

MODEL ENGINEER

Vol. 192 No. 4216

5 - 18 March 2004

Northern Association
**MODEL
EXHIBITION**

27/28 March
Risley Conference
Centre Warrington

See inside
for details

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- REAR CHIP GUARD

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POPPET VALVE REGULATOR

A Super-Regulator designed and made
for reliability and smooth operation.
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On the cover ...

This superb 1:15 scale model of
a Malone Stirling engine was created
by Herbert Stumm of Germany
and was his entry in Class A1 of the
73rd Model Engineer Exhibition.
This unique model was praised by
the Judges and awarded a Gold Medal.
Operating on the Stirling cycle,
the prototype engine used water as a
working fluid instead of the usual gas.
This was achieved by operating at
conditions beyond the critical point
for water which occurs at 3,215psi
and 375deg. Celsius.
Quietness and economy were claimed
to be two of the advantages of
this arrangement.
A full report on the Class A competition
entries at the 2003 Model Engineer
Exhibition begins on page 252.
(Photograph by Mike Chrisp)

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Reeves' boiler fittings; news from Model
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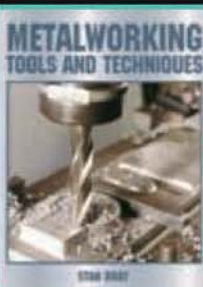
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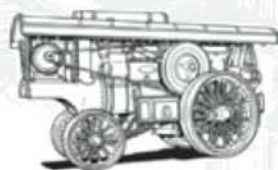


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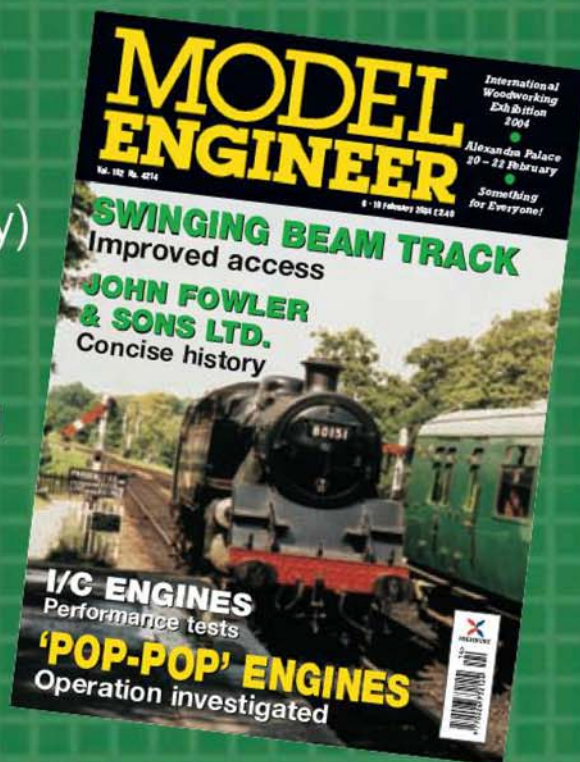


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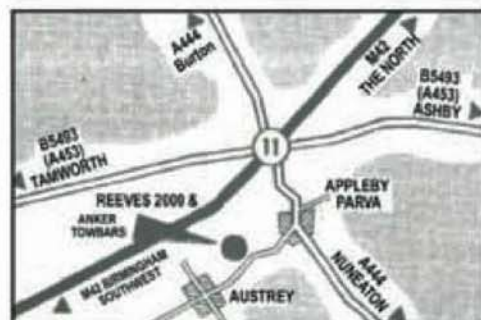


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With the Editors

Meet the Pioneers

To celebrate National Science Week this year, on 6/7 March Kew Bridge Steam Museum is inviting visitors to *Meet the Pioneers* — Dr John Snow, the first to prove that cholera was a water-borne disease (circa 1854), and Joseph Bazalgette who designed and built London's first integrated sewer system (circa 1858-1865). This live history event is part of the museum's family education programme and will run from 11am on both days.

Visitors will have the opportunity to 'meet' Dr. Snow in the museum's *Water for Life* Gallery at set times throughout each day, when he will talk about how he detected the link between cholera and 'bad water'. Joseph Bazalgette will also be 'at' the museum explaining the link between water supply and the problems of sewage disposal in Victorian London. His main backdrop at the museum will be the Easton & Amos rotative beam engine which, although smaller, is similar in operation to the four giant engines he installed at Crossness Pumping Station in South-East London.

'Joseph' will also talk about the history of pumping London's water supply up to the 1850s using the Boulton & Watt beam engine, and will finish with the Grand Junction 90in. Cornish beam engine, highlighting the importance of the need for a reliable and decent water supply.

Meet the Pioneers is aimed at families with children of 8 years and above. However, younger children are invited to create their own versions of a well-known *Punch* cartoon called *Monster Soup*. This will take place throughout each day, and the museum invites Mums and Dads to bring their young offspring along to 'have-a-go'.

The museum's giant beam and rotative engines will be in steam each day, and the narrow gauge railway will be giving free rides around the site on Sunday. The *Water for Life* Gallery telling the story of London's water supply from Roman times to the present day will be open too. There is a free car park, a café serving hot and cold food and snacks, and a souvenir/book shop.

Further information can be had by contacting the museum, tel: 020-8568-4757; fax: 020-8569-9978 or by visiting the museum website at www.kbsm.org

Boost Electrical Engineering

David Sharman recently updated us about changes concerning his company, as follows:

"Boost Electrical Engineering, manufacturers of single to three phase converters, and suppliers of inverters and other products such as forward/reverse switches, etc., have recently changed ownership. The new owners have restructured Boost as a limited company and Tony Barton, the previous owner continues as Technical Director. The company has moved into larger premises which have been refitted purely for Boost, and has completely revamped its product range.

"Boost are the only manufacturer of phase converters in the UK who will supply across the entire power spectrum from small 1/2hp/0.4kW to 40hp/30kW machines. They have been in continuous production since before 1957 and guarantee their products both for performance and as having the best price. Details of their range can be found at www.boost-energy.com or by contacting

them directly when they will be happy to advise customers. They continue to be owner-managed by David Sharman who, like Tony Barton, is a hands-on professional engineer.

"Boost Electrical Engineering can be contacted at Felix Farm, Howe Lane, Binfield, Berkshire, RG42 5QL; tel: 0118-903-4881; fax: 0118-903-4882; e-mail: david.sharman@boost-energy.com"

Elizabeth Hilda

Our *Club Chat* feature published in M.E. 4212, 9 January 2004 included information concerning a new 7 1/4in. gauge club locomotive constructed by members of Hereford Society of Model Engineers and named Elizabeth Hilda.

In the recent issue of *Whistle Stop*, Hereford SME Newsletter, Editor John Townsend has provided further information about the locomotive and its name, explaining that the article on which we based our own notes was "... a tongue in cheek article about the derivation of the name ... on our new club locomotive."

We were also contacted by Mrs. Hilda Davies anxious to provide us with background information concerning the locomotive and its name. It was Mrs. Davies who supplied the photograph which we are pleased to include here.

Returning to the current HSME Newsletter, John Townsend acknowledges that the previous article did not explain the actual reason for the choice of the locomotive's name. He points out that Mrs. Elizabeth Hilda Davies had done a "... tremendous amount of work ... in raising much of the construction cost of the locomotive and in generating help towards the building of it."

He continues with a vote of thanks to "... those other members who contributed so much time and effort" and acknowledged the assistance of others in this project whose identities are not known to him.

Turning now to Mrs. Davies' letter, she writes: "The Right Worshipful, The Mayor of Hereford, Councillor Ursula Attfield, came to



Broomy Hill Miniature Railway, Hereford to christen the new electric engine ... Elizabeth Hilda, so named after the lady who raised £3400 alone in eight months.

"The Hereford Society of Model Engineers needed an engine to use quickly for giving young children rides.

"Elizabeth Hilda Davies is in the driver's seat, the men drinking champagne are the men who actually built the engine in four months. The engine has proved to be a great success."

The photograph shows (left to right) the Mayor, Mrs. Davies, Rob Willis, Brian Kempson, Colin Davies, Ken Rowe and Stuart Reid.

We at *Model Engineer* congratulate all concerned with this project on its successful completion and are sure that visitors to Broomy Hill will enjoy their rides on this fine railway behind this splendid locomotive.

We would couple with the foregoing our sincere thanks to all those heroes and heroines around the world who work hard, often in the background and very much out of the limelight, making their individual and collective contributions to ensure that all our projects continue to their successful conclusions. As John Townsend says in his editorial note: "Nobody is averse to a pat on the back!"

CHUCK the MUDDLE ENGINEER

by B. TERRY ASPIN



POST BAG

The late Martin Evans

SIRS, - I was extremely sorry to learn of the death of Martin Evans. I first met Martin in 1965. Percival Marshall had died and the editorship of *Model Engineer* was in the hands of one Leslie B. Howard, with Martin as Technical Editor. Howard and L. Lawrence (LBSC, or Curly) did not see eye to eye and Curly was no longer writing for the magazine. Articles were being published, such as *Steam in the Civil War* by Cornishman Joseph Martin, a misguided attempt to attract American readership. But such material did not bear much relationship to model engineering, and with the loss of Curly there was considerable unrest among the readership.

Howard arranged a number of meetings with model engineering societies about the country to gauge the opinion of the readership. I attended one of these meetings at the Stockport Society, where Howard and Martin were present. The outcome of these meetings was not entirely satisfactory from our point of view; Howard was a professional journalist who was inclined to tell us what we wanted.

There was no Internet in those days, but we heard on the grapevine that we should write to a Mr. D. J. Laidlaw-Dickson. He wrote back saying that we were likely to see a change in the near future. The change came in December 1965, when *M.E.* was taken over by the Model Aeronautical Press. In the issue of 7 January 1966, the full team was announced: D. J. (Dickie) Laidlaw-Dickson - Editorial Director, Vic. Smeed - Managing Editor and Martin Evans - Technical Editor. Edgar Westbury and Bill Hughes were Technical Consultants, and Curly was back! It was not long though before Curly took ill and died and this was when Martin began his locomotive serials. After Vic. Smeed moved on, Martin became Editor.

We corresponded from that time and I was able to assist with material for his projects and the queries he received from time to time. When he married Yvonne, Roy Amsbury, Roy's wife and I were invited to their wedding.

Martin was particularly interested in boilers and produced a number of very good boiler designs, some of which he built for himself. Some of these designs have been used on locomotives other than those for which they were originally intended.

The large number of locomotive

designs which he produced in the various gauges were

equally successful, which were taken, modified, detailed or super-detailed to produce excellent reproductions of full-size locomotives to suit the builder's taste.

Martin once confided in me that his ambition was to design more miniature locomotives than Curly; I believe he achieved that ambition.

Nor must we forget the several books that he wrote on model engineering subjects including locomotive construction, locomotive boilers, valve gears, outdoor model railways and, of course, the International Model Locomotive Efficiency Competition which he introduced.

There is no doubt that model engineers owe Martin a debt of gratitude, not just for these achievements, but also for bringing *Model Engineer* through the difficult period of the '60s and '70s.

His passing marks the end of an era and has certainly left a void that is unlikely to be properly filled. My condolences go to his wife, Yvonne, in her sad loss.

Dennis Monk, Derby.

SIRS, - I was much saddened to read the news of Martin Evans' passing.

I corresponded with Martin on several occasions, mostly when Yvonne and he were living in Eydon in Northamptonshire. I must admit that initially he had steadfastly stood by aspects of his locomotive designs which I had questioned. However, I soon found him very fair and extremely knowledgeable, especially where steam locomotives were concerned.

A letter I particularly treasure is one in which he describes the 'genesis' of the live steam 'O'-gauge Royal Scot described in *Model Engineer* beginning 20 June 1969. The model on which this series of articles was based had been built by Martin for M. Charles Ritz of hotel fame. The finished locomotive performed so well that it tended to leave the track on the sharper curves of M. Ritz' railway at his Paris hotel.

In some ways, like LBSC before him, Martin seemed 'ageless'. Some four years ago, my wife and I were invited to attend a staff reunion of our former colleagues at the old locomotive drawing office at Derby. My wife and I met while working as tracer and trainee draughtsman in this office. I met Dennis Monk, who I knew as a distinguished *M.E.* contributor, but not as a former LDO Derby man! It was in



Mr. Colin Lee's 1:3 scale model 1893 Gatling gun is making progress.

conversation with Dennis that I learned that Martin was then more than eighty years of age! I think it was also on this day that I found that Martin had been a gunnery officer in the RN during WW2.

As it was once correctly said of Sir William Stanier, Martin certainly loved his steam locomotives. As you stated at the end of your tribute, he leaves a void that will probably never be filled. The ranks of those who knew the world of everyday working steam are 'thinning out.' I wonder if, as dear JNM once stated, affection for our lovely hobby will survive long after? I do hope so.

Giles Taylor, Cumbria.

Nostalgia and the Engineer

SIRS, - I am sure we all realise that most of the engineering standards going back even as little as thirty years ago are no longer acceptable. But those of us who were brought up on the writings of LBSC, Don Young and their like found their articles very readable, as the background and experiences which overflowed into their articles were as a result of their life and times. Who can forget LBSC's delightfully simple descriptions of 'how to do it' such as with injector cones: "... just put a number 70 drill in a pin chuck and swirl it through with your fingers" or operations on the Polar Route.

For myself, possibly many others, it is the nostalgia I crave, meanwhile after all these years I still have yet to find success with injectors! Referring now to the correspondence concerning engineers, as with 'Hoover' the word 'engineer' means all things to all people, and writing as one who was 'admitted' (their word of the day!) to the Institution of Locomotive Engineers many moons ago, I am comfortable to be called a model engineer.

Most, if not all of us have a design input, we construct, operate and maintain in our chosen discipline, and I for one have no wish to be known as a 'home mechanic' working in my 'hobby shop'.

Despite his admiration of some American engineering principles, I doubt that Bulleid would have enthused at being called a 'Master Mechanic' as were people such as Rogers and his compatriots over the pond.

Clive R. Young by e-mail.

Artillery modellers

SIRS, - My main interest is in artillery modelling and I am now three years into an 1:3 scale 1893 Gatling gun (photo above). I have some way to go yet!

Having now been retired for a little over three years, I can indulge my lifelong interest in scale modelling. I have a well equipped workshop with an ML7 lathe, Chester milling machine, two pillar drills and a Warco BH600G which has been used 'from the box' without modification or alteration and has been a first class buy.

Having been taking *Model Engineer* for three years only, I would be very pleased to see re-runs of previous features on artillery models; I believe there has been an article on a quick firing naval gun from the '30s. I would also like to make contact with a group of like-minded model engineers who specialise in making artillery models.

I served my time back in the late '50s - early '60s working for Blackpool Transport in the fitting shop for 19 years. This was followed by 22 years with British Aerospace Military Aircraft Division. During this time I have had considerable dealings with engineers and can say without doubt that it takes a lot more than a few letters after one's name to be an Engineer!

Colin Lee, Lancashire.

News from Japan

SIRS, - It was with great regret that we read of Mr. Martin Evans' death last December.

My friend, Mr. Shotarou Saitou has just completed a new engine (photos above). He prepared his own drawings from information provided by Arthur Koppel in Germany. In



Mr. Shotarou Saitou with his latest locomotive, a Koppel in 3 1/2in. gauge.



Mr. Shotarou Saitou's Koppel has been given the name Tulpe.

3 1/2in. gauge, the 0-4-0 tank engine is called *Tulpe* and except for the pressure gauge, Mr. Saito has built it from scratch using available materials. It features Marshall valve gear which is better than Hackworth gear in this application. The locomotive took Mr. Saitou about 850 hours to complete, including about 100 hours spent on the boiler.

The locomotive is 408mm long, 192mm wide, 270mm high and weighs 19kg. The wheels are 66mm diameter and the cylinders are 22.5mm bore x 35mm stroke. It is a very nice engine.

I am building a 3 1/2in. gauge LMS Jubilee class locomotive to LBSC's *Doris* design.

A cold wind blows every day here in Tokyo, however the Japanese apricot trees will soon blossom in my little garden.

Kimio Hoshino, Japan.

Passengers per hour

SIRS, - In reply to the question raised in *Club Chat* (M.E. 4214) concerning Bristol SMEE ("can anybody do better than 184 passengers per hour?") I believe we at Cardiff MES can better these figures.

We hold 12 open days to the public, six Sundays, 2-5pm, three Bank Holiday Sunday/Mondays 12-5pm = 48 hours. In total, in this time we carried 11,880 passengers giving us a rate of 247.6 per hour.

On top of this our 18in. gauge tram carried 2645 passengers in the same period giving us a grand total per hour of 304.6.

As well as the above we have special days for the children from Chernobyl and their helpers, we also have an afternoon for children with special needs.

Add our Santa special with 660 children tickets sold and at least one adult riding with the children gives us a total of 1320 passengers between 11.45am and the last train departing at 3.45pm for Santa's Grotto, an hourly rate of 330.

We still have time to lift large sections of bar-type ground- and raised-level tracks, replacing with

plastic sleepers and profiled rail, a lot of maintenance and many other jobs throughout the year help us prepare for our rally on 12/13 June.

All this is achieved by the hard work of the members throughout the year.

Michael Williams,
Chairman, Cardiff MES.

Tich

SIRS, - I am wondering if there is anyone 'out there' who can help me. I am building a *Tich* locomotive in 3 1/2in. gauge and would like to know whether it would be possible to convert it to run with oscillating cylinders and still have enough power to pull a person or a couple of people.

If this is a feasibility, I would also like to know how best to go about it. Any suggestions would be gratefully accepted.

I look forward to buying each issue of your magazine as I am very interested in engineering.

With many thanks, and looking forward to hearing from you
Michael Burton (aged 15)
by e-mail.

Stan Bray replies:

Hello Michael, Mike Chrisp has forwarded your message to me and I will be pleased to help you all I can.

There is no reason why a 3 1/2in. gauge *Tich* should not work perfectly well with oscillating cylinders. I have a friend who has used them very successfully on a 5in. gauge locomotive, a traction engine and a steam wagon.

I will work out how to go about it and e-mail you in a week or so. It would help if you could let me know whether you already have the normal cylinder castings and propose to make use of these, or intend to make the cylinders from scratch, also what equipment you will be using to make them.

(We would be delighted to hear from any other readers who feel that they can offer Michael advice or assistance. Taking the matter a stage further, is there anyone who already

has a working design for a small oscillating cylinder passenger hauling live steam locomotive which could be presented as a build project in these pages? We are sure that there would be considerable interest in a construction series — Ed.)

Twin Sisters

SIRS, - I have recently acquired a *Twin Sisters* chassis to the design by J. Austen Walton and wonder if any reader has any drawings of this locomotive which they no longer require. All costs would, of course, be met. Many thanks in advance.

P. Lejeune, Dorset.

Self-taught

SIRS, - I am grateful that a number of readers replied on the subject of indexable tooling with which I had experienced some disappointment. Peter Cook's letter was usefully informative but he made no specific suggestions as to why I was failing to achieve the standard I sought. Tony Jeffree's essay sadly dismissed the one significant fact I included, that the tool source was impeccable and erroneously deduced that my problem was due to commercial gullibility. The paragraphs from K. A. Willson might well have nudged me in the right direction, had I not in the meantime successfully overcome the problem.

Indexable tools have been around for some time and obviously they work and have many advantages over their predecessors. Since I had sought to buy good examples I concluded the fault must lie within my own (ever suspect!) technique. I started again from scratch, inserting new tips and setting height and

shank angle with absolute accuracy. Next I dug out the pamphlet which the supplier had provided and read it thoroughly, noting particularly that higher speed and heavier cuts are recommended. Here lay the difference. The improvement was dramatic — turning 25mm mild steel was child's play and the finish as good as I could ever want. Several further trials have confirmed my newfound confidence.

The fault was entirely mine and stems largely from my early days of self-taught lathe operation, when I found that too high a spindle speed and heavy cuts got me into trouble. I tend towards going slowly — too slow and too light a cut with the indexable tips clearly impairs the resulting finish. Furthermore the tolerance of HSS tooling as to centre height has probably left me a bit careless as to that aspect, which possibly aggravated my other errors.

To finish on a commercial note, I bought three tools — a 16mm shank facing tool, a similar turning tool, and a 14mm boring tool. With VAT, postage, etc., they cost £127 and I shall now buy some more. From the adverts I have now looked at, what I bought does not seem particularly cheap, but when one considers the life of good tools they are splendid value. As a boy I was told that one should always get the proper tools for any job, that one should buy the best and look after them! So I stick to the impeccable!

I hope my confession of technical inadequacy may prevent other newcomers to indexable tooling from making the same error.

Dennis Randall, Oxfordshire.

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COMPETITION MODELS

AT THE 73RD MODEL ENGINEER EXHIBITION

CLASS A1: HOT AIR ENGINES

Reported by Julian Wood

Only two entries were entered for this class this year. Ian Cornish showed a simple gamma type engine, i.e. the power piston and displacer were in separate cylinders joined by a port or tube. These cylinders were mounted on a cast frame which supported the bearings for the crankshaft on which was mounted a single flywheel. The heat was supplied by a methylated spirit furnace fitted with a smart chimney with brass fittings. Unfortunately, the engine hot-cap which could be seen between the furnace and the frame was made of copper, a very unsuitable material for a hot cap. Its high thermal conductivity is certain to conduct heat straight to the cold end thereby 'short-circuiting' the engine. Hot caps should always be made of thin section stainless steel, say around 0.010in. wall thickness; this allows furnace heat to pass through, but its poor conductivity coupled with its thinness minimises conduction along it. No award was made.

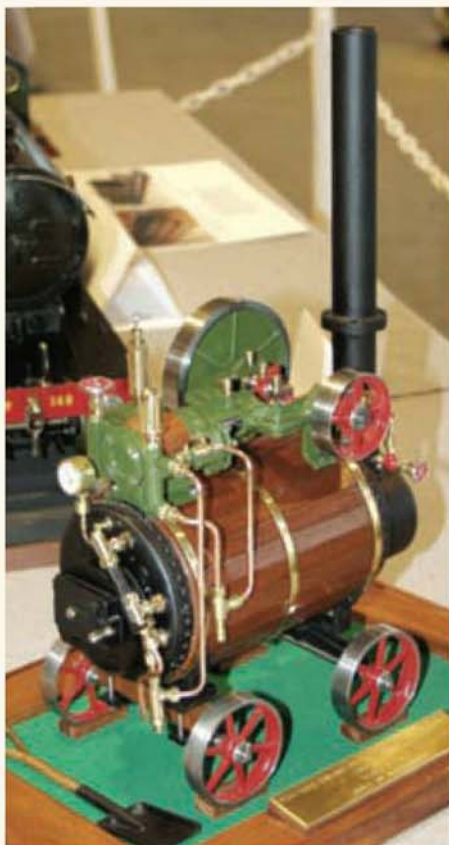
The second entry was Herbert Stumm's unique model of a Malone Stirling engine made in 1931. The peculiarity of the Malone design is its use of a liquid, in this case water as a working fluid instead

of the usual gas — nitrogen, helium or hydrogen. Tests on a prototype engine in 1931 showed it to be quieter, much more economical and safer than other engine types of similar power output, but was inclined to be heavy. This was primarily due to the need to contain the very considerable pressures developed; the higher the pressure, the greater the efficiency. However, the pressure was in the liquid, of which the mass was small, so the stored energy was minimal. The engine was considered to be suitable for ships, locomotives and power stations.

The operation depends on the compressibility of a liquid above its critical point which, for water, is 3,215psi and 375deg. C. In fact, above this point the water is in the form of an extremely dense gas or vapour which can be likened to highly compressed steam. The normal liquid molecular structure is no longer maintained, the molecules having high energy, as in steam, due to the temperature, but being prevented from expanding due to the pressure. The pressure attained in the engine could be up to 50,000psi. Despite this pressure, the engine was quiet and, apart from the furnace, cold. All glands operated cold. The high efficiency is largely the result of the excellent heat transfer properties of water as a thin film inside metal tubes.

The beautifully constructed model at 1:15 scale uses two opposite pistons working on a common crankshaft. Each cylinder is connected to a bank of ten displacers, each 4mm in diameter, running in cylinders of 4.1mm inside diameter. The displacers are brass and the cylinders stainless steel. The two banks of displacers work 18deg. apart and their cylinder volumes are piped to the power cylinders. The timing between the piston and displacer movements is effected by an eccentric and a reciprocating rack to drive the displacers. The engine has run using water but Herbert has plans to replace this with silicone brake fluid to reduce friction. Does brake fluid have a similar critical point, I wonder?

The engine was awarded a Gold Medal.



Norman Barber's fabricated 2in. scale Sisson's engine to John Haining's design was awarded a Silver Medal and the Bill Hughes Cup.



Ian Cornish developed this 4-cylinder version of the original single cylinder Twisty design published in these pages.



This 'gamma' type hot air engine entered by Ian Cornish was built from a German kit.

CLASS A2: GENERAL ENGINEERING MODELS

Reported by Anthony Mount

I regret to say that I was disappointed again this year in that there were only five entries in this class. One up on last year this may have been, but only four engines arrived. It is easy to get to Sandown and the parking is free. It would be nice to have a good selection of models in the class. If I am invited to judge next year, why not give me some real work to do?

Last year Norman Barber exhibited a Vulcan beam engine. This year his exhibit was a 2in. scale Sissons of Gloucester portable engine, circa 1840. This is very early for a portable engine. Norman supplied plenty of notes for the judges, which are very useful in determining why a detail has been done in a certain way.

The engine is carried in a main frame fixed with bolts to the top of the boiler. This had been fabricated but was a good representation of a casting and looked just as it should for this scale of engine. The boiler was neatly made with well-executed riveting. However the wood strips of the lagging seemed a little wide for scale, and the finish could have been smoother.

The forged crankshaft looked just right, as did the fittings. A small point perhaps but some of the nuts were a bigger hexagon than the heads of the bolts on which they were fitted. Nevertheless, altogether it made a delightful model and deserved its Silver Medal. It was also awarded the Bill Hughes Cup.

A regular exhibitor is Ian Cornish who this year entered a four-cylinder *Twisty* engine. This was an interesting engine and we wished we could have seen it running; the phrase "*poetry in motion*" comes to mind. It was of fabricated construction



These two steam turbines were built by the late Byron G. Barnard, restored by Derek Corless, and were Very Highly Commended.



Herbert Stumm's superb Malene Stirling cycle engine was awarded a Gold Medal.

and a drawing would have been useful to show what was going on inside. It was constructed mostly of brass with an aluminium alloy centre frame.

The next entry presented a bit of a problem as it had been made by Byron G. Barnard, entered by Elizabeth Barnard and restored by Derek Corless. No notes accompanied the entry to indicate its history. The exhibit was of two single stage turbines, constructed in brass and aluminium alloy and given a good finish. But with no notes, it was impossible to see what form the rotors took and whether it was of freelance design or based on full size practice. This exhibit was awarded a Very Highly Commended Certificate.

I have left the biggest engine exhibited till last. A cross-compound Corliss engine designed by Arnold Throp was entered by John Smith. This was a massive engine overall but when looked at in detail was of delicate design. Incorporating Corliss valves, the detail on the cylinders was complex and featured little trip levers and turnbuckles. In fact it appeared to have 'blobs and gadgets' everywhere. It must have been a nightmare to assemble in this scale.

Good notes accompanied this entry which revealed that some of the nuts had been reduced in size to better resemble full size. It is sometimes difficult to achieve a balance between what should be and what is possible with a scale



John Smith entered this fine cross-compound Corliss valve mill engine based on a design by the late Arnold Throp. It was awarded a well deserved Silver Medal and the Tom Nevins Memorial Trophy.

model, but some of the nuts could have been smaller still, though I would not envy the builder screwing whi had to fit them.

Nearly all the machined parts had been brought to an excellent finish — not too bright, but free from blemishes. That said, close scrutiny of the engine frame revealed a few cutter marks. The judges did have a few reservations about the floor on which the engine stood as it was entirely covered with chequer plate. Many engines had chequer plate around cylinders and valves, but most engine room floors were laid out with decorative tiles.

But let us not be churlish; a lovely engine, it ably represented the stationary steam engine at its zenith and richly deserved its Silver Medal and the *Tom Nevins Memorial Trophy*.

CLASS A3 INTERNAL COMBUSTION ENGINES Reported by Brian Perkins

IC engines were rather thin on the ground again this year, however the quality of the models that did appear was superb. The BMW RS500 supercharged, horizontally opposed, twin cylinder racing motor cycle engine of 1939 built by Rolf Depping showed the usual fine workmanship and attention to detail for which he is renowned. The detail work on the supercharger and carburettor was well carried out, however I felt that the

cylinder and cylinder head cooling fins were somewhat more square edged than they would have been on the prototype. The inlet and exhaust manifolds were well executed and I particularly liked the finned exhaust pipe retaining nuts. The overall standard of finish was good and the miniature BMW badge added a final finishing touch. Judging of this exhibit was greatly assisted by the notes and photographs supplied and we wish that more exhibitors would follow Mr. Depping's example. This model was awarded a Gold Medal and the *Edgar Westbury Trophy*.

The 5.3cc four-cylinder engine constructed by Peter Civati to Eric Whittle's design was also well executed but again suffered from unrealistic finning. It would also have been an improvement had an attempt been made to reduce the size of the glow plugs. On an engine of this size the plugs used seemed to overpower the overall impression of delicacy which is part of the charm of Eric's designs. This model was awarded a Bronze Medal.

The last two engines were exhibited by the widow of the late Byron Barnard and represented two of the well-known Edgar Westbury designs. The *Centaur* gas engine was well built although the finish was rather uncharacteristic of this type of engine, and more work could have been done in cleaning up castings, particularly the flywheel spokes. The 10cc OHV engine again suffered



Rolf Depping's superb BMW RS500 horizontally-opposed twin-cylinder racing motor cycle engine of 1939 was awarded a Gold Medal and the Edgar Westbury Trophy.



This 4-cylinder 5.3cc aero engine was built to Eric Whittle's design by Peter Civati and gained a Bronze Medal.



The late Byron G. Barnard's Centaur gas engine had been restored by Derek Corless and was Very Highly Commended.



Another from the Byron G. Barnard stable and restored by Derek Corless, this 10cc OHV Westbury engine was Very Highly Commended.

from a lack of final finish and attention to detail. Both of these engines had been restored by Derek Corless and were awarded Very Highly Commended Certificates.

CLASS A4: MECHANICALLY PROPELLED ROAD VEHICLES Reported by Harry Paviour

It must be a long time since this competition class in the Model Engineer Exhibition had only two entries. There must be many reasons why model engineers do not want to put their fine workmanship in the limelight to be judged. However, it is not because there are not the models out there. On the contrary, you only need to visit the other exhibitions up and down the country, including the many local events organised by the various societies, to see the number of models available. Many of these are worthy of a Silver or Gold Medal and may well qualify for the award of one of the Exhibition's relevant trophies or cups. So, why are these models not entered for competition?

We recognise that exhibiting loan or competition entries at any exhibition always has cost and time implications for the exhibitor. Maybe turning out in mid-winter in order to compete in an exhibition is no longer as attractive

to present day model engineers as it once was. All we can do is hope for the best as we look forward to more models next year.

Having 'banged the drum' to encourage more entries for next year let us move on to consider the two entries which we did receive. In past reports the judges have commented on the qualities sought before a medal or trophy can be awarded, advice which will not be repeated here.

The first model was of a Burrell 'Gold Medal' tractor in 1:6 scale (2in. to the foot) and presented as a showman's engine. The exhibit was based on the 1905-1927 5 ton tractor. The exhibitor, Mr. Alan Temple from West Sussex, obtained the model some years ago in a part completed condition. From the photographs and supporting information provided, the boiler, wheels, tanks, motion gear, etc., had already been produced, leaving the roof, steering and painting to be completed.

The maroon paint work and the lining were considered to be of fine quality. What prevented the model from gaining higher marks was the general lack of finer points of detail. The omission of any cotter or split pins on any part of the motion gear was particularly noticeable. Difficulty was also experienced in opening and closing the smokebox door.

The model was exhibited on a base covered in green baize, which with the hall lighting set the model off very well. There was a good deal about the model that made it very popular with the visitors to the display, but on close examination it lacked

that special quality to gain more than a Silver Medal. Mr. Temple was also awarded the Aveling-Barford Trophy.

Model engineers considering building any of the Burrell engines, especially if they are seeking to achieve accuracy in the fine detail, would do well to obtain the publication *The Story of St. Nicholas Works* by Michael R. Lane.

The second exhibit was an unpainted 1:12 (1in. to the foot) scale *Minnie* to the design of L. C. Mason and exhibited by Mr. C. Clarke. Unfortunately there was no paperwork to indicate where the model was from or about the model itself, which made it difficult to judge or comment upon.

It appeared to be well made and constructed as described in L. C. Mason's book. At least with not having the model painted it was easy to assess the quality of the workmanship. The model was clearly built to be enjoyed as it was evident that it is run on a regular basis. The model was exhibited with a card displaying a few unpainted tools. The firing shovel, almost to scale, was not to the same standard as the remainder of the model or the 'outfit'. Because the model was unpainted it lost marks but was eventually awarded a Highly Commended Certificate.

CLASS A5: TOOLS AND WORKSHOP APPLIANCES Reported by Geoff Sheppard

Although there was an interesting collection of tooling at this year's Exhibition, the number actually entered for competition was modest, though the quality was as high as ever.

Outstanding among the exhibits was the much-modified Quorn tool and cutter grinder constructed



Alan Temple's fine Burrell 'Gold Medal' tractor in 1:6 scale was awarded a Silver Medal and the Aveling-Barford Trophy.



Len Mason's Minnie is a very popular design; this unpainted version by Mr. C. Clarke revealed competent workmanship and was Highly Commended.



This attachment for his Aciera F1 milling machine by Dr. Peter Clark permits the use of drills down to 0.1mm diameter and was Very Highly Commended.

by Martin Gregory of Liskeard, Cornwall. Although the 'Quorn' is recognised as being a most versatile machine, capable of the vast majority of tool sharpening operations likely to be encountered in the amateur's workshop (and many professional establishments as well), it is acknowledged as not being the easiest to set up and operate. Mr. Gregory has incorporated a large number (some seventeen being listed on the accompanying display material) of modifications designed to enhance the utility of the machine. These necessitated a protracted period of study by the judges before their value could be fully appreciated. What was impressive was the manner in which they had been accommodated within the basic design — not an easy task given the compact nature of the machine in its original form.

The entry was considered to be worthy of a Silver Medal and the innovative modifications of such a standard that the *Bowyer-Lowe Challenge Cup* should be awarded. Professor Chaddock's lily has been well and truly gilded.

Peter Clark of Southwold, Suffolk can always be relied upon to produce a piece of high-quality tooling that generates interest. His methods of presentation are also to be much admired as they provide an excellent interpretation of the item, allowing visitors to appreciate its technical value. Once again he produced a useful device in the form of a self-powered micro drilling attachment for his Aciera F1 milling machine. Allowing the use of drills as small as 0.1mm diameter, it replaces the normal spindle unit on the machine. A 15 volt motor is coupled to a spindle within a quill which slides in a Fluorosint sleeve to minimise friction. The spindle is mounted on pre-loaded ball races and accepts Schaublin F-4.5 collets.

The unit was designed with the objective of

keeping the moving mass as low as possible, the quill being balanced by an adjustable weight. The drill may be fed by finger pressure on a lever or by the action of another sliding weight. Drilling depth is set using a digital read-out on the parent machine. Dr. Clark was awarded a Very Highly Commended Certificate for this excellent piece of work.

Dividing attachments are popular additions to the home workshop inventory, with at least one being seen in competition on most occasions. This time, Ian Cornish of South London produced a substantial accessory for the Myford ML7 lathe, to the design of Alan Timmins. Solidly constructed from castings, it was judged to be worthy of a Commended Certificate.

Also Commended was an item, described by its constructor as *"A simple tool, simply made, that works well."* This, surely is the ideal description of any piece of tooling made for use in the workshop, rather than for show. Inspired by a recent exhortation by Chief Judge, Ivan Law, the constructor, Gary Wooding of Leamington Spa, decided to enter his bandsaw blade soldering jig as an example of the sort of tool that we all make as a matter of course during our workshop activities and often forget about as soon as they have served their purpose.

It was interesting to see that this modest item generated as much discussion among visitors as the much more sophisticated devices. I am certain that its appearance has inspired the production of more than one copy since the close of the exhibition. The judges would appreciate seeing many more similar pieces.



Martin Gregory's Quorn tool and cutter grinder to Professor Chaddock's design gained a Silver Medal and the Bowyer-Lowe Challenge Cup.

CLASS A6: HOROLOGICAL, SCIENTIFIC AND OPTICAL APPARATUS Reported by Neil Read

I think that few will disagree if I say that this year's exhibition was a remarkable one for clocks. Rarely has there been such a range of fine timepieces for the Judges and visitors to examine and enjoy. Eight awards were made in this class and are detailed below.

The great wheel skeleton clock with passing strike by Ian Rutherford was an elegant piece of work and had a most delicate appearance. It was based on John Wilding's design but with additional strike. Generally speaking the workmanship was good and the finished clock nicely presented on an antique stand and under an antique protective glass dome. This exhibit was awarded a Bronze Medal.

The clock mainspring winder by Adrian Garner was a reminder that, in common with many trades, clock making has its own needs in terms of special tools. To try to work with a mainspring without such a tool is rather dangerous and all serious clock makers/repairers should make or buy a proper tool. This example was well designed and finished and was awarded a Very Highly Commended Certificate.

Clocks having skeleton frames and pierced dials are always popular among clock makers and visitors alike. The former like to show off their



Prolific competitor Ian Cornish entered his dividing unit to the Alan Timmins design for his Myford ML7 lathe and gained a Commended Certificate.



A simple tool, simply made, which works well, Gary Wooding's bandsaw blade soldering jig created considerable interest and was Commended.



Ian Rutherford's Great Wheel Skeleton clock with passing strike.



A Grasshopper Skeleton clock by Philip Warrington.



Philip Warrington's Joseph Merlin band clock of 1776.



An unusual and elaborate Skeleton clock by John Chantler.

skills (and why not?) while the latter like to admire the 'works' as they go round. A well-made and finished mechanical clock is so much more than just a means for telling the time. This thought ran through my mind as I examined the Grasshopper clock made by Philip Warrington. This most elegant timepiece was well made and finished and was displayed in a fine glazed cabinet. It was based on a design by W. R. Smith but the winding square has been brought forward and Harrison's maintaining gear incorporated. A conventional pendulum has been used. This clock was awarded a Silver Medal.

Mr. Warrington was also exhibiting a Joseph Merlin's Band Clock of 1776. This unusual clock presents the time using drums or bands rotating about a horizontal axis. Britten's *Old Clocks & Watches and their Makers* describes Joseph Merlin as a "... mechanical genius who designed curious dial and regulator (clocks) wound by the room door opening." I am not sure if Mr. Merlin intended this form of winding for this design but it is certainly a novel and relatively complex clock. It is fitted with a dead beat verge escapement and is powered by a worm and wheel. Well

made, finished and presented, this fine exhibit was awarded a Gold Medal and the *Claude B. Reeve Memorial Trophy*.

As has already been mentioned clocks with skeleton frames give much scope for makers to demonstrate their skills in machining and polishing. However, few clocks have been more elaborate than the clock exhibited by John Chantler. With no notes to indicate what inspired the design, we can only imagine that Mr. Chantler was trying to achieve the something in the Chinese taste that was popular in the eighteenth century. Although the elaborate in appearance and well made the clock lacked something in terms of finish and was awarded a Bronze Medal.

If the skeleton style clock is very much about show then the regulator clock is very much about

telling accurate time. The regulator 8-day movement exhibited by John Buckingham was laid out with the traditional separate dials for giving the hours, minutes and seconds. It was displayed on a purpose made testing stand but lacked some of the fit and finish associated with good clock making. This clock was awarded a Highly Commended Certificate.

The skeleton table regulator by James Marten was technically interesting as it had rolling element bearings fitted to the barrel, fusee and escape arbor. It also featured Harrison's maintaining power on the fusee. Well made and finished and mounted on a mahogany base, this clock was awarded a Silver Medal.

The last entry to gain an award in this class was the 8-day skeleton clock by David Beach. This too had a number of interesting technical features such as Harrison's maintaining power on the fusee and a dead beat escapement driving a $\frac{1}{2}$ second pendulum with an ebony rod and brass fittings. Standing on a black marble base with four brass bun feet this clock was well made and finished and was awarded a Silver Medal.

●To be continued.



Adrian Garner's clock mainspring winder.



Skeleton Table Regulator clock by James Marten.



John Buckingham's 8-Day Regulator clock.



8-Day Skeleton clock by David Beach.



Northern Association

Model Exhibition

Saturday 27th March 2004

10.00 a.m. - 5.00 p.m.

Sunday 28th March 2004

10.00 a.m. - 4.00 p.m.

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NORTHERN ASSOCIATION MODEL EXHIBITION

Eric Clifford,

Exhibition Co-Ordinator, sets the scene for the forthcoming event to be held in Warrington.

Scheduled for 27/28 March at Risley Conference Centre, Birchwood Park, Warrington 10am - 5pm Saturday and 10am - 4pm Sunday, the forthcoming Northern



Association Model Exhibition will soon be throwing open its doors to welcome visitors.

At the time of writing these notes 23 model engineering clubs and societies have agreed to attend together with 6 model boat clubs plus a number of visiting clubs and societies, including the 7¹/₄in. Gauge Society, Gauge 1 Association, G-Scale Group, Meccano Guild and a number of individual entries.

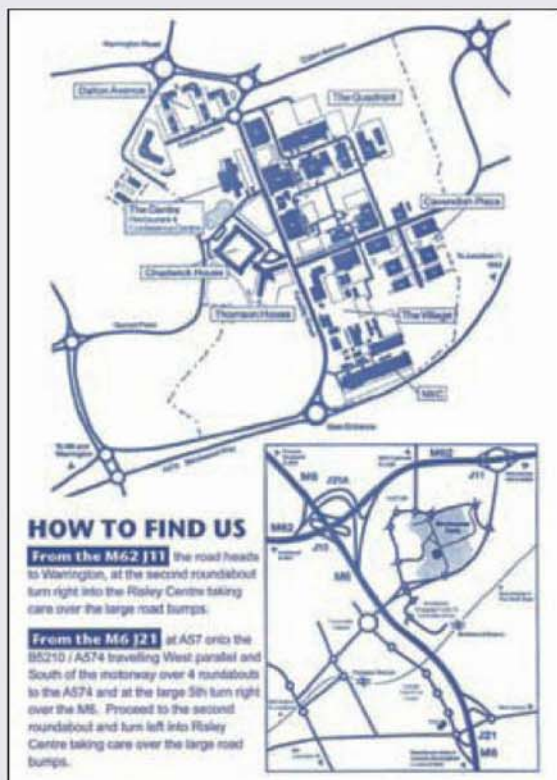
Most of the requirements of visiting modellers will be met by the 17 traders who will be present, and there will be a craft stand too, plus a couple of charity stalls, one supporting the Royal National Lifeboat Institution, the other Cancer Research UK.

Visitors will be able to enjoy a number of lectures on a variety of subjects, which will be presented in the comfortable and well appointed Lecture Theatre at Risley Conference Centre, Birchwood Park, Warrington.

Outside the hall three portable miniature railway tracks will be in

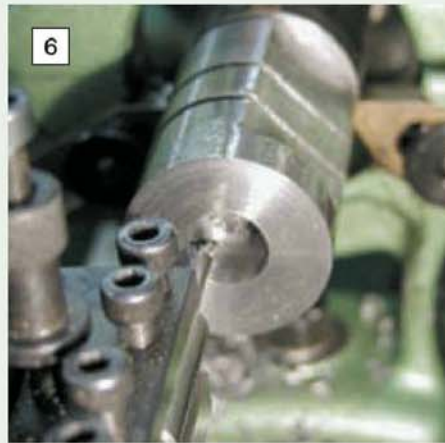
operation, and boats will be sailing on the lake. Permission has also been obtained for large scale traction engines to run around the site.

Visitors are assured of a warm welcome and plenty to keep the family amused and entertained, all for just £2.50 entry!





5
Turning multiple components. Here the sections have been defined with the parting tool.



6
The flat has been milled and the parts re-chucked for boring.



7
The brass sleeve has now been fitted to the index hub and the index disc locating boss turned.

Colin Pape

describes how he cut the worm.

●Part III continued from page 137

M.E. 4214, 6 February 2004)

I started by reducing the bar section at each end of the future worm to make space to advance and retract the tool at each end of the cut. When cutting a metric or any other 'strange' thread it is essential not to disengage the saddle from the leadscrew. A number of cuts are necessary to form this worm and between each, the tool has to be returned to the start point at the left hand end. This means that some method has to be found to reverse the direction of the leadscrew. If you do this electrically by using the reversing switch, you will have to wait a long time between stopping and starting because the motor will not change direction until it has stopped. You may also begin to wonder if you will burn out the motor.

I decided to use a handle in the end of the mandrel and turn the leadscrew back by hand. The lathe is running in low back gear, there is no wildly turning handle and therefore virtually no hazard. The motor can be left running at the end of each cut, the belt drive disengaged, the cutting tool retracted and the leadscrew wound backwards by hand; the tool can then be advanced and the belt drive engaged again. The method is quite fast and good exercise.

I ground a tool to the dimensions given in the book and shown earlier. The rapidity of the helix of the worm means that it is very important to pay attention to the side clearances. On the left-hand side the angle can be zero because this side of the worm is actually moving away from the tool. On the right-hand side, the angle has to be quite considerable. I ground the tool back about 8deg. on this side and I checked the cut often to make sure that no rubbing was taking place.

I decided to use a plunge cut, i.e. straight in, cut and not to move the tool in at 20 degrees. I used a diamond lap to finish the cutting edge to a keen edge. Initially, my cuts were only 0.1mm deep, an in-feed which was halved as cutting progressed. From time to time I moved the tool about 0.1mm sideways to make a repeat cut and then brought it back to centre. This ensured that the tool did not have to spend its entire time cutting both sides of the Vee at one go. When the tool was within 0.3mm of the final depth this sideways relief cutting was stopped.

INDEXING ATTACHMENT FOR THE MYFORD LATHE

Bearings and shaft end assembly

It is essential that these three pieces are co-axial. The index hub at the end of the worm shaft looks like a bearing but that is not its real purpose. Its main job is to ensure concentricity of the shaft and the index discs.

I made these parts from a single piece of 35mm free cutting mild steel round stock. I put the stock in a 3-jaw chuck and left it there until all the important operations were finished.

Operations such as milling the flats, which allow the parts to sit on the backbone, are all done while the pieces form part of the original stock. I arranged the order of the parts on the stock so that each part could then be finished off while still united to the rest. So the right hand piece is the index hub, the next piece is the centre bearing housing and the last piece is the end bearing housing. The stub was used to make the hub for the radius arms.

As each component was finished it was cut off so that work could continue with the next piece. The process is illustrated in some photographs.

Photograph 5 shows the bar still in one piece. The sections have been defined with the parting tool. The cuts have been taken to below the level of the milled face which will be created in the next step. **Photograph 6** shows the same bar after the milling operation. At this time the index hub is being bored out to take the brass sleeve. **Photograph 7** shows the brass sleeve fitted in the index hub. The locating boss for the index discs has been formed. This piece is now being cleaned up. Next, the brass sleeve will be bored out and then the piece will be parted off.

In **photo 8** the index hub has gone and the bearing has been fitted in the centre bearing housing. The exposed end is the thrust face which resists the motion of the worm towards the operator. The face is being cleaned up and then this piece can be parted off. Note that this piece will have to be turned round for the assembly on the backbone, but it is properly concentric and square and provided the backbone is flat, the alignment will be good.

The two bearings are close to the worm and must be shaped so that their inner faces do not interfere with the worm. The material to be removed is shown in fig 2. I removed this material later as a separate operation in a milling machine.

Hub for the index radius rods

This piece was made using the stub of the round bar used for the bearing housings. A flat a little longer than the finished article was machined on a section of the stub. Then two parallel holes of 4.5mm diameter spaced 16mm apart were drilled through the section from this flat face. After this, the end of the stub was machined away to leave two parallel, semi-cylindrical slots for the radius arms.

Plunger

This was one of the last pieces to be made. It was not made until all the index discs had been finished. The index discs that I used had nominal 3mm holes punched in them but all were undersize. I drilled out every hole with the same 3mm drill.

I made this part out of two pieces of silver-steel. I used a length of 8mm rod for the sliding part through which I drilled a 4mm hole. I took great care to finish this part so that it was a smooth fit inside the index head. I took a length of 4mm rod to make the stylus rod and I turned a smooth section of 3mm diameter for the actual stylus. I tested this end in a number of index holes. It had to go in and out with no binding and no slop. This end will get a lot of use and should be hardened. The thin rod was inserted in the fat part and secured with Loctite.

Adapting the index plates

As supplied, the index plates may not be completely finished and, in any case, are unlikely to have a centre hole of the right size.

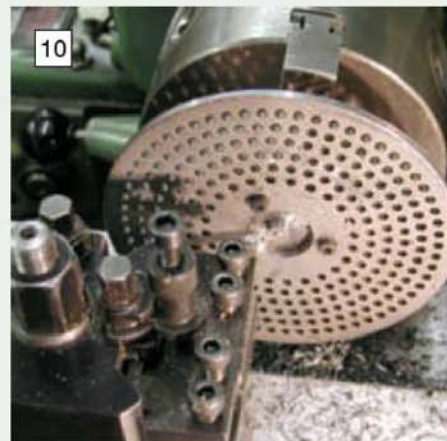
I have shown an index disc in fig 5. The central hole does not have to be the size that I have shown but it must be bigger than the central holes in the fingers. If you have some index plates with a finished central hole that is usable



8
The index hub has now been parted off and the bearing fitted to the centre bearing housing.



9
The special fixture used to finish the index discs to a good standard.



10
An index plate after the trepanning operation; finish boring is in progress.

then I recommend that you use it as your standard and adapt the other parts to suit it.

In my case, all the holes in the plate were nominally 3mm and they were all slightly undersized. As far as I could measure, the circles of index holes were all perfectly concentric and all four plates used the same diameters for the circles of holes.

A 3mm diameter central hole is unusable so I had to bore out these holes to a suitable size while ensuring that they remained concentric with the index hole circles. The outer edge of the discs had been cut by chain punching. I wanted to finish this edge and this too had to be concentric.

I used a fixture for these two jobs. I put a piece of 50mm steel round bar in a chuck, drilled a central 3mm hole and fixed a 3mm silver-steel pin in the hole. I then drilled the three fixing holes 120deg. apart on a 15mm radius and tapped them for 3mm. This fixture is shown in photo 9. It was not removed from the chuck until the plates were all finished.

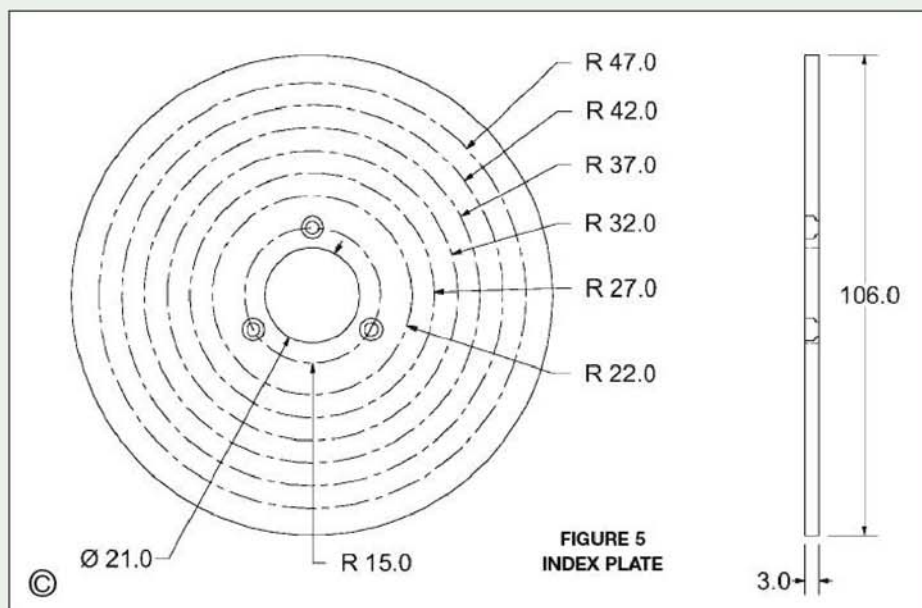
To machine a larger central hole, the first operation was to cut out a circular ring around the centre. It was a trepanning type operation. Not very elegant but it was necessary to preserve the central pin in place. Having removed a ring of steel the hole could be bored out until a gauge that had been turned to the same diameter as the boss on the index hub could be just slipped in. After these operations, the plate and the scrap around the central pin could be removed and another plate put in place.

Photograph 10 shows a plate after the trepanning operation; finish boring is in process. At a later stage the plates were returned to the fixture and the three fixing holes were prepared to accept modified socket head screws. The fixing screws were modified to a slightly countersunk form and the plate holes were adapted to accept these screws. When fitted, the heads of the screws were slightly below the plate surface. With this modification the discs are ready for the last operation which is to clean up the visible surfaces. The results, which can be seen in photo 4, are very pleasing.

Setting up

These operations only have to be done once and are quite simple. First of all, the free movement of the worm shaft has to be eliminated. This can be done with the device on the bench. Just screw in the setscrew in the end bearing housing until the ball contacts the end of the worm shaft, then continue turning until all free movement has been removed.

The single post attachment system provides considerable positioning flexibility. By tilting the post or changing its angle or changing the position of the mounting holes, the angle at which the worm lays in the bull wheel in the vertical sense can be altered. No specification has to be followed. This allows quite a difference in the angle of the index discs, which can be set to the best visibility position for owners of different heights.



Once this angle has been set, it is necessary to make sure that the worm sits at the correct lateral angle to the teeth. So the next thing to do is to establish the best angle. There is a specification for this but it is very difficult to measure and I found that an easy but very good method is to simply rest the worm shaft on top of the bull gear and let it automatically take up the best position. Now all that is required is to ensure that the backbone of the device will be parallel to the long axis of the shaft. I clamped the backbone to the support post and set a protractor to the angle between the backbone and the shaft axis. Then I machined the right-hand side of the top of the support post to provide this angle.

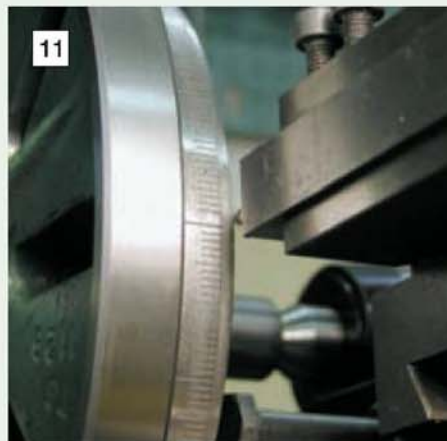
The measured angle is unlikely to be the same as the specified angle because the support bridge plate may not be parallel to the bull gear. This plate is located against the inside of the headstock casting and this casting may not be perfectly square.

Having obtained the correct angle it is now possible to check the transverse position of the worm across the spur gear teeth. It is of no importance if the worm is not exactly in the centre. If it is badly out it will probably be necessary to re-work the support post mounting.

Next comes the setting of the support strut. In the Radford/Thomas design the entire headstock indexing attachment is fixed to a freely pivoting shaft. The device does of course have some weight to help maintain the worm and bull wheel in contact but there is no locking screw to hold it down. They decided that some sort of hold down device had to be provided.

George Thomas refers to this hold down device as the swinging latch. In his design it is quite a complicated piece which requires a hole to be made in the front of the headstock casting and a piece of the device is permanently attached here. I have a couple of problems with this approach because first of all there is a big Myford label on the front of my casting and secondly I am not at all sure that a latch is required. I am not particularly concerned about the possibility that an operation on the work piece will force the worm up and out of the bull gear. I do not intend ever to use the index device to provide resistance against any heavy cutting operation on the workpiece. I am more concerned about having a nice smooth low wear operation of the index device.

I checked my device and found that it weighed close to 900 grams. With the mechanical advantage due to the dimensions of the design this weight results in a force of about 2kgf. pushing the



The first job was graduating the periphery of the GHT Pillar Tool table.

worm into the bull gear. I felt it was appropriate to take some of the strain elsewhere. This is why I call my piece a support strut.

The strut is attached to the backbone by means of a swivel. I used a Nylok nut to secure the swivel to the backbone. This allows a nice firm connection with a little freedom so that the strut can swing out of the way for storage. In use, the foot of the strut sits in a 5mm dimple that I drilled in the casting. The parts of the strut are shown in fig 1.

Note that the moment that any operation on the work piece tries to lift the worm out of the gear it will meet considerable resistance. The lifting force must overcome the resistance of the fixing screw which may have been tightened and even if this screw has been left finger tight the lifting force will immediately tend to lift the end of the strut and it will be up against the full 2kgf. force.

I can imagine some readers will have different ideas about the need for a latch and it is quite feasible to provide a simple lock-down bracket system in the same position. Even with a lock-down latch I would hesitate to use the device as a chuck blocking mechanism. I made my worm out of free cutting bright mild steel. This is not particularly wear resistant but it is working in a near zero load environment. I believe that, properly cleaned and lubricated, it will last through all the use that I can imagine for it. As a final remark on this subject I would add that some thought should be given to an eventual incident when power might be applied to the lathe mandrel with the device still in place.

So, to set the strut, the device is dropped into place and the strut end is put in the dimple. The strut length is adjusted until the worm is fully engaged with no play between the gear and the worm. Now, the length of the strut is increased by screwing it out of the swivel until a tiny bit of play appears between the gear and the worm. This can be detected by turning the chuck by hand. Back off a fraction until this play disappears and then secure the lock nut.

plunger up clear of the index disc. I copied this feature from the Radford design and it should be noted that the feature only works if the handle is turned clockwise.

When turning the handle, hold the index fingers in position by pressing the first finger (the one that you are leaving behind) against the disc. Do not release the pressure until the plunger is safely in the next hole. Complete the required operation on the work piece.

Move the pair of fingers round to indicate the next position. Move the plunger to the next position and continue.

Using the device

I have not seen a description of how these things are supposed to be used but I had a number of uses waiting for mine and I developed a simple technique that seems to work quite well.

First, turn off the power and disengage the lathe drive so that the chuck is easy to turn by hand. Next choose an index disc. Fit it in position. These discs typically have a common start position for all the circles of holes. In this position all the holes line up radially. I found it convenient to provide the mounting holes in the index hub so that this line up was at 9 o'clock.

Now select the circle to be used by setting the length of the radius arms. Set the index plunger in the first hole of the chosen circle. This hole will be at 9 o'clock.

Next bring the index fingers round so that one of them is touching the side of the plunger. Now count round clockwise from the start position and set the second index finger just past the required hole (*the number of holes between the fingers should be that required for correct indexing plus one — Ed.*). Clamp the fingers in this position. A very wise man once said to me "Measure twice and cut once."

Make it a rule always to turn the handle in the same direction, i.e. clockwise. As you lift the plunger and turn the handle, the latch mechanism will automatically come into play and hold the

Conclusion

I should have made this device years ago. It was not difficult to make and if I had not already bought a set of index discs I am sure I would have had no real trouble in making any disc that I needed, and I would have had a really low-cost device.

It can be installed and removed in seconds but I must admit that on occasion I have not even bothered to remove it when a power turning operation was due. I have simply lifted it up and blocked it in the up position by tightening the mounting screw.

The performance of the device is excellent. One of my first jobs was to scribe degree marks around the edge of the circular table of a Universal Pillar Tool. Photograph 11 shows the last graduation about to be scribed. I could not have wished for a better result.

My apprehensions about making a worm turned out to be without foundation and I feel that this is partly due to the material that I used. This was free cutting mild steel. I am sure that many readers would not consider this material adequate, at least at first sight. I would recommend taking a second look however, because as I have said, the load on the worm while turning the bull wheel is near zero. Considering the relatively low use that I expect to make of the device, I am convinced that it was a good choice for me. This could well be true for others.



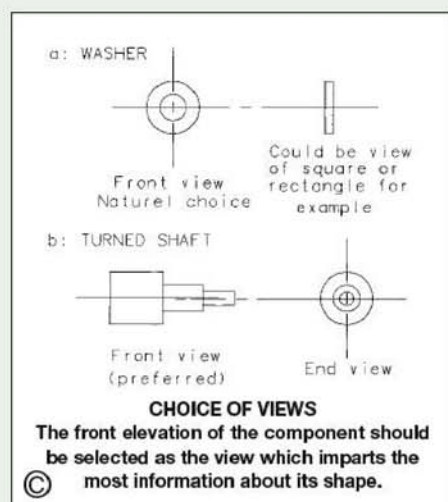
FIRST OR THIRD?

Jim Haslam

explains one of the mysteries of engineering drawings.

There are several ways in which engineering information can be displayed, ranging from a dimensioned freehand sketch to the more orderly pictorial isometric and oblique projections. Each has its particular merits based on ease of presentation or clarity of information display.

The aim of this article is to explain in some detail the more orthodox presentation of drawings by Orthographic Projection, of which two methods are in use. These are first angle projection, also known as English projection, and third angle projection, also known as American projection. With these two types of projection the presentation of information is by means of



selected separate views (elevations) of the front, end and top of the workpiece or assembly. If required, an underside view can also be added.

Views in first or third angle projection of any component part are always the same, it is only their position in relation to one another which differs. It is very important for the viewer to know to which face an elevation or view relates, and it is this which will now be explained.

Orthographic projection

Orthographic means viewed at 90deg. or 'square on' and as a result only one face is projected or shown. To provide full information, two or more views are often required depending upon the simplicity or complexity of the part.

Orthographic projection makes use of two image planes arranged at 90deg. to each other. These are the Vertical Plane (VP) and Horizontal

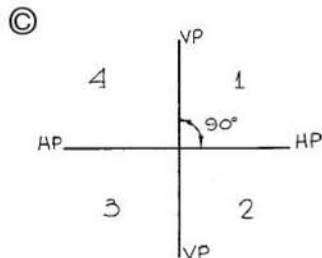


FIGURE 1

Image planes or planes of projection. These intersecting planes form quadrants which by convention are numbered 1, 2, 3, 4 clockwise from top right. Quadrants 1 and 3 only are used, 2 and 4 being redundant.

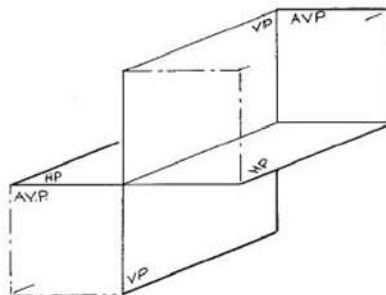


FIGURE 2

Pictorial representation of the image planes. These are the planes on to which the chosen views will be projected. The AVP can be placed at either or both ends as required.

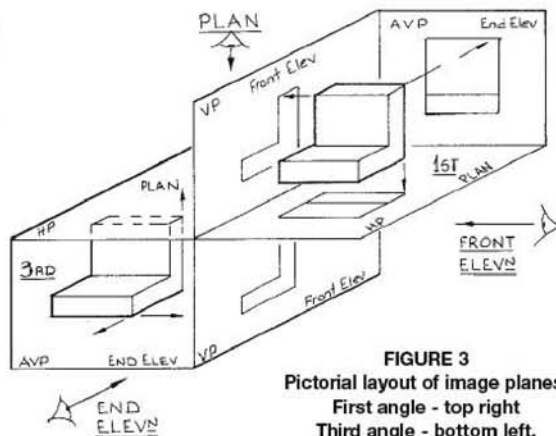


FIGURE 3

Pictorial layout of image planes. First angle - top right. Third angle - bottom left.

Plane (HP) onto which the front elevation and plan views are projected respectively (fig 1).

These intersecting image planes form quadrants, which by convention are numbered clockwise from the top right 1, 2, 3 and 4. Only quadrants 1 and 3 are used for drawing (hence the terms first and third angle), quadrants 2 and 4 are redundant. End elevations require additional image planes, which are referred to as Auxiliary Vertical Planes (AVP). AVPs can be at either end as required. It is upon these planes that the chosen views will be projected as the drawing is developed (fig 2).

Choice of views

In both first and third angle orthographic projection, the main key view is the *front elevation* (or *front view*) which is chosen as the view that imparts most information. The *plan* and *end elevations* are projected 'from' and aligned with this 'key' front view.

Consider the two examples of a washer and the stepped shaft shown. Choosing the side view of the washer as the front elevation would not be helpful. Similarly, the end view of the shaft tells us less about the part than its side view.

First angle projection

First angle orthographic projection uses the first quadrant of the image planes; the object we wish to draw or project is placed in this quadrant, parallel to the planes.

It will be noticed that the VP, HP and AVP are on the far sides of the object from the direction from which the view is taken (fig 3) and the views or images will be projected *away* from the direction of the viewer onto the image planes.

Third angle projection

Third angle projection uses the third quadrant of the image planes and again the object to be drawn is placed in a position parallel to the image planes (fig 3).

Here it can be seen that the VP, HP and AVP are positioned between the object and the viewer. The images will be projected towards the viewer rather than away from them.

Placing of views

If we now consider the images or views as projected to the respective planes from fig 3 we can make the following arrangements. The HP and AVP can be rotated 90deg. bringing them into the same plane as the VP. Now the views are represented as being in a single plane — as the sheet of drawing paper on which they will be shown (fig 4). Views in first angle projection

are placed on the *opposite side* from which the component is viewed.

Referring now to the third quadrant in fig 3, 90deg. rotation of HP and AVP will again bring them in line with the VP, hence the plan view, which is always viewed from above, is placed above the front elevation (fig 5). Views in third angle projection are placed on the *same side* from which they are viewed.

Considering the two types of projection, in my opinion third angle is more logical and easy to interpret in that the views are placed in the

obvious position, i.e. adjacent to the face viewed. On simple shapes there is little to choose between the two systems, however with more complex shapes third angle has its merits with the more logical placing of views.

At no time should the two systems be mixed on the same drawing. Not only does this make life very difficult for the person working to the drawing and lead to unnecessary confusion, but it is quite likely to result in a wrongly made component which will have to be scrapped.

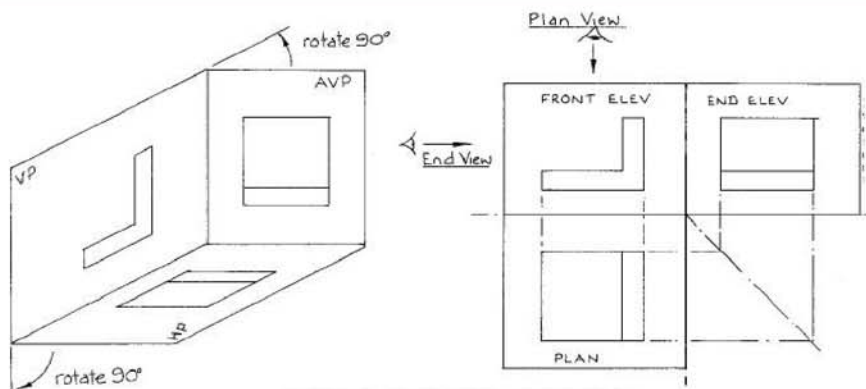


FIGURE 4 - FIRST ANGLE PROJECTION

The HP and AVP are rotated 90° to align with the VP. Views in first angle projection are placed on the *opposite side* of the front elevation to that from which the component is observed.

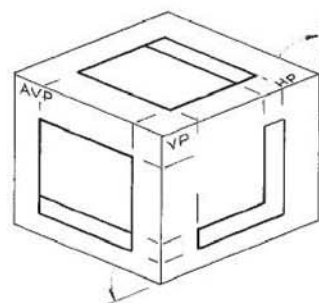


FIGURE 5 - THIRD ANGLE PROJECTION

By placing the object in the third quadrant and rotating the HP and AVP through 90° to align with the VP views are obtained in third angle projection. The process is similar to that used for first angle projection, in this case however the views can be considered to be projected onto the walls of a transparent box.

In third angle projection the views are placed on the *same side* from which they are viewed. The plan view therefore appears above the front elevation and the end elevation can be seen on the side from which the observer is viewing the component.



The Author's clock, illustrated here to remind builders of its attractive and unusual style.

Ian Beilby

continues his clock with the back cock pillars.

●Part V continued from page 144
(M.E. 4214, 6 February 2004)

We have now reached the stage where in order to set the clock running we only need to make the back cock, pallet arbor, and pendulum crutch. Traditionally the back cock is filed from a brass casting. However, an easier method of construction is to fabricate the component from brass rod and sheet. John Wilding has used this method of construction in a number of his clock constructional articles and I intend to do likewise. A start is first made on the back cock pillars detailed in fig 13.

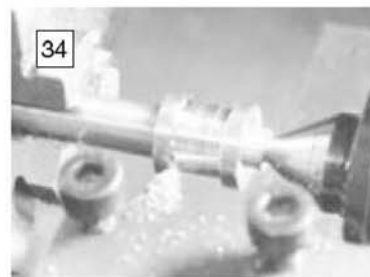
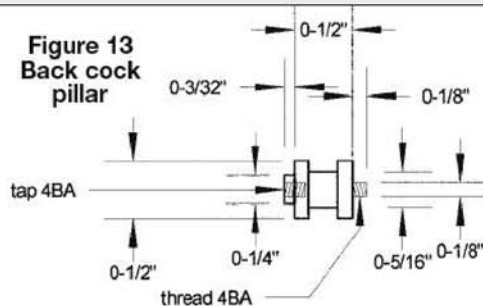
A sufficient length of $\frac{1}{2}$ in. brass rod is gripped in the 3-jaw chuck and, after facing the end, a spigot is turned and threaded 4BA. In order for the pillar to screw fully into the backplate the shoulder should be undercut and the root of the thread should be turned away using a $\frac{1}{16}$ in. parting tool. The second shoulder is marked at $\frac{1}{2}$ in., and the pillar is then reversed in the chuck. After facing the stock and centre drilling, the pillar is drilled with the 4BA tapping drill. The spigot is then reduced to $\frac{1}{4}$ in. dia. for $\frac{3}{32}$ in. and tapped 4BA.



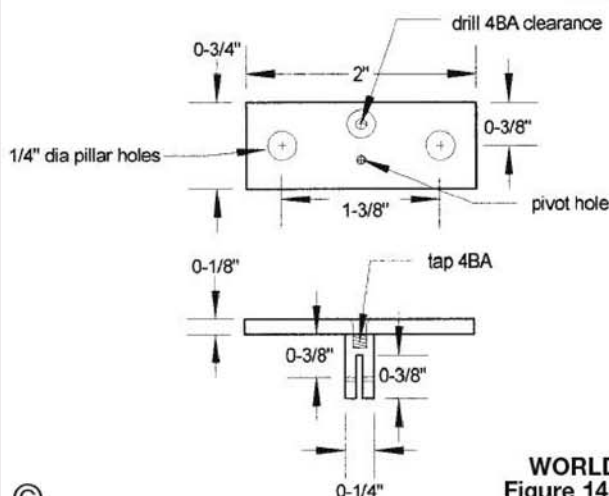
The pillars and suspension post are secured to the back cock plate using steel screws.

WORLD TIME DIAL CLOCK

Figure 13
Back cock pillar



Waisting the centre section of a back cock pillar using a round nosed tool.



WORLD TIME DIAL CLOCK
Figure 14: Back cock plate/post

A Vernier gauge should be used to check that both pillars are identical in length; if one pillar is found to be slightly shorter, a 4BA tapped mandrel should be gripped in the 3-jaw chuck, and the shorter pillar screwed fully into the mandrel. The pillar should be supported with the revolving centre in the tailstock, and a very light-facing cut taken across the shoulder of the pillar with the $\frac{1}{16}$ in. parting tool.

The cross-slide is then locked at this setting, and, without disturbing the mandrel, the second pillar is then screwed fully into the mandrel and the procedure repeated. Both pillars should then

be identical in length. At the same time, and adopting the same set up, the central portion of the pillars can be waisted using a round nosed turning tool (photo 34). As with all plate pillars, the shoulders of the pillar should be undercut to ensure full diameter contact of the pillar on the plate.

Backcock plate and post

The dimensions of the back cock plate are given in fig 14. The various positions should be marked out and carefully centre punched. All the holes are then drilled 1.3mm diameter. The same drill



WORLD TIME DIAL CLOCK
Figure 15:
Back plate pallet arbor hole

©

36



The back cock plate with suspension post fitted is mounted on the back plate.

**WORLD TIME
DIAL CLOCK**
Figure 16:
Pallet arbor

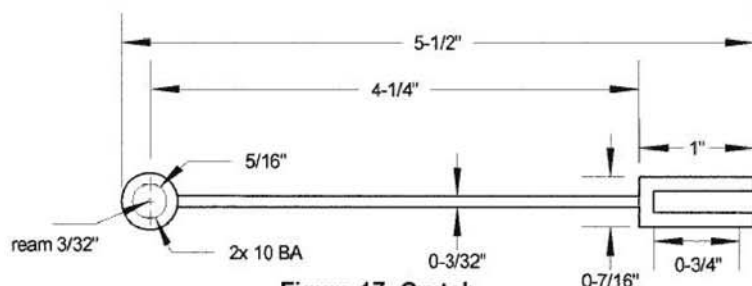
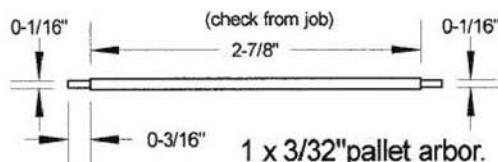


Figure 17: Crutch



© Pendulum crutch to profile, all that remains is for the foot to be bent up at 90deg.

is then placed in the pallet arbor hole in the back cock plate and the previously drilled hole for the pallet arbor in the backplate of the movement. This gives the correct location of the back cock plate relative to the movement backplate. The two plates are then aligned with the aid of an engineer's square, and clamped in place with toolmakers' clamps.

The 4BA tapping drill is then taken through the positions of the back cock pillars. The plates are then separated, the holes in the movement backplate tapped 4BA, and the holes just drilled in the back cock plate opened to 1/4in. diameter. The back cock plate also requires a 4BA-clearance hole to be drilled for the steel screw that holds the pendulum suspension post in place.

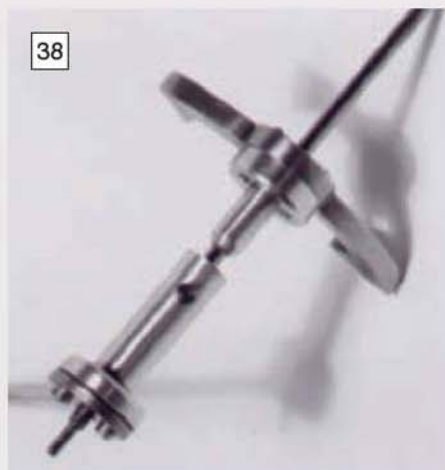
The suspension post is made from 1/4in. brass rod. A saw slit can be made with a junior hacksaw blade or a slitting saw in the lathe. I am using a commercially available longcase pendulum and suspension, the slit in the post should be made just wide enough to accept the brass top block of the suspension.

A hole is drilled in the top block of the suspension and a cross pin fitted; this rests in a Vee notch filed horizontally in the top of the post. The post is fixed to the plate with a steel screw (photo 35). The back cock pillars should be numbered in the same way as the other plate pillars, and a corresponding number stamped on the movement backplate.

The pallet arbor hole in the movement backplate can now be drilled out to 3/8in. and, in order to facilitate the fitting of the pallet arbor, two parallel saw cuts made from the top of the plate as shown in figure 15 and photo 36.

Pallet arbor

The pallet arbor is detailed in fig 16 but, now the back cock has been made and assembled, we can take an accurate shoulder-to-shoulder dimension from the actual job. The front pivot should be turned and finished first, the arbor can then be laid across the plates in order to ascertain the position of the second shoulder. Both pivots should be turned parallel and



The crutch is secured to the crutch collet with two 10BA steel screws.

smooth with no ridges or cuts and brought to a high polish with the aid of the pivot burnisher. The pivot holes can be opened out from the inside of the plates and again a small amount of endshake should be present.

Pendulum crutch

This is the final item to make for the pallet arbor; its dimensions are given in fig 17. This item should be made from a suitable strip of 1/2 x 1/16in. steel. The component is marked out, and simply cut out with the piercing saw before being filed to shape. The foot of the crutch is then bent up at 90 degrees. Before cutting and filing to shape, the 3/32in. centre hole should be reamed, and two horizontal equidistant 10BA tapping holes, which will secure the crutch to its collet, should be drilled.

The crutch can then be used as a template to drill the two 10BA tapping holes in the crutch collet. The two 10BA holes should be drilled with the crutch in a vertical position, and the holes in a horizontal line with the slit in the collet sleeve in order that the tightening screw in the

outer sleeve will be positioned vertically in operation. The two holes in the crutch should then be opened out to 10BA clearance.

The slot for the lower pendulum suspension block should be a close fit in the foot of the crutch and should be burnished (photo 37). The pallets should be screwed to the pallet collet, then fitted onto the pallet arbor and a check made in relation to their position with the escape wheel before securing them to the arbor with Loctite. The crutch should be fitted to the arbor and held in place with the adjustment screw (photos 38 and 39).

The movement can now be assembled in order to set the clock running. I found my clock would run well with a weight of 8lb. (photo 40). The weight required to run the clock at this stage depends largely on the finish of the pivots and pinions and the accuracy of depthing in the train.

The clock should be set in beat, and the adjustment screw in the crutch collet tightened. The clock can then be left running while the various motion work fittings and dial are made.

●To be continued.



The crutch is fitted to the arbor and held in position with the adjustment screw.



The movement can be assembled and set running while work continues on other parts.

WORKSHOP WHINGES

Chris Moss

addresses a few words to fellow model engineers and general tinkerers with things practical.

There are altogether too many things these days conspiring to make me feel inadequate. Most ten-year-olds can work wonders with a computer while I struggle to find the on-off switch. I never seem able to get my hands completely dry before those blowers in the gents washroom cut out. I can never pour a cup of tea without the pot dribbling on the table. And every so often, when I am feeling particularly useless, along comes one of those 'workshops visited' articles in *M.E.*

We see the usual lovely photos of racks of gleaming tools, lathes and milling machines cleaner than my car, purpose-made cupboards for everything, and not a speck of dirt anywhere. Am I the only slovenly individual beaver away happily ankle deep in swarf, shavings and accumulated fag ends? No, I cannot seem to give up smoking either! Am I the only unmentionable low-life who knows precisely (well pretty much) which heap of assorted bits and pieces (who said junk?) contains what, and who, on looking up from bench or lathe, gets a view of the outside world through the resident spider's latest creation?

Another thing that gets me down is that everyone who writes any sort of constructional article sooner or later has to say "... a rummage in the scrap-bin revealed ..." or words to that effect. Practically all my material is what others would call scrap. In fact I get a lot of fun out of making good use of the stuff other people throw

away. I almost feel defeated if I have to buy something; being mean is a tremendous advantage in this approach to the hobby, and I have long since learned to live with the family allusions to Steptoe and Son. Water off a duck's back now, I assure you.

Of course I do have the occasional blitz, and sweep and dust and tidy, but when I do the place seems to take on a slightly unfamiliar and unfriendly air and, for the short time that it stays relatively beautiful, I feel vaguely guilty about doing anything! Apart from that, I like to spend what precious time I get in my little hovel adding to the chippings, not clearing them up.

I can see the pitying smiles and shaking heads of the god-like doyens of our hobby, whose palaces normally feature in these pages. I also hear all the sorts of sound advice that I used to get from my mum: "... it doesn't take any time to be tidy" and "... if you put things away you'd know where to find them" and so on. The fact is that it does take me time to be tidy and if I put things

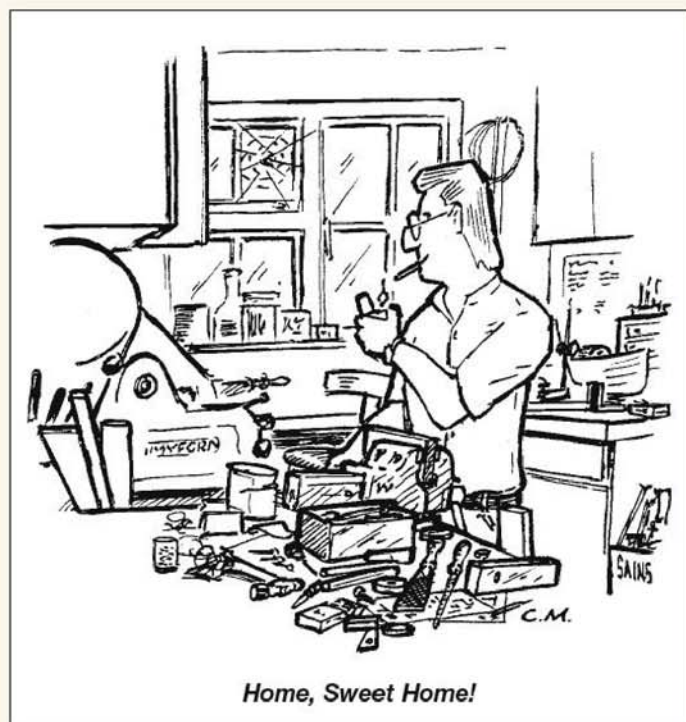
away I can never remember where the devil I put them.

It makes me wonder; when these supermen were small boys did their mums ever have to complain about the state of their rooms? In later years did their long-suffering wives ever complain about twenty-five years' worth of *Model Engineer* under the bed? Have they ever heard the immortal words "... what on earth do you want that for?" when the roadside or a skip has yielded some useful material, albeit often heavily disguised as rubbish! You would be amazed how quickly those wheel balancing weights mount up into a sizeable lump of lead and just

how many of them a leisurely stroll with one eye on the gutter will yield. Or how many dumped washing machines still contain perfectly good motors ... I could go on.

I called them 'supermen' earlier and perhaps I have inadvertently hit the nail on the head. They are all related to Clark Kent aren't they? Has anyone spied a tight blue suit with a big red 'S' on the chest peeking out from under (no doubt spotless) white overalls? Just a thought.

Of course, I am consumed with jealousy; that must be obvious by now. I would love to be like them and have a workshop with catering standards of cleanliness, racks of virgin materials, every tool in its own little nest; I was just born with the wrong genes or something. But I have always thought the universe to be far too vast for ours to be the only living planet, and by the same token, I feel that somewhere out there must be another slob like me. If I am right and he (it couldn't possibly be a she, now could it) is reading this. *Take heart mate, you're not alone!*



Neville Evans

and Simon Bowditch

discuss valve events and making the weighshaft and eccentrics.

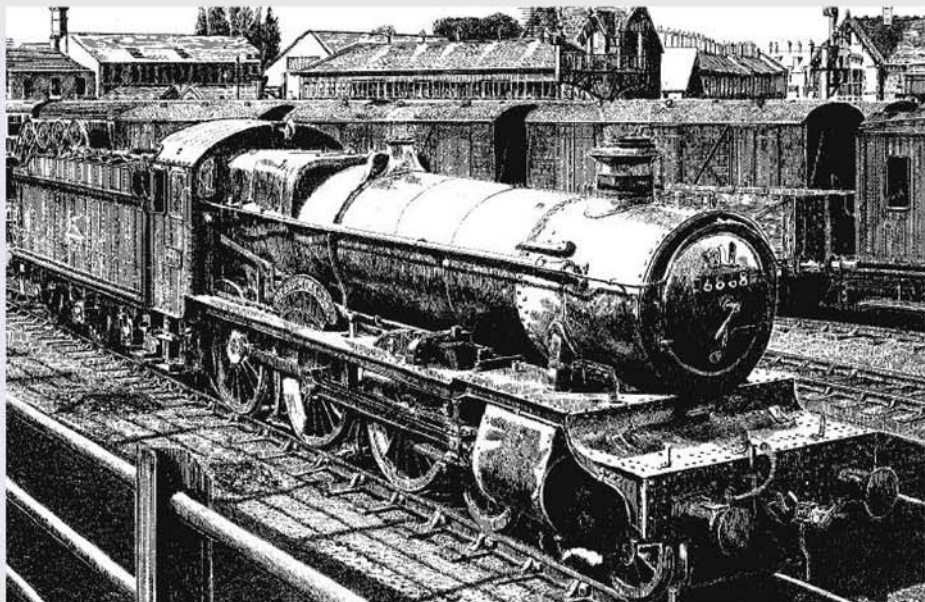
●Part V continued from page 327

(M.E. 4204, 19 September 2003)

The concept of *Penrhos Grange* was, and still is, that people will be able to use *Torquay Manor* cylinders, motion and wheels, etc., if they already exist. As made plain at the very beginning of the series however, we are offering alternatives in detail design. This seems to be a convenient time to produce the valve gear modifications, both in dimension and in detail, that we have arrived at over the last few months. I would also advise you to examine the roller bearing modifications that Ivor Roberts has been using over the last 20 or so years, with complete success. Use them or not at your discretion. I can but assure you that they work very well indeed.

Another innovation that Ivor has tried with great success, is the use of a rolling bearing in place of a solid die block. This idea is not new by any means. I can remember LBSC and others discussing it about 50 years ago. His opinion was that it wouldn't work, because the roller would tend to drag and the whole notion would therefore be self defeating. We were discussing it a while ago; I thought that it would work, he said that it certainly did work, that he had used it with great success for decades and that it not only worked better, but it lasted longer and both rolling die block and links (you don't have to square off the ends of the slot) were much easier to make. I shall of course show alternative, traditional, die blocks for the benefit of traditionalists.

Many successful models have been built to Martin Evans' design for *Torquay Manor*, originally published in *Model Engineer* in 1972. It has also proved to be quite successful in IMLEC competitions and has become one of the



PENRHOS GRANGE

great standards in model locomotive design. There is no doubt that Martin Evans used the best information by way of design fixes and formulae when he produced this locomotive. In the ensuing 30 years however, there has been a lot of fresh thinking on the design of locomotive valve gear. First I would mention Don Ashton's invaluable treatise on Stephenson's valve gear. Secondly, there are the computer programs of Professor Bill Hall and Charlie Dockstetter, to mention but a few, which allow us to examine all the parameters at the press of a few keys.

The initial computer examination of the valve gear for *Torquay Manor* reveals three main problems:

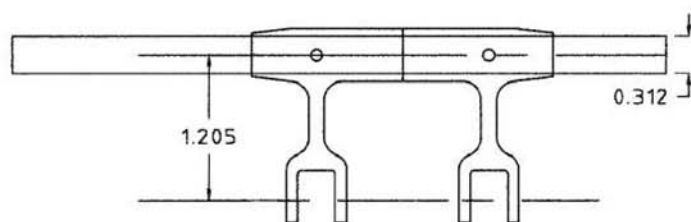
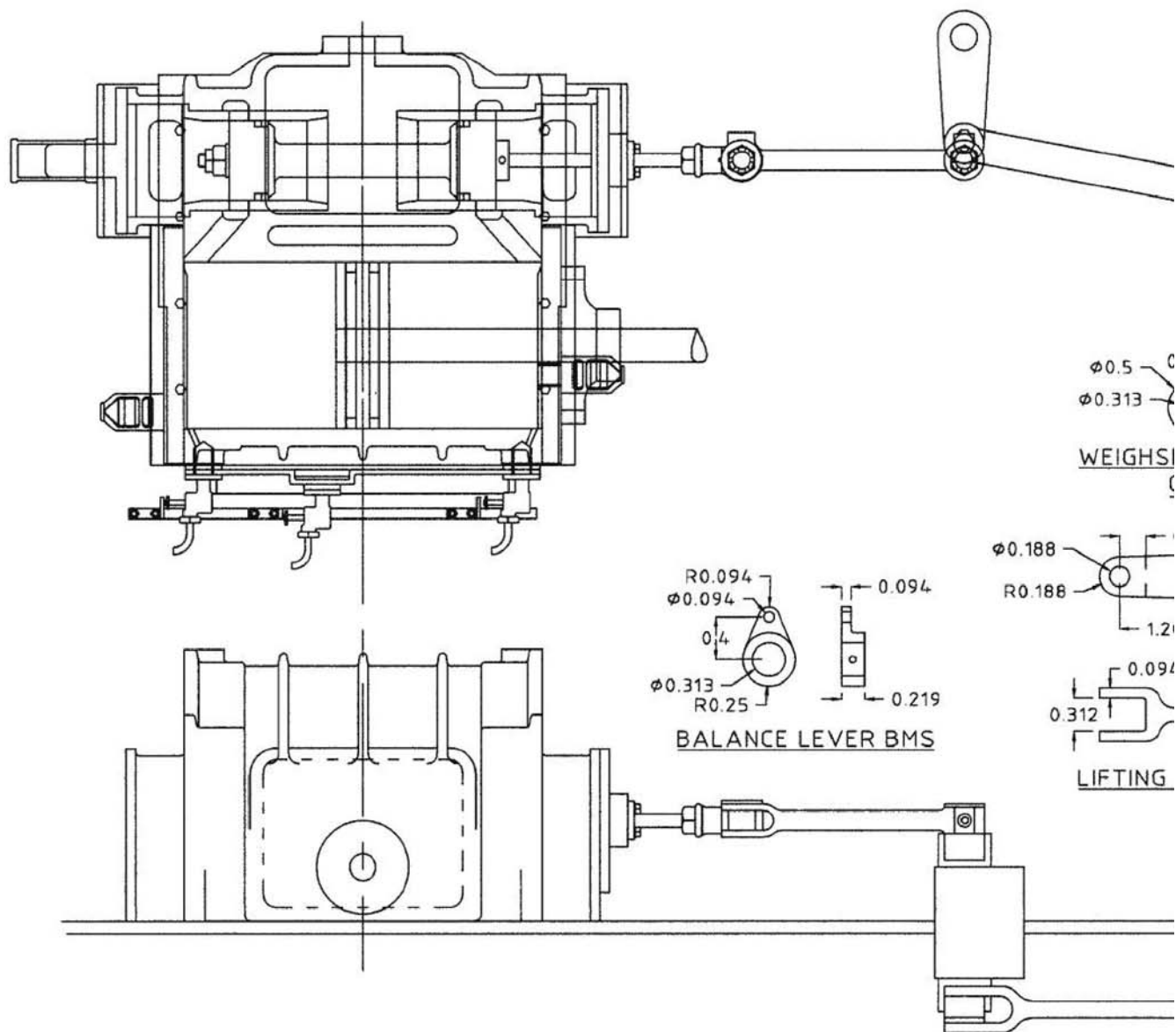
- 1: The valve gear produces uneven cut-offs in the cylinders throughout the whole useful range.
- 2: The valve gear produces high compression figures at short cut-offs which may prove problematic with small clearance volumes.
- 3: There is an unequal amount of work being done at each end of the cylinders.

These problems are endemic in the Churchward layout of the Stephenson valve gear and occur because of the combination of long travel valves and short eccentric rods. This means that the resultant lead variation is excessive. Churchward's solution was to set the eccentrics for negative lead in full gear in order that a sensible figure might be achieved when working the engines at short cut-offs, and not because he thought that negative lead was particularly beneficial. While negative lead will not of course impair the starting qualities of an engine, it is the last thing you need when running fast at short cut offs with a full size engine.

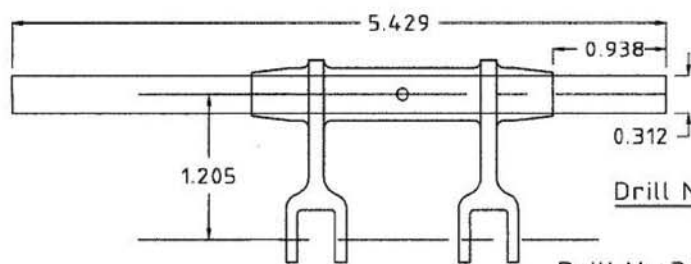
Apart from the problem of excessive lead, we also have the lack of symmetry to consider, which is no doubt caused by the position chosen to suspend the link. Fortunately for us, the computer program allows us to easily view the effect of altering this point. It soon becomes apparent that the link suspension offset needs to

Table 4 Valve events for Stephenson valve gear used on *Penrhos Grange*, 5in. Gauge 4-6-0 tender locomotive

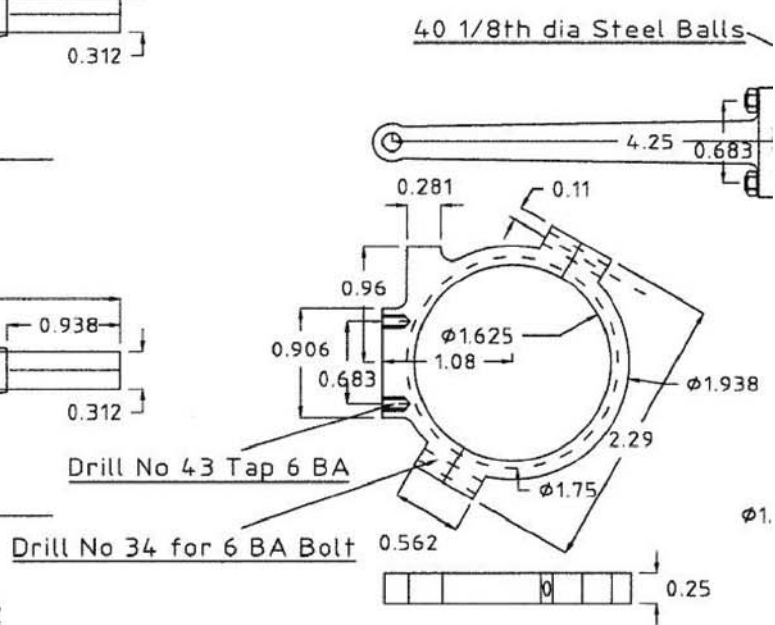
Cut off (%)	Notch Angle (deg.)	Travel (in.)	Compression		Admission		Cut-Off		Exhaust		Port Opening		Lead	
			Front (%)	Rear (%)	Front (%)	Rear (%)	Front (%)	Rear (%)	Front (%)	Rear (%)	Front (in.)	Rear (in.)	Front (in.)	Rear (in.)
77	34.0	0.667	5.86	5.26	-0.14	-0.17	78.03	76.20	94.73	94.14	0.161	0.156	-0.023	-0.021
73	30.6	0.627	7.21	6.61	-0.09	-0.09	74.14	72.28	93.39	92.79	0.141	0.137	-0.015	-0.014
68	27.2	0.608	8.93	8.31	-0.03	-0.03	69.34	67.44	91.69	91.07	0.121	0.117	-0.008	-0.008
62	23.8	0.549	11.11	10.45	-0.001	-0.001	63.44	61.48	89.55	88.89	0.101	0.098	-0.002	-0.002
55	20.4	0.511	13.88	13.18	0.03	0.02	56.21	54.17	86.82	86.12	0.082	0.079	0.004	0.004
46	17.0	0.477	17.14	16.64	0.09	0.08	47.49	45.38	83.36	82.59	0.065	0.062	0.009	0.009
36	13.6	0.447	21.86	21.00	0.25	0.24	37.41	35.32	79.00	78.14	0.049	0.048	0.013	0.013
25	10.2	0.423	27.42	26.43	0.59	0.58	26.73	24.91	73.57	72.58	0.037	0.036	0.016	0.016
16	6.8	0.404	34.19	33.05	1.28	1.25	16.95	15.67	66.95	65.81	0.027	0.027	0.018	0.018
9	3.4	0.394	42.09	40.80	2.68	2.58	9.51	8.82	59.20	57.91	0.022	0.022	0.020	0.020
5	0	0.390	50.69	49.31	5.44	5.14	4.84	4.57	50.59	49.31	0.020	0.020	0.020	0.020
-10	-3.4	0.395	42.07	40.74	2.33	2.26	10.35	9.62	59.26	57.93	0.023	0.022	0.020	0.020
-17	-6.8	0.407	34.06	32.92	1.09	1.09	17.84	16.45	67.08	65.94	0.029	0.028	0.018	0.018
-26	-10.2	0.426	27.13	26.26	0.48	0.51	27.42	25.37	73.74	72.87	0.039	0.037	0.016	0.015
-36	-13.6	0.451	24.41	20.84	0.19	0.21	37.82	35.43	79.16	78.59	0.052	0.049	0.012	0.012
-46	-17.0	0.481	16.83	16.51	0.05	0.07	47.71	45.38	83.49	83.17	0.068	0.063	0.008	0.007
-55	-20.4	0.517	13.20	13.10	0.02	0.01	56.34	54.32	86.90	86.80	0.087	0.080	0.003	0.002
-63	-23.8	0.555	10.34	10.41	-0.02	-0.01	63.54	61.95	89.59	89.66	0.107	0.098	-0.002	-0.005
-69	-27.2	0.595	8.10	8.29	-0.07	-0.04	69.45	68.29	91.71	91.90	0.128	0.117	-0.009	-0.012
-74	-30.6	0.637	6.36	6.61	-0.13	-0.09	74.28	73.52	93.52	93.39	0.150	0.137	-0.016	-0.020
-78	-34.0	0.679	4.91	5.27	-0.23	-0.17	78.23	77.82	94.73	95.09	0.172	0.157	-0.023	-0.028



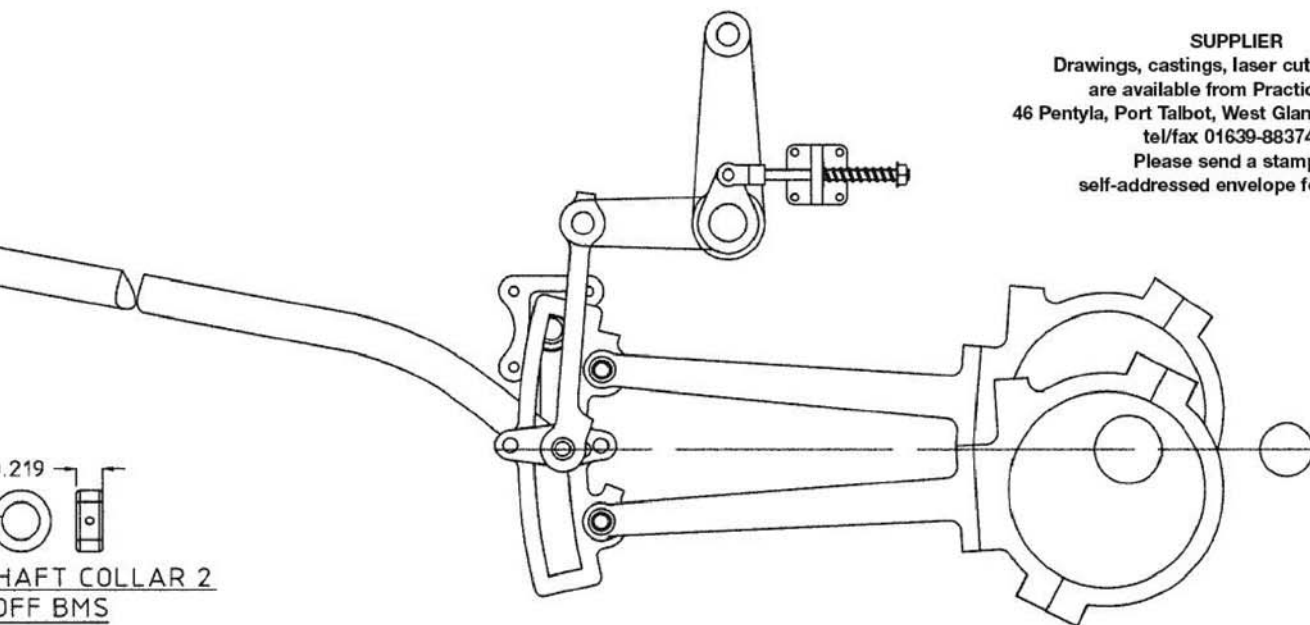
WEIGHSHAFT PLAN 1



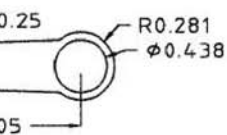
WEIGHSHAFT PLAN 2



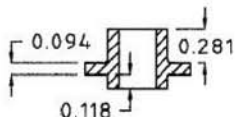
SUPPLIER
 Drawings, castings, laser cut frames, etc.
 are available from Practical Scale
 46 Pentyla, Port Talbot, West Glamorgan SA12 8AA
 tel/fax 01639-883741.
 Please send a stamped
 self-addressed envelope for details.



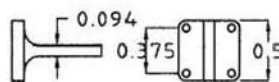
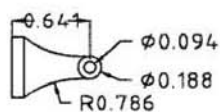
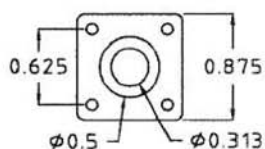
SHAFT COLLAR 2
OFF BMS



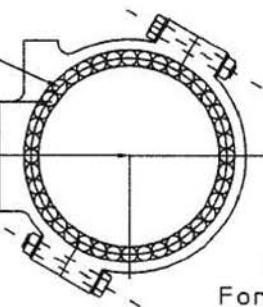
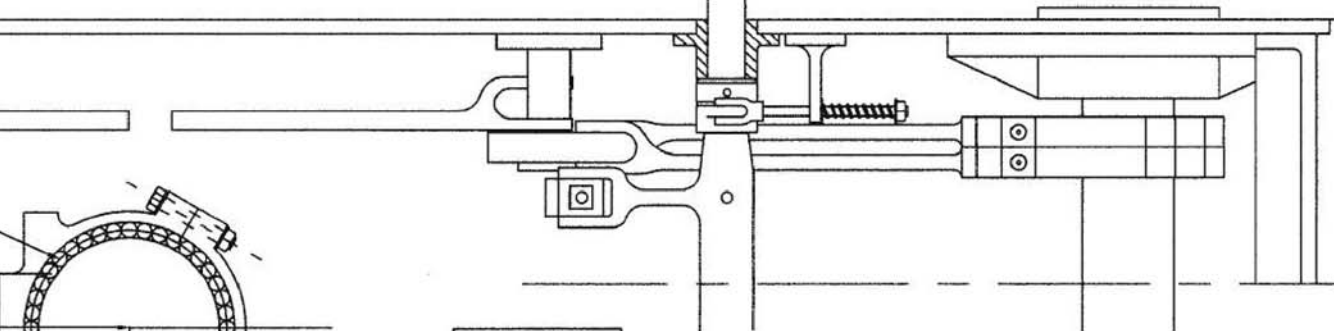
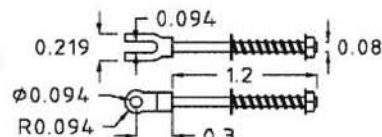
LINK 2 OFF BMS



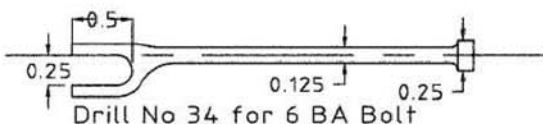
WEIGHSHAFT BEARING 2
OFF GM



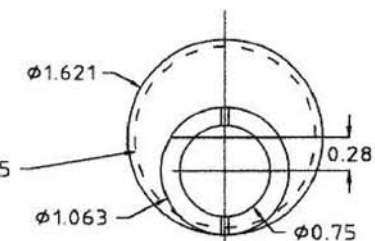
BALANCE GEAR BRACKET & SPRING SHAFT



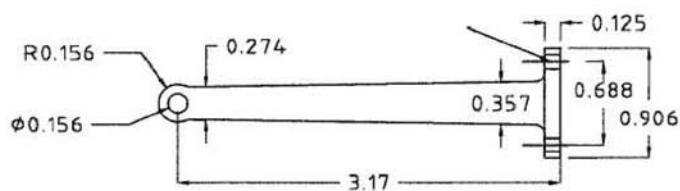
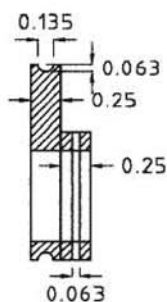
Form tool for eccentric groove



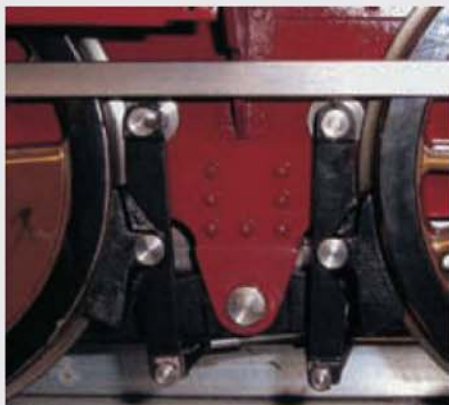
Drill No 34 for 6 BA Bolt



BALLRACE ECCENTRIC
SHEAVE 4 OFF C.I.



ECCENTRIC RODS 4 OFF
BMS



Big Goods: left hand driving wheels and brakes.



A tight squeeze: ashpan, brakes and equalisers.



Big Goods ashpan.

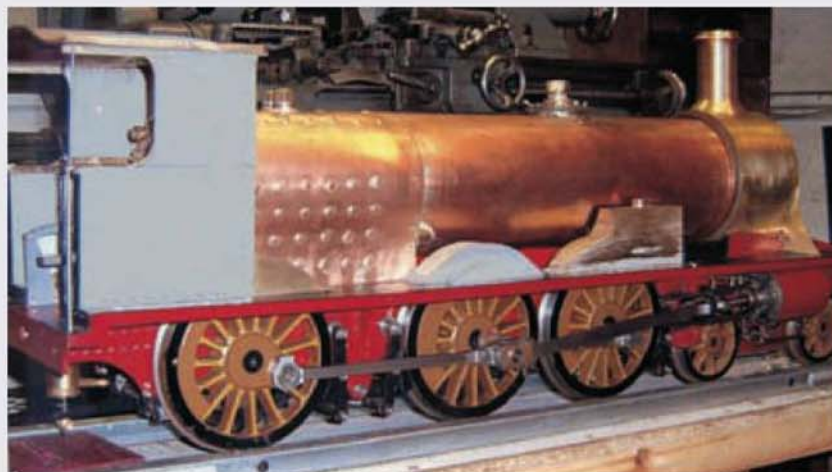
be increased to achieve a greater degree of symmetry of valve events without incurring the penalty of die slip. We can, however, then get into a position where one end of the cylinders does all the work in full gear, and the other end does all the work when linked up to a normal running position. In other words, when you've got the roundabout turning nicely, the swing smacks you behind the ear when you least expect it. To quote Don Ashton:

"Full equality for all cut-off positions is, as in other gears, impossible to achieve and we must look for a compromise which gives the least percentage of error. By choosing to equalise events at 50% cut-off, we have a simple way of establishing the correct position for the suspension pivot."

The results from preliminary work made Simon realise that he could reduce the throw of the eccentrics from 0.330in. to 0.281 inch. This gave an angle of advance for the eccentric of 27.97deg. (or thereabouts). He then increased the value of the lead by increasing the lap to 0.175 inch. This gave a lead of about 0.016in. at 25% cut-off, with compression figures well below the 30% mark. Excessive compression could impede the smooth running of this locomotive as our clearance volumes are as low as 5.5%. The larger lap means that we can now increase the width of the port to 0.188 inch. Finally, in an attempt to get both ends of the cylinders to do a similar amount of work, we increased the value of the radial displacement of the point of suspension of the expansion link, from 0.031in. behind the rear of the centre line to 0.100 inch. This adjustment has resulted in an excellent degree of symmetry achieved over almost the whole useful range of settings on the reversing gear without die slip presenting any problems. The port openings are also a little better than scale, a fact that could well become useful when all the bearing surfaces and pin joints have had a chance to bed in.

Weighshaft

The weighshaft is one of the most important parts of the valve gear assembly and one that demands great accuracy in its construction. I have shown two methods of construction. Plan A is to follow Martin's drawing, and to make the centre part in two separate pieces. In other words to follow the instructions for *Torquay Manor*.



Bob Raffan's Big Goods locomotive is almost ready to steam.

I have always thought that this was a particularly difficult part to make accurately and it is essential that the 1.205in. dimension be held as close as possible.

Plan B therefore is that we make the centre bit as one piece and silver-solder the two lifting links on after they have been finished. All will become clear as crystal on a swift perusal of the artwork. Be sure to push a length of 0.187in. dia. rod through the eyes of the links before assembly and ensure that it is parallel to the weighshaft centre line, both horizontally and vertically. The lifting links are then assembled onto the 5/16in. dia. weighshaft bar when it is slid into place in the chassis and pinned to said bar.

Ball bearing eccentrics

Here too are the drawings for ball bearing eccentrics. They have been designed to use 1/8in. steel balls. These are standard cycle parts, and should cost about £6 per 120 in your friendly local bearing shop. Don't go to a cycle shop as they may charge a lot more. In fact the sheaves are slimmer and easier to make than plain ones, because we don't need the locating flanges on the outside. The balls themselves will centralise the straps on top of the sheaves. The only tricky operation is in the machining of the ball grooves. The best idea is to grind up a form tool with which to make a sort of trench. The balls need to run on the bottom of said trench, and must have a certain amount of side play. Past experience says that about 0.004in. total, that is 0.002in. per side is about right.

Bear in mind that if we wish to cut both grooves with the same tool, we must spin the lathe in the opposite direction to cut one of the grooves, unless the form tool is double sided. In other words, the strap is spun anti-clockwise while the

tool is fed in to the required depth, whereas the sheaves are machined as part of a long stick of cast iron or steel, with the motor running in the opposite direction. The same tool can now be fed in without moving the tool-post. The strap must be held onto the face-plate for machining, by a couple of dogs. This does away with the risk of distortion, which will certainly occur if the strap is held on the outside by chuck jaws, the jaws squeeze the strap until you finish up with something like a Wankel engine rotor. Incidentally, if you are using steel, make

sure that it is of a good quality. A nice piece of EN3 would be ideal, try a local steel stockist, you will probably pick a bit up for a few bob or so.

The important thing is to make certain that the bottom of the two grooves are the correct distance apart, so as to ensure that when assembled the eccentrics have no slack in them. The 0.004in. side clearance can be given by simply moving the tool to and fro the appropriate distance. As for the diameters of the two parts, the sheave can be easily measured with a pair of calipers. The strap is a bit trickier; my technique is to stick a ball on top of the groove, with a touch of grease, while it is still in the chuck. Drop a second ball into the bottom of the groove and measure between them. Takes a bit of practice but it's not that difficult. The closer you can make the clearance between sheave and strap the less muck will get in. My 0.004in. is just a suggestion, perhaps a form of labyrinth seal could be worked in. Or is it worked out?

The Highland line

I was pleased to see friend Peter Lamberton the other day, he arrived to order his boiler and to run the chassis of his 'Loch', under compressed air. Needless to say I took the opportunity to give my own chassis a bit of a gallop as well and must report that they both performed in an exemplary manner. Enormous power, clean starting and no leaks at all from the balanced valves. Peter had also designed and built a neat, light little rolling road, based on some scrap aluminium angle left over from a greenhouse project, of which more later.

I include a few photos of Bob Raffan's 'Big Goods' engine which, as can be seen, is nearing completion.

●To be continued.

PETE'S PAGE

Peter Spenlove-Spenlove describes a useful tool and an interesting process.

Just before World War Two, boy's magazines often included scale drawings of the latest ships and aircraft. One such plan was of RMS *Queen Mary*, then recently launched onto the Southampton to New York run. She was beautiful, so I decided to model her in wood as described. The local toy shop sold packs of pre-planed wood strips, tubes of *Croid* glue — I wonder how many readers recall that particular product and its characteristic 'aroma' — and paint. The tools suggested included hard backed razor blades, small chisels, assorted rubber bands and a small saw. Also required were cabinet maker's pins to hold wooden parts in place while the glue hardened overnight. The pins were to be of 24 gauge and $\frac{3}{8}$ to $\frac{5}{8}$ in. long. The local ironmonger had some, but they looked so small! I could never drive such things with my ancient 1lb. hammer.

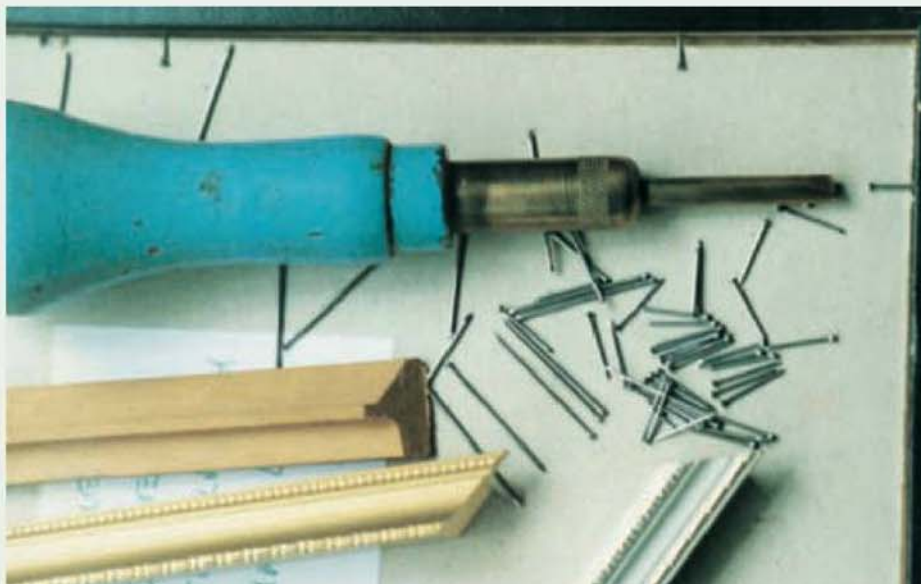
On asking the salesman for "... the smallest hammer you've got" he realised my problem and showed me an ingenious tool for *pushing* the pins in. It avoided any possibility of such thin pins from bending over when hitting them. It goes without saying that I bought this tool and it really does work. In fact, I still use it today, especially when I push pins into a picture frame to retain the glass plus the picture and backing board. Lengths of picture frame moulding timber can be purchased from specialist suppliers as well as the larger DIY stores. Some types have an elaborate plaster coating with a gold or other coloured finish. Hammering pins into this material can easily damage this coating by chipping. Using one hand to push the pins in and supporting the frame with the other hand, the pin is inserted gently with no possible damage to the frame corner joints; no cracked glass either!

These pins are made from bright steel wire by a process called cold heading which forms a point as on 'normal' nails, but the head is tiny. They are intended to be driven so that this head is just below the wood surface. Subsequent filling and

Cold heading

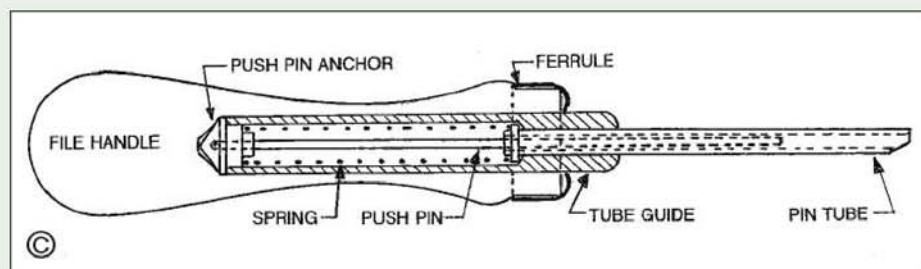
Cold heading is a process used in the manufacture of nails and small bolts, etc. from wire stock by upset forging which increases the cross-section by a reduction in length. Carried out on cold material, the extent of deformation is restricted by the malleability of the stock material. Nails are generally produced from 'dead mild' steel wire.

In operation, wire is fed into a gripping/heating die with sufficient protruding for the head which is formed by being struck by a heading tool. The gripping/heating die opens, the wire is fed forward by the length of the nail, the die closes and a pair of cutter jaws close to sever the wire and form the point. The cycle is repeated rapidly to give a constant flow of nails from the cold heading machine.



A narrow black wooden picture frame receiving $\frac{1}{2}$ in. long pins pushed in to retain the glass, picture and backboard. Gummed paper tape is normally used to keep dust and insects out; for fairly short term applications, self-adhesive masking tape may be used.

PIN PUSHER



paint hides the pins on the model. These bright steel pins which can rust in the damp should not be confused with panel pins which are thicker with conical heads and given an anti-rust coating. Panel pins are easy to drive home with a hammer.

It is not possible to dismantle the 'pin pusher' tool, but I have sketched its likely construction so that readers could make one to suit their needs. Please note that my sketch is not to scale. Check the head size of the pins which governs the tube bore and the push pin within it. Obviously, a large bore with very small gauge pins will not work; the pins will buckle when pushed into anything but the softest wood.

The following notes may help readers to make a tool. The first task is to select a file handle which should be a large wooden one with its metal ferrule. Drill it to receive the metal assembly with a fairly tight fit; if you make the hole too big, the tube can always be glued in place. The push-pin itself is from $\frac{1}{16}$ in. silver-steel. One end is slightly hollowed with a small drill while in the lathe and then hardened and tempered. It is then magnetised by stroking one way only with the pole of a strong magnet. The other end is press fitted or secured using Loctite into the blind hole in the anchor. The anchor is a push-fit in the rear of the tube guide which contains a light open coiled compression spring. In my tool, the load required to compress the spring when the pin tube is pushed level with the pin is about 4lb. There is no advantage in having a stronger spring.

The tube guide is $\frac{1}{2}$ in. dia. brass with a $\frac{3}{16}$ in. reamed hole to fit with a free sliding finish. The pin tube is a length of straight hard brass $\frac{3}{16}$ in.

O/D x $\frac{1}{16}$ in. bore. The push-pin slides easily in the bore. A collar is soldered onto the inner end to provide a seat for the spring. Since the magnetised tip of the push-pin holds the pins inside the brass tube don't be tempted to use mild steel in place of brass, unless you don't need the magnetic facility.

The outer end of the pin tube is chamfered at about 30deg. as far as the centre line. This allows small pins to be pushed into picture frames close to the backing board. Assemble the parts, make sure it works freely and smoothly and then fit it into the handle.

A couple of frame finishing points. If your frame has a pre-pierced backing board for hanging on a nail or screw head, add a piece of card behind the picture so that the nail head cannot mark the picture. Also, keep dust and insects out for short hanging periods by sealing the gap between the frame and the back with workshop masking tape. The adhesive used on this tape gradually dries out and fails, so you will need to use water moistened gummed paper parcel tape for a more permanent job.

Warning!

While using one hand to oppose the tool pushing a pin into a picture frame made of narrow frame wood, do make sure a finger is not opposite the pin, lest you push the pin too far and into your finger!

Since preparing these notes I have polished the brass tube guide and found the words *Woden Pushpin* lightly stamped on. As Woden is a well-known maker of bench vices and woodworkers' tools, it is possible that this useful tool can still be found in the toolshops.



JOHN FOWLER & SONS LTD. SOME NOTES ON A COMPANY AND ITS PRODUCTS

Martin Wallis

looked at some of Fowler's oddities last time; now he turns to some more representative examples.

●Part II continued from page 151
(M.E. 4214, 6 February 2004)

Ploughing engines are the genre most associated with Fowlers, so we will consider them first. Any model engineer who has built one will readily testify that ploughing engines were complicated machines with more gears and component parts than other types. It is all too easy to forget the enormous investment a pair of ploughing engines and their associated tackle represented at the time. The commercial considerations in meeting loan repayments, coal bills and the men's wages were far from insignificant. Where local conditions allowed, larger engines were favoured as the same number of drivers and men were needed to operate a large pair of engines as a small pair.

In their literature, Fowlers noted that with a small set of tackle the men's wages may amount to 50% of the running costs but on a large set this portion fell to 30%. Further saving could also be made by compounding, which was more economical with both coal and water and thus by the turn of the century large compound engines were almost universal. Economy of coal and water was important, as unlike a thrashing engine which would probably be working in a yard, or near a road, the ploughing engine could easily be a considerable distance from a metalled road making the cartage of coal and water an important consideration.

Compound cylinder

The Fowler compound cylinder is quite distinctive and is revealed in a state of 'undress' in photo 5. The two cylinders and valve chest are fully steam jacketed to increase efficiency by keeping them hot and prevent premature

condensation of the steam. Both the curved side faces are steam jacketed and the jacketing itself is insulated by cladding which has been removed in photo 5. The two steam jackets, one each side of the cylinder, then come together above the valve chest, thereby steam jacketing the valve chest.

Further study of photo 5 reveals a pattern of studs and nuts on the very top of the block. This is for a relatively small plate which is integral with the safety valves. Working downwards there is another larger arrangement of studs and nuts; if the nuts are removed the cylinder head, not unlike a large upturned baking tray, may be removed revealing yet another flat plate with its own pattern of studs and nuts. This flat plate is the valve chest cover under which are the slide valves which distribute the steam to the cylinders as required.

It may therefore be noted that full steam jacketing of the Fowler cylinder means that the valve chest may not be accessed while the engine is in steam. However, the valves may still be adjusted while the engine is hot by turning the threaded valve spindle, the female thread being in the valve driving buckle. If the valve chest is not jacketed, as on a Burrell, the cover may be removed when the engine is hot so the valves may be set visually. When hot, the boiler barrel expands by some $\frac{3}{16}$ in. and the cylinder will move away from the crankshaft. Fowler slide valves are set cold and the valve rod then given two complete turns to allow for the expansion. Working instructions sent out by Fowler explains the valve setting as follows:

"Setting Slide Valves"

"All engines leaving the Works have the slide valves correctly set. After the crankshaft brasses and eccentric straps have been adjusted for wear, the valves may need re-setting."

"To correctly Set the Slide Valve when the Boiler is Cold"

"Put the reversing lever in 'full forward' gear and the corresponding crank on the 'dead centre' at each end of the stroke, turning the crank alternatively in the running direction of the engine, for that position of the reversing lever, adjust the position of the slide valve on its spindle so as to give an equal port opening at each 'dead centre' of the crank."

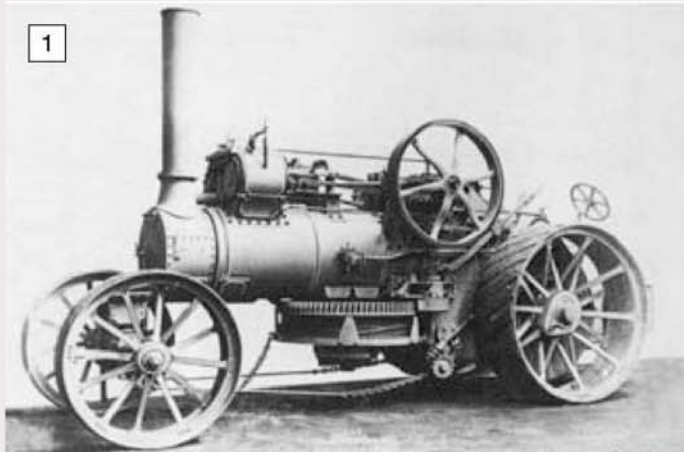
"Repeat these operations with the reversing lever in the 'full back gear', again turning the crank in the correct running direction for that position of the reversing lever."

"If the slide valve is correctly set, the port openings will be the same as in the 'full forward gear'."

"To allow for the expansion of the boiler when steam is up, screw the valve spindle outwards two complete turns – this will lengthen the distance between the valve and the crankshaft and give the correct openings under working positions."

The ploughing engine is basically a mobile winch. Ploughing engines work in pairs, each with steel ropes pulling the plough inwards, i.e. towards the engine, and thus each member of the pair works alternately as the plough is winched across the field and back again. Very early engines worked individually with a mobile anchor on the other headland to return the cable when pulling the plough away from the engine.

The engines had wide wheels to support their great weight, which was essential to prevent them from being dragged sideways as the plough was hauled in. Communication between drivers was by whistle, larger engines having up to 800 yards of wire rope on their drums placing a potentially great distance between them. With a convex field it was quite possible for the two engines to be completely invisible to each other.



John Fowler's first compound ploughing engine for the home market, Works No. 4291, built in 1882.



Fowler K7 10nhp ploughing engine built in May 1916 photographed in 'working order' raising steam on its low loader.



Seen here in exhibition condition, Fowler BB 16nhp engine Works No. 15416 was built in May 1919 and weighs 20 tons.



This beautifully made 4in. model BB1 is owned by Gordon Brooke and was photographed at the Harrogate show.

Classification of ploughing engines

Fowler's classified their ploughing engines as classes D, K, B, A and Z. Each had a series of sub-sets or derivatives indicating different arrangements, boiler pressures and other details. For example the class B included B4, BB, BB1, B4S and BBS where the 'S' suffix indicates a superheated boiler. The initial letter indicates boiler barrel diameter with class D at 2ft. 1/2in., class K at 2ft. 3 5/8in., class B at 2ft. 6 3/4in. class A at 2ft. 9 3/4in. and class Z at 2ft. 11 3/4in.

Fowler ploughing engines had a reputation for being very solid and well engineered, two good reasons for the near monopoly they achieved in steam ploughing. By the same token Fowler heavy road engines were very well thought of, one of the best known hauliers, Norman E. Box purchasing almost all their new engines from Fowlers.

During the First World War the company was heavily involved in war work, both ploughing engines for the food ministry and haulage engines for military use in France. Photograph 6 is of a B6 8nhp engine built to haul howitzers on the Western Front.

Heavy road engines and the First World War

The war and its aftermath created a 'boom and bust' for many traction engine manufacturers, including Fowlers. In 1914 the War office ordered 16 8nhp B6 road locomotives, 7 7nhp R3 road locomotives, 8 class Z ploughing engines



Many engines were saved by being employed on soil sterilising duties in nurseries. Unfortunately Fowler BB1 ploughing engine No. 15164 was 'reduced' to perform this job but happily has been rebuilt by the Hurst Steam Centre.

with special trenching ploughs, and an extensive assortment of other engines. In 1917 a further 50 road locomotives were ordered by the War Department together with 75 TE2 hauling and winding engines, an example of which is shown in photo 9.

The 125 engines ordered were completed but the war was soon to end and the War Department sold them off cheaply as redundant stock. This, as may easily be imagined, saturated the home market making it very difficult to sell new engines. Fowlers also supplied 14 steam rollers for airfield construction and a great deal of agricultural machinery; they too were all sold off at a discount price.

An additional part of the 'boom' was a large order from Russia for no less than 168 road

engines. These comprised 28 B6 engines, 52 R3 engines and 84 TE2 engines. A further 196 traction engine wagons were ordered to complement these engines. Fortunately for Fowlers most of engines and wagons were exported before the Russian Revolution took hold and the subsequent collapse of the Tsarist regime terminated the contract. Even so, Fowlers were left with 21 engines which they had to try to sell on the home market.

War surplus conversions

A number of the road locomotives released by the War Department were converted for showland use, Openshaws of Reading being one of a number of companies specialising in such work. The showmans' market was largely dominated by Charles Burrell,

as much due to their advantageous leasing arrangements as anything else, and the surfeit of converted War Department Fowler road locomotives cannot have been very helpful for them either. Combined with ever increasing inroads being made by internal combustion engine vehicles, the post-World War One market could have been in better shape.

Showmans' engines have been mentioned already, but despite Burrell's dominance in the showland market, and the war surplus engines, Fowlers still managed to build a good number of showmans' engines, all based on their range of 3-speed sprung road locomotives. The last four, the 10nhp 'Super Lions', were probably the best known.



Distinctively Fowler and in WD colours, this B6 is awaits full lagging. First believed to be 14115 Lafayette she was later found to be 14113 The Lion.



Class A9 7nhp road locomotive, Works No. 15462, built in 1919 demonstrates the classic Fowler light road locomotive outline.

8



A TE2 haulage and winding engine built for Russia but never exported. Note the slanting shaft below the crankshaft which takes the drive to the winding drum beneath the boiler barrel.

9



Fowler B6 10nhp showman's engine Lion Works No. 19782 photographed at the GDSF in 2003. Note the non-standard chimney top, as fitted from new.

Sidney Harrison and the 'Super Lions'

In the early 1920s, Fowler works manager Harold Livesey left John Fowler & Co. to become the general manager of Charles Burrell & Sons. Sadly for Mr. Livesey the 'grass was not greener' and with Burrells now entangled with the 'Agricultural and General Engineers' combine he decided to return to his old employer John Fowler. With him came Sidney Harrison, the Charles Burrell sales director who, with his knowledge of and friendships within the fairground fraternity, was able to greatly assist the Fowler marketing team.

The existing Fowler product was accordingly doctored to meet specific showland preferences, not least including the left-hand steering as fitted to Burrell engines. The result was the four Fowler 10nhp 'Super Lion' showmans' road locomotives with specifications as follows:

"B6, 10nhp Super Lion compound locomotive with three speeds, oil bath spring gear, special front spring, twin endless solid tyres to hind wheels, singles to front wheels, gear driven pump, injector, Pickering governors, rim brakes, large front tank, winding drum with 75 yards rope, liner in smokebox, splashers over cranks, large size big end lubricators, dynamo bracket and platform, wide long awning with side and end curtains, extension chimney, flywheel brake, Rochester 3 pint lubricator, polished copper pipes, special painting and lining.

The grand total for the above was £1,470.00 and extras included:

"Twisted brasses for awning with cross stays and diagonals £25, Brass caps for front and rear wheels £9, Cylinder covers, stars and lagging £5, Brass stars on front tanks £3, Brass stars on motion covers £5."

Lion

The first 'Super Lion' was works number 19782 *Lion* which was completed in March 1932. She was built with a full scenic crane on the back of the tender for lifting and moving the cars on scenic rides and was delivered to West Country Amusement Caterers Anderton and Rowland based in Bristol. *Lion* was their first new purchase from Fowlers, Burrells being their preferred make. She travelled widely with them up to 1946 when they laid her up, selling her in 1950 to Mr. Lucas. Initially Mr. Lucas took her to local rallies including Andover and Cranborne, her last outing with Mr. Lucas being to Wimborne St. Giles fair in 1964. Subsequently she was steamed once a year for family and friends until Mr. Lucas died in 1994. In 1995 she was purchased by present owner, Mr. Thomson, who began a total restoration.

Unlike most restoration jobs *Lion* was purchased totally complete, exactly as Fowlers had built her, Anderton and Rowland having had no cause to replace or modify anything. Restoration was extremely thorough and included a new flanged

and riveted firebox, new boiler tubes, a new front water tank, new press-on endless rubber tyres, new woodwork on canopy, and a rebuild on the Mather & Platt P9A 110 volt dynamo. *Lion* was the subject of the stunning model by Ron Dawe which took a Gold Medal at the 1999 Model Engineer Exhibition and a well deserved Duke of Edinburgh Trophy the subsequent year.

Steam rollers

These are sometimes seen as a poor relation to road locomotives and showmans' engines. This is sad as a steam roller is as equally fine a piece of engineering as any steam conveyance, and the steam roller was a significant part of the production schedules of most engine manufacturers. Indeed, as in the 1920s and '30s the orders for road engines, threshing engines and ploughing engines became ever more sparse the production of the steam roller kept many companies solvent, Fowlers included.

During the latter part of the steam era the steam roller accounted for over 70% of the John Fowler order book, a little over a half of which were exported. In 1921 42 rollers were built, a figure which steadily rose to peak at 132 in 1927, thereafter declining to 22 in 1934, 11 in 1935, and 24 in 1936. The importance of steam roller orders is clear from the total number manufactured: 1,153 from 1921 to 1937, of which 834 were exported.

The last Fowler roller built was a class DNB 12 ton compound engine Works No. 22596 fitted

10



Ron Dawe's beautiful 2in scale model of Fowler B6 10nhp showman's engine *Lion*. (Photo: Ron Dawe)

11



A Fowler DN1 roller works number 16235 built in 1924. She is a 7nhp engine weighing some 10 tons. The brass cylinder lagging, towing pin on the front roll scraper, and wooden canopy end boards are not Fowler features.

12



An example of a Fowler 6hp agricultural engine Works No. 11814 manufactured in 1919.

13



Mr. Keith Tucker's beautifully made 2in scale Fowler agricultural engine on show at the Model Engineer Exhibition in 1999.

with tar spraying apparatus. She was delivered in 1937 to a customer in Cardiganshire and worked for 25 years. Happily the engine has survived into preservation.

Fowler steam wagons

Readers are unlikely to see a Fowler steam wagon at a rally as sadly only one survives, number 19708, a gully emptier which resides in the Ulverston area. Fowlers entered the steam wagon market in 1924, rather late in the day, the prototype being exhibited at the RASE show in Leicester. A year previously W. J. Lewin had departed the Yorkshire Steam Wagon Company and taken employment at Fowlers, his brief to design a steam wagon. Since Fowlers had not previously built a wagon, the wisdom may be questioned since Fodens already had the major share of the overtyping wagon market and likewise Sentinels had the undertyping market. More importantly, however, was the popularity of petrol driven lorries in the 1920s which were becoming very much more reliable and economical.

The Fowler wagon had compound cylinders drawing superheated steam at 225psi. The engine was mounted behind the driver with the two cylinders mounted in 'V' formation driving on to a single crankpin. Steam was supplied to the cylinder by piston valves, and roller and ball bearings were used throughout with oil bath lubrication to the motion and three-speed gearbox. Steam oil was fed to the

cylinders by pump in the usual way. The back axle drive was similar to a modern lorry, the back axle having an oil filled gearbox with worm and wheel reduction gears and a differential. A 165 gallon water tank was fitted underneath the chassis and the bunkers held 6cwts of coal. Following some quite encouraging initial sales, the numbers sold declined dramatically after 1926, the last wagon being completed in 1933.

A total of 124 wagons were built, one third of them as gully emptiers, the remainder with platform bodies, either fixed or tipping. Inevitably and the internal combustion engine superseded the steam engine, and Fowlers both designed and made their own diesel engines which they fitted in to their own vehicles, although they did install many engines of other makes as well.

Regular readers will be aware that Tony Webster's new series describing the construction of a fine 1:4 scale Fowler wagon began in *M.E.* 4213, 23 January 2004.

Internal combustion and the Gyrotiller

On their first internal combustion ploughing engines Fowlers simply grafted large multi-cylinder diesel engines into the space previously occupied by the cylinders and motion, the result being a hybrid which very clearly had steam roots and used a great many components straight from their previous steam designs. In due course

the famous 'Gyrotiller' was manufactured, initially with 150hp MAN engines but thereafter with 170hp engines of Fowler's own manufacture.

The Gyrotiller was their principle product during the 1930s, accounting for nearly half of their revenue at the time. Sadly both the MAN and Fowler diesels fitted to the Gyrotillers gave problems which, combined with a prejudice in favour of the conventional plough, did little to endear the machine to the customer. Happily greater success was attained with a more conventional crawler tractor which pulled a conventional plough behind.

Annual losses and rising debt

Throughout the 1930s the finances of Fowlers were far from stable, annual losses were recorded and debts mounted. By the commencement of the Second World War Fowlers were in poor shape and the company was taken into government control, building amongst other things, large numbers of *Comet* and *Cromwell* tanks.

As the war neared its conclusion the Ministry of Supply announced its intention to relinquish control in November 1944 and Fowlers returned to private ownership in the February of 1945. Shortly afterwards the company was sold to T. W. Ward of Sheffield who already owned Marshalls of Gainsborough, with whom John Fowler merged. The Steam Plough Works eventually closed in 1974 and all was demolished by 1975.

●To be continued.

14



The surviving Fowler wagon at the Great Dorset Steam Fair in 1996. (Photo: Ron Dawe).

15



Fowler 6/7 ton wagon No. 16498 built in 1925 initially went to South America on a sales tour but failed to sell. She returned in time to attend the Reading Royal Show in 1926 and was later sold to Bicester Rural District Council.



Left: viewed from the front, the 1:60 scale model of the Davey 80in. pump engine is installed in an engine house appropriate to the period.



Right: the Author admits to building his models to represent full size practice, not to please architects or exhibition judges!

DAVEY'S 80in. ENGINE

the late Frank D. Woodall presents an account of his model of an historically significant prototype.

At Preston Grange near Edinburgh there is a preserved Cornish engine, or at least most of an engine, which was built with two unusual features. In place of a governor or regulator valve, so that the engine man could make adjustments if the steam pressure varied, it had a variable lift to the inlet valve. Strangely, the preservationists did not know about this until I asked to look under the floor. The other feature is such that nobody could miss it. The cylinder has separate ports so that the steam going in does not pass through a port cooled by the expanded steam coming out. This is a sound idea and some have suggested that the designer just missed inventing the Uniflow engine. It could well have been some foundry considerations that prompted the design. Two other double-ported engines went for scrap between the wars and were both thought to be very unusual.

It is now known that this design dates from the very early days of engine building in Cornwall. Long before locomotives brought noise and smoke

pollution there were large pumping engines, and contemporary accounts tell of them working silently and with no more than a little haze over the chimneys. Some became famous due to their high thermal efficiency, something which was then called duty. Several were well documented but not recorded in sketches or paintings.

Almost by accident I found that Davey's 80inch engine at the Consolidated Mines was shown in the French publication *Annals des Mines* for 1835. These drawings are not only older than any other published drawings of a Cornish engine, but are much more complete and show it to have a double ported cylinder. It would seem that they were prepared from the builder's drawings. One hears stories of engines being drawn out on the shop floor with chalk, but it is probably no more than modern folklore. These French drawings are scaled in metres and *Pieds Anglaise*. It would be good to hear of model builders at Liskeard or Perranporth using them but they do not seem interested in their illustrious forebears.

I had the drawings copied and found them to be 1/4in. to the foot (1:48 scale). All my previous models are a 1/5in. to the foot (1:60 scale). To resolve this, I made a pair of double-ended dividers

in the proportion of 4 to 5. These emphasised what was already known, namely that model-builders make things too clumsy. This is due to a mistaken idea that things need to be a bit stronger than scale, and to their inability to work small enough. The first can be cured by a re-think but the second needs practice and the avoidance of heavy work such as gardening. John Wilding once gave some good advice by suggesting that it is best to sit down to work.

As a first step I adopted a smaller size head for home made 13BA nuts and bolts; I bought 14BA dies and made some taps. The first part to be made was the cap at the top of the piston rod. The side view in the drawing automatically gave the width, as this part is round. It is not a simple part so, to explain it more clearly, a large wooden one is shown in the accompanying photo. Next I went to Kew Bridge Steam Museum and measured the loops on the 90in. engine there, not so much to get the size, but the proportions. The model ones were cut from packing case bands and, after punching the slots for the gibs and cotters, were bent to the correct shape, the length checked and others made until correct. These and the cap having been made determined the width for the beam, which was not on the drawing.



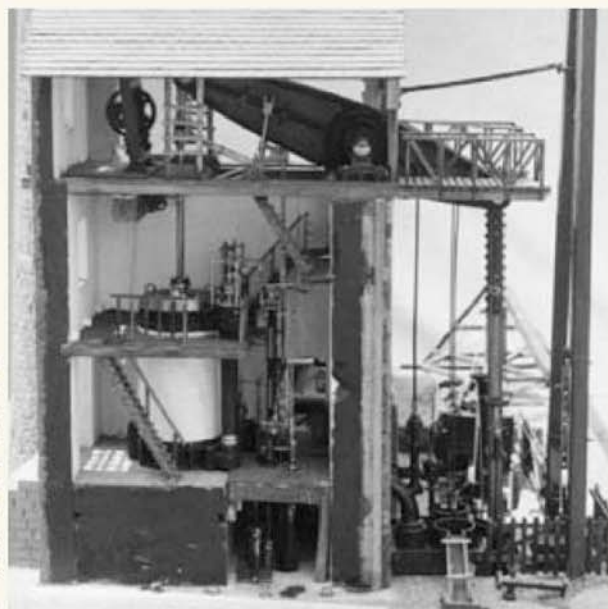
The boiler house contains three boilers constructed to represent the dimensions provided by John Bourne in his treatise on the steam engine.



A closer view of the pump shaft and operating beam. The tiles on the roof of the boiler house have been omitted to give visual access within.



Left: the side wall of the engine house is pierced with a hole to provide viewing access to the interior workings.



Right: the side wall is held by magnets which allow it to be removed to reveal the engine installation. Note the intricate joinery required on a model of this nature.

A model beam is best made by cutting out the outer rib and soldering it to a centre piece made complete with the bosses. Brass is best but can show through the paint on the corners. I used aluminium alloy and a modern adhesive but shall not repeat this foolish exercise. In future I shall stick to brass and solder even if it means tinning it all over.

Cornish engines did not usually have a rib on the centre-line of the beam, but this early one did, and also cross ribs blended into some of the bosses. Making the beam led to an exercise in making octagonal drifts. The nose pins work in half brasses in the ends of the beam. These and others require means to machine them as shown. I machine these and then mill half away before parting off. It wastes a bit of material but not much in small-scale models.

In a model of this sort there are many parts with slots; I usually drill some $\frac{1}{32}$ in. dia. holes which I join together by means of a piercing saw and then drive a drift through. This method is not entirely satisfactory, so it is best to make the slot first and then to make the rest of the part so that it ends up with the slot where it should be. The valve gear comprises many small parts and where possible it is my practice to make them complete before parting off. The long slender links in the parallel motion were turned as thin as I dare but then looked too thick. The problem was resolved using the steady shown in the accompanying photograph.

The French drawings were of no help in making the house for the model but it seemed more or less obvious that the opening where the exhaust pipe went from the exhaust valve would be offset. I asked my old friend J. H. Trounson, the famous Cornish mining engineer, to look at the ruins of the engine house but he found it too difficult and sadly did not live to know that the model had been built.

Many early engine houses seem to have flat topped rather than arch windows and I even went to the trouble of looking at one on St. Austell golf links through a telescope. Older houses were often built without overhanging eaves, the roof finishing level with the wall. This is not a pleasant architectural feature but I do not build models to please architects or exhibition judges but to show things as they are known to have existed.

Whatever the house is like it is desirable that a side can be taken off to attend to the mechanical parts. An earlier model had countersunk screws concealed by plastic wood, which was not a good method. Small nuts and wall plates have been tried and, while these would be correct for an engine house in a district liable to subsidence, they were not a prominent feature on engine houses in Cornwall. In this model, magnetic blocks are let into both the fixed part and the removable wall. To prevent even a glimmer of light showing through there is a tenon and groove where the two parts fit together.

In this type of model there is a lot of carpenter's work such as floors, stairs and banisters. In the

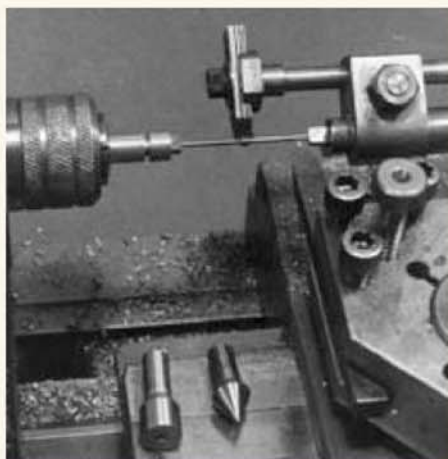
past I have made floors of thin wood and scored it to look planks but have always been concerned that someone would point out that the grain ran through from one plank to the next. In this case the floors are proper planks about $\frac{1}{8}$ in. wide and 0.02in. thick and not all of the same wood thus making them more obviously separate planks. This became possible due to the construction of a small woodworking machine known as the Woodall Micro-Carpenter.

The boiler house contains three boilers made to the sizes given in John Bourne's book on the steam engine. These are completely bricked in, which would conserve heat but hide corrosion. In later years it is the sort of thing to which the Manchester Steam Users Association would have objected for, just as Cornwall showed how to use steam economically, Manchester showed how to use it with safety. The fire doors open upwards as shown on another early drawing and I have put test cocks at the side because I have not been able to find whether gauge glasses had come into use by 1835.

There was never any thought given to a steam driven model which would be difficult but also impracticable for running in a glass case. The model is driven by a 'secret works' in the base. The model has been on loan to Kew Bridge Steam Museum so that visitors could see how the engines that pumped London's water supply were developed from mine pumps. In the earliest cases such engines were not developed but rather converted from mine pumps. 



The Author's wooden model of the cap at the top of the piston rod.



The special steady devised to turn some of the very thin sections required on the model.



A milling spindle in use on the lathe to prepare a special drift.



Photographs do not do justice to Len Steel's superb workmanship. This photo shows the work completed on his magnificent 9F locomotive at the time of preparing the accompanying notes.



The regulator operating rod extends down the outside of the 'Brit' boiler.

POPPET VALVE REGULATOR

John Jones

describes fellow Guildford MES member Len Steel's 'Super Regulator' built to fit the latter's 5in. gauge 9F locomotive.

Many moons ago Lionel Flippance of IMLEC fame built a rather nice 5in. *Britannia* to the Perrier drawings. Having run the loco very successfully for a couple of years, it then passed into the hands of Len Steel who has himself run the locomotive at numerous efficiency events throughout the land. Indeed, the rivalry between these two drivers is well known. In the interests of improving the operation of his 5in. gauge locomotives Len has made many improvements to various standard items. Just try standing with your back to the 'Brit' when the safety valves blow off; this has cured many a constipation problem for the unwitting ageing bystander! These improvements have been much admired by his fellow Guildford club members as

well as modellers outside of Surrey County. He is also building a 5in. gauge 2-10-0 Class 9F into which he is incorporating many of the improvements he has made to the *Britannia*.

The standard regular designed for the 9F is of the slide valve variety. One of the snags with this type is that there is a fair degree of friction acting on the valve faces which inhibit smooth operation in use. In the extreme it can be a case of either fully open or fully closed and not much control in between. If we assume there is a square inch of surface area on the valve mating faces then the force acting on the valve under 100psi of steam pressure is 100lbf. This force has to be high in order to fully seal the valve on shut off. If we assume the coefficient of friction to be in the order of 0.2 then the force acting on the regulator pull rod is also quite high. Bearing in mind that this pull rod is only 1/8in. diameter, for these reasons the Len Steel thinking cap was donned.

Before proceeding too far, a brief description of the system of operating the regulators on each of the locomotives may not come amiss. The

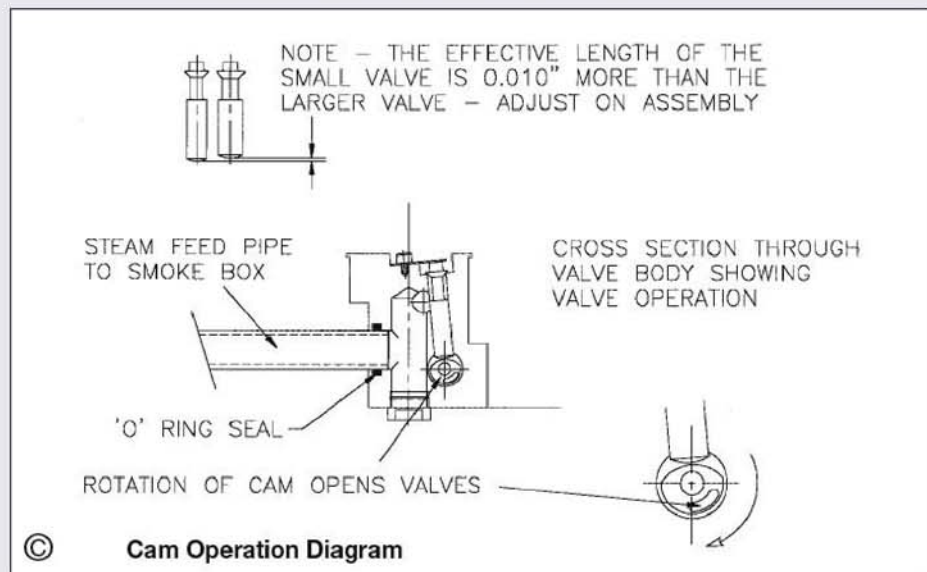
regulators on both locomotives are operated by control rods which pass from the levers in the cab and down the outside of the left-hand side of the boiler. On each there is a side entry bush which carries a stainless steel shaft that operates the regulator inside the boiler itself. In the case of the *Britannia* the regulator is fitted in the smokebox but on the 9F the regulator is fitted inside the boiler dome. This arrangement is clear in photos 1 and 2. There wasn't much Len could do to modify the smokebox regulator in the *Britannia*, but much thought was given to the possibility of fitting an improved poppet valve regulator inside the dome of the 9F.

The new valve was to be of the double poppet type and was subsequently made. When our worthy Editor heard about and saw this for himself Len was approached for a description and write up so that more of us may benefit. So here goes.

The action of the new steam valves is simplicity itself. In fact there are two of them. One is 1/4in. dia. the other is 5/16in. diameter. Both work in tandem but the smaller of the two



The complete poppet valve regulator block fully assembled and ready to be fitted into position through the boiler dome.

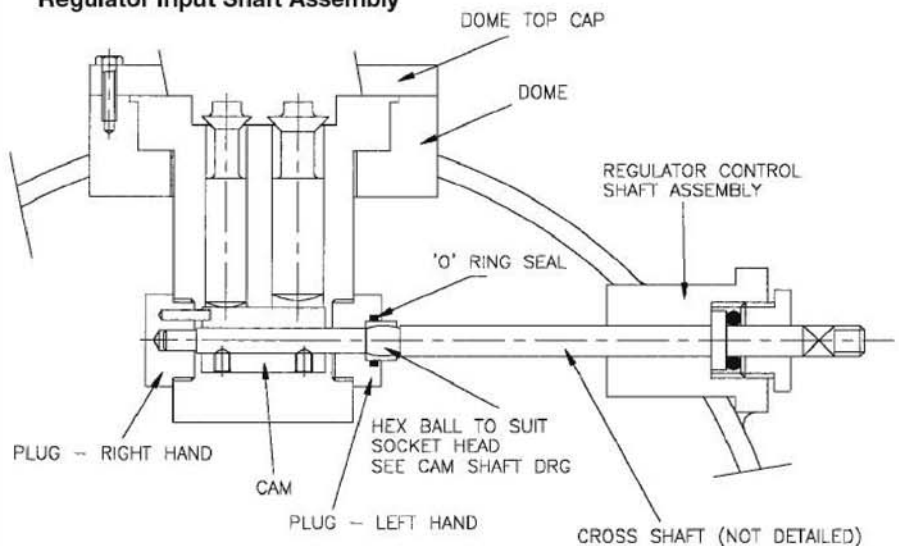




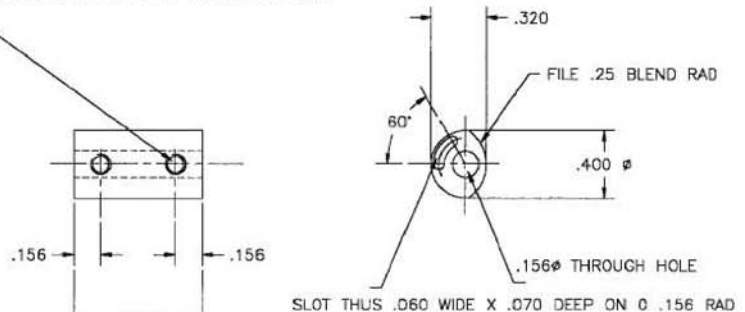
It is clearly evident that the centre line of the dome of the 9F does not align with the centre line of the regulator bush. The drawing indicates the bushes as being $\frac{9}{16}$ in. out of line (see text).

has an effective length 0.010in. longer than the other. This means that when the regulator handle is pulled from the fully closed position, the smaller steam valve opens fractionally before the larger one. This allows the small valve to act as a pilot before the main valve becomes operational and gives the driver total control of steam from a very low steam output to the cylinders to maximum steam when needed. Wheel spin is a thing of the past. Hopefully the Cam Operation diagram here will give readers a clearer view of the sequence. The valves are raised by the rotation

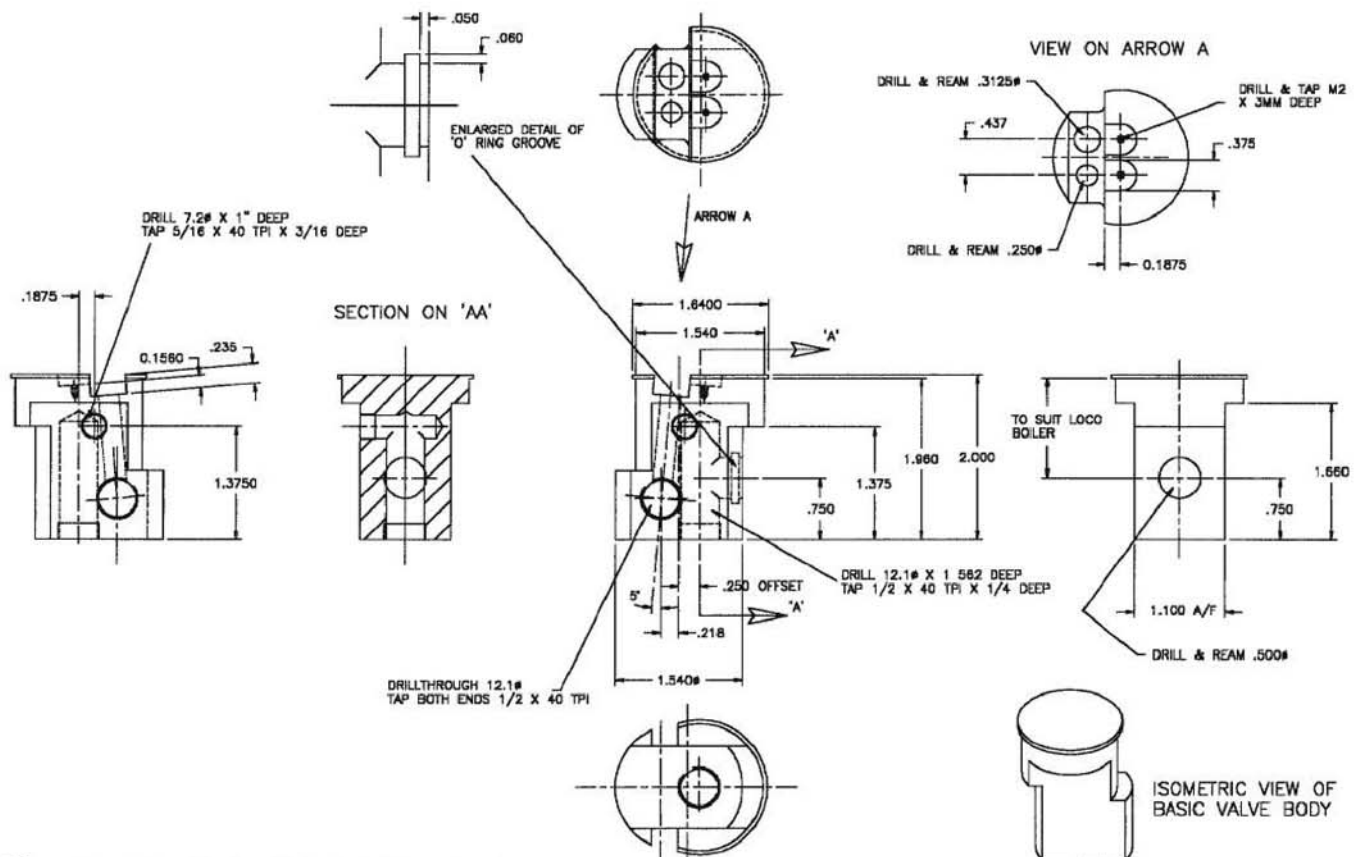
Regulator Input Shaft Assembly



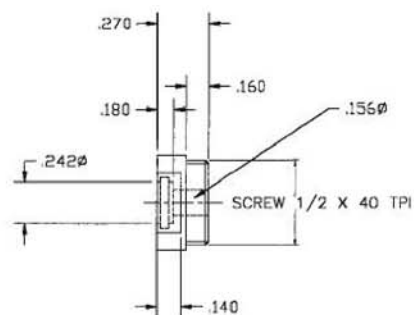
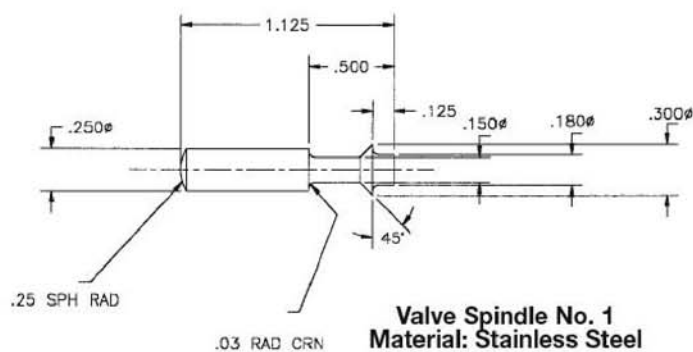
2 HOLES DRILL X TAP 6 BA INTO BORE



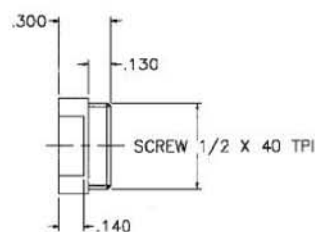
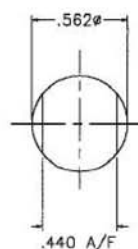
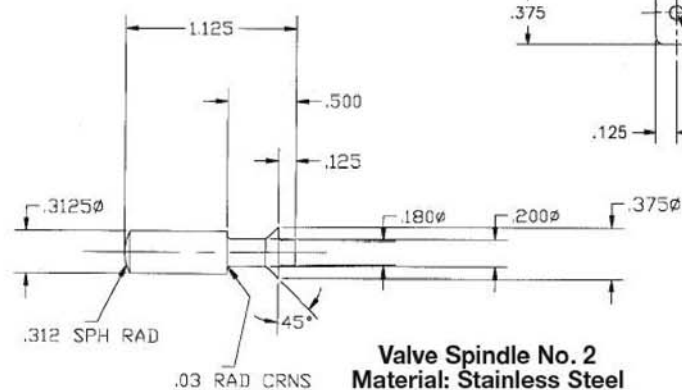
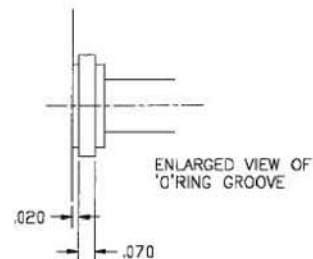
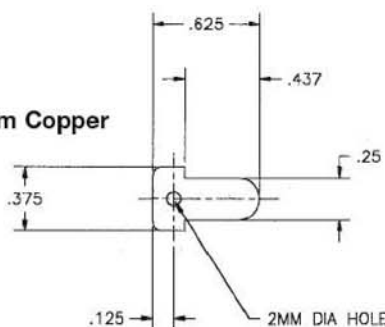
Cam - Material: Stainless Steel



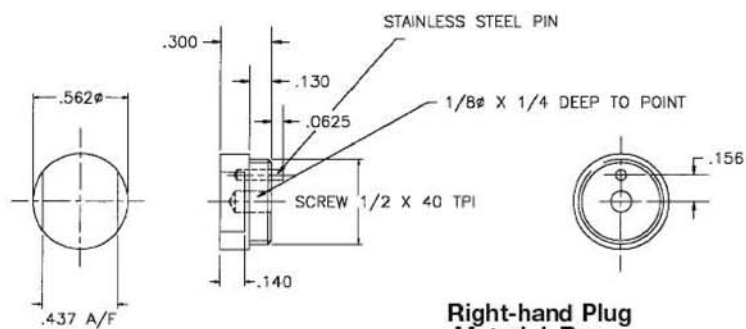
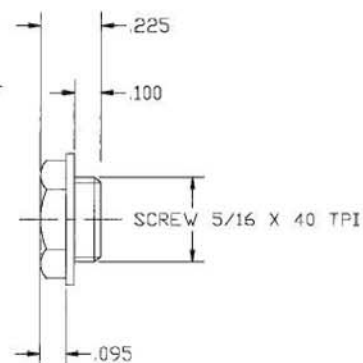
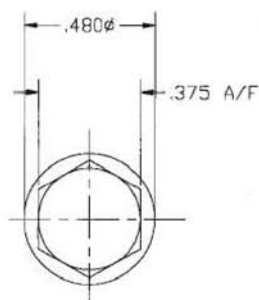
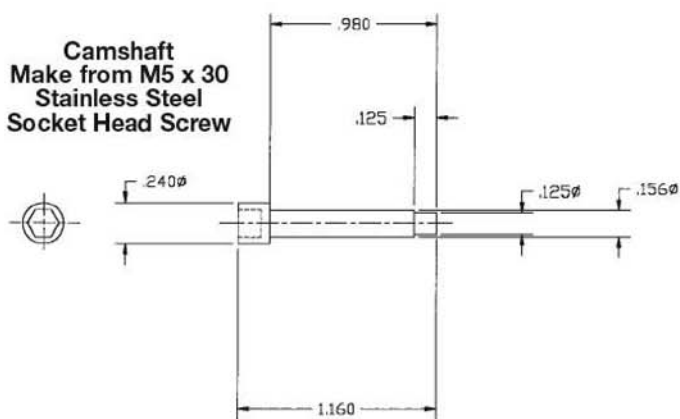
© Regulator Body - Material: Phosphor Bronze



Spring
Material: 0.010in. Beryllium Copper



Camshaft
Make from M5 x 30
Stainless Steel
Socket Head Screw



**POPPET VALVE
REGULATOR**
for a
**5in. GAUGE 9F 2-10-0
LOCOMOTIVE**
Design: Len Steel
Drawn: John Jones

of a simple cam. The maximum rotation of the cam is 60deg., approximately 15deg. of this being taken up by the 'pilot' before the second valve becomes operational. A flat beryllium copper spring is fitted to the top of each valve to assist in closure although in theory this is not necessary because steam pressure should close the valves.

Photograph 3 shows the regulator block assembled with all its component parts. The hole in the front of the block, to the left of the view in the photograph, takes the pipe which feeds steam through to the smoke box. This is sealed with an 'O'-ring which means that the tube can be easily removed through the front of the smoke box and allows the block itself to be removed through the top of the dome. The block is secured into the dome by a circular blanking plate (**photo 4**).

An additional problem is that the bush in the side of the boiler carrying the regulator input shaft is not in line with the centre line of the dome. A careful measurement had to be made of the amount of offset. In Len's case the offset was found to be $15/32$ in., hence the 0.250in. and 0.218in. dimensions on the Valve Body drawing. The isometric view on the same drawing indicates the general shape of the body and

shows how the valve assembly can be dropped down through the dome bush and then 'stepped backwards' so that the cam operating screw then aligns with the boiler bush. The Cam Shaft is turned by the Cross Shaft which, to take care of any slight misalignment, terminates in a hexagon which locates inside the Cam Shaft. This is made from a stainless steel socket head screw.

The Cross Shaft is shown on the Regulator Input Shaft Assembly drawing. The Cross Shaft itself passes through a bush sealed with an O-ring. The input end of the shaft has a milled hexagon to fit inside the hexagon Cam Shaft. This allows for any slight misalignment of the

two. It has already been stated that the circular rotation of the cam needs to be about 60deg. from closed to fully open. This rotation is restricted by the small pin in the side of the Right-Hand Side Plug which fits inside the little annular groove milled in the end of the Cam. An alternative to this would be to restrict the movement of the regulator lever inside the loco cab.

The O-ring seal fitted in the counterbore of the left-hand plug protects the undersides of the poppet valves from full boiler pressure.

No blow-by-blow account of the method of manufacturing each individual part of this set-up is provided here, although all parts have been drawn up and accompany these notes. The main reason for this is that it is anticipated that each and every locomotive will differ in both form and dimensions and the parts will therefore have to be adjusted accordingly.

Suffice it to say the parts need to be machined and assembled with precision and care. I trust that these words have helped interpret the music of a master craftsman to an extent where more model engineers will be able to make a 'Super Regulator' either for a model under construction or even as replacement for an existing unit which could perform rather better than it does. 



INTERNATIONAL RANGE OF BOILER FITTINGS FROM REEVES 2000

Reeves 2000 have realised that there is a lack of high quality boiler fittings available to the UK market. The introduction of their International range of products is aimed specifically at this market sector.

Products currently available include various valves — check, backhead, blow-down and globe (both 90 and 180 degree). PTFE is used within all bodies for improved seals. Captive spindles on globe valves prevent them from being unscrewed

Reeves 2000 can supply precision single and double sight feed lubricators.



thereby improving safety. Hand wheels are reduced in section providing a cooler surface and neater appearance; they are also broached and 'notted' for safety. Fine threads on all products result in more accurate control. Shorter olives produce tighter radii giving neater backheads. Locking nuts on the check valves enable precision location.

The blow-down valve has an insert inside the main body which prevents potential water leaks from the valve unit. Overall size on all products is reduced giving a much more authentic appearance.

The chime whistles are designed to be of particular interest to the $7\frac{1}{4}$ in. gauge market. Highly polished brass, they sound a three-tone chord producing a superb sound. The steam

whistle valves have turned wooden handles, locking nuts to locate the valve on the manifold and a fully rotating collar for positioning of the lever handle.

The range of single and double sight feed lubricators contain at least 54 individual pieces. Each unit features two fine threaded valves, one controlling the main flow of oil to the unit, the subsidiary valve controlling the amount of oil to the cylinder. Every effort has been made to produce a precision unit resulting in yet another excellent product.

More recent introductions to the range include 18oz./min. injectors, blower valves, oil check valves, displacement lubricators and injector water control valves.

For further details contact Reeves 2000, Appleby Hill, Austrey, Atherstone, Warwickshire CV9 3ER; tel: 01827-830894; fax: 01827-830631; email: sales@ajreeves.com website: <http://www.ajreeves.com>

180° and 90° globe valves are available with PTFE seals and captive spindles.



3-tone chime whistles are available and each whistle valve is fitted with a polished wooden handle.

Christopher Hogg

visits Germany's Auto & Technik Museums where a fascinating selection of machinery resides, some of which even defy gravity!

A jumbo jet (Boeing 747) at 150ft. above the ground, without engines or fuel, is usually considered an impossible feat, or at least very unwise! If, however, you visit Germany's Auto & Technik Museums this feat is performed as many times as you like during your visit, all with the aid of stilts.

The title Auto Technik is slightly misleading as it in fact describes two collections, one in Sinsheim and one in Speyer. Both are readily reached by rail or car from Heidelberg, itself in turn reached from Frankfurt. In the museums, Sinsheim especially, cars certainly abound, but they are only a fraction of the many hundreds of exhibits sampled here.

The range of technology over a 100 years or



Stilt mounted some 150ft. in the air, this ex-Lufthansa Boeing 747-230B (D-ABYM) makes an impressive spectacle. Inset: the 747's wing walkway is not for those without a good head for heights!

TECHNOLOGY FOR CHILDREN FROM 8 TO 80!



Arriving on 19 July 2003, this ex-Air France Concorde (F-BVFB) is a recent addition to the museum. Its last flight was on 24 June 2003 and, during its 27 year flying career, the aircraft clocked-up a total of 14,771 hours.



Russia's rival to the Concorde was the Tu-144, (popularly known in the west as Concoriski). This aircraft suffered many problems during its relatively short career including a fatal crash at the 1974 Paris Air Show.



The author poses beside a massive model of the German ocean going liner, Bremen. Hanging above is a North American OV-10 Bronco aircraft.



An overall view of the Chinese Quian Jin locomotive. The steps at the right of the photo allow visitors access to the cab.



One of several delightful mechanical organs that will play for you for the princely sum of one Euro!



A 'Crocodile' locomotive from Switzerland whose articulated bogies allow tight curves on the railway.



Main photo and inset: just some of the many interesting cars that are on display, some of which are mounted vertically to allow for chassis inspection.



From the WW2 period, one of Adolf Hitler's impressive Mercedes Benz 'Maybach' limousines.

more is staggering, spanning steam locomotives, mechanical organs, aircraft including *Concorde* and Tu-144 *Concordski* (its Russian 'sister'), midjet and full-size submarines together with a maritime museum and a *Star Trek Enterprise* collection! This is not a static collection as you, dear visitor, are the prime mover! Most of the aircraft, although steeply angled, can be climbed inside. Aboard the Boeing 747, for instance, you can visit the cargo hold, flight deck and then inspect the surprisingly thin rear pressure bulkhead that keeps you comfortably pressurised at high altitude. Then you can even step out onto the wing! The mechanical organs delight (for a one Euro fee) with music and unspooling perforated paper cards.

You can even make the steam locomotive work.

One steam locomotive, a Chinese *Quian Jin* despite weighing 156 tonnes had to be turned on its side to reach Speyer and overcome its height of 4.8 metres. Two IMAX cinemas offer the 3D experience of the Space Shuttle visiting the space station and astronauts jetting around outside with their personal rocket packs in action. Perhaps you prefer the undersea world with microscopic plankton cannibalising each other on a screen over 100ft. wide. Other offerings include the Pharaohs or an exquisitely candle lit Tibetan temple at night near Everest. All brought to you by 22,000 watt projector bulbs (your household light is 60 watts!). The museums at Sinsheim and Speyer also offer the live steam enthusiast model exhibitions including the annual event in early January (e-mail echtdampf@schall-messen-de).

timetables (www.deutsche-bahn/hafas).

Websites

Sinsheim Auto-Technik Museum — brochures and museum hotel; www.technik-museum.de also e-mail info@technik-museum.de

German railway timetable and internet bookings from the UK:

www.deutsche-bahn/hafas

Instant internet translation to and from German: www.babelfish.com

Heidelberg tourist office:

www.cvb-heidelberg.de

UK railway timetable:

www.nationalrail.co.uk



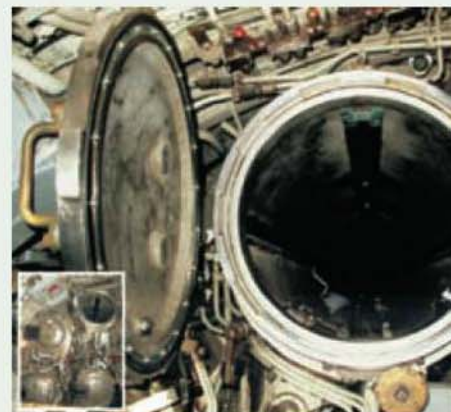
A real oldie, the 'Adler' locomotive.

Other attractions

These include a printing museum in Mainz and the Opel car factory at Russelheim (e-mail Opel.Live.Reservierung@de.opel.com). Rhine cruises start from Rudesheim.

If you are unable to visit in person, the museum shop offers a magnificent book with over 800 pictures from both collections (in English and German ISBN 3-00-009833-X), a CD ROM and DVDs including in-depth coverage of the 747.

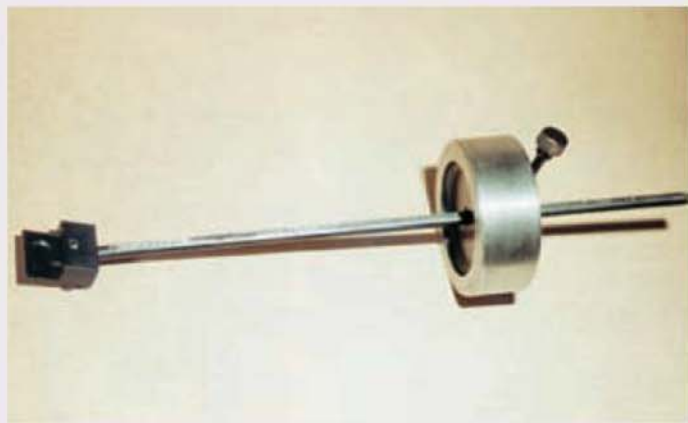
Fahrplanauskunft: the Deutsche Bahn railway stations at Heidelberg and Frankfurt will print you a *gratis* railway timetable with platform numbers personalised to your visit. From the UK the internet offers bookings and personalised



Just one of the diesel-electric submarine's eight torpedo tubes.



The loading gauge in use with the author's 5in. gauge 2-8-0 locomotive. The device is designed to be used with the locomotive standing on a hard surface.



A view of the gauge which was made from simple materials and is quick and easy to use.

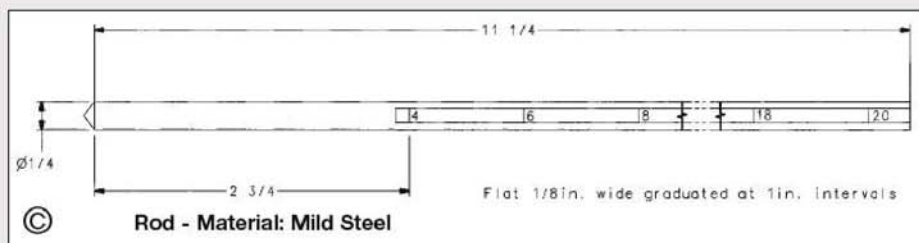
A SIMPLE LOCOMOTIVE WHEEL LOADING GAUGE

H. D. White

describes a device of particular interest to those who wish to haul heavy loads with their miniature locomotives.

Having recently completed a 5in. gauge 2-8-0 locomotive model, the axlebox springs needed setting up to give proper load sharing between the eight coupled wheels. Equal load sharing between driving wheels is obviously an important factor in achieving maximum wheel to track adhesion when running. The pony truck wheel loading also requires adjustment to give the best compromise between too much load, thus removing weight from the driving wheels, and pony truck derailment if loaded too lightly. In my case the setting for this was largely guesswork, but I thought it was a good idea to set it to a known figure to start with.

The simple wheel load gauge shown in the sketches was made and proved easy to use. The locomotive is placed resting on its wheel flanges on a flat table with a clean, fairly hard surface. The foot of the gauge is inserted in the gap under each wheel tread. The position of the sliding weight on the gauge is then adjusted to just lift



the wheel under test from the table surface. The wheel loading is then read off from the gauge calibration scale.

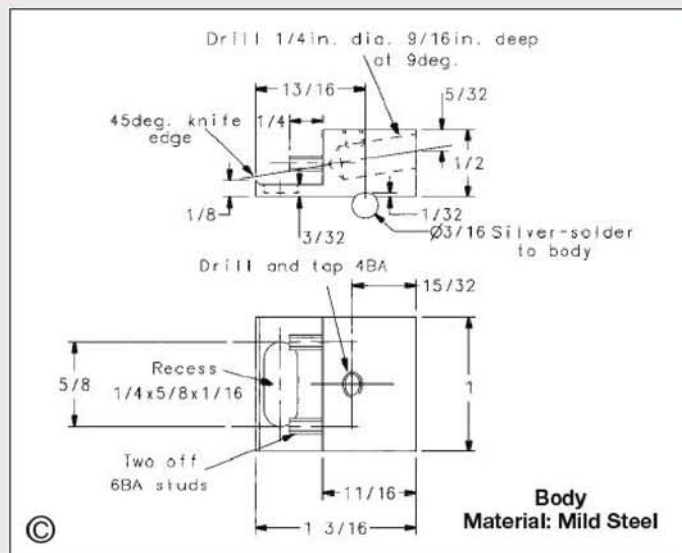
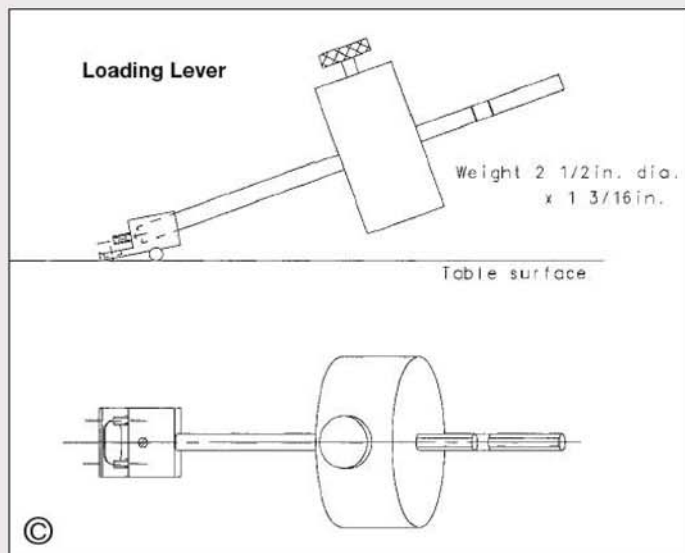
The exact design is not critical, since uniformity of load on coupled wheels is the object of the exercise, rather than a precisely known load figure in pounds. I calibrated my scale by actually balancing some known weights on the knife-edge, marked the scale division lines with a cold chisel, and identified these with number stamps. The scale could be quite arbitrary, and could be achieved by simply dividing it into equal increments. If the measurements given in the sketches are followed, the weight calibration should be within about 10%.

The dimensions specified all originated from the 1lb. 10oz. weight which I used. This, believe it or not, came from the scrap box and was a

turned-from-the-solid flywheel made for a model abandoned some 50 years ago. I never throw anything away it seems.

It is important that the knife-edge is the only part of the gauge to make contact on the wheel tread. To ensure that this occurs, the foot of the gauge is recessed to provide clearance from the outside corner of the wheel under test. Repeatability is also improved by the stop pins, which allow constant positioning of the gauge under each wheel.

As drawn, the gauge is intended for 5in. gauge models with wheel loading between 4 and 20 pounds. For 3 1/2in. gauge models, because of the smaller wheel flange height, some of the foot dimensions may need reduction. For wheel loading outside the range given, the sliding weight dimensions can be changed.





Approaching the summit.



The Gang!



Inaugural passenger train.

BAGGERIDGE MINIATURE RAILWAY

Keith Wilson
brings us up to date.

A couple of years or so ago the first section of the Baggeridge Miniature Railway was completed and described here. Since then progress in constructing the second stage has been great if fairly slow. Slow not for lack of enthusiastic workers but because of the heavy (for amateurs) earthworks needed.

A survey of the proposed circuit revealed a fall and rise of about 6 feet, no joke in view of the gradients enforced by the lengths of run available. Fortunately for us, the site is a reclaimed ex-coal mine and is also used by Baggeridge Brickworks. We were granted use of part of their storerooms as a Club facility, and since they have to pay for removal of rejected bricks it required no great powers of persuasion to get them to dump a few tonnes of them on our site. This allowed us to raise the lower portion of the track by over a metre, resulting in a ruling gradient of a mere 1 in 90 — of little concern to even the smallest locomotive.

Vast quantities of earth were shifted from where it wasn't wanted to where it was, resulting in nice wide-topped sloping embankments, duly surveyed, grassed, and 'levelled'. Trees have been planted, there being no lack thereof in members' gardens, and they are now well established.

A carriage storage shed has been built and connected to the new main line with a facing point, there being no real choice. Immediately outside this shed there is an ample turntable. We discovered that a better layout could be worked in if the first turnout to the new line (forming a figure eight with the old one) was actually a 'turn in' followed by a diamond crossing. This reduced the curvature needed to join up properly.

Best avoided where possible, there is always a need for facing points. In our case, the exit to the new track comes before the re-entrance; thus during operational working with passengers, all facing points can be locked; in the possible case of emergencies to locomotives, such as urgent requirements for water, there are two sets of trailing points which can be immediately utilised.

Work on track-laying (including ballasting and trimming) continued all though the winter of 2002-3 and it was planned to actually use the new track for passenger purposes last Easter. This involved not a little of the blue-tailed fly approach, but the first passengers were duly carried round Thursday afternoon 17 April. The extension has only rails for 7 1/4 in. gauge locomotives at present, but the arrival of more rail will permit the installation of 5 in. gauge all round.

One of our eager members brought along a bogie with a little gallows on it supporting a plumb bob; this ingenious device greatly facilitated

track packing and super-elevation. It was suggested by another ingenious member that this device could well have been used for the Pyramids, but when he asked me for my suggestion of what was used for Pyramids, I couldn't help myself and merely answered "rocks" to everyone's delight, except his.

The new layout shows great promise and work is proceeding on a locomotive unloading/lifting mechanism, signal box, twin-track station, semi-automatic signalling system, and the thousand-and-one items which go towards making a successful railway.

The formal opening took place in August, and was well attended with visitors, enthusiasts and locomotives. Being in a public park with good walks, adjacent to a childrens' playground and a café a mere 100 yards away, we almost have a 'captive audience'. The weather has to be very inclement for our trains to be empty. Since the park is locked at nights and is situated about half a mile from the nearest road, vandalism has not so far been much of a problem.

The track is open to the public on Bank Holidays and every second Sunday in the month. Away from the track, meetings are held every first Friday of the month at the Fordhouses Community College, starting at about 7.45pm. Any enquiries may be directed to 01902-712704 day or evening.



Cold fingers!



Checking and setting superelevation.



Well equipped workman.

TRADE TOPICS

NEWS FROM

MODEL ENGINEERING PRODUCTS, BEXHILL

This company has now been established for over ten years and offers both model engineering supplies and diesel outline battery electric locomotives and rolling stock. The locomotive stable has grown over recent years and this year has seen the introduction of another new class (the '90') along with two new items of rolling stock — the 6-wheeled 1906 cattle drover's brake van and the 6-wheeled coach.

The company concentrates mainly on 5in. gauge and, to complement the locomotives, have a large range of rolling stock. Some rolling stock in 7 1/4in. gauge is also available, together with two engines, an 0-6-0 and bo-bo American style locomotive. All the rolling stock can be provided with brakes if required and all the 4-wheel and 6-wheel vehicles are sprung. Padded seats have recently been introduced as an optional extra.

Most rolling stock required for either raised or ground level operation (or dual purpose in some cases) can be supplied. In the past all the products were supplied painted and ready to run, however, recently and after considerable development, fully machined kits for all but two of the locomotives and rolling chassis have been offered and flat-pack laser-cut body kits for home assembly of the rolling stock range have been introduced. These kits have proved very popular and seem to be what most customers like as they can put their own individual touches to

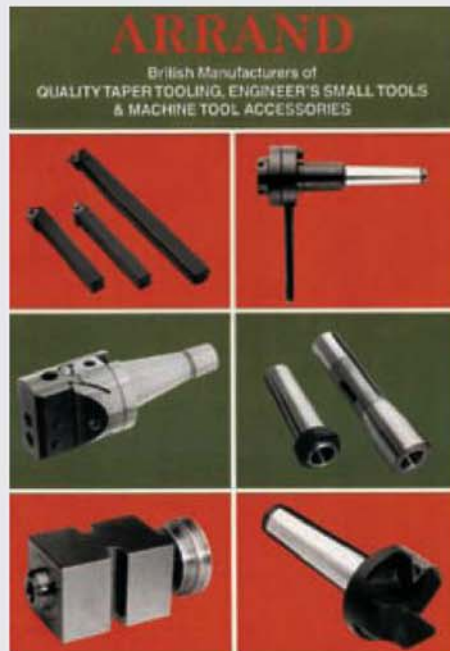
what they buy. Every effort has been made to ensure that the kits supplied can be put together with only basic hand tools and a cordless drill for the few remaining, undrilled holes. Bogies and chassis are supplied as complete sub-assemblies as these are welded fabrications. The rest of the components are all pre-drilled and all holes tapped as required. All necessary fasteners are supplied, together with a tube of Loctite!

Once the components are painted, assembled and the controller fitted and wired up, the purchaser has a rolling, powered chassis. A customer of the company has kindly provided a comprehensive illustrated build manual detailing stage by stage construction which is now supplied with all kits. Kits and ready to run locomotives are now supplied worldwide thanks to the development of the company website.

One of the most popular items in the rolling stock range is the 'Toad' van in both 5in. and 7 1/4in. gauges. Another item common to both gauges is the well wagon suitable for both raised and ground level tracks.

As many as possible of the sheet steel and plate components supplied are laser cut for ease of assembly. Machining work is undertaken by a group of retired engineers who do stalwart work for the business. These factors, coupled with a fully equipped workshop, combine to make the products well engineered and, with careful routine maintenance, they will last for years. Of course, authentic paint colours can be provided for the locomotive and rolling stock colour schemes.

The website is a great asset to both aspects of the business, but it requires much evening work to keep it up to date. Customers often complain



because it has not been updated for a few days! Every effort is made to photograph as many stock items as possible since the website makes it possible to bring the shop into prospective customer's homes.

A good and varied range of used machine tools and tooling are also carried in stock, and a large selection of mild steel and brass sections along with all the usual fixings, plus drills, taps and dies. An A4 colour brochure is available for £1.75, including postage. The company attends exhibitions at Brighton, Taunton and Guildford and if asked, may be available for other club open days and rallies.

Further details may be had from Model Engineering Products Bexhill, 17 Sea Road, Bexhill-on-Sea, East Sussex TN40 1EE; tel/fax: 01424-223702; mobile: 07743-337243; email: diesel@17bexhill.fsnet.co.uk website: www.model-engineering.co.uk

NEW CATALOGUE FROM ARRAND ENGINEERING

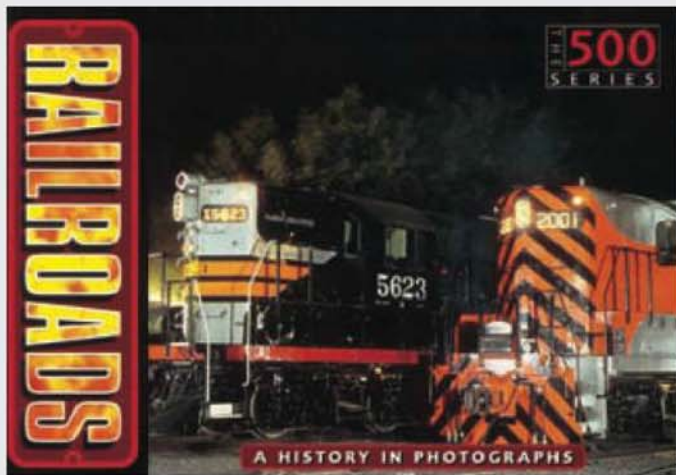
Arrand Engineering has released a new catalogue detailing all the tools currently made in their workshop at Knossington. Arrand has been manufacturing now for thirty years and supplies model engineers and companies throughout the world. Arrand's range of equipment for the model engineer and clock maker includes boring heads, indexable tip carbide tools, ER collets and collet chucks and quick-change tailstock tooling. For a free copy of the new catalogue contact Arrand Engineering, The Forge, Knossington, Near Oakham, Leicestershire LE15 8LN; tel/fax: 01664-454566.

RAILROADS

by Steve Barry
Published by Salamander Books
ISBN 1-84065-387-6
Price: £9.99

This book in the Salamander 500 Series follows a similar format as its sister publications. It sets out to give the history of American railroads in 500 photographs. Written material is provided to support the photographs and supply the details. The book





points out that the earliest locomotives in America were of course imported from Britain but the America railway engineers quickly adapted the technology to suit their particular requirements and eventually developed the traditional 4-4-0 type. The rapid expansion

The industry hit its peak just as the USA entered World War Two and from that point the story is one of decline until high-speed passenger trains were developed late in the last century. Detailed profiles are provided for many of the steam locomotives including some of the huge engines

during the 1830s and '40s is recorded together with the use of railways during the American civil war. Some of the difficulties encountered in realising that great engineering achievement, the creation of the transcontinental rail route, are recorded as is the building boom that followed its completion.

used to haul freight across the plains. A short chapter looks at railway stations.

As the story unfolds we arrive at the era of the diesel locomotive, and these are dealt with in detail from the points of view of both passenger and freight traffic. A chapter entitled *Working on the Railroads* gives an insight into what it was like to work on the system in years past, together with some more recent photographs of present day occupations. Final chapters deal with the electric locomotives and the rebirth of the railways in the USA and Canada. The photographs and illustrations are all of excellent quality and the book represents good value for money. Published in A5 landscape format with soft covers *Railroads* is available from Salamander Books Ltd., 8 Blenheim Court, Brewery Road, London N7 9NT.

Neil Read



UK News

The National 2 1/2" Gauge Association has a good programme of events planned for the year, the first being a Get-Together on Saturday 17 April from 11am until 5pm at the Surrey SME Clubhouse, Mill Lane, Leatherhead. Hot food will be available at midday.

Ashcombe Miniature Railway reports good progress on track levelling and sleeper replacement, and some new work being carried out, thus making the end of year a good period for the club. Improvements are to be made to the signalling system; foundations for a lever frame have been dug and concrete blocks placed in position. The signalling system has suffered minor vandalism with the cables being cut. The original plastic rope cables are now replaced with steel cored plastic which should make them more difficult to damage. At half term, club members travelled to the Great Western Society at Didcot and were able to visit the footplates of many engines. The visitors also saw A4 Pacific *Union of South Africa* passing with a special train on the main line. The night running event went well and the club thanks Jamie Mason's dad for being the 'fish and chip chauffeur' for the event.

Another group with a good programme of events for the coming year is Basingstoke MES.

now raised sufficient funds to purchase the 'Broad Halfpenny' site at North Waltham which will become their new base due to uncertainty regarding the future of the existing Viabes site. In his report, the Chairman comments about the club being "... pushed away from public running ..." because of the increased health and safety/insurance costs. I suspect this is true of many societies and may become more of an issue in future.

At the time of publication of the most recent issue, the Editor of the *Bournemouth DSME News* was pleading for members to loan their fairy lights for use in Santa's Grotto. I hope he succeeded and that the event was successful. He was also looking forward to "the annual sojourn to Sinsheim."

Directing our attention much further north, members of Bradford MES held their annual competition at which John Whitely was awarded the *Best in Show* trophy for his 9-cylinder Gnome rotary engine. The society has a good relationship with local Guiseley School and club members have been offered use of the school milling machine and other equipment. This seems to be an excellent way of fostering interest in model engineering from both sides. It also appears to go against the general trend in that many schools have been disposing of such

equipment and give the impression that they have no interest in fostering such skills. If readers know of establishments which do encourage model engineering, I will be pleased to mention them in this column. The society obviously plans well ahead because members are already discussing options for their 2008 Centenary Celebrations! As seems usual during the winter period, maintenance has been progressing with various items of groundwork being carried out to improve drainage, and improvements to rolling stock being made. The Wednesday Workers were generously granted Christmas and New Year's Eve off but were hard at work again on 7 January.

I have recently obtained a leaflet describing a new club catering specifically for the model car racing fraternity. The *British Model Car Club* is for tether and rail car racing enthusiasts. A full calendar of events is planned for 2004 and anyone interested can obtain more information from Jim Elsegood, 31 New Road, Offord Cluny, Huntingdon, Cambridgeshire PE19 5RP (tel: 01480-810539). Members of this group are assured of regular mentions in these columns provided we receive information on these events. After all, car racing makes a change from those noisy, smelly steam engines!

We have details of the 2004 programme for the *Claymills Pumping Engines Trust* steamings at their Burton on Trent site, the first of which is an Easter Steaming on 11/12 April. Further details can be obtained from the trust; call 01283-509929 or visit the web site at www.claymills.org.uk

The Editor of the East Somerset SMEE newsletter complains that he is always upset over Christmas because these are the two days of the year when his family tells him that he is not allowed in the workshop. He thinks it is totally unreasonable to "... keep clean and say hello to all the family." I suspect many others may sympathise with this point of view. The society is still negotiating a lease with the Royal Bath & West Society and hopefully things will have moved forward by the time you read this. Some members recently visited the *Echills Wood Railway* to pick up ideas from another railway operating in an agricultural showground environment. I don't know how many ideas were picked up but the members concerned certainly seem to have enjoyed their visit. An unusual item in the *For Sale* column was a 4 1/2in. gauge tram with two 240 volt motors providing the motive power. From the photograph it has third rail pickup which, after recent reports, lead me think about the merits of this system as a vandal deterrent.

Members of Erewash Valley MES are still progressing with efforts to improve drainage of their field. They hope to have reached the lowest point by the time this is in print and hope that a big improvement will be made. The Society has a new secretary in the person of Geoff Haddon who can be contacted on 01332-760359 or at 12 Lynwood Road, Sinfen, Derby DE2 9PA. We wish Geoff good luck with his new role. The club as a whole is to be congratulated as this year marks their 30th anniversary as well

In Memoriam

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

Cyril Cooper
Dilwyn Herbert
Dick Hodges
Sam Ludford

Basingstoke MES
Maidstone MES
Maidstone MES
Maidstone MES

as 15 years at the current track site. To mark the event, members are proposing to hold a celebration on 17 July which will culminate in an evening barbecue; they also hope to have the first circuit of the ground level track finished in time for this. We will report progress as we obtain more news.

A 3¹/₂in. gauge Black 5 locomotive was has been donated to Fylde SME by a recently widowed lady who hopes to see the locomotive finished and running. In the same newsletter in which this is reported, Bob Shaw comments on discussions aired in recent issues of this journal concerning the relative volumes of steam passages and cylinders. He makes the point that one should question everything and prove or disprove any statements for oneself. This seems to me to be sensible advice — where would we be if no one questioned things? Still with a flat earth, presumably! Editor John Palmer would like to see more understanding between all aspects of this hobby of ours. I agree with this because we can all learn something from looking at the way others do things. What is wrong with using clock making techniques on steam engines if they make things easier or produce a better job? What do you think out there?

High Wycombe MEC has decided that they require two more passenger carriages in order to provide extra capacity and flexibility on public running days. If a project leader can be found (coerced?) members would prefer to make their own carriages. The club has a full programme of events planned for the year; the March offering is a talk on 'Hydraulic Systems and Models' by Derek Goddard. Derek produced the fine working model of the Armstrong Hydraulic Crane seen at the 2003 Knowl Hill Rally. The club opened up the track to coincide with a local minor football league competition day and had plenty of customers with John Matthews *Dart* being seen pulling a full football team complete with their newly acquired trophy. The club has also hosted a visit by the local 8th High Wycombe Beavers under the leadership of Squirrel and several assistant squirrels in the shape of mums. The reporter resisted the temptation to allocate small furry mammal names to the club members as well. The event was successful and a similar event may be repeated this year.

The well produced journal of the Historical Model Railway Society

carries an article on Welsh narrow gauge and Highland Railway wagons which may be of interest to those who like the narrow gauges. There is plenty of detail of several wagons including photographs and small scale drawings. The issue in question is Volume 18, No. 5.

Members of Kinver & West Midlands SME are appealing for volunteers for 'Friday night speakers.' I am sure a call to the Editor on 01562-744757 from any local volunteers would be welcomed. The club reports that the 24 hour charity run was a great success. Mike Fox from Oxford enjoyed the night running so much with his Britannia William Wordsworth that he has asked to run again this year. By the time this is published, the new club website will be up and running, so anyone interested should visit www.kinvermodelengineers.org.uk. The club is hosting IMLEC this year and the work needed to ensure a successful event is well under way. At the time of writing, four applications for Official Entry Forms have already been received at the Editorial Office! The next evening event is a varied film show presented on Friday 27 February by John Swingwood. Member Brian Waite has written an article entitled *Model Engineering on a Budget (or How to Cheat)*; it concerns his narrow gauge diesel outline locomotive. Among other things, Brian uses composite construction frames and buffer beams made from MDF with an outer layer of steel. Metal inserts are fitted at bolted connection and significant compression points. The cab is a double skin of steel with the bonnet made from MDF with a steel outer skin. The louvered doors are extracted from ventilator panels.

The Maidstone MES Wednesday Gang have been busy during the summer building the new riding car store and very impressive it looks too. One picture even shows a vehicle in it before the roof is on! The club is hosting the Southern Federation Autumn Rally this year on 18/19 September. Maidstone is yet another club celebrating an important anniversary this year, in their case the 75th. May we congratulate the club on this achievement? Ron Attfield relates his experiences in the development of tyre testing equipment used to

measure the changes in dimensions of tyres being rotated at high speeds (400mph equivalent). The equipment and engineers were all behind 1in. thick glass screens in case the tyre exploded. Having once been following a lorry down the M6 when one of its tyres did just that I can appreciate the precaution! The 'shrapnel' that flew around was something to behold. As part of this exercise Ron designed a differential screw assembly to adjust the camera height. This enables very fine adjustments to be made because while one thread moves forward, the other moves backward. The resulting movement is therefore the difference between the two. As Ron says, if 24 and 26tpi threads are used the resulting movement is equivalent to 312tpi.

The 'Professor of Engineering, University of Life's Experiences' from the Melton Mowbray DMES has a useful tip when using parallels to support work in a machine vice. He puts a light compression spring between them which stops the bars lifting and swarf getting underneath when the vice is opened. This year's annual Whissendine Rally will be held on 5/6 July. Contact Peter Robinson on 01572-821457, or e-mail daphneandpeter@lyddington10.freemove.co.uk for further information.

We have received advance information about the Large Scale Model Rail Exhibition to be held 17/18 April at the Warwickshire Exhibition Centre. Contact Meridienne Exhibitions on 01926-614101, e-mail info@meridienne.co.uk for more information. The exhibition covers gauges 'O' and '1', G scale and 16mm scale railways.

City of Oxford SME is continuing negotiations with the city council concerning the clubhouse and is hoping for completion this year. The society recently had a presentation on 'Meccano Past and Present' by David Mayers in which he showed pictures of various models made with Meccano including the usual planes, trains, clocks, etc., and unusual items like *Big Ben* and the F. A. Cup. David explained that Meccano is still being made in France and Argentina but under the trade name 'Exacto'.

Rugby MES reports a very successful season with a total of

5,353 rides being given. This is second only to 1994 when 5,411 rides were given. Members have put considerable effort into tidying up the site and removing accumulations of scrap; this resulted in a 3.5 tonne skip load being removed. Further work has taken place on ground level track building with about 18 tonnes of excavated soil having been moved to build up the embankment. The Briggs & Stratton engine in the club 2-6-2 locomotive *Rufus* is being replaced with a new electric start Honda unit.

World News

Australia

Steam Locomotive Society of Victoria has acquired a new bandsaw to replace the old power hacksaw in the workshop. Member John Brown won the *Marcus Traylen Trophy* with his Great Northern locomotive. Peter Gray won the *President's Trophy* with his Fowler crane locomotive. The newsletter carries an article on the 'Humphrey Pump', a four-stroke pump in which the explosive force from burning the fuel acts directly on the column of water. Each outward stroke of the pump dumps 6 tonnes of water into the delivery channel.

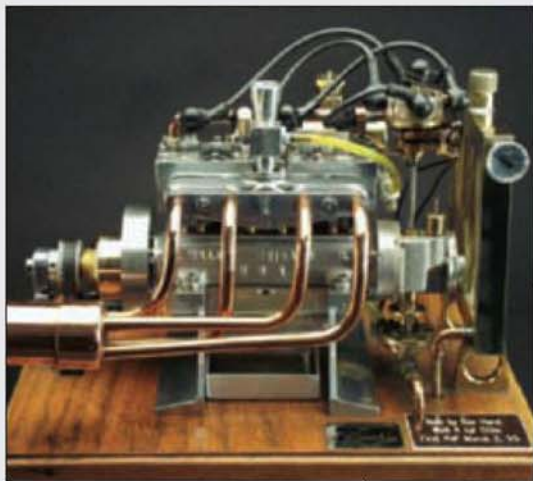
Work carried out at the Maryborough ME & LS site includes some tarmac laying around the steaming bays and the provision of a new water tank after the old one had to be "...relocated to the dump." Member Bill Olds won the *Doug & Mary Kuskie Award* for his DD17 class tank locomotive, *Blue Baby* and Dale Smith was awarded the *Judges' Encouragement Award* for his LNER B1 *Chiru*. Our congratulations to both winners.

South Africa

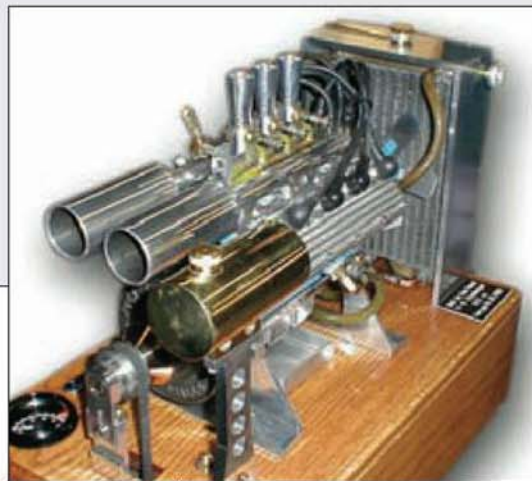
In the Knysna SME newsletter Ron Etter describes some uses of PTFE for valves and seals in locomotive building. Some suggested uses are in check valves, and the use of PTFE tape to form a gasket seal for tank tops. Ron is also reported as turning to Greek mythology for the name of his fourteenth locomotive, a 5in. gauge Shay which is awaiting dismantling, final painting and reassembly. The name? *Hephaestus* god of the fire and forge.

United States

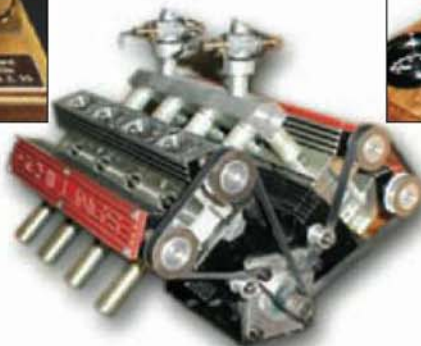
We have a new non-steam contribution from the Bay Area Engine Modellers from California. This group specialises in IC engines of all types and has a



Bay Area Engine Modellers in California, USA, celebrate miniature engines and the home shop machinists who make them. Left: Ken Hurst's Wall In-line 4-cylinder engine and right his Challenger V8. Below: Bob Kradjian's Schillings V8.



website at www.baemclub.com with some interesting pictures and articles. About 100 strong, the group holds regular meetings to "... celebrate miniature engines and the home shop machinists who make them." I have enclosed some



photos from the website and am grateful to secretary Bob Kradjian for permission to use them, and for his help in providing information on an engine I recently obtained, which is what led me to the site in the first place.

CLUB DIARY

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

MARCH

- | | | | |
|-----|---|-------|---|
| 5 | Kinver & West Midlands SME. <i>Dave Reynolds: Tales of The Severn Valley.</i> Contact John Campbell: 01384-891244. | 12 | Chichester DSME. <i>Introductory Evening.</i> Contact Brian Bird: 01243-542266. |
| 5 | Maidstone MES. AGM. Contact Martin Parham: 01622-630298. | 12 | Colchester SMEE. <i>Brian Bourne: Precision Time Keeping in the 20th Century.</i> Contact L. G. Hammond: 01376-511686. |
| 5 | North London SME. <i>John West: Not Just a Hole in the Ground.</i> Contact David Harris: 01707-326518. | 12 | Hereford SME. <i>Meeting.</i> Contact Richard Donovan: 01432-760881. |
| 5 | North Norfolk MEC. <i>Auction.</i> Contact Gordon Ford: 01263-512350. | 12 | Toronto SME. <i>Meeting.</i> Contact Art Gordon: (905) 820-1988. |
| 5 | Rochdale SMEE. <i>Dave Coleman: The Corris Railway.</i> Contact Mike Foster: 01706-360849. | 12-14 | Great Western Soc. (Didcot Railway Centre). <i>Day Out with Thomas.</i> Contact Jeanette Howse: 01235-817200. |
| 5 | Vale of Aylesbury MES. <i>David Strong: Restoring a Steam Powered Boat.</i> Contact Clive Elam: 01296-623433, Ian Meikle: 01844-291590 or Bob Jones: 01296-29468. | 13 | Leighton Buzzard NG Rly. AGM. Enquiries: 01525-373888. |
| 5 | Woking MRS. <i>Pub Games Evening.</i> Contact Ronald Dewar: 01932-343331. | 14 | Bedford MES. <i>Boiler Test Day Rail Locomotives.</i> Contact Ted Jolliffe: 01234-327791. |
| 6 | Birmingham SME. <i>BSME Dinner & Dance.</i> Contact John Walker: 01789-266065. | 14 | Cheshire Live Steamers. <i>Boiler Testing Day.</i> Contact Tricia Sturgeon: 01606-48586. |
| 6 | Cardiff MES. <i>Steam-Up and Family Day.</i> Contact Trevor Jenkins: 029-2075-5568. | 14 | Hornsby ME. <i>Running Day.</i> Contact Ted Gray: 9484-7583. |
| 6 | Worthing DSME. <i>Club Dinner.</i> Contact Bob Phillips: 01903-700642. | 14 | Leeds SMEE. <i>Running Day.</i> Contact Colin Abrey: 01132-649630. |
| 6 | York City & DSME. <i>B. Robinson: A Railwayman's Tale.</i> Contact Pat Martindale: 01262-678291. | 14 | Sutton MEC. <i>Track Day.</i> Contact Mike Dean: 0208-657-5401. |
| 6/7 | Kew Bridge Steam Museum. <i>Meet the Pioneers.</i> 11am-5pm, Adults: £5.20, OAPs and Students: £4.20, Children (5-15 years) £3.00, Family: £15.95. Information: 020-8568-4757. | 15 | Leicester SME. AGM. Contact Raymond Wallis: 01162-858824. |
| 6/7 | Liskeard MS. <i>Annual Exhibition.</i> Contact Peter Field: 01503-240312. | 16 | Basingstoke DMES. <i>Bring & Buy.</i> Contact Ian Shanks: 01420-561741. |
| 7 | Ottawa Valley Live Steamers. <i>Meeting.</i> Contact John Bryant: 761-1109. | 16 | Chesterfield MES. AGM. Contact Mike Rhodes: 01623-648676. |
| 7 | South Durham SME. <i>Steaming Day.</i> Contact B. Owens: 01325-721503. | 16 | Romney Marsh MES. AGM. Contact John Wimble: 01797-362295. |
| 7 | Surrey SME. <i>Members' Steam-Up on Ground Level Track.</i> Contact John Cook: 020-8397-3932. | 16 | South Durham SME. <i>Afternoon Steam-Up.</i> Contact B. Owens: 01325-721503. |
| 7 | Sutton Coldfield MES. <i>Steam-Up.</i> Contact Neal Harrison: 0121-378-3992. | 16 | Surrey SME. <i>Tony Holley: SS Shieldhall.</i> Contact John Cook: 020-8397-3932. |
| 8 | Bedford MES. <i>A. Tait: Arctic Survival.</i> Contact Ted Jolliffe: 01234-327791. | 16 | West Wiltshire SME. <i>Victor Green: Building 'O'-Gauge Locomotives.</i> Contact R. Nev. Boulton: 01380-828101. |
| 8 | Erewash Valley MES. <i>Evening Meeting.</i> Contact Jim Matthews: 01332-705259. | 17 | Bournemouth DSME. <i>Richard Knott: Video Evening.</i> Contact Mike Baker: 01202-383653. |
| 8 | Melton Mowbray DMES. AGM. Contact Phil Tansley: 0116-2673646. | 17 | Bristol SMEE. AGM. Contact Trevor Chambers: 01454-415085. |
| 8 | Saffron Walden DSME. AGM. Contact Jack Setterfield: 01843-596822. | 17 | Chingford DMEC. <i>Acorn Films Programme.</i> Contact Martin Masterson: 0208-989-5552. |
| 9 | Crawley ME. <i>Goffs Park Light Rly. First Aid Lesson.</i> Contact Allan Sinclair: 01293-888203. | 17 | Guildford MES. <i>Bits & Pieces.</i> Contact Dave Longhurst: 01428-605424. |
| 9 | Dockland & E. London MES. <i>Prize Quiz Night.</i> Contact P. M. Jonas: 01708-228510. | 17 | Hornsby ME. <i>Board Meeting.</i> Contact Ted Gray: 9484-7583. |
| 9 | Historical MRS (North West Area). <i>Dave Skipsey: Colour Light Signalling.</i> Contact David Goodwin: 01224-880018. | 17 | Leeds SMEE. <i>Geoff Bird: Memories of York Shed.</i> Contact Colin Abrey: 01132-649630. |
| 9 | Northampton SME. <i>Auction of Materials, Models and Tools.</i> Contact Pete Jarman: 01234-708501 (eve). | 17 | MELSA. <i>Club Meeting.</i> Contact Graham Chadbone: 07-4121-4341. |
| 9 | Surrey SME. <i>Bits & Pieces.</i> Contact John Cook: 020-8397-3932. | 17 | Staines SME. AGM. Contact Stan Bishop: 01784-241891. |
| 9 | Sutton Coldfield MES. <i>Geoff Nicholson: President's Evening.</i> Contact Neal Harrison: 0121-378-3992. | 18 | Cambridge MES. AGM. Contact Rex Mountfield: 01284-386128. |
| 10 | Norwich DSME. <i>Meeting.</i> Contact Paul Reed: 01603-462925. | 18 | Cardiff MES. <i>Brian Davies: Even more on the Winding Engines.</i> Contact Trevor Jenkins: 029-2075-5568. |
| 11 | Chingford DMEC. <i>Ron Manning: 'Merlin Ambrosius'.</i> Contact Martin Masterson: 0208-989-5552. | 18 | East Somerset SMEE. <i>Richard Elam: Social History of our Time.</i> Contact Roger Davis: 01749-677195. |
| 11 | Harlington LS. <i>Members' Auction.</i> Contact Peter Tarrant: 01895-851168. | 18 | Leyland SME. <i>Backhead Evening.</i> Contact Mark Entwistle: 01772-422411. |
| 11 | High Wycombe MEC. <i>D. R. Goddard: Hydraulic Systems and Models.</i> Contact David Savage: 01494-527402. | 18 | Rugby MES. AGM. Contact David Eadon: 01788-576956. |
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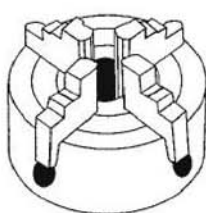
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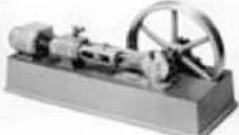
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COLCHESTER BANTAM 2000, 6 1/2" centre height x 30" between centres + gap bed, 1 1/2" bore, 16 speeds, D13 camlock fitting, 3 and 4 jaw chucks.....	In very nice condition	£3450
COLCHESTER BANTAM 2000 as above but latest model made.....		£3750
COLCHESTER STUDENT Square head, 1500 revs / 2 speed motor model, geared head, gearbox, imperial / metric, power cross feed and gap bed, dual dials, 3 Jaw chuck, taper turning, coolant, etc.....		£2950
COLCHESTER MASTER 6 1/2" x 36", gap bed, gearbox, power feeds, coolant.....	nice	£1750
COLCHESTER MASTER SQUARE HEAD 6 1/2" x 36" precision lathe, gearbox, power feeds, chucks, dickson tool post in nice condition.....		£2250
COLCHESTER MASTER 2500; short and long bed lathes well equipped.....		£2950
COLCHESTER TRIUMPH 6 1/2" x 25", 3 jaw chuck, Dickson tool post, very nice ex. college Each.....		£3950
HARRISON L5, 4 1/2" x 24", fully toolled, complete with clutch.....	one of the best start up deals	£950
HARRISON 140, 5 1/2" x 24", geared head, semi gearbox, 3 jaw chuck, gap bed, power feeds, clutch.....		£1400
HARRISON 140, 5 1/2" x 24", geared head, semi-gearbox, gap bed, power feeds, tooling, coolant, 240 volts from new.....		£1750
HARRISON 140, 5 1/2" x 24", geared head, gearbox, gap bed, power feeds, tooling, coolant.....		£1725
HARRISON M250, 5" x 20", gearbox, power feeds, 3 & 4 chucks, Ex-services.....	nice condition	£2950
HARRISON M250, 5" x 20", gearbox, power feeds, 3 and 4 chucks, nice condition and 240 volts from new.....		£3250
HARRISON M250, 5" x 30", long bed, gearbox, power feeds, chucks. Acutite III DRO on cross-slide, dual dials.....	In very nice condition	£3250
HARRISON M300 6" x 24" precision lathe, geared head, gearbox, power feeds, 3 jaw & 4 jaw chucks.....	Choice	£3250
HARRISON M300 6" x 24" precision lathe, geared head, gearbox, power feeds, 3 jaw chuck, Dickson toolpost. This machine is 240 volts as new and in very good all round condition.....		£3550
HARRISON M300 6" x 40", geared head, gearbox, power feeds, gap bed, 3 jaw & 4 jaw chucks, fixed steady.....	In very nice condition	£3,750
HOBBYMAT MD65 2 1/2" x 12" screwcutting lathe with changewheels and some tooling as new.....		£395
MYFORD ML7 3 1/2" x 19" lathe, 3 jaw chuck we have a large selection of this popular model.....		£750
MYFORD ML7B 3 1/2" x 19" gearbox, 3 jaw chuck and tooling.....		£1250
MYFORD SUPER 7 3 1/2" x 19" changewheels, 3 jaw chuck and tooling.....	Choice	£950 - £1150
MYFORD SUPER 7, 3 1/2" x 19" 3 jaw chuck, power cross-feed.....	Late model Choice	
MYFORD SUPER 7 3 1/2" x 31" changewheels, 3 jaw chuck and tooling.....	Choice	£1400
MYFORD SUPER 7B 3 1/2" x 19" gearbox, 3 jaw chuck and tooling.....		£1650
MYFORD SUPER 7B 3 1/2" x 19" gearbox, Power Cross Feed, cabinet stand, tooling.....		£2750
MYFORD SUPER 7B 3 1/2" x 31" gearbox, Power Cross Feed, 3 jaw chuck and tooling on industrial stand, excellent condition from new and NOT re-conditioned.....		£550
MYFORD C7 CAPSTAN LATHE.....		£1200
SMART AND BROWN collet lathe complete with cross / top slides and collets.....		£345
VICEROY TDS 1 GBL 5" x 24", gearbox, power slides, 3MT tailstock complete with fixed steady.....		£1250

TOO MANY LATHES TO LIST!!

MILLING MACHINES V - VERTICAL, H - HORIZONTAL

ACIERA F3 universal milling machine complete with collets 1/2" - 3/4" & 2mm - 20mm, suds and light in all round good condition.....		£3250
BOXFORD VM30 vertical variable speed / 30 INT head, table 21 1/2" x 6" + Abwood vice and chuck.....		£1500
BRIDGEPORT vertical belt head 2 speed (short motor) head, R8 powered head, gearbox table, 42" x 9" table.....	needing work	£750
CENTEC 2A Vertical-Horizontal, swivel 2MT head, 16" x 4 1/2" table, pedestal model.....		£1200
CENTEC 2B Horizontal, 1" arbor, table powered, 3 ph motor, single phase main motor.....		£725
CENTEC 2B Vertical-Horizontal, quill 2MT head, 25" x 5" table, pedestal model.....		£1400
ELLIOT MINIBORER (Jig borer) collet fixture head with good selection of collets.....		£1200
ELLIOT '00' OMNIMILL V/H 3 Morse taper quill universal head, 28" x 7 1/2" powered table.....		£1250
HARRISON Vertical 30 INT swivel head & clutch, 30" x 8" table / powered.....		£1650
HARRISON horizontal, 31" x 8" powered table.....	still good value	£625
HARRISON H/V 30 INT swivel head & clutch, 30" x 8" table/powered.....		£1650
MARLOW VERTICAL TURRET MILL, 3MT, 28 x 7" ..a favorite mill for its height under the head.....		£950
MYFORD VME turret type milling machine in nice condition complete with R8 collet chuck.....		£2400
SIP RF30, vertical milling/drilling machine complete with accessories.....	Still only and New	£799
TOM SENIOR M1 horizontal, 25" x 6" powered table, 1" arbor.....		£575
TOM SENIOR M1 V/H, 25" x 6" VMT, 1" arbor.....	Selection	£1200 - £1750
TOM SENIOR ELT MAJOR, 2MT quill feed head, powered 37" x 8 1/2" table in.....		£2,750
VICEROY AEW vertical mill, 30 INT swivel head, powered table 34"x 8",.....	choice	£1250 - £1625

DRILLS

ARBOGA ER 25 / 25", 3MT Radial drill speeds (8) 100-2900 RPM.....	clean table	£1425
ASQUITH 14-54 001 Mk2 (5mt) radial drill.....		£3950
BOXFORD 2MT pedestal drill.....		£295
BOXFORD 2MT pedestal drill, very late machine.....		£425
FOBCO 1/2" bench, tilting table.....		£325
FOBCO 1/2" pedestal drill tilting table.....		£345
MEDDINGS 1/2" pedestal drill.....		£245
MEDDINGS 2MT pedestal drills.....		£275
POLLARD CORONA pedestal 1 1/2" TMT.....	From	£100
SIP HDP 600B 1/2" / 2MT bench drill, table operated by rack, speeds: (16) 162 - 3000 rpm New.....		£175
STARTRITE MERCURY 1/2" 4 speed bench drill.....		£225

GRINDING / BUFFING

CLARKSON MK1 Tool and cutter grinder complete with universal head and centres.....	Just in	£550
EAGLE 4W wet surface grinder + magnetic chuck.....		£725
HERBERT drill grinder + followers.....	as is	£245
HERBERT tool and cutter grinder.....	as is	£425
JONES & SHIPMAN SURFACE GRINDER complete with 18" x 6" magnetic chuck, Optidress overhead wheel dresser and coolant.....	please ring first to view this machine	£2750
MILFORD 12" Pedestal Grinder.....		£325
VICEROY Grinder, pedestal model.....		£145
VICEROY Buffers, pedestal models.....	each	£250
VICTOR EAGLE surface grinder, 21" x 6", complete with + 14" x 6" magnetic chuck, dust extractor & coolant.....		£1250

MISCELLANEOUS / FABRICATION MACHINERY

JUST IN: Boxford dividing head and column suit 4 1/2" and 5" lathe complete with three dividing plates.....		£845
Myford dividing head (boxed) suit ML10, ML7, Super 7 lathes.....		£450
JUN-AIR 18-50 compressor 120psi / 50 litre tank.....		£425
HPC TWO twin large compressor.....		£675
GABRO 24" box and pan folder.....		£325
BATY digital vernier 6" with metric / imperial, origin and absolute buttons.....	new	£35
EDWARDS 39 1/2" x 16g treadle guillotine with all its stops in very nice order.....		£625
ALCOSA hearth.....	Just in	£245
WELLSAW 4" hacksaw.....		£325
RJH horizontal 4" finisher complete with built in dust extractor.....		£625
RJH vertical 4" finisher complete with built in dust extractor.....	very nice machine	£750
BOXFORD 8" SHAPER, powered table + vice in nice condition.....	very clean	£425
OMT Optical Measuring Tools universal boring head, 40 INT, boxed + tooling.....		£345
TRANSWAVE 12.5hp / 9.6kw static converter as new.....		£550
CLARKE strip heater, 110 amps in very good order.....		£75
MITUTOYO 7-8", 9-10", 10-11", 11-12" micrometers just in.....	each just	£45
ABWOOD SWIVEL/TILT 4" vice in all round good condition.....		£245
ABWOOD SWIVEL/TILT 6" vice in all round good condition.....		£375
CLARKSON RADIUS MK1 radius grinding attachment in nice condition.....	boxed	£345
NEW FROM NEW ZEALAND:- Machine vice, 55mm. Jaws precision miniature type ideal for vertical slides and smaller milling machines such as BCA now with the swivel base.....		£134
.....vice on own		£85
.....Swivel base on own		£49
CROMPTON PARKINSON 1/4 HP, resilient mount, Boxford / Myford Super 7 Type motor.....	new	£140
MYFORD RODNEY HEAD MILLING HEAD for the Myford ML10.....		£550
MYFORD CAPSTAN attachment (large bed type).....		£550
HOFFMAN DIVIDING HEAD complete with tail stock.....		£425
ARCHER tapping heads.....	from	£70
HARE MODEL 51T complete with hydraulic indexable table.....	just	£425
MARLCO notch broaching + notch broach.....		£425
MYFORD vertical slides.....	just in	£140 / £245
BCA 12" horizontal / vertical rotary table.....	very nice	£425
QUANTITY of slips, height gauges, squares, straight edges, micrometers, cubes, angle plates and miscellaneous measuring tools.....		
COPE AND DRAGS / BLACKSMITH'S FRAMES.....	wood	£20 / metal
TONGS (a varied selection).....	each	£5
FLAMEFAST DS 130 ceramic chip forge.....		£345
FLAMEFAST DS 100 hearth.....		£140
JONES AND SHIPMAN 4" x 24" bench centres.....	very nice example	£245
TOM SENIOR slotting head.....		£450
RJH BT 125 Fretsaw, variable speed.....		£345
SMART AND BROWN / CLARKSON H3-H5 toggle presses.....	each	£195 / £275
VERDICT CLOCKS, Long/Short Metric and Imperial models.....	new	£40
FLAMEFAST LD300 soldering iron stove.....		£75
GRANITE 18" x 12" Surface Plate.....		£140
VIBROSHEAR Nibbler.....	just in	£425
SIP 7" bandsaw, horizontal & coolant.....	new	£750
DUPLEX D29 toolpost grinder.....		£345
BOXFORD (imperial only) thread dial indicator.....		£65
BURNERD, D14 lever collet chuck + collets.....		£400
BURNERD, L0 lever collet chuck + collets.....		£400
VERTEX Dividing head.....	New	£245
VERTEX 6" - 8" - 10" rotary tables.....	good value equipment new	from £135
MYFORD ML7 / Super 7 rear tool post.....		£400
MYFORD 254" rear tool post.....	new	£40
LOCKWOOD quad headed 2MT Die Holder.....	quality equipment new	£40
LOCKWOOD quad headed 3 MT die holder.....	quality equipment new	£40
STARTRITE 352 woodworking band saw.....		£975
STARTRITE 14-S-5 woodworking band saw.....		£775
ALCOSA GF 080/1 Rapid Melting Furnace.....		£300
COLCHESTER D13 Burnerd 4 Jaw 8" light body independent chuck.....	one off	£245
AJAX 6" hacksaw.....		£425
STEEL STOCK different stock rolling in almost daily.....	to callers only	
ELLIOT U1 / U2 Slotting Head.....		£475
SWAGE BLOCKS.....		£125 / £145
J & S Universal grinding vice.....	choice	£275 / £325
HORIZONTAL METAL BANDSAW 8" x 4 1/2" capacity.....	new	£170
COLCHESTER STUDENT / MASTER Round head, face-plates, small / large.....		£50 / £80
QUALTERS AND SMITH 6" Hacksaw.....		£345
TRANSWAVE 3HP Converter.....	new	£305
TRANSWAVE 5.5HP Converter.....	new	£400
TRANSWAVE MT & RT rotary converters.....	from	£400
CROMPTON PARKINSON 1/4 HP, resilient mount, Boxford / Myford Super 7 Type motor.....	new	£140
CROMPTON PARKINSON SINGLE PHASE start / stop switch model DL1 2000 series (4.5-7.5amps).....	new	£69
DEWHURST reversing switch.....	the original from Dewhurst!	NEW £126.50



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DISTANCE NO PROBLEM!! DEFINITELY WORTH A VISIT ALL PRICES EXCLUSIVE OF V.A.T.

- 2-Axis DRO from **£615** Inc vat
- Made in the UK
- 5 year No-Fault Warranty
- 10 micron Accuracy



£275

Cobra Lathe

- Centre height: 70mm • Distance Between Centres: 250mm
- Speed Range: 100-200rpm • Metric or Imperial Leadscrews
- Variable Speed Control



Cobra Mill

£299

Special Deal
includes 4 metric
& 4 imperial
Collets

- Variable Speed Control
- Spindle Taper: MT2
- Table Size: 145 x 240mm
- Metric or Imperial Leadscrews



DB8 Lathe

£699



- Centre Height: 105mm • Distance Between Centres: 400mm • Complete with 3 & 4 Jaw Chucks, Fixed & Travelling Steadies & Face Plate
- Hardened & Ground Bedways • Accuracy Report

DB10G Lathe

£850



- Centre Height: 125mm • Distance Between Centres: 550mm • Thread Cutting Gearbox • Complete with 3 & 4 Jaw Chucks, Fixed & Travelling Steadies & Face Plate • Vee Bedway • Accuracy Report

Model B Super

£670



- Maximum Swing: 420mm
- Distance Between Centres: 520mm
- Cast Iron Construction
- Metric or Imperial
- All Tapers MT3
- Supplied with 3-Jaw Chuck, Drill Chuck & Arbor and more!

£1100 Centurion



- Distance Between Centres: 520mm
- Centre Height: 210mm • Spindle Bore: 28mm
- Powered Crossfeed • Separate Motor for Lathe/Mill
- Complete with 5" 3-Jaw Chuck, Lathe Tools, Change Gear and more!

Conquest Lathe

Complete with a USA
Built PCB

£380



- Centre Height: 90mm
- Distance Between Centres: 325mm
- Large MT3 Spindle Taper
- Spindle Bore: 19mm
- Now C/W Quick Change Toolpost
- Variable Speed Range 100-2500rpm
- Metric or Imperial Leadscrews

626 Turret Mill

£1299

Now Supplied
with a 100mm
Machine Vice

- Table Size: 156 x 745mm
- 1.5HP Motor
- MT3 or R8 Spindle
- Metric or Imperial graduations



Champion Mill/Drill

£585



- 1/2HP Motor
- Table Size: 150 x 630mm
- Complete with Drill Chuck & Arbor
- Ground Cast Iron Column
- MT3 Spindle

Craftsman Lathe

£1499



- Centre Height: 150mm
- Distance Between Centres: 570mm
- Swing in Gap: 450mm
- Powered Crossfeed • Spindle Bore: 36mm
- Complete with 3 & 4 Jaw Chucks, Fixed & Travelling Steadies, Face Plate, Machine Stand, Accuracy Report & much more!