

MODEL ENGINEER

Vol. 195 No. 4255

2-15 September 2005

*SEQLEC
LOCOMOTIVE
TRIALS*

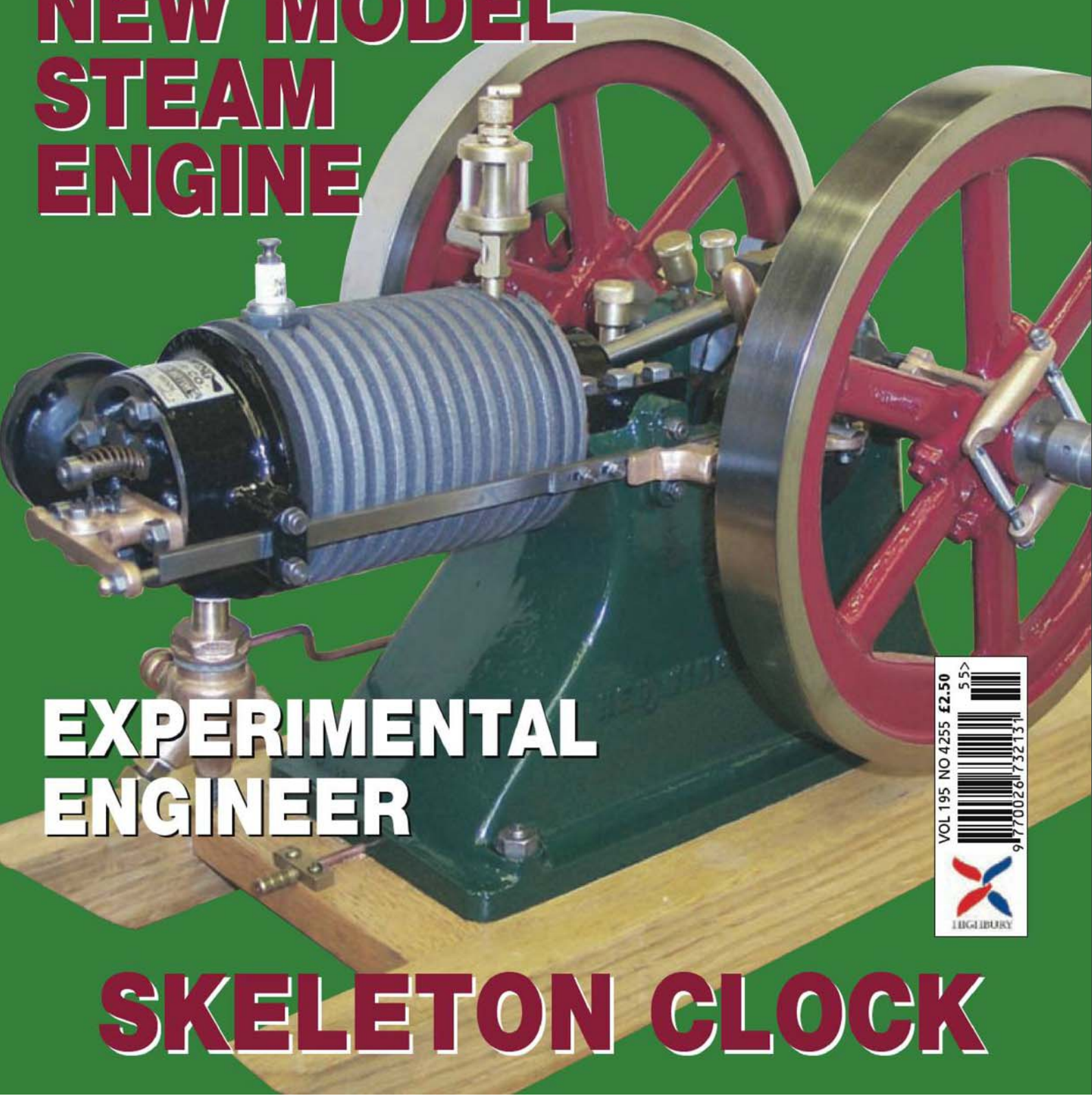
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is it.
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On the cover ...

Model of the successful Red Wing engine.
A series on the construction of this model
begins in the next issue of Model
Engineer. The series will detail how to
build this delightful model of a typical
farm engine which found a variety of uses
from driving saw-benches to grinding
cattle feed. The model is an air-cooled,
horizontal machine with an open crank,
constructed from a drawings and castings
package from a business in the United
States which also produced full-sized
engines in days gone by.

THE MODELS OF DAVID PARKER

A recent article on a steam powered
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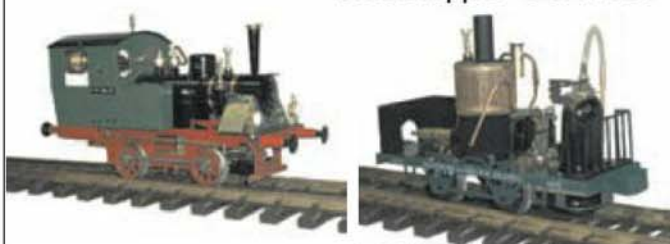
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ENJOYABLE INFORMATIVE



The Modern Machinist • 1895 • Usher • £ 11.20

This extremely useful book was reprinted back in 1990 and it has been unavailable for some time - and how can 1895 book be "extremely useful" you ask? The simple answer is that this is a book about machining steam engine parts and the erection of said steam engines, in this case stationary ones and, to an extent (American) traction engines. So you have loads of set-ups for machining cylinders, bedplates, bearings and the like, in both the lathe, the mill and drill press which, taken with the asides, are worth the price of this book on their own, but the chapters on fitting and erecting are also full of useful information, ideas and practices, most of which you can use. OK, this book is about full size engines, but parts for models need exactly the same machining techniques. So treat yourself and buy a copy of this 322 page paperback illustrated with well over 200 engravings.



Gear Calculations Gear Cutting • 1921 • £ 6.95

This combines reprints of two *International Correspondence Schools* course books, the first (42 pages), and probably the more useful, describing the various types of gears, and how to calculate teeth, depths etc.; if not exhaustive, this is pretty comprehensive. The second book (48 pages) covers set-ups and methods of gear cutting - the methods are mainly commercial, but the set-ups certainly have application in the model engineer's workshop. Definitely useful stuff. 47 illustrations, plus tables. Paperback.



The Lads of Enfield Lock • Birchmore & Burges • £12.40

This unusual book is the story of 172 years of apprentice training at the *Royal Small Arms Factory* between 1816 and 1988, and is salutary reading at a time when such apprenticeships are rapidly becoming things of the past. It is also an interesting, enjoyable and informative read, which will bring back memories if you served your apprenticeship at a large engineering works. 139 pages with appropriate illustrations. Paperback.



Today and Every Day

App. 77 mins • B & W • DVD £12.99

Combines three films from the 1940s; *Locomotives for the Second Front*, which is a short newsreel on the production of WD Austerity locomotives at Springburn in 1943, *North British*, a fairly long and detailed look at the process involved in designing and manufacturing steam locomotives in 1949, which includes new locos being hauled through the streets of Glasgow to the docks by traction engine. The main feature is *Today and Every Day* which is a fascinating look at the railways of Britain in 1947, and which was made with the co-operation of the 'Big Four' railway companies. Amongst other delights this includes a trip to Dover on the "Golden Arrow" to see the train ferries and unique sea locks in operation, a footplate trip on "The Cheltenham Flyer" from Swindon to London, plus a few (pre-war) shots on the legendary 10 1/4" gauge 'Surrey Border and Camberley Railway'. And there is much more, including the first mainline diesel-electric locomotive, LMS 10000. Highly enjoyable!



Model and Miniature Locomotive Construction • Bray • £ 33.45

This book by Stan Bray covers the construction of model and miniature locomotives from Gauge 1 to 7 1/4" gauge, with the accent on the passenger hauling gauges. It is Stan passing on hints, tips, ideas and practices he has picked up over fifty years as a model engineer, and he covers the subject with chapters on each major part, such as frames, axleboxes, valve gear, cylinders, boiler, platemwork etc. Stan also covers electric and I.C. powered locomotives, a subject not covered before in a book on this subject. Each chapter is illustrated with drawings and photographs of the relevant parts of the locomotive and there are eight pages of Appendices of useful charts. Whilst especially useful for the beginner, the ideas, hints and tips in this book make it one every model or miniature locomotive builder should have on their bookshelves. Quality hardbound A4 format book. 208 pages. 158 drawings. 300 B & W, and 32 colour photographs. 12 charts.

"In my view this book is destined to become one of the "Classics" for all those interested in model engineering.My copy is destined to become become "dog-eared" with use!" Mr. B.L. U.K.

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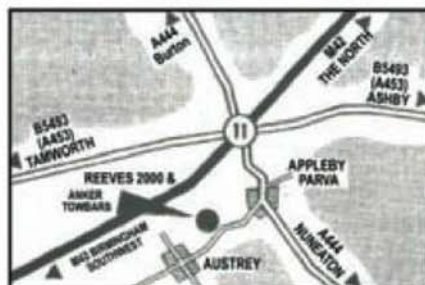


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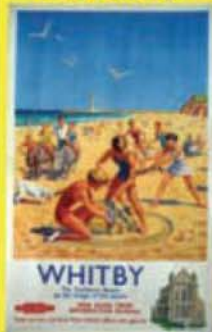
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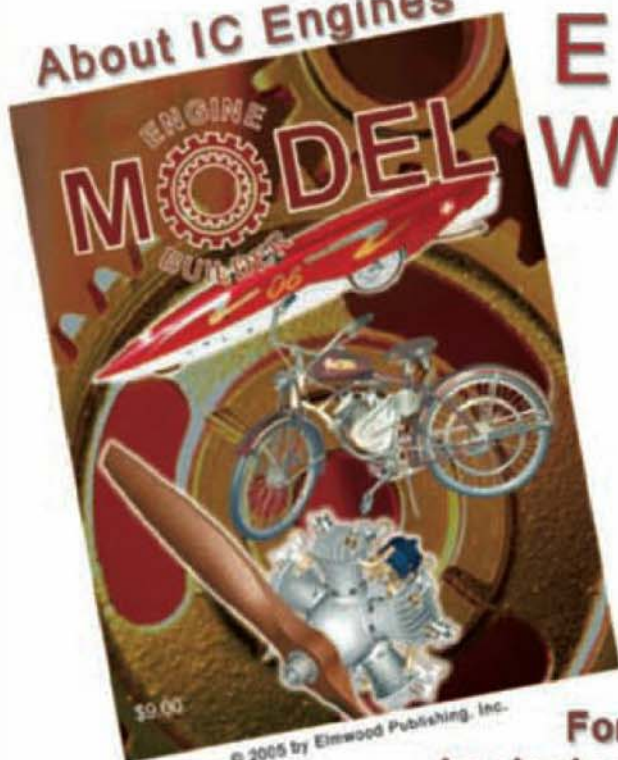


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SMOKE RINGS

With the Editors

Off and running

We are off and running for the 75th Model Engineer Exhibition. Already we have heard from a number of people who are showing some great models, both in competition and loan classes.

Thanks to all those who are responding to our plea to make this the sort of exhibition which will help recruit more people into model engineering. That is something we can all do. Even if your latest model or unfinished project is not likely to be in line for a gold medal, we would like to see it there. The Model Engineer Exhibition has earned the reputation for displaying the very best in model making, but that should not put off us mere mortals from displaying our own efforts.

Every individual and club that displays a model is a winner.

In centre of this issue you will find an entry form for this year's exhibition. If you have either a model that you think will appeal to experienced model engineers, or one that might encourage a beginner to take the plunge, fill in the form right away.

If you are a beginner, show us (and especially other beginners) what you have done.

Elsewhere in this issue are details of other events sponsored by this magazine: SEQLEC and the LBSC Memorial Bowl.

IMLEC on screen

One of the other great events we sponsor is IMLEC. Throughout the two days of this year's event a professional cameraman captured all 28 runs, the locos being steamed up, and other significant moments on video. These will be available shortly either on VHS tape in PAL format or as a DVD. The cost will be £15, including post and packing within the UK. To receive details of how to place an order please e-mail peter.j.jarman@btinternet.com

Copies of the videos of previous IMLECs at Northampton in 1996 and 1999 as VHS-PAL tapes or on DVD are also available for the same price.

We're here

Following the recent sale of part of Highbury Leisure, another change has now taken place. From now on our email addresses are different.

Please note that the editor is now at david.carpenter@highburygroup.com, and the technical editor is at neil.read@highburygroup.com

It's a nuisance having to change things, but please do it. We like to hear from you.

New superheaters, drawings, and kits

Doug Hewson tells us that Ballan Baker won IMLEC 2005 using his new one-piece stainless steel superheaters. These are made from thin walled 5/32in. OD stainless tube, bent cold so there are no tricky welds. Each element has 2.5m of tube as they are doubled back on themselves just like the full size ones. In Doug's BR 2-6-4 Tank there are two rows of four, in total that makes about 50ft. of superheater element. The top row extends to the back of the firebox but the second is shorter so that it does not interfere with firing.

He also tells us that he is nearing completion of drawings for the BR Standard Class 4 4-6-0

tender loco (75000). Most of the castings are the same as his 2-6-4 Tank. He is also drawing the Class 4 2-6-0 (76000) but those drawings will not be ready until next year.

Doug is also completely re-drawing the *Britannia* with correct detail. He has virtually completed a chassis and is re-drawing the boiler to the correct outline. The new boiler will comply with the Australian boiler code.

He has already completed drawings for all the various BR Standard tenders, and underframe kits are available. Tender tanks will be available as kits of water jet cut brass parts with ready-formed side sheets. He already has orders for about ten different tenders.

GL5 members and others will be interested to know that a new kit for the 14ton ex Air Ministry tank wagon is also imminent. It will be supplied as a complete kit including specially made dished ends and digitally punched underframe and tank. The tank comes ready rolled and all the rivets are specially made.

Incensed

Many readers were rightly angry about the strong possibility that magazines like *Model Engineer* might no longer be available through local newsagents. We suggested two responses: a) take out a postal subscription (and save money, too), b) lobby to your MP. Many have asked for a reference before writing. Here is the bulk of a Press Release from the Office of Fair Trading dated May 19 announcing 'consultation'. That 'consultation' ended on June 17!

The OFT has concluded, subject to consultation, that current distribution agreements for newspapers are likely to satisfy the criteria for exemption under the Competition Act. However, the distribution agreements for magazines are likely to need amendment to satisfy those criteria.

Under existing distribution agreements,

newspapers and magazines are distributed to retailers through a system of exclusive territories, reinforced by absolute territorial protection. This means that a retailer must use the wholesaler allocated to its area and is prevented from seeking a better deal elsewhere. Absolute territorial protection would normally be banned under competition law.

In the case of newspaper agreements, the OFT is nevertheless satisfied that the restrictions are necessary to ensure the benefits that flow from the agreements. Newspaper distribution has special characteristics, in particular the very narrow overnight time-frame for distribution and the newspaper code of practice (the Code). The Code obliges wholesalers to supply all retailers within their exclusive territory meeting the minimum supply level. The OFT sees this obligation – which ensures that even small and remote retailers can stock a full range of newspapers – as one of the key benefits justifying the current system for newspaper distribution. The Code does not extend to magazines.

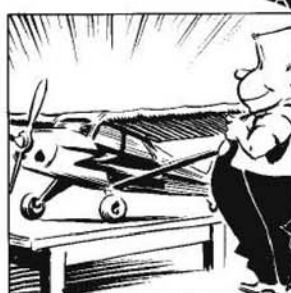
In the case of magazine agreements the OFT believes that territorial exclusivity but not the further restriction of absolute territorial protection is likely to satisfy the criteria for exemption. Retailers should be free to seek better deals than those offered by the appointed wholesaler for their territory. Absolute territorial protection prevents alternative, and potentially more efficient, arrangements for magazine distribution emerging.

Where substantial efficiencies arise from distributing magazines jointly with newspapers, as will often be the case, joint distribution is likely to continue naturally, unforced by anti-competitive restriction.

The likely upshot of this is that multiple retailers will get mass circulation magazines delivered cheaper, and make distribution of special interest magazines like ours to local newsagents prohibitively expensive. Somehow, we can't see Tesco retailing *Model Engineer*.

CHUCK, the MUDDLE ENGINEER

by B. TERRY ASPIN



POST BAG

Penrhos Grange spring link

SIRS, - I fear that there is a mistake in the published design for *Penrhos Grange* (M.E. 4242, 4 March 2005). The link connecting axle box to spring buckle is not correct. It should be a 'T' section (a batch of these under construction is shown in the photograph).

It will be seen that this gives greater flexibility in the whole springing system, because the two pivots are at right angles. The T is in the usual as-written position, i.e. cross-piece at the top, pivoted parallel to the rail. The bottom is across the engine, pivoted parallel to the axles. I would add that I have checked this with the Swindon 'Grange' drawings, so there is no possible doubt.

Keith Wilson, by e-mail.

Penrhos Grange
spring link



Thanks

SIRS, - Through your excellent column I would like to express my grateful thanks to the people who have responded to my recent advertisement.

It has involved me in some very interesting conversations on a variety of subjects and I have had the pleasure of speaking to some very genuine people.

If the gentleman from Bristol (Paul?) who contacted me would care to ring again I would appreciate it. Again many thanks and keep up the good work with your excellent magazine.

Peter Annely, by e-mail.

A cautionary tale

SIRS, - Just over ten years ago I ordered from one of our best-known suppliers, a full set of ME taps and dies in 32 and 40tpi, and 26tpi BSB taps and dies for sizes from 7/16in. by 1/16in. to 5/8 inches. These were put in separate boxes and put away for future use.

Last week, I was fitting the ready-made turret (this is a *Polly* kit locomotive) to its professionally made boiler, and found that after three threads were entered, it became very tight. So, I thought, I need to clean out the thread. I measured the thread and it was what I expected, 1/2in. x 26tpi BSB, so I reached for the tap box and the 1/2in x 26 tap. This was no trouble to put through, although I thought at the time it seemed to be cutting quite a lot. But when I put the turret back into the boss, it was wobbly loose! I wondered if I had mistaken the thread on the turret for 12 x 1mm pitch, but no, a repeat measurement showed this wasn't the case. I puzzled over it, slept (not very well) on it and woke the next day wondering if it was the tap. A closer look at the tap disclosed the marking 1/2in. x 26C. I hadn't seen

that little 'C' before. So now all was clear: I had tapped out the bush as 1/2 x 26 Cycle thread, which has a 60deg. thread angle, whereas BSB has Whitworth form, 55 degrees. No wonder it was loose!

I checked the eight (Seconds and Plugs) BSB taps: two of them were marked BSB, two had no indication (one appears to be BSB, one Cycle) but the remaining four were marked with a 'C'. The invoice, which I still have, states that all the large taps and dies supplied were BSB. The dies (marked BSB) were, but plainly half the taps weren't: however, after ten years, even though they had not been used in that time, I didn't feel that I could return them with a complaint. At the time I bought them, I didn't even know that larger Cycle threads were 26tpi, 60deg. angle! (They now have marking grooves ground in the shank as a warning for the future; I won't make this mistake again)

In discussion with Andy Clarke (maker of the *Polly* kit), we decided that the Cycle thread I had inadvertently tapped out would be perfectly satisfactory if the turret leg were re-made with a matching 60deg. thread. I duly unsoldered the existing part and made a new piece, threaded on the lathe before soldering it back onto its crosspiece. I also made a test nut using the same tap, so that I could test the lathe threading process without removing the work piece from the lathe. A day wasted, a lesson learned.

If you are buying BSB 26tpi taps and dies, make sure that what you get is what you asked for. Somebody was very careless (or maybe just ignorant of the two types) when picking out those items, that day in 1994. A cautionary tale, indeed.

Tony Finn Hedon, Yorkshire.

Order of machining

SIRS, - I refer to Keith Wilson's article describing the construction of *Lillian* (M.E. 4247, 13 May 2005). Mr Wilson recommends, in general, doing the most accurate machining on a part first, to reduce the amount of wasted effort if a mistake is made. I understand his thinking, I've done it myself, but I was always taught that you should do the bits requiring the greatest accuracy last, so that if the less important machining causes warping/distortion, this is safely out of the way before the accurate stuff is done.

Richard Wilson (no relation).

New Zealand Ab locomotive livery

SIRS, - Re Ab locomotive query (M.E. 4244, 1 April 2005). I have checked with a railway historian who confirms details of the original livery.

The boiler brass bands and the dome cover were polished brass. The joins in the steam cover were dove-tailed and brazed over a coke fire, often by an apprentice, some by my father-in-law in 1925.

I am unable to establish whether or not the lining on the cylinders, tender or cab was white or gold. I started as an apprentice fitter in 1944 and about 1946 I saw an old shunting locomotive with gold lining showing where the over-painting had peeled off. This was built either by Neilsen in 1872 or Dubs in 1890. I never saw any old lining showing on an Ab locomotive. At this time there were still a lot of tradesmen around who had worked on the Ab locomotives who talked of the pride in workmanship in their young days but I have no memory of any talk about lining in either white or gold but I am sure it would have been white. Red paint can be seen in the flutes on the connecting and side rods. When I was in the design office in 1956 I had to re-draw the Ab side rods because the original drawings had so many amendments and notes workshop staff complained they were too hard to follow. I have no recollection of any note on the original drawings re painting the flutes but that was nearly 50 years ago. However, this is the sort of detail that may have been added by workshop staff although in those days any deviation from instructions could incur the wrath of Head Office.

A batch of Ab locomotives was

made by the North British Locomotive Co. 1921-23. If they are still in existence they may have records of what they did which would have been in accordance with instructions from NZR.

Don Angus, Christchurch, New Zealand.

Boiler tests

SIRS - A close relative of mine owns a full size steam roller which of course has a steel boiler and steel firebox. Each year the boiler after washing out is prepared for inspection by the removal of the manhole cover, mud lids, wash out plugs and ash pan and the smoke box door is opened.

The boiler inspector, employed by the insurance company, examines all that he can see and feel using torches, mirrors and callipers where appropriate. He may also ask for the fusible plug to be removed. He will also ask to see the report for the past year which the careful owner will have recorded any leakages taken up, any replacement fire tubes and any other incidents.

The inspector may stipulate some repair or other. However, if he is satisfied with the state of the boiler then the covers are replaced and the boiler is steamed. The inspector then checks that the safety valves lift at the correct pressure and again examines for any weeps or leakages. The gauge glass blow downs are tested and all means of boiler filling are seen to work.

After ten years from the last hydraulic test the insurance certificate is withdrawn and the boiler is subjected to a more rigorous examination. This involves removal of the cladding, boiler mountings, manhole covers and mud lids and the fire tubes so that the boiler is accessible for examination inside and out. The safety valves may also be stripped for inspection. The boiler's history will also be considered. If all is well then the boiler, after re-assembly, will be given an hydraulic test of one and a half times working pressure and, after a steam test, issued with its next ten year's certificate. With the above in mind can anyone explain why my little copper boilers holding a few pints of water are subjected to a hydraulic test every two years? Since corrosion is not a problem our model boilers are hardly likely to fail at one and a half times working pressure if, especially in the case of a new boiler, it was tested two years

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earlier. It could be argued that frequent hydraulic testing causes more boiler damage and is more likely to promote leaking seams than the few hours they spend running each year under working conditions.

If we are only half as responsible and only half as conscientious as the full size owners then perhaps for copper boilers five years between hydraulic tests would be more appropriate together with a yearly steam test.

P. Whittaker, Cheshire.

Evening classes

SIRS, - Upon retiring as an agriculturalist I had, at last, a little more time to allocate to my interest in model engineering. There was plenty of enthusiasm but a desperate lack of crucial skills. Agricultural engineering, at my skill level, had dangerously limited application in the complex world of model engineering - a fear frighteningly reinforced each time I visited a model engineering exhibition. I hardly dared look at all the wondrous workmanship on display.

Then, in *Model Engineer* I read of a course *Mechanical Engineering/Model Making* run by Leicester College. Not for me I thought, far too advanced. How wrong. Signing-up for 30 Wednesdays brought just what I needed - a happy decision indeed. Some on the course (most in fact!) are light years ahead of me but no matter, the tutor, Norman Smedley, accommodates us all and in addition I have the advantage of being able to learn from ten others each with a project in hand.

Sadly, a scarcity of such courses severely limits the opportunities for people like me who take up the hobby late in life. If you want to learn and are lucky enough to find a course don't dally - sign-up. Shall I sign-up for next year - you bet! Are there others like me? I'm pretty sure there must be. If so let's make our presence felt.

D. R Surfleet, Rutland.

Alexander Allan Foote

SIRS, - I am writing a biography of Mr. Alexander Allan Foote. This gentleman was a British intelligence agent in the Second World War as part of the 'Lucy Spy Ring' working in Lausanne, Switzerland.

I am informed by his family that Mr. Foote was part of a small

Manchester based team of amateur experimenters attempting to develop a jet engine from 1930 to 1935.

It occurs to me that these activities might be known to readers of *Model Engineer*. If any of your readers have any knowledge of Mr. Foote or his activities I would be pleased to hear from them.

George S. Harrison, Liverpool.

Engineering and metalwork

SIRS, - One of the regular advertisers in *Model Engineer* advertises a couple of small lathes and a bench milling machine under the heading "Engineering in the Small Workshop".

For the sake of newcomers to our hobby, I would point out that what the advertiser appears to mean is "Metalwork in the Small Workshop".

Let us have some definitions from the *Oxford Dictionary of Current English*.

"Engineering: the branch of science and technology concerned with the design, building and use of engines machines and structures."

"Metalwork: the art of making things from metal."

There is far more to engineering than just using tools to make parts. Whilst this is important, and I would recommend that any budding engineer should get plenty of workshop experience, the essence of engineering is the plotting, planning and deciding what to do and how to do it for the best.

Neil G. Heppenstall, Cheshire.

More water in the fuel

SIRS, - Dr. Malcolm Metcalfe's article on moistened fuel and air and the internal combustion engine is of great interest. About a half a century ago I was a young apprentice working at the R.A.E. at Farnborough. As I remember it, experiments were being carried out there on using water/methanol injection on Bristol aero engines. An engine fitter there nicknamed 'Busty' 'acquired' a drum of this magic mixture. He had a 1936 Ford Model Y and he fitted a gravity feed tank to the dashboard, a needle valve and sight feed which fed the

mixture directly into the engine inlet manifold.

Busty, who had taken me under his wing, demonstrated this and claimed that it had increased the economy of the Ford from 28 to 60 miles per gallon. There was a snag though, the mortality rate on exhaust valves increased dramatically!

There was a strong rumour around at the time that someone had tried to exploit this idea commercially for cars, but that unfortunately he was found floating

upside down in the River Thames. Can anyone add to any of this?
Peter Parks, Devon.

Metric threads on a Myford

SIRS, - I am the proud owner of Myford Super 7 (8tpi leadscrew) with a screwcutting gearbox, beautifully set up to cut imperial threads.

Over the past few years there has been a great deal of discussion over the best gear selection to achieve a range of metric threads with this gearbox.

I wonder if, through your pages, I could garner the perceived wisdom (and, where applicable, tolerances) on this subject?

G. D. Hall, Warwickshire.

Juneero

SIRS, - A year or so ago, readers and the Editor were discussing the merits and fun to be gained by early boy's construction outfits. During the first half of the 20th century there were two types, the most popular being Meccano and Trix.

The second type, not quite so well-known, was a kit of materials such as rods, sheets and strips together with various tools designed to cut, bend and pierce the raw materials so that models could be made. One such kit was known as 'Juneero'.

One of the tools supplied for Juneero users was a small bench mounted lever press. This could (from memory) bend Juneero rod, strip and pierce holes for Juneero bolts.

I do not know whether the tool could sheer the Juneero sheet steel which was, I believe, lightly tin plated steel, much as used to make biscuit tins at the time.

While clearing out a lot of miscellaneous copper, brass and tin plate, I found four pieces of 'corrugated iron' (two 7 1/8 x 9 1/4in. and two 4 1/8 x 7 1/2in.) It was bright tin coated when new but being cheaply made the tin 'fell off' ages ago. I am pretty certain that the four pieces were part of my Juneero kit.

Did Juneero supply a special shear to cut this corrugated material without deforming the shape? There are 19 corrugations in 4in. with a height of 0.055 inches. The material is 0.012in. thick.

I do not know if the pitch was supposed to be suitable for the Hornby Gauge 'O' model railways popular in the immediate pre and post-war periods.

This Juneero material would probably be suitable for railway modellers to make corrugated iron roofs for buildings.

Peter Spenlove-Spenlove, Leicestershire.

If any of our readers have a use for this material, Peter is offering it to readers at no charge other than the cost of postage and packing.

Peter Spenlove-Spenlove's samples of Juneero.



I/C TOPICS

Nemett

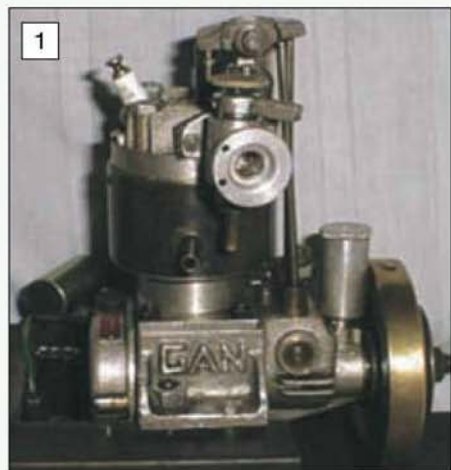
provides a very mixed bag of items including responses to some queries and a brief report on the I/C engines seen at the recent Guildford MES Rally.

● Number IV continued from page 140 (M.E. 4253, 5 August 2005)

Before I properly begin this edition I would like to thank all those who have written in expressing appreciation of this new series. I am very flattered by the interest and have noted all your suggestions for future topics and will address them in due course. As I said in my introduction to this column, I want this column to become a forum for I/C engine news and views and to help answer reader's queries when possible.

Engine to identify

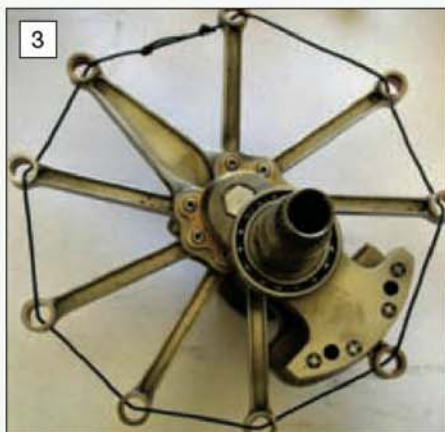
The first of our readers queries this month concerns the engine shown in **photo 1** sent in by David Japp from Norfolk. The engine is a water cooled spark ignition single cylinder four stroke with a maker's plate "Nurthen and Muirhead Engineers England" at the back of the crankcase. David can find nothing on the internet about this



David Japp's Gannett four stroke engine.



Fine collection of engines by Peter Mitchell.



Master/slave rod assembly from Mike Tull's Bristol Mercury.

firm and would love to know when the engine was made and if possible get some information about the type/size of a suitable model boat and some instructions as to how to start it and run the engine.

The engine is in fact a *Gannett*, I think of 15cc capacity, and was made by Nathen and Muirhead around the early 1960s. I do not know the exact dates but remember one being used to power an Aerokits *Sea Queen* model boat when I was a member of Southend MPBC at that time. I remember the engine as being very smooth running and somewhat quieter than the two strokes being used by the rest of us. Further information on these engines or the company will be very welcome. Since his original query, David tells me that he has acquired another one of these engines so now has one with magneto and one without. The coincidence is that he is also intending to use one in a *Sea Queen*.

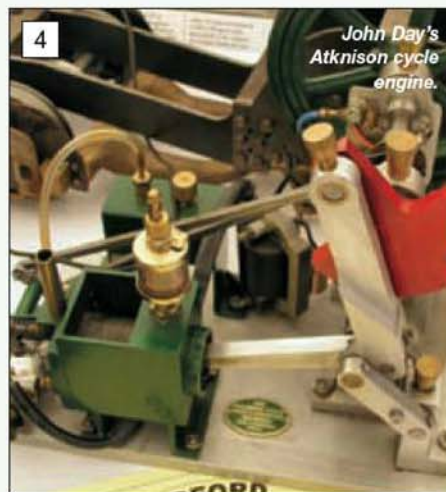
Radial engine query

Another reader with a query is Peter Mitchell from Wales who has been designing and building small four stroke engines (**photo 2**) for some years. He is now building a seven cylinder radial engine and in his words "has a problem with the spacing of the slave big ends round the master connecting rod". I have to say to Peter that you are not alone and there has been a lot written about this subject over the years.

For readers unfamiliar with the problem, it occurs because only one cylinder (the master) has a 'normal' connecting rod. All the other connecting rods are connected around the big end of this rod at their 'big ends'. I use quotes there because in this arrangement the so called 'big end' is often smaller than the 'little end' in order to fit the connecting rods round the master.

The master and slave connecting rod assembly (**photo 3**) from Mike Tull's part built engine taken at Guildford shows the arrangement very well. The slave big ends are usually evenly spaced around the relevant pitch circle, so for a nine cylinder engine they would be spaced at 40deg. intervals. The problem Peter has is that because the slave rods are not connected directly to the crank pin, when the crank pin is on the centre line of one of the 'slave' cylinders (the normal TDC position) the master connecting rod is at an angle. This means that the slave connecting rod is not forming a straight line with the crankshaft and crank pin and therefore the relevant slave piston is not at its highest cylinder position when the crank pin is at the normal TDC position.

Peter is asking if he should alter the spacing of the slave big ends round the pitch circle to correct this. The answer is "Yes if you want to",



but all of the engines I have details of have even spacing and equal length slave rods. There are actually two errors involved, one is the timing due the radial spacing of the big ends, and the other is the compression ratio, which is different for each cylinder because of the unequal effective lengths of each slave connecting rod.

The other areas affected by this are the valve timing and the ignition timing (for spark ignition engines). Don't forget also that this unevenness is probably what gives radials and rotary engines their distinctive sound. I will publish details of correction methods used and a fuller analysis once I have obtained the information (hint!).

Schillings engine information

I have received some information on Schillings engines (M.E. 4249, 10 June 2005) from Mr. H. Slingerland from the Netherlands who informs us that the engines were designed and built by Hubert W. Schillings (born in 1922) in Germany who also wrote a book on his engines. According to the book, the timing diagram shown in the article is slightly incorrect as Schillings claims that the exhaust opens 40deg. before BDC and closes 30deg. after BDC whilst the inlet opens 30deg. before TDC and closes 40deg. after BDC. Malcolm Stride tells us that the reason for this lies in his method of measurement which was done by inserting a '1 thou' feeler gauge under each cam and rotating the engine until it was gripped lightly between cam and tappet and so the diagram he produced is not likely to be totally accurate.

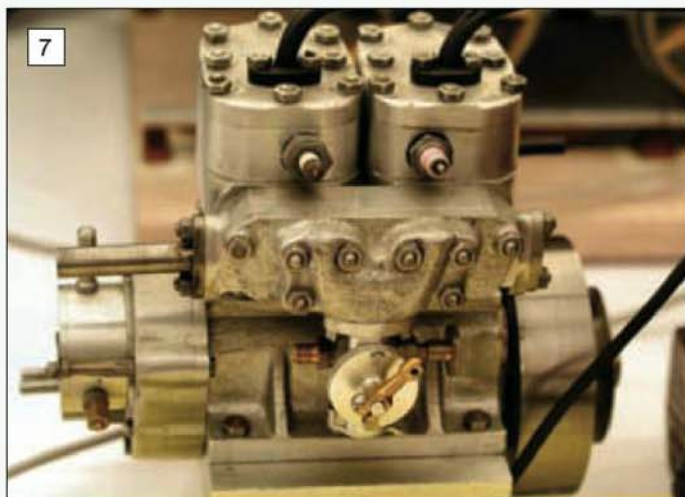
Mr. Slingerland also gives details of a German website www.vth.de which has details of the book



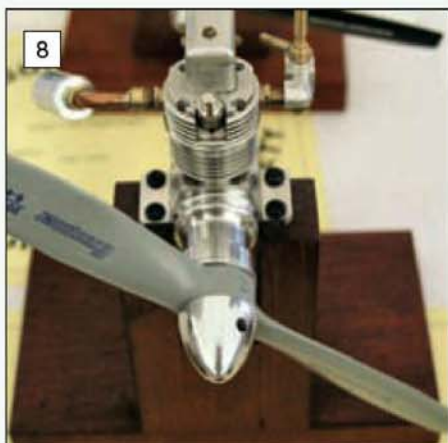
Fine Otto Deutz Gas Engine also by John Day.



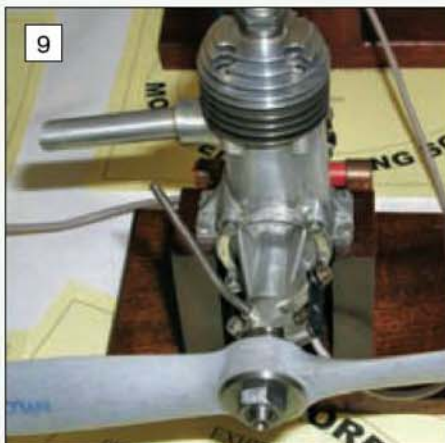
Well-known engine design, the RLE gas engine by John Day.



John Day's twin cylinder Seagull to the Westbury design.



John Carter's diminutive 1.2cc Robin four stroke engine.



Another Westbury design, this time the Atom Minor two stroke engine also by John Carter.



Sectioned two stroke engine displayed by Mike Tull.

and drawings of Schillings and other engines for sale. We express our thanks to Mr. Slingerland for the information. Many readers will have seen this engine was running at Guildford.

I/C engines at Guildford

I visited the Guildford MES 2005 Rally on the Saturday which continued the spell of hot weather enabling visitors to enjoy the exhibits and train rides in the sunshine. I will start my look at the I/C engines with a very nice and varied group of engines by John Day. John obviously has a set colour scheme for most of his

engines which meant that the display was very nice indeed.

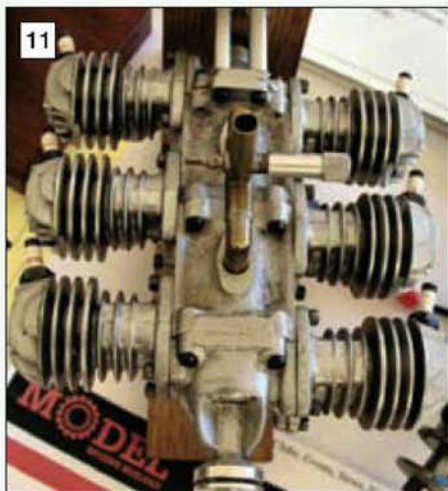
The first of John's offerings was the Atkinson Cycle engine (photo 4). This unusual engine manages to gain a four stroke cycle out of just one revolution of the crankshaft. John had described it as a "2/4 cycle". I think the original was one of many designs of that era that tried to get round the Otto patent for the four stroke cycle.

John's next engine was the Otto Deutz Gas engine (photo 5) which is unusual in that it is a vertical engine, presumably built in that arrangement in order to take up less floor space.

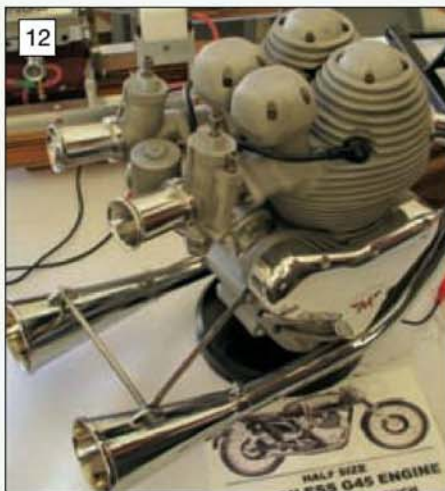
The well-known RLE stationary engine (photo 6) is the more usual horizontal arrangement and was mounted on a nice skid base.

The next engine in this display doubled the number of cylinders and was an Edgar Westbury Seagull (photo 7). This water cooled twin cylinder side valve four stroke engine was left in the plain aluminium finish more suited to this type. John should be congratulated on his group of engines which attracted a lot of interest.

As you would expect, the majority of the I/C engines were displayed on the I/C Engine Builders Group stand and included some very



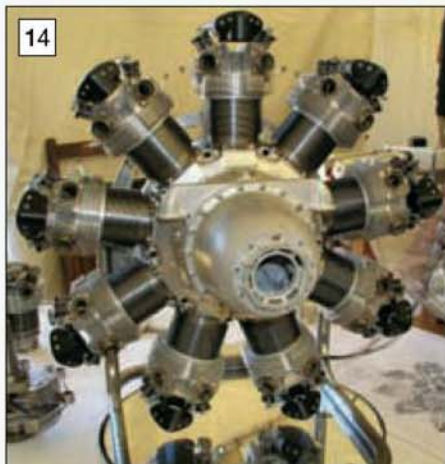
Replica ELF flat six two stroke engine by Eric Offen.



Bill Connor's fine Matchless G45 twin cylinder motor cycle engine at 1/4 scale.



Another motorcycle engine by Bill Connors, this time his Norton single.



14
Mike Tull's impressive part built Bristol Mercury nine cylinder radial engine.

fine examples by group members. I will start with one of the smallest engines on display the *Robin* single cylinder pushrod four stroke engine by John Carter (photo 8). This diminutive engine has a capacity of 1.2cc and was also running during the day. Another engine by John was the Westbury designed *Atom Minor* 6cc two stroke (photo 9).

An interesting engine for visitors to examine was the sectioned two stroke engine displayed by Mike Tull (photo 10). This gave those interested a chance to work out how these engines work and to see how few moving parts there are in a two stroke single.

Eric Offen had his replica *Elf* flat six two stroke (photo 11) on the table which must make an 'interesting' noise when it runs.

Bill Connor's half size *Matchless G45* twin (photo 12) was displayed part finished and matched his Norton single (photo 13) which was making that wonderful Norton noise outside in the running area at regular intervals.

Another part built engine was the impressive 1:4 scale *Bristol Mercury* nine cylinder radial (photo 14) being built by Mike Tull who was also running his very neat Seidel five cylinder radial engine outside (photo 15). The long bar at the back of the latter engine is the 'chicken bar' to prevent Mike walking into the propeller.

The next engine really defies description because it is a superb example of the engine builder's art and has all been machined by hand

without the use of CNC. This is the *Napier Dagger* (photos 16 and 17) being built by Norman Lawrence. The finish on all the parts of this twin crankshaft 24 cylinder engine is nothing short of superb and it will be a very impressive engine when finished.

Another superb multi-cylinder engine, but this time finished and running was the own design V12 four stroke glow engine (photo 18) by Ron Hankins. This engine is around 90cc capacity with belt driven overhead cam shafts and was running regularly throughout the day.

I suppose the most exciting engine for the spectators was the fearsome nine cylinder radial by Bill Connor (photo 19) who described it as "*Bentlyish*". This 830cc monster was spinning a very large wooden propeller and was blowing air on the crowd who no doubt appreciated being cooled down but may have wondered where the oil on their clothes came from when they got home!

The other fine engine on display (but not photographed) was Clen Tomlinson's well known *Napier Deltic* engine which must be getting close to its first run now.

The I/C Engine Builders Group

I would like to introduce readers of this column to the I/C Engine Builders Group. The group has been founded to foster interest in the building and running of all types of I/C engines and to act as a forum through which ideas and techniques can be discussed and exchanged.



15
Another engine shown by Mike Tull, this time the very attractive five cylinder radial engine by Seidel.

At the moment it is very much internet based because being a national group individual members do not meet very often other than at a local level. It is not intended to become a very formal organisation but is looking for someone with the time and inclination to help organise things such as membership lists. The good news is that there are no subscription charges at the moment.

Contact is via the website (very basic at present) on <http://iceba.mysite.wanadoo-members.co.uk/> Anyone interested in joining the group should e-mail their contact details using the contact button on the home page. I will provide details of the groups future activities in this column at regular intervals so those without web access can contact group members at such events.

●To be continued.



16
Superb part finished crankcase from the Napier Dagger engine being built by Norman Lawrence.



17
Crankshafts and connecting rods from Norman Lawrence's 24 cylinder Napier.



18
New engine from Ron Hankins, his own design V12 four stroke glow engine.



19
The fearsome 830cc nine cylinder rotary engine by Bill Connors seen cooling the crowd outside.

D.A.G. Brown and Mark Smithers complete the hand pump before moving on to the intricacies of the Giffard injector.

● *Part XIX continued from page 148*
(M.E. 4253, 5 August 2005)

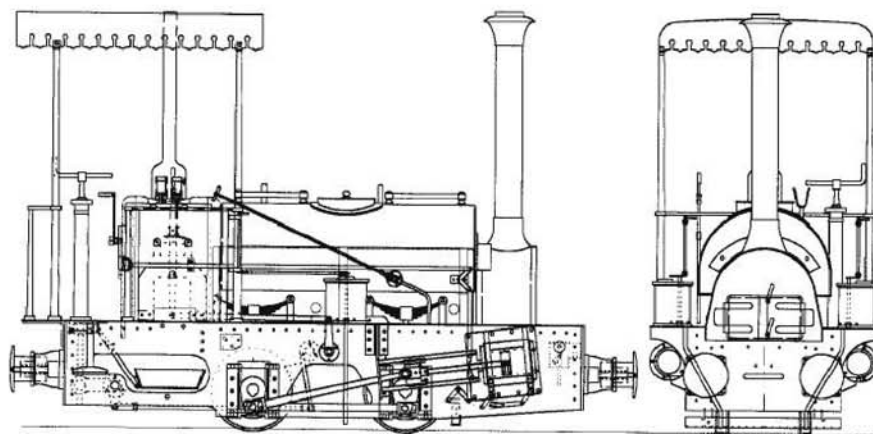
Continuing from the last instalment, I shall deal first with the Hand Pump, that all-important fitting which is there to get you out of trouble, but which should not be required during normal operation. I personally make regular use of my hand pump for filling the boiler, thus keeping it in proven condition. You will need an extension lever to keep on the footplate, which I have not drawn out.

The pump fits into holes already drilled in the rear Buffer Beam, to accommodate 1/4in. BSF studs, which should be flush with the outside surface, and therefore invisible beneath the paint. I sincerely believe in the philosophy of unit assembly, in which the pump is attached by only two screws and the pipe connections from each end body. I watched in awe many years ago when the late Ted Moon (a fellow member of the North London Society and SMEE) ran into plumbing trouble during a day's operation with his narrow gauge *Suzie M.* With a minimum of fuss and very few screws he soon had the locomotive stripped down and rapidly put the matter right, before returning to steam. The moral is simple: think at the design stage about how the thing can be pulled to pieces simply and without damaging the paint work.

So, from the base upwards, so to speak, the studs carry two Spacers, which keep the Baseplate at a good distance from the Beam, but well clear of the coupling spring assembly. On the Baseplate details I have not specified tight dimensions, but the obvious way to construct it is by coordinate drilling a 7 in. length of 1 x 1/4in. mild steel strip. The two brass Bodies are fabricated mirror image from blocks of brass 7/8 x 1 1/4 x 1 3/8in. with some 11/16in. bore tube silver soldered into them. Again I have assumed screw cutting, especially since the male threads contain only about three threads. I keep a screw cutting tool ground with the left hand land only about 1/32in. wide, so that it cuts tight up against a shoulder. I do, however, start with a 1/32in. parting tool to thread depth, so that the female part mates snugly up against the shoulder. The rest is fairly straightforward; the purpose of the screwed-on cap being to allow the ball seat to be lapped before seating the ball, thereby getting a true seat which should remain watertight.

Next, the top and bottom fittings have open dimensions on their lengths; start off with them a little long and adjust on assembly to allow the balls to lift only about 0.040 to 0.060 inch. This will reduce the incidence of valve bounce.

The double ended Ram is a length of stainless steel, with a 1/4in. wide slot milled across its centre line and a pin-hole reamed 5/16in. dia. at right angles to the slot. The ends of the Ram are furnished with O-ring grooves, aiming for a very light fit of the rings within the cylinders. You may appreciate the wisdom of standardising on 3/8in. x 32 for the water connections – more duties for the Union Nuts and Nipples described in the last issue.



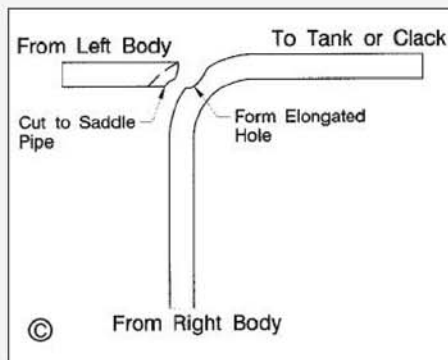
ANNA A MANNING WARDLE LOCOMOTIVE FOR 7 1/4in. GAUGE

The assembly is completed with the Fulcrum, best fabricated from either pieces of angle or flat strip. It is attached to the Baseplate by two 2BA screws and supports the twin Links of 1/8in. thick material, which in turn bridge the Operating Lever. I have not specified the length of the operating section of this piece, leaving it to the constructor to decide during the fitting out process.

Plumbing up the pump

As already mentioned, the delivery should be led as discretely as possible to the front left Clack Valve, making sure that you have already fitted the boiler Supports and that you stay well out of the way of their access path inside the Frames. The water feed, on Mark's suggestion, has been provided from a hole in the bottom of the Saddle Tank, out of sight behind the Sander. You can adapt a standard Pipe Union to mate up with the Pump line, with a Running Nut inside the tank and an Union Nut on the outside.

It is necessary to join together the two legs of the feed and delivery pipe work, and this is best achieved by joining the pipes on a bend. Cut a 7/32in. dia. hole and elongate it on the outside of the bend; then shape the end of the mating piece to be a good fit over the saddle of the pipe. So long as there is no more than about 0.010in. of gap between the two pieces, silver solder will produce a perfect job, without bridging the hole in the parent section of pipe. With such a configuration the water flow should be quite smooth as each section of the pump performs its own duty.



Injectors

As already mentioned, the original machines were each fitted with a Giffard Injector. We are going to follow this practice, but also make provision for one of my standard injectors, to be fed from the tender tank.

First let me dispel the odd myth about injector sizing. As in full size practice, you should be able to maintain the water level with the engine working hard, but not have an injector so large that it flattens the boiler pressure whenever it is put on. For our purposes on *Anna*, each injector should be of no more than 26oz./min. capacity. This agrees with my findings over the past ten seasons with the Hunslet, on which I have never been embarrassed by a lack of water; others who have driven it agree that the sizing is just about right. On a tough session of running I normally run the injector for about 1/3 to 1/2 of the running time, often putting it on while 'storming a bank', while the boiler pressure is going up, using it as a vehicle to control boiler pressure and stop blowing off. This is good driving practice.

Giffard injector

Designing the replica of the Giffard injector proved to be quite a nightmare; we had established the outside dimensions and it is vital to stick to these for aesthetic purposes, while dressing it up to accommodate my standard innards. The original had a manually operated cone adjustment to allow for starting and for a vacuum to be established, but ours has a dummy handwheel for small boys (and big ones) to fiddle with! It is noteworthy how large the original beast was, designed of course for operation on much larger, main line engines. I wonder if the nineteenth century designers just did not realise how rapid is the transformation from steam to water within the combining cone. In our application condensation is certainly complete within 20 micro-seconds, such is the turbulent nature of the mixed flow within the cone structure.

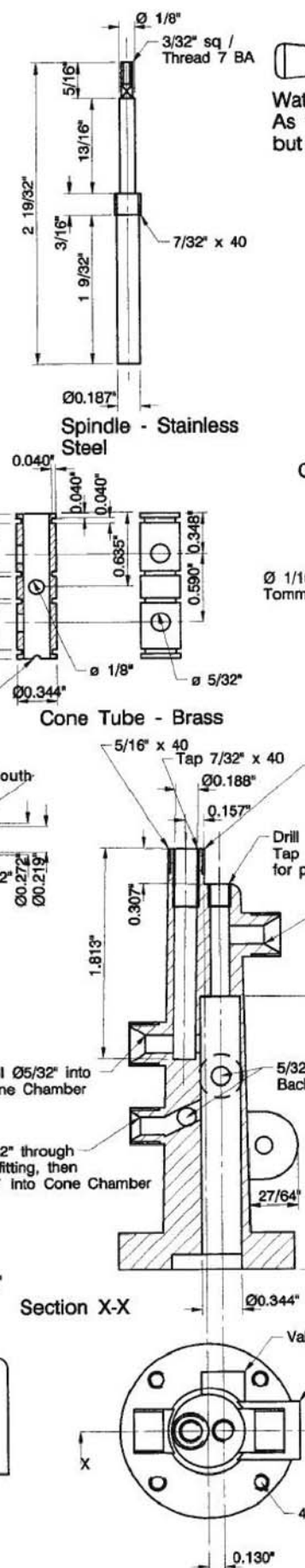
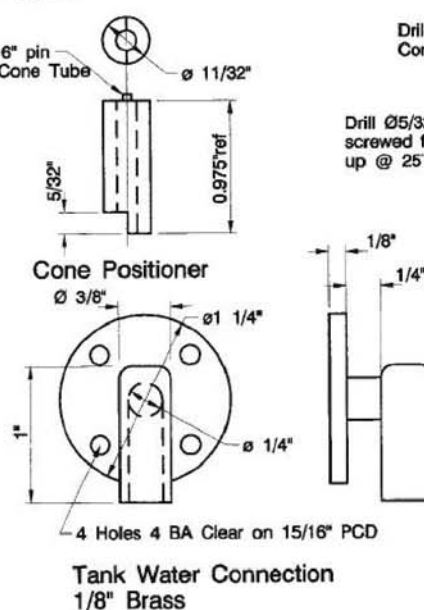
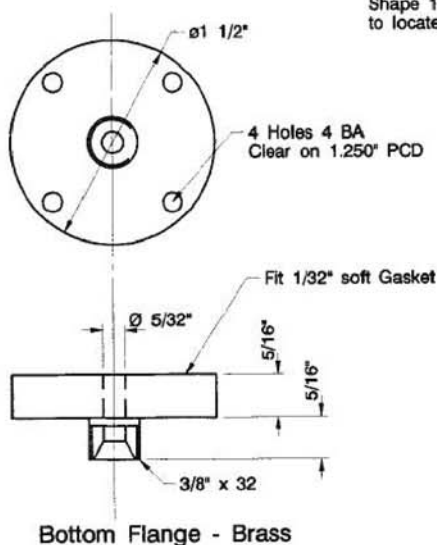
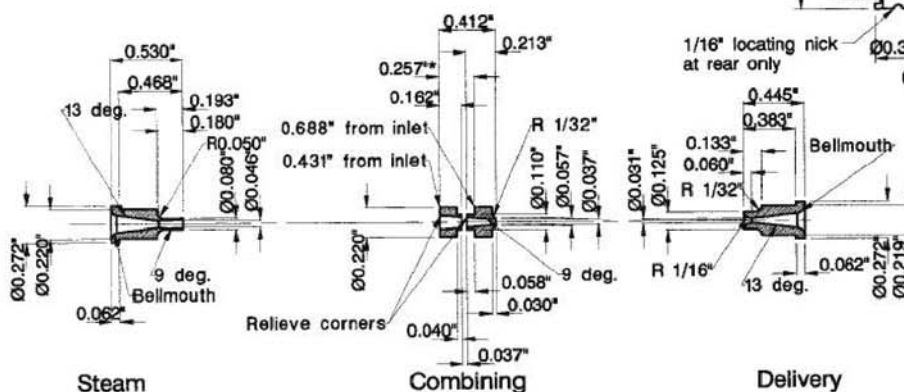
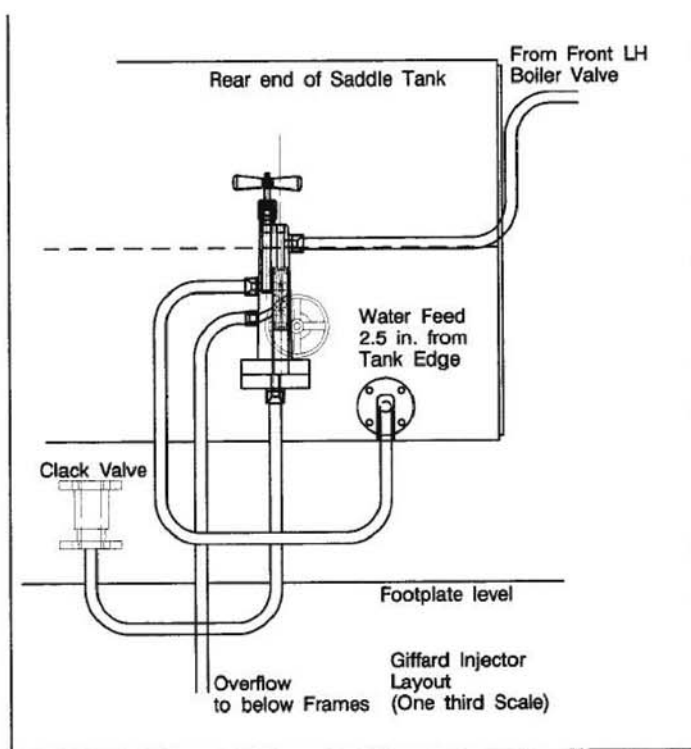
It is interesting to reflect that the basic miniature geometry was worked out by 1899 by Linden; his work was first reported in this journal in the first couple of years of its existence. So we have a cone chamber which quite frankly you could swing a cat in; but that is

where the easy part finishes.

Giffard placed the water control valve directly on top of the injector body and the engravings which we have studied indicate that it is slightly offset towards the smokebox. I have taken a slight dose of poetic licence and pushed it slightly further off-centre, to allow the various passages to clear each other. Let us first examine the layout of the whole installation, at the top left of the centre drawing. By the wonders of CAD I have been able to shrink the whole of the assembly to one third of its size, thereby putting its worth in perspective with the rest of the details. Also, by shrinking the line widths to minimum I have positioned the working parts where they belong, and they are still visible on my A2 size print.

You may care for an explanation of the production process which I use with the Editor's blessing. I print on normal office grade paper straight from my computer at a sheet size of A2, using an ink-jet printer. The production company then scans this print and reduces it to nominal A3 size, which fits the centre spread of the magazine page; by making this reduction, the thinnest of lines is still visible and the definition of the drawing is enhanced, compared with reproducing size for size. Using this format, A2 drawings can easily be run off for supplying to those who wish to build the model in their own workshops.

The injector pipe-work is self-explanatory, being joined using our standard $\frac{3}{8}$ in. x 32 union fittings, in place of flanged joints, which were to be found on the Manning Wardle machine. I do not think it is justifiable to follow full sized practice in these details, as it is



Dummy Valve Handwheel
Fix to body

Technical drawing of a Valve Chamber Cap. The drawing shows two views: a top view and a side view. The top view shows a hexagonal cap with a central hole. Dimensions include: 5/16" Hex, u/cut, 1/4" x 40, 3/32", 1/8", 5/16", 0.219", 0.196", 0.176" slot, and Drill 5/32" deep. The side view shows the cap's profile with a slot that lines up with the outlet. The text "Valve Chamber Cap" is written below the drawing.

Island Nut - Brass

0.251"

0.094"

0.266"

0.126"

Stop - Brass

Threaded Boss &
Ø3/16" Hole set
over @ 1"

Support for Handwheel

Holes Tap 4 BA on 1.250" pcd

Plan

Diagram illustrating the components of a manual valve assembly:

- Handle
- Gland Nut
- Stop
- Spindle
- Spindle closes Port, thus
- Cone
- Cone Tube
- Valve Chamber fits at Rear
- 3/16" Ball
- 4 O-rings
- Cone Positioner

Valve Chamber. Cap as drawn
for Giffard Injector

Technical drawing of a shaft with the following dimensions and labels:

- Overall length: 1.250"
- Distance from left end to first step: 0.920"
- Distance from left end to second step: 0.625"
- Distance from left end to third step: 0.330"
- Distance from third step to right end: 0.200"
- Left end diameter: $\varnothing 5/16"$
- Right end diameter: Ream $7/32"$
- Feature: Screwcut $3/8" \times 32$
- Label: Body

Overflow Cover
Standard Injector

General Assembly
Silver Soldered

Standard Injector
All components except Ball - Brass



First angle

**Giffard Injector Body
Fabricate from Brass**

Drawings, castings and laser cut components for this locomotive are available from the designers.

**Contact D. A. G. Brown, tel: 01780-753162,
e-mail: dag.brown@bopenworld.com
or Mark Smithers tel: 01609-773734
e-mail: marks_northall.yorks@tiscali.co.uk**

certainly essential to remove and replace the injector for cleaning most times it is used.

An exception to the standard size is the overflow connection, which is reduced to $\frac{5}{16}$ in. dia. to agree with the full size version. I have shown all the pipe work as $\frac{1}{4}$ in. dia., which is fairly true to scale, looks right, and supports the injector without any unwanted 'bracketry'.

Near the top right of the drawing sheet I have assembled the important bits in their relative positions; three fairly unconventional features are: firstly the water valve spindle merely forms a plug in the way in for the water, without a proper seat, and although this might allow the merest of dribbles in operation, it is unlikely to cause embarrassment, seeing that the water head is only a few inches. Secondly, the ball valve chamber is horizontal, so that the ball seat is on its side, but this principle is well tested and works well with its support arrangement. This tiny assembly will not be visible behind the body. Thirdly, the cones are in a sub-assembly, again successfully tested in another design which I have done in collaboration with Doug Hewson.

Giffard injector components

Starting with the main Body, this may either be machined from a length of $1\frac{1}{2}$ in. brass bar, or fabricated from $\frac{3}{4}$ in. bar with a flange silver-soldered on the bottom. The body tapers down from $\frac{3}{4}$ in. to $\frac{5}{8}$ in., with a small radius on the top. The bottom flange has a shallow bore of diameter 0.604in., tangential to which is the main bore of $\frac{11}{32}$ in. dia. to accept the cones. Make sure that the depth of the bore (2.348in.) is precise, while the hole continues to the top at a reduced diameter of $\frac{5}{32}$ inch. You can finish this bore with a D-bit reamer, fitted with a depth stop. Before destroying this set-up, drill the four 4BA tapped holes off centres at 1.250in. pitch circle dia. in the base flange, so that they may be used subsequently to register the piece accurately for the other holes to be positioned.

Going to the top of the Body, the steam passage is blanked off with a screwed plug, which has to be easily removable to allow the cone assembly to be pushed out. To make a good metal to metal seal for this plug, make sure that the first thread is cleanly removed by either boring or slot-drilling.

Across the top centre-line from the main bore is the bore for the Water Spindle, which is inclined at 1deg., in order to provide a safe clearance between the two passages. Set the body, preferably on an inclined angle plate or sine table, making sure that the plate is truly parallel to one machine axis, with the 4BA holes in the Body also clocked true to an axis. Since the main bore was offset by 0.130in. and the top of the inclined bore has to be offset by 0.157in., the sum of these figures is used to locate the position for the inclined bore. Drill under size to a depth of just over $1\frac{3}{4}$ in.; the bore will be reamed to $\frac{3}{16}$ in. dia. after finishing the top boss. For the latter piece, spot face the area around the hole, so that the boss may be held at the correct 1deg. during silver-soldering.

The next operation, to prepare the branches, requires the body to be held horizontal on a dividing head or rotary table. Again, the four

4BA holes are used for alignment of the axes and datum points are established on the axis of symmetry and the bottom of the base. The steam and water branches are straightforward, in each case requiring a $\frac{5}{32}$ in. dia. hole and a spot face for location of the boss. My intention for such positioning is to turn down a short 'tube' of brass, a close fit in the hole, to ensure correct position and right angle during silver-soldering, after which process the 'tube' is drilled out. While in position for the steam branch, mill a shallow slot with a $\frac{1}{2}$ in. dia. slot-drill to locate the handwheel support about one third of the way up the body.

The overflow boss is a different kettle of fish; for a start it is only $\frac{5}{16}$ in. dia., and its bore is stopped without an appreciable penetration. Aim, therefore to form the spot face so as to grip the boss without the spigot described above. Place on one side ready for a further operation.

Further operations on the dividing head are carried out after rotating through 90 degrees. The job is brought beneath the spindle centre-line and offset 1.640in. from the base and 0.130in. from the axis, to position correctly for the Valve Chamber. Centre deeply and drill into the main bore with a $\frac{5}{32}$ in. drill; since this hole approaches the surface of the body at an appreciable angle, it will wander unless it is able to follow a full countersink pilot hole. You now need to sink a $\frac{3}{8}$ in. dia. slot-drill to within $\frac{1}{32}$ in. of the main bore. Remember the X and Y settings of the table, install the slot-drill, and then gauge its depth with a stop just to touch the $1\frac{1}{2}$ in. dia. of the base flange. If this flange is not accessible, you can use another well-defined diameter, even the outside of the chuck on the dividing head. By a cunning calculation arrange either to raise the machine table, or to drop the stop by the correct dimension, so that the slot drill will penetrate to the required depth after it is returned to the original position.

Now index down the body from 1.640 to 1.311in. and by 0.293in. on the other axis, to give the correct location for the other $\frac{5}{32}$ in. hole, which will go into the overflow bore when it is drilled. Centre drill and follow up with a $\frac{5}{32}$ in. drill to well past the half way point of the body; so long as it does not penetrate the far end, it must take out the metal which will eventually be met by the skew hole from the overflow boss. By doing so, it will help prevent that drill from wandering.

The final hole to be drilled in the body requires the latter to be positioned with the overflow boss hole pointing upright and the body at 25deg. to the horizontal. Pick up the original vestige of a hole in the middle of the spot face and enlarge it initially with a slot-drill, so as to prevent the $\frac{5}{32}$ in. drill from wandering. This operation must be completed with care, since you will be breaking through into the main bore at a rakish angle. You should have met the cross hole mid on during that operation.

Lastly align the body with the Valve Chamber pointing upwards and rotate the assembly so that a slot-drill will run into the centre of the cross-hole. Mill the slot to the same depth as the Valve Chamber, so as to complete the path for the spilled water after it leaves the ball valve during start-up.

Preparing for silver-soldering

Although the various branches are drawn integral with the body, they are machined separately, with all the threads properly formed, positioned as discussed above and the whole lot fixed together by silver soldering at one operation. On the drawing I have called for a cover plate over the overflow passage and, if you feel confident you can prepare it and silver solder it into place with the rest of the parts; otherwise leave it until later and soft solder, first gouging out a clear passage on its underside if necessary to avoid restriction of the water flow.

The Valve Chamber should be finished apart from the bore for the ball seat, which is reamed after assembly, the reamer being guided in a purpose made bush screwed into the $\frac{1}{4}$ in. tapped hole in its mouth; lack of proper constraint in such operations scuppers any chance of keeping a true reamed hole.

I am inclined to perform the whole silver-soldering operation at one setting, with the body resting on its base; if the parts are trapped in place as described, there should be no problem with them moving.

Fitting out

The body should be returned to the table, inclined at 1deg. to enable the $\frac{3}{16}$ in. bore to be reamed with a D-bit. Truth of the threads can be checked while in this position and gentle persuasion of the top part even used, should alignment have suffered during silver soldering. Most of the machined components have either been dealt with in a previous instalment, or need no explanation. The Spindle, however, should have its end turned to a very close fit within the $\frac{3}{16}$ in. reamed hole; concentrate on the end $\frac{1}{4}$ in. of the part, that portion nearer the top being relieved as deemed necessary. The valve, in the closed position, merely gets in the way of the water as it flows from the tank to the injector.

The Valve Chamber Cap provides excellent guidance for the ball, directing it onto the seat, irrespective of the angle of repose of the injector. It is drilled to a depth where the thread starts with a No.9 (5mm) drill, which ensures that the ball never gets held up within it. After fitting it within the Valve Chamber, the Cap is marked so that a section of the end proboscis can be milled out with a 4.5mm. dia. slot-drill to allow the water free passage to overflow. Getting it right in this area helps to ensure that the injector starts readily.

The Cone Tube is a delicate job, requiring a really sharp 0.040in. parting tool. I have a supply of 8 x 1mm O-rings which will easily stretch over the slightly larger outside diameter of the Tube. If stuck for supply of these, please contact me; they are not expensive! The final piece of the jigsaw is the Cone Positioner, which, after assembly, presses the cone assembly into place. To achieve this, a gasket under the base of the Body keeps the components in place; the alignment must be such that the Cone Tube points in the right direction.

The next article will commence with some comments on cone manufacture and the Standard Injector.

● *To be continued*

LBSC WEEKEND



An invitation to take part in the LBSC Memorial Bowl competition.

Among the most prolific writers about building small steam locomotives the name of Curly Lawrence will always come to the fore. Better known by his pen-name LBSC he had the gift of inspiring many a novice builder, often with little knowledge of what they were getting into, into successfully building a working live steam locomotive. This was simply achieved by following Curly's "words and music", as he used to call his descriptive articles in *Model Engineer* and other magazines.

Remarkably his designs are still popular, even 30+ years after his death in 1968.

Following his death a fund was set up to purchase a trophy, to be competed for annually, called the "LBSC Memorial Bowl". This competition, organized by the *Model Engineer*, was for many years a feature of the Model Engineer Exhibition but in later years the event was moved out into the open with a different club or society hosting each year.

This year, Bedford MES have agreed to hold the event on its Winterfields Railway at Haynes, some six miles south of Bedford on top of a hill, with some wonderful views over the surrounding Bedfordshire countryside.

Many model engineers have the odd LBSC designed, or derived, locomotive among their collection and for this year, as Bedford has ample facilities for a extended event that will cover two days in order to offer enthusiasts a chance to come along and to run or exhibit their engines, finished or part built, just for the fun of it. You could even enter them into the competition if you are so inclined.

The LBSC Rally Weekend, which will include the main competition, will take place over the weekend of September 24-25.

Saturday will be a free for all running day on the track for those who wish to do so. Bedford will have marquees erected on site, one devoted to the needs of the inner man and a social chat area, the other with a display of LBSC locomotives, complete or part built. If anyone still has them it would be nice to have some of the tooling described by the great man as part of the display.

Sunday will incorporate periods of free running at times when the track is not in use by the Judges, and of course the other facilities will still be in place.

The track

Bedford's elevated track is around 750ft in length, catering for 2½, 3½ and 5in. gauges, and is mostly profiled aluminium rail. The minimum radius is 40ft.

A sketch shows widths and ground clearances required for driving cars. The club uses 12v batteries for steam blowers, and suggest crocodile clips on the blower leads would make life easier for those expecting to run.

Coal, soaked wood, etc will be on hand for use by all but you may prefer your own. Water is provided from rainwater butts as the local tap water is quite hard. It is suggested that you bring your own driving car as there is a limited stock of unbraked passenger cars available.

Please remember that if you wish to run you will need to bring your boiler test certificate and evidence of insurance cover.

If you fancy entering the fairly informal competition you will find details of how to do that and what it entails elsewhere.

For those entering the competition we would recommend that you bring the coal which you know performs

well on your locomotive. It is not an efficiency trial, but the judges do like to see your engine performing as well as possible.

The main operation area is around 1000ft from the elevated track so there will be running a shuttle service on the ground level track of our Summerfield Railway to ease the long, though pleasant, walk from the car park, and toilets, up to the top end.

We have space for caravans and camping at the bottom end, with electric hook-up if needed. Space is limited, hence prior application is essential.

All catering will be at the elevated track site and our catering team has promised to lay on bacon rolls at breakfast time, and a selection of ploughman's lunches each day, along with the usual teas, coffees and cakes.

Some trade stands have been invited

There are several reasonable hotels and guest houses in the area, most are only few minutes drive away from the track, and nearby Shefford boasts a good selection of takeaway food for those who may wish to enjoy such on either evening.

Entries are now being accepted for the rally and the competition.

In the first instance, Social Secretary Ted Jolliffe is handling all queries.

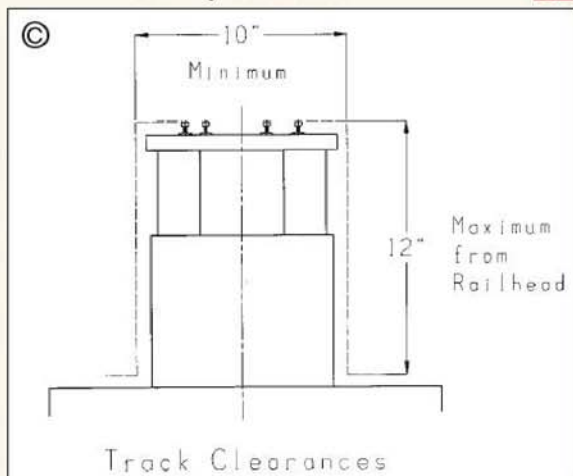
He can be reached on 01234 327791, by Fax on the same number, or by snail mail at 150 Highbury Grove, Clapham, Beds, MK41 6DU.

Ted will also take care of bookings for caravanning and camping.

By the time you read this the Bedford website should be up and running on www.bedfordmes.org.uk

This will be a restricted event in that the general public will neither be admitted nor carried, it is aimed at giving smaller gauge enthusiasts a weekend for chatting, running and learning from someone else's experiences.

We hope to see a good number of LBSC designs over the weekend, accompanied of course by their owners.



Jan Osborne's 7 1/4 in. gauge 'Lady Val' at the station. 7 1/4 in. track

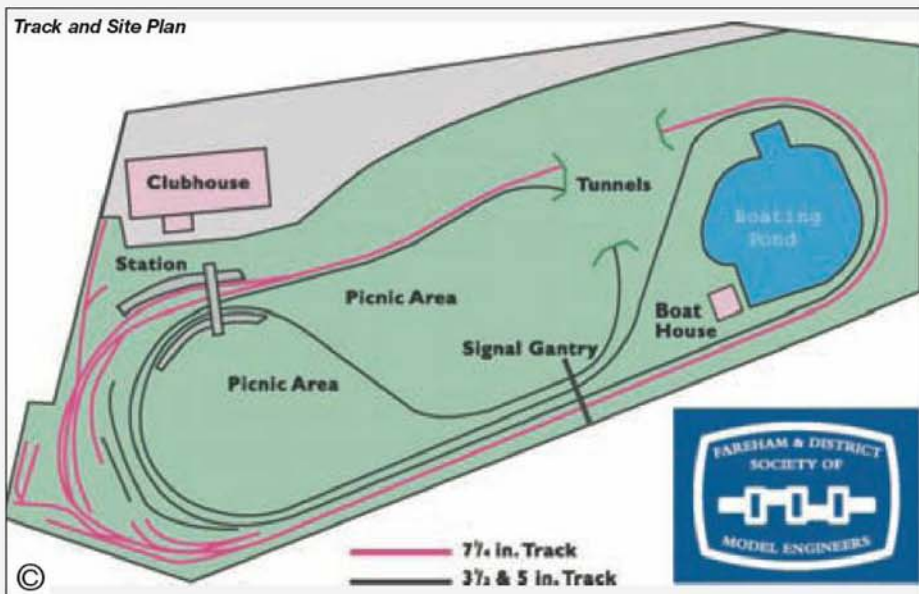


SEQLEC 2005

Ray Hillman driving his 'Dolphur' Hunslet 2-8-4T on the parallel 5 in. gauge track



Track and Site Plan



This year the annual 7 1/4 in. Gauge Efficiency Competition (SEQLEC) is being hosted by the Fareham & District Society of Model Engineers at their track at 'The Railway Field', Segensworth Road East, Titchfield near Fareham in Hampshire, on September 11. The society extends a warm welcome to all competitors, supporters and spectators to this highly enjoyable event.

Those who have attended the event in previous years will know that the 'social side' is as important as competing and we all look forward to seeing 'old faces' and meeting new friends, and this is especially the case this year as Fareham had the pleasure of hosting SEQLEC a few years ago.

The event will follow the format of previous years, and we are once again indebted to Neal Harrison and Sutton Coldfield MES for their generous support with the all-important loan of the dynamometer car.

There are two tracks at Fareham, an elevated dual 3 1/2 and 5 inch gauge track 1,565 feet in length and a 7 1/4 inch gauge track, in the shape of an irregular elongated oval, with a running length of 935ft which will of course be used for the competition. The 7 1/4 inch gauge track has a maximum gradient of 1 in 71, is equipped with steel rail and has a minimum radius of 51 feet. The Tracks are situated within the club's private grounds incorporating its large clubhouse, with toilet facilities, including those for the disabled. During the event the clubhouse will be the catering centre from which hot and cold food will be available on the day.

For competitors, the track presents quite a challenge. Leaving the station area, the track runs down a brief 1 in 114 descent before starting to climb adjacent to the engine shed and steaming bays. The climb is initially at 1 in 357 before stiffening considerably to 1 in 71 up to the signal gantry. From there, past the boat house and on to the boating pond the gradient eases to 1 in 176. At last the summit is reached and the line descends at 1 in 124 to the tunnel, before dipping briefly at 1 in 65, and reaching the 1 in 135 back to the station.

The track is attractively landscaped, with many mature trees within and bordering the site and, weather permitting, seating and tables for picnicking and watching the event in comfort will be laid out. There will also be a small exhibition of member's models in the clubhouse. It is hoped that the 5 in. gauge track will also be in passenger operation on the day offering a 'different view' of the proceedings.

More details of the event, maps of the location and rules, together with entry forms can be obtained from the Fareham club by contacting Mike Machin preferably by e-mail, mike@freelancedesign.co.uk or phone 01489 860113, or Pete Reynolds on 023 9226 8351.

A special thanks to Ted Wally of the Fareham Society for his meticulous records of the track profile and gradients.



LETTERS TO A GRANDSON

M. J. H. Ellis

continues his description of the origin of length standards.

● *Number LXXIX continued from*

page 144

(M.E. 4253, 5 August 2005)

Dear Adrian, I am in no doubt as to what I am going to write about today; it will be a continuation of the story of engineering metrology. We got as far as King Edward I and his 'Iron Ulna' in my last letter, and it so happened that yesterday evening I watched a television programme about this belligerent monarch and his merciless efforts to conquer Scotland. It was with good reason that he was called 'The hammer of the Scots'. As far as I could see, they had done him no harm, he was just covetous and unprincipled. Incidentally, it was mentioned that he was 6ft. 2in. tall, well above the average height in those days, which was several inches less than it is today.

The next date to note is 1496, when Henry VII was on the throne. An octagonal brass bar was made, and in the following year Edward I's standard was confirmed. This bar is stated to be in the custody of the Science Museum. It is an 'end' standard; that is to say, the standard yard was the distance between its end faces, rather than that separating two finely scribed transverse lines. It compares very closely with King Edward's standard, being actually 0.037in. short of the present standard. The bar still exists.

We now move on nearly a century to 1588, a year renowned in English history by the utter defeat of the Spanish Armada sent by King Philip II to invade England. The country was now ruled by Queen Elizabeth I, and her grandfather's standard was superseded by another brass bar, also of the 'end' type, but rectangular in cross-section. The change in length was minimal, as the length of the new bar, which has also been preserved, was 0.01in. less than the present standard. The difference between the two standards was thus $0.037 - 0.01 = 0.027$ in., and it makes me wonder why the change was made at all. Indeed, my supposition is that in fact the new bar was meant to be of the same length as the old, and the difference was incidental rather than intentional. If you think about it, the same thing could also have applied to King Henry's bar and the 'Iron Ulna' which it replaced. The standard promulgated by Queen Elizabeth (often referred to romantically as 'Good Queen Bess') served the country for longer than any of its predecessors; but not for as long as the name bestowed in her honour on one of: the new American colonies, 'Virginia'.

The next change, in fact, did not take place until the reign of George IV. It is hardly likely that it was the king who instigated the establishment of a new standard in 1824, as the only reason for him to be remembered at all is his dissolute life-style when he was Prince of Wales. It seems more likely to have been called for as a result of the improvement in engineering precision brought about by such men as Henry

Maudslay, who, in 1824, would have been 53 and at the height of his career. This sounds plausible enough, but the fact cannot be ignored, that the actual standard bar adopted had been made over 60 years previously, by a gentleman named Bird in 1760. I have yet to discover who he was, and the circumstances which led him to produce a new standard bar; but I can tell you that it was of a type different from the preceding ones. Instead of being of the 'end' type, the bar was longer than a yard by a matter of a couple of inches or so. Near the extremities, two gold plugs were inserted, flush with the surface of the bar, and the standard yard was legally defined as the distance between two fine punch marks, one in each of the plugs. This was apparently done with the intention in mind of using a microscope to copy the standard length onto, subsidiary standards.

You will see that so far, the standard yard had really been rather arbitrary, as it had all been based on nothing more precise than the length of three grains of barley placed end to end. Now, however, a fresh line of thought appeared, which sought to found the standard of length on something more absolute and permanent. As my account develops, you will see how this objective was progressively achieved. The first step towards doing so was made in the statute which promulgated the new standard. It laid down that if the standard ever needed to be replicated, it should use the length of a pendulum with a half-period of one second, swinging in a vacuum in the latitude of London. This would be regarded as 39.1393 inches. No doubt this definition was a step in the right direction, but one can scarcely consider it to be ideal. Astronomical observations would no doubt have enabled the second to be determined with an adequately high degree of exactitude, but what about the other quantities involved?

In the equation, $t = 2\pi\sqrt{l/g}$, which represents the time of oscillation of a pendulum, π is not going to change, (or else the people who worked out its value as 3.14159 26535 89793 23846 26433... and so on, to a million places of decimals wasted a lot of time and paper), and whatever rumblings may go on within the bowels of the earth, the gravitational constant 'g' doesn't seem

to have, varied very much, or the astronomers' clocks would have shown it up.

This leaves 'l', the effective length of the pendulum, and bearing in mind that the bob would have to be of substantial size, and that the weight of the pendulum-rod could scarcely be neglected, it seems to me that it would be very difficult to work to an accuracy of $1/10$ th. of a thou. However, it was a start; I would even say, a good try. Incidentally, with π evaluated to a million and one digits it would never surprise me if some mystic discovered that it enciphers the secret of the universe (whatever that might mean). At least, it would be better than trying to find it in the dimensions of the Pyramids! Actually, as we have no idea what the decimal digits will be, it seems reasonable to expect a random distribution. Yet of the 25 digits which I have quoted, while every one from 1 to 9 appears at least once, zero, which is equally likely does not occur at all. Odd; I make the odds 12.93 to 1 against it happening by chance.

I have no information as to how this standard compared with the present standard yard, and it is too late to do anything about it now, since the 1824 standard was destroyed when the Houses of Parliament were burnt down in 1834.

In 1838, soon after the accession of Queen Victoria in 1837, a commission was established to consider how best to replace it. It seems that two of its members came to the fore, Francis Baily, and the Rev. Richard Sheepshanks. Both gentlemen were astronomers, and Baily's name is remembered by the 'beads' named after him, which can be seen at the edge of the sun during an eclipse. In 1825, he retired from business as a stockbroker, and devoted his time to astronomy. He did a lot of work on pendulums, and because of his experience in this field he was asked to lead the investigation. He began work in 1843, but unhappily did no more than specify the composition of the bronze from which the new bar should be made before he died in 1844.

Fortunately, however, Sheepshanks was there to take over his work. He was a first-class honours Cambridge graduate, and qualified in both law and divinity. However, he had no need to practice in either profession, being well enough off to be able to devote himself to scientific work. For 11 years, he worked on the standard of length in the basement of Somerset House, a large mansion belonging to the Crown, and dating from 1776, situated between The Strand and the River Thames in London. As I concluded earlier, Sheepshanks found that it was not possible to derive the standard from the length of a pendulum, and so, once again, the new standard simply became a mishmash of the old ones.

At this point it is convenient to break off, and relate the following story. I needed some stainless steel clips to repair the electric cooker, and ruined a nearly-new HSS hack-saw blade in cutting the first two from sheet metal. The teeth were blunted, not stripped; clearly due to the old enemy, work-hardening. Replacing the blade, I took care to lift the new one out of the cut on the return stroke. Eureka! no more trouble. Rubbing, not cutting, had been the cause. One can still learn, even at 84!

Your affectionate Grandpa.

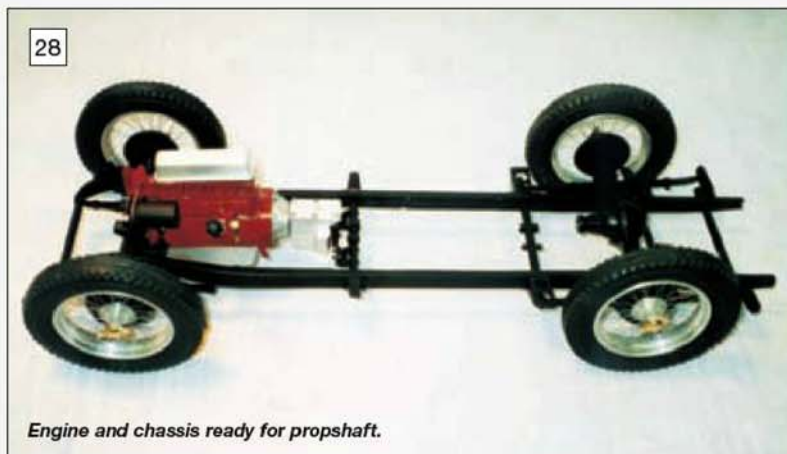
● *To be continued.*



The late J. J. Constable - see M.E. 4253, 5 August 2005. Photo: the author.



Engine mounted.



Engine and chassis ready for propshaft.

Stephen Atkinson completes the chassis of his model with the propshaft and exhaust before moving on to the bodywork.
●Part IV continued from page 155
(M.E. 4253, 5 August 2005)

With the engine and gearbox mounted in the chassis there is only the prop shaft remaining to really complete the chassis and the 'works' (photos 27 and 28). This shaft is of $\frac{5}{16}$ in. diameter bright mild steel $4\frac{3}{4}$ in. long. The connections to both the rear axle and the gearbox are via universal joints. These are quite easily fabricated from mild steel as shown in my drawing (fig 21). Drill the rear axle and the gearbox rear end and then connect by means of small pegs turned on the outer parts of the universal joints. There is no need to glue or fix these in anyway as the whole assembly will link itself together.

The exhaust system is now made up in sections to fit. The exhaust manifold on the engine is drilled to take the pipe, this is all $\frac{3}{16}$ in. diameter. I used stainless steel for the whole system, not an original material but one that is largely employed as a new replacement part nowadays. The silencer near the centre of the car is $\frac{1}{2}$ in. dia. and 3in. long. Turn a small recess in each end of this part about $\frac{1}{16}$ in. deep, leaving a very thin edge to simulate the sheet material from which silencers are made in full size. The front pipe joins the silencer in its centre whereas at the rear, the pipe is attached at the very lower edge of the silencer. The rear pipe has two bends so as to move the tail end alongside the chassis member where it is clipped into position. This is simply a strip of very thin metal bent around the pipe, the ends closed together and then bolted to

the side of the chassis with a 12BA nut and bolt. Leave the tail pipe protruding past the rear of the chassis leg by $\frac{1}{4}$ inch. Just the fixing to the manifold at the engine and this clip at the rear is quite adequate to support the whole system.

Bodywork

I used 20swg brass sheet for everything on the body apart from the mudguards, both front and back. These were made in the same thickness but of copper instead of brass. This material is more easily beaten into shape (figs 19 and 20)

Start with the side pieces as they are comparatively easy to make (photos 29 and 30). You will need to first cut out a former from MDF. This is medium density fibreboard, an excellent sheet material for all sorts of work. It can be obtained in many thicknesses but for this job choose 12 millimetres. With a coping saw cut out the shape where the door is to fit and continue back towards the rear corner of the bodyside. Take this shape from your full size drawing that you have had photocopied to actual 1:8 scale. Carbon paper between the drawing and the MDF makes a good quick job of copying the shape you require. Now radius off the outside top corners. One piece of 12mm MDF will act for both sides if you radius off both top corners.

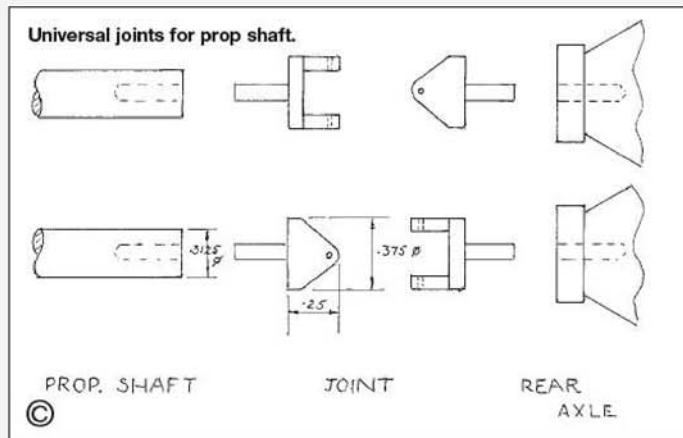
Cut a piece of brass sheet to shape allowing sufficient extra to produce the $\frac{3}{16}$ in. top edge that is required. Now anneal the sheets and with them clamped to the template beat over the top edges using a wooden mallet. A bossing mallet with its domed ends is the most useful for getting around the required shape. You may have to reheat and anneal the sides more than once. The top edge which is at the front of the door opening must also have an edge turned inwards. This makes the visible joint which is formed between the piece you are currently working on and the curved piece with its two humps which make the surround to the

dashboard. For want of a better word let us call this the dashboard cowl. While talking of this cowl it may just as well be produced. With MDF make the required shape along one edge of a piece and leave it wide enough to go into your vice. The cowl can then be hammered into shape over the MDF and when satisfied with the shape, bend in the two edges at right angles. Between these and the top edges of the sides you should have a well fitting makings of a joint (photo 31). You could in fact silver solder the two joints, one at each side and the body will begin to take shape.

Next make the rear panel which is simply vertical with the two ends curved in making nicely radiused corners. The top edge along the back will be bent inwards like the sides but around the corner it would be more difficult to carry on the inward bend. I found it much easier to silver solder pieces of brass cut to shape on the top edges when everything was also fixed together.

My photographs should show quite clearly what I have been describing. The infill at the rear gives an internal platform for luggage and its rear vertical bend has a slot cut out for the prop shaft to pass through (photo 32). The very bottom edge as can be seen, is again bent to be horizontal and this gives support to the floor boards eventually.

While working at the rear end of the car you might just as well make the rear mudguards and solder them into position (photo 33). At this stage it is as well to make yourself a good set of



MDF formers for body sides.

Figure 19
Front elevation and plan views

©

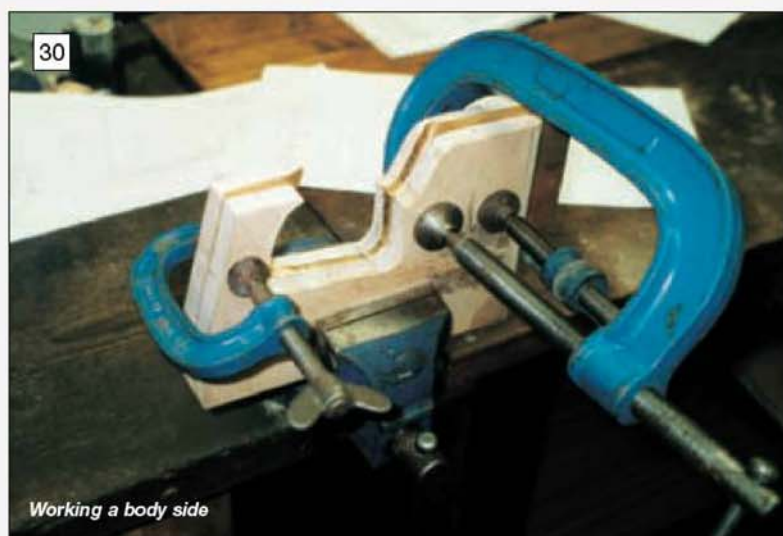
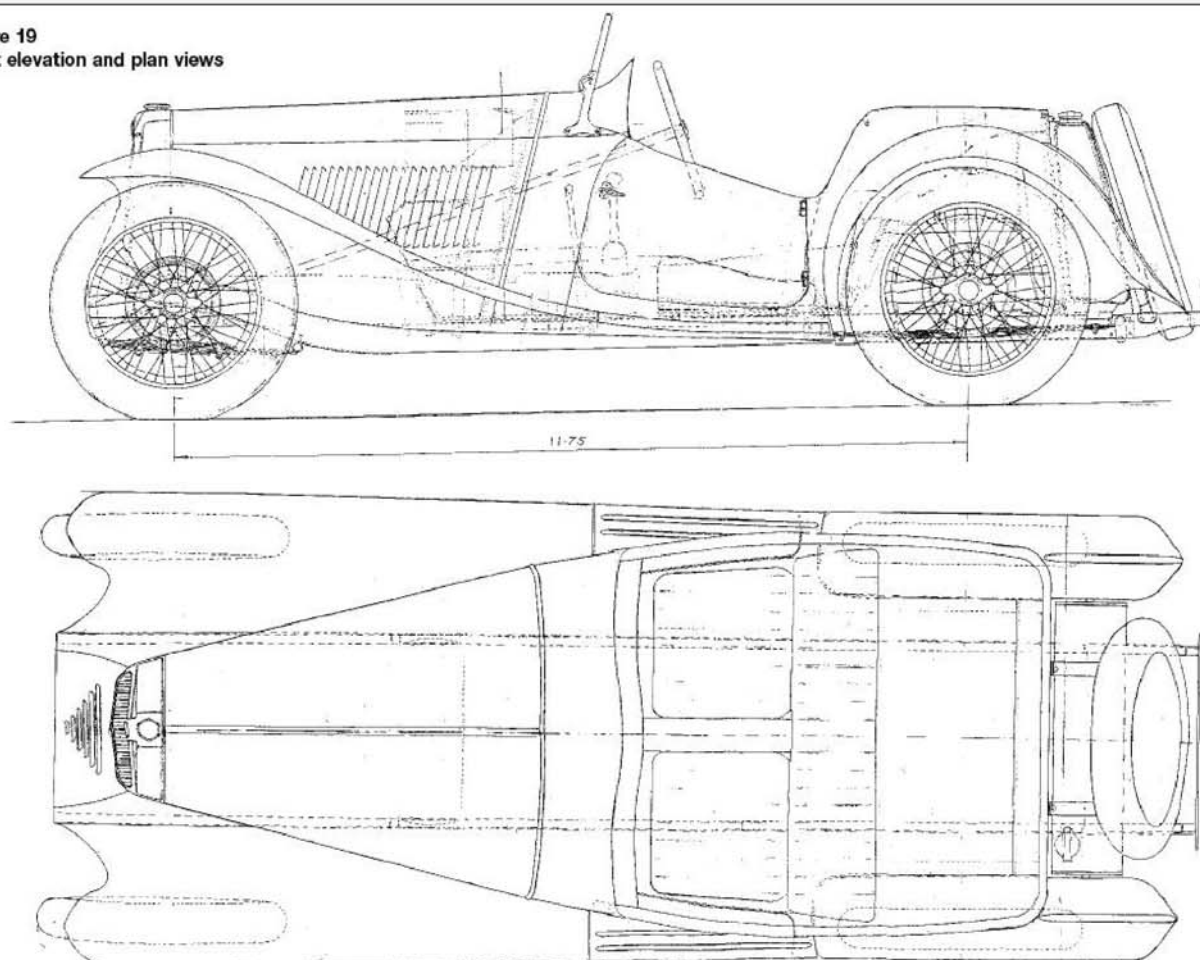
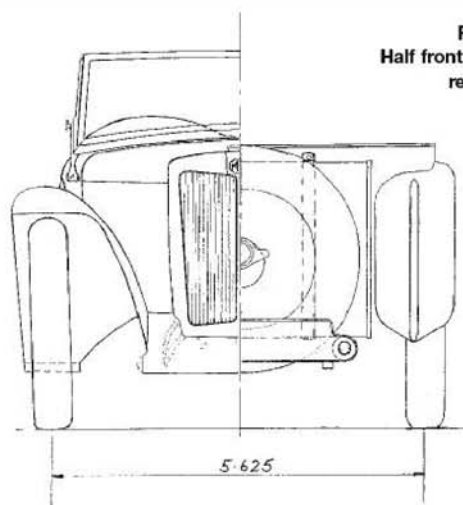


Figure 20
Half front and half rear views





33 Wooden formers on a baseboard for working mudguards.

formers over which the front and rear wings are beaten. Start with a baseboard large enough to cover the length and make it the correct width.

Now shape blocks of wood for each of the four mudguards and drill them to accept strong dowels of $\frac{3}{8}$ in. hardwood. If these are positioned as per the scale of your car on the baseboard it will make a very useful reference point. Do not, however, glue these pieces together but rather have them separate so that the guards can be beaten over each (photo 34). By using copper for all these mudguards the beating to shape is not really too difficult. Do not be too concerned about the surface finish for filler will produce a good finish when all is assembled.

You will see from the pictorial drawing of all the body panels that there is an inner rear mudguard as well as the outer one which is more evident. These drawings which are reproduced by kind permission of Moss UK are, of course, showing the way in which the full size car is assembled. You will notice that I made some modifications. I made the rear panel have curved ends unlike the full size and I made the inner shelf piece at the back (the luggage provision) from metal in order to give rigidity. You will notice from the drawings of body timbers that this shelf is produced in wood with comprehensive framework. This also applies to the rear panel which I simplified and made in brass.

The front wings or guards actually produce the structure of the car at the front (photo 35). They are linked together by the curved section shown



34 Front mudguards ready for soldering to body.



35 The front piece partly made.

Along the lower edges of the front wings there are strips which have to be bent to shape and soldered on. These help to tie parts together and form a platform for the bottom edges of the bonnet sides.

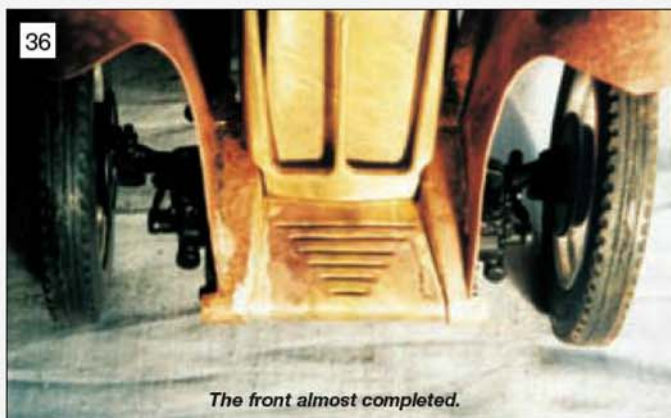
What now remains for the bodywork is the projection behind the engine compartment and the bulkhead and footplate. The battery case and tool box are made up and soldered on top of the projection. Do not forget to drill holes in the lower side of these boxes as you can not solder together a completely sealed compartment. There are three grooves on each side of this projecting section which are obviously there to strengthen the assembly. Carve this shape into a piece of hardwood and dress the metal to fit with the end of a fairly sharp ended hammer pein.

In order that the bonnet has a small platform upon which it can rest shape a strip of brass to fit around the bulkhead and solder this to the bulkhead approximately $\frac{1}{16}$ in. from the edge.

The front and rear mudguards on each side are now linked together by the running boards (photos 37 and 38). These have their outer edges bent downwards to add rigidity and have a beading at the joints, front and back. This beading also fits around the joint between the rear guards and the bodywork. Now that all the rest of the body construction

has been silver-soldered it seems appropriate to use thick copper wire for the beading and soft solder it all the way along.

●To be continued.



36 The front almost completed.

in one of my photographs (photo 36). This has louvres punched through it which I will deal with when I come to describing the bonnet as this also has louvres along the side panels.



37 Front view of completed bodywork.



38 Rear view of completed bodywork.

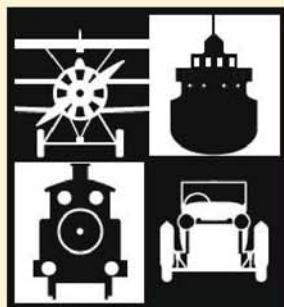




THE 75TH EXHIBITION



COMING SOON...



THE MODEL ENGINEER EXHIBITION

Please return completed form to:
Model Engineer Competition, The Leys,
Church St., Twyford, Bucks. MK18 4EU

ENTRY FORM - COMPETITION & LOAN MODELS

ENTRY NO.

OFFICE USE ONLY

CLASS	ENTRY NO.

PERSONAL DETAILS (Please print)

Surname Forename(s) Age

Address

Post Code Home Tel: Daytime Tel:

Model Club or Association

Have you entered before? (Y/N)

Do you purchase or subscribe to a Highbury House Communications plc magazine? (Y/N)

How many years have you been a modeller?

Mail Order Protection - please tick this box if you would prefer not to receive mail from other companies which may be of interest to you ☐

MODEL DETAILS - PLEASE TICK BOX IF MODEL IS FOR LOAN ☐

Entry Class (competition entries only)

Model Title (to be used for catalogue and display card)

Model Description

Model Scale Length Width Height Weight

Type of construction

Parts not made by you and commercial items

Have you supplied a photograph? (Y/N)

Are you supplying Judges Notes? (Y/N)

Value of model (Highbury House Communications plc will not insure the model unless a value is entered) £

Name and address of local newspaper

.....

NB Please make a copy of this form and any photographs enclosed for your own reference. Please note that Highbury House Communications plc will not accept liability for any loss of documents or photographs submitted with this form

TO HELP YOU GET THE BEST FROM THE MODEL ENGINEER EXHIBITION

These notes are written purely for guidance. Full information is contained in the Competitors' Information booklet which is sent to every entrant as part of the information package. If you have an item and are unsure as to the Class into which it should be entered, leave that section blank and we will take care of it. The Judges have the right to move any competition exhibit into another class if they feel that by doing so its chances of gaining higher marks or a more appropriate award are improved.

If the item is offered as a Loan exhibit please indicate this by writing Loan on the form in the box identifying the Class. Loan models are not judged but carry all other privileges associated with competition entries.

Part built models are particularly welcome in the Loan Section; visitors like to see work in progress, and entry does not preclude the item being entered in competition when completed.

The classes listed below are those associated with mainstream model engineering.

Club exhibits

Where a club is exhibiting, each model should be entered on a separate entry form and clearly identified as a club exhibit by entering Loan/Club in the class section box. This ensures that we have a full record of all models on display during the show and facilitates matters of administration and insurance.

Additional forms

If you do not wish to deface your copy of the magazine we are happy to receive photocopies of the entry form, one for each model. We will be pleased to send out extra forms if required, so if you know of a modeller who is not a reader of one of our magazines but who you think may wish to participate, please advise them to contact our Exhibitions Office, or simply photocopy the entry form for them.

The success of the show depends largely on the number of models on display. Your work could well be the stimulus which inspires someone else to start in the hobby. There can be no doubt that this event is our showcase on the world of modelling in all its aspects. Every modelling discipline needs more and more participants, and it is by displaying not only the crème-de-la-crème, but also examples of work of a more achievable standard, that people are encouraged to join into the wonderful world of modelling, in whatever aspect.

We look forward to seeing a sample of your work at the show!

COMPETITION CLASSES

Engineering Section

- A1 Hot air engines.
- A2 General engineering models (including stationary and marine engines).
- A3 Internal combustion engines.
- A4 Mechanical propelled road vehicles (including tractors).
- A5 Tools and workshop appliances.
- A6 Horological, scientific and optical apparatus.
- A7 General engineering exhibits — not covered by the above

Railway Section

- B1 Working steam locomotives 1in scale and over.
- B2 Working steam locomotives under 1in scale.
- B3 Locomotives of any scale, experimental, freelance or based on any published design and not necessarily replicas of full size prototypes, intended for track duties.
- B4 Scratchbuilt model locomotives of any scale, not covered by classes B1, B2, B3, including working models of non-steam, electrically or clockwork powered

steam prototypes.

- B5 Scratchbuilt model locomotives gauge 1 (10mm scale) and under.
- B6 Kitbuilt model locomotives gauge 1 (10mm scale) and under.
- B7 Scratchbuilt rolling stock, gauge 1 (10mm scale) and under.
- B8 Kitbuilt rolling stock, gauge 1 (10mm scale) and under.
- B9 Passenger or goods rolling stock, above 1in scale.
- B10 Passenger or goods rolling stock, under 1in scale.
- B11 Railway buildings and lineside accessories to any recognised model railway scale.
- B12 Tramway vehicles.

Marine Models

- C1 Working scale models of powered vessels (from any period). Scale 1:1 to 1:48
- C2 Working scale models of powered vessels (from any period). Scale 1:49 to 1:384
- C3 Non-working scale models (from any period). Scale 1:1 to 1:48
- C4 Non-working scale models (from any period). Scale 1:49 to 1:384
- C5 Sailing ships and oared vessels of any period - working.
- C6 Sailing ships and oared vessels of any period - non-working.
- C7 Non-scale powered functional models including hydroplanes.
- C8 Miniatures. Length of hull not to exceed 15in for 1:32 scale; 12in for 1:25 scale; 10in for 1:16 scale; 9in for 1:8 scale. No limit for smaller scales.
- C9 For any model boat built from a commercial kit. Before acceptance in this class the kit must have been readily available for at least 3 months prior to the opening date of the exhibition and at least 20 kits must have been sold either by mail order or through the retail trade.

Scale Aircraft Section

- D1 Scale radio control flying models
- D2 Scale flying control-line and free flight
- D3 Scale non-flying models, including kit and scratch-built
- D4 Scale flying radio controlled helicopters

Model Horse Drawn Vehicle Section

- G1 Carriages & other sprung vehicles. (Omnibuses, trade vans etc.) Wagons, carts and farm implements. Caravans.

Junior Section

- J1 For any type of model, mechanical or engineering work, by an under 14 year old.
- J2 For any type of model, mechanical or engineering work, by an under 16 year old.
- J3 For any type of model, mechanical or engineering work, by an under 18 year old.

All entries will be judged for standard of craftsmanship, regardless of the modelling discipline, i.e. a boat will not be competing against a military figure. Providing a model attains sufficient marks it will be awarded a gold, silver or bronze medals

Model Vehicle Section

- K1 Non-working cars, including small commercial vehicles (e.g. Ford Transit) all scales down to 1/42.
- K2 Non-working trucks, articulated tractor and trailer units, plus other large commercial vehicles based on truck-type chassis, all scales down to 1/42.
- K3 Non-working motor bikes, including push bikes, all scales down to 1/42.
- K4 Non-working emergency vehicles, fire, police and ambulance, all scales down to 1/42.
- K5 Non-working vehicles including small commercial vehicles (e.g. Ford Transit). Scale from 1/43 or smaller.
- K6 Any available body shells including Concours, in any scale or material, to be judged on appearance only.
- K7 Functional model cars/vehicles which must be able to move under its own power of any type. Can be either free-running, tethered radio controlled or slot car, but must represent a reasonable full size replica

DUKE OF EDINBURGH CHALLENGE TROPHY

Rules and Particulars

1. The Duke of Edinburgh Challenge Trophy is awarded to the winner of the Championship Award at the Model Engineer Exhibition.
2. The trophy remains at all times the property of Highbury House Communications PLC.
3. The name of the winner and the date of the year in which the award is made will be engraved on the trophy, which may remain, at the discretion of Highbury House Communications PLC in his/her possession until required for renovation and display at the following Model Engineer Exhibition.
4. Any piece of model engineering work will be eligible for this Championship Award after it has been awarded, at The Model Engineer Exhibition, a Gold or Silver medal by Highbury House Communications PLC.
5. No model may be entered more than once.
6. Entry shall be free. Competitors must state on the entry form:
 - (a) That exhibits are their own bona-fide work.
 - (b) Any parts or kits that were purchased or were not the outcome of their own work.
 - (c) That the model has not been structurally altered since winning the qualifying award.
7. Highbury House Communications PLC may at their sole discretion vary the conditions of entry without notice.

COMPETITION RULES

1. Each entry shall be made separately on the official form and every question must be answered.

2. Competition Application Forms must be received by the stated closing date.
- LATE ENTRIES WILL ONLY BE ACCEPTED AT THE DISCRETION OF THE ORGANISERS.
3. Competitors must state on their form the following:
 - (a) Insured value of their model.
 - (b) The exhibit is their own work and property.
 - (c) Parts or kits purchased.
 - (d) Parts not the outcome of their own work.
 - (e) The origin of the design, in the case of a model that has been made by more than one person.

NOTE: Entry in the competition can only be made by one of the parties and only their work will be eligible for judging.

4. Models will be insured for the period during which they are in the custody of Highbury House Communications PLC
5. A junior shall mean a person under 18 years of age on December 31st in the year of entry.
6. Past Gold and Silver medal award winners at any of the exhibitions promoted by Highbury House Communications PLC are eligible to re-enter their model for the 'Duke of Edinburgh Challenge Trophy.'

Past winners at any of the exhibitions promoted by Highbury House Communications PLC will not be eligible for re-entry into the competition unless it has been substantially altered in any way.

7. Highbury House Communications PLC reserve the right to:
 - (a) Transfer an entry to a more appropriate class.
 - (b) Describe and photograph any models entered for competition or display and to make use of any such photographs or descriptions in any way they may think fit.
 - (c) Refuse any entry or model on arrival at the exhibition and shall not be required to furnish a reason for doing so.

8. Entry into the competition sections is not permitted by:
 - (a) Professional model makers.
 - (b) Anyone who has a financial interest in the direct supply of materials and designs to the public.

NOTE: If unsure, please contact the Competition organisers, prior to the show.

9. The judges' decision is final. All awards are at the discretion of the judges and no correspondence regarding the awards will be entered into.
10. Exhibitors must present their model receipt for all models collected at the end of the exhibition and sign as retrieved.
11. The signed release for each model must be presented to security staff when leaving the exhibition complex with display model(s) after the close of the exhibition.

IMPORTANT NOTE PLEASE MAKE COPIES, INCLUDING PHOTOGRAPHS, OF ALL INFORMATION RELATING TO YOUR MODEL, AS Highbury House Communications PLC WILL NOT ACCEPT LIABILITY FOR ANY LOSS.

CLOSING DATE 12TH DECEMBER 2005



The clock, as supplied by the makers, is a functioning unit but requires finishing.

Ian Beilby

explains how to get the best from these comprehensive kits.

●Part I.

Nowadays we live in a world whereby nearly everything we require in our daily lives can be obtained ready made and packaged ready for instant use, from ready made meals to ready made life styles. Life for the consumer has never been better. All you need is the money to buy the items and they are yours for the asking.

Even the practicality of buying and obtaining items has been revolutionised with the advent of the Internet and home shopping. Everything from a can of beans to a Porsche motor car can be viewed, ordered, paid for, and delivered, all on line. You do not even have to leave the comfort of your armchair to buy the goods.

Of course this lifestyle of convenience and hassle-free purchasing goes hand in hand with the busy life styles that the majority of us now lead. A lot of the ease with which we can now buy items and services must have enhanced our lives for the better, and I think most people would agree that our general well-being has improved over the years.

I am sure we can all think of examples whereby modern technology and the availability of products at an affordable price have radically altered our own life styles. For example, twenty years ago, without the aid of a computer and digital photography, I could not have written and presented this article with such ease. The technology was not readily available, and certainly not at a price affordable to the average man.

Unfortunately, as ever, there is a down side to this ready-made affordable lifestyle. These advances are not just limited to modern technology, and it is when we perceive those traditional skills and cultural interests being lost in the process, we start to feel a little uneasy.

Some would argue that a lot of people are losing their creative ability, and that we are becoming lazy and complacent. Girls cannot cook

or sew, boys cannot even mend a puncture, children no longer learn to play musical instruments, in short we no longer seek to do anything practical for ourselves. Generalisations I agree, but in some cases, unfortunately, very true.

Having painted a rather gloomy picture of our 21st century life styles, it is only fair to point out that not everyone follows this trend, and I can think of several examples of people doing their own thing in order to maintain their creative individuality. Not everyone is happy to simply 'unpack the box' or 'plug and play' their latest acquisition, and it is refreshing to see many individuals seeking out particular hobbies and practical pastimes perhaps in order to compensate for a lack of creative-achievement in their ordinary lives.

The ability to succeed in any chosen pursuit depends largely on your own personal sense of priorities, your ability, and most importantly on your determination. I think most model engineers would certainly fall into the category of someone that is determined, and prepared to do something for themselves.

Of course model engineers, who by their nature are very practical people, know only too well it is one thing to have aspirations and determination, and another to turn these ideas into reality. You cannot make a piston rod or flywheel by dreaming about it in your armchair however determined you are. At some point you have to dirty your hands and spend some time in the workshop. Again, the best of intentions and ideas will come to nothing without the necessary tools and equipment to complete the job. However, model engineers are recognised for their ingenuity, and it is surprising what can be achieved with a little thought and adaptation.

Time and money are the other vital ingredients that always enter the equation. In family life, very few can afford to be over self-indulgent in terms of both time and money, and sometimes ideals have to be sacrificed in pursuit of domestic bliss! As an amateur clockmaker/restorer (and a single man) I am very lucky. I can afford to be rather selfish in what I do with my time and money. I earn my living by other means than clockmaking, I have no production schedules to meet, my time is virtually my own, and what I spend on my hobby is my affair! However, even I have some restrictions and frequently find that I have to be prepared to accept a compromise.

Quite often I will buy-in components where the time/money factor does not make it practically viable for me to make them myself. This frees up time to concentrate on components that have to be made by me, and are unobtainable elsewhere. I am sure the model engineer often finds himself in the same position. I know there are quite a number of firms out there producing

castings, components, and kits of all types in order to ease and speed-up different model engineering projects.

To me this is a perfectly legitimate and sensible course of action. Without it many projects would never get off the drawing board, or be doomed to failure. Quite often I speak to model engineers who are very interested in the mechanics of clocks, and have often felt the desire to make a clock. However other long-term projects are taking up all their spare time, and somehow they never get round to actually making one.

To me, this is a great shame, they possess the know-how and the ability, but again, it is all down to priorities. Bearing in mind all that I have just said, amateur clockmakers and model engineers frequently ask me about the quality of some of the clock kits on the market at the present time. So, in order to give a true appraisal, I decided to have a look at one of the skeleton clocks manufactured in kit form by Classic Clock Kits. I wanted to judge both the quality and the ease of assembly of the kits with the amateur enthusiast in mind. Although I appreciate that in constructing a kit, the individual components are not made by yourself. The final clock is, however, assembled and finished by you, and you are ultimately responsible for the visual appearance of the end product.

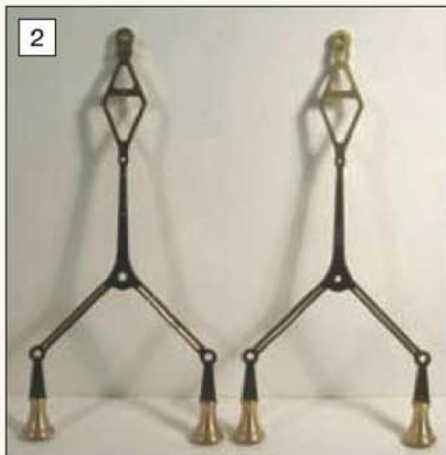
With a commercial clock the better the finish the higher the retail price, and this is another important aspect that should be borne in mind. Your labour costs you nothing, and by finishing the clock to a high standard you should end up with a clock worth far in excess of what you paid for it, or would expect to have to pay for other comparable clocks on the market.

More importantly, by constructing a clock you will fully understand every aspect and detail that has gone into the clock's assembly, and your knowledge of the clock's mechanism becomes first hand and thereby much more extensive. There are then several very good reasons why this method of clock construction should be looked at by someone who is keen on taking the first practical steps towards constructing their own clock.

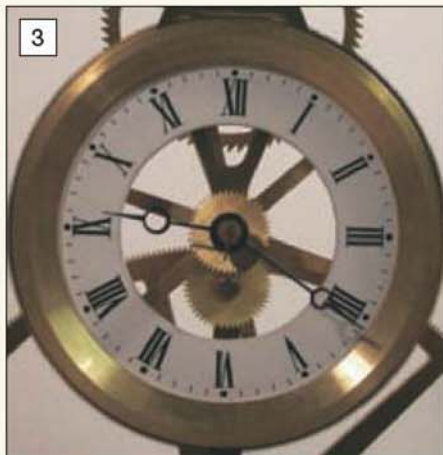
At the present time Classic Clock Kits can supply six skeleton clock kits and one carriage clock kit. In this article I have chosen to look at their French Great Wheel skeleton clock. A photograph of the clock is shown in **photo 1**. I have chosen this particular clock for two reasons: -

1: To my mind this is one of the more pleasing and unusual designs of skeleton clock, elegant and uncluttered yet perfectly at home in either a traditional or contemporary setting.

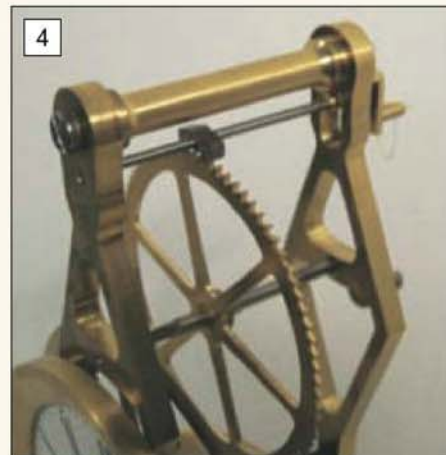
2: Owing to the large diameter of the great



The clock is built up around these elegant inverted Y-frames.



A feature of this clock is that the centre wheel is slightly larger than the dial bezel.



Located at the top of the clock are the pallets and the escape wheel.

wheel (7in.) this clock is perhaps one of the most difficult for the amateur clockmaker (myself included) to construct.

Referring back to my previous comments on the necessary equipment required in model engineering or clock construction, although I have a well equipped workshop and I have made several different clocks, I could not cut the great wheel for this clock on my lathe owing to the large diameter of the great wheel. I am sure there are many other amateur clockmakers and model engineers out there in the same position.

Before going on to discuss this particular clock in more detail, readers may be interested in some background information on Classic Clock Kits and the present owners of the company.

Classic Clock Kits (tel: 02086 685 559) was started in the late 1970s by Tony Ainslie who was an engineer from South Africa. The firm traded from Jerusalem Passage in Clerkenwell, London's traditional clockmaking area. The company traded successfully until 1982 when, owing to high production and development costs, it went into receivership. Arthur Meaton and his friend Tony Foxton (the present owners) bought the residual stock from the receivers and continued the business on a part time basis. At that time both partners still had other full time occupations. The stock consisted mainly of brass wheel blanks and other partly finished components along with some machinery and tooling.

Arthur Meaton's interest in skeleton clocks was fuelled at an early age by his father's rather amusing purchase of a quality London skeleton clock. The clock was purchased for 30 shillings (£1.50) during a 'doodle-bug' air raid in 1944, when he and the intrepid auctioneer were the only ones still left in the room!

When the new owners took over from Tony Ainslie they discontinued some of the unprofitable, slow selling kits and streamlined the manufacturing process. It was not deemed viable to continue making all the components at one location and with one work force so subcontractors are employed for gear cutting and precision drilling, etc. Most of the subcontractors originally worked in Clerkenwell and have 'inherited' and are still using the original machinery used when the firm was first founded.

The French Great Wheel skeleton clock produced by Classic Clock Kits is typical of this type of skeleton clock produced in both France and England from around 1810 onwards. Reference to either F.B. Royer-Collard or Derek Roberts' books on skeleton clocks show numerous examples.

The earliest Great Wheel skeleton clocks produced in France all employed inverted Y-frames. The clean lines of the Y-frame, which can be seen in **photo 2**, do not visually detract from the movement, as do the over-fretted frames generally found on English skeleton clocks.

Most French Great Wheel skeleton clocks employed a going barrel and very rarely a fusee. The clocks were usually made to go for eight, fourteen or thirty days. By not employing fusee work, large diameter great wheels with high wheel teeth counts were necessary to obtain the longer running durations. Some (though not all) French Great Wheel clocks were designed with four-wheel trains. The Great Wheel skeleton clock from Classic Clock Kits has a more correct three-wheel train, with a large diameter 80-tooth escape wheel. An interesting feature of the design is that the diameter of the centre wheel is a little larger than the diameter of the dial bezel, hence the teeth of the wheel appear to run around the dial (**photo 3**).

The low powered escape wheel is fitted with a tick tack escapement embracing $2\frac{1}{2}$ teeth. The pallets and escape wheel can be seen in **photo 4**. This design of escapement dictates a pendulum with a wide arc of swing, and the pendulum, in typical French style, is suspended from a silk suspension. The simple pendulum is provided with a shepherd's crook to hang from the suspension. Many early French skeleton clocks exhibited elaborate sunburst pendulum bobs, and many were fitted with Harrison Gridiron pendulums. The wheel/ pinion counts for the clock are as follows: -

Great Wheel	384
Centre Wheel	384/ 16
Escape Wheel	80/ 8

The Y-frames are milled and machine finished as opposed to being cast, and the teeth are cut on a CNC machine. All the components and frames are machined and well finished, but they are left unpolished. Skeleton clocks are always displayed under a glass dome or in a rectangular Perspex case. One of the main design factors and attractions of this type of clock is that all the wheel work and frames are visible. This presents a wonderful opportunity for both the clockmaker to exhibit his skills and talents, and for the curious owner to view the normally hidden workings of the movement.

For the clock to look its best, it is not only traditional, but also highly desirable that all the fittings, wheel work, frames, etc. are polished to a high degree and this is where you as the assembler of the kit comes into the picture.

This final crucial part of the operation has been left for you to perform, and the future visual credit (and intrinsic value) of the clock has been well and truly placed in your hands. Make no mistake, although the clock as received is already very well finished, there is still a lot to do and a lot of hard work to be carried out if the clock is to be finished to an acceptable and traditional standard.

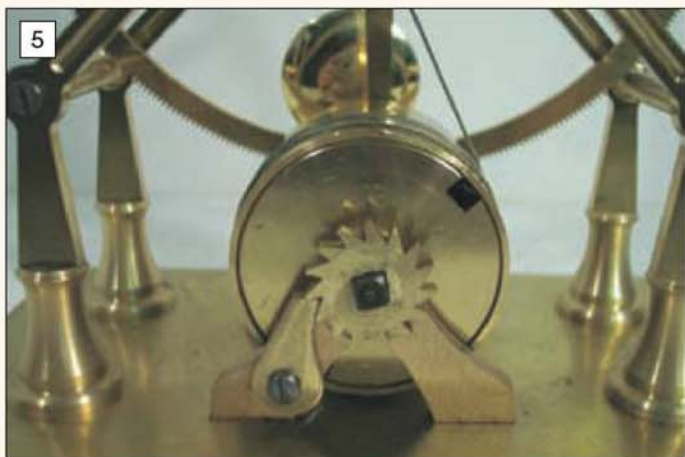
When my 'kit' arrived I was somewhat surprised to find the clock fully assembled. Initially I thought that there had been a mistake and that, for some reason, I had been sent a pre-assembled clock by error. It transpires that in the early days of Classic Clock Kits, the kits were supplied in various forms to suit the skill and needs of the individual constructor. The kits could be purchased simply as a set of castings and rough machined parts whereby the purchaser was required to do all the finish machining and assembly of the components, or fully machined and only requiring hand finishing and assembling to complete the clock. The kits are now only supplied in a finish machined state, and fully assembled.

The clocks are thoroughly tested and assembled before despatch, giving both the company and the constructor the assurance that they have purchased a clock that is guaranteed to run. There is no risk of receiving a kit with missing or faulty parts.

This proved to be the case with the clock I had purchased. After carefully unpacking the clock the pendulum was hung on the suspension and the clock started to work at once. It was even in beat! This does mean however that the clock must first be dismantled before any of the finishing work can be carried out.

To the uninitiated this in itself is a discipline worth learning. By the time the clock has been dismantled, polished, and reassembled the owner is guaranteed to have a thorough working knowledge of the clock. There is a set procedure for dismantling and assembling a clock, and this procedure must be followed if damage to the clock/ owner is to be avoided. This clock is fitted with a fusee and a very powerful mainspring, and before dismantling this or any other spring driven clock, the mainspring must be fully let down and the movement rendered inert.

This operation *must* be carried out before dismantling the clock. The spring is very powerful and contained in the mainspring barrel, which is shown in **photo 5**. You can see the taught steel line that delivers the power from the



The mainspring is located in this barrel and is very powerful. A carefully devised procedure must be followed to let the spring down properly.



The design of this clock is such that the winding square does not protrude far through the frame and ratchet wheel.

mainspring barrel to the fusee. When the mainspring has been let down this line will be slack, rendering the clock movement safe to dismantle.

In photo 5 you can see that a square on the mainspring arbor is fitted with a ratchet wheel. The ratchet wheel is kept in place with a click attached to the barrel support bracket. This click is held in place with a steel screw. The click and ratchet wheel are taking the full power of the mainspring whilst the mainspring is wound up.

I know of several clock repairers who always allow the train of fusee clocks to run-down naturally before attempting to remove all the power from the mainspring. Even when the movement is run-down, the mainspring is still set-up with a pre-load, which must be removed. However it is a bit quicker to let down the spring in this state than when the mainspring is fully wound.

In order to fully let-down the mainspring, a key or spanner must be placed on the square of the mainspring arbor, and the tension of the spring taken by the key. Only then can the click be released from the ratchet and the spring allowed to gradually unwind in stages. The key or spanner must be a good positive fit on the square of the arbor and a firm grip must be maintained at all times. The spring is very powerful and once the click is released from the ratchet teeth you must be prepared to take the power of the spring with the key.



The tool used by clockmakers to safely let down powerful clock springs. Different sized arbors can be fitted to suit different winding squares.

The steel screw holding the click in place may need releasing slightly in order to be able to release the click from the teeth of the ratchet wheel. On no account remove the click completely. The mainspring should be let down slowly and in stages of two of three teeth at a time, re-engaging the click with the ratchet teeth at each stage.

When the mainspring is fully let-down, the steel fusee line should go slack, and the click can then be safely disengaged from the ratchet wheel.

In photo 6 you can see that the square on the mainspring arbor does not protrude very far through the front frame, so it is vital that the key or spanner that is used to let down the spring must be a very good positive fit.

When letting down clock mainsprings, clockmakers use a special tool shown in photo 7. The letting down tool is provided with

interchangeable arbors to accommodate the many different sizes of winding squares found on commercial clocks. You can see the substantial fluted handle provides a positive firm grip that can be maintained whilst unwinding the spring. The letting down tool fitted to the square on the mainspring arbor of this clock can be seen in photo 8.

I am sure you will have realised that both hands are fully occupied when letting down a strong mainspring, and that at the same time the movement must be held firmly in place on the workbench. If the movement is not held securely, the spring, as it is being let down, will attempt to revolve the whole movement!

The design of a skeleton clock whereby all the wheels are exposed, and the plates are difficult to hold, makes this task a little more difficult. In order to make the job a little easier, and safer, I strongly suggest that the clock be clamped and securely fastened to the workbench before attempting to let down the mainspring.

In photo 9 you can see that I clamped the clock's base plate to a wooden board that was securely held in the machine vice. This left both hands free to safely unwind the spring.

●To be continued.



Here the letting down tool is in use. The ratchet click can be eased out of engagement and the arbor allowed to turn a few teeth at a time.



It is important that the clock is firmly clamped down for the letting down process or the movement may try to rotate around the mainspring arbor.

Classic Clock Kits can be contacted at 75 Foxley Lane, Purley, CR8 3HP; tel: 02086 685 559; website: www.classicclockkits.com

The late David Parker.



1



The prototype single cylinder four stroke engine.

2



The final version of the four stroke engine mounted on an aircraft.

A TRUE MODEL AND EXPERIMENTAL ENGINEER

Malcolm Stride takes a look at the model engineering activities of the late David Parker.

The recent article in this publication (*M.E.* 4248, 27 May 2005) about Edward Perera's steam aeroplane *Comet* to the design by David Parker prompted a letter from David Parker's son Ian. Sadly Ian informed us that his father had passed away last year but also gave us some information about the model engineering and other activities of David. This led us to investigate further and resulted in this feature on a man who many readers will not only know of through the *Comet* steam aeroplane but also his V-twin glow engine design *Vega*.

David Parker was born in 1920 and after school started an apprenticeship at de Havillands, working on early jet engines at the start of World War Two. After learning to fly in Canada David returned to Britain to join the RAF.



David Parker at the controls of a Vought F4U Corsair in Fleet Air Arm service during the late 1940s.

In 1942 the first evidence of his model engineering activities comes with a letter from *The Aeromodeller* acknowledging receipt of a prototype model aircraft engine for evaluation and offering 15 guineas for delivery of the finished version "complete and in running order". This single cylinder overhead valve four stroke engine is shown in **photo 1** with the final version mounted on an aircraft in **photo 2**.

After the war he joined the Fleet Air Arm and qualified as a test pilot in 1947. Ian provided an

insight into his father's approach to life with some quotes from David's Navy log book; "window blew out at 33,000ft.", "escape hatch blew off" and "port engine failed - landed in field". An accident report stated "whilst taxiing back to hanger after a test flight the pilot failed to keep a good look out and allowed the port wing to strike a lamp post".

Altogether David logged 6,100 hours in 62 types of aircraft including the *Corsair* (**photo 3**) and the *Gloster Meteor*.

4



David Parker's flat twin four stroke engine.

5



A high speed single cylinder two stroke engine.



6
The V-twin design Vega four stroke glow plug engine.

David also built several full size boats and in addition to his model engineering activities also found time for model aircraft among many other things.

After retiring David continued with his model engineering activities and continued to design and make model aircraft engines including the flat twin four stroke (photo 4) and a high performance single cylinder two stroke (photo 5).

The engine many readers will recognise is the V-twin design Vega four stroke glow plug engine (photo 6) which was featured in *Model Engineer* (M.E. 3768, 3 January 1986) with many examples being made.

Many of David's engines were flown on his own design aircraft *Firebrand*.

I mentioned the *Comet* steam powered aircraft as the trigger of this article and in fact the first free flight version flew in 1967



7
The front cover of *Model Engineer* No. 3848 featuring the *Comet* and steam power plant.

with the radio controlled *Comet II* flying in 1969. The aircraft had a wing span of 8ft. and weighed 46oz without fuel and water. The engine run duration was 1½ minutes. The power plant and aircraft was featured on the cover of M.E. 3848, 5 May 1989 (photo 7) with a three part series on its development starting in the same issue. Photographs 8 and 9 show David with the aircraft in the early days.

His modelling interests also turned to designing and building practical twin-engined radio controlled flying scale aeroplanes, two



8
David launching the *Comet* on an early flight.

notable ones being a HP *Harrow* and a Grumman *Tigercat*. The HP *Harrow* was kitted by Complete-a-Pac, from the mid 1980s.

In addition to all this, David found time to build three locomotives, a Pecket saddle tank modified from the Reeves design (photo 10), an own design GWR 'Z' Class 0-8-0T (photo 11) and a *Betty* 2-6-0 (photo 12) to the LBSC design. All these were steamed at the Westlands MES club track.

Son Ian has inherited his father's "model engineering" genes and is building a fine *Jubilee* whilst grandson Adam has also caught the bug and regularly drives on the track.

I am indebted to Ian and Gill Parker for the information used in preparing this feature and also for the hospitality they showed (especially the curry!) when I visited recently.

We all offer our sympathy on their loss and mourn the passing of a very talented man, a true model and experimental engineer.



9
David posing with the later *Comet II*.



10
The Pecket tank engine modified from a Reeves design.



11
David's own design GWR Z class 0-8-0T.



12
David's version of the LBSC *Betty* locomotive.

JIG AND FIXTURE DESIGN

Dennis Knight

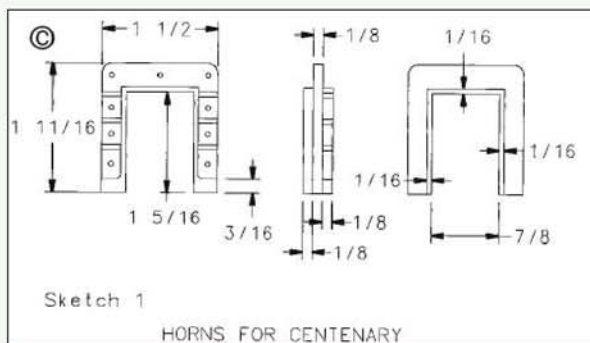
introduces a subject which may be new to many readers.

Jigs and fixtures are used in manufacturing engineering to mass produce components. Large companies have their own design and tool room facilities to design, make and repair these aids to manufacturing. Both jigs and fixtures are used for work holding on machine tools. In general terms, fixtures hold the work but have no means to control the position of the cutter in order to achieve the correct dimensions. Jigs are also work holding devices but have the means to guide the tool, which is often a drill of some sort. Dependent upon the complexity of the component the fixture can be very simple or rather complex. The reason for using these devices is of course very simple - economics. The manufacturer can use relatively unskilled personnel to load and unload components to and from the jigs and fixtures at a lower cost per man-hour than that for skilled labour.

The main point to observe and remember when designing a fixture is to inspect the component drawing and determine the prime datum features. It is also important to note the interfaces with other features of the whole design. By deciding which features are to be machined in the fixture it is then possible to determine the prime location surfaces on the fixture. To illustrate this I have taken an example from *M.E.* with which many readers will be familiar. I have chosen the horn block of the locomotive *Centenary* by Martin Evans, *M.E.* 4062, 27 February 1998. There are six to be made so it is worth a bit of effort to speed the job up. Just imagine, if you were to build a 5in. gauge *Evening Star* you would have ten to machine!

Manufacturing sequence

Let us consider the way we are going to set about the fixture design. A good datum or location feature is required first, then we can machine the



rest of the features using the prepared, robust datum. Referring to Martin Evans' drawing (reproduced in sketch 1 for convenience) this shows the Centenary horn block design which will be referred to from time to time. Our manufacturing sequence could be:-

- 1: Mill the $\frac{7}{8}$ in. wide x $\frac{15}{16}$ in. deep slot first.
- 2: Mill the outer face of the horn block second.
- 3: Mill the inner face of the horn block third.
- 4: Finally machine the flange face and the 1in. wide x $\frac{13}{8}$ in. length.

I have assumed that it is not normal to machine the $\frac{11}{2}$ in. wide x $\frac{11}{16}$ in. long features. The procedure I have proposed will require two simple fixtures, the second one with two sets of clamps.

Materials for the fixture

The base blocks can be made of mild steel or cast iron, the location plates of mild steel or gauge plate and the dowels and location pins from silver steel. As the quantity of components to be made using these fixtures is very small, fixture wear and tear will not be a problem, so heat treatment will not be necessary. There is a firm who produces machined blocks and plates in spheroidal graphite cast iron whose name was Purefoy but was taken over by another firm called WDS, Richardshaw Road, Grangefield Industrial Estate, Pudsey, Leeds, LS28 6LE; tel: 0845 606 66 77; fax: 0845 601 11 73; email: sales@wds Ltd.co.uk; website: www.wds Ltd.co.uk. They also sell clamps and all the accessories

associated with jig and fixture manufacture.

The first fixture

Referring to sketch 2, this shows the design of the first operation fixture, which consists of a plain square or rectangular block into which an open ended recess has been milled to accept the 1in. wide x $\frac{13}{8}$ in. long feature which locates the horn block in the locomotive frame.

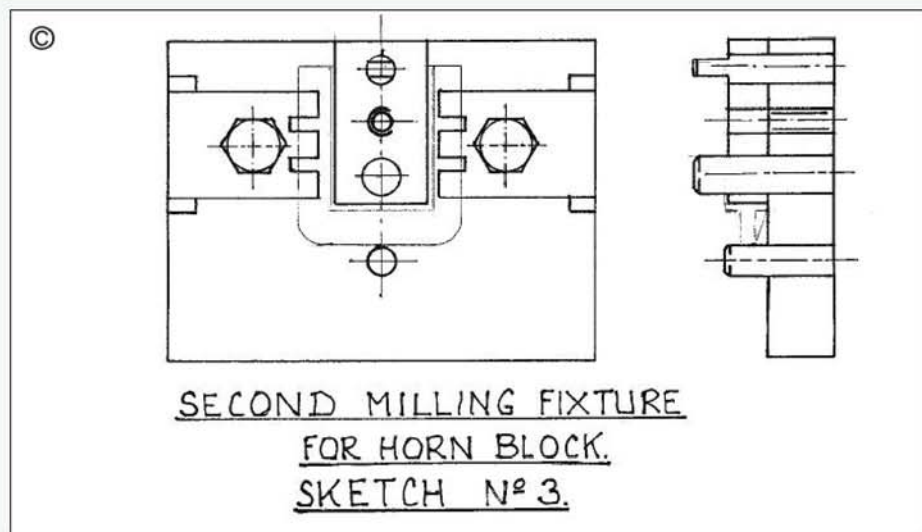
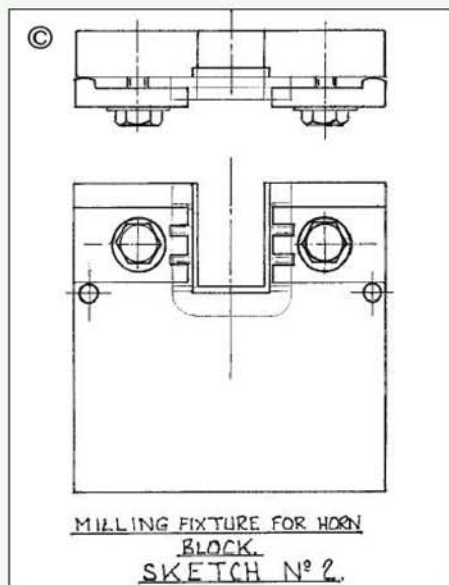
Now, I do not have access to a set of horn blocks, either cast or the hot pressed variety, so I do not know how much machining allowance has been left on them. Therefore machine the recess such that the component is a good fit on the width. Drill and tap two holes $\frac{1}{4}$ in. BSW or similar, which should be adequate, positioned either side of the recess. These are for the clamping screws.

The clamps need making now, they need to be about $\frac{3}{8}$ in. thick, mill a step equal to or slightly more than the unmachined flange thickness of the horn block. Mill two slots in the clamping end wide and long enough to clear the webs on the horn blocks. Mill a slot in each clamp to accept the clamping screw. This slot will enable you to draw the finger plate clamp back when changing components.

Finally file a radius on the heel of the clamp to aid better clamping. One last refinement, drill a hole in the main block just below the heel of the each clamp when they are in the clamping position, press a pin into each hole. This pin will stop the clamp swinging out of position when the clamp bolt is slackened.

The second fixture

Referring to sketch 3, this shows the design of the second fixture, which will be used to machine the other features. This requires a block of metal roughly the same size as the first fixture, to this we attach a second piece of metal which is say 0.015in. thinner than the finished thickness of the horn blocks. The width of this plate should be a very good fit in the gap just machined in the horn blocks, the length should be longer than the



1⁵/16in. dimension to permit a comfortable spacing of the dowel and securing holes.

You will notice I have chosen two different sizes of dowels to locate the plate on the base plate. This will provide a foolproof method of locating the clamp plate and the drill when these are in use. As two different plates will be engaged with the protruding dowels I have put two flats on the smaller dowel so that if there is any slight discrepancy in the centre distance of the dowel holes in the plates they should fit easily. Incidentally, this is common practice in industry.

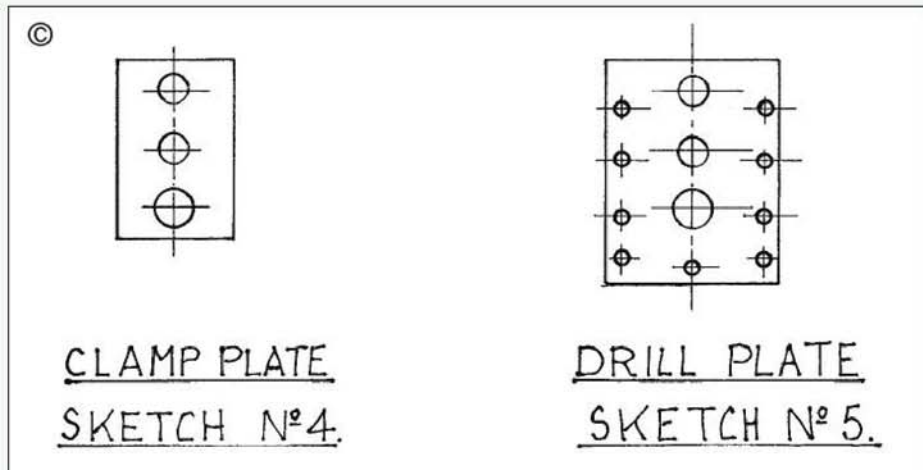
Referring to Sketches 4 and 5 the clamp and drill plates can be made from 1/4in. thick material. The clamp plate being 0.015in. smaller on the width of the 1.0in. dimension a similar allowance for the 1³/8in. dimension. Drill and ream the dowel holes and drill a clearance hole for the clamping screw. The drill plate should be 1.5in. wide and the length sufficient to cover the horn block and location block. Drill and ream the dowel holes and drill the clearance hole for the clamping screw. Mark out and drill the rivet holes in the drill plate.

The clamps from the first fixture can be used to secure the horn blocks for milling to thickness, however they will need to have packing at the end of the clamp. A 1/8in. thick strip bonded to the base plate using Loctite Superglue or similar will help to keep them in place during use.

I have put a dowel in the base plate to ensure that the component is prevented from longitudinal movement. This maybe an unnecessary precaution, however I consider it worth the slight extra effort. The cutter depth setting for machining the flange will, once set, remain constant.

The drill jig

This, readers is your bonus part, I had not thought about drilling the rivet holes in the



blocks, however, by changing the clamping plate on the second fixture we can drill all the rivet holes. You will now understand why I required the dowel holes to be precisely positioned.

Using the fixtures and drill jig

First take the horn blocks and check them for the presence of flash, burrs and other excrescencies, which may impede good location. Remove these defects. Martin Evans in his article said that there would be a radius or fillet on the horn block adjacent to the flange face. We must therefore remove the sharp corner on the external edge of the recess in the base plate of the first fixture sufficient to ensure that the flange face is in intimate contact with the fixture face for maximum support. The use of the fixtures and jig should be self evident, please ensure that the components are deburred after each operation to ensure that they locate correctly in the fixtures.

Analysis

This refers to the identification of the prime datum feature for machining purposes. I realise that some very experienced locomotive builders may have very different views about this point and consider the location in the frame to be more important. The use of the main axlebox slot has

been chosen because the location feature on the fixtures is robust and will prevent closure of the gap during subsequent machining.

This is but a brief outline for one particular component, but the ideas can obviously be expanded to suit other parts, whatever the finished product.

In conclusion

I have not mentioned accuracy of the mating locomotive parts during the course of this article. This I feel is the responsibility of the model engineer concerned. I have taken and read *M.E.* for over 45 years, so I am at least familiar with the framework of a locomotive and if attempting to build one would endeavour to the best of my ability to make all like features as alike as possible. This means I would go to the trouble of making gauges to confirm dimensional conformity of like features. Note I wrote conformity, not accuracy, because model engineers do not have drawings with tolerances on them. I trust that this comment will be taken in the spirit it is meant.

Finally please remove all the sharp edges and burrs, as an apprentice tool and gauge maker my colleagues and I were in constant trouble for omitting this process.



IN THE NEXT ISSUE

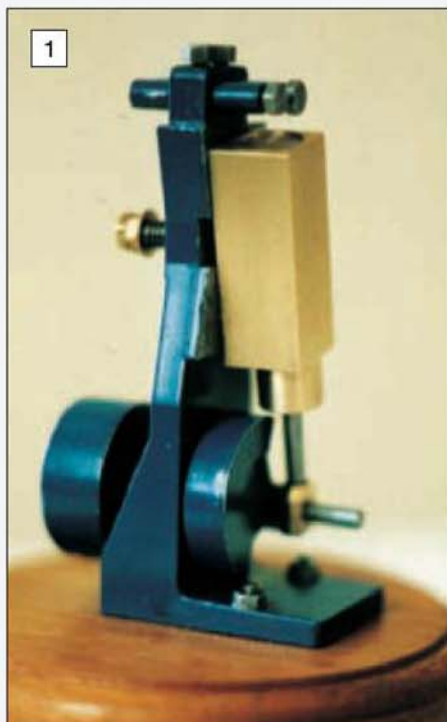
- **Ayesha arises**
- **Redwing engine – super new series**
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Plus all the usual features



ON SALE 16th September 2005

(Contents may be subject to change)



The finished engine is an attractive little model with a lively performance.

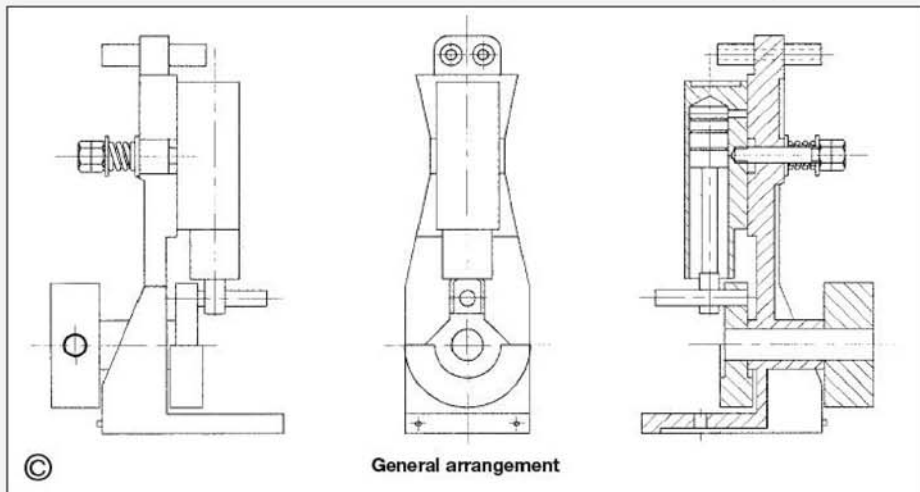
Anthony Mount

describes a simple engine, ideal as a first project.

I expect you have all seen Tony Green's advertisement in the magazine, and seen his stand at many exhibitions where all sorts of goodies for the steam enthusiast are available. Included among them is a small oscillating engine called the 'Unit Steam Engine'.

It must be one of the simplest working models available, ideal for use in small steam boats and the like. It is called a 'Unit Steam Engine' as it can be used either as a single stand alone engine, or assembled with others of its kind into 2-cylinder engines, triples, V-8s in fact all sorts of combinations.

It was at a recent exhibition that Tony asked me if I would build one of his engines and write it up. I happily agreed and was handed a standard kit, which consists of three alloy castings, some bar material in brass, mild steel and stainless steel, a little plastic bag containing screws, nuts, spring and coil of copper wire. All you need to build the engine.



UNIT STEAM ENGINE

Unit Steam Engines, parts list

Part No	Drq No	Description	Material	Quantity
01	02	Main frame	Alloy casting	1 off
02	03	Cylinder	Brass 1/2 x 1/2in.	1in.
03	03	Pivot pin	Mild steel 1/8in. dia.	4in.
04	03	Crankshaft	Mild steel 1/4in. dia.	2in.
05	03	Crank	Alloy casting	1 off
06	03	Crank pin	Mild steel 1/8in. dia.	Part of 03
07	04	Piston	Brass 3/8in. dia.	1in.
08	04	Piston rod	Mild steel 1/8in. dia.	Part of 03
09	04	Big end	Brass 5/16in. dia.	1in.
10	04	Flywheel	Alloy casting	1 off
11	00	Washers	Brass	2 off
12	00	Spring	Steel	1 off
13	00	Lock nuts	Brass	2 off
14	00	Flexible tube	Plastic	1 off
15	00	Copper wire	Copper	1 coil
16	00	Screws	Steel	4 off
17	00	Allen grub screw	Steel	1 off

On getting back from the exhibition and into the workshop, production started. Eight hours later I had a complete engine painted and running. It really was that easy.

To whet your appetite to build one of these engines photo 1, shows the completed engine, mounted on a little turned wooden base. So without further ado lets get started on building the engine. If you want to make one as well they are available from Tony Green Steam Models, 19 Station Road, Thorpe On The Hill, Lincoln, LN6 9BS; tel: 01522 681 989

Main frame (part 1)

The main frame is supplied as a die cast alloy casting. The finish is superb and only needs the merest touch with a fine file to remove any flash. None of the other surfaces need any machining.

First job is easy enough just pass a 1/4in. hand reamer through the main bearing. I suppose about 0.001in. needs removing.

Next job is to drill the pivot and port holes. The drawings supplied with the kit show the positions as radial from the pivot point on a pitch circle diameter (PCD) and give a 28deg. included angle. I redrew all the parts for publication using

CAD and took the opportunity to position these holes with co-ordinates as well.

Clamp the casting in the machine vice on the vertical milling machine and, with an edge finder, pick up the bottom and side of the casting. The dials being zeroed on the centre line and bottom. It is now an easy job to drill the holes using co-ordinates. They are 2mm dia. for the ports and are blind holes being 5mm deep.

The pivot hole is drilled at 3.3mm diameter. This hole does not need to be tight as a little flexibility here will help the cylinder to bed down easily on the port face of the main frame casting.

The inlet and exhaust holes can now be drilled through the spigots at the top of the casting. I made up a mild steel sleeve about 15mm long, one end drilled a tight fit on the spigots the other end drilled 2mm dia. to act as a guide for the drill. Just push the sleeve onto the spigot and drill



The main frame is a die casting and requires a minimum of machining.



The completed cylinder and pivot sub-assembly.
The bore needs to be finished with care.

through half way. Put the sleeve on the spigot on the other side and drill through to meet the first hole. Making up the sleeve will ensure the hole is in the middle of the spigot.

Small self-tapping screws are supplied to blank off the holes as required or you could tap the holes 7BA for hexagon headed screws.

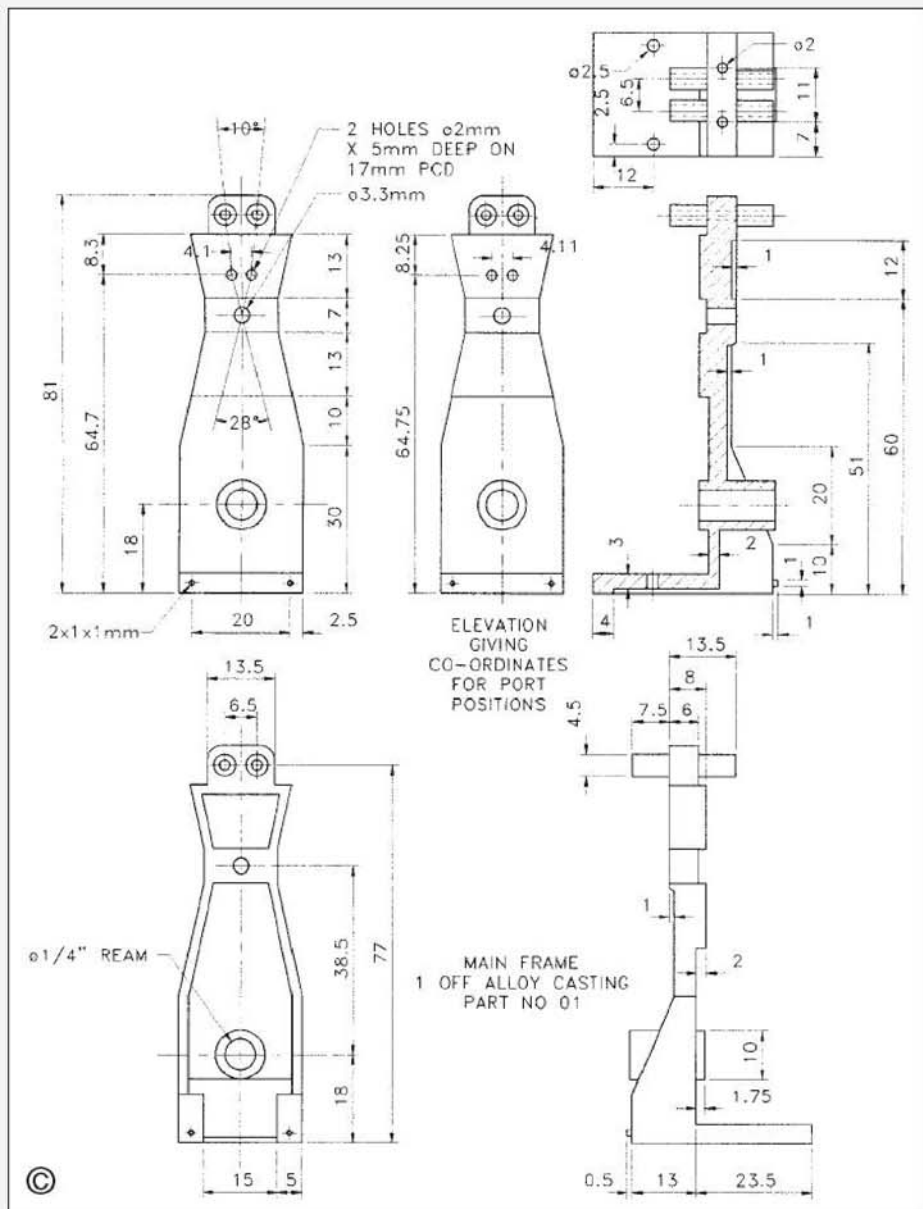
Centre punch the top of the casting for the angled holes that join the steam inlet and exhaust holes to the steam ports. These are also 2mm dia. and can be sighted through accurately by eye to join the holes together. They are also blanked off with self-tapping screws, or they can be tapped if you wish.

Final job on the main frame is to rub the port face on a piece of fine abrasive paper to give a truly flat surface. This can be done on a surface plate or other flat surface such as the drilling machine table. The completed main frame is shown in photo 2.

Cylinder (part 2)

The cylinder is made from a piece of 1/2in. square brass bar. Start by facing off both ends and bringing to finished overall length. This can be done by holding the bar in the 4-jaw self centring chuck. Turn the little decorative recess in the top.

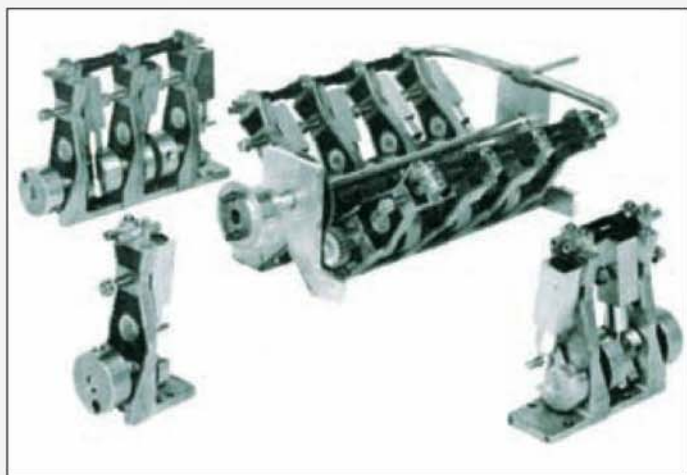
Change to a 4-jaw independent chuck and offset the bar 2.7mm for turning the end to 10mm dia. and drilling the bore. Drill the bore undersize and finish with a machine reamer. The reason for a machine reamer over a hand reamer is that it cuts on the end and has no lead, so it will finish to size the whole depth of the bore.



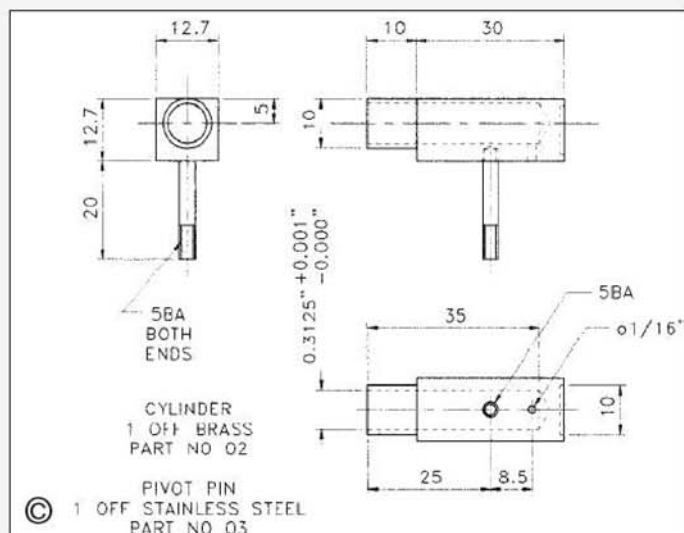
Change to the machine vice on the milling machine and drill the pivot hole and port by using co-ordinates. Be careful with the pivot hole not to drill too deep. Tap 5BA while set up on the milling machine so that the thread is square and straight. As the thread is quite shallow you may need to grind the end of the tap for it to cut full depth.

Finally, rub the port face on a piece of fine abrasive paper laid on a flat surface to flatten it off to provide a good seal with the rubbing surface on the main frame.

The completed cylinder with pivot attached is seen in photo 3.



A number of Unit Engines can be built up to form multi-cylinder engines in a variety of configurations.



Pivot pin (part 3)

A single length of $\frac{1}{8}$ in. dia. mild steel rod is supplied, and the pivot pin is cut from this. Machine off the ends and bring to length and thread both ends 5BA.

Crankshaft (part 4)

The crankshaft is made from a short length of $\frac{1}{4}$ in. dia. mild steel rod. All that needs to be done is to face off each end in the lathe and to finish the edge with a small chamfer.

Crank Disk (part 5)

The crank comes as an alloy casting. Again the finish is excellent and almost nothing needs to be done, apart from passing a reamer through the centre hole and the crank pin hole. The crank pin and shaft can be fixed with Loctite or you can use just the front of the hand reamer to open out the beginning of the holes to allow the crank pin and shaft to be pressed in.

The completed crank with crankshaft and pin is shown in photo 4.

Crank pin (part 6)

The crank pin is cut from the same length of $\frac{1}{8}$ in. dia. mild steel as the pivot pin. Face off to length in the lathe and secure in the crank with a press fit or Loctite.

Piston (part 7)

The piston is made from a short length of $\frac{3}{8}$ in. dia. brass. You will notice on the drawings that tolerances have been given for both the cylinder bore and the piston. The cylinder can be 0.001in. maximum oversize and the piston a maximum of 0.001in. undersize. So to take the most extreme case the piston could end up with an annular clearance of 0.001in. all round.

The cylinder bore is taken care of by a reamer so there is nothing you can do about the finished size of the bore, unless you bore it out with a boring tool. What you can do is make the piston to fit the bore. Turn down the brass rod until it just starts to enter the bore of the cylinder, but is a bit tight. Turn down to this size and then put in the little oil grooves.

The oil grooves are shown as parallel sided but they could be V-grooves as an alternative. Now take another pass with the turning tool at the same setting as previously. I am presuming that you are using a quick change tooling system or an indexing tool post. If not, very carefully bring the tool up to the work and take the pass to remove any burrs raised up when turning the oil grooves.

Try the piston in the cylinder. It should still be tight of course. Advance the tool 0.0005in. and take another pass. It should now just go into the cylinder bore.

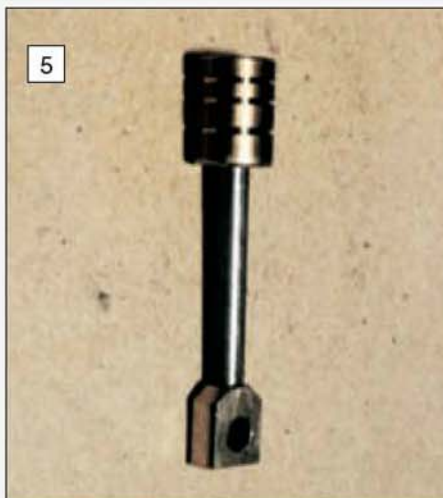


The crank comprises of an alloy casting with steel crankshaft and crank pin.

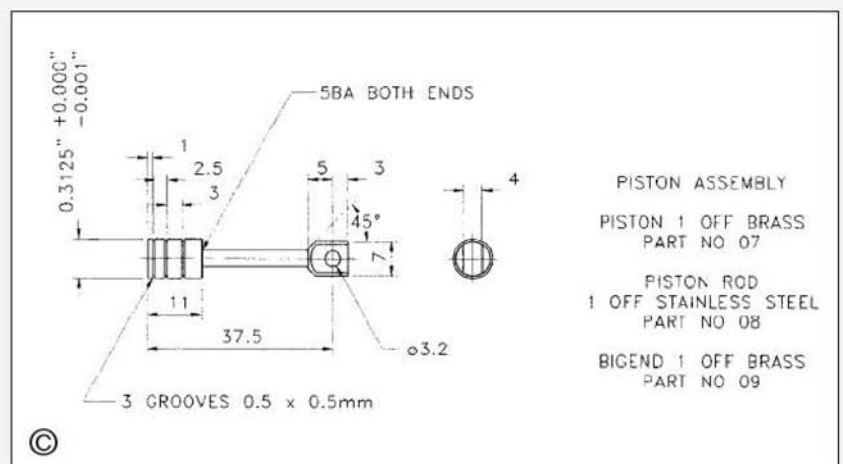
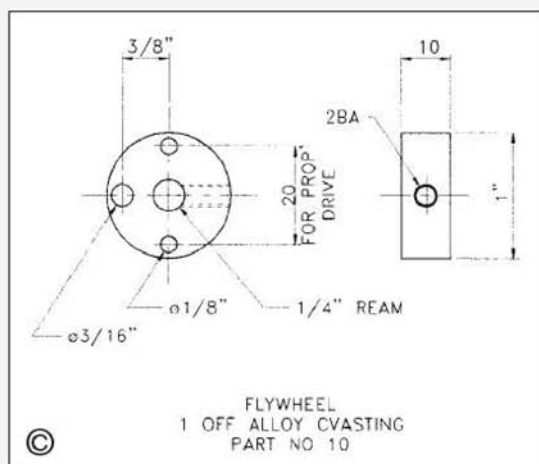
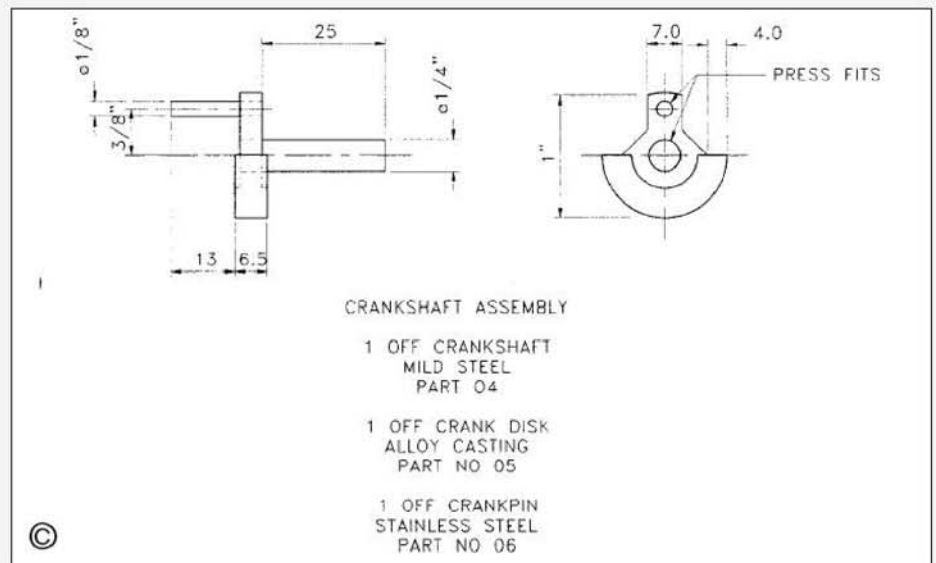
Centre and drill down 9mm deep and tap 5BA for the piston rod. Part off, reverse, and face off bringing to finished length. A completed piston with rod and crosshead is seen in photo 5.

Piston rod (part 8)

Another job for that length of $\frac{1}{8}$ in. dia. mild steel is to make the piston rod. Cut off a little over length, face off each end in the lathe bringing to a finished overall length of 31.5mm, and then thread each end 5BA using a tailstock die holder to maintain concentricity. Thread for a length of 7mm at the piston end and 3mm at the big end.



The piston and connecting rod sub-assembly. Note the oil grooves in the piston.





Setting up the flywheel in a dividing head facilitates machining the crank pin hole and those for the propeller shaft drive.



A close up view of the finished flywheel. The smaller, diametrically opposite holes are those for the propeller shaft drive.

Big end (part 9)

The big end is made from the $\frac{5}{16}$ in. length of brass rod supplied. Chuck in the lathe and face off the end. Transfer to the milling machine and hold horizontally in the machine vice. Pick up the side and end with an edge finder, and zero the dials. Now find the position of the cross hole by using co-ordinates, i.e. 5mm from the end and in the middle, and drill and ream $\frac{1}{8}$ in. diameter for the crank pin hole.

Centre, drill and tap 5BA for the piston rod. Turn down to 7mm diameter and form the chamfer. Back to the milling machine again and, with the rod horizontal in the machine vice, mill either side to finish with a 4mm thick big end. To save turning the rod through 180deg. both sides could be machined with a large Woodruff cutter at one setting.

If you choose this method, start by passing a drill through the hole and sighting through against the milling vice jaws to orientate the big end. Drop the Woodruff cutter down until it just touches the big end. Drop down a little more and machine the flat surface. Drop down below the big end then bring it up until it just touches the underside of the big end. Then raise it a little more to take the second facing cut. Which, if your calculations are correct, will leave the big end at 4mm thick. Part off and the job is complete.

Flywheel (part 10)

The flywheel is the last of the alloy die castings. The centre hole is already there so a $\frac{1}{4}$ in. reamer can be passed through this. Set up the dividing head (see photo 6), with a chuck, on the lathe cross-slide and index around to drill the $\frac{3}{16}$ in. hole for the crank pin and the $\frac{1}{8}$ in. holes which are the drive to the propeller shaft if the engine is to be used in a boat.

The dividing head can be turned through 90deg. to drill for the grub screw or the flywheel can be removed from the dividing head and set up in a drill vice for making the grub screw hole, which is tapped 2BA. Photo 7 shows the completed flywheel.

Brass washers (part 11)

Two brass washers are supplied and they go either side of the spring.

Spring (part 12)

The spring is supplied complete and in use it pulls the cylinder against the port face. But being flexible it does allow the cylinder to lift off the port face should there be water in the steam line that could cause a hydraulic lock.

Lock nuts (part 13)

Two thin brass lock nuts are supplied with the kit. They go on the end of the pivot pin, and stop the spring and washers from coming off. They can also be used to adjust the tension of the spring.

Flexible tube (part 14)

A length of clear plastic tube is supplied with the kit and is special material to withstand the temperature of steam. It slips over the inlet and exhaust spigots, connecting the engine to the boiler and the exhaust outlet, or in a multi engine set up to the next engine.

Copper wire (part 15)

A length of copper wire is supplied to be twisted around the flexible tube locking it to the spigots.

Self tapping screws (part 16)

Two long self tapping screws are supplied which are used to blank off the spare spigots and two short self tapping screws are used to blank off the holes at the top used to connect the spigot holes to the ports. As mentioned in the text above, these holes could alternatively

be tapped 7BA and hexagon headed screws used in their place.

2BA grub screw (part 17)

A 2BA grub screw is supplied to lock the flywheel to the crankshaft.

Assembly

Assembly is self explanatory from the drawings which include an exploded view. The main points to watch are that the crankshaft spins freely and that the cylinder port face sits flat on the main frame.

Bolt the engine down to a substantial base, I used a polished turned wooden base as my engine is for display only. Oil all rubbing surfaces and, to start with, connect up to an air supply. Only about 10psi will be needed to get the engine going. There are no adjustments to make with an oscillating engine, it will go first time or it won't go at all.

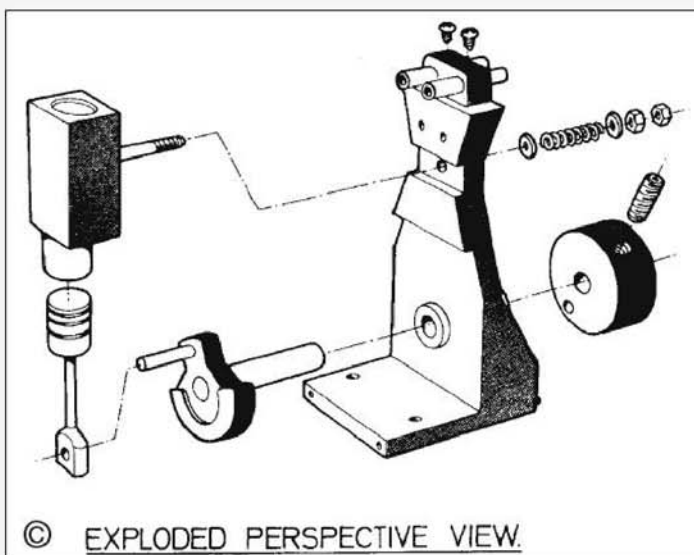
With a little engine like this you can run it up to very high speeds but, to start with, just let it tick over for a while to allow things to bed in and to check that nothing is going to work loose.

I have not mentioned painting, but all the cast parts can be painted. I used a medium blue colour for mine but, of course, you can please yourself what colour you choose. I find that for me spray painting with aerosols is the easiest way to obtain a good finish, and there is no cleaning up to do afterwards.

I would however advise the use of a spray booth such as a large cardboard box, to catch the over spray, and wear a face mask to avoid breathing in any paint spray. If you can arrange for some suction as well all the better, as this will further inhibit the spread of paint droplets.

So there we are, a steam engine built in a day. It is a very pleasant exercise and makes up into a useful little engine. The design is also open to experiment. You could build any number of multi-cylinder designs. How about building a V-12?

For those who would like to use steam instead of compressed air, Tony Green can supply ready made boilers to run the engine, or a kit of boiler parts for those who would like to silver solder the boiler together themselves. His address once more is: Tony Green Steam Models, 19 Station Road, Thorpe On The Hill, Lincoln, LN6 9BS; tel: 01522 681 989.



© EXPLODED PERSPECTIVE VIEW.

Keith Wilson

gives a brief holiday report before getting down to business with the boiler.

● *Part XII continued from page 161*

(M. E. 4253, 5 August 2005)

Just returned from a short holiday in Guernsey, where there is an understandably small but enthusiastic model engineering society. I was given a great welcome, and we had a nice steam-up afternoon. Space on the island is, of course, somewhat limited and the railway is in the garden of one of the members. If any 'fans' are planning to visit the island, an e-mail to davesimon@cwgsy.net will provide details. There are a couple of photographs, one of a fine 'Pansy' and t'other of a rather novel version of an oscillating-cylinder engine, working merrily on compressed air.

Kettle

The boiler, kettle, urn, samovar, teapot, etc. for this engine is rather large and heavy, however quite simple to construct. There are no strange shapes to be worked out as for taper barrels and Belpaire fireboxes.

I reckon that oxy-acetylene is essential, certainly I cannot imagine that the good old paraffin blowlamp(s) would be overmuch use - even with old Curly's use of coke as packing round the brazing hearth - except possibly for some pre-heating. In such a case, anything smaller than a pair of 8-pint beasts would be a waste of time.

Calculations show that outer shell weight would be about 84lb, with the complete urn weighing in at about the 183lb mark. Enough.

Several years ago I did a complete calculation on several boilers, with the interesting result that for a locomotive type boiler, the weight of the outer shell in pounds is just about the weight of the complete kettle in kilograms. Quite useful. Or if you prefer everything in one type of measure, 1kg = 2.2 pounds. So shell weight of 100lb = complete weight of 220 pounds.

The weights given above are for a pot made from 6mm copper, but 10 gauge is strong enough. However, I certainly would recommend

nothing less than 4mm (0.157in.) for weight is useful.

Since there is no exact prototype, you can use any thickness mentioned above with the same-sized former plates, the slight change in overall size will not be obvious. The only thing to watch is that the diameter of the barrel will need minor adjustment. The calculation is quite easy. If the diameter of the barrel is taken as O/D minus one (1) plate thickness, then this figure x π gives the size of the sheet to cut for rolling. It is a bit of a bind, but it is best to leave the big hole in the top for the dome until after rolling and silver-brazing the barrel.

I have mentioned this before, but on no account omit the butt-strip. The only exceptions would be the complete castellated joint (coppersmith's joint) or good quality arc welding. A plain, silver-brazed butted joint (no strip or castellations) can 'unzip' itself with disastrous effect. This is about the only danger from a boiler, for the radial bursting stress on the barrel is easily the highest stress of all; the longitudinal stress being precisely half. Even if a stay or two breaks or even tears out nothing more than a thin stream of steam or hot water is likely to emerge, probably into the fire anyway.

There is no danger of the boiler failing by sudden elongation, for stays, tubes etc. help the loading, but radial stress on the barrel cannot be reduced or eliminated.

Some concern has occasionally been raised about the joint betwixt barrel and throatplate, however there is no real cause for worry. For this joint is to some extent in compression rather than tension, so nowt to worry us.

Curly always called for as many boiler tubes as could be crammed in, but there are four objections to this. One is scale (Not the 1in. = 1 ft. type) if you're not running with only distilled water or rainwater.

Two is the difficulty of drilling tubeplates and silver-brazing in tubes. It is remarkably easy to watch part of the plate vanish during either of these operations, more than an "Oh dear. Tut Tut!" exclamation being self-evident. Try an accurate draw-out of his 'Doris' tubeplates.

Three is the ease of renewing tubes if ever necessary.

Four is improved circulation. So not less than $\frac{3}{16}$ in. between tubes for $7\frac{1}{4}$ in. gauge, $\frac{1}{8}$ to $\frac{5}{32}$ in. for 5in. gauge.

The tubes are better off for a rise from back to

LILLIAN

A NARROW GAUGE LOCOMOTIVE

for $7\frac{1}{4}$ in. gauge



This fine Pansy is a native of the island of Guernsey and was photographed during a steam up with enthusiasts on the island.

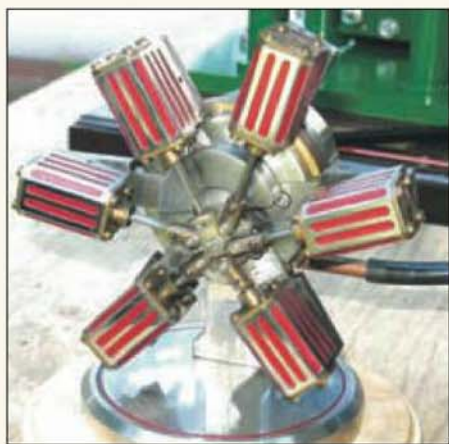
front; this does not aid gas flow significantly but gives better clearance at the front end for the tube plate flange.

There is no need to use rivets on a boiler except for short stays, all other joints being plain silver-brazed. The only exception to this would be for an internal fitting, such as a top-feed trough as in Martin Evans' Torquay Manor, for if an internal part like this melts off then you are really in trouble. Whether there is any real need for this trough in our sizes I do not know. Operation full-size is far smoother (relatively) than with us.

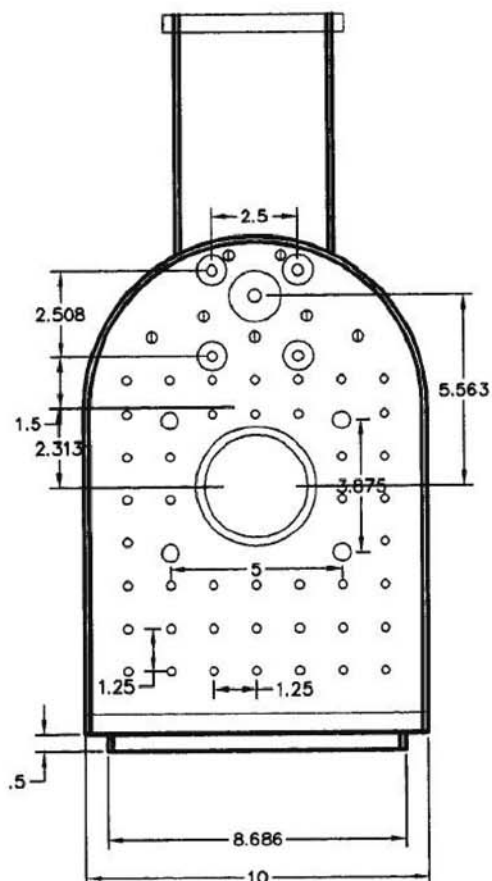
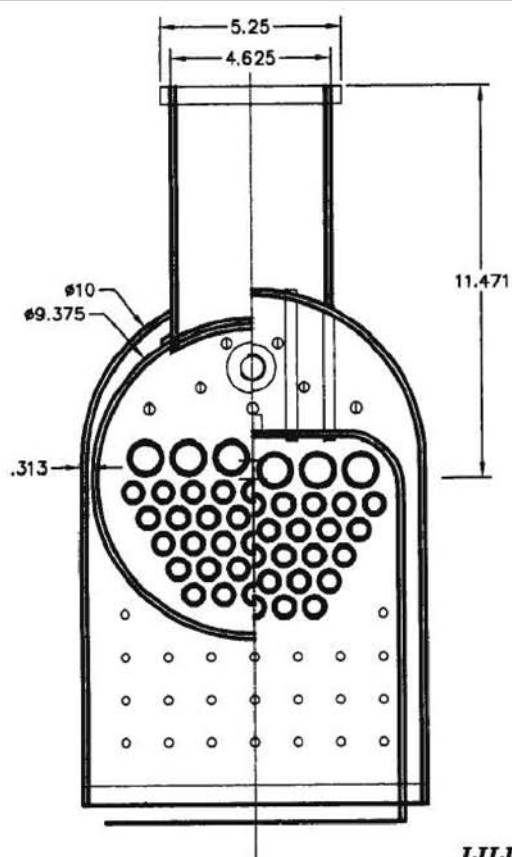
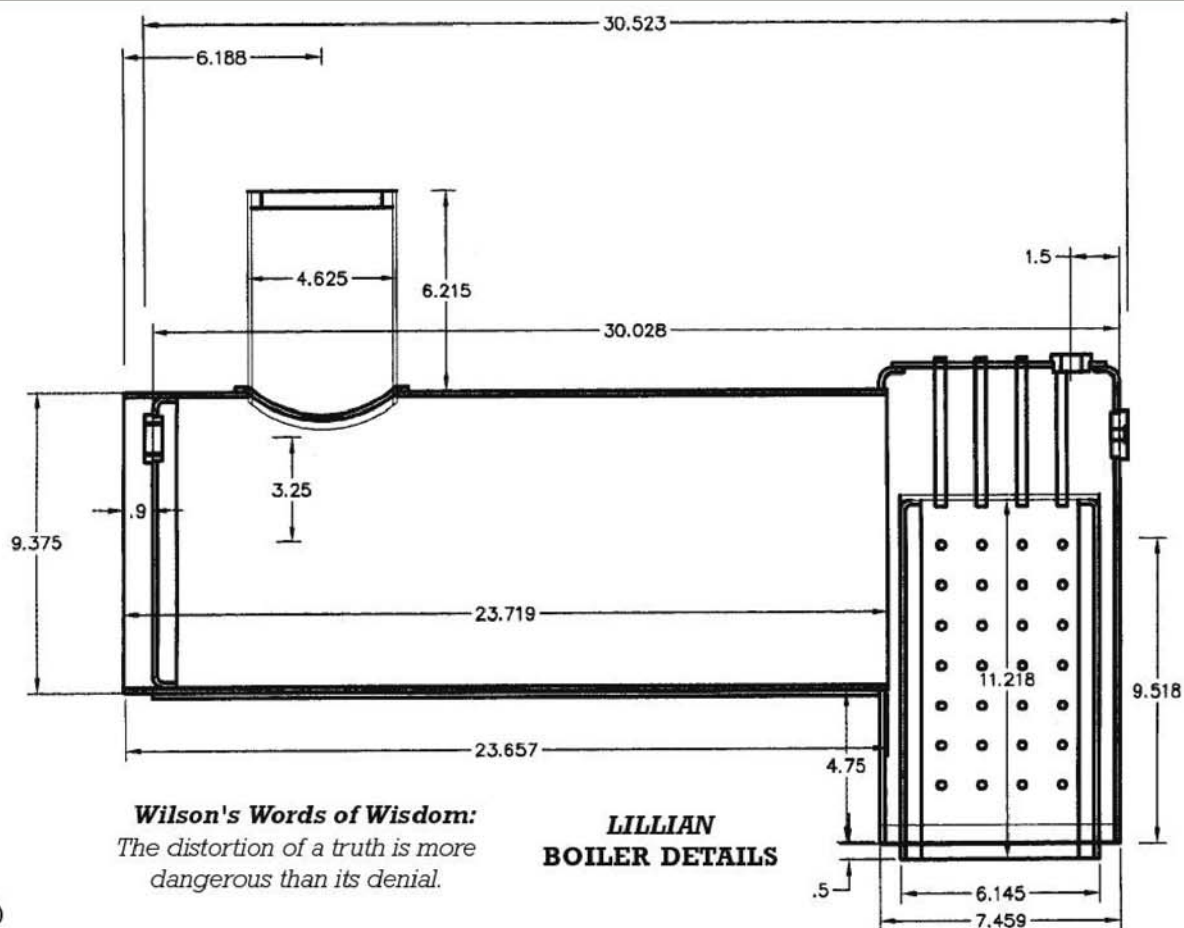
Water feed to the boiler is okay at the sides, provided it is near the front end. On the horizontal centre-line, level with the dome is about right. Top feed is best of all, so take your pick. A good place for top feed entry would be just in front of the dome. But allow a little distance here for screwing-in purposes. It is infuriating to find that the 'swing' of an angled fitting will not clear a fixed item - all right, yes I have!

For the steam dome, it can be silver-brazed separately and put into the barrel later. It is well, but not essential, that a ring (like a large curved copper washer) is put round the bottom of the dome. Alternatively, after setting in the dome, with a little care the bottom edge of the dome can be beaten outwards to increase the size of the joint, after which it can touched-up again with some more silver-braze. It is safest here to put in some saw-cuts into the bottom of the dome, as this bashing-out is then far easier. Also, less chance of 'un-rounding' the barrel!

Easyflo Nos.1 or 2 are best for all joints (or equivalent from other suppliers), don't be too stinky (stingy? stingey? mean?) with the flux either. Tapping fittings directly into the soft copper is to be eschewed, always use a bronze or gunmetal bush. Soft copper threads might be okay for the first time, but to open the joint for any reason renders it difficult to re-seal afterwards, wear is not over-slow.



Also seen on Guernsey was unusual oscillating cylinder radial engine.





The drilling of the tube holes in boiler plates is best done in stages. Those on the right are now to size.



One of the substantial steel formers for flanging the various boiler parts. Heavy hammer work is required to make this boiler.

There is no problem with dry steam flow for the turret/ fountain (this fits in the bush just on top of the backhead) but if you like an internal pipe could be fitted to actually collect dry steam from inside the dome. I have yet to have trouble with a plain bush as shown, for even if a bad surge causes injector(s) to cut out, they will restart automatically – if made and installed properly. (Note recent article on this matter by Paul Mann, *M.E.* 4252, 22 July 2005, page 102.) This matter will be dealt with in a later article.

In theory, superheating is seldom used in 'small' engines like this one, but it is well worth the effort. It can – again theoretically – take some time for them to warm up, but with stainless tubes actually over the fire they are always hot – very hot – and can often be seen glowing.

In the early days of railways, superheating could not be very high, for the vegetable oils (used for lubrication) generally would disintegrate, carbonise, deteriorate – or what you will. Nowadays, with modern mineral oils and silicon-based oils, far higher temperatures are okay.

In the case of high-power steam for turbines and the like in power-houses, the superheater tubes look nearly transparent; they can be seen shimmering, a bit unnerving the first time you see this effect. At these temperatures, latent heat goes to zero, so centrifugal methods have to be used to separate steam from water-droplets that are still present (consider the pressure) or I understand the superheater tubes would go pop!

The above remarks on latent heat may seem puzzling, but 'tis a fact. It takes a certain amount of heat to turn water into steam. Neglecting heat losses through radiation, convection or conduction, irrespective of the final pressure! This is true within very close limits – check by looking up steam tables in an engineer's reference book.

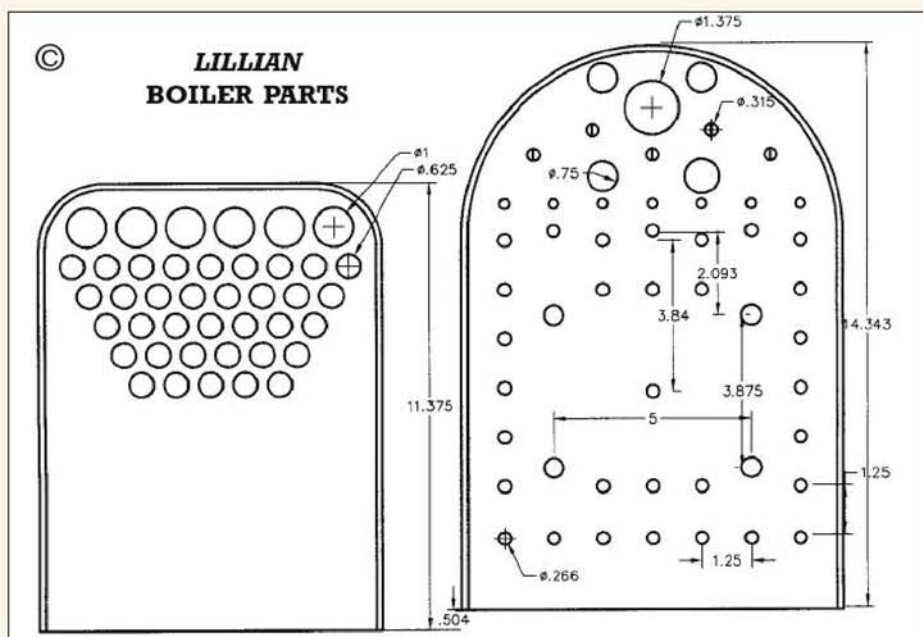
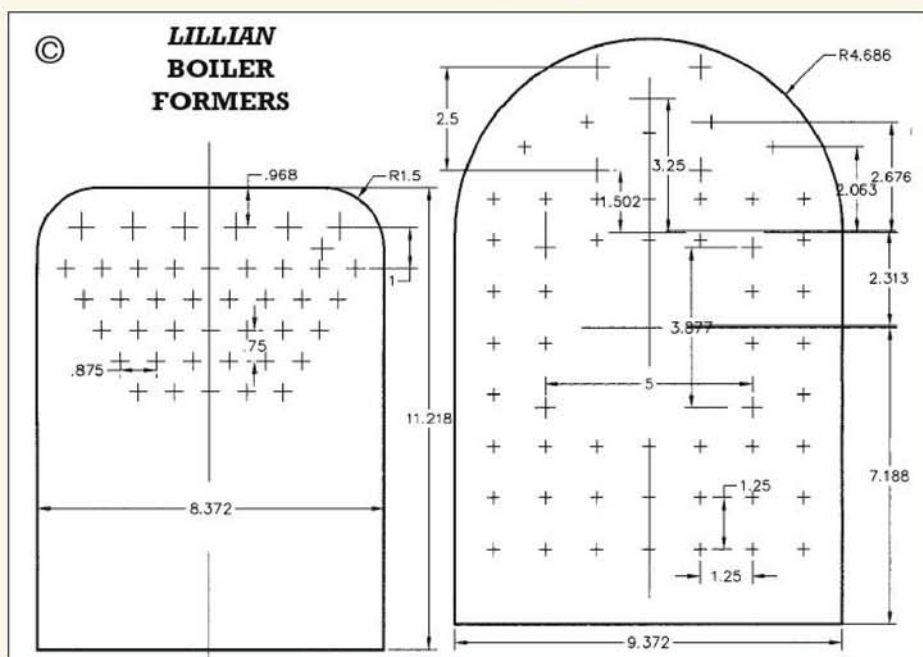
I considered using a Belpaire firebox, but there would be no advantage that I can see, for a boiler of these proportions. Although in a boiler of different proportions, the use of a combustion chamber might be appropriate, however, this boiler steams like ****. Incidentally, there was at least one 'main-line' boiler built with another combustion chamber about halfway along, although what rather muddled thinking produced this freak I know not. Precisely how the hot gases were to be re-ignited has as yet not been explained. Emptying it also poses a problem unless you are small enough to crawl through a tube.

The precise location of the dome along the boiler is a matter of choice – I have shown it on

the drawing as well forward because on the near-prototype there was also a big sand-dome on top of the boiler. Sanding is not to be recommended on a locomotive of our size, for the motion work,

bearings etc. are so much nearer the rail level that sand can get where it ain't wanted – not nohow!

Rolling up the barrel can present problems depending on what size of rollers you have





The boiler barrel front tube plate former is approximately 8³/₄in. diameter.

available, but it is not impossible to locate a nearby metal fabrication firm (*Yellow Pages*) who might well be persuaded to do the job for at a nominal fee.

In cutting the butt strip to length, allow for it not to actually reach the ends of the barrel, for in one case it could get in the way of the throatplate, t'other end fouling the smokebox.

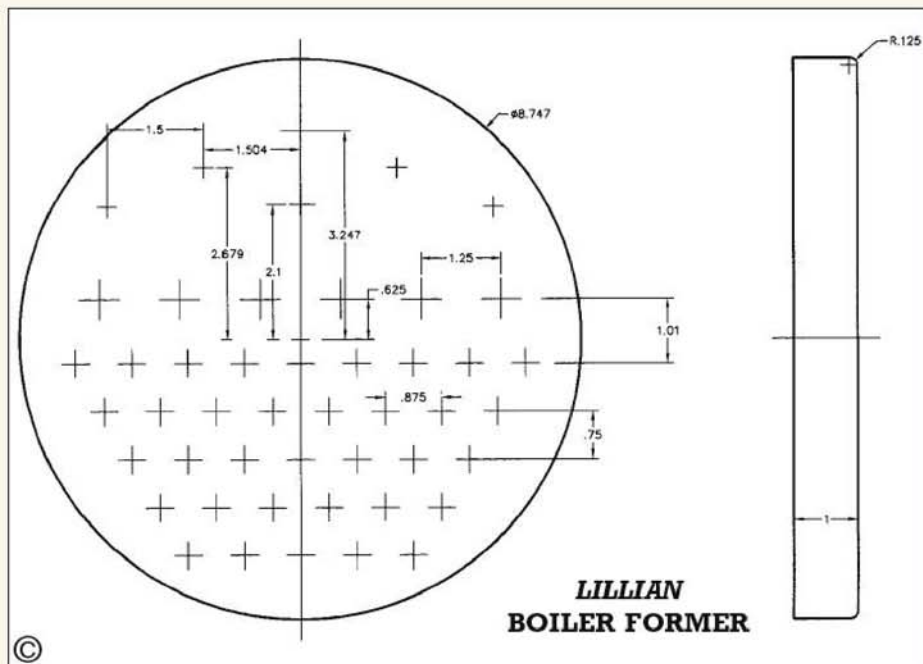
Good hard bang

It is probably cheaper in the long run to purchase former plates 'ready bashed'; it is one thing to beat up a 3¹/₂in. set of plates or even 5in., we are dealing with pretty near 10¹/₄in. sized plates. They take a bit of bashing, and not many folk have vices capable of holding plates of this size and mass. When some years ago I had to beat some really massive plates (5⁵/₁₆in. thick copper), I used my big fat milling machine.

By putting the over-arm forwards and locking it securely, the table could be powered up to make a massive horizontal vice. Pounding with a 7lb club hammer persuaded the copper into the form I desired, three annealings helped of course.

When drilling these big plates, there is a dickens of a lot of heat developed, so have tongs or thick gloves handy plus a big bucket of water. Another crafty wangle is to have a big Mole Grip handy, use it to hold the plate steady on the drilling machine table and for dunking it in the bucket, or a large G-clamp for the same purposes. Don't try to drill the full-size holes first go, shove a 1¹/₄in. dia. drill through first, opening out in a couple of stages later. It is amazingly easy to produce a semi-pentagonal hole with a large drill in relatively thin sheet (compared to the drill diameter). This is not too much of a worry; either a round file can be used or a slightly larger drill to open out. Recollect that the holes should be slightly larger than the tube diameter (about 1¹/₆₄in. ideal) for however strong silver-braze is, it is much better in shear rather than tension, it is also better protected from corrosion by hot gases. Do not ream the holes to exact size, for it is wasted effort.

To get the tubes set into the firebox tube plate, fix said plate flange upwards horizontally at the correct distance above a flat metal surface, this distance determined by length of tube; aim at about 1¹/₈in. to 3³/₁₆in. of tube protruding through the plate. Load the tubes in through the firebox tube plate, locate the far ends in the smokebox tube plate. It is then quite easy to apply flux and silver-braze the tubes in. You can see all round each tube, which you certainly couldn't do with putting the tubes into the finished firebox from



the outside as is often recommended. You will also see small flames at the far end (bottom) of the tubes, hence the flat metal surface.

I find that using the biggest jet of the oxy-acetylene torch - it has 6 small holes in it - produces a diffused flame that is less likely to burn the ends of tubes - easily done with a smaller, fiercer jet. If memory is correct, dear old Curly suggested a similar procedure, in his case a jet 2 sizes larger than recommended by the jet sellers (you know what I mean) and a softer flame.

When satisfied with the joints, allow the assembly to cool off quite a lot - a good test is to spit on the thing, if it 'explodes' (the moisture I mean) then wait longer, if it just sizzles then it can be quenched in the acid bath. However, considerable care is required, for the acid will run up inside the hot tubes and flash into steam which will rush up the tubes and give you a nicely cooked or scalded hand. This could easily make you drop the whole thing, result clouds of steam and acid fumes. Therefore, when in doubt, leave it out - until only warm.

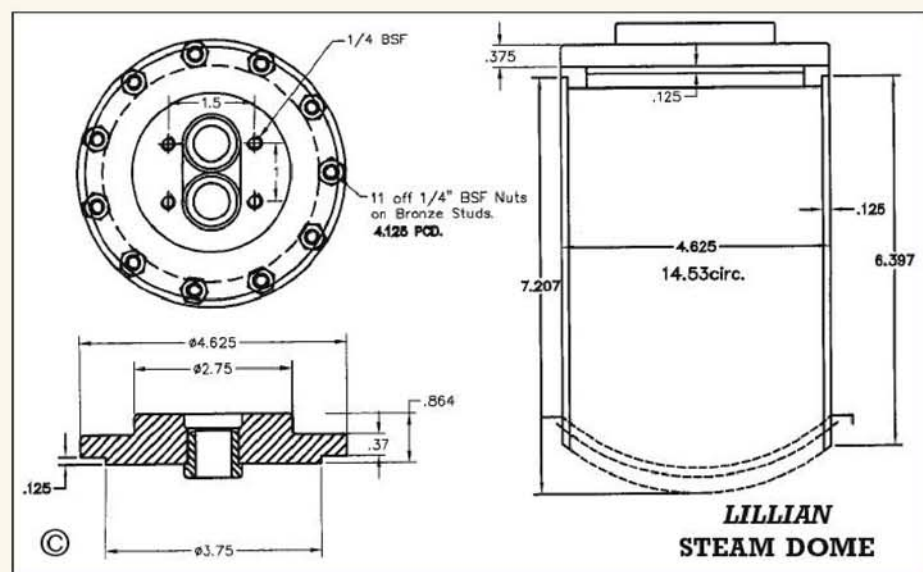
For the acid bath, get concentrated sulphuric acid and dilute it to about 1 part in 30 in water. Some places will sell battery acid; this of course is still sulphuric and needs less dilution. Note:

never add water to concentrated sulphuric, but odd as it sounds, add acid to the water. A plastic dustbin makes a good bath, and for a boiler the size of this one, if you have an overhead hoist of some sort then use it to lower the assembly gently into the bath. It will pay.

Be well assured that there is very little danger - if any - with this acid bath. If you are worried however, have some washing soda or baking powder handy, these are bases (alkalis chemically speaking) and will neutralise the acid. Some carbon dioxide is liberated, but hardly enough to affect the atmosphere. The current propaganda on global warming caused by release of carbon dioxide is just a cheap excuse for governments to increase taxes, and our colonial friends 'across the pond' haven't been fooled by this scam. It is actually caused by increased solar activity plus some eccentricities in the earth's orbit; but of course there is no money in it so the matter is carefully distorted, like the speed camera activity.

Acid on hands - wash off a.s.a.p. On clothing apply the above soda, washing it in with a little water.

●To be continued.





UK News

Basingstoke DMES held a shunting competition in April and the event was blessed with good weather in spite of the weatherman's predictions. The competition was held on the steepest part of the raised track and each driver had to complete the 100 yard course as slowly as possible without stopping, at the same time 'picking up' five heavily laden trucks which were parked on the route. The trucks were held with small chocks (lolly sticks!) so that as the driver came up to them they could be pushed forward with the chocks falling away as this was done. The strategy was to go as slowly as possible at first and then accelerate as the load increased; slowing down once all the trucks were picked up for the final part of the course. The 5in. gauge steam class winner was Neil Davis with *Linda* (modified from the *Gert* design) who took 347 seconds with no stops. The 3 1/2in. gauge steam class had only one entrant, Stephen Newell with his *Juliet* who unfortunately failed to finish. In the 5in. gauge non steam section, Guy Harding won with a time of 400 seconds using his Metropolitan

his *Ruston* locomotive recording a time of 304 seconds. Congratulations to all the winners and to the club for putting on such an unusual and interesting competition in which all types of locomotives (and members) can compete.

Birmingham SME is considering holding an event to celebrate *Trafalgar Day* in October with one idea being for a "soup and rolls steam up". The Editor has included some photographs of Spanish rural trains passing through the middle of towns alongside back streets, beaches and apparently through the middle of woods, all with very little evidence of any fences! The repairs to the tunnel are also well under way following the discovery of a crack, thought to be the result of ground heave after the long dry summer.

Steam locomotive drivers at Bristol SME are celebrating finding a source of Welsh steam coal that burns well with little ash and is an excellent steam producer. This is a replacement for the Chinese coal which caused build up of clinker on the locomotives. After a failure of the new signalling system there was much scratching of heads as to the cause, which was

eventually found to be due to a sheared bolt head falling across the insulating gap between two rail sections. Once this was removed all was well. A decision has been made on the refurbishment of the raised track with the present concrete structure to be retained but with brick built piers under some beams where necessary. Following this the running rails will be replaced. Replacement beams and support piers will then be cast a few at a time with a view to eventually replacing all the beams.

At the annual general meeting of the Colchester SMEE member Les Hammond was given Honorary Life Membership in recognition of his "sterling service as secretary as well as many other posts". I am sure all readers will endorse our congratulations to Les on this honour. Work on the ground level track is progressing well with the base for the steaming bays and turntable now concreted with ducts for the services and a soakaway built in. It is hoped that a continuous run will be completed by the end of the year. Norman Barber has carried out some experiments with the fitting of driving wheels to axles. Norman tried several press fits, increasing the interference level each time until the hub split and compared this with the results using Loctite according to the

manufacturer's recommendations. The results seem to confirm that using Loctite will give as good a result as press fits but that quartering is a lot easier with Loctite.

Crawley Model Engineers had an added attraction at their Goffs Park track recently when the council organised a 'music' event which coincided with the club public running Sunday. People stopped for rides on the way in and again on the way out which left members with not much to do but drink tea and listen to the very loud music during the intervening period. The band in question was called "Red Fish". Editor, Jack Darby reported that many of the passengers were in large families which made me wonder if there is a connection between loud rock music and large families. No doubt someone will get a research grant from public funds to investigate this! Jack tested his new electric powered GT3 locomotive in June and apart from some slip (cured with a suspension modification) was very satisfied. The hot weather in June caused some distortion to the track and jammed the traverser solid for the day. The I/C engined locomotives also suffered from fuel vaporisation problems during the day.

We have received a communication from another society

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.

SEPTEMBER

- 2 Aylesbury (Vale of) MES. Track Night. Contact Andy Rapley: 01296-420750.
- 2-4 Bedford MES. Visitors Rally. Contact Ted Jolliffe: 01234-327791.
- 2 Canvey R&MEC. On the Table 3. Contact Brian Baker: 01702-512752.
- 2/4 East Somerset SMEE. RB&W National Amateur Gardening Show. Contact Roger Davis: 01749-677195.
- 2 Maidstone MES (UK). Evening Run & Fish 'n' Chips. Contact Martin Parham: 01622-630298.
- 2 North London SME. On the Table: Work in Progress. Contact David Harris: 01707-326518.
- 2 North Norfolk MEC. Bits & Pieces. Contact Gordon Ford: 01263-512350.
- 2 Portsmouth MES. Bob Aldred: Machining a Crankshaft. Contact John Warren: 023-9259-5354.
- 2 Romford MEC. Competition Night. Contact Colin Hunt: 01708-709302.
- 3 Birmingham SME. Garden Party. Contact John Walker: 01789-266065.
- 3 Cardiff MES. Steam-Up and Family Day. Contact Trevor Jenkins: 029-2075-5566.
- 3/4 Chesterfield MES. Open Weekend. Contact Mike Rhodes: 01623-648676.
- 3/4 Furness MRC. Warrington MRC Exhibition. Contact Fred Firth: 01229-821192 or Colin Burns 01229 837079.
- 3 Guernsey Model Engineering Society. Track Day. Contact Dave Simon: 01481-251017.
- 3 Ickenham DSME. Public Running. Contact David Sexton: 01895-630125.
- 3 South Lakeland MES. Open Day. Contact Adrian Dixon: 01229-869915.
- 3/4 Tyneside SMEE. Late Summer Rally. Contact Ian Spencer: 0191-2843438.
- 3/4 Urmston DSME. Open Weekend. Contact A. L. Fussell: 0161-748-0160.
- 3/4 Guild of Model Wheelwrights. Chatsworth Country Show, Derbyshire. Contact Biddy Hepper: 01492-623274.
- 4 Frimley & Ascot LC. Public Running. Contact Bob Downman: 01252-835042.
- 4 Guildford MES. Members' Running Day. Contact Dave Longhurst: 01428-605424.
- 4 High Wycombe MEC. Family Day at Track. Contact Eric Stevens: 01494-438761.
- 4 Malden DSME. Public Running. Contact John Mottram: 01483-473786.

- 4 Northampton SME. Public Running Day. Contact Pete Jarman: 01234-708501 (eve).
- 4 Oxford (City of) SME. Public Running. Contact Chris Kelland: 01235-770836.
- 4 Plymouth MSLs. Public Running. Contact John Brooker: 01752-671722.
- 4 Reading SME. Public Running. Contact Brian Joslyn: 01491-873393.
- 4 Rugby MES. 7 1/4in. Gauge Society Invitation Day. Contact David Eadon: 01788-576956.
- 4 South Durham SME. Running Day. Contact B. Owens: 01325-721503.
- 4 Taunton ME. Public Running. Contact Don Martin: 01460-63162.
- 4 Westland & Yeovil DMES. Public Running. Contact Gerald Martyn: 01935-434126.
- 4 Wimborne DSME. Public Running. Contact Eric Basire: 01202-897158.
- 4 Wortley Top Forge ME. Annual Open Day. Contact Alec Butteriss: 01226-728423.
- 5 Peterborough SME. Bits & Pieces. Contact Tony Meek: 01778-345142.
- 6 South Durham SME. Meeting. Contact B. Owens: 01325-721503.
- 6 Stafford DMES. Track & Social Evening. Contact Chris Dobbs: 01889-270533.
- 6 Taunton ME. 7 1/4in. gauge Loco Night. Contact Don Martin: 01460-63162.
- 7 Bradford MES. Meeting. Contact John Mills: 01943-467844.
- 7 Brighton & Hove SMLE. Wrinklies Running Day. Contact Mick Funnell: 01323-892042.
- 7 Leeds SMEE. Meeting Night. Contact Colin Abrey: 01132-649630.
- 7 West Wiltshire SME. Steam-Up. Contact R. Nev. Boulton: 01380-828101.
- 8 N. W. Leicester SME. David Hulze: Early Steam Engines. Contact John Elliott: 01455-847040.
- 8 Westland & Yeovil DMES. Public Running. Contact Gerald Martyn: 01935-434126.
- 8 Worthing DSME. Bits & Pieces. Contact Bob Phillips: 01903-243018.
- 9-11 North Norfolk MEC. Steam Gala Contact Gordon Ford: 01263-512350.
- 10 Adelaide Miniature SRS. Members' Day. Contact Bob Yule: 8387-5032.
- 10/11 Bournemouth DSME. Autumn Run. Contact Dave Fynn: 01202-474599.
- 10 Brighton & Hove SMLE. Fun Run for Members. Contact Mick Funnell: 01323-892042.
- 10/11 Claymills Pumping Engines. Heritage Non Steaming Open Days. Contact B. Eastough: 01283-812501.

In Memoriam

It is with the deepest regret that we record the passing of the following members of model engineering societies. The sympathy of staff at *Model Engineer* is extended to the family and friends they leave behind.

Irene Fait
Gordon Nightscales
John Palmer
Walter Pruden

Rand SME
Gauge 3 Society
Birmingham SME
British Columbia SME

contributing for the first time. Gordon Drumm, President of the **Dublin SMEE** reports that for over a decade there has been an exchange of visits between themselves and the **Model Engineers Society of Northern Ireland**. This year it was the turn of the Dublin society to host the event and the visitors travelled south to renew old friendships and to make some new ones. We look forward to hearing more from Dublin in the future.

Patrick McCormack, Public Relations Officer for the **East Somerset SMEE** informs us that the first phase of the new 7¼in. gauge ground level track at the society's Bath & West Showground site was opened on 1 June this year. The opening ceremony was performed by the Most Hon. the Marquis of Salisbury, PC DL who is President of the Royal Bath & West of England Society. After cutting the ribbon, the party were given a ride on the railway.

We are pleased to welcome another group to this exclusive fold. The **Gauge 3 Society** whose members "build scenic standard gauge railway prototypes in 17/32in to the foot scale on 2½in. gauge track". Ian Turner, Editor of its newsletter describes members' interests as on the border between the model engineering world and

the larger scale model railway world such as Gauge '1'. The excellent newsletter contains a wealth of articles covering the construction of locomotives and rolling stock together with descriptions of layouts and members activities. We extend a warm welcome to the group and look forward to hearing more from them in the future.

We have reported regularly on the progress with the restoration and new building project at the **Hereford Waterworks Museum**. The latest news is that life on the new building project has been a bit of a roller coaster over recent months, not least to the fact that the company providing the structural steel had gone into receivership. After consultations with the various parties involved the situation has now been resolved and a new team has been put together to take the project forward. Good news is that when the museum re-opened at Easter "visitors came back in droves". The sand washer is being restored by Tim Breen.

After becoming famous following the mention in this column of his 20 years service as Editor of the **High Wycombe MEC** newsletter, David Broughan has

come back down to earth with a bump to the more mundane tasks like cutting the grass at the track, weed killing, painting the footbridge and of course producing the newsletter. Following the lifting and relaying of the track it was noticed that some of the rail was badly shaved in places. The SMEE standards have been printed in the newsletter as a reminder to members to check their locomotive and riding trolley wheels. The society has negotiated security of tenure at their Homer Green track site for the foreseeable future and is now turning its thoughts to future development of the site.

I was pleased to meet Alan Bibby at IMLEC. Alan produces the newsletter for the **Northern Association of Model Engineers** who are celebrating their Diamond Jubilee with a rally at the **Stafford DMES** on the 17 September. Alan is going to send regular copies into this column which will enable us to keep you all informed about association activities. The association has a new website at www.normodeng.org.uk and have welcomed four new clubs in the past year with several more making enquiries about joining.

One club celebrating an important milestone this year is the **City of Oxford SME** which has been in existence for 50 years. The society is intending to obtain a second club locomotive to be named *Golden Jubilee* as a way of marking the occasion. This will be funded by a Chairman's Appeal because existing resources will be needed for the new club house project. A Jubilee dinner has also been proposed for later in the year so that members can mark the occasion. The Jubilee season got off to a busy start with passenger numbers increased from last year. The storage unit has been cleared out and all junk was despatched to the tip. This has made room for a delivery of one ton of various sized steam coal. Some parts for the new traverser have arrived so that a start can be made on the project which will be completed during the winter months because of the need to break the track. Another piece of good news is the signing of the new lease for the site. This means that the club can now start pressing forward with the new club house. The raised track articulated passenger trolleys have been modified to reduce the risk of trapped limbs on curves. The design of the modification was agreed on a Tuesday evening and the work was finished (and painted)

- 10/11 **Edinburgh SME. Locomotive Efficiency Trials/Competition.** Contact Robert MacLure: 01506-655270.
- 10 **Hollycombe Steam & Woodland Garden Society. Fairground at Night.** Enquiries: 01428-724900.
- 10/11 **Leighton Buzzard NG Rly. Steam-Up Weekend.** Enquiries: 01525-373888.
- 10 **Malden DSME. Families Day.** Contact John Mottram: 01483-473786.
- 10 **North London SME. MENCAP Children's visit.** Contact David Harris: 01707-326518.
- 10 **Westland & Yeovil DMES. Track Running Day.** Contact Gerald Martyn: 01935-434126.
- 10 **Guild of Model Wheelwrights. Usk Farmers Club, Gwernesney.** Contact Biddy Hepper: 01492-623274.
- 11 **Bristol SMEE. Public Running.** Contact Trevor Chambers: 0145-441-5085.
- 11 **Birmingham SME. Simply Trains.** Contact John Walker: 01789-266065.
- 11 **Canterbury DMES (UK). Public Running Day.** Mrs P. Barker: 01227-273357.
- 11 **Fareham & Dist SME. SEOLEC.** Contact Pete Reynolds 023 9226 8351.
- 11 **Guildford MES. Driver Training Day.** Contact Dave Longhurst: 01428-605424.
- 11 **Harlington LS. Exhibition Day.** Contact Peter Tarrant: 01895-851168.
- 11 **Hornsby ME. Running Day.** Contact Ted Gray: 9484-7583.
- 11 **Leeds SMEE. Running Day.** Contact Colin Abrey: 01132-649630.
- 11 **Leyland SME. Boiler Testing Day.** Contact A. P. Bibby: 01254-812049.
- 11/12 **Northern Mill Engine Society. Open Days.** Contact John Phillip: 01257-265003.
- 11 **North London SME. Boating Regatta.** Contact David Harris: 01707-326518.
- 11 **Stephenson Memorial Miniature Locomotive Association. 50th Annual Locomotive Efficiency Trials.** Upperby Park, Carlisle. Start 10am. Entries from Member Organisations only. Contact Eddie Gibbons: 0191-4107564.
- 11 **Sutton MEC. Track Day.** Contact Bob Wood: 0208-641-6258.
- 11 **Wimborne DSME. Young Members' Running Day.** Contact Eric Basire: 01202-897158.
- 11 **York City & DSME. Running Day.** Contact Pat Martindale: 01262-676291.
- 12 **Bedford MES. More from the Heys Archives.** Contact Ted Jolliffe: 01234-327791.
- 12 **Frimley & Ascot LC. Evening Meeting.** Contact Bob Dowman: 01252-835042.
- 12 **Rochdale SMEE. Alan Taylor: Malta Railways.** Contact Mike Foster: 01706-360849.
- 12 **Saffron Walden DSME. Club Night.** Contact Jack Setterfield: 01843-596822.
- 13 **Chichester DSME. Kids on Trains with Rotary Club.** Contact Brian Bird: 01243-536468.
- 14 **Adelaide Miniature SRS. Working Bee.** Contact Bob Yule: 8387-5032.
- 14 **Guildford MES. First Bits & Pieces.** Contact Dave Longhurst: 01428-605424.
- 14 **Hull DSME. Keith Hale: Silver-soldering - a Black Art?** Contact Tony Finn: 01482-898434.
- 14 **St. Albans DMES. Bill Davis: On and Off the Footplate Pt. 2.** Contact Roy Verden: 01923-220590.
- 15 **Adelaide Miniature SRS. Meeting.** Contact Bob Yule: 8387-5032.

- 15 **Brighton & Hove SMLE. Workshop Evening.** Contact Mick Funnell: 01323-892042.
- 15 **Leyland SME. Chat Night.** Contact A. P. Bibby: 01254-812049.
- 15 **Sutton MEC. Strange Tools & Mechanical Oddities.** Contact Bob Wood: 0208-641-6258.
- 16 **Canvey R&MEC. Meeting.** Contact Brian Baker: 01702-512752.
- 16 **North London SME. Loco Section Meeting.** Contact David Harris: 01707-326518.
- 16 **Rochdale SMEE. Auction Night.** Contact Mike Foster: 01706-360849.
- 16 **Romford MEC. Peter Lawrence: Below London Streets.** Contact Colin Hunt: 01708-709302.
- 16-18 **Guild of Model Wheelwrights. Sacrewell Farm Show of Skills, Nr. Wansford.** Contact Biddy Hepper: 01492-623274.
- 17 **Adelaide Miniature SRS. Major Projects.** Contact Bob Yule: 8387-5032.
- 17/18 **Birmingham SME. National Locomotive Rally.** Contact John Walker: 01789-266065.
- 17/18 **Claymills Pumping Engines. Burton Festival combined with Severn Trent.** Contact B. Eastough: 01283-812501.
- 17/18 **Furness MRC. Glossop Exhibition.** Contact Fred Firth: 01229-821192 or Colin Burns 01229 837079.
- 17/18 **Furness MRC. North Fylde (Fleetwood) Exhibition.** Contact Fred Firth: 01229-821192 or Colin Burns 01229 837079.
- 17/18 **Kew Bridge Steam Museum. London Open House Weekend.** Information: 020-8568-4757.
- 17/18 **MELSA. MELSA Annual Competition, Display & Awards.** Contact Graham Chadbone: 07-4121-4341.
- 17/18 **North Norfolk MEC. 1940s Weekend.** Contact Gordon Ford: 01263-512350.
- 17/18 **Nottingham SMEE. Thomas the Tank Engine Weekend.** Gerry Chester: 0115-9259096.
- 17/18 **Reading SME. Southern Federation Rally.** Contact Brian Joslyn: 01491-873393.
- 17 **Stafford DMES. NAME Rally.** Contact Chris Dobbs: 01889-270533.
- 17 **York City & DSME. Informal discussion - club issues.** Contact Pat Martindale: 01262-676291.
- 18 **Bedford MES. Teddy Bears Day with Public Running.** Contact Ted Jolliffe: 01234-327791.
- 18 **Bristol SMEE. Public Running.** Contact Trevor Chambers: 0145-441-5085.
- 18 **Frimley & Ascot LC. Club Running.** Contact Bob Dowman: 01252-835042.
- 18 **Guildford MES. Charity Day, Public Running.** Contact Dave Longhurst: 01428-605424.
- 18 **Northampton SME. Sunday Steam-Up.** Contact Pete Jarman: 01234-708501 (eve).
- 18 **Oxford (City of) SME. Public Running.** Contact Chris Kelland: 01235-770836.
- 18 **Plymouth MSLS. Public Running.** Contact John Brooker: 01752-671722.
- 18 **Rugby MES. Public Running.** Contact David Eadon: 01788-576956.

in time for the next Saturday lunchtime by member Pat Beesley. So if you want a quick job done then contact Pat!

Peterborough SME had an excellent attendance at their pre-season clear up day in March with 25 members attending. During the day various tasks were carried out including the distribution of eight tons of gravel round the steaming bay area. This took about 45 minutes leaving the rest of the day for other chores such as weeding, painting, sorting electrical problems and eating the fish and chip lunch! Work on the track includes the replacement of badly worn rails with four lengths replaced on the 21 May.

Work on the new storage container at **Reading SME** has continued apace with the new riding car rack in place and the hydraulic lift fully operational (thanks to Mike Sinclair and Brian Murby) making the loading and unloading of trucks much easier. The program to replace the ageing concrete beams on the raised track has also taken a giant leap forward with working parties spending two weeks in May replacing 34 beams under the watchful eye of Les Dawson and Tony Giles. The old beams have been built into a retaining wall to provide tidy storage for the ballast heap for the ground level track.

The **Talylyn Railway** has completed the development of the new building at Wharf Station and as a result report increased revenue from the shop and café compared to last year. The old building was put on e-bay and "fetched the princely sum of one penny". It is thought that the condition "buyer collects" may have made people reluctant to

bid! Perhaps one of our readers has bought it for a new workshop?

Yet another very welcome new recruit to the *Club Chat* fold is the **Westland and Yeovil DMES** who are based on the edge of Yeovil airfield and have a raised triple gauge (5, 3 1/2 and 2 1/2 in.). The 25 members also operate a straight up and down track at Yeovil Junction station on the South West Main Line Steam Trust track. The club was formed as an amalgamation of Westland MES and Yeovil College MES when the latter lost their track to developers. The same happened to the new club some five years ago but they were allocated the present site and have been running on the new track since 2003. The next track running day is on 10 September and further details can be obtained from Gerald Martyn on 01935-434126.

World News

Canada

Lyndsay McDonnell comments on his design for the three axle bogies on his locomotives in the **British Columbia SME** newsletter. Lyndsay uses rigid frames with sliding axle boxes and supports the locomotive on two rollers fitted to the bogie bolster. The springs are calculated to give 1/4 in. deflection under the full weight of the locomotive. Work on the track improvements continues with the preparatory work for the remodelling of the east interchange completed. This means that work on the new diamond crossings can start in earnest. Because the crossings are being built in situ, the work will have to be carried out between running sessions. The formal proposal for the extension to the car

barn has been submitted to the local parks board for consideration. It is hoped that the extension will be completed this year.

New Zealand

Auckland SME has had a computer donated by member Paul Eaton. This has allowed some upgrading to the old one and the intention is to install the very useful *Model Engineer* index on it for the use of members. At the May "Bits and Pieces" evening there was a good collection of items brought in for the member's attention.

Graeme Quayle brought in a standard carpenter's motorised drop cut off saw which he has converted to cut off short pieces of metal by substituting a grinding cut off disc instead of the saw blade.

Derek Simonds showed a copy of a 'Diamond' type tool holder he has made (this is the type where square tool steel is held vertically in the holder) and went on to explain his difficulties when trying to use it for screw cutting. He also brought a grinding device which is fitted with a calibrated worm reduction unit of 60:1 ratio, to enable him to grind the correct angles on such tools.

Murray Grainger showed his British 18lb Field Gun on a swivel base to counteract tanks and other quick moving targets, all mounted on a wooden plinth. Murray got the details of this gun from the original in the Wairoa Museum and scaled them to suit.

A large radius valve gear link for a steam boat engine was next on the table. This had been laser cut from 20mm steel by Brian Eaton both external and internal profile being very good and needing very little finishing work.

Another set of work made by computer operated machinery was next, these being spokes for the front wheels of Bill Parker's Traction engine.

A short section of railway line was shown next, the piece having been cut out of the Rimutaka incline. The 'Owner', John Olsen showed the evidence of the gripper rollers from the 'Fel' locomotives on the rail. John is building a 30 x 6ft. steam boat hull having cedar planking and brought along a half section model of the hull so that members could see the shape.

Mike Jack showed another month's work on his detailed railway carriage, this time with the well detailed chassis mounted on the commonwealth bogies.

The *Society Inventor*, Graeme Murray brought along a very small cut off grinder that he made to cut up razor blades into very small pieces for some scientific work that he is undertaking. Murray also described a way of making very small slitting saws.

The last item of the evening was a 'Helio Chronometer', (*Sundial* for those not in the know!). This well made piece of scientific gear was made by the firm of Ross in about 1903 and was brought to the meeting by Christopher Radcliff.

South Africa

The newsletter of the **Rand SME** carries an article on *Shay* locomotives with a picture on the front cover of a very elderly locomotive working hard with sparks and flame coming out of some very strange places, including the side of the chimney! The wooden front buffer beam appears to have a very bad case of woodworm!

- 18 **Saffron Walden DSME. Running Day (public running after 2pm).** Contact Jack Setterfield: 01843-596822.
- 18 **Saffron Walden DSME. One Day Rally (open to all clubs).** Contact Jack Setterfield: 01843-596822.
- 18 **St. Albans DMES. Club Running.** Contact Roy Verden: 01923-220590.
- 18 **Taunton ME. Public Running.** Contact Don Martin: 01460-63162.
- 18 **Wimborne DSME. Public Running.** Contact Eric Basire: 01202-897158.
- 19 **Model Steam Road Vehicle Soc. Hamish Dawson: Clyde Puffers.** Contact Geoff Miles: 01869-247602.
- 19 **Peterborough SME. Fire Fighting.** Contact Tony Meek: 01778-345142.
- 20 **Chesterfield MES. K. Grainger: GWR Broad Gauge.** Contact Mike Rhodes: 01623-648676.
- 20 **Nottingham SMEE. Stan Nipper: Savage's Universal Carrier.** Contact Graham Davenport: 0115-8496703.
- 20 **South Durham SME. Afternoon Steam-Up.** Contact B. Owens: 01325-721503.
- 20 **Taunton ME. Alan Fradgley: Post-war Far East Railways.** Contact Don Martin: 01460-63162.
- 20 **West Wiltshire SME. First Winter indoor Meeting.** Contact R. Nev. Boulton: 01380-828101.
- 21 **Leeds SMEE. Don Smith: Ships & Train slides.** Contact C. Abrey: 01132-649630.
- 22-24 **North Norfolk MEC. Thomas Weekend.** Contact Gordon Ford: 01263-512350.
- 22 **Sutton MEC. Video Night.** Contact Bob Wood: 0208-641-6258.
- 22 **Worthing DSME. Bob Symes: Modelling Techniques.** Contact Bob Phillips: 01903-243018.
- 23 **Brighton & Hove SMLE. Keith Carter: Travelogue Films.** Contact Mick Funnell: 01323-892042.
- 24/25 **Bedford MES. LBSC Memorial Bowl Rally.** Contact Ted Jolliffe: 01234-327791.
- 24 **Brighton & Hove SMLE. Trackday.** Contact Mick Funnell: 01323-892042.
- 24 **Chesterfield MES. Running Day.** Contact Mike Rhodes: 01623-648676.

- 24/25 **Furness MRC. Southport Exhibition.** Contact Fred Firth: 01229-821192 or Colin Burns 01229 837079.
- 24/25 **Furness MRC. Leigh Exhibition.** Contact Fred Firth: 01229-821192 or Colin Burns 01229 837079.
- 24 **Hollycombe Steam & Woodland Garden Society. Fairground at Night.** Enquiries: 01428-724900.
- 24 **Hornsby ME. Family Day - Boiler Inspection.** Contact Ted Gray: 9484-7583.
- 24/25 **National 2 1/2 in. Gauge Ass'n. LBSC 'Curly' Bowl at Bedford MES.** Contact Clive Young: 01233-626455.
- 24 **North London SME. G1MRA visit.** Contact David Harris: 01707-326518.
- 24/25 **Nottingham SMEE. Thomas the Tank Engine Weekend.** Contact Gerry Chester: 0115-9259096.
- 24/25 **St. Albans DMES. Club Exhibition at Francis Bacon School.** Contact Roy Verden: 01923-220590.
- 25 **Adelaide Miniature SRS. Public Field Day.** Contact Bob Yule: 8387-5032.
- 25 **Ammerfield Miniature Railway. Public Running.** Contact David Jerome: 0118-9700274.
- 25 **Birmingham SME. Cycle for Charity Day.** Contact John Walker: 01789-266065.
- 25 **Bournemouth DSME. Funlec.** Contact Dave Fynn: 01202-474599.
- 25 **Bristol SMEE. 3 1/2 in. Gauge Rally.** Contact Trevor Chambers: 0145-441-5085.
- 25 **Cardiff MES. Open Day.** Contact Trevor Jenkins: 029-2075-5568.
- 25 **Guildford MES. SMEE Day.** Contact Dave Longhurst: 01428-605424.
- 25 **Harlington LS. Public Running.** Contact Peter Tarrant: 01895-851168.
- 25 **Leicester SME. Open Day.** Contact Raymond Wallis: 0116-285-8824.
- 25 **SM&EE. Visit to Guildford MES.** Contact David Boote: 01202-745862.
- 25 **York City & DSME. Running Day.** Contact Pat Martindale: 01262-676291.
- 26 **Bedford MES. Power Transmission - discussion evening.** Contact Ted Jolliffe: 01234-327791.
- 26 **Hornsby ME. Meeting.** Contact Ted Gray: 9484-7583.

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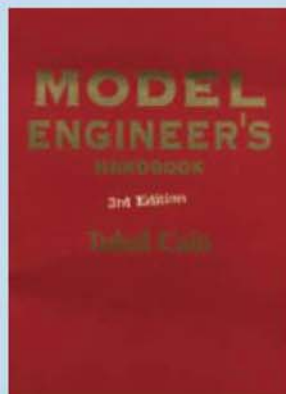
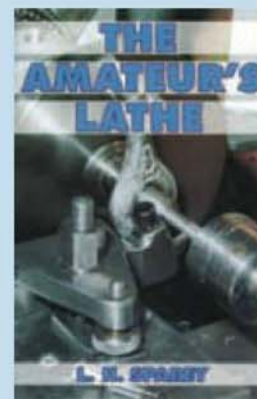
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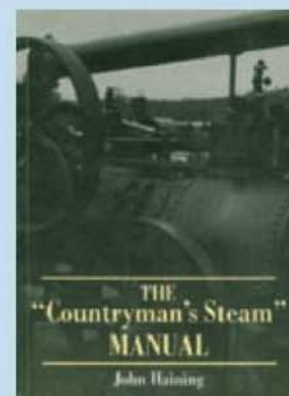
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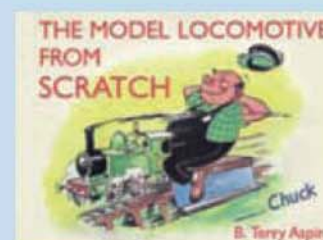
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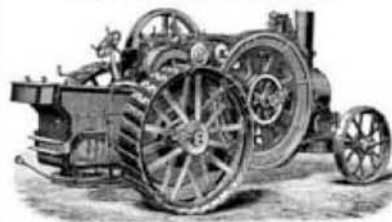
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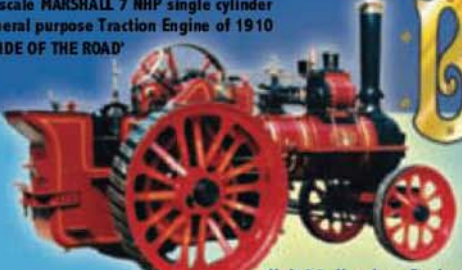
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Boxford CUD Mk III centre lathe 5" x 22" in very nice order



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D16

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