries. They would have to be consulted regarding the exact properties of these products.

Dave Smith
Canada.

Missing sheets

SIRS, - Several months ago I was given nine sheets of drawings for a 5in. gauge Schools class locomotive. The drawings were originally sold by Ashdown Models of Robertsbridge which I know went out of business a few years ago.

I have completed the tender, and the locomotive main frames and bogie are complete. I have also made a pattern and had the wheels cast. However, I am now at a standstill since I feel that there are some drawing sheets missing, mainly to do with attaching brackets, etc., to the main frames.

Can any reader help me with my search? Better still, has anyone actually built a locomotive to these Ashdown Models drawings?

I would very much appreciate any assistance that anyone can provide. The Schools class has been a favourite of mine since my school-boy days before WW2 and I would dearly love to complete the model and see it in steam.

I have built four locomotives to Martin Evans' designs. The drawings were very clear and easy to follow and the locomotives are all good performers.

G. W. Haines
Kent.

Peter Lewis

has put considerable effort and energy into resolving the difficulties associated with building *Ariel*, a 5in. gauge rebuilt Bulleid pacific locomotive of the Southern Railway, and has put pen to paper so that others could benefit from his experiences.

●Part 1

In 1993 I had the notion to build a 15in. gauge rebuilt SR Merchant Navy locomotive. This idea came about mainly due to a lack of suitable motive power on the Bure Valley Railway which runs between Aylsham and Wroxham in Norfolk. I was familiar with the line and those who had built it; however, having made many inquiries and considered all the various aspects, bearing in mind that at that time the BVR was going through a change, I decided to abandon the idea and to build myself a 5in. gauge locomotive instead.

One way or another, I have been associated with steam all my life. My father was a professional engineer involved with steam on the railways and in power stations. He had also owned two Doble steam cars which ran at 1500psi (100 atmospheres), one of which I was to restore many years later. Despite this, I was sent to sea and spent three years as a cadet in Nautical School, not on the engineering side but with a view to becoming a Deck Officer. Most of my life has been in, or associated with the Merchant Navy, once the biggest and best in the world but now reduced to almost nothing. At the age of 26 I obtained my foreign-going Masters Certificate which has stood me in good stead ever since. Nevertheless, I have always had a yearning for engineering matters and one of my projects which gave me the greatest satisfaction was to build from scratch a 16ft. 6in. steam launch.

For me, building a Merchant Navy locomotive was most appropriate, so in late 1993 I purchased a complete set of castings and drawings from M. J. Engineering, at which point the fun started and this tale really begins. One of my first tasks was to choose a suitable name for the engine. I had been nine years at Dover in various capacities and I could therefore have called it *Channel Packet* (No. 1, or 21C1 for the Spam cans or



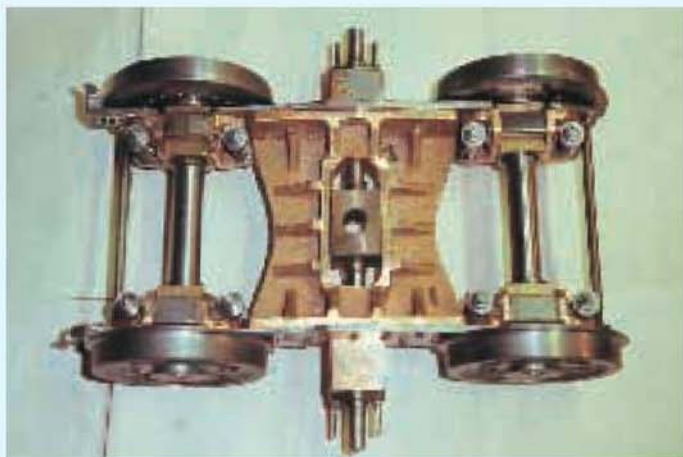
35027 Port Line photographed on the Bluebell Railway. Port Line entered traffic in unlined malachite green livery in December 1948 and was allocated to Bournemouth. Withdrawn in September 1966 with a final mileage of 872,290 Port Line was sold to Woodham Bros., Barry for scrapping. Resold to the Port Line Locomotive Project she left Barry in December 1982 and subsequently, in 1988, was the first Barry Merchant Navy class locomotive to be steamed. The Golden Arrow was one of the Southern Railway's most prestigious trains with both the engine and rolling stock immaculately turned out. The international nature of the train was enhanced by the Union and Tricolour flags which were carried on a holder mounted on a central lamp bracket below the smokebox.

GENERAL STEAM NAVIGATION



Built at Eastleigh in 1944, Bulleid pacific 21C11 was named General Steam Navigation at Waterloo station on 20 February 1945 and entered traffic in black livery. Withdrawn from service in February 1966 after having run a total of 1,069,128 miles, GSN was sold to Woodham Bros., Barry as scrap, was reserved for the Barry Steam Loco Action Group and now moulders gently on a siding at Brighton.





Two views of the writer's front bogie, with which he says he is well pleased. The bogie frames are in 1/8in. steel as shown on the drawings and needle roller bearings have been fitted. Castings are available from M. J. Engineering, deep in S.R. territory.



No. 35001 for the rebuilds) but instead I chose the name *General Steam Navigation* a Company for which I was Second Officer more than forty years ago and which provided me with the best time of my life at sea.

Founded in 1824, GSN is (was) the oldest steamship company in Great Britain and I was proud of my association with the company; the name therefore is very personal. I already had a reasonable amount of information about the locomotive, and by chance have a very fine photograph of it in Guildford locomotive shed together with other more recent pictures of it as wreck photographed on a siding at Brighton in 1995.

Having made a start, I then set about finding other builders. The first reply I received was from Ken Whittle in January 1994 who declared "I'm glad to hear someone else out there is a glutton for punishment!" Ken outlined the problems, listed the worst errors and finished by admitting that his tally had reached 380 errors before he stopped counting. Another reply received was similar and commented on all the omissions.

These early warnings put me on my guard and I wrote to Keith Wilson who had prepared the design at the command of the then editor Lawrie Lawrence. Despite all this, looking back through my file which is nearly three inches thick, I didn't actually receive much helpful advice.

Before I go any further, I want to say here and now that in my view Keith lays somewhere between a Genius and ... oh dear! I have listed and collated the major errors, but as Ken Whittle remarked, there are hundreds more. John Steer of M. J. Engineering furnished me with a list of other builders, concentrating particularly on Australia where I lived in 1969; needless to say,

they came up with significant errors. I felt that it was so much more difficult for them since they couldn't get near a full-size locomotive. So, to date I have made a trip 'down under' every year and kept in contact with Australian builders who in my opinion are brilliant engineers.

This also allowed me to keep in touch with my past associates, attend Anzac day parades and Merchant Navy functions. In Australia they seem to care much more about their past and the folk who stood up for their country, than is evident in the UK.

Meanwhile, I placed an order with Roger Lee Radbourne of Priory Boilers in Warwickshire to build my boiler. I specified one or two minor changes including setting the gauge glass centres on a wider pitch. The price was most reasonable and I collected the boiler in March 1994. There is a particularly serious error on the boiler drawings: the 2 13/16in. dimension for the combustion chamber is an inch short, it should be 3 13/16 inch. Mr. Radbourne observed that this caused him so much heartache that his cat wouldn't speak to him for a week! I shall return to the boiler in due course, but would add that I found the turret feed bush to be in the wrong place and have had (as they say in Norfolk) one hell an' all of a job to fit the outlet with the appropriate valve.

Generally speaking I have followed Keith's articles in *M.E.* between 1984-87. I have been particularly fortunate in being able to make regular visits to the Bluebell Railway and examine *Port Line*. All the Bluebell Railway staff have been most helpful, and I often descended upon them in overalls with camera, clipboard pencils and rule. *Port Line* was over the pit when I paid my first visit which was a real Godsend! I have

also visited the Nene Valley Railway and the Watercress Line.

This reminds me that friend Keith called his loco *Ariel*, a rebuilt Merchant Navy class Pacific locomotive, and then went on to state that on the whole, he had used West Country class drawings. This has added to the general confusion as there are significant differences, but Fred Grosvenor in Sydney struck on the notion of naming his locomotive *Clovelly*, a West Country class. On the same subject, Peter Theobald and Ken Whittle have named their engines *Brocklebank Lines* and *Cunard White Star* respectively.

All the information sent me by my friends down-under saved me a tremendous amount of heartache in the early stages. At the time of writing, I seem to have made the best progress, except possibly for Peter Theobald in Ballarat, and I have prepared these notes in order to set the record straight with regard to the difficulties, and also to say that along with the torn out grey hair, building my locomotive has given me a great deal of pleasure. It runs well on air and it *can* be built—that is if you are a masochist!

As an aside, and bearing in mind I am a Norfolk resident, I have been asked why am I not building a LNER locomotive? The answer is simple; I was brought up in the South East during the war and well remember all the Southern engines, so for me it has all come together.

Looking back, I appear to have taken thousands of photographs of full-size locomotives with close-up shots of every single bit I could see. It has been great fun crawling underneath and popping up every now and again for a shot to provide results which have been an invaluable and indispensable resource. I have also photographed each piece I have made. ▶



Left: Stretchers, stays and buffer beam for GSN were made up with a few alterations as described in the text and posed for a photographic record.



Right: Box of Delights! This collection of bits and pieces is destined to assemble to become the outside motion brackets.



Above: The parts for the superbly detailed outside guide bar brackets were assembled by silver-soldering; regrettably they are to the West Country design!
Left: The inside motion bracket required modification as described in the text.

It seems that I started with the simple bits such as the front buffer beam, frame stretchers and the front bogie. At the time, since I thought I wouldn't be able to manage the job, I recall asking an engineering firm if they could make the con. rods, but I made them myself in the end.

Some of the drawings Keith has produced are excellent (especially sheet 3 with all the motion brackets, a work of sheer genius, Keith) but the other part is located miles away on another sheet. There is no General Arrangement of the engine, but I managed to obtain one and while I was at it also managed to persuade Jim Vass to part with some copies of the full-size drawings which have also been of great help.

I wish to make it quite clear that the purpose of these notes is not to provide an opportunity for a continual moan, but to try to gather some order from the muddle and to clear a way through to help other builders to reach a satisfactory conclusion to their own building projects.

Front bogie

I was very pleased with the front bogie which came out quite well without too many alterations and looks a treat. I fitted needle roller bearings in the axle boxes on all wheels. In his article Keith mentions an argument about frame thickness; someone had made them $\frac{3}{32}$ in. instead of $\frac{1}{8}$ in. thick because of the small amount of clearance. I made mine $\frac{1}{8}$ in. thick as per drawing and had to file off the tops of the rivets because they touched the wheels.

The side control block on the outside should be $\frac{1}{8}$ in. wide not 1in., and the two protruding studs with the end cover can then be made horizontal and not on the 'wank'. All Merchant Navy bogies are shown with this horizontal, although I am told that there was interchange between the

Merchant Navys and West Countrys, etc. I made the cross beam and spacers (four off) from five pieces each held together with a $\frac{1}{16}$ in. pin and then silver-soldered the whole lot up. The bogie side bracket holes are shown as $\frac{13}{32}$ in.; this should read $\frac{3}{32}$ inch.

Buffer beam, stretchers and motion brackets

The front buffer beam is dead smooth on the outside so I have used countersunk rivets, and with the whole lot painted over it looks fine. I recall the assurance that "a little bit of paint covers a multitude of sins" from an old 'Chippy' with whom I sailed years ago. However, there are no cut-outs as shown on the drawing; otherwise a man would fall down them. I later discovered that these are covered by the front platform plates.

I have made and fitted the lubricator as described, taking a drive from a small plate fitted to the inside expansion link; it seems to work fine, but if ever I am not satisfied I will use one of the four lubricators fitted to the outside platform plates.

The frame stays (stretchers) are okay but I reinforced the corner lugs which take the spring bolts. Later on, I had to cut these off the front stay to clear the brake gear. The rear stay shows a $\frac{3}{4}$ in. O/D bush, this should be tapped or have a 'captive' nut fitted otherwise the boiler has to be taken off to remove the Bissel truck—no joke, as I found out to my cost.

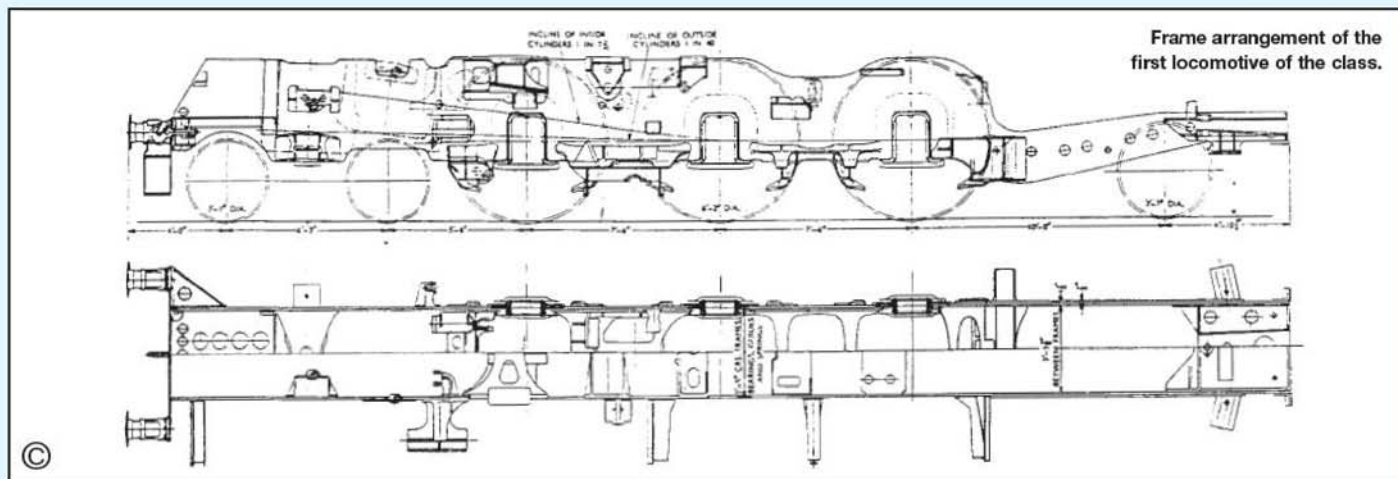
On the rear view of the smokebox saddle, I am told that the measurement of $6\frac{1}{4}$ in. should be $6\frac{3}{4}$ inch. The frame stretcher at the trailing wheels should be dished to clear the boiler. I noticed that this stretcher had a bit cut out of it on *Sir Archibald Sinclair*. I know this engine is a Battle of Britain class, but this part is similar, and at the time I was fortunate to find this locomotive

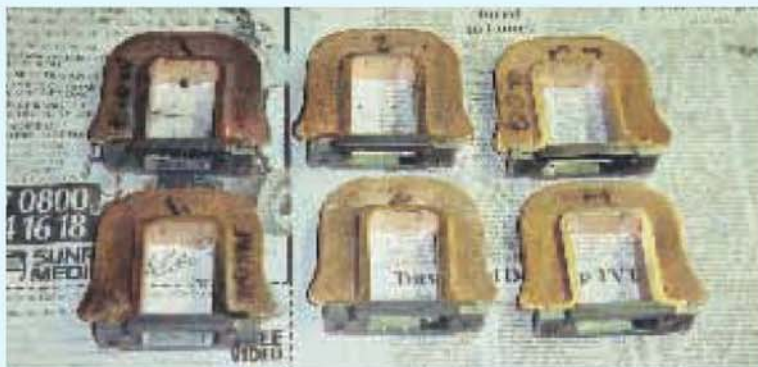
with the boiler off—and what a boon it was to be able to take shots of the whole layout between the frames showing all the stays, etc.

I have already mentioned that I think Keith has done a great job with the motion brackets. The first look at sheet 3 with all the details shook me rigid but against his advice I attempted the inside one first. Like all of them, I cut out all the bits and silver-soldered them all together using an oxy-acetylene torch.

According to Ken Whittle, the guide bar support is $\frac{3}{32}$ in. too low, but I discovered later that I had got it at the wrong angle and had to mill it off, so I couldn't really check. The mention of bearings on the motion brackets for the expansion links presents a major problem; if bearings are used, the bolts will have to go through them—no can do! I dealt with this by making phosphor bronze bushes, each like a flat saucer and cup with a hole right through and fitted inside the housing with the cover plate also just inside the edge as per full-size. Two small holes were drilled for lubrication.

Peter Theobald subsequently pointed out that the outside motion brackets are shaped for a West Country/Battle of Britain locomotive. I was caught out here and made plates to resemble the Merchant Navy type, but I don't like carving up what is a lovely job so they will have to stay as they are. It is the only give-away since I didn't get caught with the screw reverser bracket which is also shown incorrectly as a West Country type, not the Merchant Navy variety. The difference is that the brake hanger pin is in the middle of the bracket and not forward of the centre as shown. The bracket shape therefore is somewhat different. This problem is compounded by the fact that all the brake hangers for the Merchant Navy are the same shape and size, not as shown on the brake drawings.





Above: The horn blocks and keeps were carefully finished before being assembled into the frames; an approach which required much corrective afterwork!

Left: Phosphor bronze strip was used for the main leaf springs.



While dealing with the screw reverser bracket shown on sheet 4, I should also mention the leaf springs shown on the same sheet. I had bought steel spring for this job which, if I remember correctly, cost me about £12 for the lot, including sufficient for the tender. Some said later that this lot would be too stiff, so I shelled out for phosphor bronze strip, which came to about £70 at the time. I must admit that there has been a considerable expense and I wouldn't like to start again with prices as they are today. My photograph shows the springs with the buckles, etc.

Fred Grosvenor in Sydney has pointed out that the $1\frac{11}{16}$ in. cylinder to centre line shown on the outside guide bar brackets gives $7\frac{1}{8}$ in. cylinder centres but in other places the centres are shown as $7\frac{1}{16}$ inch.

My photographs include shots of a tray of bits and pieces ready to be assembled for an outside motion bracket, the completed inside motion bracket, and the pair of outside guide bar brackets.

I wasn't satisfied with my earlier painting efforts so sand blasted it all off and started again, using Dulux satin black paint which I reckon looks pretty realistic.

Before pressing on, I should mention that many of the tapping and clearance size holes shown on the drawings are incorrect, as also are holes, threads, etc., which do not match up and are too numerous to mention.

Main frames

Supplied flame cut by M. J. Engineering, these are a fine job. One or two errors come to mind. First the position of the holes for the left-hand side motion bracket are in the wrong position; they should be about $1\frac{1}{2}$ in. forward of the position shown. I don't know what went wrong here.



A view of the writer's main frames, assembled with the newly painted frame stays and with horns suitably adjusted as described in the text.

The holes for the screw reverse bracket and the associated frame stretcher coincide, requiring some sorting out. The rear doubling plate shown by a dotted line is correct and I note one or two have been caught out and extended it right to the back.

Now I come to a right muck-up of my own making. I can already hear you thinking "Oh no, surely he didn't do that" to put it politely. I made all the hornblocks and keeps to size. Like everything else on the frames I arranged these to bolt on with 7BA bolts and nuts or tapped holes where there was a lack of access. The only exception to this is where I riveted on the doubling plates. I carefully assembled the horn blocks onto the frames with $1\frac{1}{4}$ in. square steel blocks held in place with the frames also held $3\frac{1}{2}$ in. apart with bolts, distance pieces, etc. As far as I could tell, all was square.

When I later came to fit the side rods, etc., I found that the axles were all over the place—and certainly not at right angles to the frames. I ended up by 'cleaning' out the horn blocks and the axle-boxes, and fitting shims to get everything right. It works and is as good as I will get until I strip down the whole locomotive and start again, something I have in mind for the first major overhaul for which I already have a list a mile long—rather like a ship's first drydocking. I know now that I should have fitted the hornblocks, bolted the frames together and milled across them so there would have been no argument.

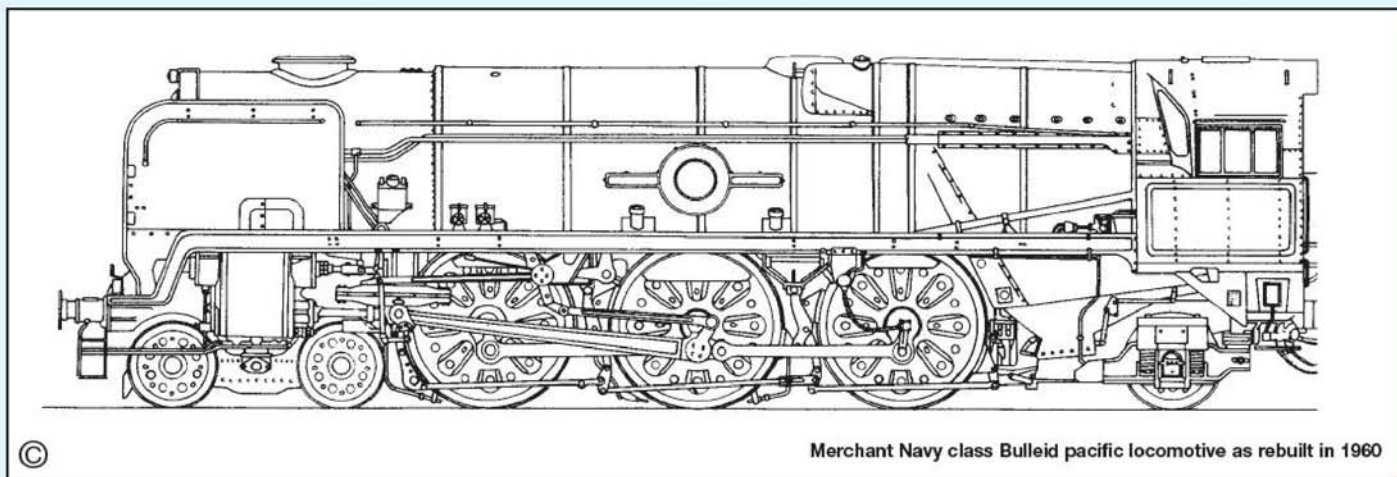
Suppliers

Drawings (24 sheets: LO 968) for *Ariel* in 5in. gauge are available from Nexus Plans Service (call Customer Services on 01322-660070).

Castings and drawings for *Ariel* are available from M. J. Engineering, Manor Hatch, 63B Southampton Road, Ringwood, Hampshire BH24 1HE (call 01425-476234).

Jim Vass Miniature Locomotives may be contacted at 25 Snow Hill, Maulden, Bedfordshire MK45 2BP (call 01525-403656).

●To be continued.



Merchant Navy class Bulleid Pacific locomotive as rebuilt in 1960

Peter Spenlove-Spenlove

discusses the use of an airline in the home workshop and describes how to make a coiled air hose before explaining the construction of a simple low volume air blowgun.

●Part I

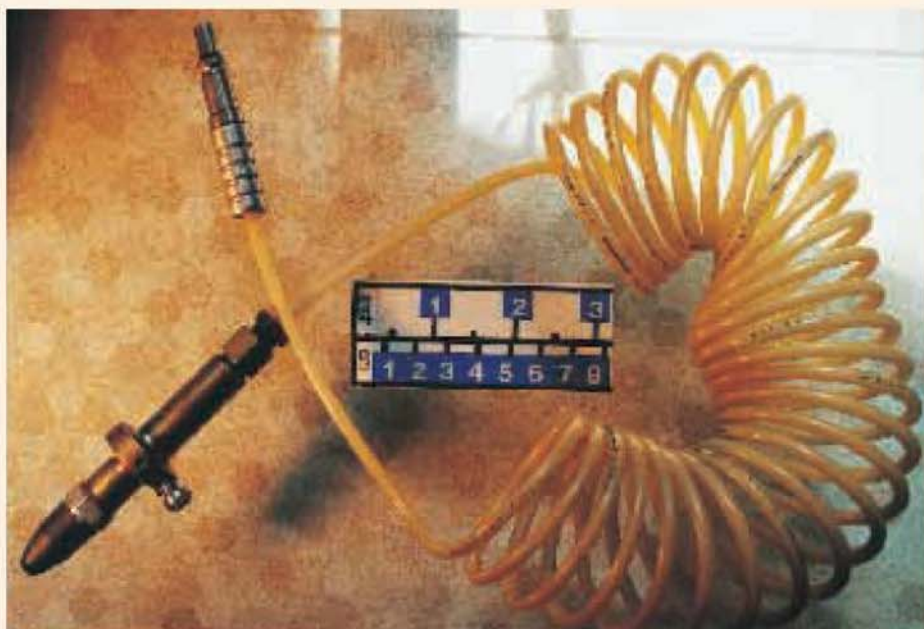
We are all well used to distributing electricity to several socket outlets in our workshops—why not air also? A modern, small, self-contained electrically powered air compressor can be installed outside the workshop and housed in a dry, safe structure such as the garage where the noise of its operation will not cause a nuisance. Both the on/off switch and the air can then be brought into the workshop.

In many towns there are companies which supply air compressors to the local industry. Their stock-in-trade includes both copper and semi-rigid nylon tubing in a range of sizes together with brass and plastic fittings, as well as reducing valves, gauges, stop valves, and the like. One particularly useful standard air-line component is a self-sealing air socket which can be screwed to a wall or clipped to a bench leg. Air is piped to it and only when a matching plug on an air tool hose is inserted can air flow to the tool. When the tool is no longer needed, it can be unplugged and another plugged into the same socket to complete other work.

When not in use, a seal inside the socket prevents any air from escaping. The facility to insert and unplug tools as quickly and easily as portable electrical equipment avoids a temptation to have rubber hoses snaking across the floor or draped in loops over some nearby object. It is far safer and much more convenient to use tools with relatively short hoses which can be plugged into one or more sockets installed close by the point where the tools are normally used.

My photograph shows a small home-made airline blowgun with a rubber tip and a very small air flow rate. A standard industrial blowgun can blast grit and swarf all over the place, and when used to clean a machine after use, can cause problems by blowing debris into the slideways and bearings. My miniature version delivers a gentle puff which is only slightly more than can be delivered by a pair of healthy lungs. The other end of the hose is fitted with a push-in plug cut down from a commercial item and made to fit a socket clipped to the lathe bench. Instead of using costly flexible rubber hose, I used $\frac{3}{16}$ in. O/D nylon tubing from the air tools firm to make a miniature 'coily' nylon hose after the style of those to be found in garages and factories.

On close examination of a commercial 'coily' mains electric lead, I noticed a flat on the circular PVC covering inside the coil. It occurred to me that during manufacture it must have been tightly coiled onto a mandrel and 'cooked'. On cooling the PVC had adopted the coiled form which it retained. I assumed that I could do the same with my $\frac{3}{16}$ in. nylon tube; it was simply a matter of to what temperature and for how long



The Author's length of $\frac{3}{16}$ in. nylon airline hose, coiled in his domestic oven, has survived the rigours of workshop use for many years. For convenience in use, the hose is fitted with a modified standard industrial push-in airline connector and supplies a home-made low volume air gun, the construction of which is described in the accompanying text.

COMPRESSED AIR in the HOME WORKSHOP

should I 'cook' my coiled up tubing? I never did establish the actual temperature in degrees, but read on for an approximate clue.

First, I bought four yards of $\frac{3}{16}$ in. PVC tubing which was cut from a large bulk reel. Next, I wound it tightly around a 12in. length of $1\frac{3}{4}$ in dia. pipe retrieved from my odds and ends box. The close wound coils occupied the middle 6in. of the pipe. A few tight turns of masking tape served to hold the springy tubing in place. A piece of aluminium kitchen foil was then wrapped over the coils and stuck down with plenty of masking tape. About 6in. of the nylon tube was bent against its will to lie along each end of the pipe and held there with more tape and string. These ends were also wrapped in kitchen foil and this assembly was ready for my oven.

The gas oven in my kitchen has no thermometer but a simple Regulo heat control marked 1 to 9. I chose the setting recommended for making a rice pudding in a baking dish. On lighting up, most gas cookers burn vigorously to pre-heat the oven to the selected temperature and the flames could have caused localised very hot spots. I therefore waited for the oven temperature to stabilise, at which point the flames had reduced to just maintain the heat. I popped the nylon tube/pipe assembly into the oven and left it for half an hour before turning the gas off and leaving it to cool in the oven.

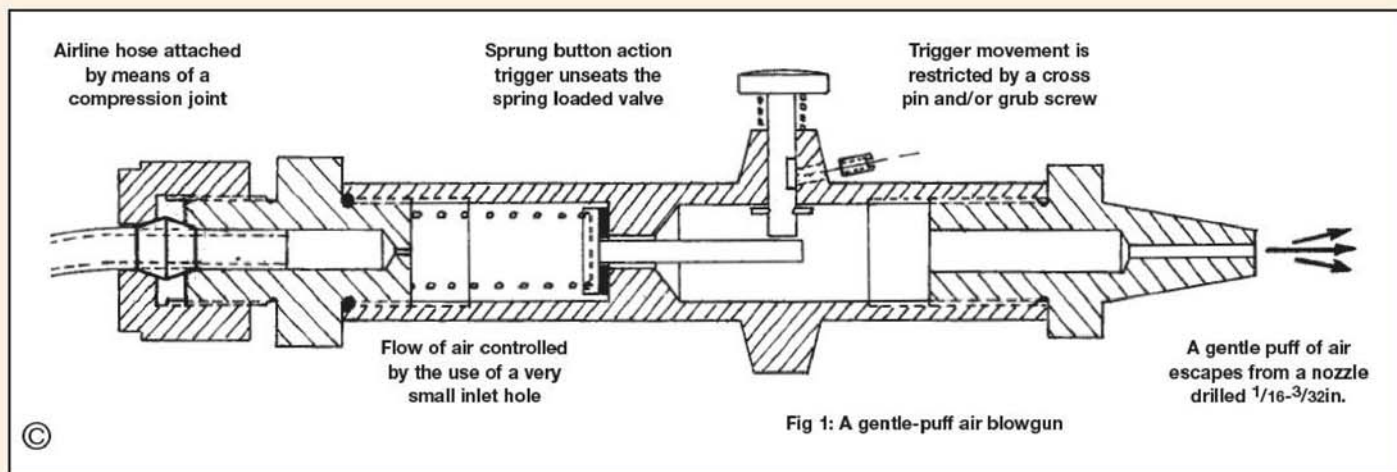
When it had cooled, I was a little apprehensive about the result as I removed my experiment from the oven. The ends of the tape had lifted a bit and were slightly darkened but not scorched. While it wasn't actually burned, the rubbery tape adhesive had become slimy and smelled of burned rubber.

This sticky mess of tape and foil was removed and *Hey Presto!* the freed nylon tubing unwound itself only slightly to form coils of about $2\frac{1}{4}$ in dia. from the original size on a $1\frac{3}{4}$ in. pipe. The nylon seemed not to have suffered from the heating and withstood an air test of 120psi.

All this was done at least twenty years ago. The nylon air hose has retained its new shape despite being stretched to 3-4ft. during regular use and to 7-8ft. occasionally. The accompanying photograph was taken very recently and although the original creamy white colour of the nylon tube has darkened to a pale yellow, there is no sign of brittleness. The nylon wasn't discoloured by the heating, it is probably due to oil and general ageing in the workshop.

Observant readers may notice the markings on the coils which read "Nylon - Enots - $\frac{3}{16}$ " DIA". The tubing is made for or by Benton and Stone, a major pneumatic components supplier to the UK trade; their trade name is Enots which is Stone spelt backwards. Fittings are normally secured with olives and nuts, the nylon having been cut cleanly and no other shaping is necessary. The same fittings can be used for copper tubing. UK engineers term this nut and olive system a 'compression fitting' because the nut squeezes the olive, a small soft brass ring slipped over the tube, into the tubing slightly, giving an air (or water) tight joint.

Compression fittings are not suitable for high pressures such as those in hydraulic systems, or for pressure lines subject to mechanical vibration and fluid pulsing from pumps. I wouldn't suggest the use of compression fittings for steam pressure lines as it is possible to pull a copper pipe



out of its olive and nut fitting, especially if the pipe is hard drawn and thick walled. Such pipes do not compress to allow the brass olive to bite into the pipe surface.

The suppliers of the nylon tubing also stocked various sizes of copper in large rolls. It is annealed and suitable for normal workshop air lines. It can be easily bent to negotiate corners between the compressor and the take off point. My purposes are served by $\frac{5}{16}$ in. (8mm) copper, but if I required air for power tools, a larger size would be required to carry the extra volume of air needed.

A gentle puff blowgun

For this handpiece to work gently, the inlet from the $\frac{3}{16}$ in. nylon coiled hose at full air line pressure must be through a very small hole (fig 1). The outlet nozzle (to the right) must be much larger, as in most standard nozzles or tips which are usually $\frac{1}{16}$ - $\frac{3}{32}$ in. diameter. Other details and dimensions can be varied, except that the inlet union must be air-tight using an O-ring, washer or gasket 'goo'.

The body was turned from 1in. dia. brass bar and is $\frac{21}{4}$ in. long. Each drilled end was tapped $\frac{1}{8}$ in. BSP to match my commercial nozzles. This thread is not much different to the popular $\frac{3}{8}$ in x 26tpi thread which is ideal if you make your own nozzles. A D-bit was used to flat bottom the left-hand hole to form a valve seat for a stainless steel valve and synthetic oil resistant washer. A spring pushes the valve hard onto its seat. Finger pressure on the spring loaded stainless steel button tilts the valve stem sideways to admit air to the nozzle. The finger push button is retained in its close-fitting hole by means of either a cross pin tapped in, or by a grub screw which locates onto a filed flat. I used the latter and show both on my drawing. The head of the valve is recessed to centralise the spring.

It is usual to make the nut and union from hexagon section material so that two spanners can be used to compress the olive onto the nylon tubing. Flats can be filed onto bar stock if no hexagon material is to hand. Both nut and union are drilled $\frac{3}{16}$ in. diameter before cutting the slight tapers that compress the ends of the olive which is turned from copper or brass and annealed.

Readers will appreciate that the compression fitting system shown can be inverted; that is to say, a male threaded nut can compress the olive within a female union. Readers who purchase these items should check that the thread is standard. Some makers use 'in house' threads for which taps may be difficult to find.

Since such a tiny hole is needed, it is easier to make the nut and union as shown. Note the undercut in the nut which is best produced by the use of a small boring tool and will allow the nut to screw

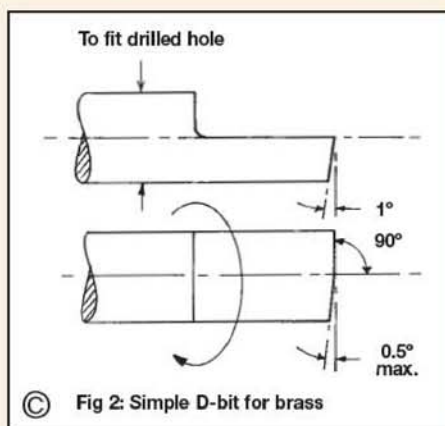
right home without jamming on the thread runout. Some plug/bottoming taps have cone tips which should be carefully ground off to allow the tap access right into the undercut. This applies to most pipework union nuts as it keeps the assembly neater whether using copper or nylon pipes and tubes. A thread-bound nut can easily be mistaken for a tight joint on the olive or cone nipple.

Now for the tiny hole. The imperial $\frac{1}{16}$ in. and metric 1mm sizes are much too big, so we should take a tip from industry where tiny holes are often *pierced*. We can do that, too. The union is drilled $\frac{3}{16}$ in. for the nylon tubing, drilling the hole as close to the end as possible without actually breaking through. A piece of wire is useful to test the depth and a sharp eye to watch for the slight bulge which will appear on the outer end face just before the drill breaks through and is caused by the drill tip trying to push its way out.

If you break through with the $\frac{3}{16}$ in. drill (easily done in brass) solder a disc of thin brass shim over the hole and use the needle tool described below to punch a tiny hole in the shim, standing the union shim end down on the end grain of a block of hardwood.

Now get a large darning needle and cut it in two by grinding to provide about $\frac{1}{2}$ to $\frac{3}{4}$ in. of the pointed end. Drill a hole axially into the end of a piece of $\frac{3}{16}$ in. steel rod so that the needle, with the tapered point sticking outwards, can be glued in place using Loctite or Araldite. Return the union to the lathe chuck and fit the darning needle mounted in its steel rod into the tailstock chuck. Feed the needle point into the union to pierce the required hole. Make a very small hole at first, assemble it into the blowgun and test it on air. If the puff of air is too gentle, enlarge the hole by pushing the needle in a bit further and re-test.

Readers with access to old carburettor or blowlamp jets should consider using one of these screwed or soft-soldered into the union.



Adjust the push button spring and slot so that the button cannot deflect the valve stem more than $\frac{1}{16}$ in. (1.5-2mm) to avoid accidental damage.

Making a plain D-bit

I suggested the use of a D-bit to finish a flat-bottomed hole after drilling with an ordinary twist drill. A D-bit has one cutting edge, not two like a twist drill, and the geometry of its cutting edge gives it a scraping action which is fine in brass but, without modification, not so good in steel. D-bits are special tools which may be available from some of the suppliers that advertise in these pages. However, regular tool stockists are unlikely to be able to supply them.

If an end mill is used to flat-bottom a hole, it will not cut to the centre and is likely to produce radial ripples on the flat surface. A slot drill is better because it will cut across the bottom of the hole and may even give a better finish if one of its two end teeth is not cutting. Commercial D-bits are made in 'round number' sizes which may not coincide with the size of your drilled hole. Fortunately plain D-bits are easily made.

Obtain or turn a piece of silver-steel to fit closely in the drilled hole and face the end smooth and square. File half of the diameter away for about $\frac{3}{8}$ - $\frac{1}{2}$ in. for the blow gun job. Harden the tip and temper it down to gold or light straw then, taking care not to overheat the tool, very carefully grind the angles shown in fig 2 to give a smooth keen cutting edge:

- 1: grind 1deg. along the whole edge, then
- 2: grind the $\frac{1}{2}$ deg. angle on the trailing half of the edge.

Use your D-bit at a slow speed and feed cautiously.

Ever since the D-bit was introduced there has been a debate as to whether exactly half of the diameter or less should be removed. Certainly no more should be removed as this could cause the D-bit to chatter. Holtzapffel & Co., who made D-bits for brass and ivory work in the 19th century, removed half the diameter. Later machinists preferred to remove less, unless the hole to be flat-bottomed was completely blind.

The ideal flat-bottoming D-bit shape would be like a twist drill with a single flute and a flat end in place of the more usual 119deg. cone point. The single flute would allow about three-quarters of the body diameter to offer good support in the hole, thereby eliminating chatter and possible enlargement of the hole diameter. The spiral flute form would ensure that such a tool would work well when cutting steel and with a single straight flute (no spiral) such a tool would work in brass.

● To be continued



RANSOMES & MAY Horizontal Engine of 1850

Stan Bray

continues the project with the piston assembly and the slide valve, describing a couple of special tools and techniques to make the work a little easier.

●Part IX continued from page 72
(M.E. 4151, 10 August 2001)

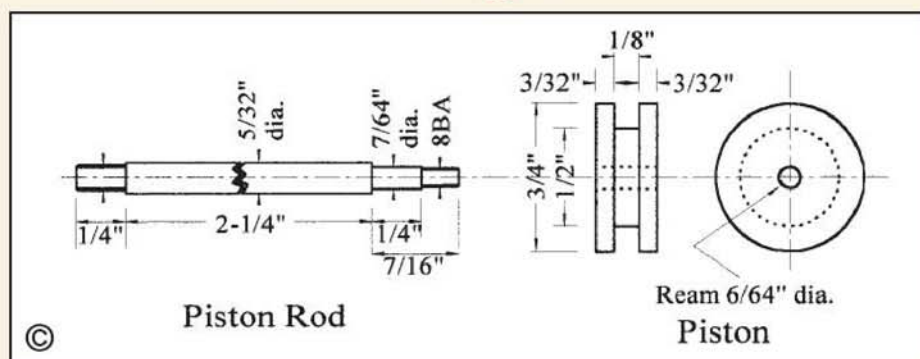
It is now possible to set up the cylinder block and guide bars, so the time has come to make the piston and piston rod. Neither should need much explanation as they are both straightforward turning operations. Variations from the original drawing include the piston groove, the material of the piston rod, and the method of securing the piston on its rod.

The groove in the piston was machined to accept an O-ring, and stainless steel was used for the piston rod instead of the mild steel specified. The original method shows the piston fitted on a reduced section of the rod with a drive fit and secured with a nut on the end. The more usual technique nowadays is to screw the piston onto the rod and then possibly to fit a lock nut. There is no reason why this modern method cannot be adopted, if preferred. The other end of the piston rod is screwed into a fork which carries the crosshead and gudgeon pin.

Making the valve

In order to see how everything is beginning to line up, attention should now be turned to the valve assembly. The valve itself is of a common enough type and experienced readers are sure to have seen the design frequently enough. The recess in the underside of the valve provides a route for the transfer of steam into and out of the cylinder by way of the ports. The slot along the length of the top of the valve accommodates the valve rod while the other across its width houses a square nut which both secures and permits adjustment of the valve position on the rod.

There is no casting for the valve which can be made from a piece of bronze or brass; it is so small that most readers will find suitable material in their scrap boxes. One problem that arises concerns forming the square recess which would normally be milled out; in this instance, due to the method of port face construction, it is essential for the corners of the recess to be square,



Left: the piston and piston rod are a straightforward turning and threading job.

Below: the piston is secured with a nut after being pushed onto a reduced diameter seating on the piston rod. The cylinder cover casting is counterbored on the inside to accommodate the nut.

something which cannot be achieved by milling, no matter how small the cutter. If milled, the corners would have to be squared using a cold chisel, and while this method may not be beyond the ability of some, it is by no means satisfactory and can lead to misalignment and distortion.

The easy answer is to make the valve in two parts, first filing a suitable square hole in a piece of $\frac{3}{32}$ in. brass sheet for the valve face and then, after checking it against the ports, silver-soldering it to another small piece of brass which will become the valve top. This top piece is machined to leave a square protrusion to fit and locate the square hole in the valve face. After silver-soldering, the valve is cleaned up and finished to shape and size. The two slots for the valve rod and nut are milled into the top of the valve and the sides machined to a slope which need not be as steep as shown in the drawings.

The nut has not been photographed, mainly because of its size. Photographs of such tiny items involve considerable enlargement which not only magnifies the whole of the item, but also any slight blemishes which may exist. The result is that scratches which inevitably appear on the



surface and might be almost invisible even under magnification, become very obtrusive and can give a distorted view of the object which is therefore best seen in a drawing.

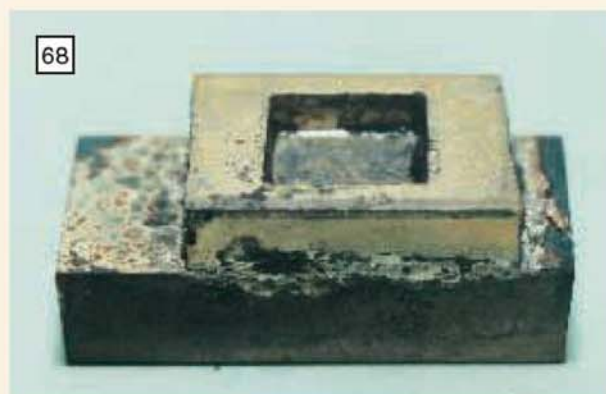
Valve rod

The valve rod should be made of stainless steel; there is nothing complicated about its manufacture except that the end which fits in the tailpiece of the steam chest needs to be carefully made because of its very small diameter.

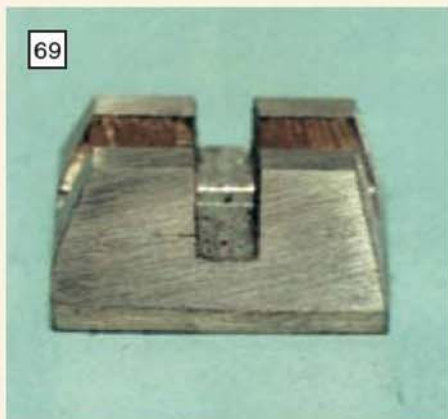


Above: the two parts of the valve; the rectangular section standing proud on the larger piece locates the cut-out to prevent movement during silver-soldering.

Left: the valve after silver-soldering, showing the square corners of the recess which milling would have left rounded and unsatisfactory.



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The finished valve, slotted ready to accommodate the spindle and nut.

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As well as being threaded, the end of the valve spindle is reduced in diameter to act as a guide. This small diameter is difficult to machine without support; shown here is a suitable device as previously described in these pages. The brass bush is drilled from the headstock to suit the diameter of the work, and a new bush is fitted each time it is used. Rigidity is assured by machining as close as possible to the steady.

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The writer's own running down tool in use for machining a small diameter. Sometimes called a rose bit, it steadies the workpiece while reducing its diameter to a size predetermined by the bore of the cutter which features cutting teeth on the end facing the lathe headstock.

Cutting Faces

Hole passes right through the tool = diameter required.

Section cut away for swarf clearance

Shape of Typical Running Down Tool

©

I have no doubt that it is quite possible to use a very sharp tool positioned with its cutting edge exactly at centre height, and by removing no more than 2-3 thou. at a time, to machine it to the required size. It is likely that most attempting this will finish up with a fair number of pieces of bent metal and so some sort of aid is desirable. A while ago a device in the form of a kind of steady was described in these pages; it consisted of a piece of angled metal bolted to the saddle and fitted with a brass insert. The insert is drilled from the headstock to the same diameter as the piece to be machined. Thus when machining starts only the piece protruding remains unsupported and by keeping the tool as close as possible to the steady, the cross strain on the metal is at a minimum. It works well and doubtless a few readers will find it useful when machining the valve rod.

Running down tool

My own preference for machining small diameters is to make a special tool with which to do the job. Based on tooling which was frequently used on old capstan and turret lathes, it is sometimes referred to as a rose bit. It is simple to make, can be kept for use at other times, and makes life easy when machining small diameters. I have made one for each size of BA thread from 2-14BA which means that the diameter of the work being machined never has to be checked; the finished job cannot fail to be the required size by the use of one of these devices.

The tool is not intended for the removal of large quantities of metal, so the part may have to

be machined slightly oversize on diameter before feeding the cutter into the rotating work which will be reduced to the size of the hole in the tool. However, our current job requires no such initial machining as the workpiece is not much larger than the thread size.

Made from a short length of silver-steel, the first task in making the tool is to drill a hole of the required diameter; if the cutter is to be used in producing a thread, the hole diameter should be the same as the outside diameter of that thread, in this case $\frac{1}{16}$ inch.

Once drilled, three or four cutting edges are filed onto the end face and a slot made to allow the swarf to escape. The tool is hardened and tempered, bringing the cutting edges to a dark straw colour to finish the job. The tool will probably function with a single cutting edge, but three or four teeth will ensure a much smoother and more satisfactory cutting action.

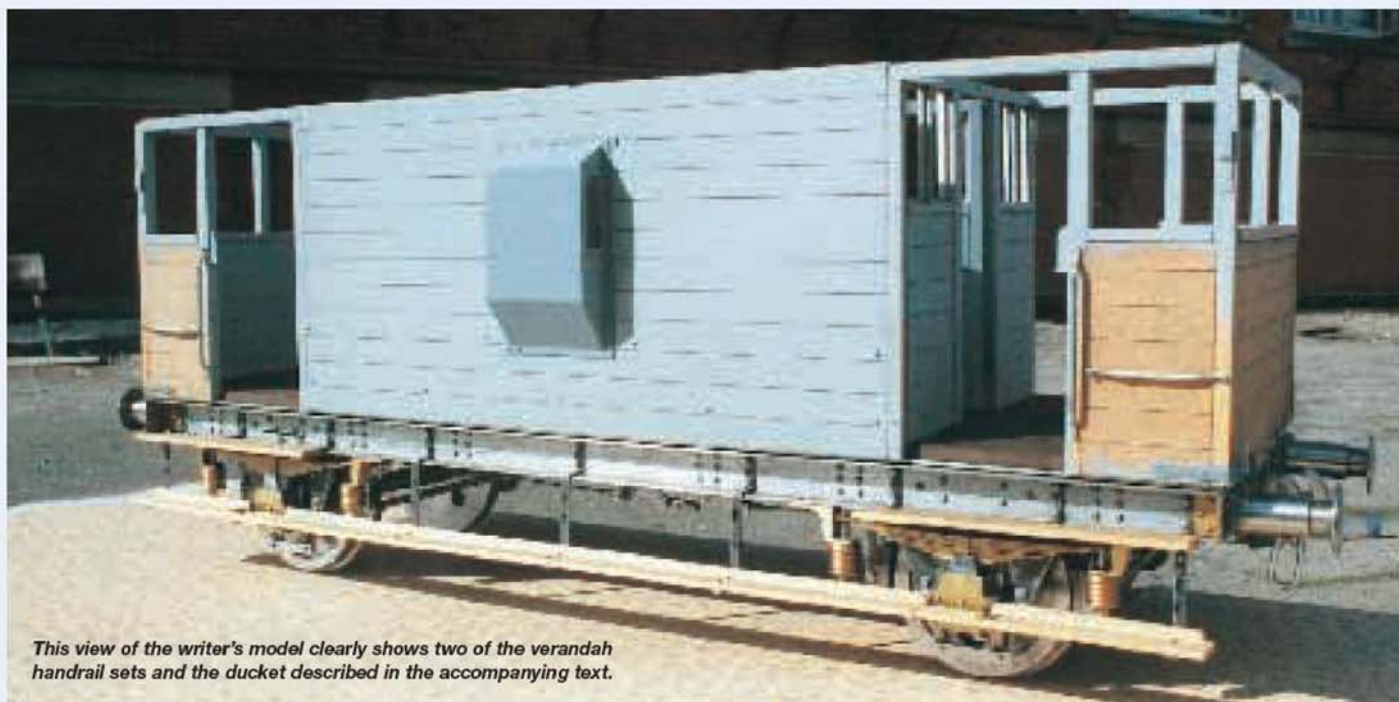
The valve rod requires to be threaded and I have a tip which some readers may not have thought of. It is not uncommon for a 3-jaw chuck to be ineffective for gripping very small diameters, allowing the work to slip. At best the surface of a slipping workpiece is likely to be marked; at worst it may be deeply scored. So, instead of using the 3-jaw chuck, try fitting the tailstock drilling chuck in the headstock to grip the work. Being designed to accept small diameter drills, a drill chuck will hold small diameter bar much more effectively than a regular 3-jaw chuck will.

●To be continued.

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Small diameter work is not always firmly gripped in a 3-jaw chuck, particularly when threading with a die when forces can be considerable. The tailstock drill chuck is designed to grip small diameters and when fitted in the headstock will hold small diameters much more securely.



This view of the writer's model clearly shows two of the verandah handrail sets and the duckets described in the accompanying text.

A 20 TON LMS BRAKE VAN in 5in. gauge

Geoff Dowden

describes how he made and fitted the verandah handrails, body side panels, duckets and internal partitions.

●Part IV continued from page 87
(M.E. 4151, 10 August 2001)

Before starting on the body side panels, a visit to the blacksmith's shop was necessary to fashion the four sets of three handrails at each verandah opening. There are two vertical handrails of unequal lengths, one on each upright, and a horizontal handrail on the short side return panel. Unfortunately, these fittings are not of the familiar slide-a-rod-through-a-hole-in-a-knob type, but are one-piece jobs. I confess that I found this task to be the most frustrating of all as I experienced some difficulty in maintaining my hand and eye co-ordination to the degree of consistency and accuracy required.

Bending lengths of 2.6mm rod, which appeared to be approximately the right diameter and of which I just happened to have plenty in my

stock box, was easy enough. However, holding a small piece of rod with a red hot end over an anvil in a pair of pliers gripped in my left-hand, while clouting it with a hammer wielded in the other in order to flatten the end was all a little too much. However, by the tenth handrail I suppose I had moved some way towards perfecting a technique. It is fortunate that the twelve handrails don't all line up together because each set of three are in different alignment, and slight departures from uniformity of the flattened ends is therefore less noticeable.

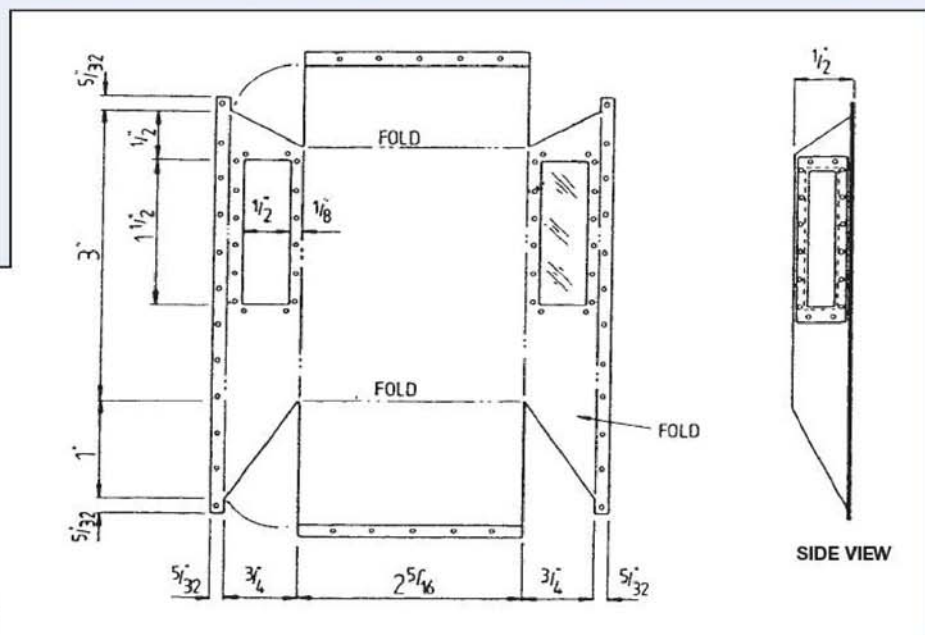
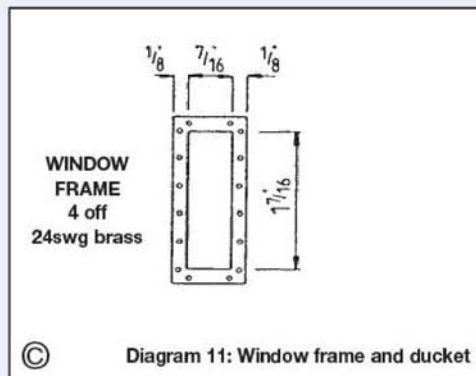
The forged sections were drilled No. 62, the ends filed to the appropriate shape and thickness, and the handrails then fitted to the uprights and the MDF with 12BA hexagon head bolts screwed

into tapped holes which I found to be a satisfactory anchorage. If the handrails work loose in service I will add a spot of glue and screw them back in, but at this early stage they need to be removable for painting.

Side panels

All that remained after fitting the handrails was to permanently secure the L-shaped pieces into place and fit a further 90deg. bracket at the top of the end corners. However, both these operations came after finishing the centre side panels so it was these which were the next bits to be tackled.

To avoid unwelcome gaps between the verandah posts and the ends of the planking, the length of the side panels was critical. With the L-sec-





The internal features of the writer's fine model are shown in this view of the side and end panels, partitions and furniture.

tions in position, squared up from the floor and clamped to the top of the uprights with large bulldog clips, the exact dimension between the inner verandah opening uprights could be determined from the job; mine turned out to be $14\frac{1}{8}$ inch. A piece of 6mm MDF was cut close to this dimension, 7in. high and the long upper outer edge radiused off as before. After squaring off one end, the planks were scored inside and out and then carefully filed to fit between the posts obtaining by trial and error a length which ensured they were held in place.

The position of the ducket opening was then marked out, a task I had not anticipated as I had been quite prepared to fit the duckets without necessarily being able to see into the van through its windows. However, I had progressed too far to accept this compromise and had become aware that the backrest of the guard's seat reclined into the space provided by the ducket. The ducket itself is positioned across the vertical centre line of the van; the hole finished up $2\frac{3}{16}$ in. wide and $3\frac{3}{4}$ in. from top to bottom, the top being just above the bottom of the third plank from the top

and its lower edge along the line of the third plank from the bottom.

I decided that the next job was to fit the main body panel handrails and this time I took the soft option of using $3\frac{1}{2}$ in. gauge handrail stanchions left over from the construction of *William* (featured in *M.E.* 3976, 2 September 1994), and appropriate lengths of $\frac{3}{32}$ in. rod. I couldn't face another session of metal bashing to forge another twelve shaped ends plus ten special tags to silver-solder onto the rail. If sometime in the future I have nothing better to do, they can be replaced with the prototypical style anchorage without spoiling or having to alter anything. In the meantime the positions of the stanchions were marked out on the side panels and drilled No. 48, taking care to maintain both horizontal and parallel alignment before tapping 7BA threads in the MDF.

The stanchions were screwed in, appropriate lengths of handrail prepared as shown on the General Arrangement drawing, and trial fitted to the body side panel. The process was repeated for the other side and the rails and knobs set aside until later.

Duckets

To someone for whom soldering is not a natural talent and therefore does not come easily, the prospect of ducket construction was one of my worst nightmares! The very thought of cutting out the metal to the intricate shape required before bending, folding and soldering operations filled me with trepidation. While contemplating the problem I recalled that in my 00-gauge phase of railway modelling I had built numerous items from card including vehicles, buildings and other elements of railway infrastructure.

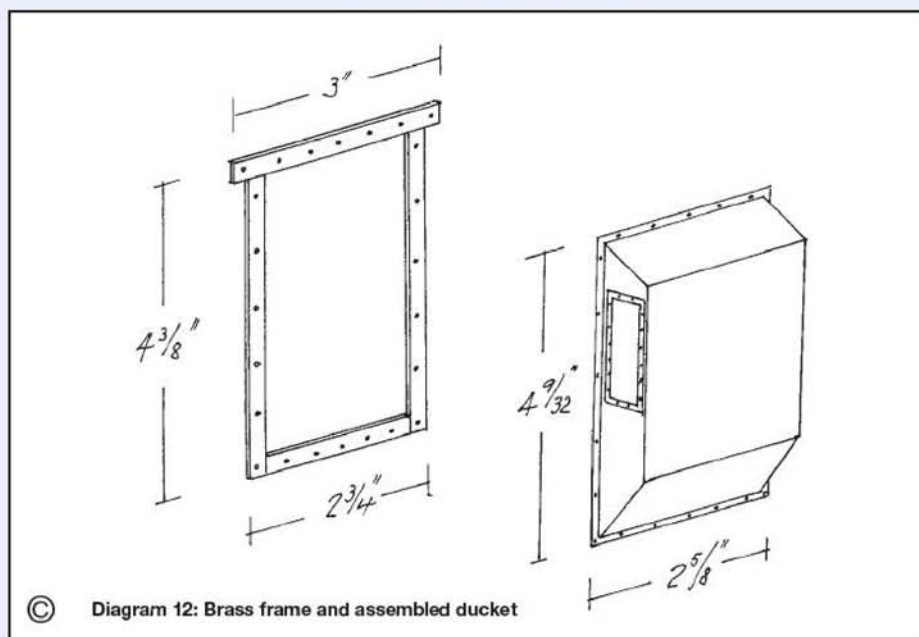
Based on this experience I decided to make a dummy run using a sample of good quality card which I still had. Assuming that there would be little dimensional difference between the duckets on the early Stanier vans and those chosen by Doug Hewson, I duly marked out the shape in accordance with his drawings. Using card, I was able to include a number of tabs for gluing (diagram 11) where a soldered butt joint would have secured the joint of the metal version.

Having cut out the necessary shape, folded up the ducket, glued the tabs and waiting overnight for everything to harden, I was very surprised to discover the rigidity of the result. I was sufficiently encouraged to produce the rectangular window frames, thinking that if it all went pear-shaped later, these at least could be retrieved and used again. The two $1\frac{1}{16}$ x $2\frac{3}{32}$ x $\frac{1}{8}$ in. frames of $\frac{1}{32}$ in. brass were therefore prepared and each drilled with sixteen $\frac{1}{32}$ in. holes (diagram 12).

The window opening in the ducket was just wide enough for a rebate to accommodate the glazing material inside the ducket. The windows were cut from some clear 0.020in. rigid packaging material which I had previously saved for the purpose. The location of each window was identified with a sticker and they were set aside for permanent fixing later.

The General Arrangement drawing shows the duckets as appearing to be fitted to a frame between the back of the ducket side returns and the van body and protruding a little around each side. This frame was soft-soldered up from $\frac{1}{4}$ x $\frac{1}{32}$ in. brass strip (diagram 12) and 24 $\frac{1}{32}$ in. holes were drilled around the frame. I can cope with the level of skill required for this sort of assembly!

A couple of coats of beige paint were applied



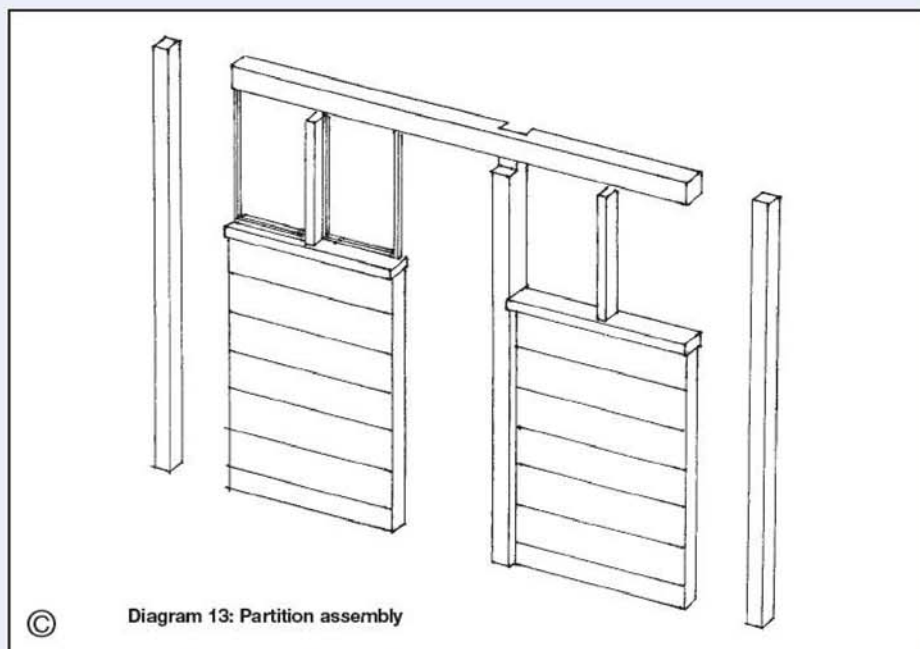


Diagram 13: Partition assembly

to the ducket before it was glued to the brass frame with a sparing application of UHU glue, care being taken to centralise the ducket on the frame both side-to-side and top-to-bottom. The assembled ducket and frame was then placed on a piece of plate glass and chunks of metal positioned on each of the four sides to ensure that the back face remained flat while the glue set overnight. Work on the ducket was completed by drilling $\frac{1}{32}$ in. from the back through the holes already drilled in the brass frame.

The ducket was given three coats of grey automotive spray primer and the internal beige surface touched up to remove evidence of overspray through the window openings. The windows were secured with a fillet of PVA glue around the edge of the rebate, sparingly applied to prevent it spreading onto the glazing material. Fortunately, excess PVA adhesive can be removed using clean water and a fine paint brush.

Pleased with both the visual effect and physical strength of the card ducket, I decided to construct the one required for the other side in similar fashion. Maybe not everyone would approve of the use of card as a model engineering material but I challenge anyone who didn't already know to tell the difference between those on my van and others of a more conventional construction since:

1: Once painted and fixed in position I believe their appearance to be indistinguishable from a metal product

2: The card duckets are simple to assemble and eliminate mental stress, burned fingers and solder on the workshop carpet.

3: When given a coat or two of matt varnish on completion of the van, the duckets should be reasonably waterproof. That said, I don't expect to run the van for very long (if at all) in the rain so this is unlikely to be a significant problem.

4: If the van should ever be accidentally derailed and suffer side impact damage, the ducket could quite easily be replaced. If subjected to a similar impact, would a brass or nickel silver ducket remain unscathed, I wonder?

5: The duckets are sturdy enough to withstand the rigours of normal handling and operation.

So, if the idea appeals to you as an alternative to several hours of tedious filing, why not give it a try? You may be pleasantly surprised. A sharp scalpel is much easier to use than a saw or file and produces beautifully clean edges and corners!

The two duckets were laid aside while attention was focused on the next stage of finishing the side panels. A couple of coats of beige paint were applied to the inside of the panels and four coats of the grey primer, thinned about 3:1, to the outside. This produced an acceptable exterior finish which I could leave at this stage in order to make further progress by fixing the four 'Ls' to the side panels.

Dealt with one at a time, the end sections were positioned and a thin layer of PVA adhesive was applied to the inner face of the 'L' upright which was then clamped to the end section at the half joint. The corresponding face of the MDF side panel was given a thin smear of PVA, positioned and then clamped to the top of the 'L' using a 3in. bulldog clip.

The same process was repeated at the other end but without the glue. The side panel was then sitting on the protruding metal sub-floor and a 30in. length of $\frac{3}{16}$ x $\frac{1}{2}$ in. steel bar was eased into the bulldog clips to guarantee a true straight alignment along the entire length of the vehicle. A couple more clips were added for good measure, effectively bringing the five components together as a single unit. Excess adhesive which had found its way out of the joint was wiped off and the assembly left overnight to harden. The procedure was repeated for the other end and again for the other side of the body.

The side panels were then removed and the $\frac{1}{4}$ x $\frac{1}{4}$ in. stripwood internal framing fitted to the insides. Two verticals were positioned either side of the ducket opening, allowing for the thickness of the floor, and two diagonals from the base of the uprights to the two outer upper corners. These stopped at the end of the MDF panel as the upright of the inner verandah opening provided a mating face for the outer ends of the partitions which were the next items to be tackled. A side panel can be seen to the rear of the group shown in the accompanying photograph.

Partitions

The overall width of the partitions is the same as the width of the floor, the ends of the partition lower planking panels and the outside edges of the outer window frames abutting directly onto the inner framing of the verandah opening. I calculated that for each partition I required two pieces of 6mm MDF $2\frac{3}{8}$ x $4\frac{1}{8}$ in. width and height, two $6\frac{1}{16}$ in. lengths of 9mm square

material for the door frames and one length of $\frac{1}{4}$ x $\frac{1}{4}$ in. for the top cross member which left 2in. spare for the door opening (diagram 13).

A piece of MDF, approximately 16 x $4\frac{1}{4}$ in., for the four panels and two door panels was scored both sides as before and then sawn and filed to provide two pieces to the dimensions given earlier. At this point I found that I had inadvertently strayed from the General Arrangement drawing by forgetting to rebate the inner face of the inner verandah opening upright to suit the end of the partition planking panel as shown on the drawing. Having glued the 'L' sections in place, I decided it would not be easy to cut the necessary rebate and resolved to carry on regardless.

To be consistent, I deliberately omitted the similar rebates in the door frames. If any readers decide to build a van as described here, the inner verandah opening upright would be better prepared from the 8mm square rather than $\frac{1}{4}$ x $\frac{1}{4}$ in. material, and rebated $\frac{3}{32}$ in. before gluing to the MDF side panel. Allowing for the same rebate in the door frame, the dimensions of the planking panels had to be adjusted accordingly from those listed earlier. I was annoyed to have made this mistake but concluded that if I told nobody, very few would notice the discrepancy.

The next job involved cutting a $\frac{1}{4}$ long x $\frac{1}{8}$ in. deep rebate on the top front face of each door frame ready for the later fitting of the cross member. The scored planking panels were then glued centrally to their respective door frames leaving a $\frac{1}{16}$ in. rebate on both inside and outside faces. The top cross member was then carefully marked for attachment to the top of the door frames and the rebates cut.

When a good fit had been achieved, the three pieces were laid on a flat surface and the top cross member glued in place ensuring, as before, that they were outside down and all square. Two $2\frac{1}{2}$ in. lengths of $\frac{3}{16}$ x $\frac{3}{8}$ in. were then glued in position for the cill plates with equal overhang to the MDF panel. Two lengths of $\frac{1}{8}$ x $\frac{1}{4}$ in. were glued vertically to bisect the rectangular opening and create the two window openings either side of the door frames. The outer window opening and its $\frac{1}{16}$ in. glass bead about the inner upright of the verandah opening.

My local model shop was able to supply the $\frac{1}{16}$ in. square stripwood required for the window beading. Two 3ft. lengths were given a couple of coats of beige paint on three sides before being cut to produce the 32 pieces required for both partitions. I began window construction by fitting the inside framing first, gluing the first piece of $\frac{1}{16}$ in. square on top of the cill plate, unpainted side down and positioned so that after allowing for the thickness of the glazing material and the external beading, an equal amount of cill plate remained on each side.

I then worked around the window opening until the four pieces all lined up nicely with each other. The pair of outer window vertical beads were the last to be fitted as the only glued joints were at the ends of the horizontal beads leaving them vulnerable to accident until glazed at a later stage.

A second partition was assembled for the other end of the van and the inside of both units given two coats of beige paint and the outside four coats of the thinned grey primer.

●To be continued.

Neville Evans

describes the machining of slide valves and balance pistons, includes the Loch cylinder drawings and discusses his proposed compound locomotive.

●Part VIII continued from page 78
(M.E. 4151, 10 August 2001)

In the last few days, I have busied myself by machining up the cylinders for my own loco and can report no snags. However, a few thoughts on slide valves and the making and fitting thereof may not go amiss. As I have made plain during the last several months, I am a great fan of the balanced valve. Over the years, Don Young did a lot of work on these devices and, while they involve a bit more work, I would think that as there are no exhaust ports to drill and mill in the main casting, there ain't much in it.

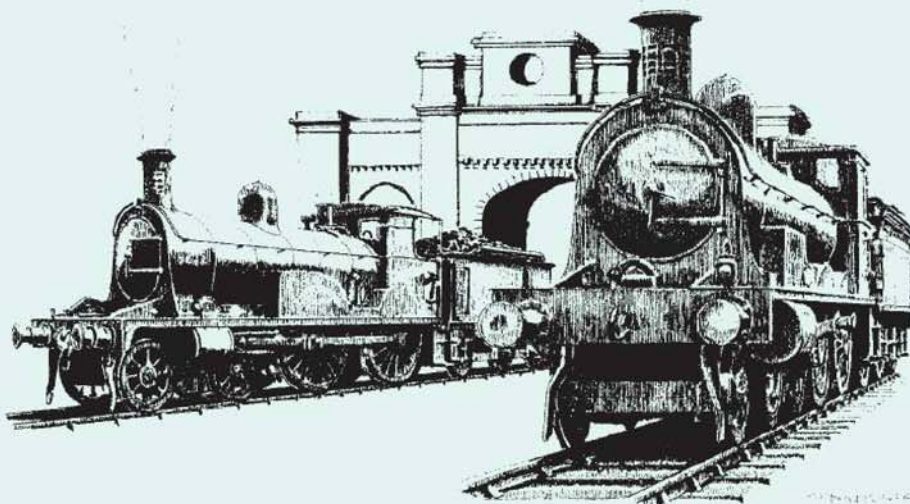
I had thought of machining the slide valves and balance pistons from rectangular section meehanite but, after discussing the rather difficult setup with Deryck Goodall, the following plan evolved.

Starting with the balance pistons, the basic shape was turned from 1³/₄in. round bar and the 1/2in. exhaust hole drilled and reamed. While still held in the chuck I machined the smaller end of the bobbin to length, leaving plenty of thickness in the 1 1/2in. diameter part to machine to finished size on final assembly. I also put in the smaller of the two chamfers, easy enough at this stage but far more difficult to set up later on.

The blank was then bolted upside down onto a steel block using a 3/8in. x 26tpi bolt through the 1/2in. hole, with an appropriate brass bush, of course. The setup was then held in the milling machine vice and the two flats were milled out of the top flange as per the drawing.

The same basic procedure was followed with the slide valves, but the fronts and sides were milled with reference to the 1in. dia. boss, making certain that the length of the valve was absolutely accurate. I then removed the valve from the steel block and bored the 1/2in. hole out to 3/4in. to fit the balance piston. The valve was inverted and replaced in the machine vice and the inside cut out with the 5/32in. slot drill, remembering to work clockwise around the square hole. The inside face was made equal to the inside dimension of the ports plus 0.007in. exhaust clearance, and as my ports came out at exactly 5/32in., more by luck than judgement, I didn't need to adjust the valve length. If the ports had been over 5/32in. wide, I would have had to add the extra onto the length of each side of the valve.

The last operation was to adjust the height of the valves with reference to the valve chest. I am using red silicone rubber O-rings to BS Ref. 116. 245-0744. These rings are 3/4in. I/D and 0.103in. thick. I've got lots of them if you're stuck. Assemble the two parts of the valve with the O-ring in between. Measure the height of the valve chest and machine the top part of the balance piston so that the assembly sits 3 or 4 thou. higher than the top of the chest. There will be enough spring in the O-ring to hold the balance piston against the valve chest cover until steam is applied to seal it.



THE HIGHLAND RAILWAY JONES 'BIG GOODS' & LOCH 4-4-0 LOCOMOTIVES IN 5in. GAUGE

Grovelling time

Despite having studied the cylinder drawings a hundred or more times, I was amazed and dismayed to notice, as soon as I glanced at the drawing in M.E. 4151 (27 July 2001), a mistake in the dimensioning of the cylinder covers. Needless to say, if you make the inside dimension of the cover flange 1³/₈in instead of the correct 1 1/2in. it will be too small. I shall elaborate no further.

Feedback

I've been most gratified by the response, both written and verbal, to my short notes on the projected Compound. First a letter from Mike Johns: "Regarding Neville Evans' article in M.E. 4143, 6 April 2001. Fancy being 'born to the GWR' and then devising a 4-cylinder compound version of Sir William's (also born to the GWR) rebuilt Royal Scot with a Maunsell cab, courtesy of the dead hand of Eastleigh. Even the original Royal Scot design by North British was based on the Lord Nelson drawings complete with an 'awful plate' smokebox. By the way, what else do you make a smokebox from?"

And fancy excluding the 'magnificent N15s and King Arthurs' from criticism—they too were designed at Eastleigh. North British built 30 of the total class of 74 locomotives at a time when Eastleigh had other commitments.

So what of the proposed design? I was a little confused reading the second paragraph on page 336 which seems to mix prototype and model details—is something missing? The prototype cylinder proportions seem to accord well with Andre Chapelon's findings that the volumetric ratio should lie in the range 2.1-2.5, but these were matched with a high pressure, high superheat boilers. I think the model working pressure at 100psi will probably result in a 'wet' running locomotive and needs to be raised to at least 150psi.

I assume the re-heater between HP and LP cylinders is intended to be in the smokebox but

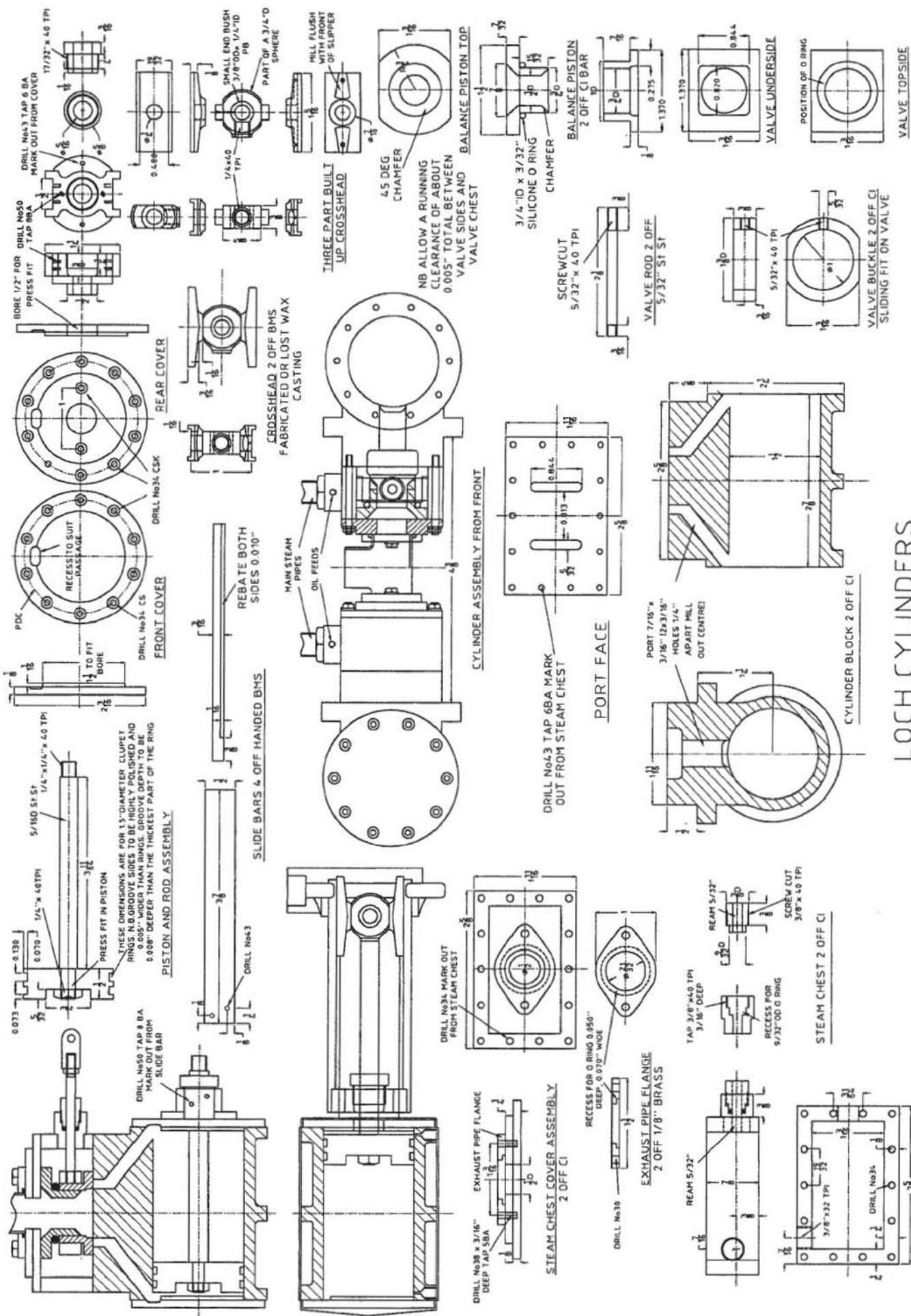
wonder if sufficient volume can be achieved in the model to dry the steam and provide an adequate reservoir for the LP cylinders. Steam jacking is unlikely to be very effective owing to the limited space available within the British loading gauge. With an overall width of 8ft. 6in. at cylinder level, there is no space on a 1in. scale model with 1³/₄in. cylinders if reasonable metal thickness is to be maintained.

I cannot see from the drawing where the valve gear rocker arms are to go. Their layout is critical to achieving reasonable HP and LP valve events, and they need to be linked to give a cut-off ratio of about 3:2 (i.e. at HP = 75% the LP = 50%) as well as driving the outside and inside slide and piston valves. The adjacent inside and outside cranks appear to be opposite one another to avoid further complications with the former driving the leading coupled axle. How about using poppet valves with independent or linked cut-offs, pre-set or variable cams, rotary shaft drive and a steam reverser just for a change? A smokebox mounted poppet valve regulator could also give finer control of steam supply from the boiler.

I wonder how a gas producer firebox will work in a narrow firebox locomotive with plate frames. These will tend to mask side access for secondary air which is critical to minimising smoke across the firebed of a coal burner. Why not use oil or gas firing for closer control of steam output and exhaust emissions?

Many other ideas will no doubt come to mind—but then I only used to work in Eastleigh Drawing Office!"

To comment briefly on this letter; first, the loco as drawn (and it has evolved considerably since that time) was the progeny of the Super Schools as described by LBSC in the 17 June 1966 edition of M.E. This loco was a development of Curly's Roedean which was a small edition of the SR Schools Class. Harold Holcroft and Roy Donaldson reworked the loco with a



LOCH CYLINDERS



This detail shows the two-stud piston rod gland fixing on Jones Big Goods, HR No. 103.



Crosshead and con. rod little end details on HR No. 103. Note the lubrication arrangements.



Just look at those lovely oil cups on HR No. 103 at Glasgow Museums Museum of Transport!

shortened Nelson boiler and Holcroft conjugated valve gear, together with a few other knick-knacks such as a proper smokebox and saddle. This seemed to me to be a logical development of the Maunsell SECR school of design, which started with the lovely and very efficient N, U, and K series of locos, these were, of course, two Moguls and a Mogul 2-6-4 tank.

The other parent was C. W. Keiller's superb 4-6-0 compound in 2 $\frac{1}{2}$ in. gauge as described in *M.E.* for June 1950. The catalyst was none other than John Van Riemsdyk whose book *Compound Locomotives* should be required reading not only for students of the locomotive, but for the pleasure of its lucid, elegant prose. I remain very grateful to J. V. R. for his advice and instruction over the years, of which more later.

I maintain that the N15s were Northern British shop engines. Finlayson was, I suspect, brought in by Robert Urie from the North British Locomotive Company with a view to the future development of the British steam engine after the departure of Dugald Drummond. Once the draughting problems were dealt with by the Maunsell SECR men and later by Oliver Bulleid, the N15s were capable of development, even to the level of the *Red Knight*, which was acknowledged to be equal in speed and hauling capacity to a Lord Nelson.

One of the merits of a good design is its potential for development. I recently noticed a cover on a book which showed a head-on view of the prototype Spitfire Mk XII. The airframe of this aircraft started life as a Mk I Spitfire. It was re-engined with a *Merlin* 20 to become the Mk III, which never reached the production stage. It then was given a new lease of life with the 1750hp *Griffon* Mk 3 to become the Mk XII, the best low level fighter of its time. The last Spitfire, the Mk 24, was said to be equal in weight to a Mk I, plus 15 passengers and all their luggage. Sadly enough, it felt like it too!

The Spitfire's adversary in the early days of the war was, of course, the Messerschmitt Bf 109E. This aircraft, more of which were lost in flying accidents than by enemy action, would never have been passed through Martlesham Heath for service with the RAF due to its lethal landing characteristics and poor undercarriage design. It was only capable of limited development; in fact the definitive version, the Bf 109F, was in service by 1941. After that time more power and heavier armament only served to reduce its effectiveness!

On a point of order, if Mr Claridge (*Postbag*, *M.E.* 4148, 15 June 2001) reads Jeffrey Quill's book *Spitfire, A Test Pilot's Story* a little more closely, he would see that the little Vickers fighter with the Bristol *Aquila* engine was in fact called the *Venom*. The *Demon* was a Hawker two seater biplane fighter. The reason that the *Venom*

was not proceeded with was that Bristol cancelled the engine as they had too much on their plate with the *Hercules*, *Centaurus* and so on, to be able to develop the *Aquila* which was too small anyway. The airframe had a lot going for it, it was easy to make and therefore cheap. It was certainly faster than the Hurricane on less power, was extremely agile and, while it didn't have the development potential of the Spitfire, it was a generation ahead of the metal tube, wooden lath and canvas construction of the Hurricane which wasn't going anywhere in terms of development.

To return to Earth in general and Compound locos in particular, the cylinder proportions are critical if the valve events are linked. The LP to HP ratio is defined within fairly close constraints by the boiler pressure, if a simple conjugation is used. Incidentally 'conjugated' just means joined, the Castles and Duchesses had conjugated valve gear, it doesn't necessarily imply sophistication as in the Gresley 3-cylinder or the Holcroft 4-cylinder set-ups, which gave impulses at 60deg. and 45deg. intervals respectively.

For a pressure of 100psi or so, which is what I envisage, a ratio of between 1.8 and 2:1 is recommended, as the cut-offs in the LP and HP cylinders will be more or less the same. You cannot actually have a cut-off ratio of 3:2 with a conjugated valve gear, you can vary it a bit by using the Von Borries system of separate combination levers, but I don't think this is justified in the model, although Holcroft used three separate combination levers in the Super Schools. One of the greatest compounds of them all was the 4-6-4 DeCaso Baltic 232U. This loco had similar LP and HP cut-offs, with no individual adjustment when running, although for starting, the LP engine could be held at about 90% cut-off during initial acceleration. It was very strongly built, with big axleboxes, a cylinder ratio of 2.33:1, and 300psi.

I had thought of steam jacketing the HP cylinders, (which are inside), there being plenty of room for a $\frac{3}{32}$ in. steam space between the cylinder casting and the liner. Instead I have now settled on a single radiant superheater flue, $\frac{1}{2}$ in. diameter from backhead to cylinder, with a poppet valve regulator on the backhead similar to Mr. Austen Walton's. I would retain the reheater, a 2 x 4 element flue type, of course, which will extend back as far as the firebox. The boiler is round topped with direct stays as are the boilers for the Highland twins. I don't understand the allusion to there being no room for $\frac{13}{4}$ in. outside cylinders. This is equal to 20in. in full-size, and I've bored Doug Hewson's BR cylinders, as fitted to his class 4 2-6-4 tank loco, to $\frac{13}{4}$ in. on many occasions.

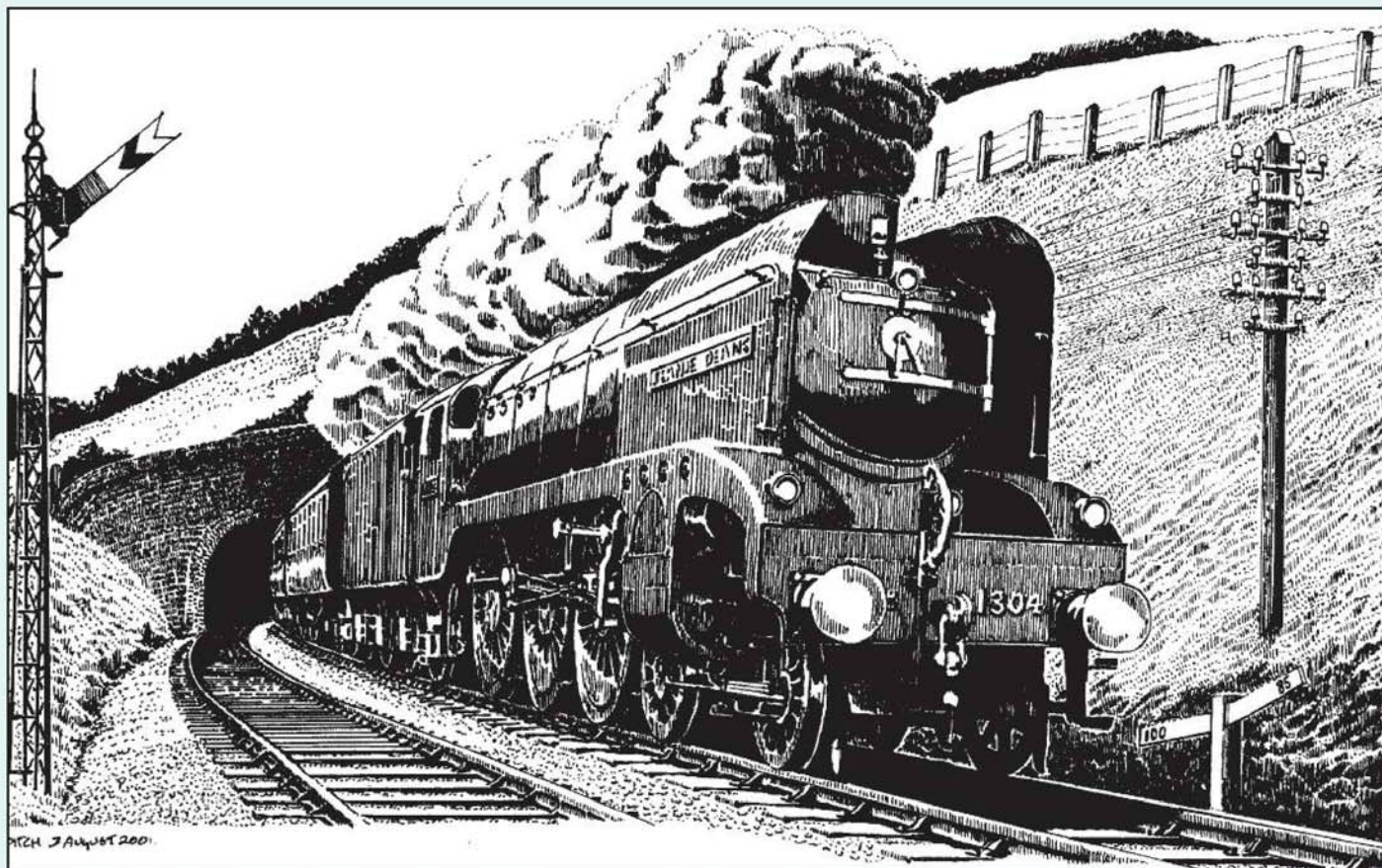
The rockers to drive the inside HP valves are in fact vertical and are pivoted just above the slide bars. This arrangement gives inside admis-

sion to the outside cylinders and outside admission to the inside cylinders, which is just what I want, as I'm using balanced slide valves on the inside engine with piston valves on the outside. Another advantage of the short vertical rocker system is that the inside rocker arm can easily be displaced to the rear, as in the Great Western set up, to compensate for connecting rod angularity problems. At some stage, in the not too distant future, Simon Bowditch and I are going to set out the parameters of the design, starting with $\frac{13}{4}$ in. outside cylinders, and will put the whole steam circuit through the computer. We may even end up with a $\frac{3}{2}$ in. gauge 4-8-0.

Gas producer fireboxes work fine with narrow boxes and have been used successfully on quite a few occasions. However, I have been thinking of using oil firing. The GWR apart, oil firing was never properly thought through by British Railways (which is about par for the course). The advantages were overwhelming, especially as suitable coal was becoming unobtainable. No ash to be cleaned out and disposed of from ashpan and smokebox, simplified fuelling arrangements, no fires to be cleaned, the loco can just be turned around at its destination. The burner can be left on a pilot light overnight with the water just off, or even on the boil. When required for duty in the morning the wick is simply turned up and pressure builds up without strain on the boiler. Erosion of the tubeplate is minimal as there won't be a lot of sharp ash or grit particles flying around in the firebox, and a vital point is that the full power of the engine is available at the turn of a tap, it doesn't depend on the skill, enthusiasm and strength of a fireman to hump coal into the firebox. Possibly the most important point of all is that when a lot, if not all of the filth, drudgery and pollution had been taken out of the job, it might have been possible to recruit men who could maintain and run the locos to a decent standard.

This brings me to a letter from Mr Hingley: "I was interested to read Mr. Evans' (should we be calling him, public school fashion 'Evans Minor' as in that legendary school magazine report from WW2, 'Wavell Minor has been doing well in Africa'?) description, as part of his *Highland Railway Series*, of his 'optimised' 4-6-0. But does he really think a 4-6-0, firebox constrained by the frames, could ever compete with the well over 2,000hp which was the maximum output ever extracted from a *Duchess*, or the evaporative rate of the Bulleid Pacific boiler flat out? Somehow I can't see his engine taking 14 coaches up Shap unassisted.

More seriously, or perhaps amusingly, Mr. Evans appears to have independently arrived in almost every detail at the design of the 800 or Queen class 4-6-0 of the Great Southern Railway of Ireland. Only three were built, and I have never



seen even the preserved example, but I am told they were majestic machines; if I were not a GWR fan I would refer to them as an 'Improved King'. The main difference from Mr. Evans' design is that they were 3-cylinder simples rather than 4-cylinder compounds. Compounds have never been that successful in Britain after all.

There were some good drawings in the old Model Railways and there is a glorious story that the middle cylinder originally exhausted through the rear stack and the outside ones through the front, so that while one hole blew the other sucked. It is said the steaming was rather indifferent with this arrangement which was rapidly altered—but I suspect this is just another of those Irish stories! An example of 'Convergent Evolution' in the genus *Equus Ferrus* I suggest.

Evans Minor (Evans Miner would have been appropriate for my father in his early days) has in fact done his prep. There is no doubt that a King sized boiler with about 34sq.ft. of grate area could produce well over 2000hp, Chapelon (he to whom we doff our caps) estimated that a similar boiler could turn out 3,600hp which is as much as any British Pacific could develop. David Wardale estimates that his development of the BR Standard class 5, arguably the best 4-6-0 ever built in Britain, could give at least double the power of the basic engine. Steam locomotive design has progressed greatly, even from the days of Chapelon. Remember that Livio Dante Porta (what a name, eh?) said: "The single expansion engine has been popular all over the world because a good compound is far more difficult to design". He concluded that even the best French compounds suffered from poor detail design, like bad axleboxes.

It must always be borne in mind that the steam locomotive is constrained by two basic facts:

- 1: Adhesion. You can't use more than about 3,000hp on 3 axes with a 23 ton axle load.
- 2: Firing rates. With hand fired coal, you are limited to about 2,000hp in short bursts.

There's nothing that you can do about these inescapable facts, unless you go to 4 axes and build a 4-8-0, oil fired of course. But what an engine that would be ...

As to the comparison with the Irish Queens, suffice it to say that though there may be a superficial resemblance to those lovely locos, that is where it ends. Incidentally, they had parallel boilers, the tapered bit was just in the cladding, probably to make the domes look smaller. Perhaps they found some small, cheap ex-WD domes, who knows. I heard that the chimney was given two separate blastpipes for religious reasons, though I can't think what they might be. It is obviously an engine that is shrouded in mystery and designed by Michael Blarney Esq.

Compounds always had a bad press in Britain; possibly they sounded foreign, and it became very fashionable to denigrate the Webb compounds. Most of these locos, however, did all and more that was asked of them. *Jeanie Deans* ran the dining car express from London to Crewe and back nearly every day for eight years and is recorded as hauling 325 tons from Nuneaton to London at an average speed of 54mph. Not bad for the 1890s. They'd probably have been better off with coupling rods though.

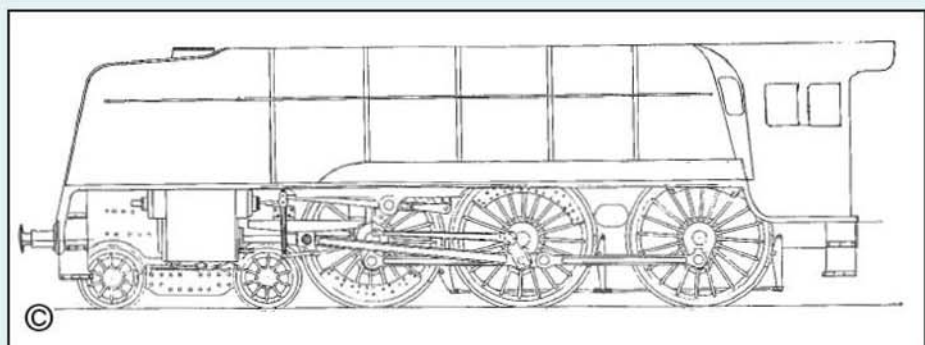
The 4-cylinder 4-4-0 compounds of the Alfred the Great class could haul 480 tons from Rugby to Harrow in 80 minutes, putting out about 1000

cylinder horsepower continuously on 20.5sq.ft. of grate area. In other words, size for size they could knock spots off a Saint, Star or Castle. Just imagine what would have happened if one of Mr. Churchward's young men had designed their steam circuits, or if A. Chapelon Esq. had sat at the designer's elbow for a minute and had whispered "Double the area of all the steam pipes, ports and passages, make the HP cylinders smaller to give a 2.3:1 ratio and put a starter button in the receiver." What a loco it would have been then.

To those about to trot out the old chestnut of the trials between the French 4-cylinder compounds and the GWR locos, well you can prove almost anything if you want to. Swindon wanted to prove that one of their simples was as good as the best engine in the world, so they did!

The accompanying General Arrangement drawing and Simon's marvellous impression, represents what have been my latest thoughts on this loco. I would now use a round topped boiler, direct stayed of course, and as David Wardale's thoughts are towards a 100mph 4-6-0, either a 2-cylinder simple or 3-cylinder compound. I have shown my favourite *Cock of the North* front end to reduce drag at high speeds. The loco would also have an all welded frame, roller bearings throughout, a vestibule cab, a bogie tender and be oil fired. Watch this space!

●To be continued.



SAVAGE'S LITTLE SAMSON in 3in, 4in. (and other) Scales

Martin Wallis

responds to requests by giving his views on the requirements of a home workshop before describing the remaining components for *Little Samson's* back axle

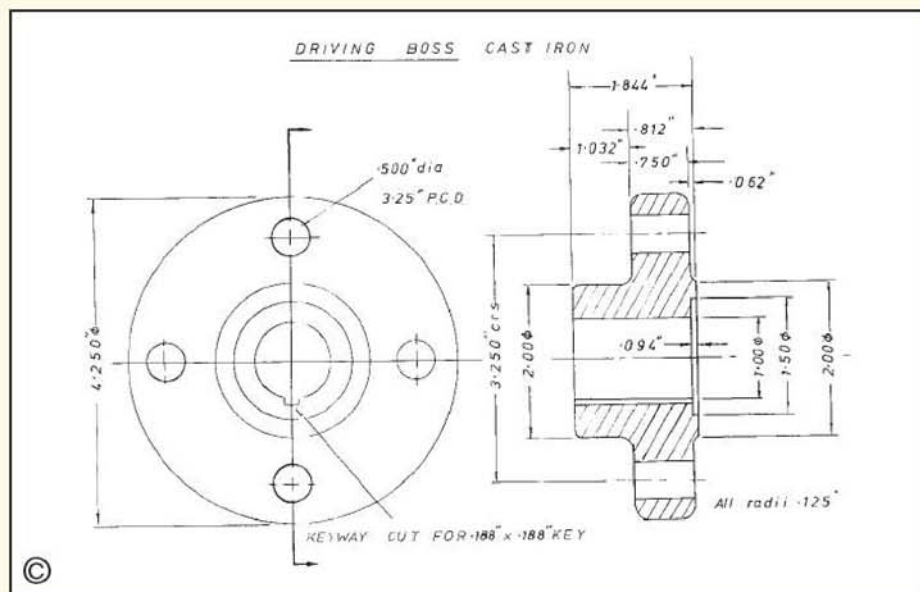
●Part XVIII continued from page 81
(M.E. 4151, 10 August 2001)

There seem to be quite a few model engineering 'beginners' following the *Little Samson* series, surely good news and one in the eye for the merchants of doom who claim that our hobby is in decline. By far the most common question is "What equipment do I need?" If our editor can spare the space it might be useful for me to attempt an answer to this question here. In my opinion four machines would do the trick.

Most important of all would be a lathe, a 3in. *Little Samson* could easily be made on the trusty Myford or Boxford. Both are readily available from second-hand dealers. You should aim for 3- and 4-jaw chucks, a faceplate, a tailstock chuck and a revolving centre as a minimum. A fixed steady is useful but not essential, and a quick-change toolpost is well worth considering.

A vertical slide will convert a lathe to enable it to perform light milling operations, but a proper vertical milling machine would be a much better option. Vertical milling machines are fewer and further between than second-hand lathes and seem to attract proportionately higher prices. Imported vertical milling machines are a popular option. Such a machine is in use in photo 6 and is fine provided heavy cuts are avoided. Useful accessories to accompany the milling machine include a clamp set, angle plate, machine vice and rotary table. Some tooling will be needed; I favour the R8 spindle with draw-in collets.

We are now two machines down and two to go. The two remaining are very cheap. One is a bench mounted drilling machine and the other is a bench grinder to keep our lathe tools sharp. I am frankly amazed at how low the prices of these items can be. However, do not be completely fooled; in my experience a 5/8in. capacity drill is only good for 1/2in. in ferrous metals, and their general rigidity is suspect—you do get what you



pay for. There are plenty of suppliers from which to choose, so make a point of shopping around.

In the way of hand tools it is surprising just how little you can get by on, but a bench and a bench vice are essential. I suggest that in the way of hand tools quality is more important than quantity; half a dozen good files are far more useful than a tea chest full of files bought at 'bargain basement prices' and made of a material which may be better bearing a cheese label.

True, a 3in. final drive or differential centre might not fit in a Myford but I would not veto a project just because one or two castings may be too big for the available machinery. Half a term at an evening class, or a day or two in a friend's workshop will soon sort them out; membership of a club or society can lead to some very useful introductions. Machining a flywheel will take a tiny fraction of the time a feed pump or whistle would take to make.

I trust those who already own a workshop will forgive the foregoing digression and may perhaps even make a contribution to the discussion. So,

back to *Little Samson*; a few loose ends remain to be tidied up on the back axle.

Driving boss

There isn't a great deal to be said here. The bore should be a close fit on the axle and the corners radiused as indicated on the drawing. I am not entirely sure what purpose is served by the 0.094in. recess (3in. scale) but it corresponds with a similar 0.094in. boss on the rear wheel. The recess and boss honours the 1908 Savage drawings on which no clue is given as to its function.

A simple jig located from the bore will guide the drill at the same radius for all four driving pin holes, or they may be indexed and drilled from the rotary table (photo 2). Since there is only one driving pin per wheel, the exact quartering of these holes is not important, but they do all need to be on the same radius.

Once the driving boss is complete, a short length of back axle material is needed to align the driving boss with the differential centre so the driving pin holes may then be spotted through into



Left: A pair of 3in. *Little Samson* back wheels. One has the brake drum fixed to it and the other a differential bevel gear. Note the end of a driving pin visible on each
(Photo: S. Nipper)

Right: The back axle driving boss is drilled for the four driving pin holes using a rotary table to index it between holes.
(Photo: S. Nipper)





3
Components for the smaller models may conveniently be cut from the solid. Here a 1in. scale brake drum is being machined from a solid billet of cast iron. (Photo: J. Milne-Fowler)



4
Close inspection of the machined surface of this ball end of a driving pin reveals rings resulting from the co-ordinate work in initial turning. (Photo: S. Nipper)



5
This driving boss serves as a stand for two completed driving pins. (Photo: S. Nipper)

the differential centre. The same set up is used to drill the driving pin holes in the two back wheels.

Brake drum

Little Samson's brake drum was an iron casting which was permanently fixed to the right-hand back wheel with wooden brake blocks fixed to a band working against it. This would have been perfectly satisfactory as a parking brake and could contribute to holding a load on a downhill gradient. It should be remembered that the primary source of braking on a steam road engine is not the brake but the engine itself through the motion.

The cast brake drum adopted by Savages for *Little Samson* would have been much less effective than back wheel rim brakes, where the brake acted against a hoop inside the back wheel rim thereby affording much greater leverage. Most other road steam manufacturers at the time had moved over to rim brakes for their steam tractors. As with the curved spoke flywheel, Savages were behind the times.

Machining the brake casting supplied requires little explanation. Alternatively, the drum may be taken from the solid; in 3in. scale, a 5¹/₄in. diameter billet is needed. As with much of his engine, Jonathan Milne-Fowler in Australia cut the brake drum for his 1in. scale *Little Samson* from the solid (photo 3).

Once turned, the holes for the fixing screws to secure the brake casting to the back wheel may be drilled and countersunk. The brake drum is then located on the back wheel and the holes spotted through. Some countersunk Allen screws will be fine—they cannot be seen and are much stronger than ordinary slotted steel screws. The hole for the driving pin may be jig drilled from the wheel (or vice versa depending which came first).

The greater portion of the brake drum circumference will fit over the driving boss making a compact and neat assembly. The brake bracket, brake band and brake blocks will be covered with the back tank furniture in due course.

Driving pins

The back axle assembly is completed with the driving pins. The majority of the Savage works photographs suggest that they should painted, although one picture appears to show them left bright. It therefore seems fair enough for a builder to have them bright or painted as preferred. If the pins are to be left bright it is worth considering the use of stainless steel, but I do not

recommend a mix of materials. If the driving pins are stainless, so also should be the cotters and studs that secure them to the wheels.

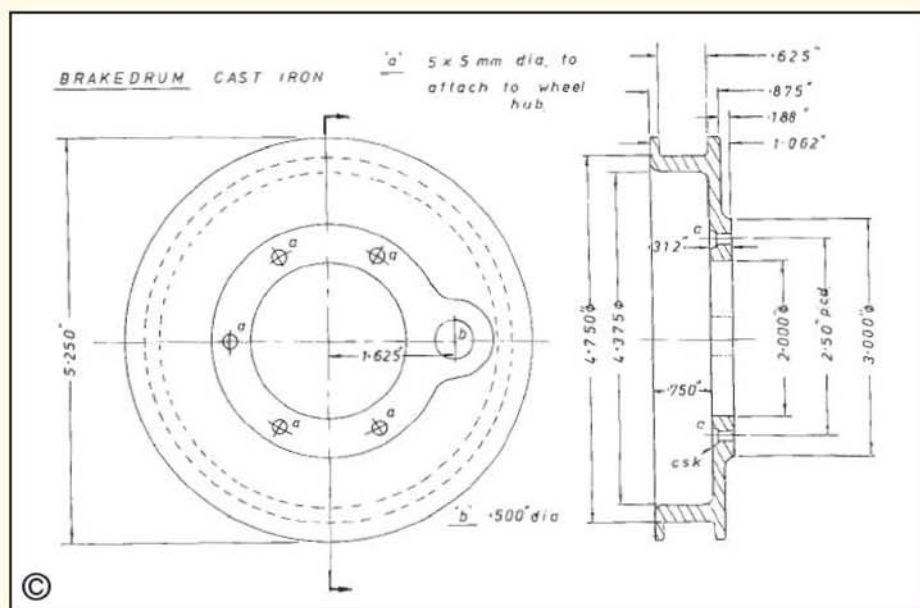
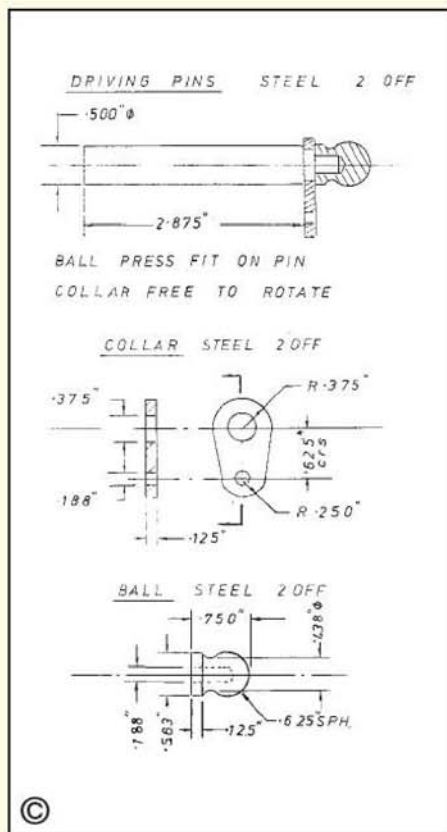
The driving pins are in three pieces: pin, collar and ball. The collar should be a loose fit so that the pin may rotate and wear evenly. I have specified a press fit but Loctite is just as good here.

Since the pins are a focal point on the engine, the more so if left bright, it is worth investing extra care in their construction. A ball turning attachment, if you have access to one, could be pressed into service. Failing that, a form tool would make an excellent job. Free-handing turning is fine but a template is really necessary to check the profile. Please let's not have any pear shaped ball ends!

Stan Nipper used the co-ordinate method to produce his ball ends. A computer spreadsheet program provided the co-ordinates which, by means of the cross-slide and top-slide index dials, were used to produce lots of little steps. The steps can be discerned in photo 4. The ball was then blued all over and filed smooth in the lathe until the blue rings just disappeared. A final polish with emery cloth completed the job.

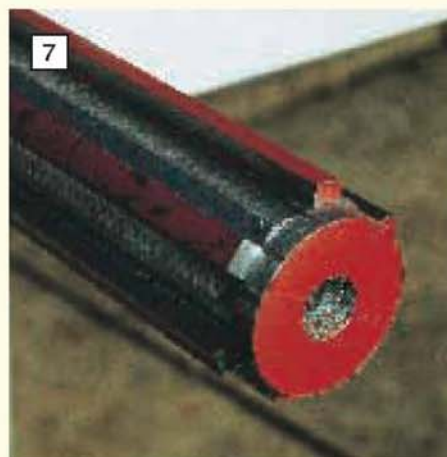
Steel rope

A length of suitable steel rope will be needed for the winding drum. Any yacht chandlers will be able to oblige. Stainless steel rope may be preferred, but avoid any that is too bright and shiny which would look out of place.





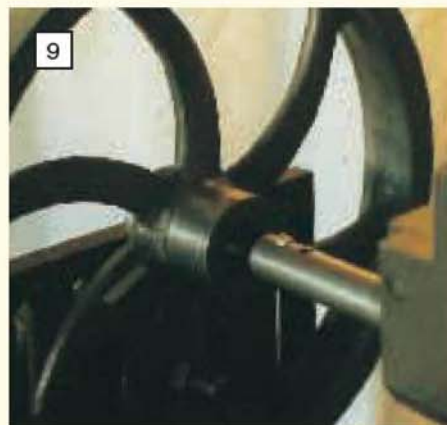
Left: The crankshaft splines are machined with the crankshaft held in the 4-jaw chuck and supported on a steady. The rotary table is used to index the crankshaft to produce the six splines. (Photo S. Nipper)



Right: The roughed out 4in. splines on John Freeborn's Little Samson give an idea of the finished product. (Photo: P. Kybert)



Left: An internal keyway cutting set up on a 4 1/2in. Boxford lathe. The feedscrew has been removed from a topslide to convert it into a planing attachment.



Right: Planing keyways under power. A form tool is mounted in a holder on a shaping machine. (Photo: P. Kybert)

For larger models, suitable wire rope may be obtainable from the lift industry. Many lift mechanisms use wire ropes which, to satisfy the requirements of insurers, have to be changed regularly, 'time expired' ropes usually ending up in a skip. I know of a number of big models and full-size engines which have been fitted out in this way. If a cable is rated at four or five times the tonnage an engine can muster there ought not to be a safety issue, but do check to make sure.

Splines and keyways

These have already been covered (*M.E.* 4101, 27 August 1999) so I hope a summary will be acceptable here. The crankshaft is equipped with external splines and there are internal splines in each of the two crankshaft pinions. There are several keyways in the associated gears and in the driving bosses of the road gear train.

The external splines on the crankshaft may be milled from the solid. The crankshaft is held between centres, or between a chuck and centre in a dividing head (photo 6). Metal is removed by milling until the keys are left proud on the shaft. After roughing out, the splines will look like those in photo 7. Lots of light cuts are then taken 'at all points' around the dividing head to smooth off the portions of the shaft between the six splines. Any remaining irregularities may be polished out with emery cloth.

The internal splines are cut by planing and indexing in the lathe using a set up similar to that in photo 8. By good fortune I spotted a spare Boxford top-slide at a dealer and immediately bought it for the purpose. Some 20 years or so ago there were quite a few top slides around as all state schools had been instructed to 'go metric'. This was done by replacement feed screws, but in the case of the Boxford top-slide, the conversion required an exchange of the complete assembly,

not just the feedscrew. As attachments go, mine has had a great deal of use and has been well worth the time and effort spent on its manufacture.

Internal keyways may also be cut by racking the saddle up and down along the lathe bed, but the exertion is much greater.

A shaping machine will also give good service for making internal keyways. John Freeborn cut all the internal keyways for his 4in. *Little Samson* in a shaper with very little effort.

If cutting the internal splines by planing in the lathe, a head-stock indexing arrangement will be required. Several methods are available for achieving this. One is to fit a change wheel to the gear train end of the lathe mandrel and work from that. On a Myford the large bull wheel in the backgear train is accessible and may provide the necessary indexing. A third technique is to simply press an indexing ring onto the back of a chuck, an arrangement which is easy to fit and may be seen in photo 3.

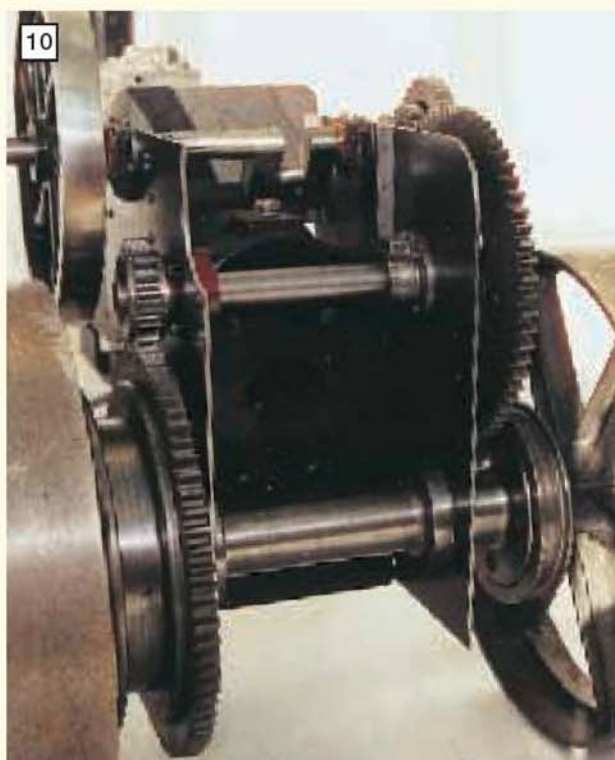
I believe this completes the essentials of the gearing and shaft assemblies.

Supplier

A *Little Samson* catalogue listing drawings, copies of works drawings, materials and castings in 3in. and 4in. scale, is available for £2.50 post paid

(UK) from *Little Samson Models*, 38 Wheatsheaf Way, Linton, Cambridge CB1 6XD. Visit <http://homepages.tesco.net/~little.samson>

● To be continued.



Apart from the top of the cylinder head poking out over the spectacle plate progress on Little Samson should look just like this. The brake drum is fixed to the right-hand road wheel and slides over driving boss. (Photo: S. Nipper)



Keith Wilson

deals with the crossheads, offers advice about silver-brazing and pickle baths and introduces us to his new digital camera.

●Part XVIII continued from page 84 (M.E. 4151, 27 July 2001)

Crossheads are rather essential items, nice to look at but not quite so easy as some bits to make. They can be built up from smaller pieces, indeed some sort of building up is virtually unavoidable. There were several designs of crossheads, but two main types for the 29s and 47s; I'll not bother with one of these, but the other is another matter. To make a pair, a 4 1/4in. long slab of mild steel is required. You'll need to chew them out of 2 x 1in. stock; leave it a bit over-thick for now and make the width to drawing.

Now, the following method of machining this slab is recommended, for it is easy to get the necessary grooves out of line, cutters and milling machines being what they are. If the slab be clamped firmly to the table in the 'flat' position, a slot-drill will make short work of the slots for

the slippers. Drilling the pin holes first helps, but I suggest that they are left undersize for the present, say 3/8in., to suit bolts. A bolt through an item to be clamped is much the strongest way to clamp, but of course you cannot clamp the part being slotted directly, so another clamp is needed. It is not a bad idea to mount a strip of steel parallel to the table axis to aid alignment and strength of clamping.

After finishing one end, it helps to machine the two end slots next. There is quite a lot of metal to be chewed away; you will need a long-series slot drill to reach the bottom of the slot. There is the distinct possibility of the slots not matching (Yes, I've done it, that's why I am passing on a few tips). Of course if you have a big enough mill and a suitable side-and-face cutter, then you're laughing.

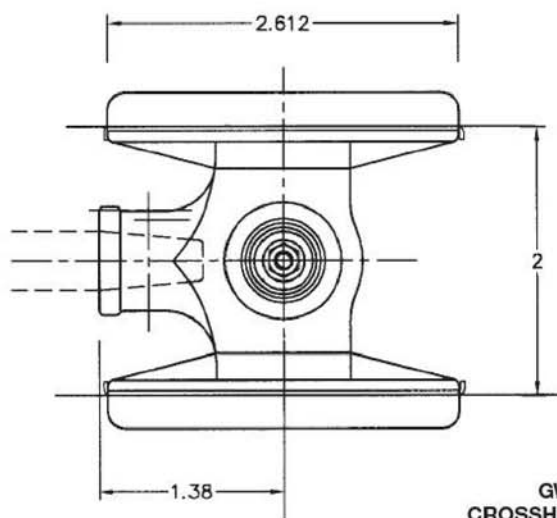
The slippers should be finally machined (the slot for the guidebar) after assembly with the

main block by silver-brazing. Note that the distance across the slippers is 0.072in. less than the distance between the guidebars; this is taken up by two 20swg phosphor bronze liners. This idea was given to me by Ted Martin, and although some people dislike it I cannot see any real reason against it. If you make the slippers out of solid phosphor bronze they are the wrong colour, swines to make and expensive to boot, but if they are made as described here and they turn out a bit slack then some shim-stock cut to size and packed behind the liners, where they will be trapped, will remove this slack.

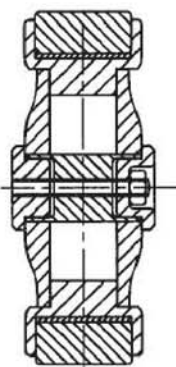
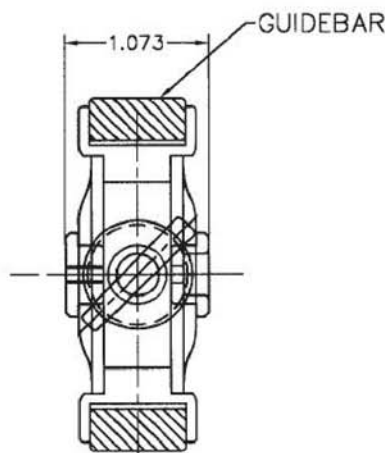
One of the tricky jobs is to get the 'floors' of the slippers parallel to the piston rod, but it's easy enough when you know how. Part the two crossheads after slotting, and mount on a specially made faceplate to get that nice curved finish on the outside.

SAINT CHRISTOPHER

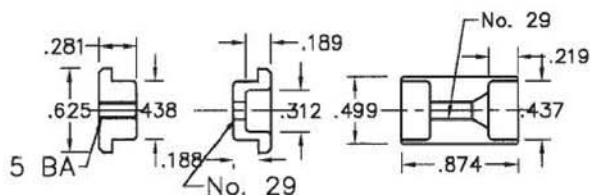
A GWR LOCOMOTIVE for 7 1/4in. gauge



GWR 29/47 CROSSHEAD ASSEMBLY



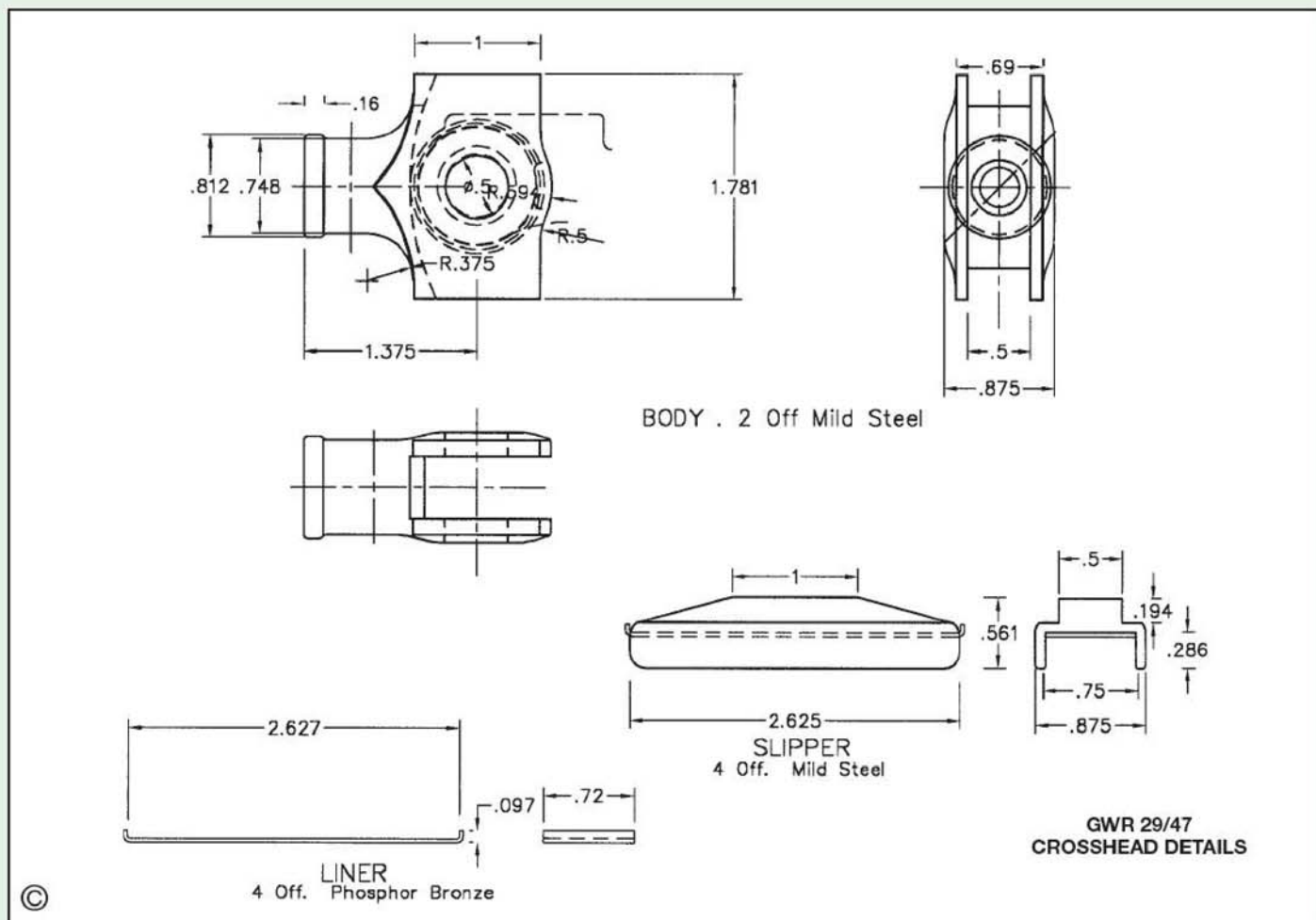
SECTION THROUGH CROSSHEAD PIN



CROSSHEAD PIN & NUTS: 2 Sets Off.
Pins: Silver-Steel Nuts: Mild Steel

This drawing and photograph show the left-hand crosshead for the GWR 29xx and 47xx class locomotives. The piston rod fits into the crosshead with a 10deg. taper and is secured by means of a 3/16in. dia. taper pin fitted at 45deg.





This special faceplate is most easily made from a 6 x 6 x 1/2in. steel or aluminium alloy plate. Mount it in the 4-jaw chuck and make sure the face is running true. Drill and tap a 3/8in. hole in the middle and a 1/4in. tapped hole a bit further out to act as a drive pin. If a steel bar is screwed into the tapped hole, it ensures that the curvy bits will be concentric with the central hole.

When one side of each crosshead has been completed, turning it over will give a rather unstable set-up, so machine a counterbore about 1 1/2in. diameter by about 1/8in. deep in the faceplate so that the embryo crosshead will nestle into it and be more securely held. A nut screwed onto the central bar will assist in keeping the crosshead firmly against the faceplate, but I have not found it essential, the use of a round-nose tool and plenty of juice should result in a good turned finish.

Turning the 'nose' on the front end of our crosshead is done with it held in the 4-jaw chuck, but keep the cuts fairly light or you'll end up with jaw-marks on your newly-turned side faces. Leave the centre holes for the time being, they are better done after silver-brazing the slippers.

Silver-brazing and pickling

Tip: when silver-brazing brass or copper, you can get good results by dipping the hot rod into the flux as you go along. But with steel, not on your Nelly; it will not work for more than a few seconds. Mix the flux with water, anoint the joints, push the bits together (tying with iron wire is tricky for you'll soon melt the wire) add some more flux, cook up and apply the silver-brazing rod. Easiflo or its equivalent is recommended, and if applied *inside* the crosshead then it's easier to clean up the outside afterwards.

When cool, dump the assembly in a sulphuric acid pickle bath that has been used for brass and copper; if you haven't got such an animal then use a fresh bath and add some copper sulphate crystals obtainable at Shakewells, your local chemist.

Much nonsense has been written in the past about acid-baths so perhaps a few words from some fifty year's experience might well be helpful. Get a plastic dustbin, fill it about three-quarters full with water and add concentrated sulphuric acid (also from Shakewells) to bring the ratio of water to acid to about 40 to 1, it isn't critical. As long as you don't immerse the boilers until they have cooled, the plastic dustbin will last indefinitely.

Now, as I have mentioned before, strong sulphuric acid is quite weak (bejabours) *as an acid*. When it is weaker (by dilution) it is stronger, begob! It has, however, a very great affinity for water, so what you do is to pour the acid into the water, being careful not to get any on your skin or clothing. If you are doubtful, keep some washing soda or baking powder handy, plus plenty of cold water. I would add the mystic words 'rubber gloves'. The acid will fizz a bit as it mixes with the water and will warm up a bit, but not to worry. As long as you DO NOT add the water to the acid all will be well. The acid-to-water method is safe, water-to-acid should never be contemplated because a lot of heat will be generated fairly suddenly with the result that a mixture of water and acid is thrown back at you. This isn't even funny to reasonably distant spectators.

Although when dilute, sulphuric acid will attack steel, the copper content will immediately copper-plate the steel and prevent any serious corrosion. Don't leave the parts in the acid too long, however and wash off in water on removal.

A scrub with steel wool will help clear the last of the copper, much of which will come off with mere tap-washing. A quick shot of WD40 is advisable at this point, or else the steel will quickly gain a coat of rust.

Back to work

To bore the taper for the piston rod, mount the crosshead in the 4-jaw chuck, drill to suit the small end of the taper and use a D-bit to cut the taper; a 10deg. included angle is about right.

To machine the slipper slots, mount a dummy piston-rod in the taper and set things up to bring this rod parallel to the axis of the milling table.

The crosshead pin, which is the pivotal pin for the little-end of the connecting rod, is rather cunning. It is very easy to make and replace if necessary, for although it may seem strange at first, in 'our' sizes it is the pin that wears rather than the bush. I learned this lesson many years ago when overhauling one of my 1366 locomotives, after something like 1000 miles hard work. I fully expected to make new bushes (hard-drawn phosphor bronze) but when I tested the bushes, they were still a firm fit on a new piece of silver-steel, but on 'miking' the pins they were down by a few thou. They were worn oval of course rather than equally worn all round.

The outside appearance is very close to scale, and another beauty of the design is that the fastening of this pin puts no load on said fastening which only serves to keep the pin in place. A 5BA box spanner should just fit into the socket in the cap; I have not experienced any slackening with this method, even if only done up finger-tight, i.e. no tommy-bar used on the box spanner which some folks call nut-spinners. If you prefer, the pin itself may be case-hardened but, as I men-



A view of the rear face of the cylinder showing the packing gland. The studs should be set at 45deg, but would incur additional patternmaking costs.



The coupling rod joint is secured in a similar fashion to the crosshead pin, utilising a 5BA nut in a recess big enough to accept a box spanner.

tioned above, it is easily replaced. The caps are plain turning jobs.

Megapixels

Having splurged out some 'ill-gotten' gains on a high resolution (3.3 megapixel) digital camera I include herewith some of the results therefrom. The crosshead exactly as described is shown and also a shot of the packing gland for the cylinders. It is obviously of a well-worn locomotive, but even with an estimated 3,000 miles 'up its shirt' this one is still using the original crosshead pins. To be precise, the gland studs should be at 45 degrees rather than horizontal, but this would clearly mean two cover patterns where one would do. Point taken? Note also that the piston rod is secured by means of a $\frac{3}{16}$ in. taper pin, at 45 degrees. Some folk don't like this system on the grounds that the pin might work loose, however I

find that once bashed in it is only with extreme difficulty that you can get it out. There is nothing to stop you threading the bottom of the pin and nutting it, or even drilling a cross-hole and shoving a split pin (cotter pin) through. The pin has been clipped off (admittedly rather roughly, it cannot be reached by normal hacksaw) to clear the guidebar brackets on this particular locomotive (a prairie). It also illustrates indirectly how hard it is to get the pin out, as otherwise a few seconds work on the belt sander would have made it look a lot better. The originals were held by means of a taper key, albeit a flat one, pinned underneath. It is a nightmare job to mill out the slot for this pin, ditto a slot in the piston rod so positioned that only one edge of the pin bore on the crosshead and t'other edge on t'rod. I did it once on certain $10\frac{1}{4}$ in. locomotives, using dear old Curly's own Wolff-Jahn vertical mill, but it

took a deuce of a time for no real gain.

Another shot shows the connecting-rod big-ends plus the joint on the coupling rods. Note that this joint is basically identical to the crosshead pin, likewise that on the front end of the coupling rods.

For those who are not too familiar with digital cameras, they can take better pictures than the conventional type with the advantage that they may be viewed within seconds of the exposure, and corrected if desired on any reasonable computer, and printed out quickly and relatively cheaply on A3 size (about 16 x 11in.) paper. As a matter of interest, I blew-up the size of the crosshead picture until it showed the actual turning-marks on the central washer; to see them 'on-site' takes a close look and good lighting. That's modern technology for you!

●To be continued.

RAISING STEAM

Mike Chrisp, Gerald Todd & Ivan Turner

respond to Ted Jolliffe's recent enquiry about raising steam in miniature locomotives and traction engines by discussing alternative methods and presenting two designs for electric fan blowers.

There seem to be almost as many different approaches to raising steam in miniature locomotives and traction engines as there are owners. Most prefer to use an electric fan type blower in the chimney and many variations of these can be found around the tracks at Open Days and Rallies. This feature offers two designs for such blowers. Other drivers prefer to approach steam-raising differently and it may be that readers may wish to contribute their own ideas on the subject for the benefit of others.

Assuming a compressed air supply is available at the site where steam is to be raised, a simple approach is to select a piece of suitable copper (or what-have-you) tube to fit the chimney in question, arranging a collar to prevent it entering too far, and securing a piece of smaller diameter

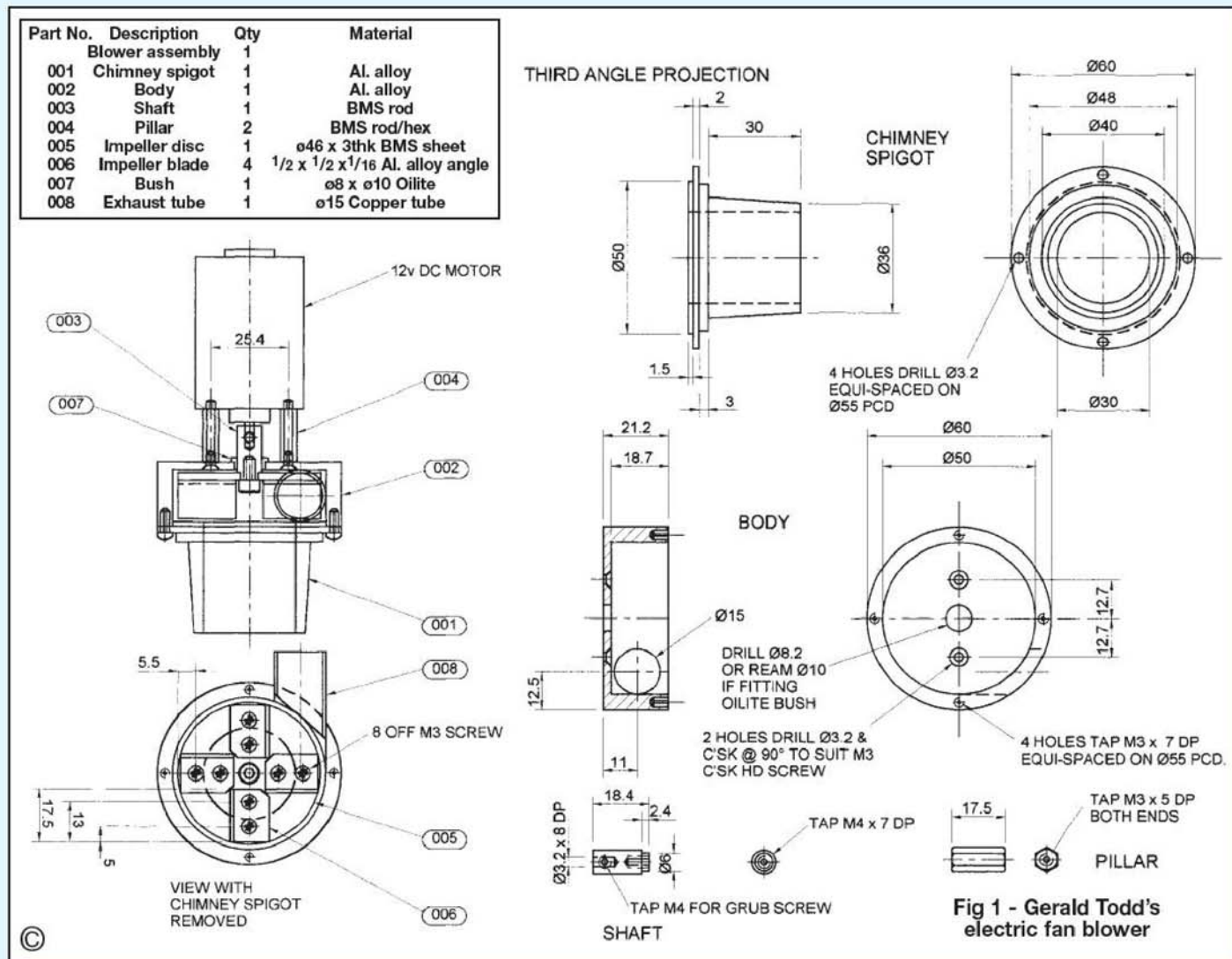
pipe into the side of the tube. This pipe is bent upwards inside the tube and its end may be flattened or fitted with a nozzle to increase the velocity of the escaping air. This air is supplied by means of a flexible hose coupled onto the end of the pipe outside the tube. The principle of operation is similar to that of a simple paint spray gun or carburettor.

An alternative and even simpler approach is to fit a convenient non-return valve to feed compressed air into the boiler above the normal water level. If the non-return valve is a regular Schraeder type connector, any normal tyre inflating hand pump, foot pump or even a 12V electric pump can be fitted to pressurise the boiler with air. This air is then available to operate the internal blower, the effectiveness of which can be adjusted by means of the normal blower valve.

The following contributions by Messrs Todd and Turner each describe electric fan type blowers. The inclusion of one or more low voltage lamp bulbs which can be switched in or out of series with the motor will provide a quick, cheap and simple method of adjusting the motor speed and hence the resultant draught. Alternatively, the output or discharge port can be adjusted by means of a simple sliding damper to modify the ferocity of the draught.



Typical 12V dc electric fan type blower adapted to suit the double chimney arrangement of LBSC's Heilan' Lassie. Some users of this type of blower have ingenious arrangements for speed control.



Gerald Todd's blower for Sweet Pea

Doubtless most clubs have a blower facility available, but there is no guarantee that it will suit everyone and independence is therefore preferable. The solution to blower ownership can fall into three categories:

- 1: Convert an existing blower, e.g. a car heater fan.
- 2: Bite the bullet and buy a ready-made item from a model engineering supplier.
- 3: Manufacture a custom unit.

My first blower falls into the first category and utilises the heater fan motor from a car. A simple four-bladed impeller was mounted on the shaft, encased, and a spigot made to fit the chimney. It also had the added luxury of a speed control potentiometer enabling the fan speed to be regulated. This blower performs sterling service and continues to do so but has the disadvantage of being large and heavy, adding unwanted weight to the toolbox.

The second category is self-explanatory. Suppliers, including Messrs Blackgates and Bruce, will be quite happy to equip you with a purpose-built unit following an exchange of a specified quantity of current legal tender!

Moving on to the third category, I enclose a drawing (fig 1) of a blower unit which I made for myself and classify as 'junkbox' engineering. The main body was made from a bar end of aluminium alloy rescued from the scrap bin. The 12V dc motor was purchased from a trade stand at a model engineering exhibition. This could equally be 6V if desired.

The drawings are dimensioned in millimetres because although I was brought up on imperial units, I have become used to working in metric units since they were imposed upon us. Also, it happened that I used a metric lathe. The diameter of the chimney spigot is rather large because it was made to fit the chimney of my *Sweet Pea*, but with a suitable adapter it can fit smaller diameter chimneys if the need arises.

In use, while I find a 12V supply voltage produces too strong a draught, 6V seems to be about right. Ideally, this calls for some form of variable speed control. I have been unable to source a potentiometer of sufficiently high current rating to meet this need. Now, if someone could come up with a compact electronic solution ...

As regards power source, while most clubs are able to provide 12V, not all offer a 6V supply. As a stand-by, I have a hand lantern which uses a standard lantern battery. This was supplied with a battery holder which houses four D-type cells. I have fitted four rechargeable cells into this which seem to provide sufficient energy for at least two steamings from a single charge.

Ivan Turner's blower for Doris

My blower has been made with a 90mm diameter rotor which is very effective in firing-up a 3 1/2in. gauge *Doris*. Few sizes or materials are specified as most readers will have different needs and resources; however, the components shown on my diagram (fig 2) are to scale and useful full-size drawings may be made from it by photo-

copy-scaling to 150%. The rotor is shown as a template which may be scaled to make a rotor of a different size, but the 90mm diameter rotor should be adequate for most 5in. gauge engines.

A copy of the template was stuck securely onto 1mm thick (20swg) mild steel plate before drilling the thirteen holes at the blade roots, and the centre hole to take the rotor boss. The perimeter was then sawn to the outline and de-burred, and the end of each blade was bent over to a right angle on the fold lines. Tight bends and sharp corners are not necessary at these bends. The rotor boss was made big enough to accommodate a grub screw, with a shoulder cut to locate the rotor, drilled to suit the motor spindle, and the end counterbored to produce a tube of material which was peened over to secure the rotor. Brazing or silver-soldering are obvious alternatives.

The grub screw was aligned with a gap between the blades when fixing the boss to the rotor. The chimney spigot was made to suit the locomotive and included a shoulder at the top end to locate in the lower plate, the end being peened over in the same way as the rotor boss.

The diameter of the pillars then had to be decided. The 5mm screws of the prototype are unnecessarily large, 4mm or similar would be adequate, and the pillars sized to suit the screws chosen. The pitch circle diameters (PCD) on the top and lower plates were checked for pillar to rotor clearance before cutting—3mm is plenty. Each plate was mounted in turn onto a wooden backing plate secured to the lathe faceplate, the

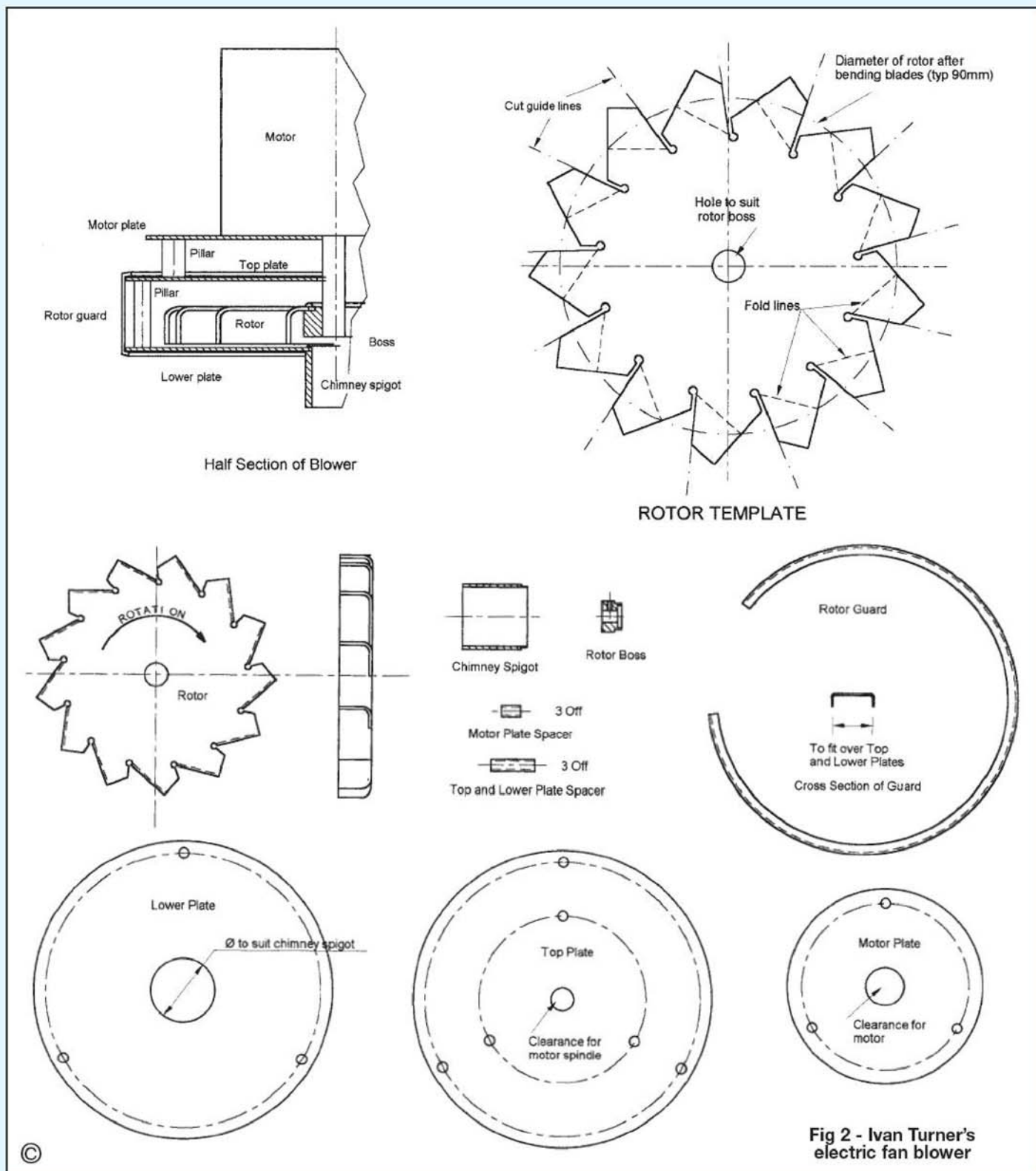


Fig 2 - Ivan Turner's electric fan blower

PCDs being marked and centre holes cut to size before trepanning out. The spacers or pillars were cut from steel tube. The pillars between top and lower plates are about half as long again as the depth of the rotor in order to provide an air gap above the hot rotor.

A powerful high speed motor was selected to ensure that the fan can develop good suction. It was secured to the motor plate and a wiring anchor to the motor plate included to prevent the wires drooping onto the hot fan. Studding was initially used between the motor and top plate to enable the rotor position to be adjusted. Ideally there should be no gap between the rotor and lower plate, but

then it would not spin, so a compromise was reached with minimum running clearance.

Before the rotor guard was attached, the rotor was turned by hand, and the blades tweaked to provide a reasonable degree of uniformity. This is not precision work, an inspection of any blower rotor after a few steamings will demonstrate that it is not easy to spot any irregularities!

A trial was next made with the the motor operating under power, due care and caution being observed to keep fingers clear of the in-running nips between the rotor and the pillars. The clearance between the rotor and lower plate was adjusted; the smaller the gap the better the

suck. If you follow suit and find fire bars in the smokebox, then I suggest you increase the gap. Spacers were then made to replace the temporary studding fixings.

The rotor guard was fitted to keep stray fingers away from the rotor. It was produced from strip, rolled to a little less than the plate diameter, and the flanges formed by beating them over the edge of a disc of steel. When completed it was sprung over the plates, leaving a gap of about 40mm for the discharge port.

The blower is effective in operation and brings the boiler to pressure very quickly, provided the rotor spins in the right direction!



Malcolm Stride

reports on a most enjoyable event marking the successful conclusion to a lot of hard work.

After many trials and tribulations the day arrived for the ground level track at Reading Society of Model Engineers to be officially opened. The following notes and photographs will hopefully give those who could not attend a flavour of the event. The club was honoured with the presence of *M.E.* Editor, Mike Chrisp, whose eyes lit up when I suggested that I would send a report of the event for the magazine.

Club history

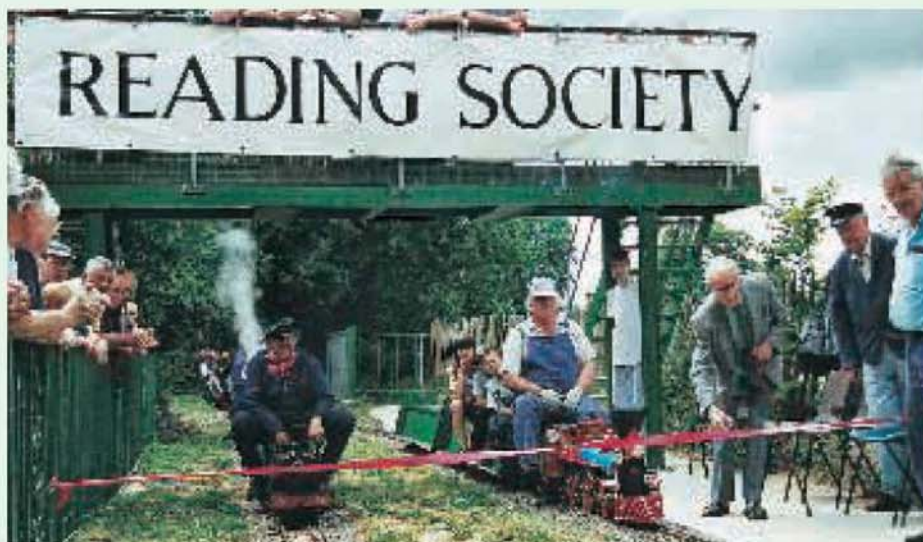
The earliest mention of the Reading club is dated 1915. After the interruption of the war, the club in its present form was reformed in 1948 by a group including our current President, Jack Shayler. The efforts of a few stalwarts during the 1950s with a portable track and a few locomotives at fetes, steam fairs, etc. resulted in the money being raised to enable the acquisition of the present site in Prospect Park, Reading. More hard work resulted in the construction of the raised track, clubhouse and other facilities.

The club now had a permanent base and, with the advent of public running, could raise much needed money for improvements. Various sections sprang up including 00- and 0-gauge, and an active model boating section. Exhibitions were held at various locations in Reading to 'spread the word' and the decision to build the new track was made about four years ago. The current situation is that we have the two tracks and a wide selection of steam locomotives in 7 1/4, 5, 3 1/2 and 2 1/2 in. gauges with active 0-, 00- and N-gauge indoor layouts.

The boating section is no longer active, mainly due to lack of local facilities. There are currently some 100 members and public running takes place on the first Sunday of every month plus Bank Holiday Sundays from 2:30pm.

The track

This now consists of 1050ft. long 5, 3 1/2 and 2 1/2 in. multi-gauge raised track laid about 30 years ago and the new ground level track with



At the official opening of their ground level railway in Prospect Park, RSME President Jack Shayler cuts the tape to give Les Dawson (left) and Alan Thatcher right of way to lead the Grand Parade.

NEW GROUND LEVEL TRACK FOR READING SME

7 1/4 and 5 in. gauges approximately 1030ft. long. The new track has been laid during the last four years and the main loop was completed in under one year. The accompanying track diagram shows the layout which passes through quite a lot of wooded areas and includes a 1 in 90 bank up through the woods.

The day

The day dawned reasonably bright which gave the early birds a good start with the setting up of the gazebos and other things needed to protect all the visitors and 'officials' from any inclement weather. After the recent hot spell, it was a relief that it had cooled slightly, giving much more pleasant conditions.

Visitors began to arrive from mid-morning and soon the site was getting quite busy with lots of old friends greeting each other and catching up on the things that have been happening. There

was certainly a lot of the usual banter flying around—it's a good job that model engineers are not a sensitive lot! Locomotives soon started to appear, but mostly on the raised track. I assume that those with 5 in. gauge locos did not have ground level driving trucks. This situation soon righted itself and we got enough locos to be able to open the track in style.

Visiting clubs

Most of the visitors came from clubs in the southern half of the country, but we did have one visitor from Yorkshire, Peter Clayton from the West Riding Small Locomotive Society who arrived with his Black Five. I am not sure he counts as a visitor because he is a member of the Reading Society as well.

A large contingent from Worthing arrived and made themselves at home with a good selection of locos. The other clubs represented were



Left to right: Mike Styles (Bournemouth) with his Crab, Andrew Berry at the controls of the Berry Black Five and Peter Clayton from West Riding and RSME with his Black Five pause in their passenger hauling duties for just long enough to set up this photograph of three fine model LMS prototypes hard at work.



Peter Hissey's King Stephen from Harlington comes under close scrutiny.



Andover's Gordon Howell takes RSME President Jack Shayler for a spin.

Andover, Harlington, Frimley, Bournemouth, Staines and the very local Amnerfield Railway. By the time they had all arrived the car park was getting very full as were the raised track steaming bays. The air was soon filled with the smells and sounds of steam locomotives being prepared and drivers were beginning to get out onto the track so I decided it was time to investigate the locomotives to see what was about.

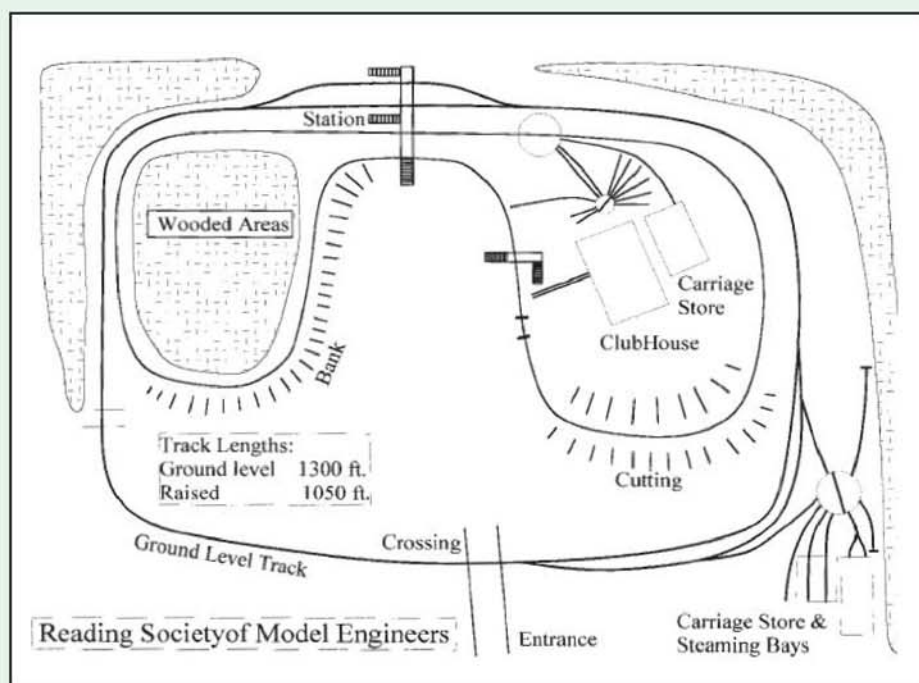
Locomotives

One of the first locomotives that caught my eye was a 5in. gauge Southern King Arthur class *Sir Lamiel* being prepared by Ian Thomas from Andover. This was built with reference to photographs and certainly looked the part. Unfortunately something came adrift on the motion so it did not run on the day. Not far away, a group was clustered around an unusual looking locomotive which turned out to be Gordon Howell's (Andover) vertical boilered Indian Locomotive which converts to/from an Atkinson tractor and has been featured in these pages before. Gordon seemed to be going round and round for most of the day.

The other locos on the ground level track included local man Alan Thatcher's *Jupiter* which is the mainstay of the ground level public running and won a Bronze Medal at the Model Engineer Exhibition a couple of years ago. Peter Clayton's impressive Black Five stood out, not only for the quality, but for sheer size. This was built from

works drawings by Peter. The other local ground level runner was Les Dawson with his NCB loco *Anna* named after his granddaughter. This was originally owned by Reading member Cyril

Kimber who passed the loco over to Les for completion just before he passed away last year. It is always nice when these locos can remain in the club as a reminder of their original owners. John



Harlington's Tony Bond with Arrow, his 27 year old Britannia.



A very happy Les Dawson (RSME) with his NCB locomotive Anna.



Charles Weatherley from Worthing with British Irish Line in 3 1/2 in. gauge.



Tony Williams (Bournemouth) with his elegant Crampton Lady Margaret.

Rea from Worthing was running the 7 1/4 in. gauge *Tich* owned jointly by him and Les Dawson.

The raised track steaming bays were a hive of activity with several fine locomotives being prepared, Peter Hissey from Harlington was preparing his GWR *King Stephen* which was a Gold Medal winner at the Model Engineer Exhibition a few years ago. This ran very well during the day. The other Harlington member was Tony Bond with his venerable *Britannia Arrow* still going strong at the ripe old age of 27.

The Bournemouth club was represented by Mike Baker with his *Achilles* and Mike Styles with his superb *Crab* to the Don Young design. This spent a large part of the day purring around the track. There was considerable interest in a fine 5 in. Crampton single wheeler *Lady Margaret* being prepared by Tony Williams from the Staines club. This ran well although suffering from a slight lack of adhesion at times. Another green loco, although LNER this time was Brian Cockman's B1 built to his own design. Brian is a member of the Frimley club and also the local Amnerfield Farm Railway. The other Amnerfield representative was Dave Jerome with his *Maid of Kent* which, as usual, ran without trouble for most of the day.

And now for the biggest contingent of all, from the Worthing Club. I counted seven locos from this society, all of which seemed to be running very well. The one that stood out first was the 3 1/2 in. Merchant Navy *British Irish Line* in

blue livery built by Charles Weatherley. This ran well during the day and stood out from the crowd. Two Great Western engines being readied were the 3 1/2 in. *County of Devon* to the LBSC County design by Alan Norman which had vacuum brakes fitted to the loco, and the well finished GWR 5700 to LBSC's *Pansy* design by Jim Ledger. This had a nice goods wagon driving truck. The other Southern loco was the 3 1/2 Schools class *Eastbourne* being set up by Alan Breese from Worthing.

The final loco was a north of the border design, a nice *Glen* to the Don Young design by Mike Wheelwright. We had a fine selection of locomotives from several designers with a few 'own designs' thrown in. All of this variety helped to fuel the 'inter-railway' banter in the steaming bays.

The ceremony

This was to be performed by our President, Jack Shayler, assisted by Ian Brown who both have a long history in the club. Alan Thatcher steamed his locomotive *Jupiter* and lined up behind the tape along with what seemed to be an army of locos behind ready to do a processional lap. A regiment of photographers also sprang up from nowhere to record the event.

After a short speech from Ian, the tape was cut with the ceremonial scissors by Jack and the procession led by *Jupiter* moved off from the station accompanied by a similar procession on the

raised track alongside. Jack climbed into Gordon Howell's loco for the ride and the track was well and truly open. From then on both tracks were very busy indeed.

This carried on during the fine afternoon until about 5pm when the sight of the barbecue being prepared seemed to reduce the desire to run locomotives. One final effort was made by Peter Clayton and his *Black Five* with four full carriages doing several laps and having a great time storming up the bank. There is something impressive about looking back to see the rest of the train coming round the bend, just like the 12 in. to the foot variety.

Acknowledgements

As usual on these occasions, none of it would happen without the work of several club members and other helpers in the background. Thanks must go to the 'Wednesday Warriors' who worked very hard over the past four years to get the track and steaming bays built and working.

On the day, special thanks are due to Nigel, Tony Giles and Tracy and Gary Williams who did sterling service providing tea and refreshments. Also to Tony Giles (again) and Graham Bustin who did a good job burning the burgers and sausages for the barbecue. When I left at about 6pm all was quiet except for the sound of enjoyable conversation with burgers and sausages being happily disposed of by all and sundry, including our editor, Mike Chrisp. 



Worthing member Jim Ledger's GWR 57xx *Pansy* to the design by LBSC.



Alan Thatcher's *Jupiter* is the mainstay for public running in Prospect Park.

CLUB CHAT

With Stan Bray

UK News

With foot and mouth disease restrictions lifted, members of Lancaster & Morecambe MES were able to go ahead with their Open Weekend. Saturday saw a good public turnout and 15 visiting locomotives. On Sunday the weather was very wet and miserable, just like last year, but even so there were 18 visiting locomotives, the largest being a *Big Boy* all the way from Haywards Heath. The ladies organised an excellent buffet which was much appreciated despite some surplus remaining at the end of the weekend as a result of the attendance being less than anticipated. Numbers were probably down because of the weather and residual uncertainty about the foot and mouth situation. Limited access to the track during the months leading up to the Open Days meant that the intended improvements had not been realised, but since then work has progressed with more pointwork and a signalling system having been completed. We understand that the signal box is a work of art and greatly enhances the railway. Stan Jackson (015395-60278) has taken over as Club Secretary following the death of the previous incumbent David Stribley whose widow kindly donated his 7 1/4 in. gauge battery electric shunting engine *Tregoss* to the society. It is proposed to use this locomotive for public running and driver training.

There is concern among members of North London SME that some members of other societies may decline to visit Colney Heath as in future all steam locomotives will have to be fitted with spark arresters. The main reason for this requirement is to avoid injury caused by sparks falling on unprotected flesh and damage to clothing, with the inevitable associated insurance claims. Another excellent reason for fitting spark arresters is to prevent sparks falling onto dry vegetation with the associated fire risk. During dry summer months several preserved railways ban the use of coal fired steam locomotives because of this danger, a situation which has also arisen at North London. The club is not alone, a number of societies now insist that spark arresters must be fitted at all times and although no locomotive owner likes the idea of using them, we realise that it is common sense to do so. One of the many activities supported by the club is slot car racing; some

members recently won a 16 hour race at Riverside, Newcastle and two teams from the club will be competing in a 24 hour race in Belgium in the near future.

For many years, monthly meetings of the Model Steam Road Vehicle Society have been held in the Civil Service Club in Gloucester. Members have recently been obliged to seek accommodation elsewhere because the area used for these meetings is to be converted into a bowling alley. Three new premises were appraised, and the decision taken to move to the Gloucestershire Club in Sandhurst Lane, Gloucester which is only a short distance from the original meeting place and was considered the venue most suited to their purposes. With many more facilities than the Civil Service Club, it is apparently far better, but its use unfortunately costs twice as much as the previous venue. Despite this, the committee are confident that members will find it very suitable.

Despite frequent checking by members, the Furness MRC track in Barrow Park suffered severe damage by vandals. The signal box was so badly damaged that it was considered a safety hazard and a local firm of joiners had to be called in to make hasty repairs. Club members were then able to bring it up to standard by applying a couple of coats of paint. The track was damaged by someone apparently dropping a large boulder onto it, making it necessary for a section of both 3 1/2 and 5 in gauge rails to be replaced. In spite of all this, the club managed to support a Family Fun Day organised by the Friends of Barrow Park and were able to use the track during the annual town Carnival.

The ongoing problems caused by foot and mouth disease seem never-ending. Restrictions imposed by the authorities have prevented access by Sutton Coldfield MES to the field normally used for car parking purposes and public running has not therefore been possible. Like many clubs, income from public running pays the bills and its loss is a major blow. However, the organisation of childrens' parties has offset this to some extent and it has been agreed to hold as many as possible. The club does not yet know whether the field will be available for the annual year end events including Bonfire Night and the Santa Specials. If these too have to be cancelled, the lost income will curtail proposed developments to the railway. When members of Erewash Valley MES visited Little Hay, they brought with them 11

locomotives to run as well as a large contingent who enjoyed just watching proceedings and having a chat.

It gave us great pleasure to receive the news that Chris Eddison, a junior member of Bradford MES, was awarded second place in the northern heats of the National Young Engineer Competition and we hope he progresses further. Following a successful birthday party, a grateful parent has offered to donate several tons of Tarmac waste to the club which will be suitable for all their path repairs. The Open Day attracted many visitors from various societies, mostly from the north, but some travelled greater distances, even from as far away as Scotland. The result was a very varied selection of locomotives on the tracks, running taking place 10am-5pm. The club is looking for a suitable trailer with which to transport the portable track; at present an old caravan is used, but this is nearing the end of its useful life and a replacement vehicle is urgently needed.

Unfortunately the Don Young Designs Rally, hosted this year by Leeds SME, was not at well supported. It must be acknowledged that 2001 has been a very mixed year regarding support for rallies. Local events seem to have been less affected but gatherings such as the DYD Rally, which rely on visitors from further afield, all generally report relatively poor attendance figures. There can be little doubt this has largely been brought about by the national situation with prospective visitors uncertain whether or not a rally is on, even though it has been previously advertised. The situation has been changing week by week and since the model engineering press is not published with sufficient frequency to give a daily or weekly update, many have just not been prepared to travel long distances only to find that local circumstances have caused a cancellation. Many have been caught out and this is doubtless a principal reason for the lack of support in this instance, particularly as Yorkshire has been very much affected by foot and mouth disease. The good number of spectators reported indicates that people were willing to travel without their models, knowing that in the event of cancellation it would be possible to visit other venues. The few that did attend the rally with models had plenty of time on the track and the locomotives belonging to visitors, as well several from the host society, were all built to a very high standard which would certainly have pleased Don. Members of Leeds SME were

their usual hospitable selves, facilities at the site being among the finest in the country. Reeves 2000 were in attendance with a trade stand and while it is doubtful if they did much business, it served to demonstrate the very welcome news that they are now well and truly back. It goes without saying that we sorry to learn that the rally was not particularly well attended, but thanks must go to members of Leeds SME for ensuring that the DYD Rally did not miss a year and no doubt they will be anxious to host the event in the future when the situation improves.

A similar situation arose with the annual West Riding SLS Rally, where too there were plenty of spectators but not as many locomotives as would normally be expected. An excellent exhibition had been set up for the enjoyment of visitors and members and during the weekend three members of visiting societies were asked to judge the models for the society awards which were made as follows: *Best Locomotive*: B. Walker, LNER B1; *Best Unfinished Locomotive*: G. Smith, LMS 0-4-0; *Best Non-Locomotive Model*: R. Byram, 4in. Scale Garratt Traction Engine. A barbecue on Saturday evening was much enjoyed by the visitors who chose to stay as well as members and their friends and families. Despite the shortage of models everyone appeared to have enjoyed themselves.

Members of Saffron Walden DSME staged a major display during the annual Audley End Steam Gala at the end of September, when they set out to demonstrate that although their locomotives are much smaller they are equally as attractive as those running on the Estate Railway. As usual, the club has been involved in a number of construction projects in addition to the track extension, which we hear is making good progress. In the search for a really efficient resistor with which to control the tram they have built, a water-cooled unit is now under test. Made up using a standard household central heating header tank containing some 40ft. of stainless steel rod divided into sections grouped in steps, the smaller the number of rods in a step the greater the resistance, etc. The water keeps the rods cool, although some heating takes place when the tram is in service. A light-hearted suggestion is that the tank presently installed in the rear compartment of the tram, should be moved to the driving compartment and used as seat during the winter months. No doubt if the last batch of summer weather is anything to go

by, a heated seat would be welcome during most of the year! The society is in the happy position of having a full membership list and do not expect to be able to accept any new members for several months at least.

When Erewash Valley MES first moved to their site and commenced track construction, a caravan was used as a shelter from the rain as well as a place to brew the tea. With the completion of the rather magnificent station building, the caravan was relegated to various places around the site, ending up at the far end of the field for use as a wood store and a home for the club exhibition stand. It remained in place doing a useful job for many years but alas Father Time did not deal kindly with it and so a new storehouse was built and everything was moved into it. The trusty van, which had done its job so well and had seen many improvements, was then demolished and consigned to a skip—actually, with other accumulated rubbish, two skips. Finally, the contractors removed it, marking a sad end to a vehicle which had served the club so well and which finally slipped away, unmourned despite the service it had given.

Concerns were expressed at the High Wycombe MES AGM that late finishing times of meetings might deter some members from attending during the winter months. Trials of an earlier start at 7.30pm were therefore suggested with a view of finishing at 9.30pm. These times might not suit everyone as members at work all day could find this start time too early, so the matter will be fully investigated by the committee before any firm decision is taken. With the aim of reducing the Chairman's workload, the position of Vice Chairman was approved during the meeting but no nominations for the post were forthcoming. The post therefore remains unfilled and volunteer(s) to fill it will be called for. The club Open Day is reported to have been very successful with numerous members of the public arriving to ride on the trains despite the indifferent weather conditions. A shortage of locomotives meant that some remained in service for long periods in order to meet the demand. An exhibition of static models, a model stationary engine driving a water pump and model road vehicles were also in operation during the Open Day.

Members of Ashcombe MRC are finding the job of replacing sleepers rather like painting the Forth Bridge; no sooner is one section complete than the next needs to be done. It had

been found that removal of sections of the track to do the job put the railway out of use for some time. Ballast is now scraped from under the area requiring attention, new sleepers are installed and the ballast repacked more or less following prototypical practice when wooden sleepers were used. To keep the youngsters who run the railway fully conversant with proper procedures, a rule book exam is held every year, followed by a fish and chip supper and late evening running. Roger Wakeford, the master who runs the club at The Ashford School, really takes trouble to help his charges learn the correct way to run a railway, whether full-size or miniature, and we wonder how many eventually bring this expertise to other societies when they leave school?

Fylde SME will be supporting the North West Garden Railway Exhibition on 6/7 October at St. Annes High Technology College, with a display of models and their portable track. Eric Clifford has written to advise us that the Northern Association of Model Engineers Exhibition originally scheduled for 12-14 October at Wigan Pier will not now take place. Fylde SME will be exhibiting models on 15 December, this time at the G-Wizz Exhibition at Lytham Assembly Rooms. The appearance of the exhibits at these shows is to be enhanced by the use of tracked base boards. A name board in true railway style is also being made up to be secured in an elevated position at the back of the stand together with a cloth surround and name board for the bottom section. All this will become a regular feature of future club displays.

Club auctions can be a funny business; many of the items sold are recirculated at the next opportunity when the purchaser decides his/her previous bargain wasn't quite what was wanted! Sometimes plenty of useful items are available for purchase at knock-down prices while at other times there is little to be disposed of and even the articles that normally reappear every year are kept by the previous year's purchasers. This latter situation appears to have occurred at Basingstoke DMES which found that despite a number of people putting in a great deal of time and effort organising things, after paying the cost of hiring a hall in which to stage the auction, the club did little more than break even. In future, therefore, such sales will be kept within the society. Andover DMES has proposed an Inter-Club Efficiency Trial

to be organised later this year to benefit both clubs which find it difficult to recruit sufficient competitors to hold individual events.

An unusual day out for some members of Isle of Wight MES came in the form of an invitation to sail model boats on a newly restored village pond at Bonchurch. With an island in the middle, complete with nesting waterfowl and some no-go areas where water lilies were being encouraged to grow, the operators had plenty of opportunity to demonstrate their skills. There was some concern when a model submarine failed to surface having been trapped in weeds, but this was freed by sailing a model tug over the area where the submarine was known to be, the turbulence created by the propeller eventually allowing the submarine to pop up to the surface. Cream teas were provided for the members, who all agreed that they had been made most welcome and had enjoyed a really pleasant day out.

Following a week of heavy thunderstorms which had virtually brought operation on the track to a halt, members were somewhat surprised and pleased that the annual Romney Marsh MES barbecue was blessed with a nice warm evening. Members of Folkestone MRC and St. Mary's Bay Camera Club were invited along and eight locomotives ran during the evening for their pleasure. The society was host to the National 2¹/₂in. Gauge Association a couple of weeks earlier and as well as a number of part-built models on show, six models were in steam. The extension to the clubhouse is making steady progress, the footings have been excavated and the extension should be completed on schedule.

Having thoroughly cleaned and inspected their ground level track in readiness for a running evening, members of Stamford MES were dismayed when a heavy storm promptly washed debris back on the line again. It took a group of stalwarts with a petrol-engined blower to get it back into shape for what turned out to be a very pleasant evening, well attended by members and some families. Despite the fact that the track runs to a large extent in a wooded area and has suffered from the heavy storms, it was found to be in generally good condition requiring only a few minor improvements.

Several societies now welcome youngsters from Chernobyl to their tracks for a day out. These children are all terminally ill as a result of radiation and are brought to Britain by volunteers in the hope that a few weeks in a clean environment will

give them pleasure and prolong their lives for a year or two. Arriving in this country with just the clothes they stand up in, they are housed, fed and clothed by the volunteers who care for them. Cardiff MES is one of the societies that offers them a day out; this year their visit was on 15 July. The youngsters were met in the car park and each was given a baseball cap with the club badge before they made their way to the railway. There they spent a pleasant time riding on the trains and the half-sized tram as well as being given the opportunity to operate the 00-gauge layout. Tea was provided by the club followed by entertainment which included model making with balloons accompanied by a juggling act. At the end of their visit, the children were all given a goody-bag of sweets and things and, thanks to digital photography and a computer, they each took away a photograph of themselves riding on the trains. Before leaving they all chorused their thanks to the club in Russian, Welsh and English.

Members of Wigan DMES are also regular hosts to the children from Chernobyl, this year's visit having been arranged for 20 June. A couple of locomotives failed during last year's visit so additional motive power was mustered to insure against disappointment this time. Fires were lit around lunchtime and in no time the locomotives were ready for work—but no children. As the afternoon wore on and no visitors appeared it was decided to investigate what had happened. Their day out included a visit to the nearby 15in. gauge railway and it was soon realised that the good folk looking after them had not been made aware of the invitation to visit the model engineers. In next to no time everything was back on course and the children were riding round the track, helping to stoke fires and fetching coal for the drivers. Lots of people, in particular the local Kwik Save and Handford's Post Office had donated sweet, drinks, and the like and the children were given just what they wanted, plus a drink (they all chose the Coca Cola) and in what seemed to be no time at all it was time for them to leave. There were plenty of goodies left which were taken to the Methodist Church Hall, where the children met every morning at the start of their day, to be included with their packed lunches. Most model engineering societies do a lot of charitable work and it is particularly pleasing to be able to report on these and other societies that entertain the Chernobyl Children.

CLUB DIARY

A minimum of 6 weeks notice is required for diary entries. Clubs and Societies are asked to include a telephone number for the assistance of would-be visitors.

To 21 October Talyllin Railway. First Class for Sunday Lunch.
Enquiries: 01654-710472.

OCTOBER

- 1 **Historical MRS (London Area).** Roy Hickman: *Modelling Scenery*. Contact John Millbank 0208-948-0556.
- 1 **Leicester SME.** Mike Perry: *Hot Air Engines*. Contact Raymond Wallis: 0116-285-8824.
- 2 **Basingstoke DMES.** Meeting. Contact Ian Shanks: 01420-561741.
- 2 **Oxford (City of) SME.** Keith Catchpole: *Journey on the Elizabethan and The Story of Coach 14*. Contact Graham Toplis: 01235-771180.
- 2 **Romney Marsh MES.** Bits & Pieces/Bring & Buy Evening. Contact John Wimble: 01797-362295.
- 2 **Taunton ME.** New Projects. Contact Don Martin: 01460-63162.
- 3 **Bristol SMEE.** David Ayers: *Hot Air Engines*. Contact Trevor Chambers: 01454-415085.
- 3 **Guildford MES.** Dave Edge: *Early Days - Great Engines*. Contact Dave Longhurst: 01428-605424.
- 3 **Hull DSME.** Jim Smith: *Talk*. Contact Chris Parsons: 01964-630563.
- 3 **Tyneside SMEE.** Meeting. Contact Malcolm Halliday: 0191-262-4141.
- 4 **Cardiff MES.** Bits & Pieces. Contact Trevor Jenkins: 029-20755568.
- 4 **Great Central Railway Soc.** (Rotherham Branch). Brian Wilson: *Pictorial & Technical Aspects of British Rail Locomotives*. Contact Stephen Gay. Meetings held at The Fairways Hotel, Bawtry Road, Brinsworth, Rotherham at 7.30 pm.
- 4 **Halesworth DMES.** Peter Grix: *Cantley Wind Pump & its Restoration*. Contact Chris Walliman: 01362-695735.
- 4 **Historical MRS (North West Area).** Edgar Richards: *Railways of Birkenhead, A Slide Show*. Contact David Goodwin: 01224-880018.
- 4 **South Lakeland MES.** Meeting. Contact Adrian Dixon: 01229-869915.
- 4 **Sutton MEC.** Bits & Pieces. Contact Mike Dean: 0208-657-5401.
- 4 **Vancouver Island ME.** Meeting & AGM. Contact Dennis Dalla-Vincenza: (250) 480-7042.
- 5 **Canvey R&MEC.** Ray Palmer: *Railways of Switzerland*. Contact David A. Clark: 01375 846921.
- 5 **Maidstone MES.** Doug Lindsay: *Kent & East Sussex Railway*. Contact Martin Parham: 01622-630298.
- 5 **Portsmouth MES.** Michael Harvey: *Steam in the 50s and 60s*. Contact Bob Aldred: 023-92-523366.
- 5 **Rochdale SMEE.** AGM. Contact Mike Foster: 01706-360849.
- 5 **Romford MEC.** Competition Night. Contact Colin Hunt: 01708-709302.
- 5 **SM&EE.** Visit to the Engineering Installations, Houses of Parliament. Contact David Boote: 01202-745862.
- 5-7 **NSI International Woodworking & Turning Exhibition** at NEC, Birmingham, Hall 10. Admission: Adult £7.50, Concessions £5.50. Discounts for advance bookings. Fri/Sat 10am-5.30pm, Sun 10am-5pm. Contact: 01353-654422.
- 6 **Cardiff MES.** Steam-Up & Family Day. Contact Trevor Jenkins: 029-20755568.
- 6 **Chelmsford MES.** Open Day. Contact D. Blake: 01376-324205.
- 6 **Isle of Wight MES.** Track & Pond. Contact Ken Stratton: 01983-760762.
- 6 **Midlands Meccano Guild.** Meeting. Contact Ernie Chandler: 86 Clapton Road, Stratford-on-Avon, CV37 6SN.
- 6 **Runnymede Meccano Guild.** Meeting. Contact Nick Rodgers: 21 Cophall Way, New Haw, Weybridge, KT15 3TX.
- 6 **Midland Federation ME.** Meeting. Contact P. Humphries: 01902-661275.
- 6 **SM&EE.** Dr. D. Foster: *The Wright Brothers*. Contact David Boote: 01202-745862.
- 6/7 **Ass'n Vaporiste du Centre.** International Meeting. Contact Christian Hacardiaux: 064-338630.
- 6/7 **Kew Bridge Steam Museum.** Festival of Steam. Information: 020-8568-4757.
- 6/7 **Vancouver Island ME.** Fall Meet. Contact Dennis Dalla-Vincenza: (250) 480-7042.
- 7 **Ascot LS.** Members' Steam-Up. Contact Tony Alderman: 01932-854393.
- 7 **Bedford MES.** Club Running. Contact Alan Guildersleve: 01525-383010.
- 7 **Birmingham SME.** Autumn Gala. Contact John Walker: 01789-266065.
- 7 **Canvey R&MEC.** Last Day of Sunday Running. Contact David A. Clark: 01375-846921.
- 7 **National 2 1/2in. Gauge Ass'n.** Rally at Hady Hill. Contact Clive Young: 01233-626455.
- 7 **Ottawa Valley Live Steamers.** Steaming Day. Contact John Bryant: 761-1109.
- 7 **Reading SME.** Running. Contact Graham Bustin: 01189-615450.
- 7 **Guild of Model Wheelwrights** at Avoncroft Museum of Historic Buildings, Bromsgrove. Contact Biddy Hepper: 01492-623274.
- 8 **Bedford MES.** Meeting: JoM Transport Slide Show. Contact Alan Guildersleve: 01525-383010.
- 8 **Erewash Valley MES.** Auction. Contact Jim Matthews: 01332-705259.
- 8 **Frimley & Ascot LC.** Club Evening. Contact Bob Dowman: 01252-835042.
- 8 **Melton Mowbray DMES.** Meeting. Contact Phil Tansley: 0116-2673646.
- 8 **Saffron Walden DSME.** Club Night. Contact Ken Archer: 01763-852911.
- 9 **Romney Marsh MES.** Track Meeting. Contact John Wimble: 01797-362295.
- 9 **Sutton Coldfield MES.** Meeting. Contact Roger Timings: 0121-308-5875.
- 10 **Bournemouth DSME.** Meeting. Contact Mike Baker: 01202-383653.
- 10 **Norwich DSME.** Graham Kenworthy: *The Permanent Way*. Contact Barry Steel: 01603-743372.
- 11 **Cardiff MES.** Bring & Buy. Contact Trevor Jenkins: 029-20755568.
- 11 **High Wycombe MEC.** Video Evening. Contact David Savage: 01494-527402.
- 11 **Leyland SME.** Beginners' Night. Contact Alan Wilson: 01942-715072.
- 11 **N. W. Leicester SME.** R. Shirley: *O-gauge Live Steam*. Contact C. E. Handley: 01509-413473.
- 11 **Sutton MEC.** Stationary Engines Run-Up. Contact Mike Dean: 0208-657-5401.
- 12 **Chesterfield MES.** Papplewick Schools Day. Contact Mike Rhodes: 01623-648676.
- 12 **Colchester SMEE.** Graham Austin: *Behind the Scenes with the Railway Civil Engineer Part 2*. Contact L. G. Hammond: 01376-511686.
- 12 **Hereford SME.** Philip Malon: *Sailing Boats and their Construction*. The Jubilee Sailing Trust. Contact John Arrowsmith: 01432-265151.
- 13 **Reading SME.** Club Running. Contact Graham Bustin: 01189-615450.
- 13 **Sheffield Meccano Guild.** Meeting. Contact J. Ozyer-Kay: 01709-547890.
- 13 **Nottingham SMEE.** Night Run. Contact Gerry Chester: 0115-9259096.
- 13/14 **Chesterfield MES.** Steaming at Papplewick & Exhibition. Contact Mike Rhodes: 01623-648676.
- 13/14 **Southland SME.** Great Little Train Show. Contact Peter Stark: 03-21-89702.
- 14 **Amberley Museum.** Autumn Vintage Vehicle Show. Contact Derek Kilburn: 01798-831370.
- 14 **Brighouse & Halifax ME.** Open Day. Contact Bob Durham: 0113-293-8524.
- 14 **Halesworth DMES.** Last Sunday Steam-Up of 2001. Contact Chris Walliman: 01362-695735.
- 14 **Hereford SME.** Club Running. Contact John Arrowsmith: 01432-265151.
- 14 **Leeds SMEE.** Steaming Day. Contact Edwin Hughes: 01757-707454.
- 14 **Leyland SME.** Diesel & Electric Day. Contact Alan Wilson: 01942-715072.
- 14 **Malden DSME.** 7 1/4in. gauge Open Day. Contact J. Mottram: 01483-473786.
- 14 **Saffron Walden DSME.** Running Day. Contact Ken Archer: 01763-852911.
- 14 **Sutton MEC.** Track Day. Contact Mike Dean: 0208-657-5401.
- 14 **Vancouver Island ME.** Club Run Day. Contact Dennis Dalla-Vincenza: (250) 480-7042.
- 14/15 **Golden Gate Live Steamers.** Fall Meet. Contact Jim Dameron: 209-835-0263.
- 15 **Leicester SME.** David Barrie: *Darjeeling & Himalayan Railway*. Contact Raymond Wallis: 0116-285-8824.
- 16 **Basingstoke DMES.** Bits & Pieces. Contact Ian Shanks: 01420-561741.
- 16 **Chesterfield MES.** Meeting: Trophies & Photo Competition. Contact Mike Rhodes: 01623-648676.
- 16 **Nottingham SMEE.** Roy Whiting: *Heat Pumps*. Contact Graham Davenport: 0115-8496703.
- 16 **Romney Marsh MES.** David Kelso: *The Channel Tunnel Rail Link*. Contact John Wimble: 01797-362295.
- 16 **Taunton ME.** Noel Whiting: *Electric Motors*. Contact Don Martin: 01460-63162.
- 17 **Birmingham SME.** John Jones: *Bolier Making*. Contact John Walker: 01789-266065.
- 17 **Bristol SMEE.** Geoff Sheppard: *On the Table*. Contact Trevor Chambers: 01454-415085.
- 17 **Guildford MES.** Bits & Pieces. Contact Dave Longhurst: 01428-605424.
- 17 **Hull DSME.** Members' Current Projects. Contact Chris Parsons: 01964-630563.
- 17 **Maidstone MES.** Members' Afternoon Playtime. Contact Martin Parham: 01622-630298.
- 17 **MELSA.** Meeting. Contact Graham Chadbone: 07-4121-4341.
- 18 **Cardiff MES.** AGM. Contact Trevor Jenkins: 029-20755568.
- 18 **Halesworth DMES.** Chat Night. Contact Chris Walliman: 01362-695735.
- 18 **Isle of Wight MES.** Dave Kennett MBE: *Highlight Rescues*. Contact Ken Stratton: 01983-760762.
- 18 **Reading SME.** AGM. Contact Graham Bustin: 01189-615450.
- 18 **York City & DSME.** Richard Evans: *Humber Bridge Master*. Contact Ken Bateman: 01904-421445.
- 19 **Canvey R&MEC.** Paul Strudwick: *I.W.A. Canal Ramblings*. Contact David A. Clark: 01375 846921.
- 19 **Rochdale SMEE.** Video Night. Contact Mike Foster: 01706-360849.
- 19 **Romford MEC.** Reg Davey: *Navigator in Bomber Command*. Contact Colin Hunt: 01708-709302.
- 19 **Romney Marsh MES.** Video Evening. Contact John Wimble: 01797-362295.
- 20 **Chesterfield MES.** Running Day. Contact Mike Rhodes: 01623-648676.
- 20 **Historical MRS (Scottish Area).** Richard Chown: *Building a Railway, The Scottish Central Line/George Davidson: Looking at Locomotives, Getting the Features Right*. Contact Richard Crockett: 01896-750730.
- 20 **National 2 1/2in. Gauge Ass'n.** Hook Get-Together. Contact Clive Young: 01233 626455.
- 20/21 **Model Railway Exhibition** at Uckfield Civic Centre, Bell Farm Lane, Uckfield, East Sussex. 10am-5.30pm. £3 Adult, £2 Concessions, £1 Child, £6 Family (2+2). Information: 01825-733133.
- 20-25 **Meridienne Exhibitions.** Midlands Model Engineering Exhibition at The International Exhibition Centre Donington Park, Nr. Derby (M1 exit 24). 10.30am-5.30pm daily, last admission 4pm, (Wed: 10.30am-8pm). Adults £7, Senior Citizens £6, Children £4, Family (2+3): £17.50. Enquiries: 01926-614101.
- 20-25 **Guild of Model Wheelwrights** at Midlands Model Engineering Exhibition, Contact Biddy Hepper: 01492-623274.
- 21 **Frimley & Ascot LC.** Club Run. Contact Bob Dowman: 01252-835042.
- 21 **Ottawa Valley Live Steamers.** Steaming Day. Contact John Bryant: 761-1109.
- 21 **Pinewood MRS.** Running Day. Contact J. Ephithite: 01344-885049.
- 21 **South Lakeland MES.** Running Day (Visitors Welcome). Contact Adrian Dixon: 01229-869915.
- 21 **York City & DSME.** Running Day. Contact Ken Bateman: 01904-421445.
- 22 **Bedford MES.** Surgery Night. Contact Alan Guildersleve: 01525-383010.
- 23 **Historical MRS (East Lancashire/North Manchester Group).** Don Rowland: *Of Accidental Interest*. Contact John Sykes: 01706-823989.
- 23 **Romney Marsh MES.** Track Meeting. Contact John Wimble: 01797-362295.
- 23 **Sutton Coldfield MES.** Meeting. Contact Roger Timings: 0121-308-5875.
- 24 **Birmingham SME.** Chit-Chat Evening. Contact John Walker: 01789 266065.
- 25 **Cardiff MES.** Keith Richards: *More about the Mines*. Contact Trevor Jenkins: 029-20755568.
- 25 **Leyland SME.** Trade Topics. Contact Alan Wilson: 01942-715072.
- 25 **Reading SME.** Meeting. Contact Graham Bustin: 01189-615450.
- 26 **Chichester DSME.** Mike Ross: *Portsmouth Naval Dockyard*. Contact Brian Bird: 01243-542266.
- 26 **Colchester SMEE.** Hugh Pullen: *The History of Firearms*. Contact L. G. Hammond: 01376-511686.
- 26 **Hereford SME.** Ian Armor: *Building the Robey Tractor*. Contact John Arrowsmith: 01432-265151.
- 26 **Historical MRS (Essex Area).** Chris Youett: *And You Thought They Were All Clean, Part 3: 1940-48*. Contact Jem Harrison, 27 Colne Place, Basildon, Essex.
- 26-28 **Amxminster Tool & Machinery Exhibition** at Bath and West Showground, Shepton Mallet, Somerset. Contact Sarah Fuller: 01934-822962. Tickets £5 on the day or £4 in advance.

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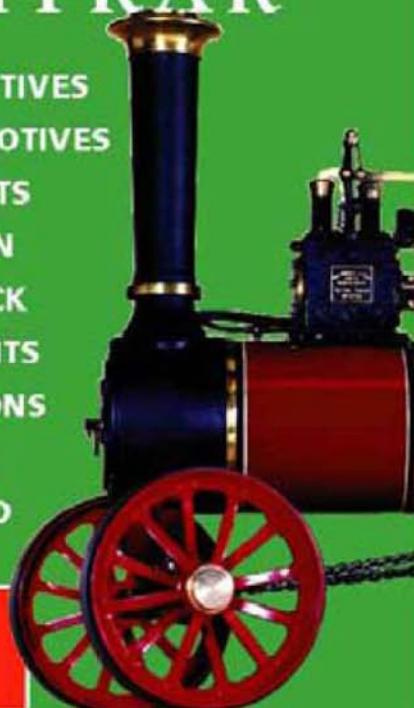
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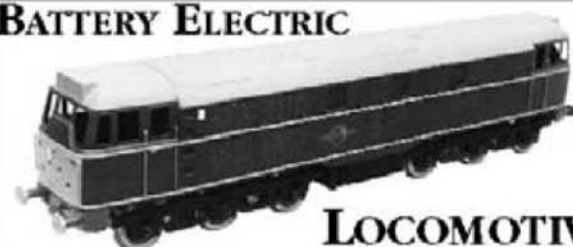
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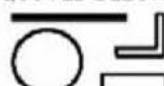


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D1	5/32 - 3/16 - 1/4 - 5/16 - 3/8.	04.10
D2	7/16 - 1/2 - 5/8 - 3/4.	09.20

BRASS ROUNDS

E1	1/8 - 3/16 - 1/4 - 5/16 - 3/8 - 1/2.	11.10
E2	1/16 - 3/32 - 5/32 - 7/32 - 9/32 - 7/16 - 9/16 - 5/8.	16.85

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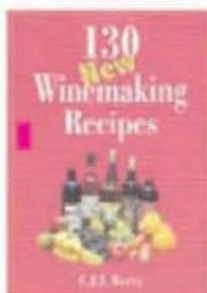
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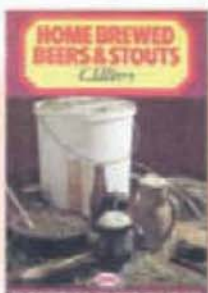
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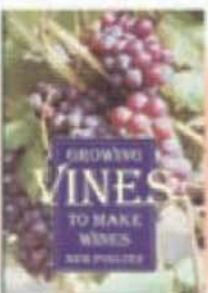
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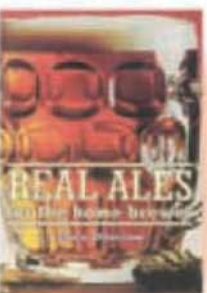
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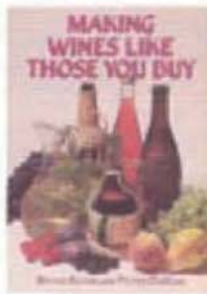
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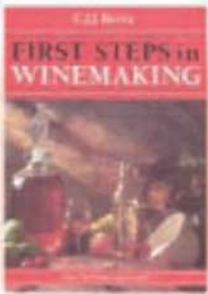
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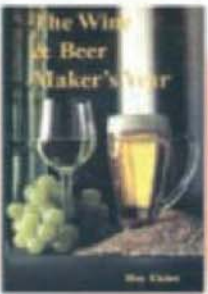
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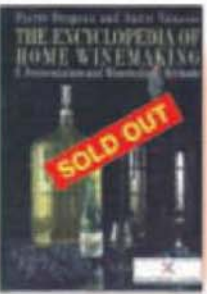
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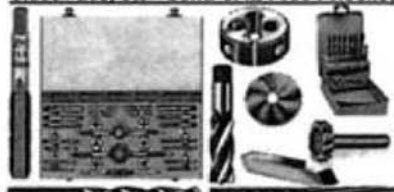
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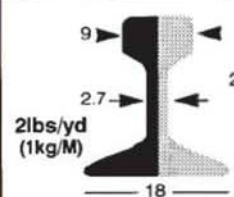
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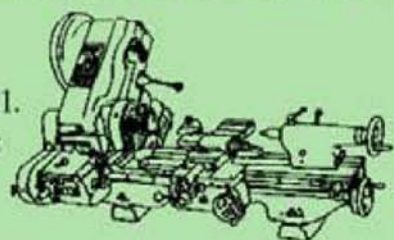
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LATHES

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BOXFORD CUD 5" x 22" Mill, chucks, 4 way toolpost	As New £1,400
BOXFORD BUD 5" x 22" Mill, chucks, power cross feed, T-slotted cross slide	£1,400
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BOXFORD 330 12" swing x 12" center, well equipped, equipped with angled screwcutting	£3,450
COLCHESTER BANTAM 1000 model 5" x 20", geared head, power feeds, gearbox	£1,400
COLCHESTER BANTAM 2000 geared head, gearbox, 3/4 jaw chucks, Dickson tool post, coolant	£2,250
COLCHESTER MASTER 2500 6 1/2" x 25" Gap Bed, Geared Head, Gearbox, Copy Attachment, Adjust Screwcutting, Facplate, Travelling Steady, 3/4 Jaw Chucks, Dickson Tool Post, Imperial Lead Screw	£3,950
COLCHESTER STUDENT 6" x 24", round head, gap bed, gearbox, power slides	£1,500
COLCHESTER STUDENT Square Head, 1500 Rens / 2 Speed Motor Model, Geared Head, Gearbox, Imperial, Power Cross Feed & Gap Bed, Dual Dials, 3 Jaw Chuck, Taper Turning, Coolant, etc.	£2,900
COLCHESTER STUDENT 1000 6 1/2" x 40" + gap bed, 19" swing, 3 + 4 jaw chucks, dickson tooling, taper turning, dial indicator, coolant, splash back, very nice, metric dial	£2,450
COLCHESTER TRIUMPH 7 1/2" x 48", Full Gearbox & Power Feeds, Gap Bed 3/4 Jaw Chucks, Face Plate etc.	£1,750
COLCHESTER TRIUMPH 2000 7 1/2" x 50" Full Screwcutting Gearbox and Power Feeds, Gap Bed, 3/4 Jaw Chucks, dickson tooling, Facplate etc.	In very nice order £3,950
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HARRISON LS 4 1/2" x 24" lathe, 240 volts	From new / choice £1,150
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HARRISON M300 5" x 24", geared head, gearbox, gap bed, 3/4 jaw chucks, steady	£2,200
HARRISON LS 6" x 24", geared head, gearbox, excellent toolpost machine, Choice 6	From £950
HARRISON 140 5 1/2" x 24", 3 jaw chuck, gap bed, power feeds, clutch	£1,400
HOBBYMAT (almost new) 2 1/2" x 12" screwcutting lathe complete with milling angle plate and machine vice, lathe machine	£550
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MYFORD SUPER 7B 3 1/2" x 19", gearbox, Power Cross Feed, cabinet stand, tooling	£2,750
MYFORD SUPER 7B 3 1/2" x 19", gearbox, Power Cross Feed, cabinet stand	£2,950
MYFORD MINIKOP Lathe	Just in £750
RAGLAN CAPSTAN 10" x 24" 6 Station Turnst, Cut of Side, Collect, Chuck (lever) & collets, Bar Feed, Variable Speed, Coolant	£2,975
SMART & BROWN 2nd operation lathe, 3 jaw chuck, x-y slider, latheblock, stand	Just £300
VICEROY TDS 1 6 1/2" x 20", gearbox, power slides, 3 more latheblock	£1,250
VICEROY TDS 5" x 24", change wheels, 3 jaw chuck, 3 more taper latheblock	£750

TOO MANY LATHES TO LIST!

MILLING MACHINES

AGERA FS Universal Toolmakers precision mill, Table 24" x 6" + accessories and collets	Just in £2,000
ADCOCK AND SHIPLEY HS Horizontal/Vertical Head, 30" x 6" powered table and feed gears, coolant	£1,625
ASTRA 14 horizontal vertical mill, cabinet stand, 240 volts, 2 more taper head, 1" arbor, very nice	£1,150
BOXFORD V400 variable speed / 30 HP head, table 2 1/2" x 6" + Abundant vice and collet chuck	£1,950
BRIDGEPORT Series 1 2 HP variable speed R6 head, powered (gearbox) table, 42" x 8"	£2,950
BRIDGEPORT belt head 2 speed (split motor) head, R6 powered head, variable speed 42" x 9" table	Very nice £4,250
CENTEC 2B Horizontal, 1" arbor, table powered, 3 ph motor, single phase main motor	£725
CENTEC 2B HV, vertical head, 2 more taper/wheel, cabinet stand	£1,400
ELLIOT OMIMILL horizontal, hydraulic table feeds, 28" x 7"	£625
ELLIOT Turret Mill R8-10 speed 70-3000 rpm, table 45" x 10" (powered)	£1,500
EMCO FB2 (6 speed head) bench Mill & Cabinet Stand, 240 volts	Just in £1,725
EMCO FB2 Vertical 6 speed drill head head 2 MT, powered 24" x 6" table, full coolant tray and cabinet stand and now 2 MT collet chuck	Very nice £2,250
HARRISON horizontal, 5 1/2" x 6" powered table	Very clean £550
HARRISON vertical 30 Int. Head, Late 2000 Rens Top Speed Model, All Gears for powered table & machine vice	£1,950
MARLOW MODEL 2 Turret Type Mill	As is £700
RAGLAN VERTICAL MILL 2 Motor taper, 2 speed motor, variable selector 175-2220 RPM, cabinet stand	£1,150
TOM SENIOR Model E vertical milling machine table 25" x 35", complete with cabinet stand, Clarkson collect chuck, Tom Senior machine vice, original 240 volts from new, probably the last one made in superb condition	£3,400
TOM SENIOR M1 horizontal, 25" x 6" powered table, 1" arbor	£575
TOM SENIOR M1 VHK, 25" x 6", 2 more taper, 1" arbor	Selection £1,200 – £1,400
TOS FO3 AV vertical turret mill, 40 INT, 54" x 10" table, power all ways	£1,950
VICEROY AEW vertical mill, 30 int swivel head, powered table 34" x 6"	Very Clean £1,625

ENGRAVERS

SCRIPTA SA 20 engraver, bench machine	Swiss £625
TAYLOR HOBSON Model A (Bench Machine)	very nice £425

DRILLS

ALJAX 3 Morse Taper Drilling Machine Power Feed	£325
ASQUITH 14-54 001 M2 (5m) Radial Drill	Immaculate coming in £3950
ASTRA Precision bench drill	£145
FOBCO 3" Bench, tilting table	£205
FOBCO 3" Podestal drill tilting table	£345
MEDINGS 3" pedestal drill	£245
MEDINGS 2 Morse taper pedestal drill	Choice £275
MEDINGS MF2 10 Speed 2MT Bench Drill 240 volts drill	£350
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CLARKSON MINI 5" x 12" tool and outter grinder, graduated dial, universal

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EAGLE MODEL 2 surface grinder 20" x 6" table with 12" x 6" magnetic chuck	£750
ESLIE MODEL 4W M2 24" x 6" table with 14" x 6" magnetic chuck + dust extractor	£1,150
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MILFORD 12" Pedestal grinder	£325
PLJH Buffing Machine, pedestal model	£325
VICEROY grinder, pedestal model	£145
VICEROY Buffing, pedestal model	Each £250
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Very clean	£245
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MAGNETIC chuck - 15" x 6" fine pole	£235
MAGNETIC chuck - 14" x 6" fine pole	£190
TOM SENIOR Model L pedestal stand	£190
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ATLAS 3" x 6" selection vice	£100
CLARKSON MK1	£100
HARDINGE Capstan type toolpost (tick in type)	£175
HARTUNG Headstock, bed stand, stand and motor	Just in
NO INT. Selection vice	Very rare
HARRISON Slotting Head & Extension	£275
STARTRITE 32 Woodworking Band Saw	£775
STARTRITE 14-6 Woodworking Band Saw	£775
MITUTOYO 000mm Height Gauge no 525-150	Donated
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FLAMEFAST CRM 6005 Rapid Motion Fixture	Choice £225
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COLCHESTER HARRISON 013 By hand 4 Jaw 8" light body independent chucks	Donated
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HARRISON LF Imperial gearbox	£325
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ALJAX 3" Bench	£425
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ELLIOT 14S, 14" shaping machine	£650
ALBA 1A, 10" shaping machine	From £250
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HARRISON LS vertical 500B	Never used £245
HARRISON LS Roring Table	£165
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DENHORN HORN No.27 Flypress	From £145
STEEL STOCK Just arrived - 6 collets only	£145 / £175
BRIDGEPORT No. 140 2 Boring Heads	£475
ELLIOT 0102 Slotting Head	£125 / £145
SWAGE BLOCKS	£125 / £145
J&S Universal Grinding Vice	Choice £275 / £325
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