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2009 Model Engineer
Exhibition Show Guide



MODEL ENGINEER

Vol. 203 No. 4365 • 20 November - 3 December 2009

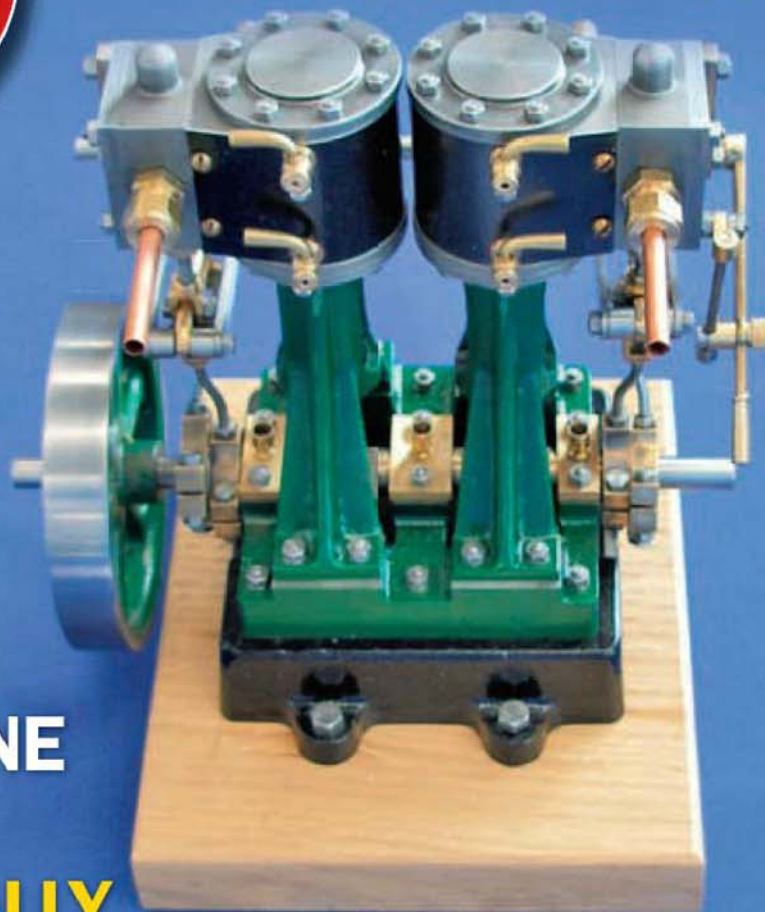
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ON THE COVER...

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See series on page 644, In The Editor's Workshop.

(Photo by David Clark)

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■ The two engines are those demonstrating the principles of Robert Stirling's invention, the "Air Engine", which he built and presented, one to the University of Edinburgh, and slightly later, the second one to the University of Glasgow. The exact dates these were built is not known, but were certainly before 1825. The Edinburgh model is the more original, as the Glasgow model was discovered in an old store by Prof. William Thomson, later Lord Kelvin, in 1847. He dismantled it to see how it worked, and restored it to working order, along the way establishing the Absolute Scale of Temperature, the term "energy" and invented the name of a new science - Thermodynamics.

■ Both models are now very fragile, but James was granted unprecedented access to measure and inspect them by both Universities. From the resulting drawings James himself made half-size models of both engines, but whilst the building instructions refer to these models, the drawings are dimensioned full size, with metric and decimal-inch measurements for accurate scaling. Hardwoods were used considerable in the original engines for frames and supports, but other than possibly for the flywheel (12" diameter in full size), no castings are required. Whilst they may look similar, there are detail differences between the two prototypes, so that making replicas or models of both is not an exercise in repetition.

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DAVID CLARK
Editor

STOP PRESS

Unfortunately the printers decided not to include the free MyHobbyStore catalogue with issue M.E. 4364. This was beyond my control although I do apologise for this error. I have been assured that the catalogue will be enclosed with this issue.

Competitions

We have a new competition for this issue. Morris Lubricants have kindly offered two 500ml bottles of their MCT metal cutting lubricant for every issue for the next year so two lucky winners will receive two 500ml bottle of Metcut MCT liquid every four weeks. See page 665 or visit our website www.model-engineer.co.uk for details. UK readers only please. Non-subscribers are welcome to enter.

Model Engineer Exhibition Guide

This issue has an 8-page Model Engineer Exhibition Show Guide in the centre pages. This does mean we have had to drop the plans for an issue. The guide has yet to be written at the time of writing but we still have a week to do it and hopefully it will look good. I expect guides will be on sale at the show but if not, we hope to be able to get some extra copies of this issue printed to sell as guides. You can always remove the guide in this issue and take it with you. You are going to visit the exhibition, aren't you?

Model Engineer Exhibition entries

Because of the possibility of postal strikes, I have decided to extend the deadline for Model Engineer Exhibition entries. Postal entries should be sent to reach us by Monday 7 December to ensure insurance cover. If necessary, you can enter your exhibit on Thursday 10 December but please be aware that it will be too late to cover it with our exhibition



Allendale Electronics Ltd.

Allendale are holding their open day on 1 - 4 December: 9am - 5:30pm and 5 December: 9:30am - 2pm. You can try their range of reasonably priced measuring equipment and a range of digital readouts will be on display for you to try. I have one of their Sino readouts on my Tom Senior mill and it is excellent, I would not be without it. Who knows, I might put one on my Myford one day.

Allendale Electronics Ltd,
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insurance and you should ensure that it is covered by your own insurance. All entries received by the closing date of 7 December will be fully covered by our exhibition insurance. An updated computer system is now in place to ensure quick booking in on the day.

If you have entered a model for the competition, or are about to, please consider entering some more of your models or some tooling to the exhibition in the loan section.

All competitors will receive a certificate thanking them for their entry and stating that their model was on display at the 2009 Model Engineer Exhibition. This will be handed out when booking the model in to ensure no one gets overlooked.

Boiler testing and manufacture

Some of the contents of the letter about boilers by Dr Alan Blacker may need clarification (M.E. 4363, 23 October 2009). Certainly several people have emailed me and phoned me. I overlooked the 2-bar/litre limit but I had assumed Dr

Blacker was talking about the larger steam locomotive (and traction engine?) boilers, not model boat or gauge 0 or gauge 1 boilers. Letters are the thoughts of readers put down onto paper and may not necessarily be correct. While we would not knowingly print incorrect information, I obviously can't know everything or spend hours researching every letter. Also, as editor of *Model Engineer*, I have my own opinions and ideas and do not necessarily agree with the content of some of the letters and in some cases, would do things differently to some of the articles that are printed. Some emails and Dr Blacker's reply are printed on the *Post Bag* page.

It seems that boiler testing is something of a minefield and the rules are open to interpretation. Perhaps a boiler inspector might like to write a definitive guide to boiler testing requirements that can be agreed on by the Northern and Southern Federation. It would be paid for like any other article and would give readers the information they require.



FIRST CLASS POST

Write to us

Views and opinions expressed in letters published in *Post Bag* should not be assumed to be in accordance with those of the Editors, other contributors, or MyHobbyStore Ltd. Correspondence for *Post Bag* should be sent to:
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The content of letters may be edited to suit the magazine style and space available.

Correspondents should note that production schedules normally involve a minimum lead time of six weeks for material submitted for publication. In the interests of security, correspondents' details are not published unless specific instructions to do so are given.

Responses to published letters are forwarded as appropriate.

Boiler testing 1

SIRS, - The letter by Dr Alan Blacker about boiler testing (M.E. 4363, 23 October 2009) contains several inaccuracies and I would like to put forward the following as clarification. In the UK, commercial construction of boilers is governed by the Pressure Equipment Regulations 1999 and commercial use of boilers is governed by the Pressure Systems Safety Regulations 2000.

Dr Blacker states: "*Be under no illusion, there is no possible legal means by which a commercially built boiler can escape the PERs and therefore a boiler purchased without a CE mark or upon which a CE mark is applied fraudulently cannot be tested and is NEVER legal.*"

I know that several of my fellow (full-size) steam boat enthusiasts read *Model Engineer* as our hobby is closely allied to model engineering. For us the following wording of the Pressure Equipment Regulations 1999 gives us exemption from the PER:

Excluded Pressure Equipment and Assemblies

14. Ships, rockets, aircraft and mobile offshore units, as well as equipment specifically intended for installation on board or the propulsion thereof;

It is worth noting that anyone considering steam-powered space exploration can also have their boiler commercially made without fear of acting illegally!

The PED also does not apply to equipment and assemblies "*placed upon the market before the 29 May 2002 and which complied with the requirements legally applicable for placing on the market before the 28 November 1999.*" This means that the regulations are not retrospective and that boilers commercially built and delivered before the 29 May 2002 need not have CE marking.

Dr Blacker states that all commercially made boilers "*shall carry the CE mark and the materials used be endorsed by the manufacturer's Notified*

Body." He also goes on to say that a boiler that does not carry a CE mark fails to comply with the Pressure Equipment Regulations 1999.

This is not true. The pressure equipment regulations define a number of classes of pressure vessel with requirements becoming more stringent as the size and working pressure of the vessel increase. Any steam generator under 2-litres in volume should be designed and constructed to sound engineering practice (SEP). Boilers of this size designed and built to sound engineering practice MUST NOT have CE marking affixed but are still compliant with PER.

The next higher category of boiler is a Category I (which is confusing for those of us who are used to a Class 1 pressure vessel being at the top end of the classification range). Category I boilers are defined as having working pressure x internal volume of less than 50-bar litres. (Many model engineering size boilers would fit into SEP or Category I). Conformity assessment for a Category I boiler is purely an internal matter for the manufacturer; there is no requirement to involve a notified body. Even as we move up into higher categories there is no requirement for the notified body to endorse the materials used; many manufacturers will elect to operate under an approved quality system instead.

Another untrue statement in Dr Blacker's letter is "*If the boiler is sold as a consumer purchase anywhere in the world, the boiler must be CE marked.*" CE marking is only applicable to the European Economic Area. If a manufacturer in the UK were building a boiler for the Australian market, for example, the boiler would not need to be CE marked but would need to comply with the requirements of the Australian market. A boiler built in Australia for the UK market would, however, have to comply with the PER and, if larger than 2-litres, be CE marked.

A frustrating aspect of Dr Blacker's letter is that he frequently refers to the code,

the RED book and several rules. A search of the internet confirmed that this is *The Examination and Testing of Miniature Steam Boilers* published by the various model engineering federations.

It should also be noted that individuals can design, manufacture and use boilers for hobby purposes without any legal constraint or inspection requirements. Certification becomes necessary, however, when insurance is sought or when the boiler is operated within an event where the organisers' rules will apply.

References

Statutory Instrument 1999 No. 2001 The Pressure Equipment Regulations 1999. www.opsi.gov.uk/si/si1999/19992001.htm
Statutory Instrument 2000 No. 128 The Pressure Systems Safety Regulations 2000. www.opsi.gov.uk/si/si2000/20000128.htm
Pressure Equipment - Guidance on the UK Regulations, April 2005 by the DTI. www.berr.gov.uk/files/file11284.pdf
The Examination and Testing of Miniature Steam Boilers. www.ntet.co.uk/pdf/miniatures_exam_and_test_code_nov_08.pdf
Mark de Barr. Marine and Steam Ltd.

Boiler testing 2

SIRS - Dr Blacker's letter is to be commended for ably summarising the requirements for boiler testing and CE marking in particular. However, I am left uncertain of some areas since Dr Blacker's statements do not seem to wholly coincide with information that I have from the Southern Federation. My comments below merely reflect my wish to fully understand what the CE marking requirements are and what corresponding responsibilities are placed on boiler testers, of which I am one. No criticism is implied or intended.

1. The RED book (Dr Blacker's capitals): I am not sure to which book Dr Blacker is referring, but the current edition

of *The Examination and Testing of Miniature Steam Boilers* (Revised Edition 2008) is blue. The previous edition was red. Could Dr. Blacker clarify? Is there a red 2009 edition that my society has yet to be informed of?

2. The Southern Federation Information Sheet No. 9 of April 2009 says (and I précis heavily here) that commercial boilers up to 2-litres capacity must not be CE marked, but (and there are other categories) commercially made boilers over 2-litres capacity and up to and including 50 bar-litres must be CE marked. There are also documentation requirements on the manufacturer for both of these categories, and significantly in the latter case a Declaration of Conformity with the Pressure Equipment Regulations has to be produced by the manufacturer and, I assume, a copy given to the purchaser.

3. These CE marking and other requirements only apply to commercial boilers made after 30 May 2002.

Dr Blacker quite rightly points out the potential pitfalls in all this, not least those that could befall a club boiler tester, and unwitting purchasers of locomotives or traction engines as kits or as completed models with commercial non-CE compliant boilers that will be refused test by their club.

I would welcome all clarification to this subject, including any corrections to my current understanding as expressed above.

Richard Harper, Hertfordshire.

Boiler testing 3

SIRS - I would like to thank those contributors who have grasped the spirit and intention of this dialogue and encourage further discussion on the topic.

The article I wrote on boiler inspections was intended for the majority of readers who own boilers which require regular testing under the various schemes which involve model engineers; the art of giving legal advice is to give concise

and limiting answers to specific questions which is what I had hoped to have done. I am a little disappointed by Mr. Barr's letter where he deviates from the central theme and goes off into areas of debate which are far off from the central theme.

I started the ball rolling as I thought it unlikely that anyone would wish to take up the cudgels of this topic and I would have thought better of Mr. Barr if he had started the process with advice of his own rather than frustrating the situation by making inflammatory remarks. The whole process of this article was to bring about an end to the myths and steam around the subject and to make it palatable for the model engineer. It is very easy to criticise someone else's opinion and it is a stance all too easily adopted in out hobby.

For model boaters they have their own advisors and ought to consult them. Boilers of less than 2-litres capacity are generally owned by model boating enthusiasts who I do not seek to advise as they do not fit the description set out in the regulations. Anyone with a large boiler, I presumed would have recourse to their own advisor since they will be insured and tested by persons competent under the law for testing larger vessels, accordingly they did not in my opinion warrant mention in the letter.

The letter outlines for the vast majority the position when it comes to non-commercially and commercially built boilers. There are several mistakes in Mr. Barr's letter and I can say with authority that I have never prosecuted a person for using a CE mark on a small vessel but I have prosecuted people for using CE marks fraudulently. To go into greater depth would only serve to increase the already frayed anxiety of people on this unnecessarily vague topic. My article and the enclosures herein serve to help and assist rather than to explain the whole law.

As to the quite proper questions of Mr. Harper I will deal with them in number order as he so usefully sets out his enquiry.

For what it is worth

SIRS, - Regarding Anthony Mount's interesting article on *Mathew Murray's Rack Locomotive of 1812* (M.E. 4363, 23 October 2009) and his speculation about the value in today's money of £400 in 1809. There exists a website which provides answers to this type of question: www.measuringworth.com/ppoweruk/

According to this website, £400 in 1809 would be have been worth £22,862 in 2008, based on the retail price index.

Chris Thorn, Epsom.

Mr. Harper is quite correct, I am not sure why the word red is in capitals, it isn't on my version and of course the current version is Blue; I apologise if this has caused confusion.

Boilers of up to 2-litres in capacity are outside the CE marking provisions and ought not to carry the mark, some are accidentally or for bona fide reasons applied, whilst strictly offensive, they carry no wider mischief unless of course they are marked with the intention of deceiving the buyer which is where I would recommend contacting the local office of Trading Standards who will deal with your enquiry.

Again, Mr. Harper is correct, the date from which all CE marking issues flows is indeed the 30 May 2002 so please take this into account if you are testing a boiler.

I would like to thank Mr. Harper for his scrutiny of my article and for raising the clarification he has so deftly done, to his credit and to the overall usefulness of the article thread in general. Take two blondes out of petty cash.

As for the other points raised by Mr. Barr, they are outside the general scope of my concise advice which is intended for the general population of model engineering societies and for which the advice is good and concise.

The subject of CE marking is wide and deep but it is of limited appeal to most model engineers and anyone building or buying anything remotely like the things Mr. Barr describes, rockets etc., would do well to contact the club's federation and seek specialist opinion. Anyone who is thinking about space exploration as outlined

by Mr. Barr ought to see their G.P. in any event!

I trust this assists.

Dr Alan Blacker, by email.

(Dr Blacker is a lawyer and consultant who specialises in human rights law and particularly as it appertains to children and vulnerable adults. A steam enthusiast from the age of six when he first developed asbestos fingers on a 3½in. Maisie, he has been active in the model and preservation sides of the hobby ever since.)

Boiler testing 4

SIRS, - I read with interest the letter from Dr Alan Blacker regarding boiler testing. I inherited many parts to build Rob Roy from a late uncle including a commercially built boiler. The company was Model Steam Boiler Specialists and the test certificate is dated 5/12/74, well before the CE mark was even contemplated. I hope to eventually get the engine up and running, so how do I get the boiler certified? There must be many people out there with a similar problem.

Gerald Williams, by email.

Drawing quality 1

SIRS, - I read Steve Cooper's letter (M.E. 4362, 9 October 2009) with interest and some sympathy. I have worked for 37 years in various mechanical engineering design/drawing offices (including a 4-year shop floor apprenticeship) and am dismayed by the appalling quality of manufacturing drawings used in industry, let alone model engineering.

One of the reasons for this is the widespread use of CAD which has systematically eroded the skills of drawing-



board trained draughtsmen by enabling anyone, sometimes with no engineering background but who can punch computer keys in the correct places, to call themselves, 'a draughtsman'!

However, model engineers are not necessarily working in industry and probably wouldn't call themselves professionals. Model engineering is a hobby, and if one such person has the fortitude to submit an article for inclusion in a specialist magazine then allowances have to be made for methods and/or drawings that might seem somewhat unorthodox to others. In no way should they feel discouraged for fear of reproach just because something is not quite up to a certain standard. It takes a lot of effort, so good-luck to all and keep on forwarding articles to the editor, checking it to the best of your ability and always taking a safe working procedure into account.

A great number of model engineers have embraced CAD and used it as a means of recording and conveying their work. The most common fault I can see is that their dimension styles are not correctly set-up, resulting in too large a text height with arrowheads, often larger than the text. This often leads to the poor presentation as dimensions are squashed-in, missed off or shown incorrectly from differing datum's etc as Steve highlights.

Re. Steve's comments about metric and or imperial designs, being an advocate of metrication (having used it for the last 34 years) if I were to submit a design in both, I would keep each system as a wholly separate concept in it's own right and there would be a metric version and an Imperial one utilising the same drawing outline, not say an imperial one with direct metric conversions showing impractical decimal figures.

Also, Steve rightly comments on the glaring errors in some designs that suppliers have allowed to be continued uncorrected and this is where the crossover from hobby to industry occurs. A commercial

product has to be correct. After any teething troubles have been allowed for and rectified, there is no excuse.

A bad example of all this is the 7½in. gauge locomotive that I am currently working on. The drawings prove that, in presentation and concept from prototype to model, the designer had no ability whatsoever to produce practical technical drawings. The errors have been horrendous. The supplier's catalogue statement, "an accurate, external scale model from works drawings for the advanced builder", leaves a great deal to be desired, in my opinion. On quizzing the supplier about this, it became clear that they would not entertain any form of constructive comment.

But one of the worst errors that I have personally encountered was when building a 7½in. gauge battery-powered locomotive to metric standards way back in 1996. I worked to the wheel back-to-back shown in Tubal Cain's *ME Handbook*, of 172mm when in fact it should read 173 millimetres. This caused me the embarrassment of clipping the check-rails on every pair of points on one particular GL railway. The current (3rd?) edition still includes this error, despite assurances from the then editor of *Model Engineer* that it would be corrected. Perhaps the involvement of one other gentleman (c/o M.E.) who implied that it was my own fault for building to metric standards in the first instance prevented this from happening?

One thing about being a draughtsman, if there's a mistake and your name is on the drawing, just hold your hand up and get it sorted.

Paul Lazenby, York.

Drawing quality 2

SIRS, - Responding to Steve Cooper's comments about drawing quality (M.E. 4362, 9 October 2009) in particular the absence of a drawing datum in published drawings, this practice is nothing new. In fact if old works drawings for steam locomotives are

inspected one will find a very similar dimensional referencing system. In part this can be explained by the size of a full-size locomotive and the size of any drawing that would be needed to represent any of it in a readable scale. In practice the drawings often represented only parts of the locomotive and in such situations the referencing of all dimensions to a single datum is not generally practical and was not generally adopted. But even in drawings for small components, a piston valve for instance, one will often see failure to use a datum.

So what happened instead? Well, David Clark hints in his reply to the good practices of accurate measuring when setting out. In other words not to measure always from the reference point given in the drawing, but always from an appropriate datum, not necessarily marked on the drawing, but which the operator can decide for themselves in order to eliminate errors due to cumulative tolerances and measurement inaccuracy.

In fact this practice was the time-honoured 'art' of the locomotive fitter and machinist, handed down over the years from foreman to apprentice. It continues to be handed down today through such fraternities as the model engineering community. Perhaps model engineering and heritage restoration are the last bastions of this 'art', but from Steve Cooper's experience it

seems to have been 'lost' in some high-tech industries such as aerospace. 3D CAD has something to answer for in this, of course, since in CAD there is no need for a datum within a single drawing due to its inherent precision.

Of course those who have not had the opportunity to learn this 'art' for themselves, the beginner notably, can fall foul if they disregard good practice and measure from the nearest handy place without regard for accumulation of errors. Maybe it is the duty of magazines such as this to keep alive the old ways of drawing. Personally, I do not see a need for rigorous application of datum in published drawings, but perhaps an article on accurate measuring, tolerancing and interpretation of drawings would be in order.

Colin D Hill, by email.

LBSC Rally

SIRS, - Thank you for publishing the LBSC report, I have been told it was in the last issue (M.E. 4363, 23 October 2009). I am still in Germany so I have to wait till next Monday to see it. I have had some good comments on it and people are pleased that you have published it so soon after the event. It was noted by one reader that by mistake I called Dennis Ede's winning locomotive a Dairy Maid and it is in fact a Southern Maid. I had the correct name in my notes but did the report out of my head so my apologies for that.

Steve Eaton, by email.



Unpublished Martin Evans designs

SIRS, - I was very interested to see that Martin had produced a design for a GNR N1 tank locomotive, because it brings to five the number of hitherto unpublished designs of his that I know about.

Martin designed a Great Eastern Railway 0-6-0 tank locomotive in 1979, but it was not published because he said it was considered that there had been too many 0-6-0 designs published recently and that he was going on to design the Enterprise 2-6-2 tank. Martin offered me this Great Eastern locomotive, a 'Buckjumper', which consisted of a set of frames and castings for axleboxes, cylinders, chimney and dome, and I duly purchased these items. The drawings were in pencil on thick cartridge paper and included a side and end elevation plus frame and boiler drawing. Martin's original drawings were of GER No. 30, whereas I completed the locomotive as No. 87, as in York Railway Museum. Martin was very pleased to see this engine at a Wembley Model Engineer Exhibition, and subsequently drove it on the Nottingham Club track, when that club hosted a Martin Evans Rally.

It languished in its box under my bench for many years and I finally sold it to make room for the larger engines I now build. Sadly I do not have the drawings any more since they were returned to Martin since he was considering completing the design and publishing it but then changed his mind. He sent the drawings to a friend in Dublin, and I have had no news of them since his death.

The second locomotive that Martin designed was another Great Eastern engine, an N7 0-6-2 tank locomotive. I had been in discussion with Martin about the N7 and did go up and take some photos of No. 999 when it was having its overhaul at the Chapel and Wakes Colne Railway in North Essex. Martin beavered away

on the chassis but asked me to make him a boiler which, in company with the late Ken Acors, I handed over to him in 1989. I was never sure if this locomotive was completed since Martin often passed on uncompleted projects to various friends.

In addition to the two locomotives mentioned above, Martin had talked to me about a Great Eastern 2-4-2 Gobbler that he was building, and I did see the frames of this locomotive. Also, I know he was building a Lancashire & Yorkshire 4-6-4 tank towards the end of his life, commenting to me in a letter that he was having trouble with its valve gear. All the above locos were designed for 5in. gauge.

So that means that there are at least four locomotive designs from Martin that are not generally known about. In addition, I had suggested a 7¼in. gauge version of Simplex, to be called 'Sevenplex', and I know he did some preliminary work on this locomotive also. Perhaps one day these designs may surface, and enough information gathered to make them publishable.

Brian Baker, by email.

If any reader has any of Martin Evans unpublished designs I would like to hear from them, Ed.

Cutting glass tube

SIRS, - I remember someone in *Model Engineer* enquiring about cutting glass tube. When I worked in a lighting laboratory all our glass tube was cut as follows. A line 3 - 6mm long was scored around the tube at the required position. The end of a piece of iron wire 1 - 2mm dia. was heated to bright orange and immediately rested along the score whereupon the tube would crack cleanly. Sometimes a very small very hot flame was used in place of the wire.

All cuts were then flame polished. The most important factor in this process is that the glass must be heated and cooled very gradually.

Peter Brewster, by email.

Greenly plan

Can anybody tell me where I can get a copy of the plans for Greenly's 5in. Halton Tank?

Peter Brewster, by email.

Gun drilling

SIRS, - Mr. Patrick Williams article (*M.E.* 4362, 9 October 2009) reminds me of Plessey Aerospace days as we used a gun drilling machine to drill the con-rods for the actuators on the Rolls-Royce Spey gas turbine. The drills were fluted tubes with brazed t/c tips which allowed the continuous removal of the swarf chips. Patrick also mentioned the scarcity of D bit info; it may surprise readers that D bits were our main cutting tools in the tool room of Lesneys when making the Matchbox car moulds. We used Alexander 3D pantograph machines and tool bits made from Tunbo which is superior to the normal HSS bits.

The D bits were ground, sometimes to 0.010in. dia. on the Alexander cutter grinders which were the basis for the Quorn cutter grinder. At Lesneys we worked mainly from photographs and were allowed within reason to enhance the moulding if practical so on the NAFFI trailer we added gas stoves at the back of the counter complete with gas taps then noticed a blank wall above which was ideal for a clock but what time should we set the hands? As the main master copy was five times larger than the finished cavity i.e. 5-1, therefore you will find the time as 5-minutes to one. Not many people know that!

Edward Roy Whiffin, Camberley.

Torquay Manor

SIRS, - I have been building *Torquay Manor* to Martin Evans design since 1991, and am currently having the boiler professionally made.

I have completely failed to comprehend the way in which the steam pipe is attached to the smokebox boiler bush from Martin's plans as he

gives no drawings of the method. The bush is threaded internally ½in. 32tpi and the steam pipe is threaded externally ¾in. 32tpi. How can a steam-tight joint be achieved around the steam tube and indeed the bush threads when neither can be turned and a wet header attached subsequently bolted to the bush?

This is the only aspect of the construction which has stumped me, and the engine is nearly finished. I shall of course reimburse postage to anyone who is kind enough to answer this query.

Professor Malcolm B. Wilkins, Glasgow.

Breaking glass

SIRS, - In answer to David Burton's enquiry about ways to cut some ½in. glass tube (*M.E.* 4362, 9 October 2009), he may find the following has the required effect:

Carefully score all the way around the glass tube where the cut is required. The score doesn't need to be deep, just all the way around. Next, acquire a piece of glass rod, say ¼in. dia., though glass tube may serve. Heat the end of the glass rod in a flame until it softens and apply it firmly to the score mark. The tube should crack around the score mark. Some people smear some spit on the tube surface where the rod is to be applied, I think as a precaution against sticking but I'm not convinced it really has much effect. The method will easily handle the cutting of a wine bottle with a little practice.

As always, when working with glass, eye protection must be worn and one should ensure there is somewhere safe to put down the hot glass rod after use. The cut ends of the tube will have sharp corners which could be 'flame polished' (heat in a flame until only just starting to soften) or smoothed with a fine abrasive such as a diamond whetstone.

Allan Hamilton, by email.

Matthew Murray's Rack Locomotive of 1812 for the Middleton Railway



ANTHONY MOUNT

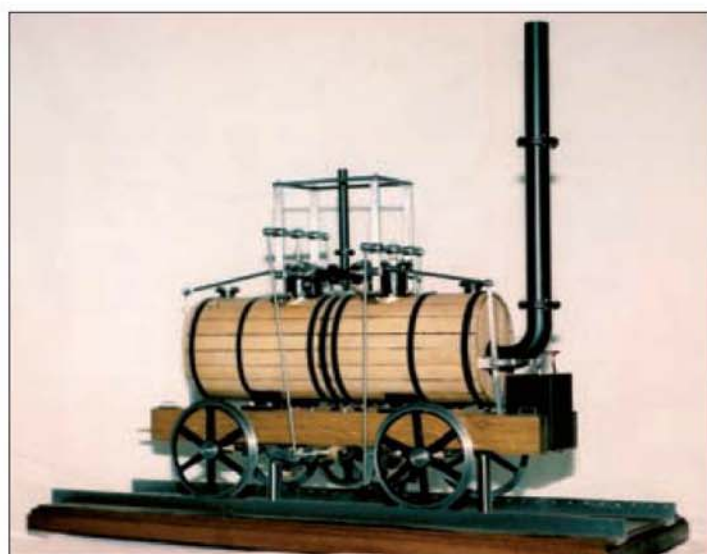
Anthony Mount makes the chimney, the wheels, and the gears.

PART 3

Continued from page 576
(M.E. 4364, 6 November 2009)

The locomotive is fitted with a tall chimney made from three components (Parts 11, 12 and 13), the tubes being connected by bolted flanges. Fortunately the diameter is 22mm and this is a standard size for copper plumbing tube. Do not attempt to cut the tube in the lathe by parting off; the wall thickness is quite thin and can buckle under the pressure. Saw a little overlength and then trim to finished length in the lathe with a sharp knife tool.

Two of the lengths are straight but one is an elbow. A standard plumbing elbow is too tight a curve and the wrong shape. However, there is a plumbing fitting that will yield the right size elbow and that is called a 'part' crossover (do not confuse with a 'full' crossover). The straight ends are cut off and you are left with a piece of curved tube just the right size.



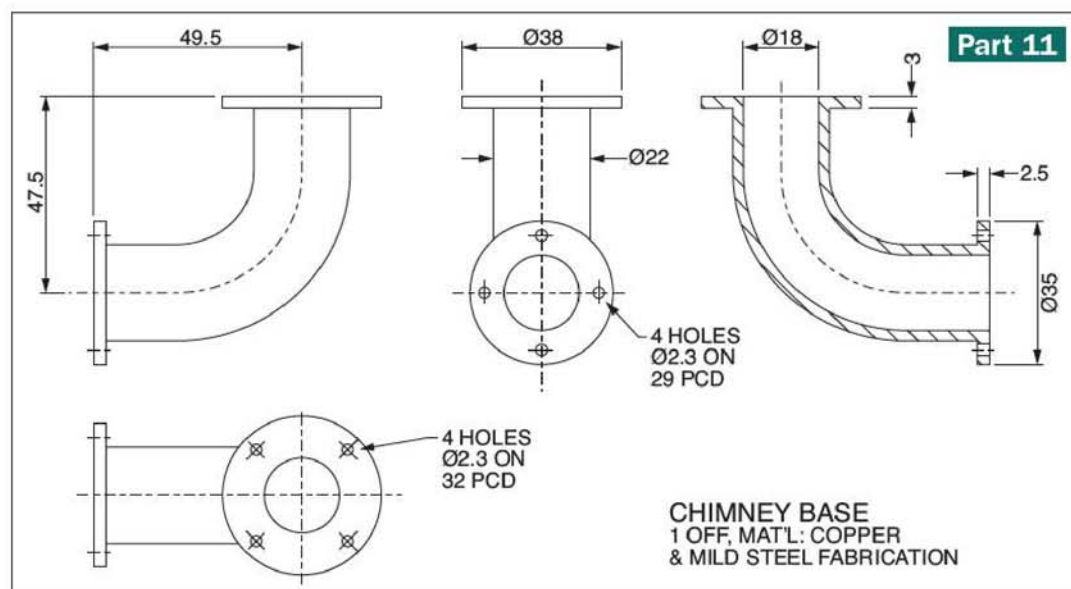
The component parts of the chimney.

The tubes are connected together with flanges and these can be made from mild steel. Just part off four at 38mm dia. and one at 35mm dia., all 3mm thick with slight chamfers to all edges. Use the dividing head to position the stud holes.

Silver solder the flanges to the tubes. Do it one end at a time and check that the tube is square to the flange and for the tube with flanges both ends that the stud holes line up. As far as I can ascertain there was no decorative top to the chimney. The completed parts of the chimney are seen in photo 7.

Locomotive wheels (Part 14)

There are four wheels that carry the locomotive, although these are not driven and just support the locomotive. Instead of using iron castings I used water jet cut blanks from mild steel. The wheels are quite thin compared with wheels from later more conventional engines.





One of the locomotive driving wheels.

The finish inside the spokes is very good and requires little or no work to prepare it for painting. To hold the blanks for machining, bored out soft jaws were used gripping on the outside of the wheel. The blanks were centre drilled and opened out and reamed at 5 millimetres. A light facing cut was taken using a carbide knife tool. I had no problems with the intermittent cut across the spokes chipping the tip but some builders may prefer to use a HSS tool in this situation.

A round nose tool was used to recess the spokes back 1mm from the face. Then a knife tool was used to form the tread.

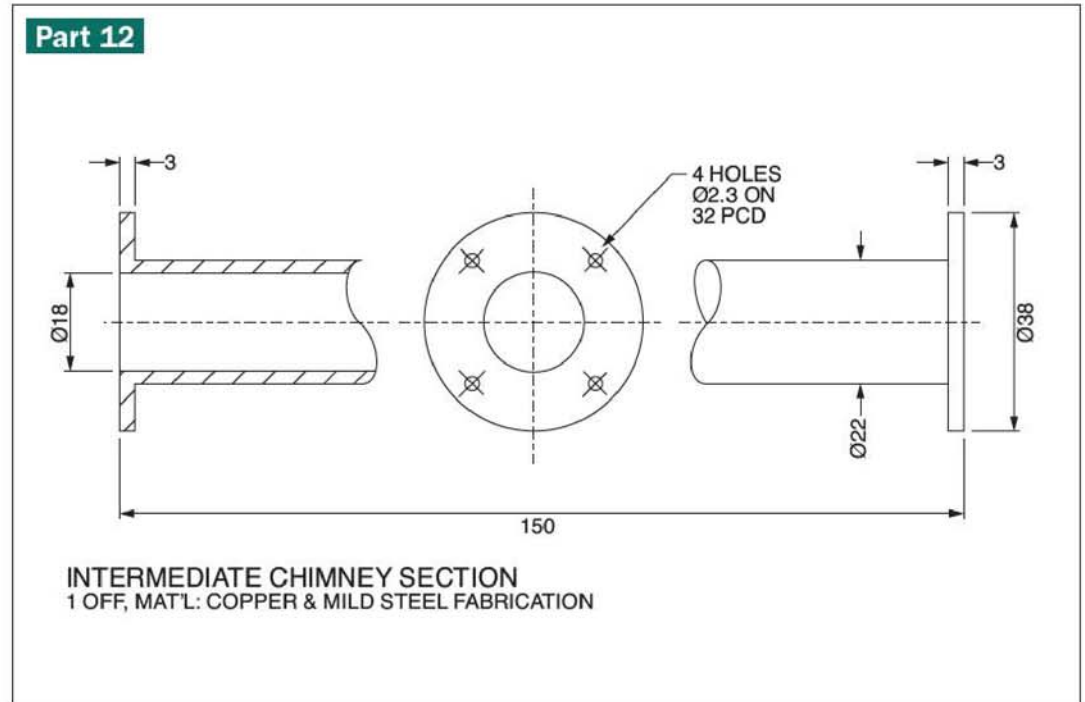
The wheel was reversed in the chuck and held by the tread for the back to be faced off and the wheel brought to finished thickness. The spokes were further reduced by 1mm in thickness on the back face. A half round Swiss file was used on the edges of the spokes to remove the burrs. A completed wheel is shown in **photo 8**.

Drive gears (Parts 15 and 16)

There are two pinion gears and one driven gear with a 2-1 ratio. The small gears go on the jackshafts, which also carry the cranks, and the driven gear goes on the central shaft, which has the drive gear on the end.

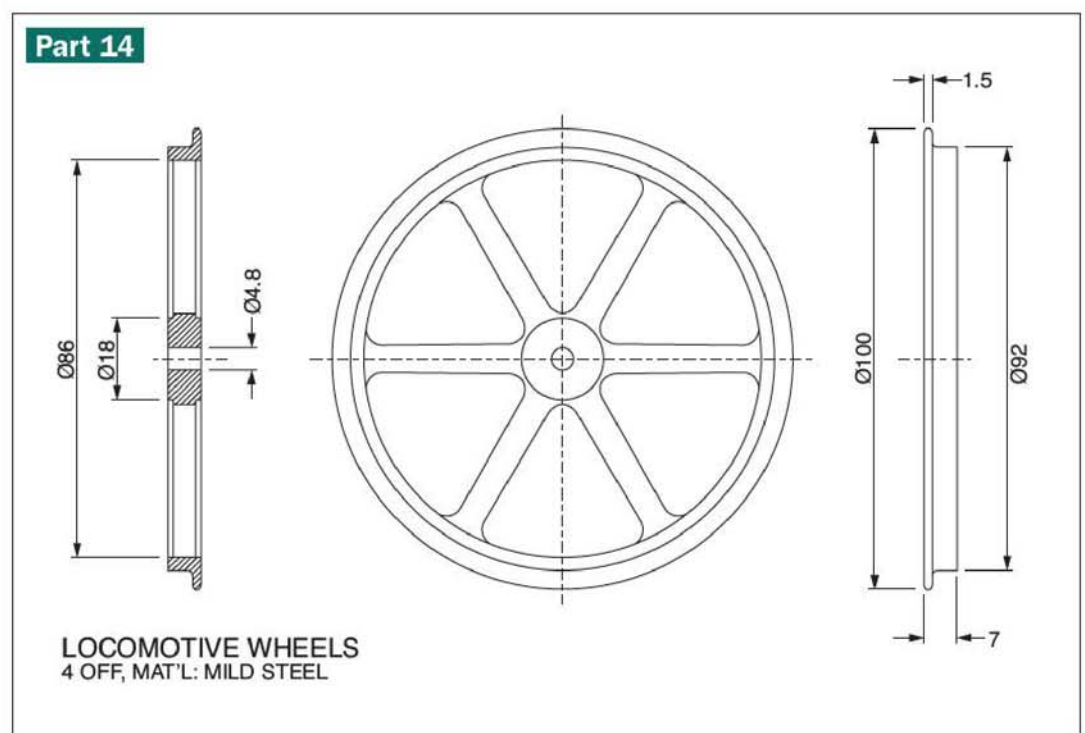
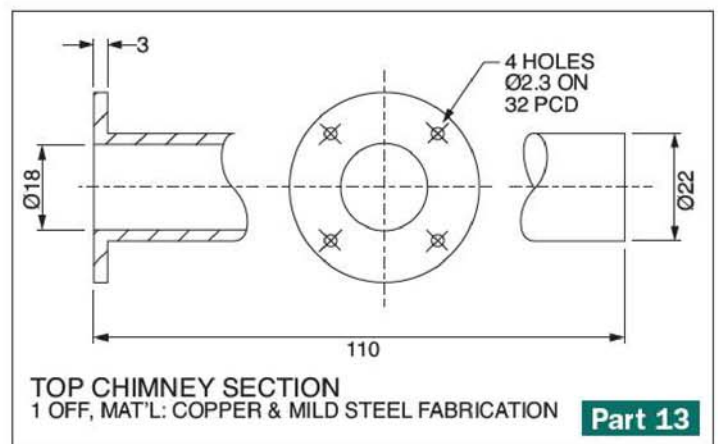
They are metric 1.25 Module gears of 28 and 56-teeth. I used metric gears, not only because they fitted the design better, but in future they will be the only gears readily available and even now are cheaper than the imperial alternatives.

As supplied they need a little modification; first their thickness at 17mm needs to be reduced to 12 millimetres. They could be left as they are but they would



not be to scale thickness. The small gears also need to be opened out in diameter to fit the jackshafts. The large gear needs to have the central hole reduced. I Loctited in a plug and drilled and bored it out later.

Obviously the gears need to be set up very carefully in the lathe chuck to maintain concentricity. I used bored out soft jaws gripping on the outside of the teeth. The material of which the gears are made is not ordinary free

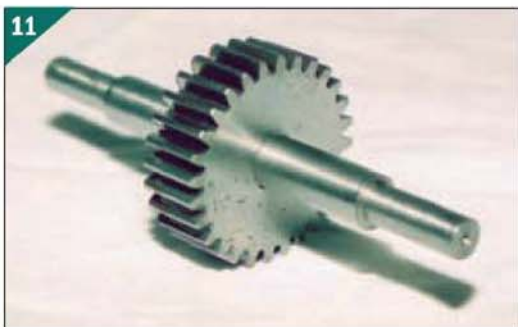




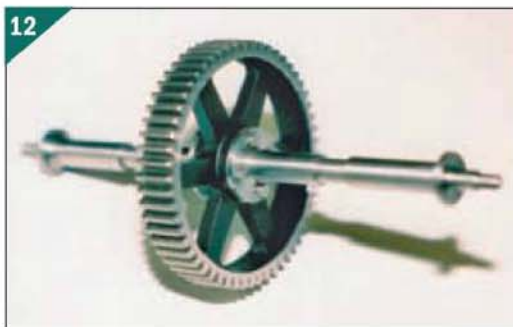
The large gear has been lightened.



Drilling holes prior to milling the spokes.

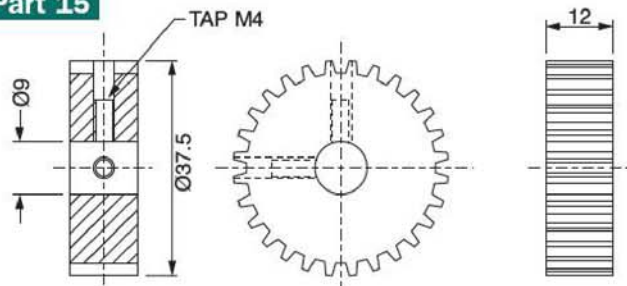


One of the small gears on its shaft.



The finished large gear on its shaft.

Part 15

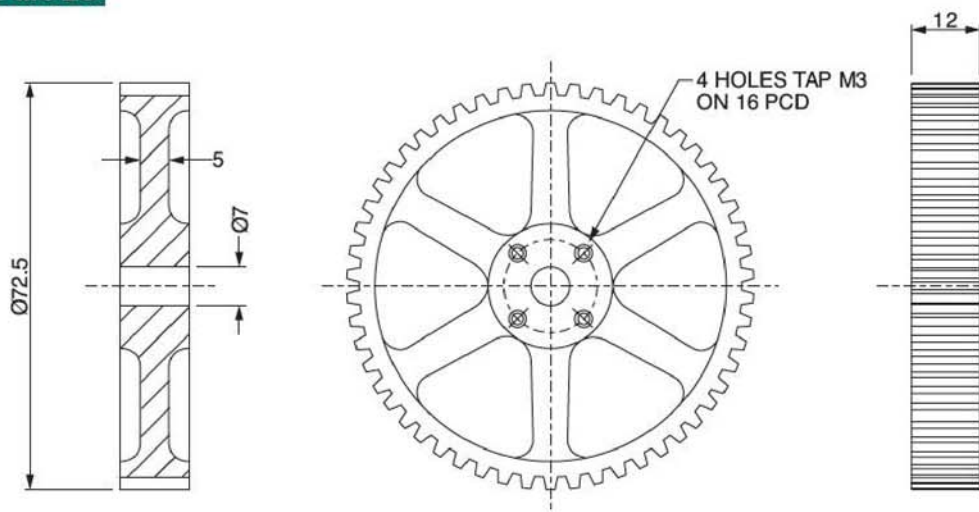


PINION GEARS
2 OFF, MAT'L: MILD STEEL, 28 TEETH, 1.25 MOD, 35mm PCD

cutting mild steel but a tougher grade, and I used carbide tools for ease of cutting.

Machining the teeth was the worst part as there was considerable chatter. I used a depth of cut that overlapped the teeth slightly, which helped to reduce the chattering and with a fairly slow rpm and slow feed machined away most of the waste material at the teeth. After that normal speeds and feeds could be used on the plain parts of the gears.

Part 16



DRIVEN GEAR
1 OFF, MAT'L: MILD STEEL, 56 TEETH, 1.25 MOD, 70mm PCD

The small gears were bored out, with a small boring tool, to a very close fit on their shafts. I expect the full-size gears were fixed to their shafts with wedges or keys. As I wanted to be able to adjust the position of the small gears to enable the cranks of the two shafts to be at 90deg. to each other I cheated and drilled and tapped the gears for two grub screws.

The large gear was centre drilled, opened out to 6.5mm with ordinary drills and finished to size with a 7mm end mill. End mills are to a certain extent self-centring when used in this way and at 7mm the hole is a little small for a boring tool to be used.

The larger gear was also reduced either side to lighten it and so it more closely resembles the cast gear that would have been used on the prototype, and it is seen at this stage in **photo 9**. A round nose tool was used to remove the bulk of the material and a boring tool used on the outer edge to clean out the corner and a knife tool was used for the same purpose on the boss. Do not forget to chamfer the inside edge of the rim.

The larger gear also has six spokes and these were milled out. I cut out the gear centre from the drawing and glued it to the gear blank. The dividing head was set up on the milling machine, as shown in **photo 10** and indexed round to drill junction holes in the corners of the spokes at the rim and boss.

The dividing head was changed for the rotary table and the spokes were milled out with a slot drill. They were all roughed out slightly undersize, and then the cutter was run around for a final finishing cut leaving a nice finish that required the minimum amount of work to prepare the wheel for painting. **Photographs 11 and 12** show the completed gears mounted on their respective shafts.

Drive wheel (Part 17)

The drive wheel is another water jet cut mild steel blank and as you can see from its shape the water jet process saves an awful lot of work.

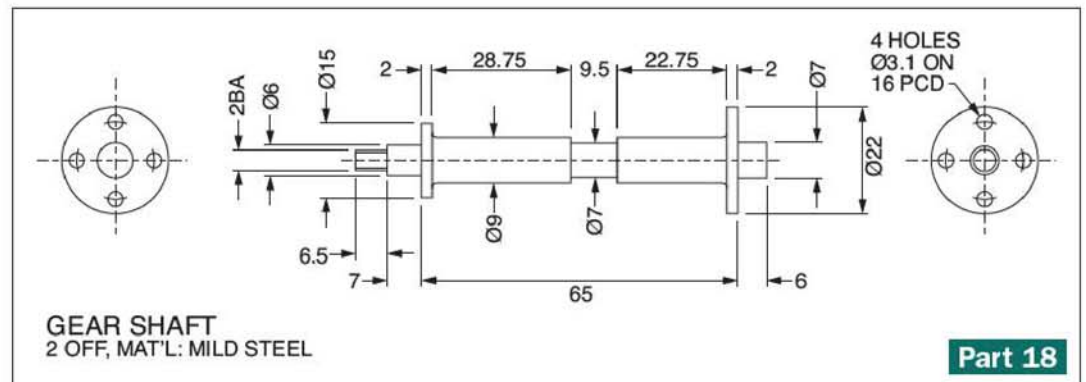
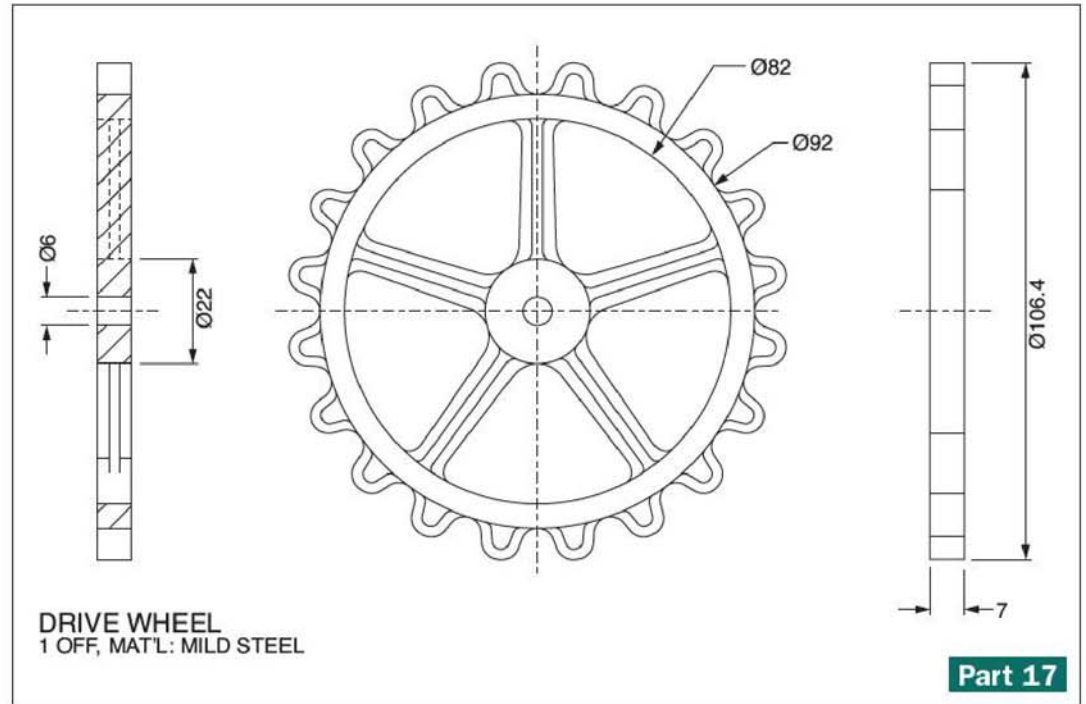
Use bored out soft jaws to mount the blank in the lathe chuck and take a light cut across the face to clean it up. Centre, drill through and ream at 6mm diameter. Reverse in the chuck and reduce to finished thickness.

The spokes are + shaped in section and this was done on the vertical mill. I thought at first to use the rotary table but this proved to be unnecessary, I clamped the gear to the milling machine table as shown in **photo 13** with dogs around the edge. These acted as locators and it was a simple job to use an end mill either side of one spoke then to move the gear around to bring the next spoke into line.

With the machining of the spokes complete, use a half round Swiss file to remove all burrs from the spokes and the teeth and then with the wheel clamped in the bench vice give a vigorous brushing with a wire brush across the tops of the teeth. I found this gave an adequate finish without requiring any further work as can be seen in **photo 14**.

Gear shaft (Part 18)

The main central gear and the drive gear with the track are both on the same shaft, but the shaft itself is in two parts with the drive gear sandwiched between. I expect the nearest stock size for mild steel bar will be 25mm diameter. Hold a length in the 3-jaw chuck and



turn down to 6mm dia., and then 4.7mm for threading 2BA.

Turn a length down to 15mm dia. and then with a round nose tool reduce the section between the flanges to 9 millimetres.

Put in the 7mm dia. seating for the bearing and then roughly form the spigot at the end before parting off. Reverse in the chuck and finish off the stub shaft that fits into the gear

bringing the flange to finished thickness at the same time. Set up the dividing head on the cross slide and index around for the four bolt holes.

●To be continued.



Milling the drive gear.



The drive gear after wire brushing.



NICK
FEAST

Nick Feast

assembles the wheels, axles and crankpins.

PART 8

Continued from page 521
(M.E. 4363, 23 October 2009)

CHARLIE

A Southern Railway Q1 for 3½in. gauge

Once all the drillings in the wheels have been completed we need to add the crankpins. These are simply lengths of 6mm dia. silver steel cut to length (¼in. will do just as well) with the ends drilled and tapped to take 3BA bolts. A standard head 3BA bolt looks right with a standard washer to keep the oil in and the grit out of the con rod bearing (**photo 86**). Chamfer the other end slightly to stop it jamming during the pressing operation. If you are building a locomotive with a mechanical lubricator, then the crankpin for the left front wheel will need to be slightly longer to drive the return crank for the operating rod. Mill or carefully file two flats on this pin to engage the

return crank, which will drive our oil pump.

Know your left and right!

It occurred to me that left and right might not be clear to everyone. So for the 'avoidance of doubt' throughout this article 'left' means the left-hand side of the locomotive as viewed standing on the footplate looking forwards. This is the driver's side on our locomotive; some railways had other arrangements. Driving any of Bulleid's locomotives from the right-hand side would have made sighting signals very difficult owing to the size of the boiler.

Not all the class was fitted with a mechanical lubricator, some stayed with the hydrostatic type to the end of their operating lives. The BR numbers of the Q1 class locomotives that were NOT fitted with mechanical lubricators during BR service are 33002/5/11/12/19/22/23/25/26/28.

The only locomotive I am not sure about is 33024. I have seen photographs showing all the remainder of the class fitted

with mechanical lubricators.

The earliest locomotives were built with hydrostatic lubricators, including the first engine C1, but other than this observation, individual builders will need to do their own research.

There should be room under the cab for an oil cylinder; there will be a boss in the backhead of the boiler available for a steam supply. However, as the mechanical lubricator system I have designed for this locomotive gives reliable but minimal oil metering, it will be possible to drive for several hours without being splattered with surplus oil.

Crankpin holes

We now have to position the crankpin holes on the wheel casting. A suitable spindle should be inserted into each wheel in turn and a line scribed to locate the centre of the hole for the crankpin (**photo 87**). You should be able to gauge the centre of the boss by eye but it is easy enough to check with the vernier callipers. We will need to make a simple jig to fix the radial position of the hole. This will have either a pin, which

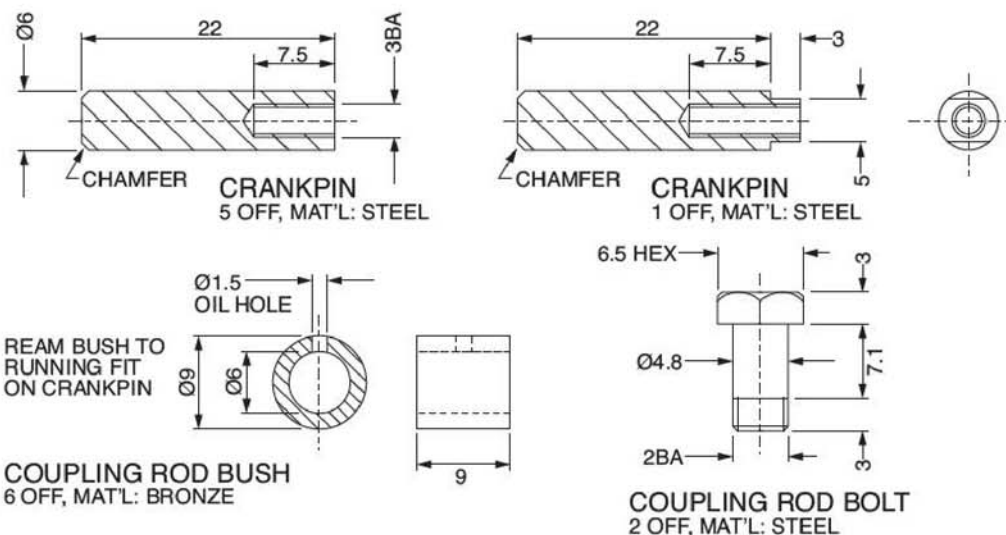


86
The simple plain crankpin, no shoulder, just press in to required depth.

Correction

The 11.5mm wheel width is as shown in the drawing of the axle and assembly, not as shown in the original drawing in issue 4359.

Apologies, this was a *Model Engineer* error, not a designer error.





87 Marking the radial line for the crankpin.



88 Drilling for the crankpin.



89 Pressing in the crankpin.



90 The wheels are ready for quartering.

is a tight fit in the centre of the wheel, or a hole through which close fitting bolt can be passed. Centre the crankpin hole in the jig over the line by eye, bolt up and clamp in a machine vice (**photo 88**). I have relied on the small machine vice on the drill table to stay put while jig drilling the crankpin hole. I have made sure the jig is securely bolted to the wheel though. It would have been better to set it up on the milling table and clamp everything in place.

Make sure the drill is sharp and run at a slow speed and feed in slowly. Let the drill do the work; do not force it through too fast. Do try to get this dead right; any errors here will be multiplied by two as the wheel rotates.

Put a bolt in each crankpin and press the pin in to the wheel as shown using the spacer to set the distance (**photo 89**). The

crankpin is squeezed into the wheel to the required depth set by the brass spacer. Don't use too much pressure or you will barrel out the pin and it will be useless. Only gentle pressure should be needed. If it starts to bind, stop and drift the pin out from the back and ease the hole slightly. If you overdo the easing no need to panic, locking fluid will hold these pins in place just as well. Remember that the pin for the lubricator drive is longer so a longer spacer is required or a couple of washers need to be added. The flats need to be positioned so that the return crank points to the centre of the wheel.

We need a side clearance of around 0.5mm or 20 thou. for the rods. Remember that the axles will also have a little side play and need to articulate independently on rough track,

so we need just over 8mm protruding on five pins, just over 11 on the front left.

Check your curve radii

Before we move on to fixing the wheels to the axles, it is worth mentioning that this model has quite a long fixed wheelbase of 330.5 millimetres. For comparison, a 'Merchant Navy' pacific would have a fixed wheelbase in this gauge of 285 millimetres. Some 5in. gauge designs such as Speedy are less than 330mm, and a 5in. gauge 2-6-0 BR standard class 2 is 370 millimetres. The point of this is that if you propose running on a club track then the curves should not present any problem, but if you are fortunate enough to have access to a private track then check the curve radii. The club track at Bournemouth has 57ft.

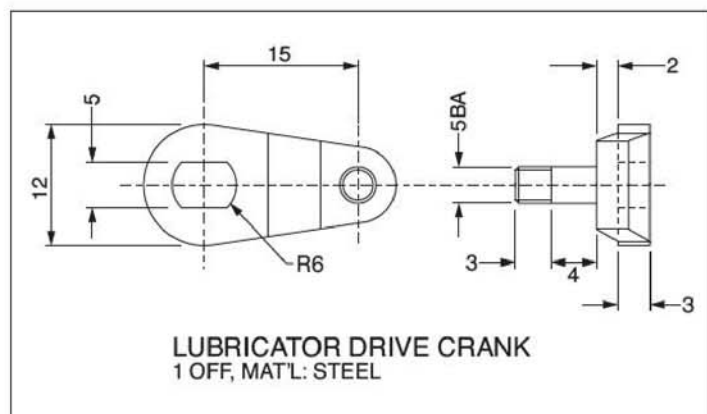
(17.3 metre) radius curves and on this track end 'float' on the front and rear axles of 0.5mm is adequate. The centre axle just needs enough for free running, say 0.2 millimetre. Once we have fixed the drivers onto their axles there is no way of adjusting the running clearance. If you anticipate running on very tight curves it is acceptable to reduce the flange thickness on the centre driver or even remove it completely. It will look a bit odd though.

You will now need to produce or borrow another jig to quarter the wheels on the axles. There are published designs available so I will not go into too much detail here. I used the design by Tim Coles in one of his excellent books on model locomotive building. If you decide to make one of these useful items make sure





The other side of the quartering jig.



it will take the large diameter wheels from an express type locomotive as well.

I made the one shown here over a couple of evenings; we need two edges at 90deg. to each other and in line with the axle centreline. We should have made the fits so that one wheel was a press fit and the other a sliding fit on its axle. The front and rear axles are simply pressed on using the vice. Be careful the jaw doesn't come right out and land on your foot if you are at the limits of its travel. As I have said before, I always wear steel toecap shoes in the workshop these days, even with 3½in. gauge locomotives the parts can be heavy if you drop them.

If your vice won't stretch to this operation, either buy a bigger vice, or find someone with a press to do the job. Do beware of applying too much pressure, bending an axle or splitting a casting; hydraulics are effortlessly powerful.

Fitting the wheels

The wheels have been fully drilled (photo 90) as per previous instructions. The quartering jig is used on the driving wheels, with the elastic bands holding everything still

while the locking compound sets. The Royal Mail delivers rubber bands to every driveway and pavement in the land, especially for this purpose!

The centre axle must be treated with care and tight fitting packings inserted to support the webs before any axial pressure is applied. The big end journal on the crank is 180deg. to the crankpin on the wheel on the same side. This is not a vitally precise position but it does help balance the out of balance weights, if you see what I mean. The relevant axlebox must be fitted before the wheel is pressed on.

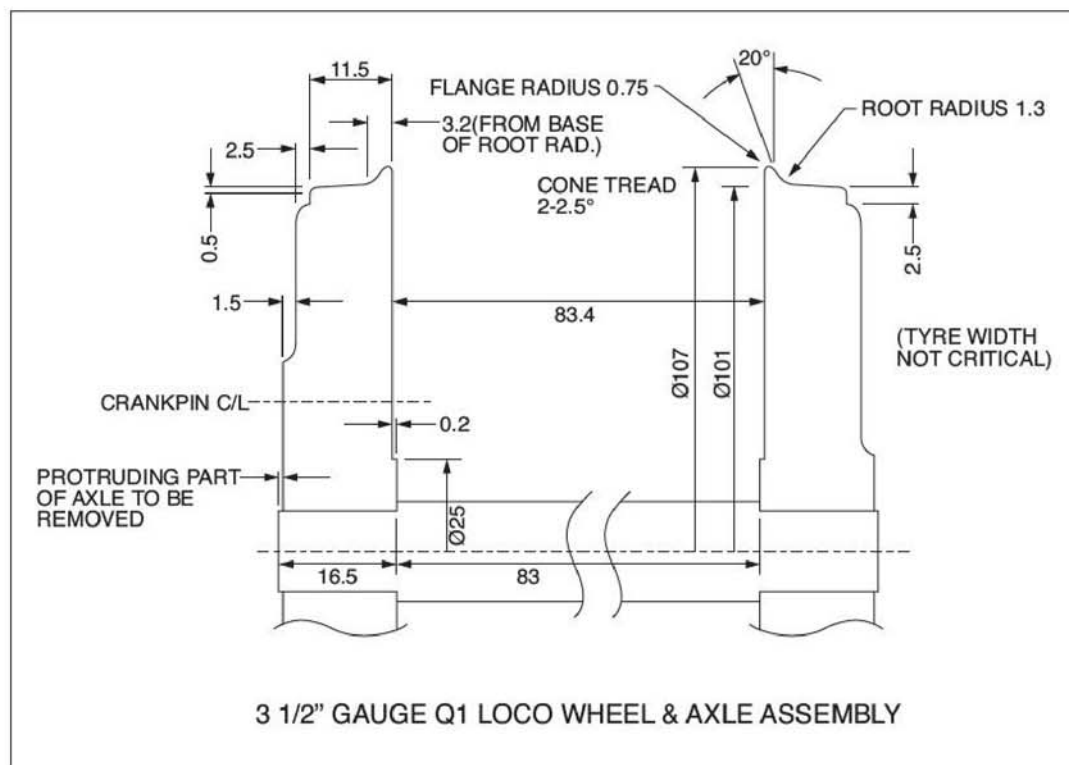
Next fit the rest of the axleboxes to the axles and use high strength locking fluid to set the second wheel using the quartering jig (photo 91). Note that the right crank leads the left crank in forward running by 90deg., a quarter of a turn, hence 'quartering the wheels'.

We can now drop the axleboxes into the frames and spin our wheels for the first time (photo 92). Fit all the wheel sets to the frames and check that the wheels are dead level. If they are not make adjustments by shimming or removing a small amount of metal from the hornstays.

They should be pretty true but if any are really horrible you will need to probably remake the spindle and bore out the hub of the wheel(s) concerned to fit a plug and start again. Rather than scrap your expensive castings find a sympathetic colleague or club member to do this for you. There is no shame in asking for a bit of help, it's what model engineering clubs are for. A few years ago I would have suggested going to evening classes at the local school but I should imagine metalwork shops are a thing of the past now in the secondary education system.

Return crank

This can be made next and is simply cut out of a piece of mild steel with a small pin brazed, or silver-soldered on, to drive the pump rod (photo 93). Before



3 1/2" GAUGE Q1 LOCO WHEEL & AXLE ASSEMBLY



92 Checking that the wheels are dead level.

attaching this, put the piece in the vice and use a copper faced hammer to put a couple of creases in it to set it out by a couple of mm. Then drill a 5mm dia. hole in the big end, which can be filed to match the end of the drive pin. The arrangement on the full-size

locomotive was slightly different in that a mechanical lubricator was mounted just below the smokebox. If you are going for hydrostatic oiling this could be modelled as a dummy, with a finer scale drive linkage.

Photograph 94 shows the swansong of the Q1 class on



93 Return crank and mechanical lubricator drive on C1.

BR. It is 19 March 1966 and 33006 has brought the LCGB 'New Forester' Railtour to Lymington Pier. This locomotive had been officially withdrawn three months previously, and this was probably its last train. Buffer heads, rods and smokebox door hinges have

been whitewashed; the number plate and the 70C shed plate are still in situ. Fortunately it is low tide so the enthusiasts can walk along the causeway for their last Q1 photos. I am standing in the group on the far left.

● To be continued.



94 The LCGB 'New Forester' Railtour to Lymington Pier. (Photo: John H. Bird, courtesy Southern Images)

Freelance Beam Engine Frivolity



MARTIN RANSON

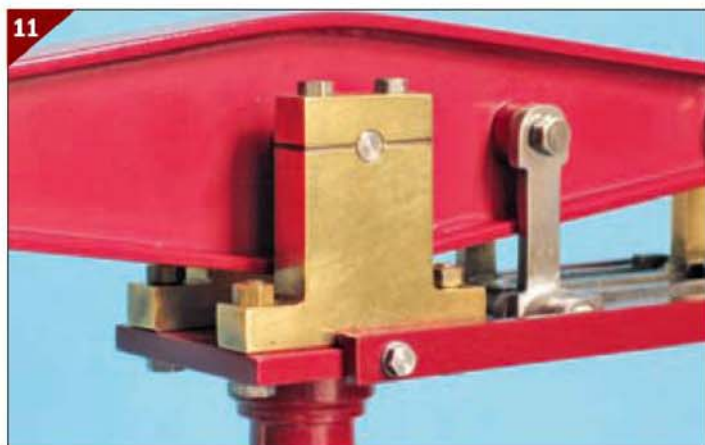
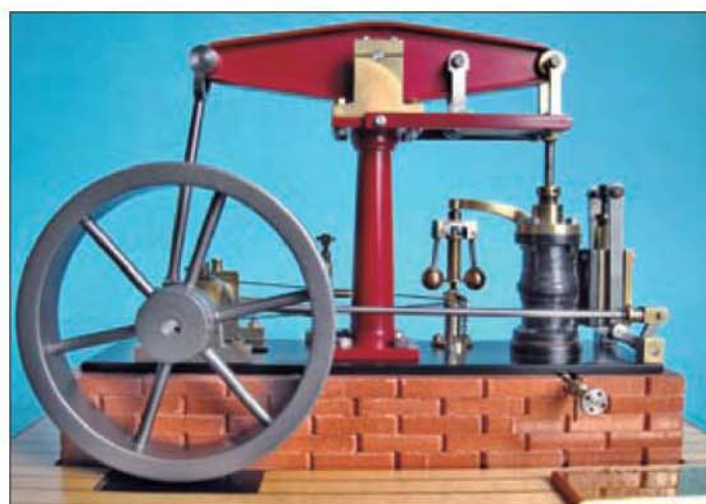
Martin Ranson

continues by making the bearing blocks, the cylinder, the valve chest and the connecting rod.

PART 2

Continued from page 573
(M.E. 4364, 6 November 2009)

The beam bearing blocks are shown in **photo 11** and **fig 6**. These are made from 1/4in. brass cut and filed to the correct outline. The two bolts in the top of each are dummies as the block is not split. Nowadays I would split the blocks as this would make it easier to re-install the beam. One end of the beam spindle is slightly squashed in the vice so it is a tight fit in that block and thus clamps itself in position. There are no special points in their construction except the two holes for the beam bearing pin



Beam bearing blocks.



Crankshaft bearing blocks.

must match each other. The outside surfaces of the blocks are a straightforward hacksaw and filing exercise.

The method used to align the beam and column onto the baseplate is to ensure the beam is square to the

column top and the beam then needs to be parallel to the length of the base. Note the bottom of the column is threaded internally 0BA. The bolt that fits in here serves two purposes; its first use is to clamp the column and the

BEARING SPINDLE Ø0.125
1.012 LONG, SILVER STEEL

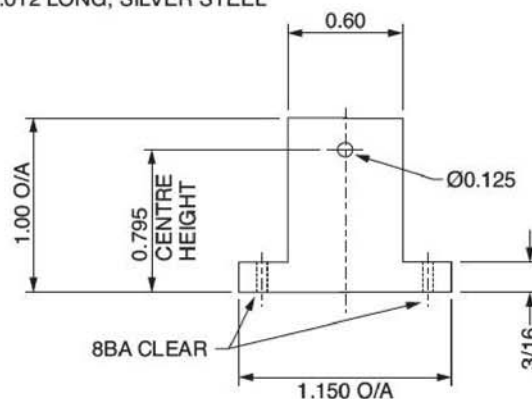
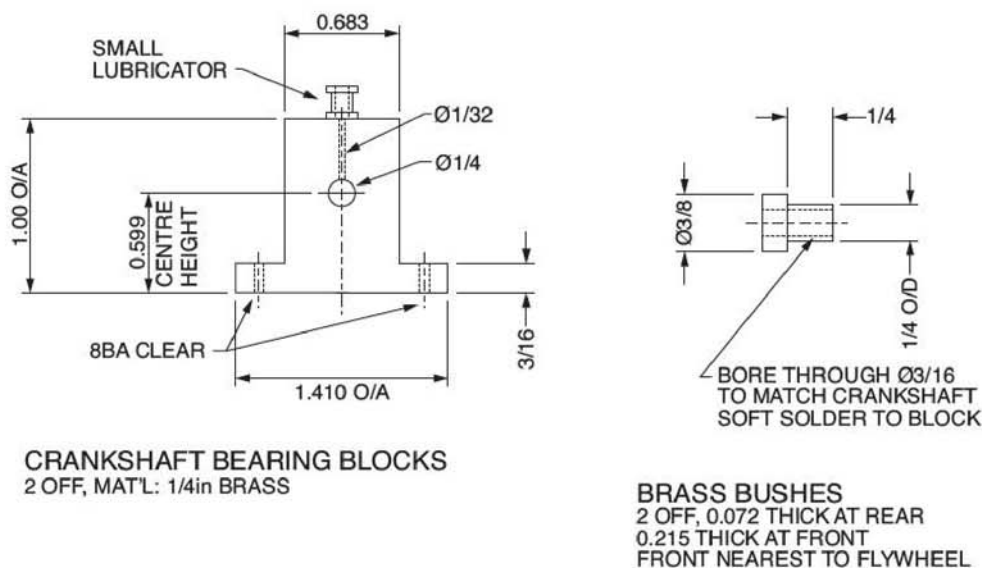


Fig 6

N.B. LIGHTLY GLUE BLOCKS INTO THE CORRECT ALIGNMENT ON THE TOP PLATE OF THE SUPPORT COLUMN. ALL FOUR HOLES CAN THEN BE SPOT DRILLED & THEN DRILLED TO 8BA CLEARANCE. GLUE IS DESTROYED BY A SMALL AMOUNT OF HEAT FROM BLOWLAMP

BEAM BEARING BLOCKS
2 OFF, MAT'L: 1/4in BRASS

Fig 7



through for 8BA clearance onto the base plate and subsequently drilled. All the engines I have ever made end up with hidden centre drill marks to show which bit goes where. The underneath of the bearing blocks and the top of the baseplate are easily marked where the holes cannot be seen. Nowadays I would use two ball-bearings for the crankshaft; there is plenty of space and all the engines that have been built since then using ball-bearings run extremely smoothly. To make sure the bearing blocks stay in line it would be very easy to drill two small holes through the base into the bearing blocks so a pin or spigot would be fitted into each one.

Cylinder and valve chest

As stated earlier, this is the only commercial item in the entire construction (photo 13 and figs 8, 9, 10 and 11). It is labelled as brass on my sketches, but what type is unknown although the piston I made was from bronze. When the engine was first run on compressed air, its performance was not as good as I had hoped. It turned over by hand very smoothly but

beam assembly so it can be set parallel to the length of the baseplate, either by eye or by marking parallel lines on the baseplate. With this completed, the remaining four holes can be spotted through and drilled 6BA clearance. (Nowadays, I would use 7BA to look a bit neater.)

Secondly, the middle of the OBA bolt is threaded 6BA; the 6BA bolt is used for finally clamping the entire assembly down onto the brick base and whatever the bricks sit on. For my purposes this has ended up as a piece of 1/4in. ply planked over the top to look like floorboards.

This is the present floor although over the last 40 years it has had various other designs and colours including 'real' slate tiles. However, these slowly warped and, after six months, they curled up like an old dried sandwich and had to be removed.

Crankshaft bearing blocks

These are similar to the beam blocks except there is a brass bearing bush through them (photo 12 and fig 7). There are several important considerations for these blocks; first the drilled holes for the crankshaft need to match to

make the shaft height parallel to the baseplate. The shaft needs to be at 90deg. to the beam length and the shaft centreline needs to be under the centre of the hole where the connecting rod is fastened. Using a dummy length of 3/4in. silver steel as a temporary crankshaft, all of these things can be solved

quickly. My method, which has been used many times over the years since then, is to lightly glue the blocks into place in the correct position. The outside edges of the bearing blocks line up with the outside edge of the baseplate.

When the glue is set, the clamping holes can be spotted

Fig 8

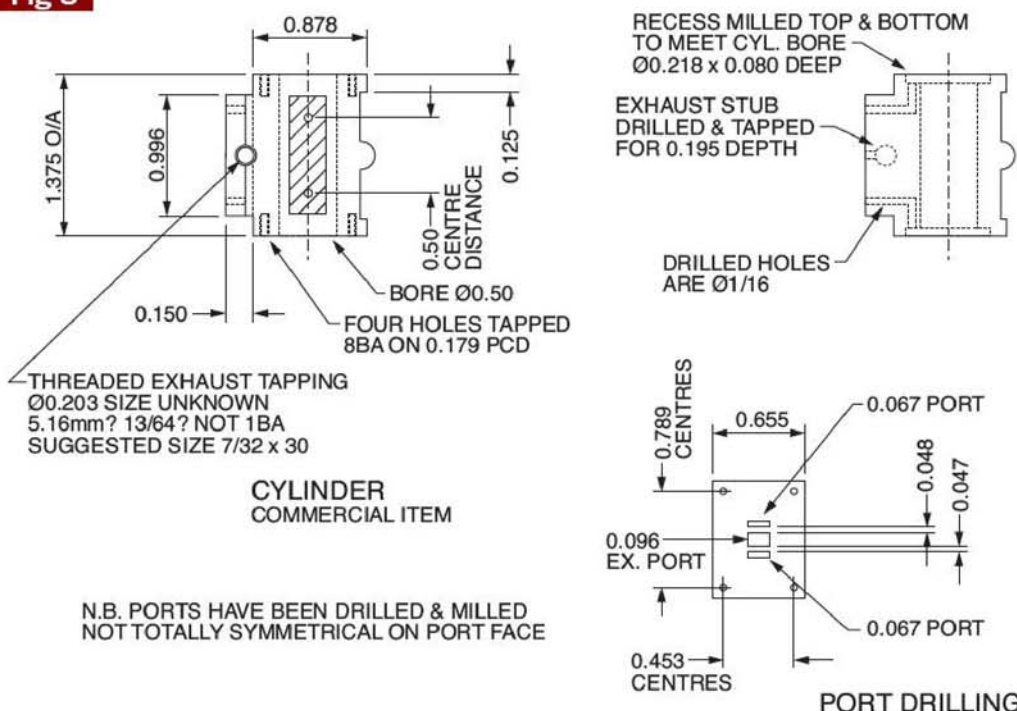
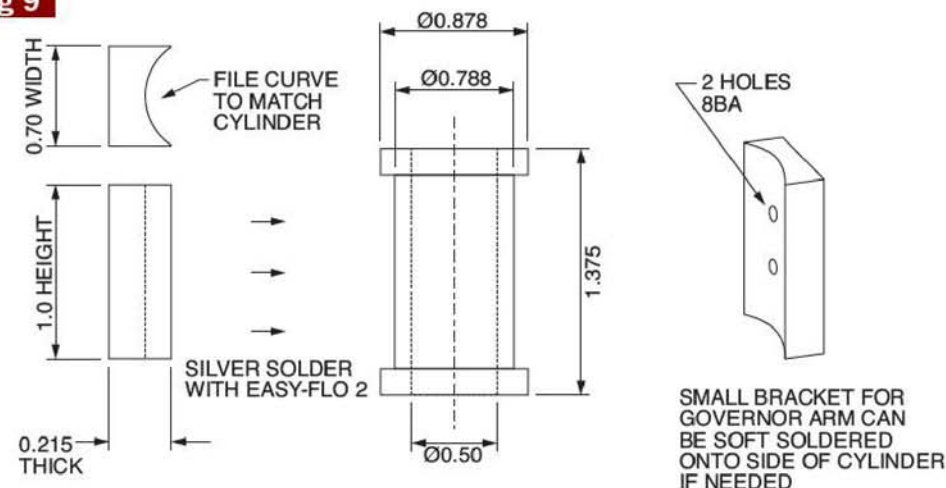


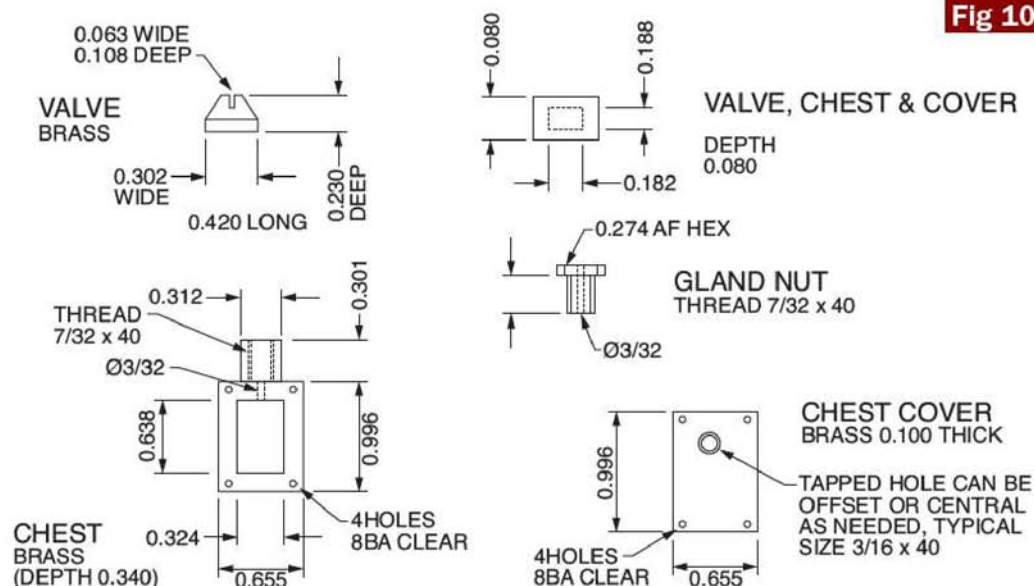
Fig 9

ALTERNATIVE CYLINDER & VALVE CHEST
2 PIECES OF GUNMETAL, SILVER SOLDERED

needed lots of pressure to make it work. The actual valve could not be set exactly by eye as it was not easily visible through the steam inlet hole.

The exact travel required and especially the valve positioning was a bit of a guess. As manufactured, the valve chest and its cover were one piece of metal. One of the later alterations to this engine was to carefully file away the metal forming the cover. This meant a new cover needed to be made from brass sheet, but valve setting was now extremely easy as the chest could be bolted onto the cylinder minus its cover. The slide valve could be seen perfectly and easily set so the ports were just cracking open at top and bottom centres.

Note the shape of the ports; they have been drilled and then partly opened out with a small milling cutter. The resulting shapes are not symmetrical and the miller has not been used totally square to the valve chest. This does not matter too much as the valve is set to the nearest point of opening as it slides up and down.

Fig 10

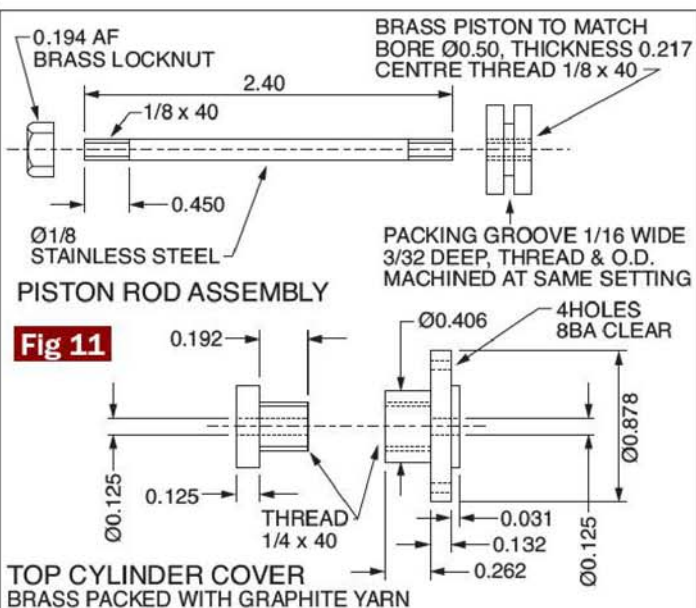
VALVE, CHEST & COVER
DEPTH 0.080

GLAND NUT
THREAD 7/32 x 40

CHEST COVER
BRASS 0.100 THICK

Connecting rod

At the time I had never made anything like this before, so there were one or two prototypes built and then scrapped because something did not fit properly. The final method was to make the small-

**Fig 11**

TOP CYLINDER COVER
BRASS PACKED WITH GRAPHITE YARN

13

Cylinder showing the inlet, exhaust and governor bracket.

end and the rod from steel and the big-end from three pieces of brass (**photos 14 and 15** and **figs 12 and 13**). The fork at the top end was made as a circle and then cut down to a half-circle but with two small pins left protruding. I used a file on the redundant half of the circle with the required remainder clamped in the vice. Yes, this was somewhat brutal on the file teeth but it was a very fast method to make the pins. The circular steel discs fitted on each side of the beam end had a small hole drilled into them which matched the pins. To clamp it all together for silver-soldering a large brass spacer washer was placed between the discs and secured with a long bolt. My silver-soldering in those days was very heavy-handed so I spent a long time cleaning off the excess. The rod itself was not really machined, I cheated and filed the ends down as the piece of steel was spinning, (My apologies if anyone is horrified, but it was over 40 years ago!).

● To be continued.



Connecting rod showing the big end.



Connecting rod showing the fork.

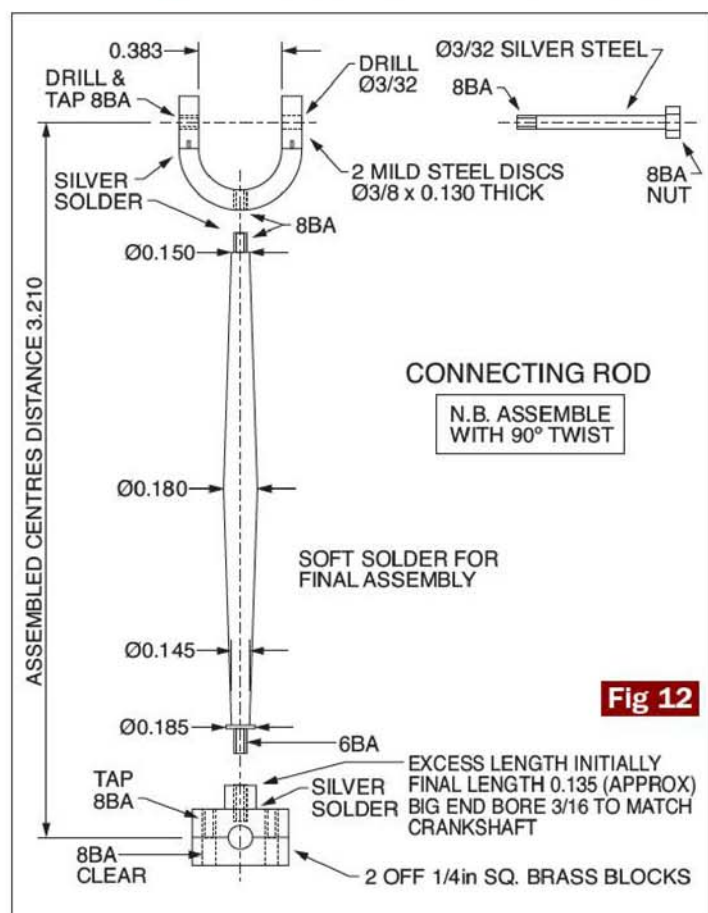
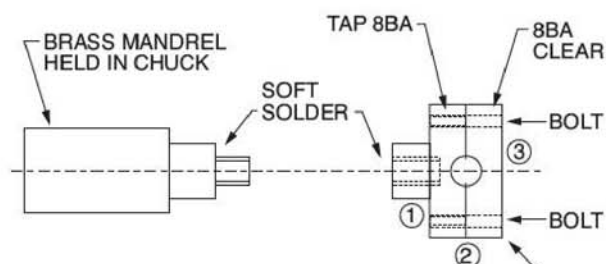


Fig 12

Fig 13



2 OFF 1/4in SQ. BLOCKS SOFT SOLDERED TOGETHER CLAMPED BY 8BA BOLTS, WHICH ARE REMOVED WHEN THE BIG END & MANDREL ARE SOLDERED TOGETHER

CUT EXCESS MATERIAL GENTLY FACES MARKED 1, 2 & 3 CAN BE CLEANED UP GENTLY

CONNECTING ROD BIG END MANDREL

Beginners start here



DAVID CLARK
Editor

In the workshop
with the editor.

PART 6

Continued from page 603
(M.E. 4364, 6 November 2009)



Following along from last time, the bedplate and soleplate were drilled ready for tapping. Tapping will have to wait until I have built a George Thomas tapping and staking machine. I have started to machine the castings and they are the current basis of the *Practical Engineer* series in *Model Engineers' Workshop*. This time, we will look at machining the bearing seatings. The castings should still be set true after the drilling operation so it is simply a matter of moving the table so that the bearing slot is 1.250in. from the datum point, **photo 21**. (Also see fig 1 in M.E. 4364, 6 November 2009.)

To machine the bearing slot, I used a $\frac{1}{8}$ in. ball nose cutter. Lock the table in the X-direction and add a tiny bit of drag in the Y-direction by very lightly nipping the locking screw. Not much, just to remove any sideways play.

When we machine the bearing slot, it needs to be fairly

accurate on the width and depth but does not need to be perfect. When painted, the paint will add at least 1 thou., maybe 2 so I aimed for 2 thou. clearance on the bearing stick. I machined the slot by raising the table about 10 thou. at a time until I just cleaned up the bottom of the radius. I measured the slot and found it was 0.425 inch. I moved the table 5 thou. each side of centre taking a cut off each side. Then I tried the bearing blank in the slot. The blank went in correctly on the width but the slot was not deep enough. I took two more cuts of 10 thou. and the bearing almost touched the bottom. A further cut of 5 thou. allowed the bearing to seat accurately to depth and had minimal play in the slot, **photo 22**.

You may have to lightly ease the sides of the bearings when you fit them but the bottom should be fine as the paint on the bottom of the slot will be

compensated by the paint on top of the bearing seat. Only the sides might lightly close in because of the paint. Although you will probably use several coats of paint on the main castings, possibly with filler as well, as long as you have a thin coat or two where the bearings seat that will be fine as it is not seen and is only really there to prevent rust.

I have not finally decided how to machine the bearings yet. Thinking about how to machine a job beforehand is half the battle to getting it correct. Whichever way I machine them, I needed to square the ends up so they are true. I put the bearing blank into the vice on parallels and machined each end square to the sides, **photo 23**. The two methods I am considering are to drill the bearing block for mounting bolts, saw into two, fit them to the casting and then drill and ream through while fitted. This would ensure they are dead in line. The other method is to put the bearing block vertically into the vice on one of its parallel ends and drill and ream through making sure the hole goes through parallel and square. I do favour the first method as it should be far more accurate.

One last little tip, I use a small fine diamond hone for deburring small components, **photo 24**. It is much finer than a needle file but does the job very well. These little hones are available for about £5 or £6 from suppliers like Arc Euro Trade.

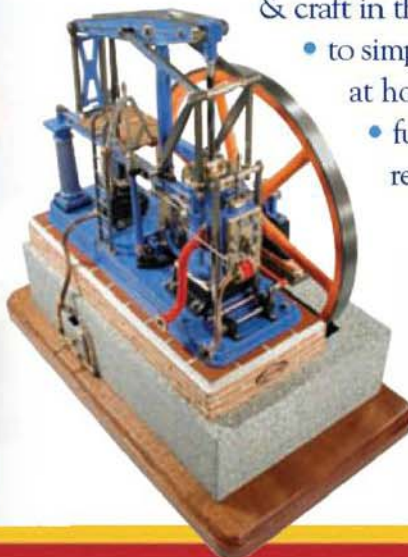
● To be continued.



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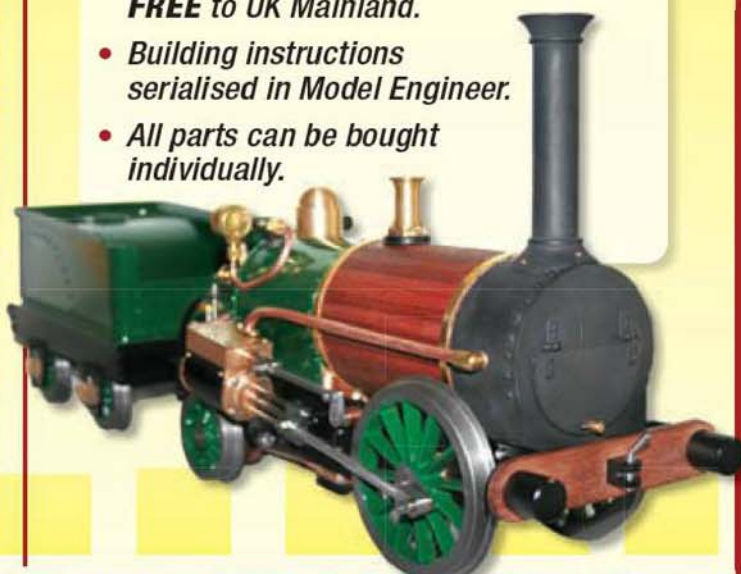
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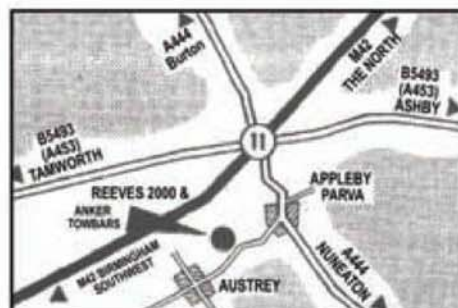


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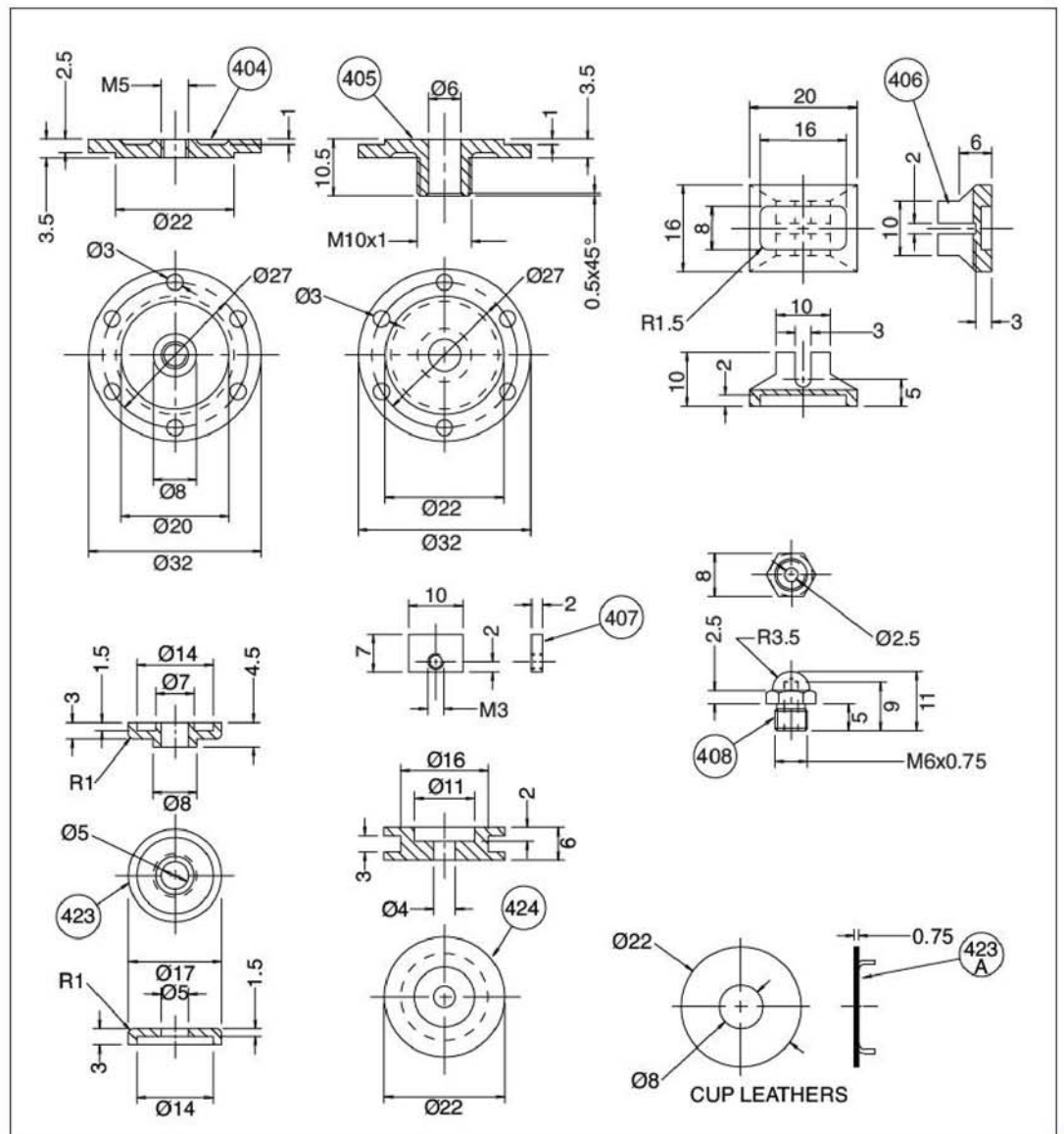


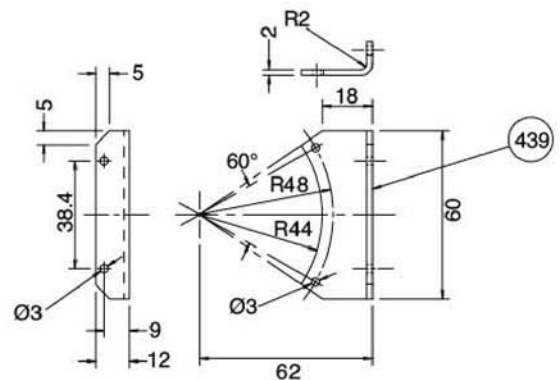
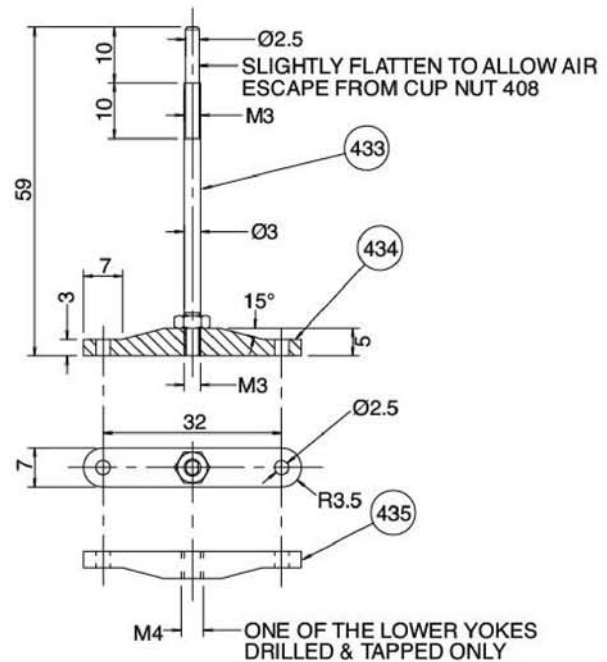
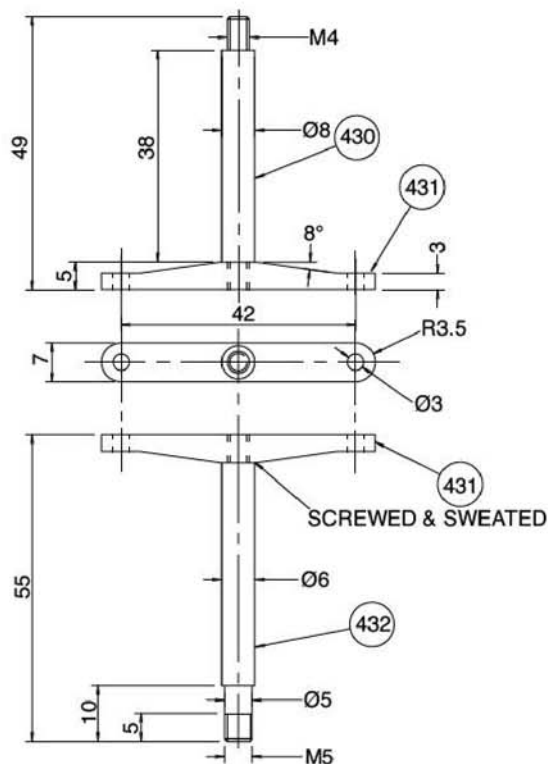
GÜNTER
KALLIES

Günter Kallies
continues the
description of his
horse drawn fire engine
with the rest of the
engine drawings.

PART 8

Continued from page 591
(M.E. 4364, 6 November 2009)





Myford Ltd Autumn show

Myford have just celebrated their 75th anniversary. Doreen Paviour baked an extra special cake, shown with Teddy Myford (**photo 1**) and Chris Moore did the honours by taking the first cut (**photo 2**). **Photograph 3** is of Malcolm from Myford pictured here with Teddy Myford. Malcolm is retiring next April just after the spring show. There is no truth to the rumour that Teddy Myford is taking his place! I have put my name down to visit the Spring show next year. I hope to see many of you there. **ME**



Will Hay - comedian, astronomer and engineer



ROGER BACKHOUSE

Roger Backhouse looks at the life of a famous model engineer.

Will Hay was one of the greatest comic stars of 1920s and 1930s entertainment.

His films like *Ask a Policeman*, *Convict 99* or *Oh, Mr Porter!* remain film classics. Not so well-known is that he was an engineer and a modeller. Will Hay's father was born in Perthshire and served an engineering apprenticeship. As an engineer he took out 11 patents, including a device to stop lifts from overwinding and later started his own firm. Early work as an engineer's fitter took him around the country, including Stockton-on-Tees where Will Hay was born in 1888.

Once settled in Manchester, William Hay senior introduced his children to music and concert performing starting young Will on the stage. Will was apprenticed in engineering at Westinghouse but studied other subjects at night school including several languages. In his free time he gained a reputation as a comic winning a talent contest at the Palace Theatre Manchester in 1909. He joined a Fred Karno review and later developed his school master sketch - the 'Fourth Form at St Michaels'. In this Hay played the pompous, rather stupid teacher with smart aleck 'schoolboys' he later refined into a laughable authority figure in films.

Touring music halls made him one of the best-paid variety artists, earning over £700 a week in the 1920s. By the 1930s he'd moved into films, first in a production of Pinero's *The Magistrate*, then into his own comedies.

A passion for aviation

Will Hay had an early passion for aviation; technical aspects of flight always appealed to him. Helped by his brothers and sister

he made an unsuccessful glider in 1909 then qualifying in 1926 as a pilot of powered aircraft.

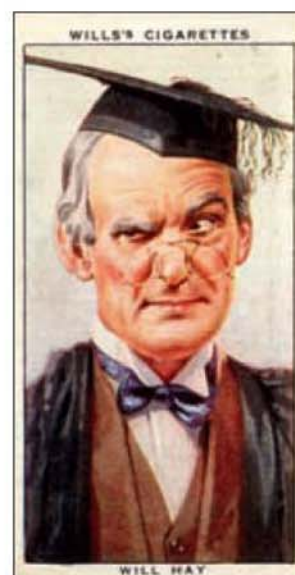
A childhood interest in astronomy also became a passion. At home in Norbury, South London, he had a fully equipped observatory with a 12in. refractor telescope where he developed his own equipment including a blink microscope and spider web micrometer. Although particularly interested in tracking comets his discovery of the spot on the planet Saturn made him celebrated in astronomical circles. Fittingly, asteroid 3125 was named Will Hay in 1982.

Will Hay is known to have made several clocks. Even on tour he made a cheap chronograph with Meccano parts. His son Billy recalled being sent out to buy a Number 5 Meccano set and a clockwork motor. This was probably the one improvised backstage at Leeds Paramount theatre where he installed a vice in the dressing room and borrowed a soldering iron from the theatre electrician, using curtain rods and an old bell to perfect the timepiece.

When Will Hay moved to Hendon he made a model traction engine and tried it out on a local road pulling three home-made trailers up a hill. He failed to notice the traffic building up behind until a local constable pointed out what was happening.

Lost in calculations

Will Hay thought of himself first as a scientist and engineer, and then as an actor. He was often seen as a loner, lost in calculations. He contributed to the charitable work of the Grand Order of Water Rats and the forces entertainment service ENSA.



Dr. Alec Smart.

His scientific approach lies behind his approach to comedy. Never a man for ad-libs everything was carefully planned for maximum comedy effect. His films remain hilarious, including the scene in *Oh, Mr Porter!* where he wrecks the naming ceremony of *Silver Link* and the climatic chase on Brooklands racetrack in *Ask a Policeman*.

By coincidence his collaborator on *Oh, Mr Porter!*, Graham Moffatt, was also a modeller. Moffatt later ran the Englishcombe Inn at Bath where he made a model railway and garage for his son.

Sadly, there are no records of Hay's models surviving. Thankfully, his films do to give endless enjoyment by one of the greatest stars of comic cinema.

Further references

Will Hay by Graham Rinaldi published by Tomahawk Press, 2009, ISBN 13-978-0-9557670-2.

W. <http://www.willhay.co.uk/>
W. <http://homepage.ntlworld.com/trevor.buckingham/willhay.htm>

ME

How do they make that?



Inchanga visits
a modern cutting
tool factory.

Samuel Osborn Ltd of Sheffield, England founded Somta Tools in 1954, through its subsidiaries Osborn Steels and Osborn Mushet Tools. The name Somta was chosen as the acronym for these companies operating in South Africa. From humble beginnings in 1954 with 20 employees, Somta has grown into one of the largest cutting tool manufacturers in the southern hemisphere, operating from offices and modern manufacturing facilities laid out over 7.5 acres with a complement of over 600 employees. The factory in Pietermaritzburg, Kwa Zulu Natal, manufactures 25,000 standard items and a further 6,000 made-to-order items to serve local markets and export markets in over 60 countries worldwide. Somta Tools specialises in the design and manufacture of drills, reamers, milling cutters, tool bits, threading tools and custom tools for the industrial and 'do it yourself' markets.

Model engineers use a large variety of cutting tools such as drills, milling cutters, taps, dies and reamers without bothering to think how they are made. Take a twist drill and examine it, it is fairly obvious that the spiral flutes are probably cut with a round nose milling cutter and then the material is heat treated and tempered. Sounds easy enough if you have the right sort of tackle and the drill isn't too small. Many cutting tools are made from high-speed steel, a very hard material, and today many are made in tungsten carbide, an even harder material. And what about the really tiny drills, taps and reamers, how are these made? To answer these questions I arranged to visit a local tool manufacturer, Somta Tools.

Blanks

The production of high-speed steel tools begins with a blank that is cut to length from the appropriate diameter of bar (photo 1). The high-speed steel is supplied in a soft condition with 5% or 8% Cobalt content; the higher the cobalt content the harder the steel will be when heat-treated. The blanks are cut with a power bandsaw or an abrasive cut-off wheel. For tools of less than 5.4mm dia. the soft high-speed steel is supplied in coils of wire. These are straightened by twisting in a special machine and pulled through die blocks and then cut into standard lengths to suit the job.

Twist drill manufacture

The earliest helical flute drills were made from flat tool steel bar, which was then heated and twisted to form the flutes, hence, the name twist drill. Today the helical flutes are machined from a round tool steel or high-speed steel bar. Although the obvious way to do this is to use a round-nose



Part of the extensive stockholding of raw bar.



Blanks cut ready for next phase.

milling cutter this is not always the case. Depending on the diameter of the drill it can also be formed by grinding.

The flutes are cut in one pass by a special grinder, a Hertlein drill flute grinding machine. Somta purchased its first one in 1963, even before the parent Sheffield company bought one. This machine is still in operation today after an extensive rebuild. This machine grinds the flutes of a drill (up to 13mm dia.) in one pass in a solid blank. The production rate of this machine is about 300 drills per hour for a 3mm dia. drill and about 200 drills per hour for a 13mm dia. drill. For drills larger than

13mm the flutes are cut with rounded profile milling cutters on automatic machines. Somta Tools makes its own special cutters in house.

As the material used is expensive, for larger tools the shanks are often made from a lower cost material and the two parts joined by friction welding using a special purpose machine. **Photograph 2** shows several bins of drill blanks.

After the flutes have been milled or ground the parts are loaded onto another grinder that provides the cutting edges and clearance angles. After grinding the drills are heat-treated and some have an extra titanium nitride (TiN) coating applied.



3 A stub drill compared to a standard drill of the same size.

Somta manufacturers jobber drills between 0.2mm and 20mm dia. as standard stock items, as well as imperial sizes from $\frac{1}{16}$ th to $\frac{1}{2}$ th in. x $\frac{1}{16}$ th increments. They also manufacture Morse taper shank drills, slow spiral, quick spiral, left-hand, long series, extra long series, centre drills and core drills in all the

popular sizes. The standard range of drills is high-speed steel and more recently TiN coated versions for longer life.

Stub drills

The stub drills (photo 3) are a useful range for model engineers. These are short parallel shank drills with only

two or three twists and hence are sturdier in the smaller sizes. They are available from 1.5mm to 25mm dia., in 0.1mm, 0.2mm, 0.3mm or 0.5mm increments depending on the size. A set of these for the common tapping drill sizes would be a useful addition to any workshop. Depending on the size they are about 10 to 20% less expensive than a standard jobbers drill of the same diameter.

Morse taper drills

For these drills the blank is first pre-formed to make the taper shank and any other details needed. Photograph 4 shows

a Morse taper tool with a taper shank and other details. The two on the right have only received the taper shank and a dummy centre point for the second machining operation. After the flutes are cut or ground (photo 5) the cutting faces are ground to the required angle and then a second operation backs-off the tips with the correct relief angle to improve the rate of metal removal. Photograph 6 shows Mr. David Risk, International Sales and Marketing Director of Somta Tools holding the 42mm drill seen being cut in photo 5.

Photograph 7 shows 1-hour's output from one of the automatic flute grinders. These are 8mm dia. standard jobber drills.



4 Morse taper drill blanks.



5 Forming the flutes with a profiled milling cutter.



6 The drill shown being milled in photo 5.



7 Drills with their flutes ground.



8 Tools as they leave the heat treatment bath.



9 TiAlN coated roughing mills.

Heat treatment

This is an important process and has to be carefully controlled. The electric furnaces at Somta Tools are computer controlled to exact temperatures, a bit like a devil's kitchen, and have salt baths to immerse the tools into for treatment. Definitely not the place to be in summer!

Photograph 8 shows a holder containing tools being drawn out of the heat treatment bath. They are then quenched in oil. After heat treatment the tools look pretty blackened and have a layer of flaky crust. They are then shot blasted to a shiny bare metal finish.

Titanium coating

Somta Tools have recently invested in a Balzer titanium coating machine. This deposits either TiN or TiAlN by an electrostatic process and then by a process of heat treatment cures the film deposited. The film applied is only a few microns thick, but increases the life of the tool by 2 to 10-times depending on the material it is used on. TiN is harder than carbide tools and withstands high cutting pressures and temperatures. Photograph 9 shows roughing end mills after TiAlN coating (still in coating holder). TiN coated drills are shown in photo 10. The shank of the tool to be coated is inserted into a tubular holder that excludes the vapour being deposited so

it remains bright. **Photograph 11** is of TiN coated taps still mounted on the coating holder by spring clips.

Marking the finished product

Somta Tools use a number of computer-controlled laser marking tools to burn in the writing on the shank of the tool so giving a permanent marking (**photo 12**). These machines are very fast; a 13mm drill takes a few seconds.

Reamers

These are made either for hand operation, or machine operation, and have either parallel round shanks for collets, square ends for a tapping wrench, or Morse taper shanks. Again, the high-speed steel blank is milled or ground to final size in one pass and then heat-treated.

Milling cutters

These are made using similar techniques to drills and reamers. A new milling cutter is now available made of solid tungsten carbide which is very hard and useful for very tough materials like stainless steel (**photo 13**). The blanks are produced at another site and ground on a CNC grinder (**photo 14**). **Photograph 15** shows a special double-ended end-mill made for a US customer for production machines.

Taps

Here is where I had the biggest surprise. Having made the odd special tap for a job, I cut the thread on silver steel using a die and then cut the flutes and hardened the tap. Somta Tools uses an entirely different method.

The blank is machined to the required size and profile and the flutes cut in the normal way by milling or grinding. It then goes to an automatic tap-grinding machine that has a large grinding wheel with the thread form on the face of the wheel. It looks a bit like a poly-V pulley. The threads are cut in one pass by rotating the blank and moving the wheel sideways. Trying to



TiN coated drills.



TiN coated taps.



Laser marking 2mm dia. hand reamers.



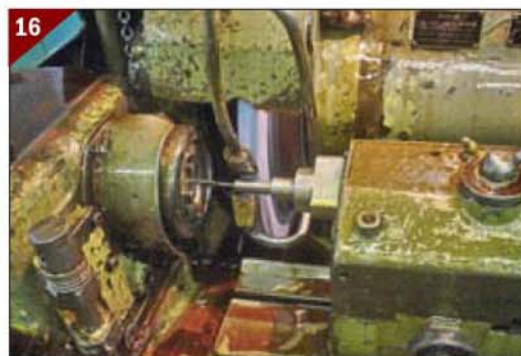
Solid Tungsten Carbide uncoated milling cutter.



Tungsten Carbide CNC grinder.



A double-ended cutter.



Tap grinding machine.



Large taps ground from blanks.

photograph this operation is difficult as the machine shutters are closed and lots of coolant is being sprayed. **Photograph 16** shows the machine with a new blank inserted and with the shutters open. When I enquired why they did it this way I was

told it was a waste of machining time to thread the whole blank and then cut away the flutes. A 6mm dia. tap is cut in less than 10-seconds. **Photograph 17** shows an operator holding two large taps ground in one pass from blanks.

Somta Tools still make BA taps and dies, although they are a very small part of their turnover and stock levels sometimes are dependant on demand. For more information see <http://www.somta.co.za/>

ME

KEITH'S COLUMN

Keith Wilson discusses a variety of early reminiscences.

WILSON'S WORDS OF WISDOM

If a man will begin with certainties, he will end in doubts, but if he will be content to begin with doubts, he will end in certainties.

Francis Bacon

WILSON'S WORDS OF UNWISDOM

If you see a bomb technician running, try to keep up with him!

USAF Ammo Troop

Due to the approach of Christmas, I have been asked to provide several early articles.

Therefore, a few early reminiscences might well not come amiss. They are not in any particular order, but have stuck in my mind for rather more years than I care to remember.

Some wartime tales

An Air Raid Warden was walking along a London road urging people to take shelter when he espied a small girl (about 8 years-old) skipping along the road with sparkling eyes watching the skies above for all the 'fireworks'

Said he: "Get inna a shelter!

She replied, "Garn, that square-headed Boche couldn't hit a haystack!"

This was a perfect example of London spirit during the blitz.

An episode that obviously infuriated the Germans was when a badly damaged Lancaster was near the Swiss border and, to avoid complete destruction, flew over Switzerland into neutral territory. Came a message from the Swiss: "You are flying over neutral territory. Leave immediately."

Reply: "We know".

"If you refuse to leave, we shall have to open fire upon you".

"We know" came the reply once more.

A short time later, flak (exploding shells) was seen about 5,000ft. below the stricken aircraft.

From the aircraft: "Your shells are exploding about 5,000ft. too low".

From below: "We know".

Any questions?

A few readers still believe that I am living in Wolverhampton. In this day and age I am not keen on publishing my address, although I still publish my email one. It means lots of spam from commercial spam writers, but it has proved useful to many readers, so overall it is useful. A quick way of contacting me and getting help is by emailing me on keithgwrloco@blueyonder.co.uk

It is now just 2½ years since we moved to Ashton-in-Makerfield, about 5-miles south of Wigan, Lancs. Although I lived just 7-miles west of Paddington during the war, enemy attention was not frequent. A local chemist/post office at the lower end of the road twice reported unexploded bombs in the garden but I think it was no more than publicity stunting. There were only two direct hits nearby, one on the main avenue at the bottom of our road (Shakespeare Road) which took out a row of shops, and one opposite which took out some sets of lock-up garages.

Whether these bombs were aimed at the Great Western Railway's Wharncliffe Viaduct which crossed the Brent Valley just west of Hanwell Station is guesswork, for it would have made much trouble for trains.

I was only about 12 when the war ended, and a few years later, whilst waiting for a Paddington-bound evening train after dark, I occasionally walked westwards onto the viaduct. There was no danger for I kept off the rails.

Then came Christmas 1962 when we lived in Southall. Brenda had taken Alan to spend the holiday season at Hanwell, whilst I remained at home in the workshop. Came 10 o'clock and I locked up the house and set off to Southall Station to travel to Hanwell; to my surprise at the time the station was locked; no trains. Knowing of some access points to the railway, I then walked all the way up the Down Main, facing oncoming traffic and keeping eyes and ears open but no trains at all were operating. It was most interesting crossing the Iron Bridge over what was then the A40 road and then the viaduct.

King drawings

The Swindon drawings of the King are a little bit different from the actual locomotive in several places. Also, you cannot tell which fastenings are rivets and which are nuts/bolts. Many years ago there was on display in a glass case a 3½in. King "built to Swindon drawings", but I noticed immediately that on the bogie it had bolts where there should have been rivets, and vice versa! Also, the rear driving wheel springs were not altered on some of the drawings. The bogie was never made as is shown on the G/A. On the bogie sides were three different sizes of bolts, these are shown and fortunately fall into consecutive BA sizes. At least the front driving axle (the cranked one) was hollow; not sure about the others. There were two bogies different in minor details, one had a slot in the front stretcher, and another one had different springing due to the springing being modified in the USA on KGV. It was no doubt very soon remodified! The slot was to pass more cold air onto the rear bogie axleboxes, and it was at one time or another under most Kings. I saw it mainly on 6028 KGV.

I saw an interesting locomotive today (Sunday 11 October) with sunlight falling at the right angle - Not 90deg. - to get a view inside the cab, the interesting thing being the light colour of paint inside the cab. I have used a colour called 'Light Buff' in this position with some advantage.

Nasty situations avoided

I can recall three railway occasions when I was in a position to avoid a possible nasty situation. Waiting for a Paddington-bound train on Hayes and Harlington Station a freight train went past in the same direction, but minus any taillight or guards' van. I rushed into the nearest porters' room, one came out to look for himself and rapid telephone calls were made. It so happened that the guard had seen the trouble and the signalmen up the line were alerted: all was well. It would seem that some useless



"Silly owd bugger!"

oafs had thought it funny to uncouple part of the train whilst it was at rest in the sidings just down the line, so few could have had seen it before I did.

Another one was at Wolverhampton High Level. The band had just come back from a short concert tour in Edinburgh; and a porters' flat truck was loaded high with instruments and baggage. The nearest corporal started with some lads towards the North end of the platform. A train was signalled to come in and about 15-seconds before its actual arrival the additional staff warning signal at the end of each platform was lit. The lads thought they could beat the signal, but I told them to stop. I had no technical right to do so, but if I am on a railway, safety of the line comes first. I mention that this was the only time I ignored a direct order. Several nearby porters also called out. We stopped. I do not claim complete success in avoiding an accident, but I recall the case at Iver Station when a trolley loaded high with newspapers had one wheel dropped over the edge of the wooden crossing. The Up Limited hit it square on at about 90. I heard that scrap newspapers and bits thereof were seen as far as Westbourne Park!

There was a button in the first signal box west of Taunton. When a train was coming down Wellington Bank the signalman pressed said button which caused a bell to ring on Taunton Station to enable the newspaper kiosk to pull down the shutters. Now I have very little idea of the actual speed (as distinct from the 'official limit' but am certain that the famous 'ton' was not by any means rare.

A minor point of interest is that in Railway Days, as distinct from railway days, a train was inspected every mile or so by the signalmen. Depending on which side of the track the signal box was located; both sides of the train were inspected frequently.

Came a day when the signalman forgot the press.

When the Up Limited came down and roared though Taunton well into the high 90s, King and about 500-tons caused quite a draught and to put it mildly the kiosk proprietor was somewhat disgruntled to say the least.

The third time was in the same year (1955). I had taken a friend on an official visit to the Stafford Road shed. When ready to go 'home' we spotted a Castle ready to back down to Low Level Station. I asked the driver if we could come with him on the footplate, he pointed out that the bus would probably be quicker (Any questions?) but we came up on the engine with his full permission. Driver gave a gentle push rearwards and locomotive rolled over an inspection pit. At exactly the same time both crew called out "Stop when I shout" and left the footplate. On hearing the "Oy" shout I put the brakes on and of course we stopped. Both of the crew were very appreciative, and I was asked to drive the Castle back to the station. It was on this trip (my first full-size drive) that I discovered that running tender first; the engine could slip quite easily. I then had the problem of getting some 135-tons to stop exactly at the right place, on the front of the train. It was managed comfortably, and my friend left (he lived in Wolverhampton) and I remained on the locomotive. I was not asked to drive, but I discovered the good engine with Walschaerts' gear would notch itself up. I had heard of this phenomenon but had viewed it with some suspicion.

Advice for all

Just received by email, a piece of advice that has not received much publicity.

A good wheeze is to write a PIN number on your card, it should be a phoney PIN not the real one. Any theft of the card will result in the robber proceeding to the nearest cash machine and trying to withdraw money. Baddie will obviously use the number on the card at least once and probably two or three

times. After the third go the card will not be returned so your cash would be somewhat safer.

The wicked wit of Winston Churchill

Drunk one night in the House he met a large female MP.

Said she: "You're drunk, you disgusting man".

Replied he: "Yes madam, I'm drunk, and you're ugly. And I shall be sober in the morning".

Hydrostatic lubrication

In the past, I have suggested that hydrostatic lubrication was/could be inferior to the mechanical lubricator. This might well be true for scale locomotives running a heavy service, for the outline is 'sacred' and there is seldom overmuch room for a large tank. For a 'narrow-gauge' type, however, there is far more room and a hefty oil reservoir can be accommodated. The inlet fitting for the condensation can be combined with the drain cock, and outlet for oil near the top. It so happened that I had a piece of brass tube 2½in. O/D and roughly 5in. long; so GWRILLIAN's oil supply is about 15 cubic inches, Probably enough for a week's running.

We live and learn - or we don't live long

Many people who should learn better believe that Charles Darwin invented evolution. He didn't. Evolution was known to the ancient Greek philosopher Democritus who, as far as we know, invented democracy. It took a few centuries until Darwin discovered how evolution worked. Alfred Russel Wallace came to virtually the same conclusion.

As a matter of interest, there is nothing in the entire universe that is not evolving - even abstracts!

Amusing to some is the story of the Bulldog at Didcot rolling into a siding when, with a mighty bang, the steam connection for the steam-braked tender exploded. There were thus no power brakes for locomotive, and the buffer stop was duly demolished. The fitter came out and put in a

brand new pipe; and the shed permanent way crew built a nice new buffer stop.

The Bulldog made its scheduled return trip on the Didcot, Newbury & Southampton (incidentally this was double-tracked in the war as a not-too-obvious route from North to South for wartime transport - and I believe this semi-secret routing also applied to what is now the Severn Valley line, and doubtless to other 'minor' lines.)

On returning to Didcot, the Bulldog eased itself onto the same siding just as the s.p.w. crew were packing up their tools, conscious of a good job well done. They all watched the locomotive as it neared the nice new buffer stop when with a mighty bang the (new-piped) pipe exploded. To their absolute horror the 'dog took down their shiny new buffer stop which was again firmly demolished. I bet the air was very blue!

I understand that there was no trouble on the trip, so what actually happened is something of a mystery! Same locomotive, same crew, same siding. Sod's Law?

S.O.B.

I had a nasty accident a few days ago. Crossing the entrance to a local car park, I staggered badly and grabbed at a concrete bollard. Missed with hands, head took the blow, no lasting damage. I sent a photograph to my regular email lads and the best reply came from Harold Pearson in Cambodia.

"Silly owd bugger!"

I don't know whether the Editor will publish the picture, it could frighten the children.

I will take a chance and publish it as a warning to others, Ed.

The s.o.b. remark reminds me of the finest 'funeral send-off' I have ever seen; given by the Monty Python group, it showed perfect respect for the departed (was it Graham Chapman?) with not exactly polite remarks and finished with a 'theme song' to wit "Always look on the bright side of Life." From *Life of Brian*. This film owed much to its chief publicity enemy Mary Whitehouse.



ANTHONY MOUNT

Anthony Mount concludes his series by assembling the final components and painting and testing the engine.

PART 8

Continued from page 517
(M.E. 4363, 23 October 2009)

Stockport Vacuum Engine



Slipped over the end of the gas valve connector is a small O-ring (Part 48) that forms a seal with the outlet from the gas control valve.

Gas pipe connector nut (Part 49)

Slipped onto the copper gas pipe before silver-soldering to the nozzle and connector is a small brass nut that fits over the connector and fixes it to the gas control valve, obviously you need to tap the nut the same thread as on the gas control valve spigot.

Ball races (Part 50)

Though I have shown plain bearings as an alternative, I recommend the fitting of ball races, which dramatically reduces friction at the crankshaft. If they are not supplied with the kit, though I hope they will be the Bearing Code is SMR117ZZ, they are 7 x 11 x 3mm shielded bearings.

Gas tank

I bought my gas tank (Part 51) as it seemed cost effective to do so, and is hardly worth the bother of making one up, especially as it seems to require to be tested to about 375psi. Why such a tremendously high figure is required I do not understand but it seems to stem from the Gauge 1 model locomotive builders, with the possibility that under certain conditions of running the pressure could rise in the tank to quite a high figure, so I suppose that with the requirement of testing a pressure vessel to twice working pressure produces the high figure.

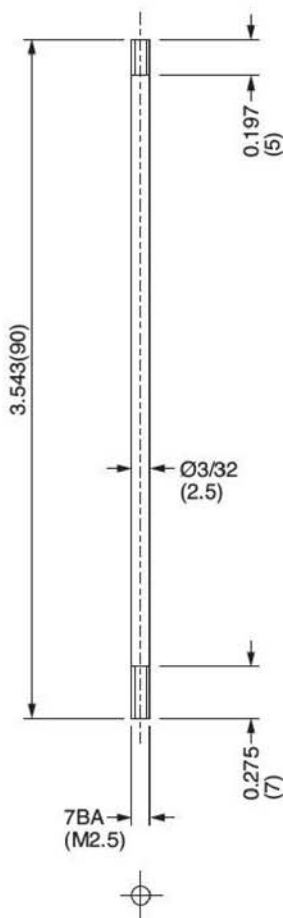
Perhaps one of our Gauge 1 modeller friends could provide the background information?

I do not have the equipment or test gauge to reach such a figure and there are a number of suppliers who produce the complete tank with both filler and stop valve. They are also available in a wide range of sizes and I chose a vertical type to match the engine.

Depending on your supplier you may need to make up a ring that can fit around the tank held in place with a few flat-ended grub screws. Obviously you must not drill into your tank. The ring can be drilled to be able to screw it down to the wooden base. I have included a sketch of a suitable form of ring, Part 44.

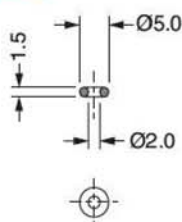
A range of gas tanks is available from Polly Model Engineering, who can also supply the connecting pipe as well. I used a 50mm (2in.) dia. x 45mm (1¾in.) high tank.

Part 05

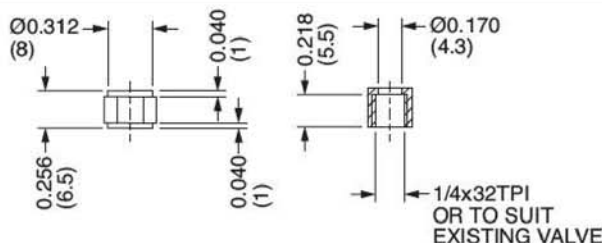


TIE RODS
4 OFF, MAT'L: STAINLESS STEEL

Part 48



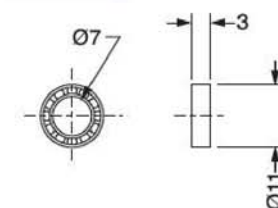
GAS CONNECTOR O-RING
1 OFF, MAT'L: NITRILE



CONNECTOR NUT
1 OFF, MAT'L: BRASS

Part 49

Part 50



CRANKSHAFT BEARINGS (SHIELDED)
4 OFF, BEARING CODE SMR117ZZ

Also required is a transfer valve that screws onto the gas canister and allows the gas to be transferred from the canister to fill the little tank and is also available from Polly Model Engineering. The canisters are used for camping stoves and disposable gas torches as sold in do-it-yourself shops. Use only Butane filled canisters, which are at a much lower pressure than those containing Propane or a Butane/Propane mix. The canisters have a male thread on the top; do not confuse them with the Campingaz brand which has no thread.

Tie Rods (Part 05)

Having checked through all the drawings, I find that Part 05 has not been published so it is included opposite.

Painting

As with most stationary engines I have no idea what colour it was painted; has a Stockport engine of any type survived from which a colour can be obtained? I used a dark green and I think it looks quite good on the engine.

As past readers of these notes know I use aerosol paints on my engines, preferring them to brushing or airbrushing. An ordinary brush requires cleaning and I have never achieved a good finish with a brush. The finish with an airbrush is very good but again you have the problem of having to clean all the equipment after each painting session.

Preparation for painting is important, castings do need to be filled and rubbed down and all sharp edges removed with a small radius as paint cannot stick to a sharp edge. At the time of writing cellulose primer is being phased out and now appears as an acrylic formula. I find it rather good with an even smoother finish than cellulose, but you cannot remove dirty finger marks with white spirit as you could on cellulose paint as the white spirit will dissolve the acrylic paint.

Alternate coats of different colour primers are useful in that when rubbing down you can tell when you are getting close to the bottom coat.

Take your time over painting as it can make or mar your model.

Assembly

Fortunately there is not a lot to say about assembly as it is a simple engine and easily put together. **Photograph 51** shows the column assembled and painted. As with all hot air engines if there is good compression with the flame entry hole blocked off then there is a good chance the engine will run; with no compression, no chance.

On the other hand the engine needs to be free running as there is little power available from this type of hot air engine so it pays to be methodical during assembly and check each part consecutively.

First put the little roller in the fork of the push rod and check that it rolls freely. If you are using a nut to hold the pin in then put a touch of Threadlocker on the screw as the nut can come undone if the pin revolves.

Make sure the push rod moves easily in the guides and that the long spring keeps the roller in contact with the cam. The throw of the cam is 7mm and with a slot width of 5mm the valve can overlap the edge of the inlet port by 2 millimetres.

Assemble the piston and connecting rod and try it in the cylinder. Push the valve rod down to open the valve and it should move up and down without any tight spots and be very free. On closing

the passageway by pulling the push rod and valve up it should become difficult to pull the piston up against the suction; remove the piston and connecting rod temporarily.

With the crankshaft and flywheel only in position, I spun the assembly and it rotated for 120-seconds before stopping. This was with ball races fitted. I only managed 12-seconds with plain bearings so obviously ball races are to be recommended.

With the piston and connecting rod added but without the valve in position the same spin lasted for 20-seconds. With all assembled and ready to run the same spin lasted for 12-seconds.

Take particular care with the sliding valve as it needs to be a good seal. With the engine assembled, position the valve so that the slot is covered, i.e. the valve shut. Now try and pull the piston up by turning the flywheel; you should feel suction as you try this.

Complete the assembly and adjust the valve and cam so that the valve starts to close when the piston is approaching the top of its stroke. On my engine the crank was approximately 25deg. from vertical as the valve started to shut.

Testing

Turn the engine over TDC and the valve should start to open when the piston has just reached about half stroke. It needs to open before BDC as there is no compression relief valve on this engine and if the piston starts to compress the air inside the cylinder it will stop, though if the clamp springs are lightly loaded the valve can lift off its seat.

Take particular care with the adjustment of the push rod. It needs to be free in the bracket holes, slide easily and follow the cam smoothly. Also the valve should not be tight between the nuts holding it on the push rod; it needs to be able to move slightly so that it is free to be tight against the valve face, one of the reasons for the clearance hole. The bottom nut of the lower two is a lock nut to stop

the valve coming loose from the push rod.

Turn it over slowly at first and watch as it follows the cam, if not properly aligned it can ride up on the edge of the cam and even turn round and jam up.

I found positioning the cam quite critical, just a small adjustment could make a big difference in running characteristics so be prepared for some experimentation and do not be too disappointed if the engine does not start first time.

The springs holding the valve to the valve face need to be quite light in adjustment as the long spring on the valve rod has to return the valve against the pressure of the springs.

Next, a few words on lubrication; vacuum engines have only a little power for their size so need to be free running. Use thin oil to reduce drag on the bearings and connecting rod. The piston might seize if it is lubricated with oil and the oil is burnt by the flame, plus there are fumes from burning oil. I used graphite powder; this is available from locksmiths in small plastic bottles that act as puffers. Shop around; I was quoted between £3.25 and £4.50 for the same size and make.

Now for the acid test, check all is free running and then put some gas in the tank, light the gas and start turning the engine over, you should see the flame about 25mm (1in.) long being sucked into the cylinder. The shape of the flame will be curved with it bending over the top of the valve as it is sucked in. You may need to adjust the thickness of the burner holder base washer to correctly position the flame. If all is well the engine will soon start to run.

For the first few intermittent tests the engine can be used as it is but for prolonged running you will need to fill the water jacket with cold water.

So there we are, another engine completed and I hope you find it an enjoyable exercise building your own model. I wonder if this type of engine was ever built commercially to do a job of work?

ME



The finished and painted column.

The 17th Annual Sweet Pea Rally



GEOFF THEASBY

Geoff Theasby reports on this popular annual event.

This year's rally was held on Saturday 6 June 2009 at the **Sheffield & District Society of Model & Experimental Engineers'** Abbeydale Miniature Railway at Dore, near Sheffield. The weather was extremely wet! According to rally organiser Mick Savage, 43mm of rain fell the previous night, but this did not stop the attendance of Sweet Pea owners from far and wide. The public address system said that the name of the rally was being changed to the "Water Lily" rally, due to the precipitation. Some of us were gathered in a tent, and one said, "It's a fine day for an outdoor event" and someone else said, "It could be worse, we could have paid to come in!" There was much laughter. Torrential rain fell until about 2pm, then it tailed off, and about half-an-hour later the sun came out. Unfortunately, the rain returned on Sunday.

A popular design

The Sweet Pea 0-4-2, 5in. gauge design was originated by Jack Buckler of Leeds



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

30-years ago and was latterly taken up by a commercial concern, which distributes castings and parts. Such is its popularity that there are now upwards of 300 examples of the locomotive in existence. This was the first such rally I have attended, and I was impressed by the numbers of variations available for such a basic design. Locomotives with side tanks, round saddle tanks, square saddle tanks and tender tanks, plus those with cranked or straight valve rods. One notable example

even had Bremme (AKA Klug) valve gear, rather than the more usual Hackworth. There are also variations from the design, with 0-6-0 models and the Sweet William (**photo 1**) for 7 $\frac{1}{4}$ in. gauge.

One new driver was asking about the control layout, and a piercing whistle was followed by the cry of, "I've found it!" Some locomotives slipped when starting on the wet rails and one driver discovered that the brakes of his locomotive worked well when the wheels locked up and he slid to a halt!



P. Greene has the look of a Wren.



Clara looks more like a Hunslet.



Margaret, an O-6-O, looks like an American locomotive.



Locomotive No. 5 looks like it is based on an Orenstein and Koppel.



A view of No. 5 showing the marine type boiler.

I was most impressed by the finish of some of the locomotives on show, but was also encouraged by the fact that some others were less than perfect, since my own workmanship is not of the finest.

Attention to detail

The June Drake Trophy for the best locomotive was won by John Marriage for *P. Greene*, a beautifully finished and detailed locomotive (photo 2). I liked the pun on the name related to the colour, and the builder's nameplates. Note that all the nameplate screw slots are horizontal. The rivets on the water tank were real, but non-functional, though others on the smokebox were real and functional. Those fitted to the cab were actually round-headed bolts, nutted on the inside. It was not the only well-presented locomotive, however. I particularly liked *Elsie Rose*, (unfortunately I did not manage to get a photo) *Clara* (photo 3) and *Margaret*

(photo 4). *Elsie Rose* was painted in a close approximation to Stroudley's Improved Engine Green, and was a previous winner of the June Drake award.

Locomotive No. 5, was considerably modified, being shortened and narrowed, to approximate an Orenstein & Koppel design (photos 5 and 6) later to have a sandbox added to the top of the boiler.

I met a fellow radio amateur, who had brought his locomotive *Vera May* (photo 7) from Worthing, in Sussex and we discussed his very slimline electric blower, which he thought was an ex-aircraft radar cooling fan. Another named locomotive was *Sidney Frank* 1905 after the owners' father and date of birth. There was no duplication of names, and I did spot a Sweet Pea, but did not establish whether she was the original.

Fred, I was informed, had a steel boiler of 8mm plate, rather than the usual copper, so I asked about water treatment.

The owner pointed to a bottle of brown liquid. 'Tannin' he said, 'as used in full-size practice'. A few locomotives had mechanical lubricators to feed the cylinders, but everything else was oiled by hand.

Photograph 8 shows *Jasper*, a very nice saddle tank engine with matching tender and photo 9 shows *Stella*, a Sweet Pea with a very tall cab.

I spent a very enjoyable afternoon at Sheffield DSME's track and clubhouse, and everyone's high spirits and friendliness contributed to the enjoyment of the occasion, despite the weather, not forgetting the ladies issuing free tea and coffee, and the burger stall. For more information on the society see their website at www.sheffieldsmee.co.uk/ ME



Vera May has a pair of side tanks.



Jasper has a Festiniog Linda look to him.



Not quite sure about Stella, she certainly has a large cab.

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■ Myford Super 7 lathe, one owner from new, 3 jaw, 4 jaw catchplate and standard faceplate, gearbox, power cross feed, leadscrew handwheel, raising blocks and drip tray, single phase with Dewhurst switch, superb well looked after machine, £2,500. Naerok bench mounted milling machine, £500. Bench rolls, £50, Myford accessories, fixed steady £80, large faceplate, £40, Vertical slide, £100. Horizontal bandsaw, £70, Vertex 6in. rotary table, £80, Naerok pillar drill, £40, Silver solder, 2 foot lengths, £2 each. **Tel: 01435 882462 Tunbridge Wells.**

■ Schaublin precision lathe type 70TO, £1000. Smart & Brown collet lathe, £200. Die filing machine, single phase, similar to photo in trade advert in ME 4352, £85. **Tel: 01538 384603 Leek.**

■ Elliot 00 universal milling machine, table 7.5 x 28in., auto traverse, ex school machine in good condition, £800 ONO. Aciera precision universal mill type 1, table 8.5 x 4in. dual voltage, good condition, £1,000 ONO. **Tel: 01562 60658 Worcs.**

Machines and tools wanted

■ Unimat SL and accessories, good condition, complete or not. **Tel: 01635 44482 Newbury.**

Models offered

■ Driving trolley in 5in. gauge, braked, suit raised or ground level track, suit Sweet Pea etc. Needs painting, £100 ONO, buyer collects. **Tel: 01943 879025 Leeds.**

■ Stuart boiler feed pump castings and drawings, still boxed and shrink wrapped, £49.50 including postage. **Tel: 0191 4563806 South Shields.**

■ 5 in. gauge Britannia near completed, engine and tender rolling chassis, boiler formed but not brazed, with drawings. **Tel: 07789 318652 (PM only) Cambourne.**

■ Jessie and Koppel, 7½in. gauge, by Ken Swan, Complete sets of castings and drawings, also a set of frames and a boiler kit for the Koppel and Ken's extra drawings, all at half price. **Tel: 01280 850378 Northants.**

■ 4in. scale Fowler road locomotive, drawings and over 140 major parts

including crankshaft, gears, axles, shafts, pistons, conrods, motion parts, platework, chimney, ashpan, fore-carriage assembly.

Tel: 01485 572693 (afternoons only) King's Lynn.

■ Full set of unused plans for Clayton under type steam wagon, £25. **Tel: 01279 653786 Hertfordshire.**

Models wanted

■ Alyn Foundry castings in any condition, also Myford 75T gear wheel. Also drawings for Chelston Model Engineering Jowitt poppet valve engine and build article (2 issues) from Model Engineer circa 1987, expenses paid. **Tel: 01275 375398 North Somerset.**

■ Doris boiler for 3½in. gauge. **Tel: 01204 388269 Bolton.**

Books and magazines offered

■ Model Engineer from 1940s, most good condition, 75 issues, 5 bound volumes, 26 issues per volume, VGC, buyer pays postage, offers? **Tel: 01423 711897 Harrogate.**

■ Model Engineer volumes 113 to 117 (1955 to 1958) Volumes 145 and 146 (1979 and 1980) plus 57 miscellaneous 1955 to 1978, 214 copies total, £39. **Tel: 01252 874622 Camberley.**

■ Model engineer, Engineering in Miniature and Model Engineers' Workshop, 290 copies in good condition, offers? **Tel: 07789 318652 Cornwall.**

■ Model Engineer, unbound, No1 to present day (not quite full set), buyer collects, will not split. **Tel: 01562 60658 Worcs.**

Books and magazines wanted

■ Martin Evans Simplex book, fair condition at a reasonable price. **Tel: 01978 860177 Wrexham.**

Miscellaneous offered

■ New electric motor, 415 volts, 3 speed, 1500 RPM with control switch, fits Smart and Brown 1024 lathe, £200 ONO. **Tel: 01767 220934 Beds.**

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www.model-engineer.co.uk/classifieds/

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- Heliochronometer
- Beam Engine *Frivolity*
- Shand Mason Fire Engine
- Northumbrian
- Fair Rosamund
- Empire Building
- Free plans

Terence Holland starts a new series with full constructional details about a Yarrow boiler.



ON SALE 4 DECEMBER 2009

Contents subject to alteration



One of Steves last duties in the army was to rededicate Steam Railway appeal locomotive No. 70013 Oliver Cromwell as No. 70048 Territorial Army at Quorn on November 8 2008. Photo Danny Hopkins



Steve in the power Hall at MOSI describing work on the restoration of his beloved RSH Agecroft No. 1. Photo Danny Hopkins

Steam Railway magazine

Engineering news from the big railway



DANNY HOPKINS

Danny Hopkins,
Editor of *Steam
Railway* magazine.

Colonel Steve Davies MBE is the new Head of the National Railway Museum.

After rampant speculation, the announcement that Colonel Steve Davies MBE would take over the National Railway Museum's reigns from Andrew Scott MBE came as a surprise to many. Only installed as

boss of the Manchester Museum of Science and Industry in August 2008, Steve was originally not expected to throw his hat into the ring. However, *Steam Railway* understands that Steve was at the top of the list of preferred candidates after a conspicuously successful first 14 months in Manchester.

In the end, his NRM appointment saw him preferred to a number of significant and long standing museum professionals and several well-known figures from the railway industry.

In his time as director at Manchester he has overseen several spectacular events, including the hugely successful Great Garratt Gathering and led a project to develop a new £7 million building re-development.

Speaking to *Steam Railway* Steve was candid about his departure from MOSI: "I will be very sad to leave Manchester, but the place is in very good nick and my successor will be picking up

a going concern. However, the NRM is undoubtedly my ultimate dream job, staffed with fantastic people."

Steve's appointment comes after Andrew Scott announced his retirement as NRM Director earlier this year after nearly 15 years with the National Railway Museum. Andrew is staying on as Acting Director of the NRM's parent organisation, the National Museum of Science & Industry until the summer of 2010.

For his part, Andrew Scott sounded very satisfied with the new face in his old chair. Speaking to *Steam Railway* he said: "We are delighted to have been able to appoint Steve to the post of NRM Director. He brings strong leadership and a clear vision of where the NRM should be going and of its place in the railway heritage world. Reshaping the NRM for the next thirty years without losing the essence of what makes the Museum special will be a huge challenge and we are sure that Steve is the right person to be leading the NRM team."



Steve's finest hour. Former workers from Gorton Foundry with the first Beyer-Garratt K1 at the foundry itself with Pete Waterman on hand on August 16 2009. Photo courtesy MOSI



WIN

52 PRIZES

to be won over the next 12 months!

a 500ml bottle of Morris Lubricants MCT metal cutting lubricant

Every four weeks for the next year, four lucky winners will receive a 500ml bottle of Metcut MCT liquid from Morris Lubricants in our new competition. The competition will run for 13 four week periods. Every four weeks, four lucky winners will receive a 500ml bottle of MCT free of charge (Sorry, UK readers only).

There is also a similar four week competition in Model Engineers' Workshop to win a 5 litre container of CORA B neat cutting oil. Again, this will be for 13 four week periods.

You can also enter both competitions on our website www.model-engineer.co.uk

Each competition will run for 4 weeks, entries will not be carried over to the next period. Keep on entering every four weeks to maximize your chance to win.

MCT Metal Cutting Lubricant

MCT is an advanced extreme pressure metal cutting lubricant for all hand applied machining operations, particularly hole tapping and drilling. Extreme pressure properties make it highly effective on difficult materials and work hardening alloys such as stainless, high tensile steels and nimonics.

It is available in a modern, lower odour formulated liquid form and in the traditional compound and spray forms to suit users' desired method of application and is particularly suited to use on machines that do not have a flood applied coolant facility.

MCT is suited to drilling, tapping, cutting, threading, reaming, thread rolling and broaching, and is ideal for use in many model engineering machining applications.

Please enter me into the competition to win a 500ml bottle of Morris Lubricants MCT metal cutting lubricant

Postal entries must be on this entry form. Photocopies are acceptable.

Name _____

Address _____

Postcode _____

Phone _____ D.O.B _____

Email address _____

Do you subscribe to
 Model Engineer ☐ Model Engineers' Workshop ☐

Please post to: MCT/Model Engineer competition 126,
 PO Box 269, Rossendale BB4 0DG

Terms and Conditions:

PLEASE NOTE: We need a name and address to send the winner the prize. By supplying your email/ address/ telephone/ mobile number you agree to receive communications via email/telephone/ post from MyHobbyStore Ltd. and other relevant 3rd parties. If you DO NOT wish to be contacted by Model Engineer and MyHobbyStore Ltd please tick here: Email ☐ Phone ☐ Post ☐ If you do not wish to be contacted by carefully chosen 3rd parties please tick here: Email ☐ Phone ☐ Post ☐ For full Privacy Policy and Terms and Conditions please see www.model-engineer.co.uk

You can find out more about the wide range of lubricants available online at www.morrislubricantsonline.co.uk

NO NEED TO WAIT – ENTER ON OUR WEBSITE www.model-engineer.co.uk/competitions/

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!

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 1" scale and over.
- B2 Working steam locomotives under 1" scale.
- B3 Locomotives of any scale, experimental, locomotive 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 1" scale.
- B10 Passenger or goods rolling stock, under 1" 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 – nonworking.
- 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 medal.

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 their 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 MyHobbyStore Ltd.
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 MyHobbyStore Ltd., 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 MyHobbyStore Ltd
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 which 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. MyHobbyStore Ltd. 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 MyHobbyStore Ltd.
 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 MyHobbyStore Ltd. are eligible to re-enter their model for the 'Duke of Edinburgh Challenge Trophy'. Past winners at any of the exhibitions promoted by MyHobbyStore Ltd. will not be eligible for re-entry into the competition unless it has been substantially altered in any way.
 7. MyHobbyStore Ltd 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 and 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 MYHOBBYSTORE LTD WILL NOT ACCEPT LIABILITY FOR ANY LOSS.

CLOSING DATE 20th NOVEMBER 2009

THE MODEL ENGINEER EXHIBITION

11th – 13th December 2009

Please return completed form to:
 Model Engineer Competition,
 MyHobbyStore Ltd., Berwick House,
 8-10 Knoll Rise, Orpington, Kent BR6 0EL

ENTRY NO.

OFFICE USE ONLY

CLASS

ENTRY NO.

ENTRY FORM - COMPETITION & LOAN MODELS

PERSONAL DETAILS (Please print)

Surname _____ Forename(s) _____ Age _____

Address _____

_____ Post Code _____

Home Tel No _____ Daytime Tel No _____

Model Club or Association _____

Have you entered before? Y ☐ N ☐

Do you purchase or subscribe to a MyHobbyStore Ltd 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 (MyHobbyStore Ltd will not insure the model unless a value is entered) £ _____

Name and address of your local newspaper _____

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Specifications:

Drilling Capacity:	25mm
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Tapping Capacity:	12mm
Spindle Stroke:	72mm
Throat:	235mm
Spindle Taper:	Choice of R8 or MT3
Spindle to Table Distance (with Guard)	
R8 Spindle:	30-380mm
MT3 Spindle:	TBA
With Head tilted at 90°:	110mm Min.
Spindle Speed:	100-1750 RPM ±10%
Table Cross Travel:	145mm
Table Longitudinal Travel:	360mm
Table Size:	550x160mm
Effective Table Size:	475x204mm
T-Slot Size:	12mm (M10 T-Nuts)
Table Drain Hole Thread:	M16x1.5mm
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Overall Dims (W/D/H):	765x670x990mm (850mm to top of column)
Weight (Net/Gross):	TBA

Standard Equipment: 16mm Drill Chuck and Arbor, Drawbar.

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080-030-01100	Model Super X3 Mill R8 Imperial	£895.00	+£60.00
080-030-01200	Model Super X3 Mill MT3 Metric	£895.00	Carriage
080-030-01300	Model Super X3 Mill MT3 Imperial	£895.00	
080-030-01703	Model Super X3 Arc Preparation Service	£255.00	

R8 Metric normally stocked. All other machines by special order only.
(Average delivery 90~120 days)

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Chuck to Bed Distance: 0-205mm
Drilling/End Milling Capacity: 6mm Max.
Throat: 165mm, Spindle: JT1 (male)
Variable Speed 0-5000rpm

Still Only £125.00 + £15.00 Carriage

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Table Size: 400x145mm
Table X Travel: 330mm
Table Y Travel: 145mm
Spindle to Table: 0-265mm
Spindle Taper: MT2
Variable Speed 0-2000rpm

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Table Size: 550x160mm
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Spindle Taper: MT3 or R8
Table Cross Travel: 145mm
Table Longitudinal Travel: 360mm
Spindle to Table Distance:
 MT3 Spindle: 105-400mm
 R8 Spindle: 85-380mm
Variable Speed 0-2000rpm
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Drill chuck holds taps with shanks up to 1/4 inch diameter.

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060-290-00400	Metric	50mm	12mm	16mm	10mm to 125mm	0.01mm	£48.00
060-290-00500	Imperial	2"	1/2"	5/8"	3/8" to 5"	0.001"	£48.00



Boring Head Arbors with 1.5" x 18tpi thread

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060-290-00700 MT2 3/8" Whit **£9.75**
060-290-00800 MT3 M12 **£10.75**
060-290-00900 MT3 3/8" Whit **£10.75**
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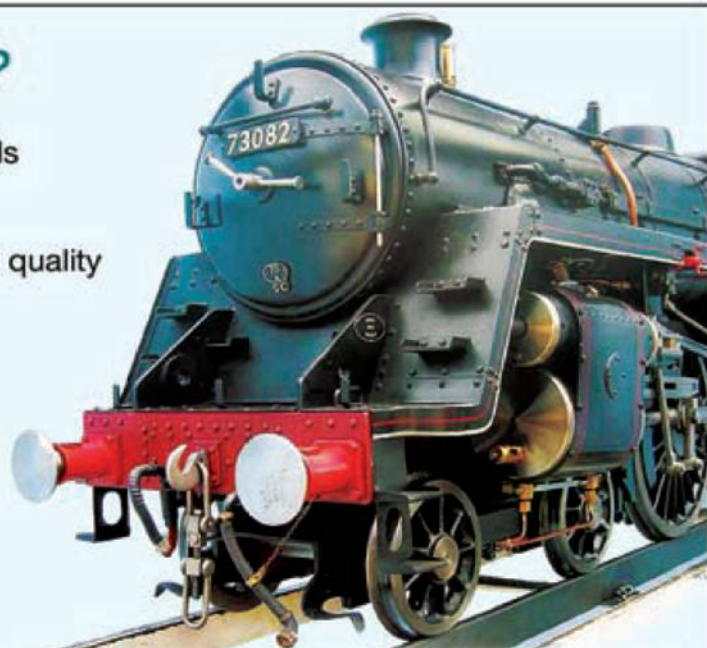
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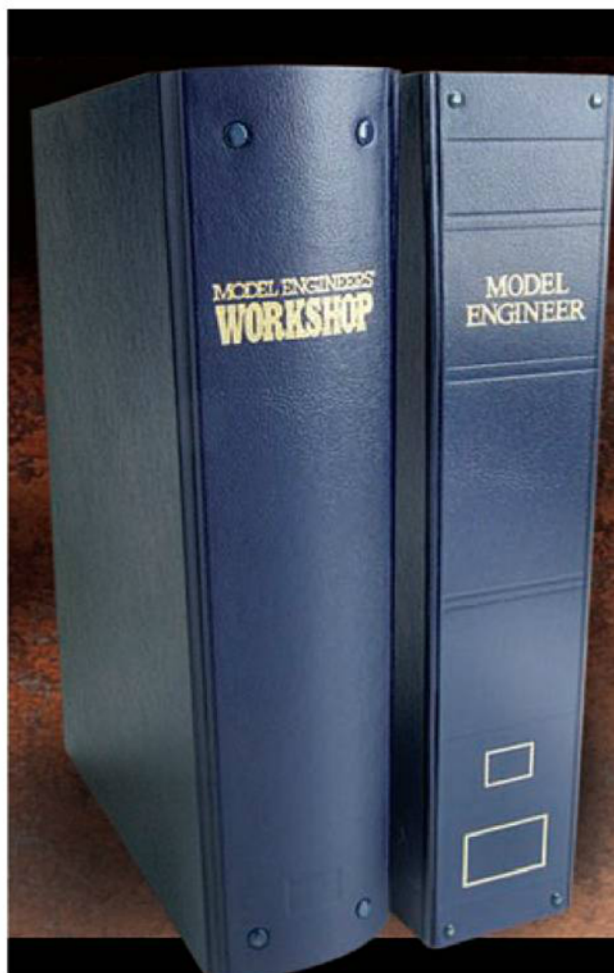
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