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MAKING BOILERS

TOP CLUB

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MODEL ENGINEER

SIEG MILL

MAKING BOILERS

TOP CLUB

ENGINES AND WAGONS GALORE AT THE GILLING RALLIES

On the cover ...

In this issue we take a look at the club
stands at the Model Engineer Exhibition
at Sandown Park. The clubs area in the
bright and airy rooms overlooking the
racetrack contained examples of model
engineering in its infinite variety. On the
cover we feature the great display
arranged by the Southern Meccano
Group which was hugely enjoyed by
thousands of visitors. It won the best club
stand award, mainly thanks to its
interaction with visitors, especially
children who were shown how the models
worked.

(Photograph by Neil Read)

TANGYES ENGINES

David Piddington describes more of the
fascinating products of the famous
Tangyes of Birmingham from its Victorian
heyday.

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on some readers' letters.

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Laying Out for Boiler Makers and Plate Fabricators

1944 • DAVIES • £34.45

Fifth, and last edition of this monumental book, an earlier edition of which was reprinted a few years back. This really is a very detailed book on laying out sheet metal to be formed into different shapes - 'encyclopaedia' is the word that comes to mind. Most of it is concerned with laying out for boilers of various types, and especially the locomotive type, but laying out for a host of other items is also included. Where this edition differs from earlier ones is that this has a long chapter on locomotive boiler construction, one on laying out and computing boiler patches, and one on laying out for welded construction. Whilst I have no doubt parts will fall foul of current boiler regulations, equally I have no doubt that you are unlikely to find a better book on laying out for, and building, full-size steam boilers. And even if you are building a boiler for a 5" gauge Flying Scotsman, rather than for the real thing, there is much of use here. 522 pages. 762 illustrations, mostly drawings, but some photographs. Hardbound.

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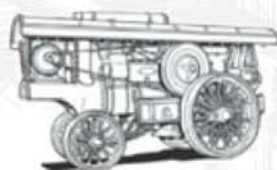


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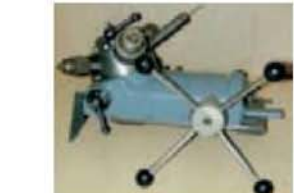
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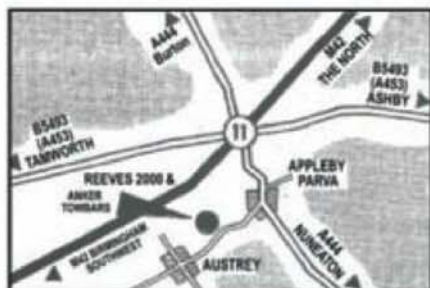
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SMOKE RINGS

With the Editors

Curly Bowl goes north

This year, the always enjoyable LBSC Memorial Trophy, better known as the Curly Bowl heads north. The City of Sunderland Model Engineering Society has kindly agreed to host the event this year.

Put the date in your diary, Sunday September 3, at the club's Roker Park track. Do please enter your Curly locomotive – call club secretary Albert Stephenson on 01429 299649 for details.

In addition to the usual prizes for those whose engines most capture the Curly spirit, there will be an additional award for all entrants. This year is also Sunderland's 75th anniversary, and to mark the occasion each member will receive a pair of specially engraved whisky glasses in a presentation box. Curly Bowl entrants will also receive them.

We look forward to seeing plenty of locomotives there in September.

Tools galore

For tools and equipment take a look at Machine Mart's bumper new Spring / Summer catalogue. With 364 pages full of products at good prices, this catalogue probably represents Britain's leading purveyor of power tools, hand tools, metalworking and woodworking equipment, construction, garage and workshop tools and more.

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Birmingham is back

Some organisational problems scuppered Birmingham's locomotive rally last year. However, it is back again in 2006 and will take place at the Birmingham Society's Illshaw Heath track on September 9 and 10.

This is one of the most popular events of the year with around 60 locomotives taking part, plus night running on the Saturday, and a barbecue. Campers and caravanners are welcome.

Contact the organiser, John Walker, on 01789 266 065.

Stockport's triple whammy

Things always tend to come in threes they say, and this is certainly the case for the Stockport and District Society of Model Engineers. This year is their Diamond Jubilee, and as part of this celebration they are holding an exhibition at the Woodford Memorial Hall near Stockport over the August Bank Holiday weekend.

As part of this they would like to hear from any past members or people with models that originated at the club, as they are trying to create a display of the Society's history.

The third item is not such good news. After more than 30 happy years residing in the grounds of the Royal School for the Deaf, they have to



Above: Harrow & Wembley carriage

Left: Wimborne & District carriage

Anniversary coaches

Eric Basire writes to tell us about two model engineering societies he is associated with, both of which have just celebrated anniversaries. Wimborne & District SME celebrated 30 years last year, and Harrow & Wembley no less that 70 years in 2006.

A special anniversary coach was produced for the Wimborne celebration. Harrow will do the same.

The Wimborne carriage created a lot of interest. Eric reports: "Everyone wanted to ride on it, pull it around and take pictures."

Sounds a great idea, doesn't it? If your club has an anniversary or celebration coming up, why not get the most artistic member to produce something special?

vacate the site and go through the trauma of finding a new home. Looks like 2006 will be a memorable year for the club.

Indy awards

The Independent, Bosch, and The Royal Academy of Engineering are launching the new Technology Horizons Award, which offers 14- to 24-year-old students the opportunity to have their work printed in *The Independent* - and win cash prizes up to £750.

To launch the award, the sponsors are highlighting the influence of Isambard Kingdom

Brunel. Celebrating the 200th anniversary of his birth this year, the Technology Horizons Award looks back at the many lasting feats of engineering Brunel created, from bridges to railway lines to docks. These achievements did not only make significant advancements in their day, they have also left a huge legacy, and they continue to ignite the passion and creativity of engineers.

To find out more, and to enter the competition, please refer to news.independent.co.uk/world/science_technology/article349789.eec.

CHUCK, the MUDDLE ENGINEER

by B. TERRY ASPIN



POST BAG

Small lathes

SIRS, - I am almost nearing the end of my first subscription to *Model Engineer* and am definitely going to continue. In the time I have been reading the magazine, I have only seen information, photographs and advertisements for lathes such as Myford, Colchester etc. As I own a Taig (Peatol) lathe I am curious as to why there is no mention of lathes such as these. Would it be possible to include some features on them?

D. M. Ricketts, West Sussex.

ED: Any volunteers?

Rural welding class

SIRS, - In the small (3,000 population) New South Wales country town in which we lived for 21 years, we had a secondary school, and in the later years a small College of Tech and Further Education, always known as TAFE. However, the real Tech stuff visited town every year or was it two? It came by rail.

Our railway had once been busy. It terminated about 12 miles North at the Queensland border, where once travellers between Sydney and Brisbane changed trains between the Queensland Narrow gauge, and the NSW Standard. After the coastal standard gauge was completed between the two State capitals, the line became virtually goods only, with a couple of daylight passenger trains a week. They came up from Sydney on one day, and returned the next. The night mail with a sleeper disappeared during our time and the last 120 miles of the 'daylight' was done by bus. The bus was rather quicker than the train at climbing the Dividing range, and it did not have to wind in and out along the crest as did the train.

The TAFE welding classrooms arrived by rail, and were parked in a siding. There were two old passenger coaches - leftovers from the age of steam. One provided a classroom and storeroom. The other had at one end what made one think of an observation car with lots of windows. There was a circular table and we would all sit round it while our instructor demonstrated the latest trick to be mastered.

The rest of the coach was taken up by six oxy-acetylene welding stations, and six electric arc welding stations ('stick' welding). That is why the class was limited to 12 students. The daytime classes were occupied by earnest

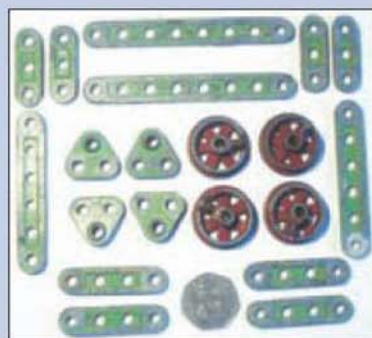
Construction kit

SIRS, - I recently unearthed from the "It will come in useful sometime" box some pieces of a construction kit that I had as a boy in the late 1940s or early 50s.

The photo shows the only bits that have survived. As I remember there were also at least two flanged red steel plates with holes along the edges, some angle pieces, black steel axles and I think some Plasticine-type substance.

The pieces illustrated appear to be diecast from a quite heavy 'monkey' metal I would be most pleased if any of your readers could let me know what the construction kit was called and when it dated from. I had a box of Meccano but the two construction kits were not compatible as the holes were at different pitches.

Ian D. Rose, Derbyshire.



youngsters looking for a lifetime occupation.

The once-a-week night-time class, Farm Welding, had a rather older group attending. In my 60s I was the oldest. We took our evening meal with us, and ate it in the break between swapping from electric to gas or vice versa.

Out on the platform there was a cage made from piping, which supported a tall chain-link fence. The local electricity outfit parked a suitable transformer there, and connected it up, while a batch of tall gas cylinders supplied the oxy-acetylene stations. It was, you might say, well organised.

I recall one of the two instructors remarking, "I thought you said you hadn't done any welding", as I was brazing a bit of 'homework', and I said that I had learned to braze from a 1930s Odhams book entitled *The Home Workshop*, using a kerosene blowlamp, and that the oxy-acetylene torch made it a piece of cake. He asked what a kerosene blowlamp was. I do not know whether he was pulling my leg or whether he was 'dinkum'. (Incidentally, the paraffin hydrocarbon series includes a raft of substances from methane through propane and butane, octanes Iso and Nor, medicinal paraffin, to petroleum jelly (Vaseline) and candle-wax, and the only place I have known to call the smelly liquid one puts in hurricane lamps etc., paraffin, is my native Britain).

As everyone knew everyone else, the class had a pleasant social atmosphere, particularly at dinner break. In my own case, I realised that unless I was using electric welding day in day out, I would not be able to produce work that I would approve. Gas welding, however, was right up my street, and its versatility 'just the ticket'. If some really hefty welds were required I could tack the bits together, and have a professional supply the strong stuff much more cheaply than by gas. (Cylinder rental doesn't come cheaply). Having learnt safely to cope with the gadgetry, I later taught myself to

silver 'braze' stainless steel, and to 'braze'-weld Aluminium, both useful in my voluntary work with Technical Aid to the Disabled.

Derek Cooke, Australia.

Lost in Wootton Bassett

SIRS, - Would Michael of Wootton Bassett, who recently bought *M.E.s* and bookbinding gear from me, please get in touch - I forgot to give him something he will need, and I have no note of his name and address. My telephone number is 01453-766009.

Roger Plenty, by e-mail.

Workshop flooring

SIRS, - This is no more than a side light on the subject as it relates mainly to the floor in my woodwork shop. The concrete floor was fairly rough and uneven and, after damp proofing, I decided to cover it with a layer of 25mm polystyrene sheet topped with 18mm flooring grade chipboard. This has generally resulted in a suitable firm level surface but for a recent project involving heavy hand planing I put down interlocking rubber matting tiles of the kind sold by Axminster Power Tool Centre as 'anti-fatigue' which solved the slipping problem and is surprisingly easy to sweep.

I have a solid floor with polyvinyl tiles in the other workshop. This is fine for sweeping but can anyone suggest a broom which doesn't retain swarf? I always end up picking this out by hand standing over the waste bin.

George Winspur, by e-mail.

Good service award

SIRS, - All too often we read letters complaining about poor customer service, so I just had to write and thank JML for the speed with which they dealt with my complaint.

At the London Model Engineering Exhibition at Alexandra Palace on Saturday 21 January, I was so impressed by the sales pitch of the JML representative that I bought one of their Vice Masters.

Two evenings later, when I unpacked it, I found that one of the pieces was damaged, broken in fact.

The next morning I telephoned JML who said that someone would phone me back, how many times have we heard this? But next day, the phone rang and it was JML asking what the problem was. I explained which piece was damaged and they promised to get a replacement part in the post immediately (heard that before too).

At 9.00am the next day, the postman was knocking on the door with a package from JML. Congratulations JML, that is what I call Customer Service, with capital letters.

Keith Barltrop, Hertfordshire.

Cup washers

SIRS, - I am most grateful for John Chappell's description of leather cup washer manufacture in your feature *Workshop Wrinkles* (*M.E.* 4262, 9 December 2005).

With his guidance I have successfully made a leather cup washer for a mains water-powered hydraulic ram, now in use for lifting diving cylinders filled with water into a test tank.

The ram's cylinder uses a 44in. length of 54mm (O/D) copper water pipe. When trimming the leather to a bevelled edge I discovered that grinding points failed to cut the leather (I tried three different grades) but that John's alternative recommendation, a Dremel sanding drum, was ideal, being more open grained.

I had been offered the same sized leather cup washer for £52.80 plus delivery (minimum order of two @ £26.40 each) which is not unreasonable considering that a mould has to be machined first, due to the non-standard size.

A commercial rubber cup washer designed for a 2in. bore had proved fractionally too small to maintain a seal in the larger pipe, but a commercial 3/8 x 3/4 x 3/16 nitrile rubber U-ring seal (£5.95) has proved faultless as a piston rod seal.

Ian Moignard, by e-mail.

Wellingtons

SIRS, - At the grave risk of being branded a right old Victor Meldrew and prolonging the

Wellington correspondence way past its decent limit, there are certain items in Mr. Cannell's letter (*M.E.* 4266, 3 February 2006) that cannot go unchallenged!

The suggestion that the Wellington would cruise happily at 36,000ft. would have been truly wonderful news to the crews back in 1941, when the service ceiling (this is when the max. rate of climb drops below 400ft./min) is quoted as 19,000ft. for the Hercules-powered Mk. III. The normal oxygen height for aircrew was 10,000ft., not 20,000, unless you had a hangover, in which case it was as soon as you strapped in the aircraft!

The high-altitude versions of the Wellington were the Mk. V (Bristol *Hercules VIII*) and the Mk. VI (Rolls-Royce *Merlin 60 R6SM*). These aircraft had a pressure cabin, and the Mk. VI had a ceiling of 38,500 feet. Some 63 went into service, but by 1941 fighters were flying too high to make the exercise worthwhile and a small number finished their days as Gee radar trainers.

They were never known as Warwicks by the way; the Warwick was an all-new aircraft similar in appearance to the Wellington but bigger and heavier by 16,500lb, at 45,000lb and powered by two Pratt & Whitney Double *Wasps* of 1,850hp each.

Down at Westlands, the Whirlwind was never powered by the Rolls-Royce *Goshawk*, but by another *Kestrel* variant, the *Peregrine*. This aircraft, our first twin-engined single-seat fighter, was a gem of an aircraft so compact that the reason there was no *Merlin* version is quite simply that there was no room! Hence the *Peregrine*, where the whole of the back-end of the engine was re-arranged. It was given a down-draught carburettor in order to reduce its height over the standard *Kestrel*. In spite of its limited power (with *Peregrines* it had only 885hp a side) at its all-up weight of 11,388lb (including 1000lb bomb-load) it would still slip along at 360mph. It was a much under-rated aircraft, but at this stage of the war no one wanted to be bothered with *Peregrines* (the Whirlwind was the only aircraft to use them) and it became obsolete well before the end of the war.

Incidentally, the chap who taught me to fly back in the 1960s had the unenviable experience of witnessing the demise of two of 137 Squadron's Whirlwinds when they collided in mid-air over their home station of Charny Down, neither pilot surviving.

We did eventually have a single-seat twin-*Merlin* fighter that would outpace virtually any other piston fighter in the sky, and that was the beautiful De Havilland *Hornet*. Sadly it did not fly until July 1944, eventually entering service in 1946.

For Westlands, their next project was perhaps as close as you'll get to a *Merlin Whirlwind*! This was the *Welkin*, a sort of Whirly on steroids, intended to combat possible stratospheric raids by the *Luftwaffe* which would have been beyond the ceiling of existing fighters. It had a span of 70ft. and was powered by 1,650hp 70-series *Merlins*. A total of 67 were built, but in spite of the service ceiling of early prototypes being quoted as 44,000ft. it was never to be used operationally.

Many years ago I had the privilege to meet the man who test-flew most of Westland's aircraft around this time, including the *Welkin*. It was a terrific thrill, he was a wonderful gentleman, Harold Penrose by name, and I have no hesitation in recommending to you any of his books on flying. Believe me, the way he wrote you were up there in the cockpit with him!

As Mr. Cannell says, the Wellington was of geodetic construction, something I have always considered a mixed blessing from the production viewpoint when compared with a conventional monocoque. All I can say is that Wallis must have been much more persuasive in his dealings with the Vickers Board than the character portrayed by Michael Redgrave in *The Dam Busters* film!

My favourite Wellington tale concerns one particular aircraft that was used for towing trials with a heavy military glider. After a while the pilot reported certain oddities with the elevator and rudder controls, and investigation back in the hangar revealed, believe it or not, that the fuselage had actually stretched! At this the pilot is said to have observed, "Ah, so that was it. I wondered why the tail-gunner's voice was getting faint..."

Martin Bourne, Cheshire.

Spirit levels

SIRS, - In *M.E.* 4266, 3 February 2006 Geoff Berriman asks "How are spirit level 'phials' made?"

I expect that you have received many replies, but this is how they were made about 40 years ago. At that time I was an instrument apprentice with Hilger & Watts Ltd, who made surveying and metrology instruments in some quantity, most



Sleeve valve engines

SIRS, - I read with interest the letter from Peter J. King re. sleeve valve engines. I have a circa 1920's Barr & Stroud single-cylinder sleeve valve engine not the motorcycle unit but the WB stationary unit close coupled to a 100volt alternator.

I have the problem of high oil consumption and smoky (very) exhaust. I am trying to find any information on this unit and would welcome any information no matter how small.

M. Hodgson, by e-mail.

of which had at least one bubble (as they were known).

The starting point was bought-in glass tube of a suitable size cut into lengths; the inside surface was ground into a very shallow barrel shape as follows:

The tube was threaded onto a slightly smaller diameter metal (mild steel I think) bar which was then held and curved, by applying a suitable force, in a machine that also had a device to hold the glass tube.

This machine was arranged to work the tube to and fro along the bar, at the same time rotating the tube, while abrasive compound was applied to the bar (with water as a lubricant);

After a suitable time had elapsed, the tube was removed, cleaned and one end sealed completely by heating and fusing it, while the other end was almost completely closed in the same way;

The tubes were then placed in a container of liquid ether, which was sealed and a vacuum applied to draw out the air and fill the tubes with ether.

Enough ether was then shaken out to leave a bubble of the desired size and the end of the tube sealed by heating it (yes, ether is volatile and flammable, but it was done).

The outside of the tube was coated with an acid resist and the calibration marks, lettering etc

incised through that layer, then the tubes were acid-etched so that after cleaning off the resist the markings could be filled with a dark material (a sort of paint).

Not all bubbles were so marked – some instruments used an optical system to look at both ends of the bubble and present them in the eyepiece field of view so that when the images coincided level was achieved.

As an aside, if you were careless enough to break a bubble you were sent to the bubble shop to obtain a replacement; that shop was run by a lady with a formidable reputation.

Best wishes for the future under your new owners,

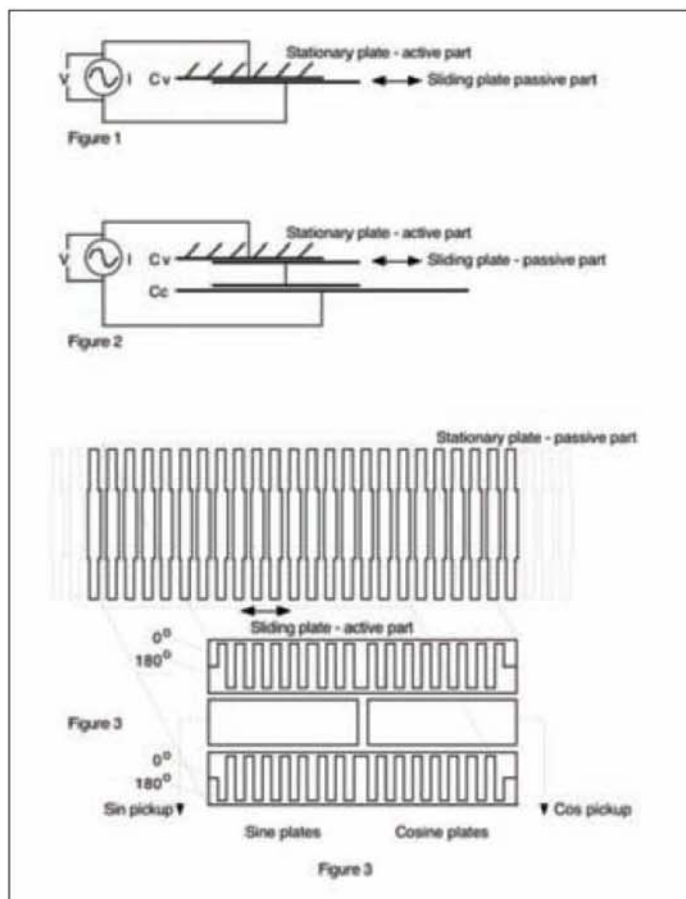
Ian Strugnell, Essex.

Digital callipers

SIRS, - With reference to the letter from Mr. Miller (*M.E.* 4263, 23 December 2005) concerning the mode of operation of Digital Callipers, I can recommend the book *Capacitive Sensors, Design and Applications* by Larry K. Baxter, published by the IEEE Press in 1997, ISBN: 0-7803-5351-X. The whole of chapter 18 (pp 243-249) is given over to a detailed explanation of the operation of the Starrett model 723.

A brief summary follows, skimming over the electronic details which are beyond my ken.

The basic transducer is a variable



capacitor. First, imagine one plate of the capacitor being attached to the sliding part of the calliper, and the other attached to the stationary part. If they are arranged in such a way that when the sliding part moves the area of overlap between the plates changes, then the capacitance will change approximately in proportion with the change in area. Figure 1 shows this schematically, with an AC current source (I) supplying a known current, the change in the variable capacitance (Cv) can be measured as an impedance change by measuring the voltage (V) required to sustain the current.

An instantly noticeable difficulty is that the sliding part requires an electrical connection, which is perfectly possible, but not very neat, and probably in the long run not reliable either.

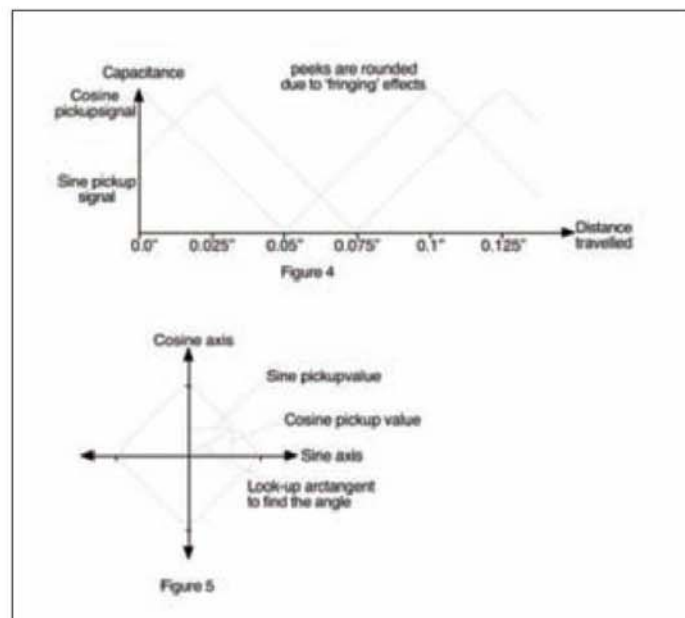
A way around this is to make the transducer up as a set of two capacitors in series, as shown in fig 2. In this case, one of the plates extends for the whole length of the slider's travel so the capacitance should remain constant over the measuring range; this is marked as constant capacitance Cc. The variable capacitance Cv remains as before, but the overall capacitance of the system drops, as capacitors in series combine in the same way as resistors in parallel.

The difficulty now is to sub-divide the measurement so that a, say,

6in. measuring range can be indicated in steps of 0.0001in. This equates to 1 part in 60,000. The stability required of the capacitors, drive and sensing circuits in order to achieve this is a very tall order, so two more tricks are used to avoid this problem.

The first trick is to use what are effectively two sets of 60 varying capacitors on 0.1in centres. This reduces the stability requirement to one part in 1000. Cunning use of differential measuring techniques (where noise in very small signals affecting all elements of the circuits equally can be cancelled when the differential signals are added and amplified) get close to this, but not close enough. See fig 3, but note that the active part is now the slider - the readout and hence the electronics generally being on the moving part of the calliper. The pads marked 0deg. and 180deg. are part of the differential measuring system.

Second, two pick up capacitors are used with a 0.025in. difference



in their pad locations along the length of travel. These two pickups are called the sine and cosine pickups for reasons which will become apparent. Considering the first pick up, if at the start of its movement the plates half overlap, and the direction of movement causes the plates to first of all overlap more, then overlap less, until there is no overlap at all, then finally when 0.1in. has been traversed from the start position the overlap returns to being exactly half and half - the capacitance varies with a triangular waveform.

The cosine pad locations are 0.025in. further along the direction of travel, so the triangular waveform from the cosine pickup is 1/4 wave in advance of that from the sine pickup - exactly the relationship between a sine and cosine waveform. See fig 4. Notice that the peaks are not perfectly sharp - this is because the electric field which forms the capacitance is not completely confined to the volume between the plates and leaks out of the sides.

The sine and cosine can be plotted against each other to give what is called a Lissajous figure. It is distorted into a blunted diamond shape because of the triangular nature of the sine and cosine signals. For any position within the 0.1in. length of one capacitance plate the sine and cosine signals will have a unique pair of values,

which give the co-ordinates of a point on the diamond shaped line. As the sensors traverse along within a 0.1in. distance the point moves either clockwise or anti-clockwise around the diamond, depending upon the direction.

Each Lissajous can therefore be split into 1000 sectors to sub-divide the 0.1in. into 0.0001in. If the Lissajous were circular one could find the particular sub-division by performing an arctangent calculation 0.0001in. being represented by 0.36deg., a technique known in this context as interpolation. Fine, except that the diamond shape distorts the arctangent function required, so a look-up table is used which corrects for this and maybe even a few other errors that I have glossed over too.

All that remains is for the whole number of 0.1in. cycles which have been traversed to be counted up (or down) and added to (or subtracted from) the overall measurement. The measurements are therefore incremental, not absolute. An absolute scale is possible however, by the addition of an extra pair of sine and cosine sensors which have a period covering the whole measuring range, which are themselves interpolated to identify which of the 60 or more 0.1in. segments the slider is located in.

The application of interpolating sine and cosine measurements isn't restricted to callipers, or even capacitance sensors. It is universally applied to linear scales (optical and magnetic) and even high performance interferometers which will measure down to 1nm (0.04 micro-inch) with an accuracy of 0.7 parts per million!

I hope this makes some sense and that it might save some good and faithful calliper from a sticky end.
Nick Weston, Peebles.

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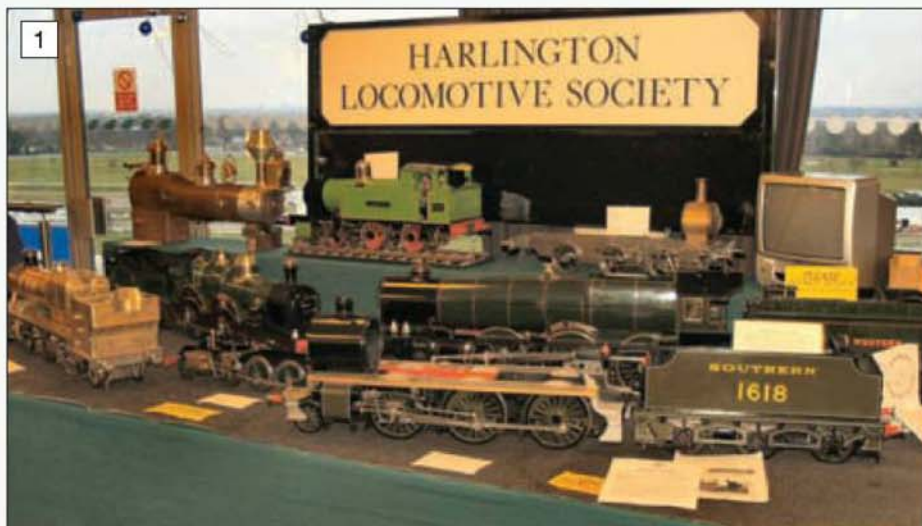
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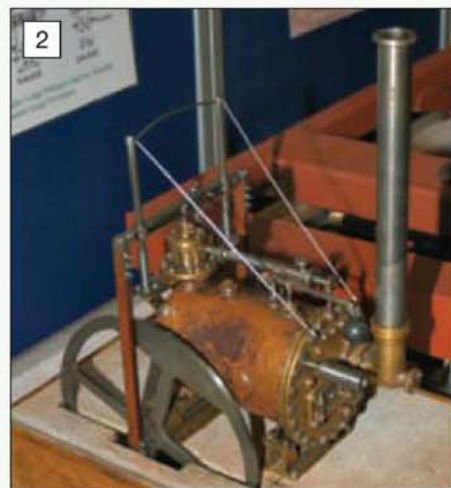
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Responses to published letters are forwarded as appropriate.



Harlington made a feature of part completed models this year.



The unusual Trevithick dredger engine by Ken Thornton shown on the Frimley and Ascot stand. This was their first time at the exhibition.



The unusual model Gatling Gun displayed by John Day on the Guildford MES stand.

CLUB STANDS AT THE 75th MODEL ENGINEER EXHIBITION

Malcolm Stride

enjoyed visiting the clubs at this year's show at Sandown Park.

There were many familiar faces among the club stands at Sandown in 2005 as well as a few new ones. This year I have decided to describe the stands in alphabetical order, that way I can't be accused of any favouritism! I have also taken most of the photographs during the judging day in order to be able to get good pictures of the stands.

Association of Model Barge Owners

The Association of Model Barge Owners caters for those with an interest in modelling and sailing miniature Thames sailing barges. The stand is always interesting with several completed models on display as well as some part built examples to show the amount of work in these impressive models. Plenty of serious contemplation of model barge drawings took place on the stand.

Frimley & Ascot Locomotive Club

This well-known society was a new visitor to the exhibition and had a well laid out display upstairs. Among the items that caught my eye were the signalling system demonstration and also the unusual Trevithick Dredger Engine (photo 2) being built by Ken Thornton. The society obviously caters for models other than locomotives in spite of the name.

Gauge 1 Model Railway Association

The Gauge 1 Association is one of several national groups that caters for a specific interest and whose members are also likely to belong to

and be active in a local club. The larger size of these models enables much more detail to be incorporated and my photograph (photo 4) shows some of the fine models on display.

Guildford MES

Guildford occupied their now familiar place in the clubroom and the stand was again filled with a wide variety of models of all types. One that has featured regularly in *Post Bag* during the year is the Gatling Gun (photo 3) and an example by John Day in 1:3 scale was on display

GWR Preservation Group

This group, based at the old GWR workshops at Southall aims to preserve "the rich railway

heritage in London" and over three decades have returned the Great Western Railway-designed 0-6-0PT Pannier, No. 9682 to steam, some 50 years after it was originally built. The group have also restored the unique A.E.C. 0-4-0 diesel shunter which was built in 1938 at Southall. Members had a wide variety of items for sale to raise funds for future efforts and also information about their projects.

Harlington Locomotive Society

Members of this society did not have far to come, being based a few miles down the road and had brought a fine collection of models for



The Gauge 1 Association showed off the wealth of detail incorporated into this model railway scale.



The famous Meccano Block Crane on the Home Counties Meccano Group display.

visitors to admire including several part built models (photo 1) enabling visitors to see what is under the skin of a model locomotive and to appreciate the work involved.

Home Counties Meccano Group

There must be many model engineers who, as I did, started their engineering activities with Meccano and then having developed an understanding of things mechanical progressed to building from the raw metal. This stand had a fine display of models, including the famous block crane (photo 5) which many aspired to but never reached and a smaller more modern model (photo 6) which appeared to be a Babbage Difference engine although I did not confirm this. The display changed each day on this stand so if you did not see the models in the photograph it is not you, they were not there.

This group was awarded the best club stand award this year, mainly because of the interaction with the many visitors to the stand, many of whom were children who were being shown how the various models worked and hopefully will have been encouraged to get involved in model engineering activities. As

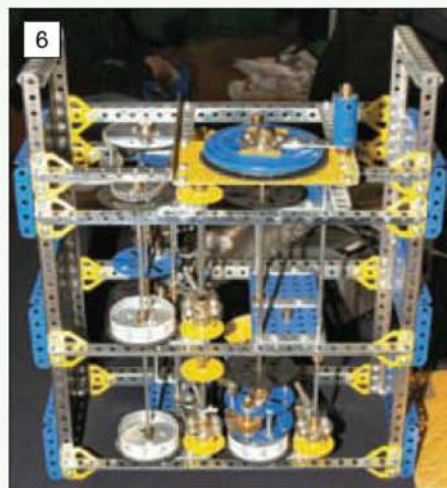
has become traditional the well-deserved certificate was presented to organiser Bryn Jones by Chief Judge Ivan Law during the show.

I/C Engine Builders Group

This group is another national group that is really a network of those interested in building and running model I/C engines and they had their usual varied display of superb models set up in the annex. Since many of the models have already featured in the I/C engine report previously, I have chosen Mike Tull's superb radial engine crankshaft assembly (photo 7) for this report. This certainly attracted much interest with the public.

Ickenham DSME

Ickenham occupied their customary spot downstairs (photo 8) and had a varied display of models on show including the familiar narrow gauge Fairlie locomotive *Taliesin* which progresses each year that we see it. The rope-making machine which has become a regular feature of the stand was in business and over the course of the show used several hundred feet of string to produce rope for visitors.



Babbage Difference Engine on the Home Counties Meccano Group display.

Kew Bridge Steam Museum

Kew Bridge had a small spot upstairs and many readers will have visited this attraction in the past. For those that haven't it is a superb place to visit so why not make the effort this year. Further details and pictures can be found on their website at www.kbsm.org/

Lynton & Barnstaple Railway Trust

This local (in spite of the name) group were upstairs in the clubroom this year and again had a good selection of information and items for visitors. Again, further details are on their website at www.lyntonrail.net2media.co.uk

Malden DSME

I suspect that the majority of visitors will remember the sectioned boiler (photo 9) on the Malden stand. I thought that it was very brave of the owner to put this on display as an example of what happens when things go wrong. The boiler had some leaks when built and attempts to correct these resulted in distortion and the (expensive) decision was made to use it to educate others. Many visitors were also interested in the Colt revolver (photo 10) on display. It is interesting to remember that the development of mass production and repeatability in manufacturing was brought about by the need to manufacture large quantities of this weapon.



The radial engine crankshaft assembly for the engine under construction by Mike Tull of the I/C Engine Builders Group.



The Ickenham DSME, occupying their usual display space, had a wide variety of models on show.



Malden DSME showed a sectioned boiler as an illustration of what happens when things go wrong.



The Colt revolver with accessories on the Malden stand.



The Napier Heritage Trust had a variety of items from a Napier Lion engine on show.

Model Power Boat Association

As a past member in my early model boating days, I am always pleased to see the Model Power Boat Association display and this year was no exception. I have always been a fan of these fast functional steamboats and the tethered hydroplanes. Unfortunately a quantity of the felt covering disappeared during the show set up so this stand was left with bare tables.

Napier Power Heritage Trust

The Napier Trust had their display of books and other items related to the Napier group on display in the clubroom and as usual a lot of interest was shown in this stand. There are still many around who had some involvement with Napier products in their working lives. Photograph 11 shows some components from a Napier Lion engine.



Ayesha, in complete and part built form, on the National 2 1/2in. Gauge Association display.



A narrow bandwidth television working on the association display.

Narrow Bandwidth Television Association

This group is new to the Model Engineer Exhibition and had a display on the first day in the back of the lecture room upstairs. This venue was chosen because the lighting could be

subdued to make the displays easier to see. The group concerns itself with television systems whose signals lie within audio frequency limits and aim to raise awareness of televisions early history. The photograph (photo 12) shows one of the systems in operation. The large spoked disc is



The well-stocked and substantial North London SME stand.



The I/C engine powered rail-racing car also on the North London display.



Locomotive No. 17 from the Londonderry railway with its mocked up wagon displayed by the SMEE.

rotating and the picture appears behind the glass screen on the right of the device.

National 2 1/2" Gauge Association

Locomotives in 2 1/2in. gauge are increasing in popularity and the revival of *Ayesha* will no doubt help this process. The new locomotive was on display (photo 13) together with a chassis and several components on the society stand which gave the visitors a chance to see this revival of a very famous miniature locomotive.

North London SME

This society had a spot upstairs in the clubroom and their very substantial stand was stocked with a very good and varied display of models. One thing I liked about this stand was the fact that it was well lit using ceiling mounted spotlights which meant that visitors could appreciate the array of models even more. I liked the nice tank locomotive with its rake of wagons and also spotted the rail-racing car (photo 15) from a bygone era.

REMAP

This organisation have become an established exhibitor at the show and this year had as an example of their work a revolving table for easy use with an armchair. Other examples were also on the stand. The work of this charity helps make living with disability a lot easier for many people.

Ruislip Lido Railway Society

This society had a stand in the annex and was displaying a wealth of information about the society activities. They also had a range of items on sale to raise funds in order to support those activities.

Society of Model and Experimental Engineers

At the end of the main hall downstairs, the SMEE had a wide range of models on display and were also carrying out demonstrations of machining for the enlightenment of visitors. I liked the part built Londonderry Railway locomotive (photo 16) displayed with a mock-up of a wagon to show the final result.

Society of Ornamental Turners

This is another society that provides real live demonstrations for the many visitors and this year was no exception. This long established craft seems to be undergoing a revival at present and that is no real surprise when one sees the marvellous results on display at shows such as this.

South Downs Light Railway Society

On entering the exhibition this year, visitors were confronted by the substantial narrow gauge locomotive *Pulborough* (photo 17) being shown by the society to publicise its activities. I am sure there were many of our younger visitors whose excitement level was raised when they saw the locomotive.

Southern Federation of Model Engineering Societies

Brian Thompson and his colleagues from the Southern Federation had their display downstairs again this year and had brought along a new addition to the stand with a display of photographs from activities of member societies. The 2006 directory

supplement is also now available and can be obtained from the Federation.

Southwater Dabblers MBC

Among the exhibitors on the first floor could be found the Southwater Dabblers model boat club with its display of model boats. I liked the amphibious ship *Rotterdam* (photo 18) which featured a working landing craft which could be deployed from the stern of the vessel under radio control.

Staines SME

The very neat and tidy stand of the Staines SME was tucked away at the end of the club room and in addition to the excellent range of models had the substantial twin-cylinder vertical steam engine base and crankshaft on show. This was a substantial piece of work at least a foot long and is hopefully destined for a full size steamboat.

Stirling Engine Society

The final society to cover at this year's show is the Stirling Engine Society which always has what appears to be an enormous variety of different hot air engines in operation and this year was no exception. As usual the display was in the capable hands of Roy Darlington, who I must thank for handing me a mince pie!

It only remains to express my thanks to all those clubs and societies who braved the weather and post Christmas sale traffic to exhibit in 2005 and to hope that they have all gained members or increased interest in their activities as a result. I look forward to seeing you all again this year.



Pulborough from the South Downs Light Railway Society provided an impressive welcome to visitors this year.



The amphibious ship *Rotterdam* took pride of place on the Southwater Dabblers MBC display.

A GWR 1400 CLASS LOCOMOTIVE IN GAUGE 1

G. R. Thornber

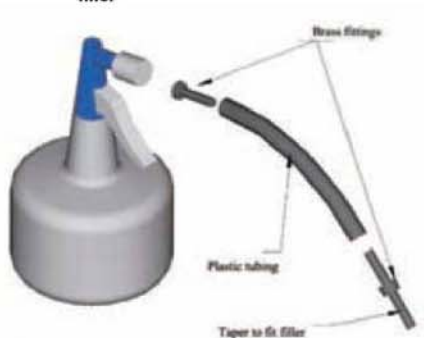
describes the burner and boiler fittings.

●Part VIII continued from page 264
(M.E. 4270, 31 March 2006)

The burner uses a ceramic plate, similar to those used in some gas fires. This is a soft white material, with a series of holes and humps. It can be cut easily with a hacksaw and file. It may be possible to obtain it from a merchant dealing in spares for gas fires. Alternatively Polly Models (ex-Bruce Engineering) can supply it. They may also be able to supply the jets. These come in different sizes and are numbered. I have a range of these numbered from 3 to 15, although 8 or 10 will probably do for this size of burner. Cheddar Models may also have the jets.

The burner tray is bent up from $\frac{1}{32}$ in. brass or copper with the back from $\frac{1}{16}$ in. material. The jet holder, which is tapped 1BA for the jet, slides into the air tube, which is open ended beneath the ceramic. I am sure that the length of this tube, the size of air holes and the positioning of the jet relative to the air holes could be the subject of a lot of experimentation. Although, in theory, the gas should be clean, jets do get blocked, so do not make the jet holder a tight fit in the air tube. Also be careful with the piping so that the jet assembly can be removed. There is not much room! I have heard of people putting a filter in the line – the filter from a tipped cigarette is a possibility.

Detail view of the filler



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GIMRA regulations say that a gas tank in this position should be pressure tested to 300psi, so this tank is made of $\frac{3}{32}$ in. brass and heavily stayed. The tank is connected directly to the pre-heater tube using a banjo connector at the tank end. Filling is via a modified Schroeder tyre valve.

The gas valve is a simple screw down valve connected at one end to the pre-heater tube and the other to the burner assembly.

The regulator is also a conventional screw-down valve, which feeds to the cylinders via a $\frac{1}{8}$ in. (or $\frac{5}{32}$ in.) tube through the top of the firebox. The bend at the regulator end is quite sharp and some people might prefer to fit a banjo here – and possibly in the smokebox.

The water filler uses a valve very similar to those on a bicycle tyre where a piece of rubber or plastic covers a hole. In this case a piece of

Exploded view of the burner

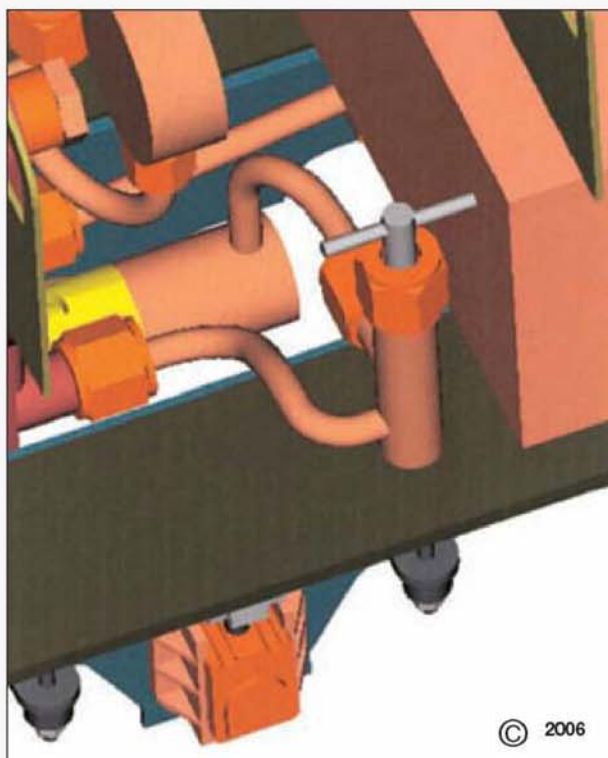


© 2006

plastic (model aircraft fuel tubing) is retained within a groove inside the boiler. This will be under water but I have had no trouble with a couple of years operation. Inside the cab the input is angled so that can be reached through the cab window. This is drilled $\frac{1}{8}$ inch.

Filling is via a cheap hand-held weed killer sprayer from the local garden centre. These little sprays, although entirely of plastic, are capable of producing quite high pressures – I used on recently to test a tender gas tank to 200psi (GIMRA regulation say that a gas tank immersed in water is tested to 180psi). The nozzle from the sprayer needs modifying to connect it to a piece of polyurethane tubing. The other end has piece of brass turned with a shallow taper so that it push fits into the boiler fitting.

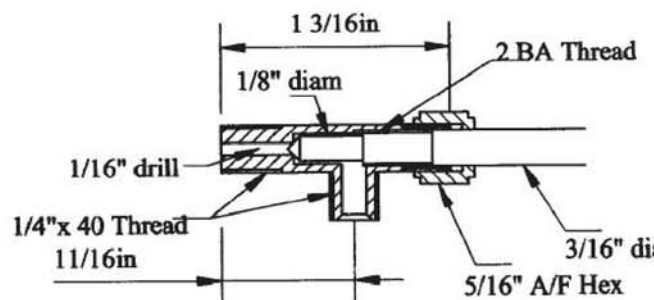
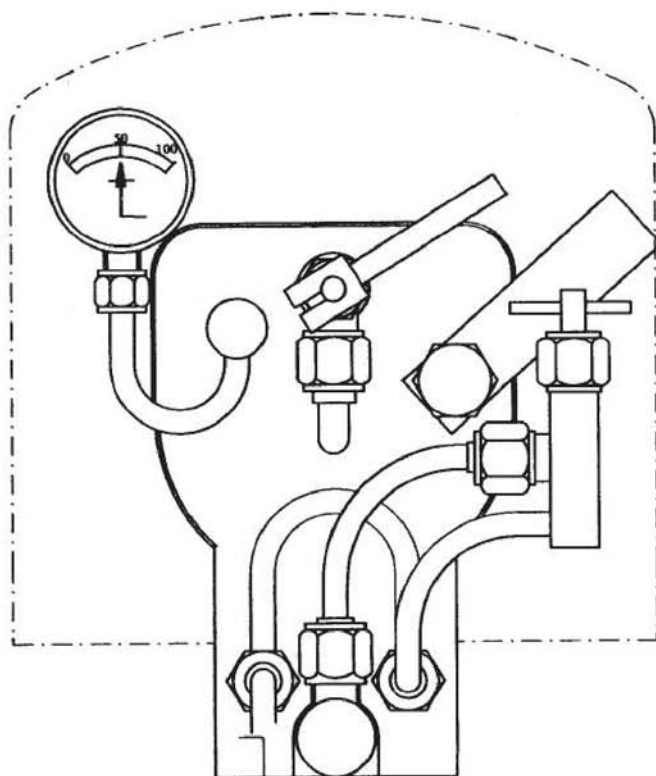
●To be continued. ▶



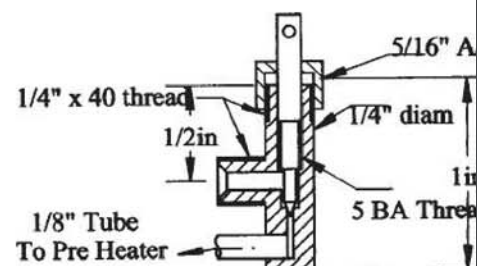
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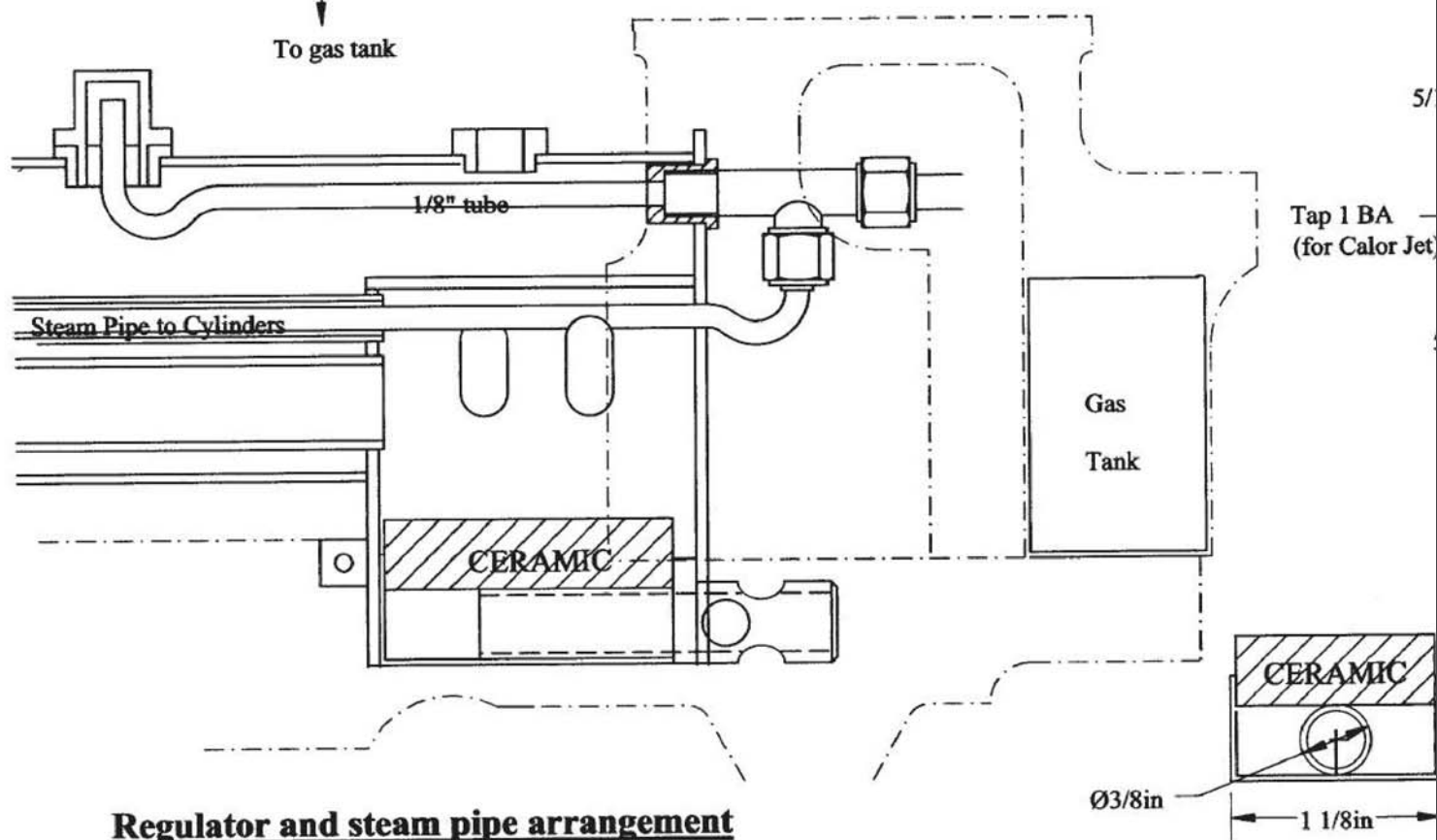
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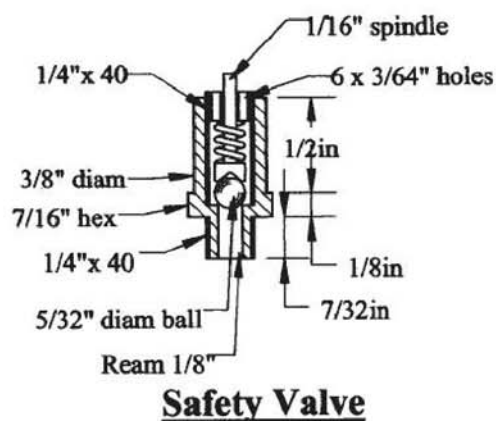
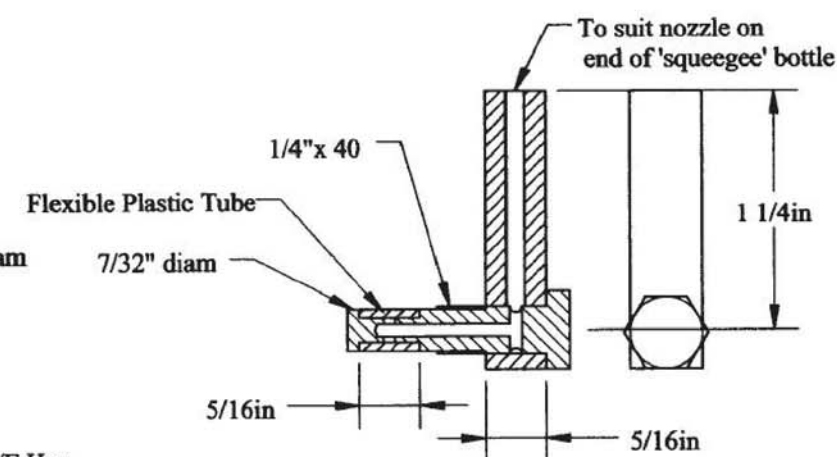


Regulator



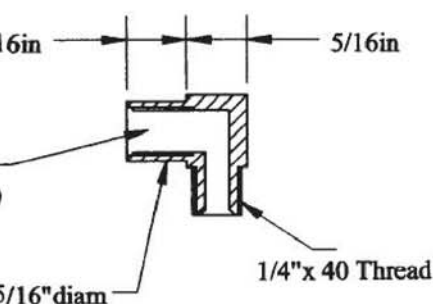
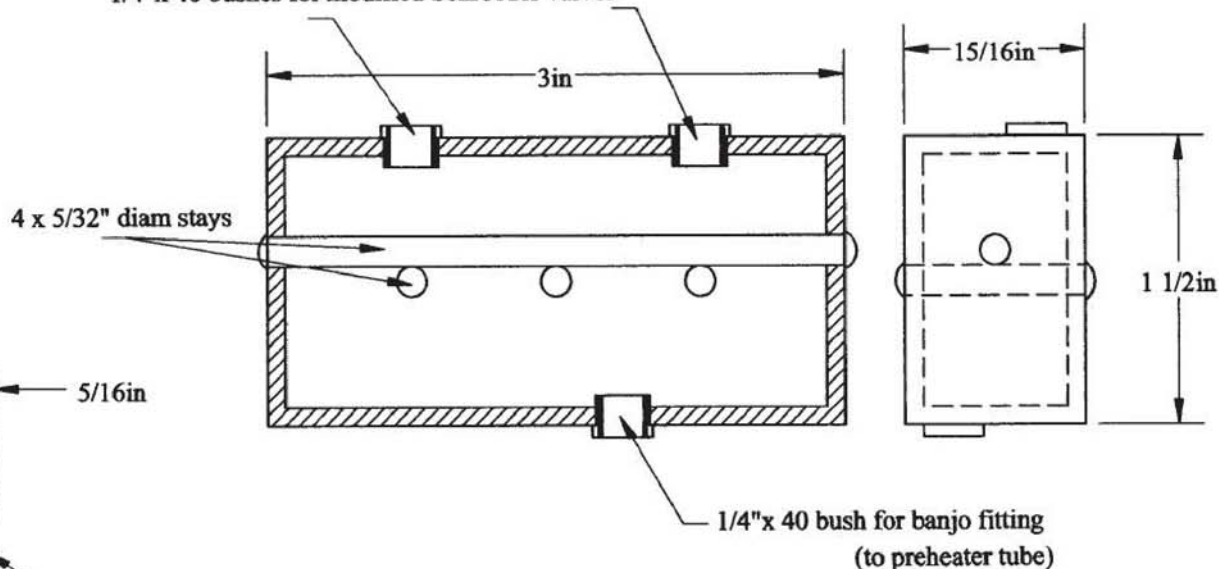
Gas Regulator





Filler Valve

1/4" x 40 bushes for modified Schroeder valves



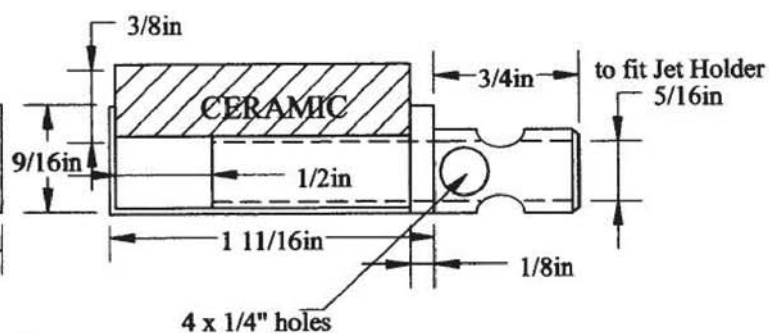
Original gas tank designed before latest Rules and Regulations.

Should now be tested to 300 psi as in a hot environment

Thickness therefore increased to 3/32" (brass)

Jet Holder

Gas Tank



Burner

PETE'S PAGE

Peter Spenlove-Spenlove
comments on some *Post Bag*
correspondence.

I read with interest Russ Turner's letter in *Post Bag* (M.E. 4260, 11 November 2005) about ball clacks and valves which seem to dribble or hiss air on the 80psi airline being used to test them. I had read as far as the airline test and at once I thought: "They cannot all leak!" Hiss is white noise and difficult to pinpoint. Was air leaking from a coupling thread or the hose itself? A way of checking this is to put the fitting on the hose under water and look for bubbles. Then I read on. I assume that the ball and seating proportions are to the standard used by model locomotive builders. My next thought concerned the seat-forming ball. Was it the same size as the working ball? If so, was the seat-forming ball hit too hard? A hard brass seat may develop micro cracks if hit too hard and might pass air even with the correct working ball fitted. I then noted the reference to D-bits and it occurred to me that this might be the root of the problem.

The D-bit is a simple tool and its design is at least 200 years old. It is readily made but, being simple, is easy to make and use incorrectly. The original purpose of the D-bit was to finish holes to size after drilling. They were the forerunner of the multi-fluted reamers now found in workshops. It could be used also to provide a flat bottom to a hole. Drills were usually flat in section and spear pointed as the twist drill had not been invented. When the twist drill came along it was found that it could be ground to give a flat-bottomed hole and the D-bit fell out of favour in commercial workshops. Specialised trades and model engineers continued to use the D-bit and Holtzapffel made sets from 1/8in. up to approximately 3/4in. in diameter. The early, practical engineers made D-bits to open up cored holes in brass castings. Twist drills were costly and often too long for small lathes anyway so the old methods persisted long after they had faded from the industrial scene. A short tubby D-bit made from cast steel or the 'new-fangled' silver steel was easy to make and did the job. Newcomers should note that cast steel was once



Carefully honed top of one of the author's Holtzapffel D-bits



Underside of the same D-bit. Note the front clearance angle.

D-BITS - MAKING AND USING THEM

an important tool making material and was used for cutting tools, punches and chisels. It could be readily forged, hardened and tempered. Silver steel is the modern, refined equivalent. Cast steel should not be confused with steel castings, which are made to a different analysis and are used for ship hull parts, engine parts, etc. It is tough but cannot be hardened like cast steel.

For best results the D-bit and its limitations need to be understood. The geometry of its cutting edges means that it is not a particularly efficient cutting tool. For example, it has no top rake just like a turning tool for brass. In use, it cuts by scraping and may require more axial pressure than a twist drill. In fact, in some material, a twist drill can self feed and hook into the material with disastrous consequences. This is particularly likely when opening up an existing hole in materials like brass. For this reason a D-bit is still often the best tool for the job provided it is correctly made and applied. A common fault in D-bit usage is chatter at the bottom of the hole. These chatter marks can appear on brass or bronze fittings and despite being only 0.001in. or so high can result in a the seat for the ball being malformed and leaking as a consequence.

D-bits are best made from silver steel and the flat should be milled or filed to slightly above half the diameter. Apply approximately 1 to 2deg. of rake to the leading edge of the tool. The cutting edge need only extend to the centre of the tool and this should be at 90deg. to the shank if a flat bottomed hole is

required. The rest of the cutting end of the D-bit can be relieved to ensure the main cutting edge performs as it should. If a flat-bottomed hole is not required the D-bit cutting edge can be angled straight across as can be seen on some of my home made D-bits shown in one of the photographs. Be careful to get a good finish and hone the cutting (or scraping) edge before the tool is used. Hone again before the finishing cut if felt appropriate.

The D-bit must be rigidly held in line with the work and it helps to partially lock the tailstock barrel to help reduce end float in the tailstock assembly. Use a low headstock speed similar to that used for a reamer of the same diameter as the D-bit or lower. Under some circumstance the best results are achieved by pulling the lathe mandrel round by hand. However, if doing this avoid letting the headstock dwell with the D-bit in cut or a radial line will result, which is just the thing we are trying to avoid.

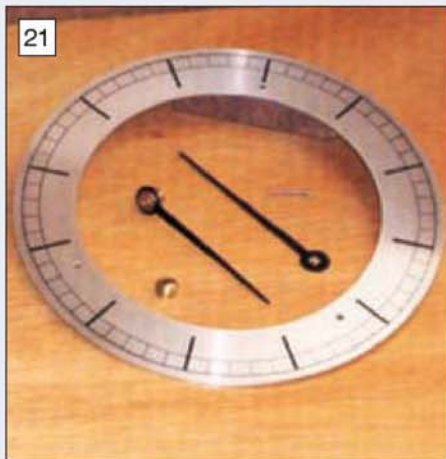
D-bits are made to the traditional semicircular section because that makes them relatively easy to make. A better pattern might be one with a 90deg. included angle flute running along its length. A tool to this pattern would be more stable in the hole but would need milling capacity to make a good job of it. My Holtzapffel D-bits are made to pretty close to half the diameter and each has been polished bright all over. They are suitable for the low speed machining of soft metals or non-metallic materials.



Selection of home made and commercial D-bits. Just left of centre is an early spear drill.



Shanks of the early D-bits. These are designed to be guided by a tailstock centre and locked by the grip of the hand or a spanner.



The simple but pleasing chapter ring and hands for the clock.

Peter Heimann

continues the description of this elegant clock designed with the model engineer in mind.

●Part VI continued from page 384
(M.E. 4270, 31 March 2006)

The centre arbor of the movement turns at one revolution per hour. The minute hand will be fitted to this. The gearing of the motion work enables the hour hand to revolve once every twelve hours. The action is as follows. The plain clutch disc is friction driven by the curved spring. Attached to this disc is a 16 tooth pinion, both fixed on to a pipe which has a square formed at the outer end for the minute hand and runs freely on the centre arbor. The 64-tooth 'reverse minute wheel' with its attached 20-tooth pinion runs freely on a stud fitted to an eccentric pillar (for adjustment of mesh). Running freely on the outside of the pipe previously mentioned is the 60-tooth hour wheel. The collet attached to this wheel accepts a split hour hand collet. The minute hand fits on to its shouldered square and is retained by a semi-spherical collet, which in turn is retained by a pin through the hole originally drilled at the end of the centre arbor.

The clutch spring curvature is adjusted to give sufficient pressure between the shoulder against which it is located and the pin at the outer end of the arbor to drive the hands, but is weak enough to allow the latter to be set. The split hour hand collet simply pushes on to the hour wheel spigot and is retained there by slightly closing the split in it. The best way to make this collet is, after turning, to mount it on a stub of brass rod and then saw the slot with a slitting saw on the lathe.

Drawing 19 and photo 21 show the simple chapter-ring and hands, which I believe are the right design for this type of clock. Readers are, of course, free to do their own thing if they feel so inclined. (In my previous series I showed how to 'engrave' roman numerals on the lathe, and I have carried out this process quite easily on 6in. dia. rings). My lathe back-plate has a trued 18mm plywood disc fixed to it. This has dealt with many dials over the years. A $\frac{3}{16}$ in. centre pin is fitted. Drill a centre hole in your work piece and then fix to the plywood disc with four or five wood screws. Position these just inside the inner perimeter of the ring.

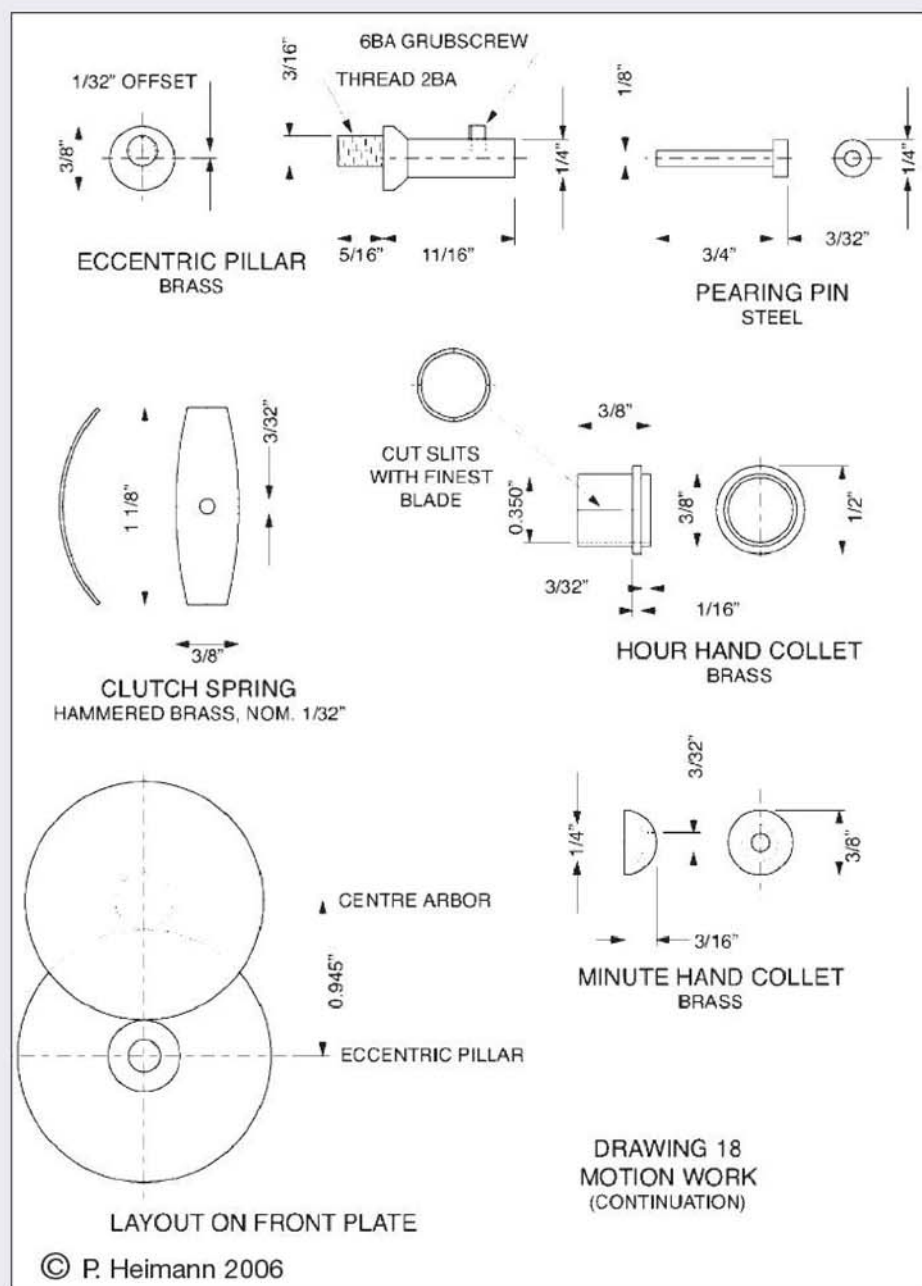
Make sure that the screw heads will not interfere with the tool path. Now find the pattern

SIXTEEN DAY PEDESTAL CLOCK

you took showing the position of the three pillars which will support the chapter ring. Transfer these points to the work piece and drill for 10BA countersunk screws. Prepare the lathe with the faceplate and dividing disc in position. With a pointed scriber in the tool post lightly mark the inner and outer circumference. Likewise mark the minute circles about 0.010-0.015in. deep. Fit a narrow tool, like a parting tool, at exact centre height and set limit stops on the cross-slide for the length of the 'five minute' divisions. One of these must actually fall on to the twelve o'clock hole drilled in your plate. You will have to adjust the relationship between the faceplate and the dividing disc to achieve this. Proceed to gently

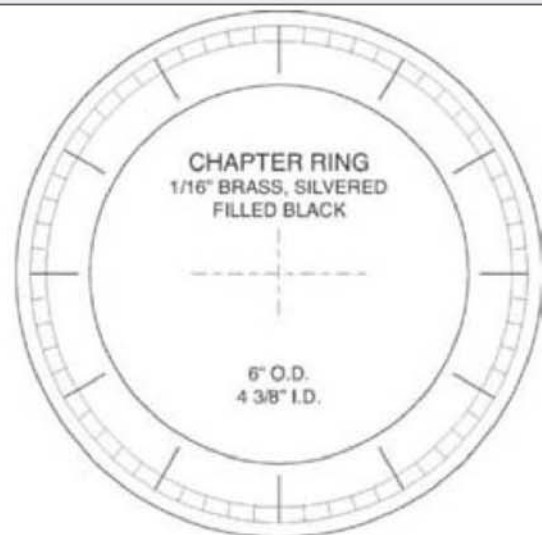
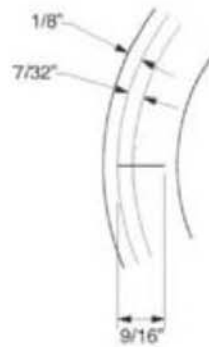
plane the twelve graduations. Change back to the point tool and deal with the minute divisions, again between limit stops on the cross-slide. If you do not have this facility you will not regret making stops. They are so useful for all sorts of jobs. Go round the circle grooves again lightly to remove any burrs, clearly turning the lathe by hand. Under power, with wet & dry paper held on a cork, clean up the surface.

Next remove the complete faceplate from the machine and fill the graduations. I use standard Araldite mixed with a little soot or carbon black. You will not need very much. If there is a problem make your own soot by burning a candle under a piece of metal plate. Warm the complete

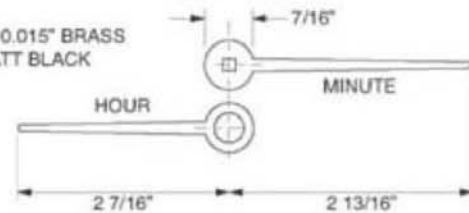




The author's driving weight prepared from pieces of steel plate.



HANDS - NOM. 0.015" BRASS
FINISHED MATT BLACK



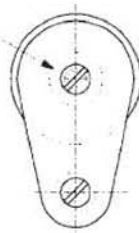
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DRAWING 19
CHAPTER RING AND HANDS

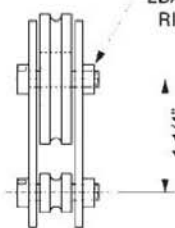
2 OFF 5/8" x 3/16" x 1/4"
BALLRACES, SIDE
BY SIDE ON 1/4" DIA.
FIXED SPINDLE

1 1/2" DIA.

3/8"

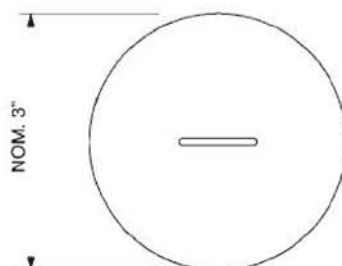
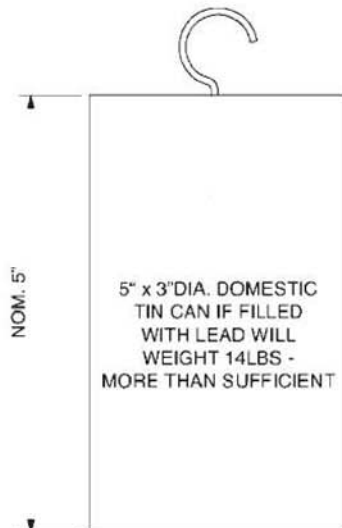


2BA SCREWS/NUTS
RIGHT THROUGH



1 1/4"

1/16"



DRAWING 20
PULLEY AND WEIGHT

© P. Heimann 2006

assembly a little to thin the adhesive mixture and spread into the graduations with a plastic spatula or even a piece of stiff card. Clearly the less you leave on the surface the easier to clean off the following day. Then back on to the lathe and clean up under power. Finally trepan the outside followed by the inside. I suggest turning by hand for the last few cuts. Smooth the edges and you are ready for silvering with a proprietary kit, which can be obtained from suppliers listed. After silvering give a couple of light coats of automotive clear lacquer. I find this better than the material supplied in the kit.

Now turn your attention to the hands which can be in brass or copper 0.015 to 0.025in. thick. The hour hand is fitted with adhesive or soft solder to the collet shown on drawing 18. The minute hand requires a square to fit the 'pipe' shown on drawing 17. Finally spray with cellulose primer and finish in matt black. If you want to be completely traditional make the hands in gauge plate and blue evenly.

With regard to the weight, you will now know more or less what is needed. Drawing 20 is self-explanatory. The pulley has two ball races, which are allowed for in the materials list. Often the pulley receives too little attention. In fact it has the greatest loading. The gap between the sheave and the wall must either be so narrow or so wide that the line, if it comes out of its groove, does not get wedged. This often happens in the real world! Unlike my other clocks the weight does not show, so a tin can is acceptable if you choose to use lead. Do be extra careful with this especially when pouring. Photograph 22 shows my own weight bolted together from some off-cuts of 2 1/2 x 5/8in. mild steel which happened to be available. It shows that in this case the weight does not have to be round, but do not exceed the 3in. dia. so that it does not foul the sides of the case.

●To be continued.

EXPERIENCES WITH THE SIEG X3 MILL

Malcolm Stride

gives us his personal view of this compact milling machine after spending some months of using it on a variety of tasks.

Readers may remember that I described the fitting of digital readouts to this popular mill earlier this year (*M.E.* 4264, 13 January 2006). At that time I had only used the machine to produce the bracket for mounting the top of the vertical readout bar, hardly extensive use. Having now used the mill quite extensively for a range of different machining operations I have been prompted to provide some comments on the machine. I should stress at this point that I am not a machine tool expert and the comments are my personal opinions based on practical use.

The same machine is sold by at least two of our regular advertisers, Arc Euro Trade (as the X3) and the Engineers Tool Room (as the BMD-25). My machine came from Arc Euro Trade after I had examined the machine at the Bristol Exhibition. The spindle drive is fully enclosed and is by means of a toothed belt from the motor via a two-speed gearbox (photo 2) to provide the high and low ranges.

My machine came with three drawbars, a drill chuck and a complete set of tools. The reason for

Basic specification

The machine is a small mill/drill with a V column (photo 1) and features a variable speed DC drive. It is an extremely compact machine for its capacity and is available in MT3 or R8 spindle versions.

The basic specification (from Arc Euro Trade) details are:

Drilling Capacity	25mm
End Milling Capacity	25mm
Face Milling Capacity	50mm
Spindle Stroke	80mm
Throat	232mm
Spindle to table distance	
(standard strut)	160-395mm **
(short strut)	60-305mm
Spindle taper	MT3 or R8
Spindle speed (Low range)	100-1000rpm
(High range)	100-2000rpm
Table Overall dimensions	555x160mm
Table cross travel	145mm
Table longitudinal travel	360mm
T-slot size	12mm
	(M10 T-nuts)
Motor output	600w
Overall dimensions (LxWxH)	685x560x830mm
Net weight	135Kg

** On my machine the minimum distance with the long gas strut is actually 100mm.



Above right: The compact X3 mill as delivered showing the Y and Z control handles at the front of the machine for easy use. **Right:** The top cover removed to show the toothed belt drive to the gearbox and the spur gear final drive. **Above:** The rear casing removed to show the gas strut and the head lead screw.



the two different sets of dimensions for the spindle to table distance is because the weight of the head is taken by a gas strut in the column (photo 3) and the suppliers supply an optional shorter strut for those who need it. An optional stand is available for those who need it. I elected to put the mill on a purpose built bench with tool storage under it.

First impressions

The machine was delivered at the time specified in a sturdy crate which, when removed, revealed the machine bolted to a pallet. All the accessories were well wrapped and taped to the column. The machine was delivered cleaned and set up ready for immediate use once installed.

Although I had seen the machine at Bristol, I was still amazed by how compact it is for the machining capacity available. This is partly due to the variable speed DC drive because the motor is smaller than the typical AC motor on similar sized machines and is also mounted on the side of the head making a very neat layout.

All the electronics are hidden in the metal casing at the rear of the column with the control knobs on the left-hand side as you look at the machine.

Those who have a typical round column mill drill (as I did) will welcome the absence of the

motor behind the column because the machine can be pushed much closer to walls or partitions behind it, a major consideration in a small workshop. This was one of my main reasons for buying this machine and I have gained a lot of extra space in the workshop as a result.

The instructions supplied are basic but cover all the operating features and include parts lists, exploded views and wiring diagrams together with details of how to operate the captive draw bar system and also the start-up sequence.

Installation

This is very easy, the machine has to be put in place, plugged into a 13-amp socket and is then ready for use. It pays to read the instructions because it is recommended to run the machine in for a short period before use. The machine is supplied with four screw-in feet for the base, but because height is a problem in my workshop, I opted not to fit these.

As is common on these occasions, the offer of tea and cake produced a working party of three club members and the machine was soon off the pallet and onto the prepared bench. I find it easy to slide the machine around to get at the rear and in fact the photographs for this



4
The quill lever and the high/low speed change knob are on the left side of the head.



5
Electronic speed control is totally enclosed in the rear casing.

feature were taken without any assistance to move the machine.

Checking the machine

Being a suspicious old cynic, I also decided to check the alignment before doing anything else. When doing this I clamp a large engineers square to the table with the blade upright on the axis being checked and then set a dial gauge on the head so that the tip runs up and down the square blade. I then repeated the process for the other vertical axis.

To check the X/Y relationship I clamped the square flat to the table and lined the stock up with the X-axis movement using a dial gauge. Then check the Y-axis with the dial gauge against the edge of the blade. I was impressed that all these checks showed no appreciable run out.

This also gave an opportunity to check the feel of all the movements and certainly the machine arrived with everything set up well and all the axes operated very smoothly. Because the Z-axis is operated from the front of the machine the action of the bevel gears means that this axis does not feel quite as smooth as the others but the gas strut makes winding the head up and down very easy.

General features

The main castings are substantial and the surface finish is good. The column is bolted to the base and seems quite substantial with stiffening ribs cast on the inside. The machine surfaces are good

quality with no visible marks. My only comment is that the machine seems to be painted using a slight hammer finish matt paint which means that oil does not easily wipe off.

The mill is pretty normal in its mechanical features using parallel gib strips with grub screw adjustment on the X and Y axes and a tapered gib strip on the Z axis with the usual large headed screw engaging in a slot in the gib strip for adjustment. All axes having single bar locking screws.

The controls are operated by good-sized hand wheels with one handle and the Z-axis is brought out to the front left side of the machine at an angle via bevel gears at the base of the column. This avoids any reaching over the table to raise the head.

Being a 'mill-drill' the quill can be raised or lowered in the head using the usual side lever with three operating bars. The index on this movement is larger diameter than many and gives easy reading when drilling holes to a specified depth.

Behind the quill lever is the knob (photo 4) for mechanical selection of the high and low ranges to be used when the machine is stationary.

The machine has a very neat transparent guard fitted which is linked to the emergency stop. It can be slid up and down and is held in the desired position by means of indents on the slide.

Oiling points are provided for the gear box and drive and also for the control handle bushes but

there is no provision for oiling the slides other than squirting some oil on the surfaces.

One problem I have is that the oiling point for the Z-axis spindle is on the base directly under the bottom corner of the column 'V' meaning that it cannot be reached with a normal pressure oilcan. I still have to make an adaptor for my oil can to get round this.

Special features

The mill has several interesting features that make it very easy and pleasant to use:

The Variable Speed Drive

This is unusual in that it is a DC drive rather than the frequency changing AC drives commonly seen. The system gives absolutely superb control and saves a considerable amount of time in use when compared to a belt-driven machine.

All the electronics are housed inside a substantial steel cover at the back of the column (photo 5) with the main controls on the left-hand side of this.

The control provides 'soft start' which builds the speed up gradually when the machine is turned on putting less strain on the drive train. The high and low speed ranges are selected by a control knob on the side of the head and in use the main power switch is set to on and then the machine is controlled using the forward/reverse switch in conjunction with the speed control.

The machine will not start if the power is switched on with the latter control in either forward or reverse. The sequence is power on, pause, select forward or reverse.

If the mill is overloaded it will cut out and a fault warning light on the motor panel will illuminate. If this happens (it hasn't yet) then the machine is switched off and then started up again which resets the electronics.

Also on the motor panel is the emergency cut out button. I felt that this was not in the best position because when operating the X-axis feed by hand, the button is out of sight on the opposite side of the head to the user. In fact the drawing inside the manual shows all these controls on the left side of the column. When operated the button locks down in the off position and has to be released before starting up again.

The Captive Draw Bar System

This is an option provided by Arc Euro Trade on the MT3 machines and makes removing tools very easy with no hammering on the draw bar to break the taper.

It is a very simple idea and consists of a fine left-hand thread at the top of the draw bar (photo 6) with a matching thread in the top of the quill.

In use the draw bar is screwed into the quill until about 10mm of thread shows and the tool is screwed up from the other end and the draw bar tightened in the normal way.

To remove a tool, the draw bar is loosened as normal and then turned further in the same direction until the left-hand thread pushes the tool out of the taper.

This makes life very easy in use and avoids potential bearing damage.

Gas Strut Head Support

I basically like this idea because it takes a lot of the load off the vertical axis drive gear and makes



6
The captive draw bar thread on top of the quill.



7
A 6in. rotary table on the machine with plenty of vertical clearance still available.

raising and lowering the head very easy. I find that it can be done one handed with no problem.

My only concern is when allowing for backlash for those not using digital read outs because if as the head is lowered the gas strut starts to take the full weight of the head as it is compressed then the backlash changes to the opposite direction giving potential problems when using the indexes.

For those that carry out a lot of milling of small or thin items clamped to the table, a shorter gas strut is available to allow the head to move closer to the table. I have not found this necessary so far although I did buy the extra strut with the machine.

Using the machine

I have used the machine over the last few months to build an I/C engine and have found it very easy and pleasant to use.

The drive is quiet and the variable speed control provides a very good range of speeds. The minimum speed quoted seems to be higher than the actual useable speed because I have tapped holes in aluminium alloy down to M2.5 with the machine turning over very slowly.

The finish obtained is very good to the extent that a club member who is a retired tool room machinist commented on the quality.

I have used the machine for all types of milling operations including face milling (with a 2in. cutter) end milling (up to 1in. diameter), slotting and boring using a boring head.

I have also carried out some heavy milling when machining the internal cavity of a crankcase some 2 1/2in. square with no signs of protest from the mill.

The only thing I have not done is fly cutting, but I don't foresee any problems.

The variable speed control means that the speed can be adjusted during a cut if things are not quite right. The speed control knob has an RPM scale, but I have not checked this for accuracy. I very quickly got used to the control layout but admit to sometimes going for the Y axis handle instead of the Z axis in the early days because they are next to each other on the front of the machine.

I have used a 6in. rotary table on the machine (photo 7) which fitted with a bit of juggling and certainly when used in the vertical position (i.e. the work rotating about the X axis) the good 395mm clearance under the spindle made life easy.

Would I recommend it?

For those who need a mill with reasonable capacity

in a small space, the answer is unreservedly yes. There are a couple of things that could be improved. The first is the position of the Z-axis drive shaft oiler which needs to be moved about 15mm further out from the column.

The second is the position of the emergency stop button. I suspect that two buttons are really needed, the existing one and another adjacent to the main controls.

I would also have liked proper oiling facilities for the slides although the oil seems to get where it is needed.

On the plus side I must include the captive draw bar system, the DC variable speed control, the front positioned Z-axis handle and the general finish and quality of the machine.

I have found the mill a delight to use and I think it performs well above the specification and what could be expected from such a compact machine. Obviously it is a small machine and so if large items are being machined, it pays to take things gently but I have had no cause for concern over the last few months.

Prices vary depending on the supplier but I think this machine represents excellent value for money for the small workshop. 

HOW TO DESIGN AND ASSEMBLE MODEL LOCOMOTIVE BOILERS

Peter Rich

continues with advice on designing boilers and moves on to assembling and brazing.

●Part II continued from page 388
(M.E. 4270, 31 March 2006)

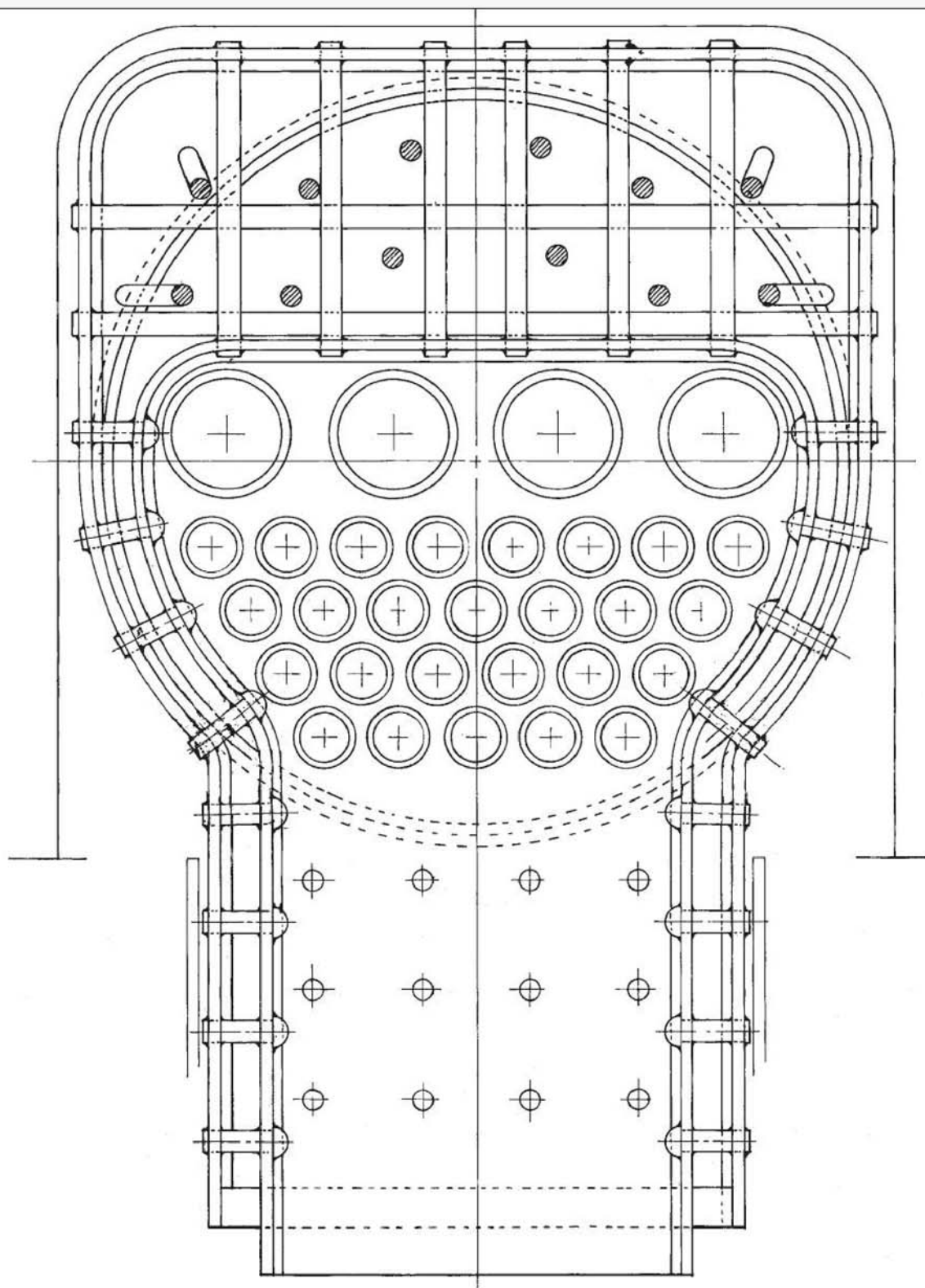
In designing a boiler, whether to scale or otherwise, attention should be paid to ease of construction. I have got the impression that some designers went out of their way to make matters difficult. Some of the designs of the past have shown very sharp bends in firebox wrapper sheets when going from the bottom vertical part to shape to the curve of the upper part. Try silver soldering the upper inside firebox stays just above this bend and you will understand what I mean by designing for ease of construction. My drawings No. 7 and 8, are based on a model design for an LMS 'Royal Scot' which I saw many years ago, and illustrate what I mean. I am an advocate of building models very close to scale and am against unnecessary alteration from the full size designs. However, this is one of those occasions where we may be wise to abandon full size authenticity for ease of construction in our model world. On both drawings the outer line represents the firebox cladding plates which are drawn exactly to scale dimensions, and the outer fireboxes have been

designed to fit inside them. Drawing No. 7 illustrates the shape of the model boiler I saw, note the sharp bends in the firebox wrapper, ideal for obstructing your view for silver soldering. Drawing No. 8 is my interpretation of the same boiler and shows that I have eased these bends which now allow more uniform stay spacing, easier access to the stays for silver soldering especially with the firebox door plate in place, less difficulty in bending the wrappers and there is still adequate clearance over the wheel tyres. In most cases there is no need to have a sharp bend here and most latter day full size boilers have long sweeping curves for these plates, and it would make our model designs that much easier if we follow them.

Regarding the proper staying of the boiler it should be borne in mind at the design stage that because of the curvature of the firebox wrapper plates it does not follow that a neatly marked out equi-distant rows of stays on the outside firebox will be repeated on the inside plate. There is no problem where both plates are straight at the vertical part of the sides but take a look at my firebox section drawing No. 2 (page 385, M.E. 4270) and it will be seen that on the flare the outer stay heads are closer together while the inside heads are at their correct centres. Where the curve reverses towards the top, the outer heads return to correct centres and it is the inner heads that are now closer together. This is a point to be careful with in your design as I am sure you

can see that you could end up with stays well over their stress limit in one or both of these plates.

Within reason you cannot have too many stays in a boiler so if you have any doubt about the position of a particular stay, perhaps it is interfering with the scale position of a valve, etc., then reduce the centres of the stays at that point and put an extra stay(s) in. The outer firebox steam space cross stays can sometimes prove troublesome for spacing when items such as long horizontal stays are used, or where an internal fitting has to be avoided, and one answer to this could be in the form of palm stays, the use of which may allow the cross stays to be moved appreciably. The palm stays can be seen on the cross section of my firebox drawing and show how they can be applied. Here I have used them to allow the cross stays to be spaced to avoid the internal main steam pipe and yet remain within the correct spacing for the intended pressure. To those who are not familiar with these stays they are copper rods with their ends flattened down and secured to the top of a firebox (see drawing No. 6 Part I) or the inside of a boiler barrel or some such other internal surface. A good way to picture them is if you place the palm of your hand down on a flat surface and imagine it is the flat part of the stay with your arm being the round part. The flat part (palm) is silver soldered to the plate with the round arm part protruding through the outer plate and secured.



Drawing No. 7.

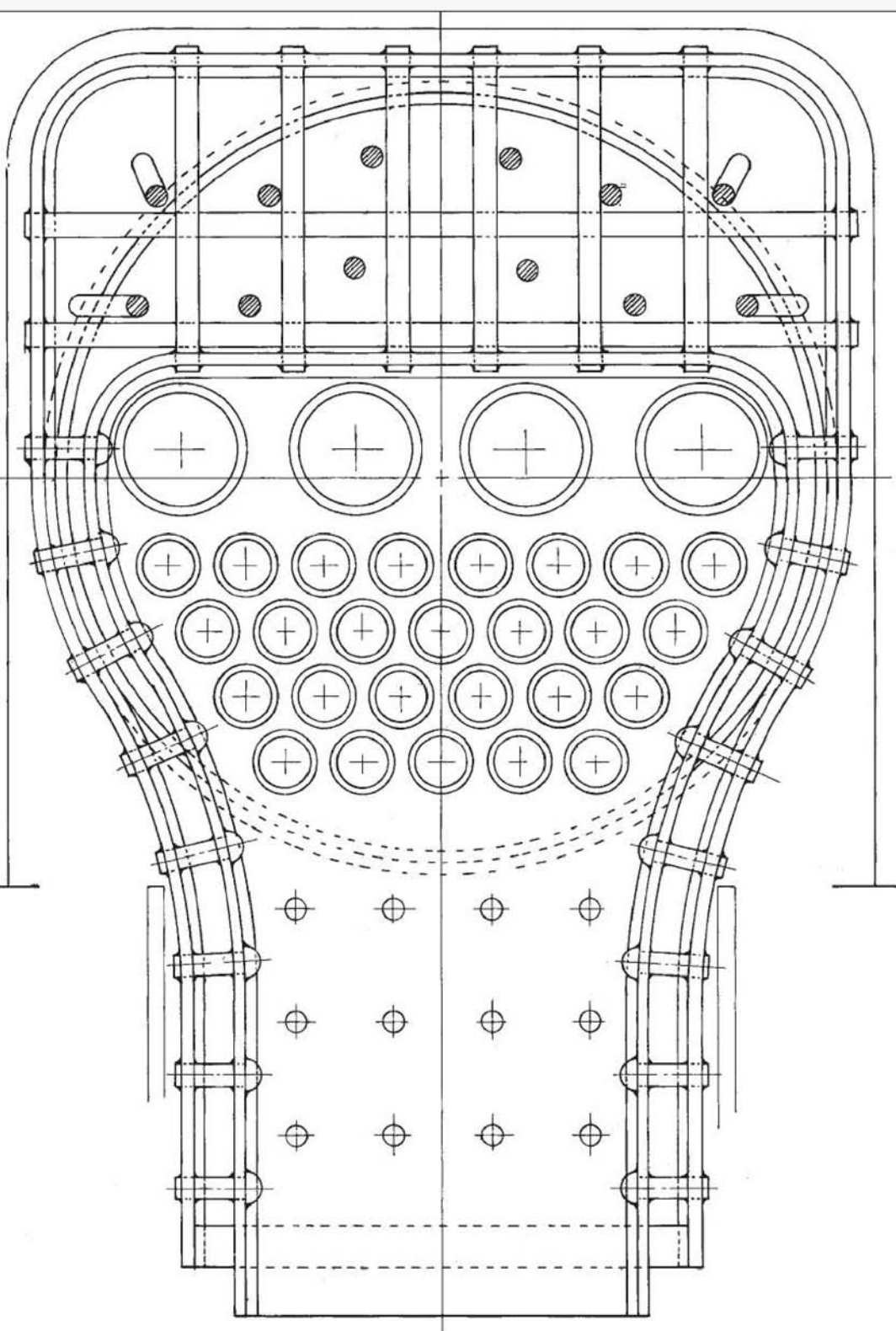
**Section through "Royal Scot" boiler
based on full dimensions.**

They were frequently used in full size practice and I have occasionally used them on my models. On full size Great Western engines palm stays were rivetted around the bottom rear part of the barrel, their ends being drilled and tapped with threaded copper stays screwed through the firebox tubeplate into the stay and riveted over

inside the firebox. I realise that in recommending them I am in danger of being guilty of my own criticism of making things more difficult, but they are neither too difficult to make nor fit. I offer them as a possible answer to what may be an otherwise incurable problem.

Further stiffening of flat or slightly curved

plates can be achieved by rivetting and silver soldering a thickening plate inside the flat surface, e.g., across the inside of the upper part of the backhead, a practice which was certainly carried out in full size. Of course, a girder type stiffening stay, similar to the girder stay usually provided centrally on top of the inner firebox,



Drawing No. 8.

Section through "Royal Scot" boiler showing cased curved plates to aid construction.

0.0625 in. dia. stays pitched at 0.3125in. apart or the same size boiler made from 6 gauge copper plate with 0.343in. dia stays at 1.89 apart and working at 100 pounds per square inch. Needless to say that if you are staying two different thickness plates your stays and their spacing should be calculated for the thinner plate size.

Now for a few words about construction of boilers. First, I remind you that as far as brazing and silver soldering are concerned cleanliness is all important and to this end you should provide yourself with an acid bath with a solution of about 5% sulphuric acid and the rest water. In the past I have used an old china kitchen sink and latterly an old water butt for this purpose. Whatever you use it should be capable of completely covering the whole boiler. I emphasise at this point that it is important to add the acid to the water and not *vice versa*. I also say never ever put a hot or warm boiler or partially assembled boiler into a cold acid bath, always leave things to cool right down preferably in a warm draught free atmosphere, if necessary over night. The reason for this is to avoid contraction because in the process of lowering it hot into the bath there are bound to be parts which will contact the acid and contract before other parts come into contact with it and the contraction will cause the metal to 'pull' and distort the boiler. Besides lowering a hot boiler into an acid solution is probably dangerous.

If you are unhappy about using an acid bath and have access to an air blown coke fire (or can make one) you could always resort to the old coppersmith's trick of heating the copper until it is red hot and then sprinkling salt over it. The salt will melt and be seen to spread over the copper whereupon the hot copper is plunged into clean cold water and when withdrawn, is very clean indeed. Unfortunately this method is only for dis-assembled plate work.

It is not my intention to describe all the processes of shaping the plates and wrappers etc., as I'm sure that by the time you get to this stage you will have obtained a basic knowledge of what is required. However, if you are building your first boiler I strongly recommend doing it under the supervision of an experienced model

maker as this will save a lot of tears. I wish someone had given me this advice in the late 1950s when I started in model engineering. To give some idea of what I mean I mention that for my first model I built four boilers, three of them without supervision of which three were thrown into the mud of the River Usk at Newport, that's

could also be used. In addition to staying the backhead from the front tubeplate with long stays the upper throatplate front corners of Belpaire fireboxes can be used for these stays, as can the rear upper part of the boiler barrels using palm stays. It does not matter what scale the model is or how big the boiler is, the most important thing

to remember about stays is that it is their diameter and pitch of the stays from each other relative to the thickness of the plate being stayed and the maximum pressure it is intended to work the boiler at. In other words, theoretically, you can have a 5in. gauge boiler made from 20 gauge copper plate safely working at 50psi., with

how good I was in those days and it wasn't until I came under the influence of my good friend and tutor Cyril Goulding, that I began to see the light. Cyril could make boilers like shelling peas and used to travel around giving demonstrations of the skill.

While I don't intend to instruct boiler construction there are some tips I can pass on which I have learned over the years the first of which is that it has to be borne in mind that in any brazed or silver soldered joint there has to be a gap through which the brazing metal has to pass and therefore it is far better to have a close loose fit than a tight fit for this purpose. I have had far more leaks in joints and stays by using a tight fit than by having a loose fit. The ideal is to have, and see, that the welding metal has flowed through the joint. Some 20 years ago I examined a boiler which had just had its firebox stays silver soldered and on not one stay had the solder run through the joint on either the inner or out fireboxes. Personally I have had excellent results by drilling clearance holes for firebox stays up to 0.015in. above the stay size and have never had a leak inside a firebox since I have been doing this. On every occasion the solder formed a beautiful fillet either side of the joint.

When you have all of your plates formed take a tip from me and do a dry run on assembling your boiler and put it together using bolts, not rivets. I use 8BA bolts and later open them out to rivet size. Doing it this way allows you to correctly align the barrel with the firebox and to drill all of the firebox stays without the barrel being in place. If you decide to drill all the stay holes at this point make sure that you put some packing pieces in the water legs to support the inner firebox against the weight of the drilling. If palm stays are called for, at this stage of drilling the outer holes I allow the drill to carry through and lightly mark the top of the inner firebox to indicate the line for their fixing rivets.

If any reader is unhappy with that then they can always run a scriber through and mark the firebox, but marking does need to be done before disassembly. Don't forget to mark those for the backhead if they are required. Bolting the boiler allows me to disassemble the boiler and clean out all the swarf and remove all the burrs around the various holes and to ensure that I have leads into the holes for the solder to flow rather than ridges which may prevent it entering the joint. I usually lightly countersink each stay hole, and remove any ridges caused by countersinking, to provide such lead. Also the rivet holes for the palm stays can be marked off and drilled.

There is nothing worse than seeing a boiler barrel out of line with its firebox however aligning a tapered barrel with a firebox is easy if you drill four 8BA clearance holes at North, East, South and West positions in the throatplate barrel flange. The assembled firebox and throatplate should be stood on its backhead on a flat surface upon which you can use squares. If your firebox is a tapered one then by touching the widest part of the firebox with a square and measuring in to the backhead of the firebox its centralisation can be adjusted

and propped into correct position. The barrel can then be entered into the throatplate and by eyesight can be adjusted to a square until the bottom part of the barrel is vertical. G.W. boiler barrels, although tapered were parallel with the rails at the bottom of the barrel. Once this has been done the 8BA North and South clearance holes can be drilled through the barrel from the throatplate flange and their bolts fitted. Once bolted up we now have to align the barrel east and west with the firebox sides and nothing could be easier. We now move the squares around to the sides and touch the square against the widest part of the firebox and carry the square up to the top of the barrel. By measuring in from the square to the top (front) of the barrel the dimension can be adjusted until they are equal and the East and West 8BA holes can be drilled and bolted up. I have no doubt that there are probably better methods of achieving correct alignment but this is the method I use and it has not let me down yet.

I have no doubt that experienced Model Engineers will have their own methods of brazing and soldering boilers and a lot of what follows may be in the nature of 'teaching Granny to such eggs' for a lot of you, but I know that when I first came into our hobby nigh on 50 years ago I had terrible trouble trying to get stays not to leak, and on curing one leaking stay only to find three more had sprung in the process. I mentioned earlier about throwing three boilers into the River Usk and that is quite true, but I then came under the influence of my friend Cyril Goulding who really set the foundation for me in our hobby. Under Cyril's guidance I still had failures in my boiler making, who hasn't, but they rapidly became less frequent and Cyril's real influence on me was that he made me stop and think for myself instead of blindly following the written word. There is nothing like expensive bad experiences ('cock ups') to teach and concentrate the mind. I reached a point where I felt that I had to develop a method of brazing boilers without failures or leaks. What follows is what I do, and I can say that I now very rarely have any kind of leak or failure.

For my boiler making I have access to oxy-acetylene equipment and Sievert gas torch with a range of burners from large to small. Except for silver soldering the tubes in both tube plates all of the work involved is done with the oxy-acetylene equipment, the Sievert blow torches being used mainly for annealing the copper and pre-heating before brazing, about which more later. The solders I use are Sifbronze for the major joints and one of the Easyflo Silver Solders for the rest. I never use soft or Tinman's solder on a boiler, indeed there is no need to. I also have access to an acid bath in the form of a water butt which I believe is of 40 gallon capacity containing a 5% sulphuric acid and 95% water solution. The rest of the equipment is rounded off by a couple of pairs of Blacksmiths tongs, an old pair of Mole Grips and long sleeved heat proof gloves and aprons.

Before making a start on the brazing I take all parts for a visit to the acid bath for a few hours and on removal they are washed off with

the garden hose over a sink, then I further clean them with wire wool or a "Brillo" pad making sure to wash away any soap. This procedure follows every brazing or silver soldering operation so in what follows rather than repeating the advice on every occasion I'll just write the word 'Bath' at that point and you'll know what I mean. I had intended to use the word 'Brillo' for this but I'm not sure whether this product is available everywhere.

Just one more tip before we start on permanent assembly. General heating of parts in the later assembly is very important to avoid distortion. If you have any doubts about this then always generally heat the whole structure before concentrating on the part to be brazed. You cannot do any harm by general heating and likewise cannot do any harm by allowing things to cool down to cold, and when I say cold I mean cold to touch. This last lot is very important if you don't want a distorted boiler.

Turning now to soldering the boiler let me first pass on a tip and always use the largest brazing/silver solder rod on joints such as the flanged parts of the boiler. Don't mess about with 0.0625in. dia. Rods as you will use far too much material to fill the joint. The larger rods do not require any greater heat than for the smaller ones, but will much more adequately and easily fill the joint than small rods.

If, as seen in my 'County' boiler, the barrel requires a butt strap joint along the bottom joint it is lightly riveted in position and fluxed with a suitable flux usually Sif Flux. The barrel is then propped horizontally with firebricks and generally heated with the blow torch. When the whole is at black heat I then prop the blow torch to play the flame externally along the bottom joint. With a long Oxy-Acetylene burner I then Sifbronze the joint from inside and allow the spelter to run through the joint. By doing this joint in this manner I find that Sifbronze will run like water and completely penetrate the joint. At about this time I also Silver Solder the bushes into the backhead plate and front tubeplate. (Bath)

While these parts are cooling down I make a start on Sifbronzing the tubeplate into the inner firebox working from the inside with the Oxy-Acetylene which is done with its backplate in position. When this has cooled its followed by a visit to the acid bath etc. Depending on the type of crown stay called for I usually leave the backplate removable, until all side and crown stays have been soldered, to ensure easy access to the rod type crown stays when fitted.

The throatplate is now riveted to the barrel and Sifbronzed from inside. Some people may be tempted to also lightly rivet and Sifbronze the outer firebox wrapper at this stage but take a tip from me and don't. You will need to be a very experienced coppersmith to do that, but for we amateurs I believe it is taking on too much work at one go. The presence of the outer wrapper it makes it very awkward to get at the bottom part of the throatplate/barrel joint for brazing. If you are using girder stays for the firebox crown it is at this heating session that you need to silver solder them to the firebox. (Bath).

● *To be continued.*

Stan Nipper and Martin Wallis describe the crankshaft for the *Universal Carrier* but begin with some comments on the Model Engineer Exhibition 2005.

●Part XIX continued from page 392 (M.E. 4270, 31 March 2006)

If our worthy editor can spare the space, a few words on the 75th Model Engineer Exhibition of December last might be appropriate. Stan was unable to visit but happily I was, and what a great day out it was. I have just read the competition models write up (M.E. 4268, 3 March 2006) the text offering a near full house of 'disappointed' in respect of the number of models entered (overall, I understand entries were slightly up on last year - Ed.). At the exhibition there were, predictably, a number of conversations referring to an imagined 'decline' in the number of practitioners of our hobby.

There has always been a degree of ebb and flow with respect to the number of competition entries but I believe the underlying picture, i.e. the health of our hobby, is as bright as ever. The premise is based on two observations.

Firstly, the day job involves teaching 11 to 18 year olds 'Product Design' which is the latest title in a long sequence including 'Design Technology', 'Creative Design and Technology', 'Resistant Materials', 'Craft Design and Technology' and 'Combined Materials' to name but those which come to mind. The subject is not what it used to be, on the plus side are the digital technologies - I would be lost without our CNC milling machine - but sadly the teaching of the traditional hand, and particularly machine tool skills, are in decline. However what does appear to be constant is the desire to create, which for a minority translates to mechanical artifacts; starting with taking a bicycle to bits and progressing to perhaps making a small steam engine. At my school as many little oscillators and beam engines are made now as ever were before. Likewise there is certainly no lack of pupil support for the school's miniature railway.

Secondly our hobby is not the preserve of the retired engineer, the appeal is much broader. The youngest builder of a *Little Samson* is a young lady of just 13 years. There are builders of all sorts of ages and backgrounds. What do the following have in common: a policeman, a butcher, a nuclear scientist, a racing car designer, a farmer, an adhesives expert, a taxi driver, an air traffic controller and a psychiatric nurse? The answer is they are each building a *Little Samson*. I can see no reason why the experience of the *Little Samson* tractor does not equally apply to the broader repertoire of engineering projects within our hobby.

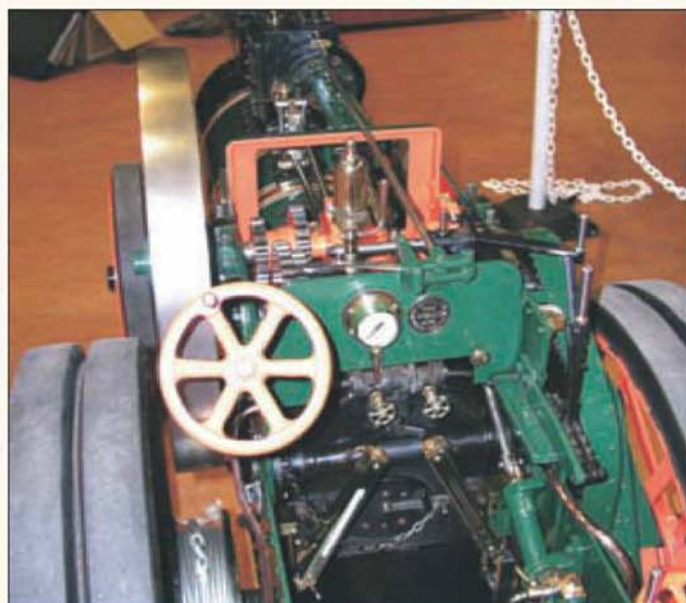
Crankshaft

To return to our *Universal Carrier*. With the

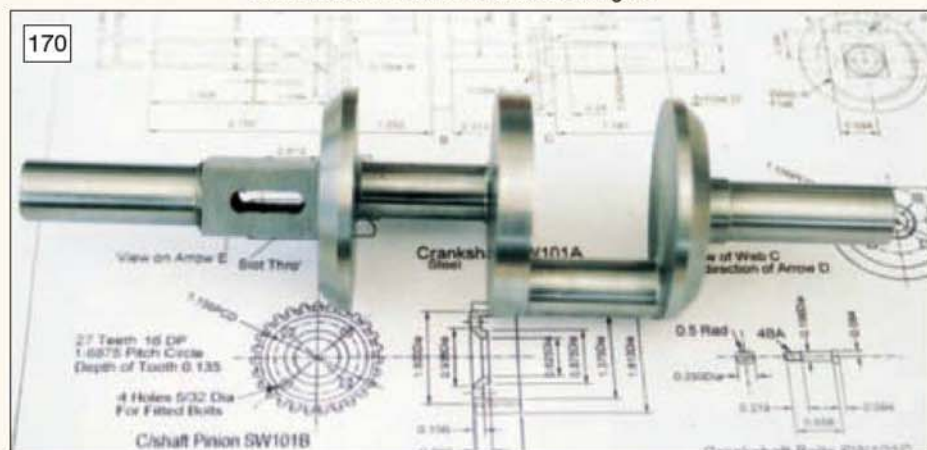
SAVAGE'S UNIVERSAL CARRIER

crankcase now complete the next logical part to make is the crankshaft. A finished crankshaft is illustrated in photo 170, and with the drive gear and moving eccentric assembly added in photo 171. As may be seen the bearing areas are generous; which combined with the oil bath lubrication must have resulted in a unit requiring a minimum of running maintenance.

The prototype crankshaft would have been a forging. On the model it is machined from a solid bar. There are alternatives, the



Seen at the Model Engineer Exhibition, 2005, the footplate and motion on John Bruce's 1:3 scale Foster traction engine.



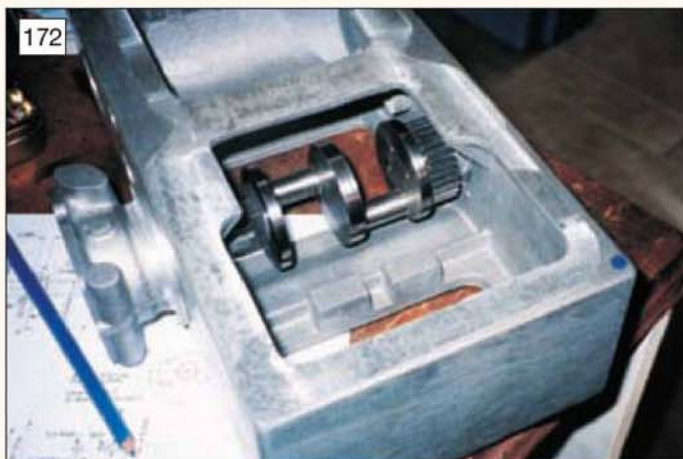
Stan Nipper's finished *Universal Carrier* crankshaft, note the through slot for the valve gear actuating pin (photo: Stan Nipper).



John Thompson's crankshaft with the drive gear and valve gear eccentric assembled (photo: John Thompson).



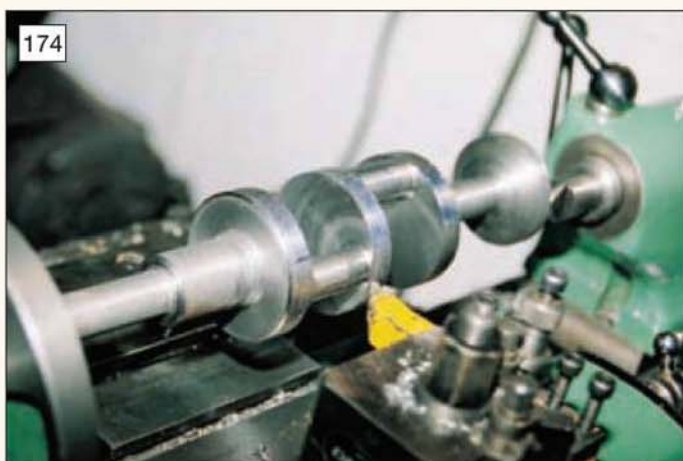
SAVAGE'S UNIVERSAL CARRIER
Fig 72: Crankshaft



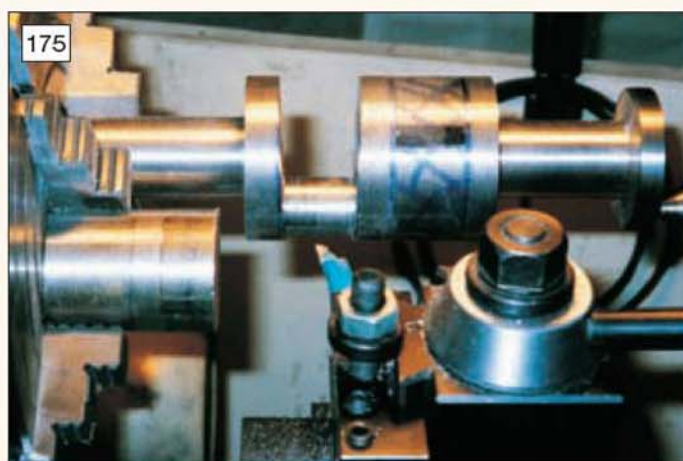
172 John's crankshaft being fitted in the crankcase for the first time (photo: John Thompson).



173 The crankshaft mounted between centres and driven by the catch plate. The second big end journal is being machined (photo: Stan Nipper).



174 The second crank pin approaches its finished size. Care must be taken to avoid deflection and chatter (photo: Stan Nipper).



175 John preferred to hold his crankshaft in a 4-jaw chuck when machining his big ends. Tailstock support is still needed (photo: John Thompson).

most obvious being fabrication but a quick inspection of the drawings and illustrations show the crank pins to be far too close to the circumference of the crank cheeks for any thoughts of a press fit - although silver solder fabrication remains a possibility. It was felt that a malleable iron casting was not warranted, primarily on expense grounds, but also in the knowledge that machining a casting would not be a very great overall time saving when compared to cutting it from the solid.

To make the crankshaft a suitable piece of 2.125in. or 2.25in. bar will be needed, or a metric equivalent. The crank webs are discs, the outside pair having flats machined on them opposite the crank pins for balancing purposes. The finished O/D of 2.062in. may at first seem rather anti-social - why not make it 2.000in. - but in order to preserve the scale crank throw of 0.750in. and the crank pin diameter of 0.563in. the extra 0.062in. is necessary.

The material is simply stated as 'steel', which those with inspector meticulous tendencies would find rather unhelpful. The intention is to avoid unnecessary complication as any steel will do the deed. Different steels certainly have differing properties, EN8 is a good general purpose steel and will make a very durable crankshaft, however for ease of machining EN1A (free cutting) is hard to beat and given the generous bearing areas the relative softness of EN1A is of little consequence. Many, if not most, builders will simply use whatever material is to hand, so 'steel' it is.



176 The roughing out is complete and the part is decidedly crankshaft looking (photo: Stan Nipper).

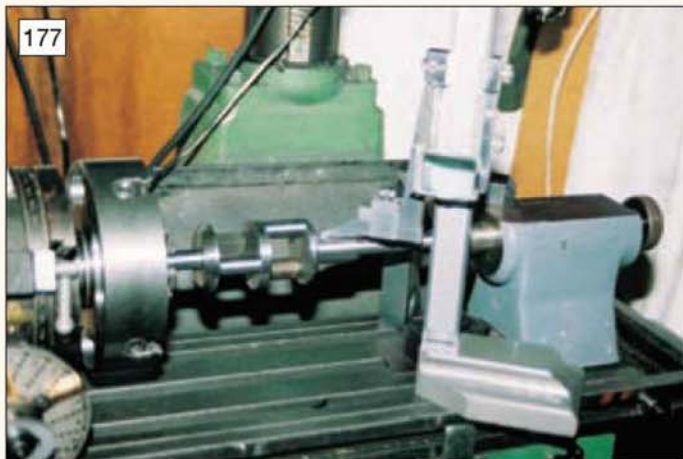
Marking out

The centres for the main bearings and the two big ends will need to be marked out on the ends of the piece of bar. It should be noted that when the wagon is being driven forwards that the crankshaft when viewed from the valve gear end (as per the end elevation on the drawing) is turning clockwise, and the high pressure crank is leading. Every care should be taken when marking out, both for accuracy and crank pin orientation.

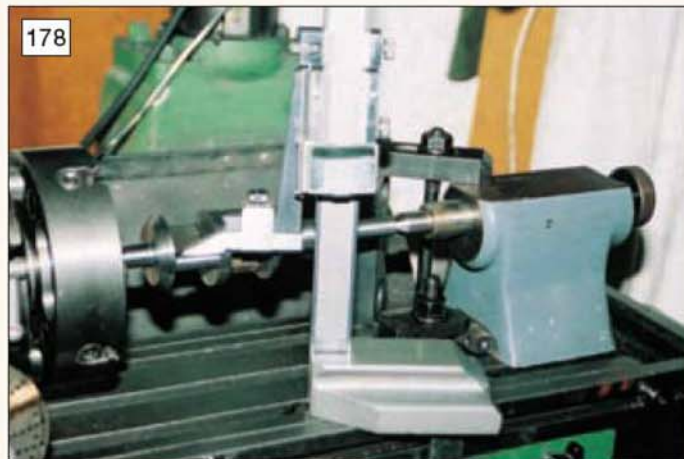
Even if your eye sight is good it is probably worth checking the dot punches are in the right place with an eyeglass before drilling them. In the absence of a miniature centre drill a 1/16in. dia., or smaller, twist drill will pick up the dot punching very nicely after which a more substantial centre drill may be used.

Machining

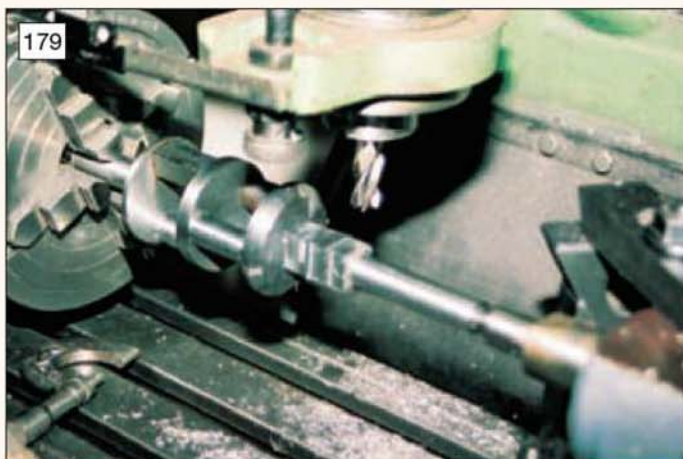
The obvious starting point is to remove most of the metal around the main bearings remembering to leave all the dimensions on the large side to allow for subsequent skims to be taken at a later stage. Obviously, remember to leave enough metal on each end of the shaft to retain the centre drillings for the crank pins. A 3-jaw chuck is fine for this initial turning. The crankshaft may then be mounted between centres, see photo 173, using the locations for one of the big ends. A big end may be roughed out, using alternatively left and right hand knife tools, remembering to take light cuts and to leave the crank pin oversize. The second crank pin is then turned, taking ever lighter



177
The top of the main bearing is picked up with a height gauge. Note the blocks fitted between the crank webs to take the tailstock thrust.



178
The height gauge is set to the centre height plus half the diameter of the big end, and the crankshaft carefully rotated until the journal just touches it.



179
The square can then be carefully machined on to the shaft using an end mill as shown.



180
A fixed steady is used to support the crankshaft when drilling the hole for the valve gear operating rod in the lathe.

cuts as the crankshaft is becoming less rigid by the minute as the material is being removed.

If chatter is experienced re-sharpen the tool to a point, a respectable finish is still achievable but a very fine feed will be needed. The reason is that a radiused ended tool will cut a wider shaving, making chatter more likely. Some care will be needed to blend in the cuts from the left and right handed tools;

The crankshaft should then look like **photo 176**, very much a crankshaft but still retaining the end flanges and with all the dimensions a little oversize.

Final Skim

It will be necessary to lightly skim all the crankshaft journals and faces. As the crankshaft was taken from a piece of bright drawn mild steel bar it will have all sorts of internal stresses locked up in it. The stresses are a consequence of its manufacturing process, where the bar is drawn cold through a variety of dies. When machining the material concentrically to reduced the diameter it is likely to remain pretty straight, but where the material was removed asymmetrically, as when making the big ends, a degree of movement is very likely.

Between the crankshaft will need to be put back between centres to lightly skim the main journals to restore concentricity, but again it is still wise to leave the dimensions very slightly oversize. The shaft is then re-set to re-skim the two big ends which may now be taken to final size. When finishing the big ends do not be

Drawings and castings for the Savage Universal Carrier and Little Samson steam tractor are available from: Little Samson Models, 38 Wheatsheaf Way, Linton, Cambridge CB1 6XD; website: www.littlesamson.co.uk; email: edward@littlesamson.co.uk A catalogue is available, cost GBP2.50 post free, cheques with orders please.

tempted to emery cloth the big ends with the lathe running as the cloth is almost certain to get wrapped around the work. With the big end journals complete the end flanges may now be machined away and a final skim taken over the main bearings and gear location.

I know of at least two builders who, in their search for perfection, even then elected to leave their crankshafts a little over size and then 'rest' their prized creations for a year or more before undertaking the final few cuts. Such care is undoubtedly not common place. Consensus might be that this is somewhat over fussy; but in one of the cases - 3in. to the foot scale crankshaft and a substantial piece of material - which ran perfectly when first machined then after two years 'resting' was found to have a 0.005in. run-out in the middle. For those who might be wondering, my understanding was that the material for this particular crankshaft had been stress relieved prior to machining by heating it to red and allowing it to cool slowly, which ought to have solved minimised the distortion.

Orientation of the square

The 1.094in. long square portion of the crankshaft is next on the agenda. The 0.656in. dimension across the flats is not crucial as the slippers could be made a few thou thicker if required, but the orientation of the square on the crankshaft relative to the crank pins is important as it determines the valve events.

Happily, it is quite easy to set the crankshaft up. First set the height gauge to the top of one of the main bearing journals. By deducting half the diameter from the reading the exact centre height of the crankshaft may be accurately established, see **photo 177**. The height gauge is then raised from centre height by half the diameter of the big end journal and the crank pin positioned so the big end is just touching the height gauge. The crank pin is then also exactly at centre height and thus its axis is horizontally orientated to the main crankshaft axis. The other crank pin will of course then be vertically aligned to the main axis.

Using a dividing head the square is then machined onto the crankshaft; light cuts and a sharp cutter are recommended. Do not dismount the shaft until the 0.219in. slot has been added. Using the dividing head approach, form the slot from both sides. If each of the slots are machined to about 0.15in. deep that ought to be about right to intersect the 0.375in. drilling.

The remaining operations are all drillings, firstly the 0.375in. hole axial to the shaft, see **photo 180**, and the four holes for the fitted bolts that secure the drive gear. The fitted bolt holes are best jig drilled from the gear.

●To be continued.

THE PRODUCTS OF TANGYES OF BIRMINGHAM 1891

David Piddington

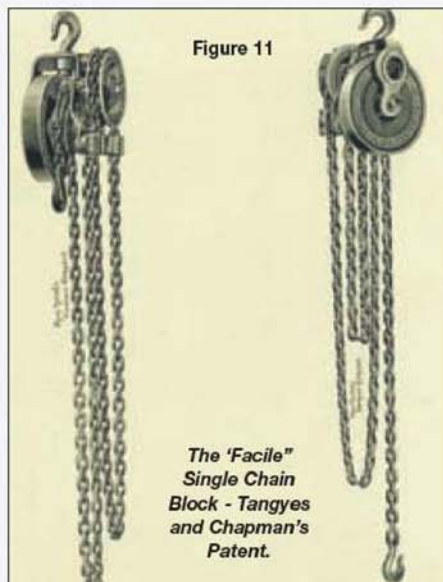
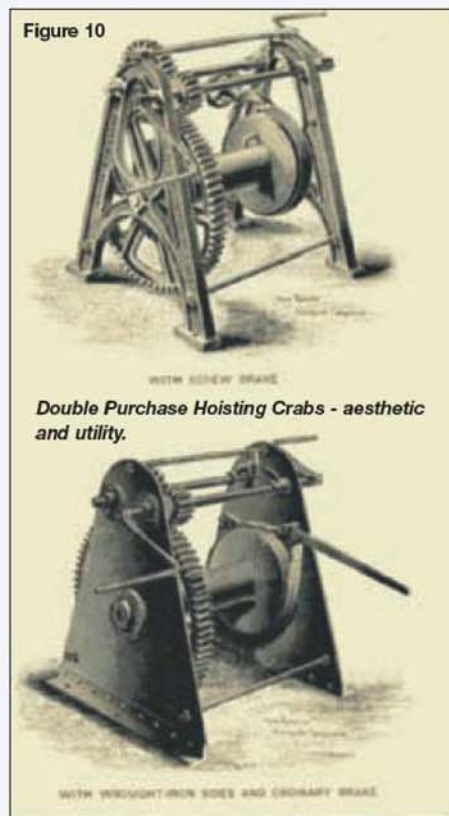
continues his look at the products of the Cornwall Works.

●Part II continued from page 396
(M.E. 4270, 31 March 2006)

Another type of crab was the ground lift type illustrated (fig 10) from which a rope or wire was taken up to a pulley which could be fixed to any suitable beam, or even a tree branch. They were available for use with hemp or wire ropes and for single, double or even treble purchase. To explain 'purchase' consider your lathe with its back gear, single purchase is equivalent to direct drive, double purchase is with the back gear engaged, and treble purchase would be with additional gearing for a yet lower ratio. As can be seen from this engraving the side frames could be cast 'aesthetic', or simple plate utility and had capacities from 8cwts to 40cwts and with from 7 1/2 to 15in. main barrel diameters. A brake wheel, cast integral with the main drum, had a ratchet fitted and the brake was either hand or screw operated.

There were many types of pulley block manufactured, (fig 11) and just one engraving here shows two of the chain type for single chain and of the sustaining type - a Tangye patent - where, when the hand released the chain the load remained suspended. Lowering was effected by gently pulling the chain the 'wrong' way. There were particularly useful with low headrooms for the hook would pass up very close to the block. These were made for loads from 1/4 to 2 tons and for lifting from 5 to 25 feet. Their actual weight ranged from 20 to 115lbs and cost from £1.4s.0d. up to £3.12s.0d. each.

Figure 10



Rope pulley blocks were used in abundance (fig 12) and many were galvanised for use on board ship. A few of the rope type are illustrated here. Most were of single, double, triple or quadruple sheave types and had a variety of fittings for support or hooks. The largest rope groove is given as 3 1/2 inches - quite a rope. I am aware that rope may be measured on its diameter or circumference. Which type is not indicated in the catalogue though I suspect for general engineering the circumferential measurement is the most likely.

The next illustration (fig 13) is of the railway travelling crane, shown here with a ground mount type of crab. Note the clips for securing the vehicle to the rails when lifting is in progress. The operator would have to be particularly not to attempt a lift of greater weight than the stated limit or one visualises the whole crane complete with track, in those days not greater than 60ft., and often half that between the fishplates, being lifted. Not a pretty sight! The carriage is basically a truck chassis but with strengthened wrought iron side plates and a cast iron baseplate with a turned roller ring cast on top. The jib was of wrought iron latticed construction and the bottom of it was fitted with a roller running on the turned roller path. The adjustable balance block was of cast iron and ran on iron wheels within the girder frame. Two sizes of this crane were offered for 5 and 10 tons lift respectively though both having a maximum lift radius

of 16 feet.

Another type of crane (fig 14) was this jib type, securely mounted to a substantial and suitably reinforced wall with a wrought iron jig and supporting girders. These were made to suit swing radii of 4, 5, 6 and 8ft. and were subdivided into lift capacities of 1/2, 1, 1 1/2 and 2 tons for each swing radius. The two heavier sizes had a return block and hook and arranged for the load to be lifted with a double chain. A floor mounted crab was for the lighter lifts with either hemp or wire rope. The swivel height of the 2 ton x 8ft. radius crane was 12 1/2ft. between the vertical pivots.

In addition to cranes, travellers, and crabs another method of lifting equipment - the original Tangye product - the jack were available in 30 different types in 1891 both hand operated and hydraulic. Four of the screw types are illustrated here (fig 15).

a) The Bottle Traverse Jack, supplied with a wrought iron case, brass top and bottom nuts, double ratchet with wrought iron wheel and pawl, and supplied with a traverse lever. Available in sizes to lift 8, 10, 12, 15, 18 and 20 tons.

b) The Leg Traverse Jack, with wrought iron legs, brass top and bottom nuts, wrought iron lifting and traverse screws, double ratchet with wrought iron wheel pawl and traverse lever.

c) An Open Case Traverse Jack, a design which secured the rigidity of the bottle type and the advantages (not stated) of the open leg type. This had a malleable iron case and nuts, wrought iron lifting and traverse screws, double ratchet with wrought iron wheel and pawl and, of course, the traverse lever.

d) Tram Car Traverse Jack. An adaptation of the bottle type but with a side step which would be inserted under an appropriate part of the tram,

Figure 12

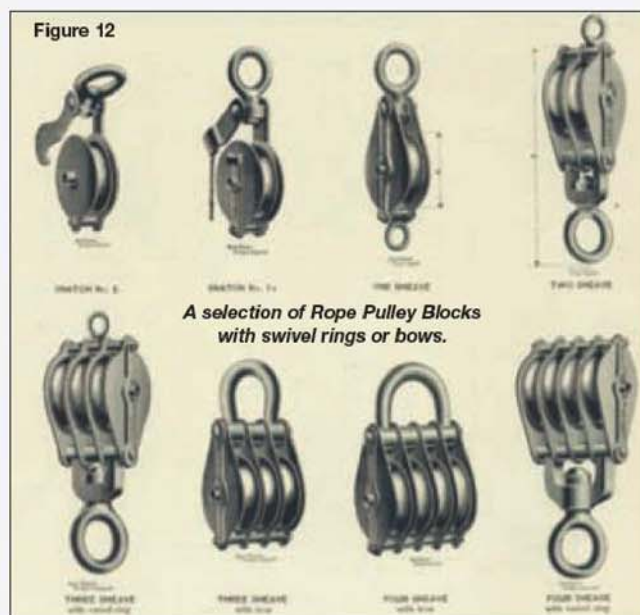
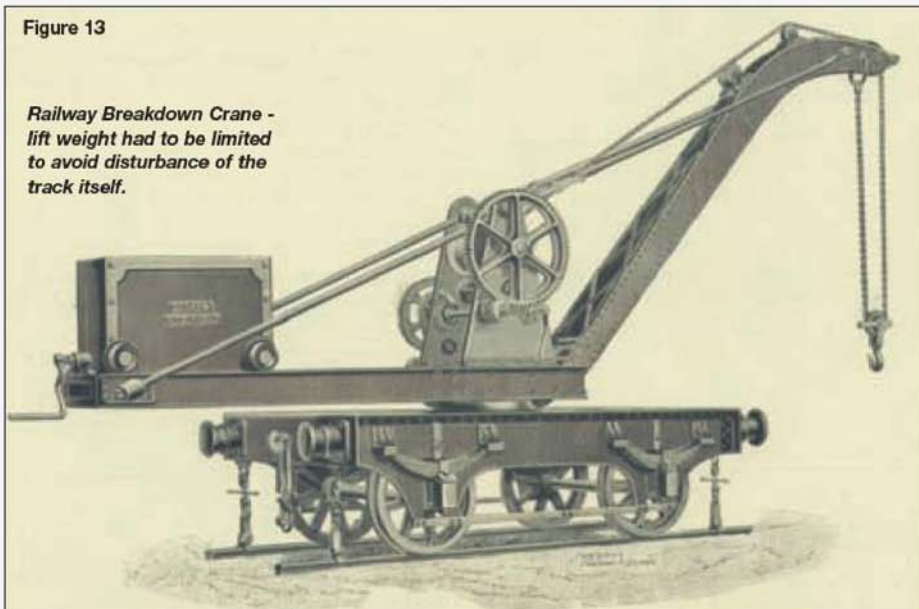


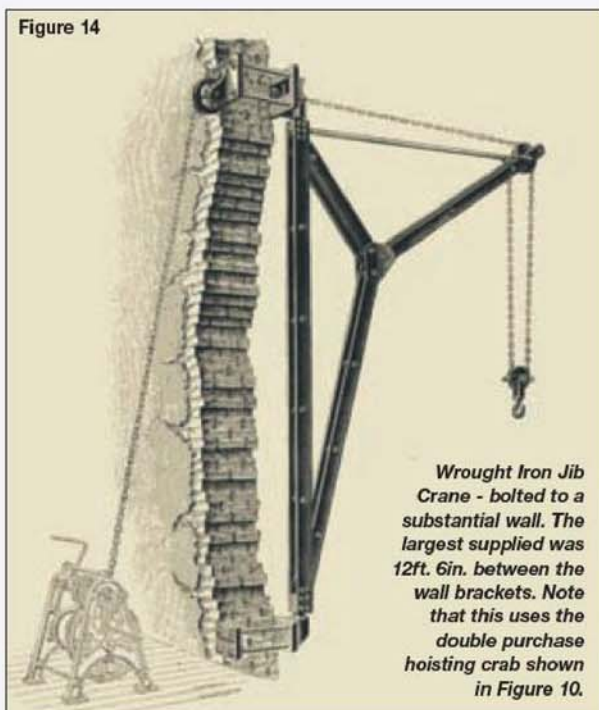
Figure 13

Railway Breakdown Crane - lift weight had to be limited to avoid disturbance of the track itself.



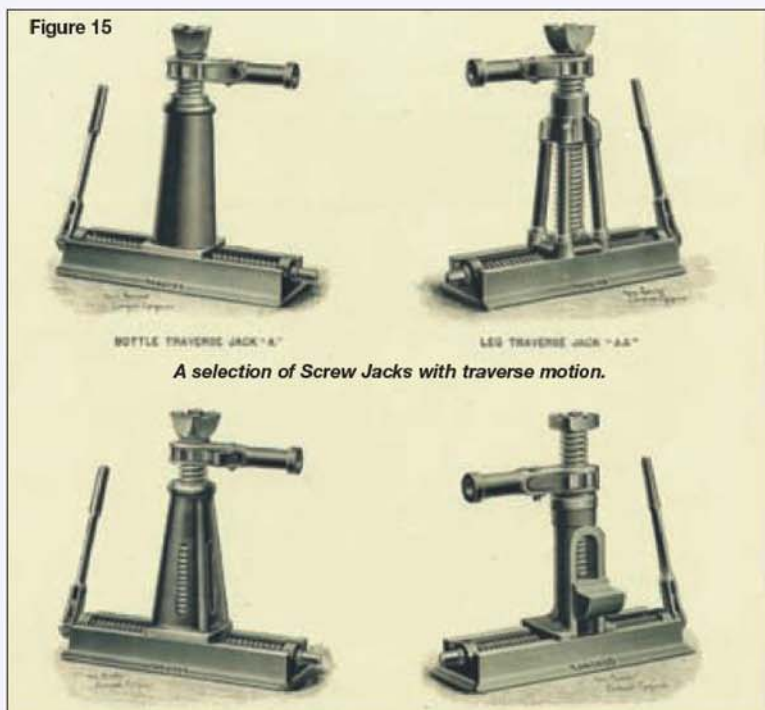
Among machine tools made by the Company drilling machines would naturally form a prominent feature of sales and I am describing three types, two large and the other, smaller. The large radial drilling machine (fig 18) was double geared from a 5-step pulley driving the spindle through both spur and bevel gearing. The bevel gears were all 90deg. mitre type and so speeds could be calculated directly from the pulley diameter and gear ratios. The feed motion of the drill head was self-acting with a steel screw of same diameter as the spindle. It was driven either by spur gear or by worm and pinion from 3-step cone pulleys giving three feed rates for either type. The motion was engaged with a friction clutch. The saddle carrying the spindle and feed motion could be moved along the arm with rack and pinion handwheel. The radial arm could

Figure 14



Wrought Iron Jib Crane - bolted to a substantial wall. The largest supplied was 12ft. 6in. between the wall brackets. Note that this uses the double purchase hoisting crab shown in Figure 10.

Figure 15



A selection of Screw Jacks with traverse motion.

and having similar specifications to the others reviewed here. This was available in only three sizes namely 6, 12 and 15 tons capacity as it was unlikely that any tram of those days would exceed that weight limit.

A quick summary of other types, not illustrated here, include a 'Haley' jack of part wood construction; windlass jacks which had a double handle similar, obviously, to a windlass; simple screw lifting jacks, Cape Wagon jacks with either metal or wooden stand, billiard table jacks (your author owned a slate bed half size billiard table when a youth and this was placed somewhat precariously on top of the dining table with selected wood posts as additional support at the corners. Four of these jacks would have been much appreciated) very slender and for up to 1/2 ton only; telescopic and traversing types, hydraulic jacks for lifts up to 200 tons; hydraulic equivalents of many of the hand types and also horizontal jacks for pulling and pushing.

A most essential piece of equipment for

moving objects around in a factory, even today (fig 16) is the ubiquitous 'sack' truck or, as in this instance, 'Wilmott's Hand Truck'. This was fitted with a patent self-locking gear, presumably as the load was lifted or levered off the ground the mechanism would lock the wheels and axle, though no specific details are given. 'Wilmott's' truck was made in five sizes, number 1 being 45in. high, weighed 37lbs and cost £1.2s.0d. The number 5 size was a giant 64in. high, weighed in at 88lbs and cost £2.8s.0d. As I mentioned before very few items are priced in the catalogues. If I may be allowed to digress here once more my daughter was about five years-old when I took the Tangye photos and I showed her this one. 'It's you, Daddy', she said! I admit to a certain likeness - tall, slim, bearded, and handsome!

We now consider an old and well-established part of the Tangye output, machine tools, made at the Oxford Works, just across the Cornwall Road. Figure 17 shows the title page of the separate catalogue. The range of supply was considerable, much more than in this engraving.

Figure 16

Wilmott's Hand truck with Self-locking Gear.

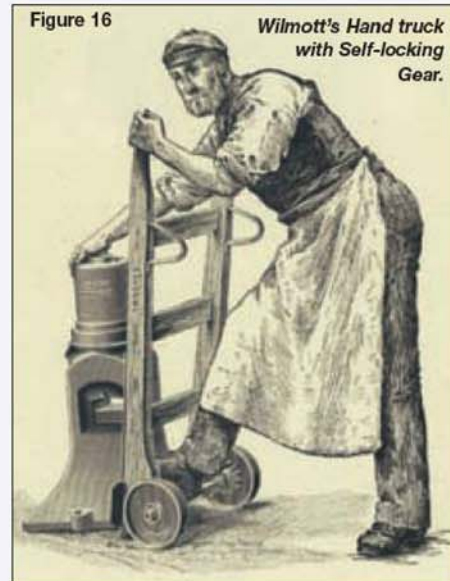




Figure 17 - Title page of the Oxford Works catalogue dealing mainly with machine tools.

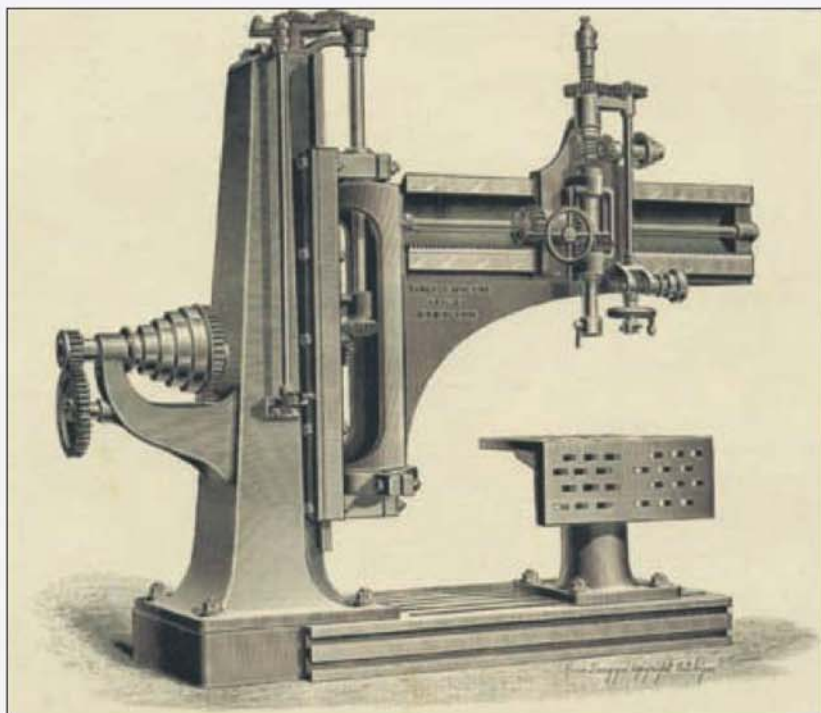


Figure 18 - Radial Drilling Machine, one of several types made by Tangyes. This example is the large type which was double geared from a 5-step pulley.

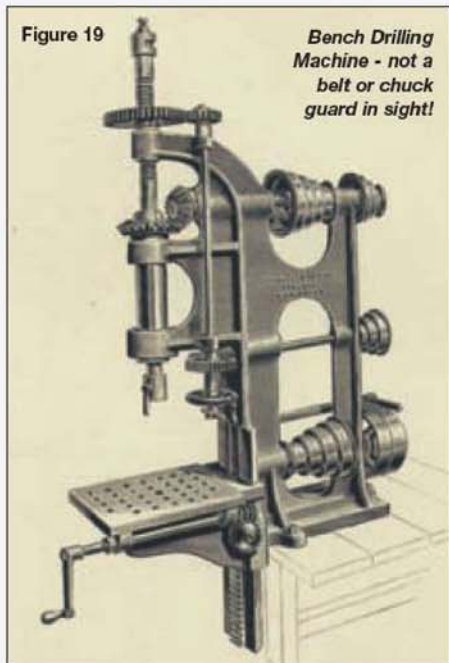


Figure 19

Bench Drilling Machine - not a belt or chuck guard in sight!

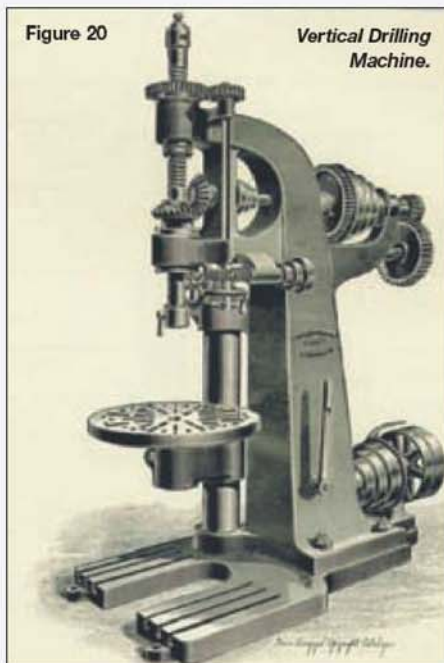


Figure 20

Vertical Drilling Machine.

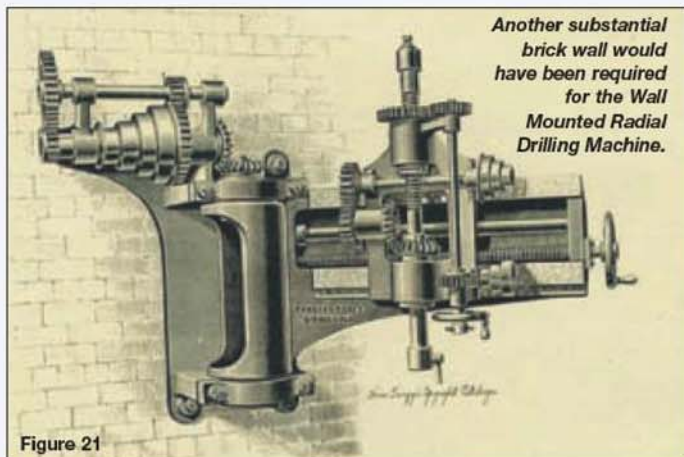


Figure 21

Another substantial brick wall would have been required for the Wall Mounted Radial Drilling Machine.

swing through 190deg. and was carried by trunnions on a vertical slide and fitted with locking bolts. The vertical slide was driven by gearing from the 5-step cone pulley and a handle was provided for disengaging the gear drive as required. The machine was made in four sizes giving effective radii of 5, 6, 7 or 8 1/2 feet. The smallest size weighed 4 tons and required a floor area of 11 by 13 feet.

The largest weight 12 tons and required a floor area 20 by 16 feet.

A smaller machine illustrated in fig 19 has certain recognisable features from today's industrial scene except, of course, that not a single guard is visible, or even perhaps used in those now far off days. Again the spindle was driven through spur and bevel gears and in common with the larger machine, engaged the final drive with a friction clutch. The table could be raised and lowered with a worm and wheel into a rack and pinion mechanism. The vertical traverse of the spindle was 5in. and that of the table a further 18in. and so a work piece of some 20in. high could be accommodated. The throat dimension was 9 1/2 inches and the machine weighed 6 1/2 cwt. (hundredweight). The bench area required was 48 by 18 inches.

The third machine of this series fig 20 is this floor mounted vertical machine of very robust character. The principle of driving the drill head is in common with the first two described, but the circular table can not only revolve on its own axis, but also pivot around its vertical column on a support arm to enable larger work to be bolted to the T-slotted feet. Two sizes were made either being available in single or double gear. The double-geared machines had a slower speed range. The conveniently placed handle on the column operated the belt striker gear for the fast and loose pulleys. Floor space required was 66in. square for the smaller which weighed 1 ton, and 88in. square for the other which weighed 32cwt. As an alternative a compound table was supplied instead of the circular one.

Other drilling machines made by Tangyes included smaller radial types down to 36in. maximum radius; a so-called portable type which weighed nearly 1/2 ton; a fixed wall mounted type; a pin hole drill, tall and mounted on a circular column, several bench drills for hand or power operation and a wall mounted radial machine (fig 21) for use where floor space was at a premium.

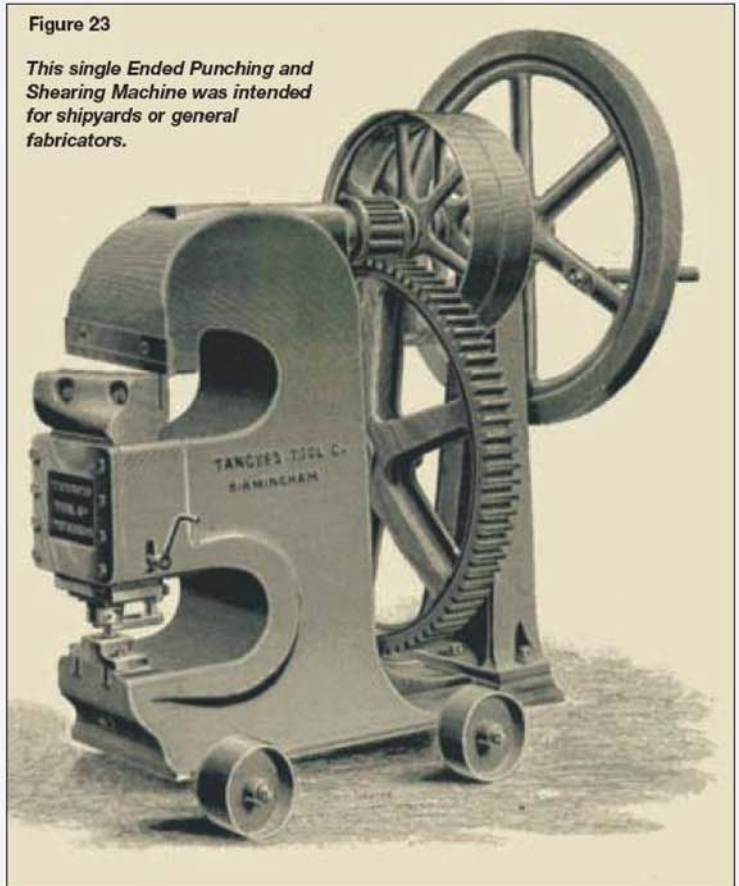
Another familiar piece of workshop equipment fig 22 is the pipe threading and

Figure 22



Figure 23

This single Ended Punching and Shearing Machine was intended for shipyards or general fabricators.



screwing machine. The 1891 version produced a full thread depth in one operation and had a hollow spindle to permit unlimited work piece lengths.

It was either hand-operated, or by crossed and straight belts from fast and loose pulleys and thence through bevel gearing. Four sizes of this machine could be ordered having three speeds except for the smallest which had only two. The sizes were for nominal 1, 2, 3 and 4in. bore pipes and thus had hollow spindles of 1½, 2¾, 3¾ and 5in. bores respectively.

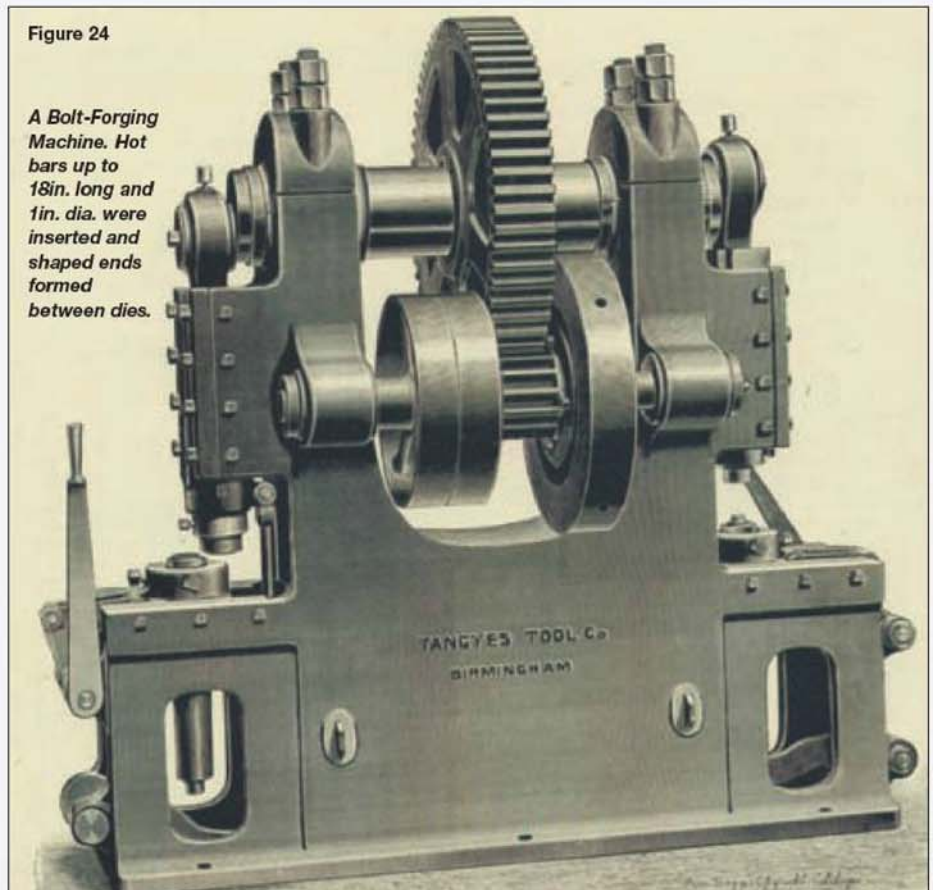
Next we come to a very robust piece of 'portable' equipment fig 23. From its size and weight the wheels must have been very free running and with no brakes one would dread this getting out of control. Presumably having been positioned the wheels would have been removed and, more importantly, there would have been two more wheels on the other side? This is a combination machine used for shearing plate and punching holes in the edges for bolts or rivets.

Four sizes were produced the smallest capable of shearing ½in. plate and punch a ½in. hole, the larger machines would, respectively, shear and punch ⅝, ¾ or 1in. materials. The smallest weighed 14cwts, the largest nearly 5 tons. The internal mechanism was eccentrically operated from reduction gearing. One would assume that the shipbuilding industry would have been the major purchaser of these machines. A very similar machine for forging bolt heads is illustrated in fig 24.

●To be continued.

Figure 24

A Bolt-Forging Machine. Hot bars up to 18in. long and 1in. dia. were inserted and shaped ends formed between dies.



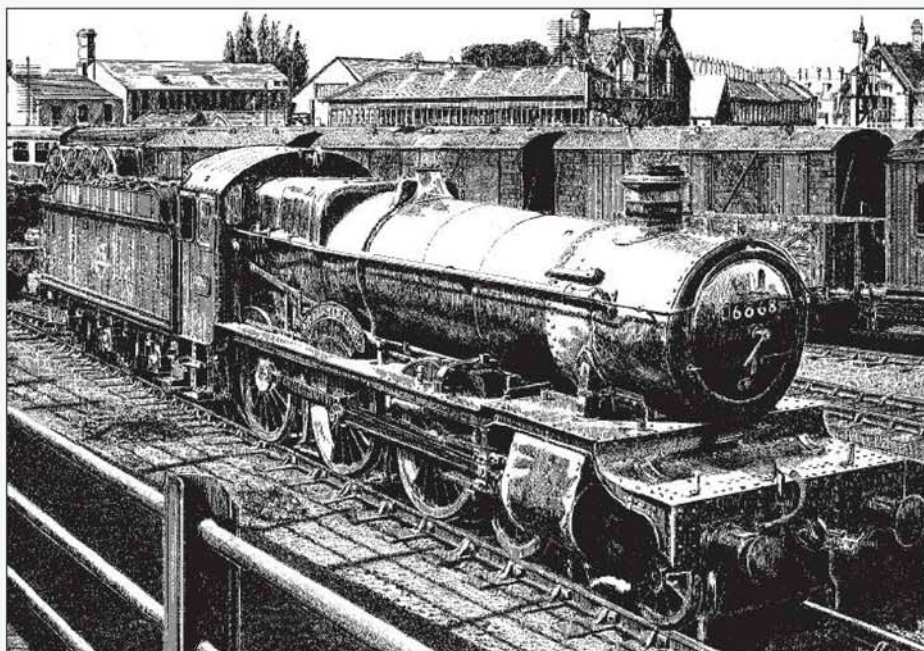
Neville Evans

resumes his description of the parts for *Penrhos Grange* and deals specifically with the draincocks and pressure relief valves before commenting on some readers letters.

●Part XXVIII continued from page 268
(M.E. 4268, 3 March 2006)

The spring loaded, plunger type of draincock that was fitted to the 'Granges' and in fact to many, if not all of the later two outside cylinder locomotives that we are describing, was introduced after much experimentation, at or about the time of the 'Hall' class in 1928. It replaced a variety of plug cocks and vertical spring loaded valves and remained as standard until the end of steam on the GWR and the Western section of British Railways. The valves themselves present a number of problems in the smaller sizes, and in fact were a very interesting piece of design work. This reminds me of the old Chinese curse of: "*May you live in interesting times*". I have grown to admire the simple and uncomplicated.

The presence of the bent up supports behind the rather complex levers and structures that actuate the plungers means that the valves have to be dismantled to reduce their width before they can be screwed into the cylinders. The central draincocks are attached to the valve chest drain and should be adjusted so that they open a little later than the two outside cylinder drains. This means that, with a little judicious wangling, the cylinder cocks can be opened without lowering the pressure in the valve chest. The plungers are operated by small levers attached to the pull rods by means of 12BA bolts set in slotted holes, so that they can be adjusted slightly fore and aft to give a small amount of leeway in the original set up. This rather flimsy arrangement could be augmented by soldering the levers onto the pull rods after the final adjustments have been made.



PENRHOS GRANGE

What must be borne in mind, however, is that as the valves are spring-loaded they have to be positively held open by the lever in the cab while they operate. The alternative is simply to hold the valves open while it is deemed necessary to clear water from the bores. I have used a length of Bowden cable working in a brass tube to transmit the pull from the cab lever to the business end via a 1/8in. dia. cross-shaft and linkages. The GWR used a long link from front to back but during the course of a long chat with David Aitken, who is one of my telephone gurus, (actually I hoped that he had sorted out all the problems years ago) he voiced the opinion that the whole idea of a long flexible link was a severe pain and that he would be happy to see a better solution. I don't know if this one is better, though it certainly is different. I hasten to add that I claim no originality for the scheme, which is as old as the hills.

The construction of these valves should present few problems. They can be fabricated from brass or gunmetal and in fact Bruce Engineering should, by the time that you read this, have bodies partially or completely machined in stock. The plunger is made from a piece of stainless steel and it may be possible to scrounge the springs from discarded disposable lighters. Failing that they will be obtainable from trade sources. It should be possible to grind the 30deg. bevel into its seat by holding the protruding end with a small hand vice.

Readers letters

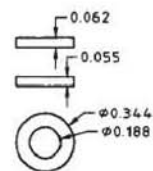
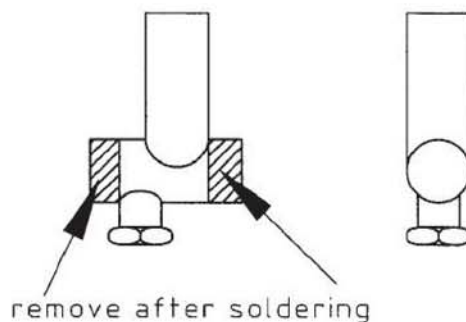
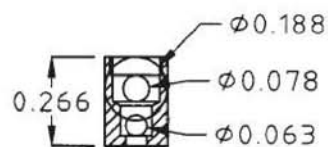
I found the letter from Mr. Cannell in M.E. 4266, 3 February 2006 to be a little disturbing. I feel that many people actually believe everything they see in print and that therefore it behoves us to try to be as accurate in our 'burlblings' as we can. The interplay between fact, memory and



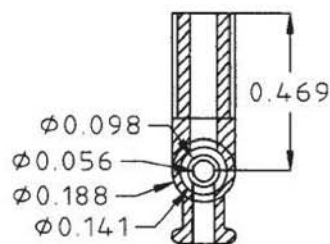
A view of the full size draincocks fitted to Manor and Grange cylinders by the GWR.



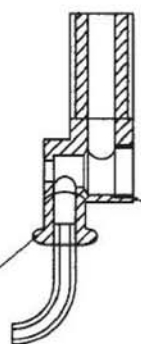
The draincocks from the opposite side. Actuation in full size is by link but a Bowden cable is used on the model.



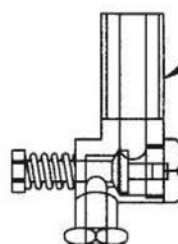
spacer washers 40ff ea.



lower chamber from
3/16" AF brass

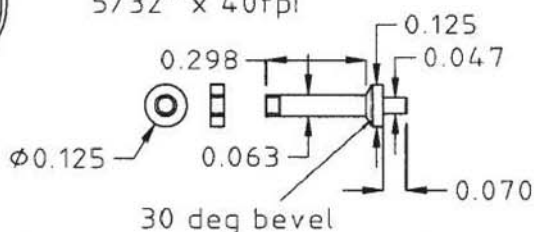
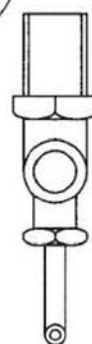
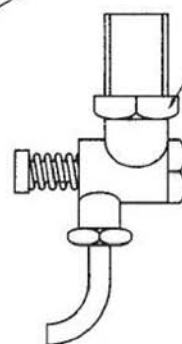


5/32" x 40tpi

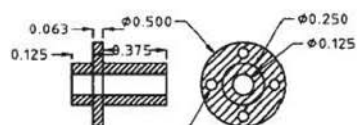


3/16" x 40tpi

1/4" AF locknut



GWR DRAINCOCK x2. Pb & St st

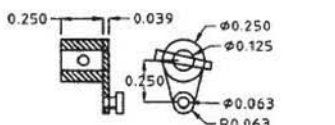


4x No50 at 3/8 pcd for 10 BA
weighshaft bearing 2off

1/8" x 40tpi union

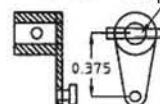
1/16" Cu tubing

weighshaft 1/8" dia x 5.829" BMS

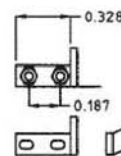


outer bellcrank 2off

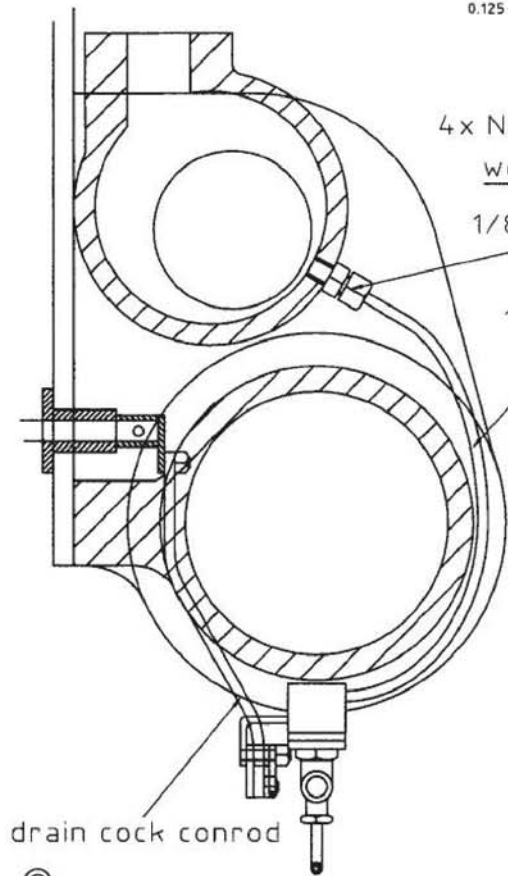
1/16" taper pin



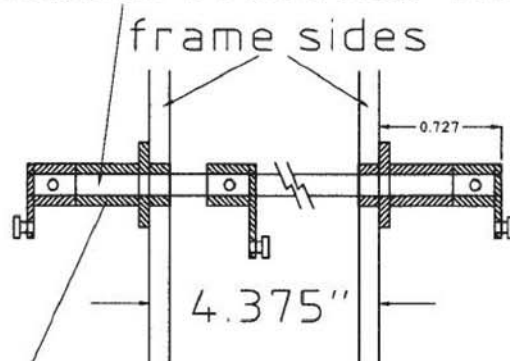
inner bellcrank 1off



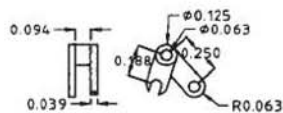
12 BA



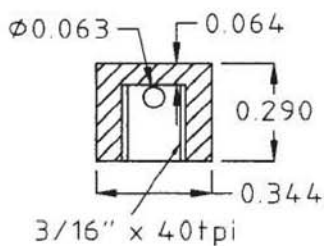
drain cock conrod



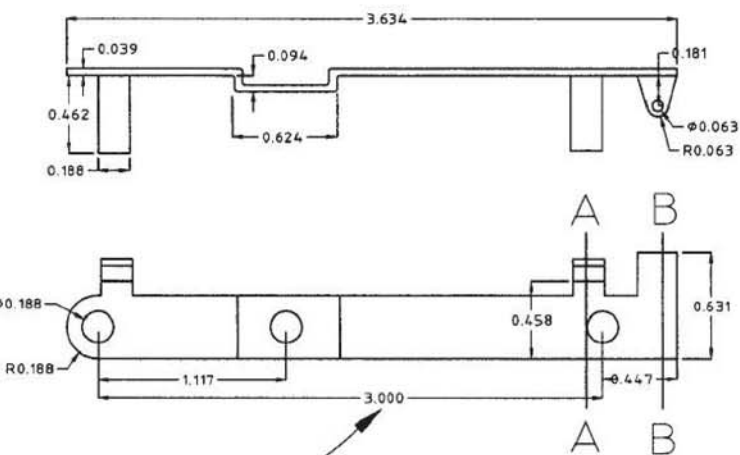
set 2.875 to rear of cylinder c/l and 1/2" above motion c/l
drain cock weighshaft
viewed from above



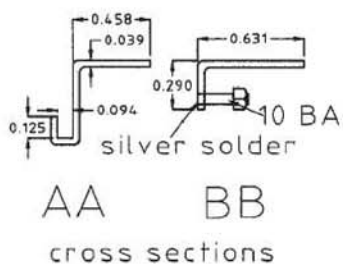
pullrod bellcrank 2off BMS



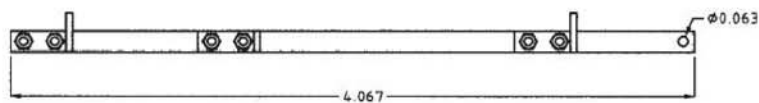
valve chest draincock boss 2 off x2
2off brass



to fit drain cock centres
2off 1mm BMS handed



AA BB
cross sections

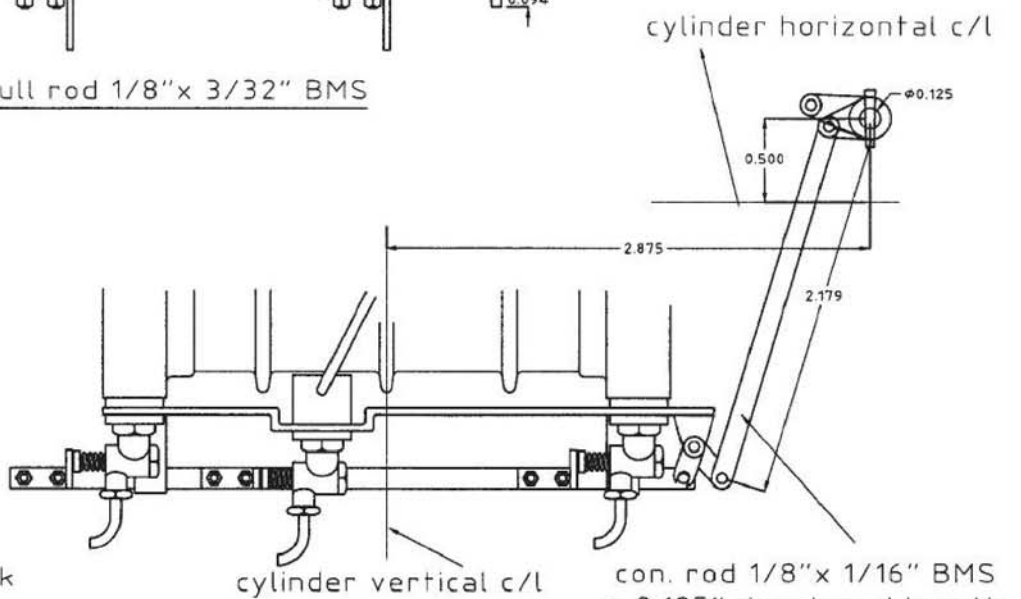


pull rod 1/8"x 3/32" BMS

off
off



front draincock



see L.H. cylinder drawing for shape guidance

opinion has led many people astray including, only too often, myself. While Mr. Cannell is partially correct in saying that there were high altitude Wellingtons, these aircraft were not very successful and should not be confused with the common or garden 'Wimpey' as we knew and loved it. There were two high altitude Wellingtons, the Mk. V of which only three were made and were, reportedly powered by turbo-supercharged *Hercules*, and the Mk. VI which was built in small numbers of, I think, just over 50, and was supplied to 109 Squadron for a short while. These aircraft were extremely difficult and dangerous to fly at high altitudes, and were soon relegated to the scrap heap. We, as boys, used to see them on the airfield at Farnborough, the ones that I saw were painted in photo reconnaissance blue. The shade was called 'cerulean blue' and I thought that the P.R. Spitfires looked particularly well in it. The outstanding feature of the Mk. VI 'Wimpey' was the use of the outstanding Rolls Royce *Merlin* 60 R65M. The supercharger of this engine was the brainchild of Dr. Hooker, who at the time was the world's leading authority on superchargers. He developed a 2-speed, 2-stage blower with a cooler between the two stages to improve the density and therefore the volumetric efficiency, of the ingoing charge. I think that the then Mr. Hines, the Chairman of Rolls Royce, told Vickers that they shouldn't be messing around with this magnificent engine in a no hoper like the Mk. VI 'Wimpey'. Why didn't they try it in a Spitfire, which was also a Vickers product, as Supermarine was owned by them? They did, the result being the superb Mk. IX Spitfire. The early *Merlin*, the Mk. X as fitted to the various bombers in 'power egg' form, and among other aircraft to the Mk. II Beaufighter, only developed about 1,145hp which was a lot less than the *Hercules*, the alternative fitment. This meant that an aircraft such as a 'Wimpey' or a Beaufighter, which would only just fly on one engine when powered by a *Hercules*, wasn't capable of maintaining height on one engine, when powered by the *Merlin*. Result misery. Another thing that could catch out the unwary was that the *Merlin* turned clockwise when viewed from the cockpit, which meant that aircraft so fitted swung to the left on takeoff, whereas the *Hercules* turned anticlockwise, swinging the aircraft to the right.

As to the allusion to a 50,000 foot ceiling version called the Warwick, this is I'm afraid a complete mistake. The Warwick was a development of the Wellington, which fell into the 'size trap'. Vickers tried to stretch the Wellington, by lengthening the span from 86 feet to 96 feet, and increasing the length by about 12 feet, depending on the version. The idea was presumably to increase the performance. Due to the laws of nature however, the extra weight and drag nullified the extra power available from first, the awful Rolls Royce *Vulture*, which was two *Peregrines* spliced together to form an 'X' and was a total failure. They then tried the Pratt and Whitney *Twin Wasp* of 1850hp which was much too small. The Bristol *Centaurus* which did the job with a little to spare, was late coming and in fact nearly missed the war altogether. I have happy memories of the quiet, smooth, 3,000hp plus

Centaurus as fitted to the Bristol Brigand. The Warwick was useless as a bomber especially as it could only carry half the bomb load of a 'Wimpey' and it was turned over to a grateful Coastal Command. The bomb load, such as it was, was replaced by extra fuel tanks and at least it was better than nothing until the wonderful 'Consolidated Liberator' arrived.

The Westland Whirlwind was a super little twin engined fighter powered by two Rolls Royce *Peregrine* engines. These engines were the final development of the *Kestrel* and suffered from being too small and unreliable. The airframe was too small for the larger *Merlin* and was too expensive to produce economically, especially as the Mosquito had by now shown itself to be capable of doing anything that a Whirlwind could do. The Rolls Royce *Goshawk* was only flown experimentally in the Hawker Fury test bed before being quietly laid to rest as steam cooling proved to be a good(ish) idea that didn't work.

There was nothing strange or sinister about the Air Ministry allowing Rolls Royce to export a proprietary engine of their own design and manufacture to whom they pleased. The *Kestrel* powered all or nearly all of the Hawker biplanes that we exported all over the world, even to Japan, I imagine that the Air Ministry was only too pleased to see our aircraft and engine factories kept in employment at a time of recession.

Whittle published his patents world wide in, I believe, the 1920s. The German aircraft firm headed by Ernst Heinkel took up the idea in secrecy, when we in Britain didn't, due to our being too heavily committed in other ways and a lot of political 'shenanigans'. Thus Germans then gained a lead in aircraft design, because they made the facilities for research into high speed aerodynamics available. This meant that although we led the world in the design and production of the gas turbine, we didn't have an aircraft of equal performance to the Me262 until the Swift and the Hunter came into service. Incidentally, harking back to the problem of engine power, I see that the Americans have developed the Packard *Merlin* for racing, to give about 3,800hp for a short period. This huge amount of power is sufficient to move a much modified Mustang along at 500 or so miles per hour. In 1943 however, an aircraft of comparable size to the Mustang, but without the drag of a propeller and cooling system, the D.H. Vampire was able to do 520 miles per hour. This shows that a comparatively small

gas turbine such as the D.H. *Goblin*, must have been capable of turning out nearly 4,000hp at this speed.

The letter from Don Ashton, a highly respected expert on valve gears, in M.E. 4264, 6 January 2006, proved to be difficult of access, as they say about some of the Schubert Impromptus. If anyone can translate the last paragraph for me, and particularly the last sentence of that paragraph, I shall be most grateful.

●To be continued.



Full size draincock lever shown mounted on the cab floor.



A Penrhos Grange cylinder undergoing machining at Polly Model Engineering Ltd. Note the fixture plate holding the casting.

Doug Hewson

describes last year's main line rallies and provides a background to how it all began.

Following the report I wrote on the 2004 Rallies (*M.E.* 4246, 29 April 2005) I had a number of people ask me how it all began and how the events are organised (from a railway point of view). I thought this year I would give a little in the way of background but illustrate the report with photos from the 2005 events.

In the late 1970s I had just completed building my house and had begun building my railway in the garden having been inspired by Sunday morning running sessions at Ron Bray's in the 1960s. Within a few years I had a loop around the house, some of which was double track and we had sidings. After running at Ron's the main ingredients had to be that it would be a 'railway' and not a 'track'. There had to be lots of pointwork and, most importantly, a signal box and signals and running in both directions. This would be far more interesting from an operational point of view and, as at Ron's, a much more railway-like atmosphere than just a single track in a circle.

In about 1980 Alan Worden from the newly formed Ryedale Society of Model Engineers rang me and asked if he could call and see me as he had read an article of mine in which I had mentioned my railway. Alan called in one Sunday morning with wife Renata and we had a good natter and were quite obviously on a similar wavelength. Alan was suitably impressed so the visit culminated in arranging a further visit along with some other fellow club members.

On the second visit a mini bus full of members duly arrived complete with at least two locomotives and we enjoyed an interesting day's running. The guests departed saying that that was the kind of railway which they wanted to run, so, in short they went home and built the railway at Gilling East, the story of which would fill a book on its own (maybe later Ed willing).

After a year or two they had enough track to run on so invited us (now the newly formed Lindsey Model Society, LMS for short) for a return visit. They had not completed a full circuit on that first visit but had some pointwork laid



A turntable scene at the May Rally. Around the turntable are Steve Andrew's NER T3, the author's Y4, a 9F, two Britannias, two K1s, GWR small Prairie, and Manor, a V2, a Gresley 2-6-2 Tank, and an LMS 2-6-4 Tank whilst Omiya waits at the shed exit signal to travel around to Erimus Yard for shunting duties. In the background is Steve Trudgill double-heading with the other V2 on an express passenger.

GILLING MAIN LINE RALLIES 2005

and enough line to have a good run around the school and back. These visits became annual events and it was interesting to see the rapid progress with signals beginning to sprout and a wonderful 30-lever frame fully mechanically interlocked signal box.

Having cut my teeth at Ron Bray's pulling and shunting real wagons I began building wagons of my own and as I thought other people might be interested I wrote a series of articles on building wagons which was published in *Engineering in Miniature*. By this time the LMS had gathered six or seven members who had mostly been members of local Model Railway Societies. We all wanted wagons so a scheme was devised whereby we would build a batch of seven wagons and end up with one each. Some members had no previous experience of building 5in. gauge wagons and, more to the point, no equipment so the work was divided up into lots of who could

do what. This meant that everyone in the Society could contribute towards the building and own a wagon at the end of the project.

With the articles in the magazine the wagon building really took off as a new hobby within the hobby and lots of people began to realise that they could build wagons without having all the skills or equipment required to build a steam locomotive. This meant that they too could contribute to running days whereas hitherto they had been destined to be interested onlookers and could only stand in awe at the locomotive builders.

By 1991 the railway at Gilling was double tracked and had a bay platform in the station, a locomotive shed and a very nice carriage shed built in local stone to house their passenger carrying trucks. I was sitting eating my packed lunch nattering to Alan Worden admiring all their handiwork and our gathering collection of rolling stock and said to him that we ought to organise a



This is one of the many wagons brought to the GL5 Rally by Martin Rant from Didcot. It is a Southern 8 Plank, what the Southern term a 'High Sided Goods'.



Two of the super larger locomotives on shed which came to the August Rally. They are Nigel Dickinson's King John (from Bath) and Sean Bowler's LNER A3, (from Sunderland)



Ballan Baker and Bill Sharp at the May Rally double-heading the morning 601 'Fish Empties' through Gilling station.

get-together of everyone we knew who had wagons to see them running in long scale trains. A sort of 'wagon rally'. He said that funnily enough he had been thinking along similar lines (pardon the pun). As their carriage shed was connected to the railway via the turntable I suggested that we could use it as a running shed. The one snag was that they only had one siding to store rolling stock and being a single siding it would not be possible to shunt the stock into different trains. Alan said that that was no problem, they would build more sidings, and by golly they did. I said that if the Ryedale Society could prepare the railway I would see to the operational side of things. However, we decided that there would be little point in having a lot of rolling stock if we did not have locomotives to pull it. In fact, we decided that we did not want any old locomotives but all had to be British standard gauge locomotives which would have been in use on all but industrial lines. Instead of calling it a 'wagon rally' it would be better to call it a 'main line rally' and the name stuck.

I mentioned the idea to two of our other members, Mike Earnshaw who worked on the full-sized railways and Colin Garton one of our prolific wagon builders. I said to them that I wanted to organise the running side on the basis of a proper working timetable. Well if 20 locomotives turned up we couldn't have them all running round together so some sort of timetable would seem the appropriate way of organising the event if there was to be one.

When I mentioned this it was just as we had left the Midlands exhibition and were sitting in a pub waiting to be served. Mike being 'in the know' suggested we start by using some kind of service numbers so that we could use these on a signal box working timetable and make out some driver's roster sheets with the numbers on. In fact the service numbers were used throughout the whole of the evolving documentation. (The numbers decided upon are shown in the table at top right).

These ideas were all scribbled down on the backs of menus and table napkins whilst we were still waiting to be served. We then started making a mental list of who we knew had rolling stock to see what trains could be run also bearing in mind of course what locomotives might turn up and what would make authentic trains. We knew that we could muster enough mineral wagons amongst our own members to make a presentable coal train so we thought we would start with that. We also know enough people with Aristocrat coaches to make some sort of passenger train so that came next.

Now, the Ryedale people had not only completed their main line but it was double track so we had both 'Up' and 'Down' lines to play with. More napkins were required so we had to commandeer some from nearby tables.

When I built my railway I made a couple of passenger carrying trucks based on some built by Ron Bray but mine were modelled loosely on the LMS Theatrical Scenery Vans. When our Society built our portable ground level track a couple more were built and so these were used as a rudimentary parcels train albeit without Guard's accommodation. In fact it ran at 9.20 so was therefore labelled the 'Down Newspapers'. If drivers ran sensibly two trains could be accommodated on both Up and Down line without them seeing each other. We thought that a 40-minute run on the main line would satisfy most drivers so the whole timetable was based around these timings. As one train terminated another one was timed to take its place which meant that there would be an engine change or train change on one line or the other every ten-minutes.

In order to give the express passenger a reasonably clear run it was decided to run them on the Down Line and most of the goods on the Up. With the 40-minute schedule it meant that the intervening 20-minute slots could be filled with local passengers, parcels or fast goods etc. to keep the timings lively.

The Ryedale members, in the meantime, had not only laid the three more sidings but had also extended the original one by using their portable track in case we were overwhelmed with stock. As it turned out on that first Rally in August 1992 we were, so much so, that until the first two trains departed from the Yard some stock had to be stored on the footpath. As these new sidings formed a nice little yard on the Up side it became known as the Up Yard and that name is with us to this day.

Anyway, we had scribbled down the basis of the timetable by the time our food arrived and over dinner other ideas for general railway operation were thrown around. Such things as a milk train, stopping parcels, passenger trains delivering odd fish vans as they used to do and passenger and parcels trains stopping to collect or set down parcels vans. All these activities were to be included. In fact the timetable was designed to use as many locomotives and make as many moves as time would allow to give all visitors (and members) as much or as little running as they wanted. The whole idea of this event would be to get away from aimlessly running round in circles. Everyone would have a specific job to do as it would have been done full size. If it meant

holding a train at a signal for some other movement to take place so be it. Parcels trains were designated to depart from the Down Bay platform but terminated by crossing from Main to Main at the western end of the station, running wrong line through the station and straight in to the Up Yard. This meant that we then required a Station Pilot to fetch the stock back over and set it into the Down Bay just before the next departure. The idea was to create a job for another small tank locomotive and this job became 'A' Pilot.

The Up Yard was worked in about 1 1/2-hour shifts by other small tank locomotives which became 'B' Pilot.

The next thing was that the Yard would need to know what trains to make up, what time they were due out, what time the light engines were due to arrive to collect the trains and what times the various trains terminated, including the Parcels which terminated there.

To this effect a Yard Roster was drawn up with one hour per A4 sheet. The sheet was divided into 5-minute intervals in the hope of making it easy to read but inevitably some light engine movements were slotted in between the 5-minute so that theoretically they did not clash with other moves elsewhere. The yard instructions would read something like "B Pilot to marshal 902 'Pick Up Goods' due to depart 10-15". As 'A' Pilot was mainly employed in moves from one side of the station to the other they all had to be signalled so his moves were woven into the timetable amongst all the other main line movements and so as not to clash with engine changes on the main lines.

After numerous telephone calls to consult with Mike we ended up with a timetable which has worked quite well. Various refinements have been made over the years but generally it still works as we originally set it down on those napkins in the pub.

Now that we had established all of the train movements (78 booked turns a day in the new timetable) the light engine movements could be worked out so I then drew up the 'Loco Shed Departure Schedule'. The Loco Shed Departure Schedule was the list of duties in chronological order giving the train reporting number, the duty name and where the locomotive had to be sent to commence his turn. There were two blank columns to fill in, the locomotive number and driver's name once entries were received. The idea for this and some of the other paperwork came from reading a superb paper about organising the locomotive sheds and stations at

Reporting No.	Description	Headlamp Code
100	Express Passenger Train	A
200	Ordinary Passenger	B
300	Parcels/Perishables Fully Fitted	C
400	Empty Coaching Stock (ECS)	D
500	Not used	
600	Express Goods Fully Vacuum Fitted	C
700	Express Goods Semi Fitted (fitted head of six vehicles)	D
800	Fast Freight Carrying Through Load	F
900	Mineral, Ballast or Empty Minerals	H
900	Pickup Goods	K
e.g. 201 is the first Ordinary Passenger train in the working timetable etc.		
'A'	Pilot Station Pilot	
'B'	Pilot Up Yard Main Goods Pilot	
'C'	Pilot Up Yard Transfer/Trip Pilot	
'D'	Pilot New Yard Upper/Low Yard/Parcels Trip Pilot	
'E'	Pilot New Yard Goods Pilot	



Another one of our young members Joseph Gibbons shunting coaches in the Down Carriage sidings with his Dad's Adams Radial.



At the July GL5 Rally we had lots of wagons! Here we see Lionel Flippance with his BR Std. 2-8-2 (which were never actually built) with a 38 van fish train.

Blackpool for summer Saturday excursions. It was written by the Shedmaster and published in one of the 1938 Institute of Loco Engineers Journals: It made riveting reading and told how they dealt with 120 incoming excursions in four hours on every summer Saturday. It gave details of where all the empty coaching stock was stored, where the light engines were stabled, coaled and watered, who relieved the incoming drivers on arrival and most importantly how they managed to get the right locomotive on the right set of stock in the right platform at the right time, at the right station for the evening departures. Fascinating stuff. Oh! and they didn't know what excursions to expect until the previous Thursday night. Nowadays when one reads about an excursion in the railway press they seem to want a years advance notice and then they bring the network to a standstill! Anyway, the forms which they used were headed 'LMS Traffic Dept.' so it suited my purposes ideally. For our purposes I also adopted their terminology and shortened, such as L.E. for light engine.

Once the locomotive shed departure schedule had been drawn up I could then write out all of the locomotive driver's individual rosters, 64 of them for each day at that time. These rosters gave the train reporting number, a space to fill in the driver's name and locomotive number, the time due to book on shed for this shift, the time due off shed and where he would be expected to pick up his train. It helps greatly if the driver's can remember their reporting number so that when they arrive at the Yard on station they can report the number to the Yardmaster, e.g. I am the L.E. for 602 etc. The chances are that the train will be waiting and the Yardmaster can then set him back on to his train. In a lot of cases the shunter will hook him on and he will be asked to pull up to the Yard exit signal ready for away. Drivers leaving the shed should make sure that their tender or tanks are full and that they are coaled up.

As we were all new to this it was a steep learning curve for a start and to assist the drivers I included a diagram on their roster sheet showing the required headlamp code for the train to be worked. I didn't include the diagram for the L.E. head code as drivers were expected to know that this was a single lamp above the front drawhook. Also on the roster sheet were timings where required for such things as stopping to detach or pick up parcels vans or fish vans etc. en-route. Well, I say en-route but at that time there was only the Down Bay. The timings on the sheet not only provided the driver with a bit more

interest but it also assisted him in planning a water stop and saved disrupting the main line unnecessarily. Since we began the Ryedale members have used the spare space at the side of the bay to add four sidings and a head shunt to make the 'Down Yard'. This addition made for much more interesting working as it now meant there was somewhere to keep spare coaches and somewhere for passing trains to call to drop off or pick up vans etc. and with the head shunt it could be worked without stopping the Down Main. It also provided a new port of call for the Pick Up goods trains.

A further addition here provided three long carriage sidings alongside the Down Main and a head shunt at the far end. This not only meant that the new sidings could be shunted from either end but it meant that any one of them could be used as a run round loop.

However, having now completed all the rostering work all of the signalled moves were written into a working timetable for the signal box. As the signal man sat at the lever frame his view straight ahead was directly down the running lines with the Down main going away from him on the left and the Up line coming towards him on the right. In view of this I arranged the working timetable so that the left page was the Down line and the right page the Up. Again the main divisions were five-minute intervals down each page and the instructions slotted in to the appropriate times. Before any of this was written we had a day up at Gilling carrying out various shunting and light engine moves to work out timings. In the early days before the big extension was added the biggest problem was the fact that it only took about three minutes for an Express Passenger to complete a circuit. This meant that before you could get a light engine across the crossovers you had a train waiting at the home signal again.

In 1992 we announced to the press what we had planned and rang round inviting people who we knew had rolling stock and both magazines printed a very helpful editorial and the response was quite amazing. We did find that the people who had rolling stock were generally interested in and had a reasonable knowledge of how a railway should run. This helped enormously on that first Rally which was held over the August 1992 Bank Holiday weekend and various people just took charge of working the Yard and the Loco Shed.

Entry forms were drawn up so that prospective drivers could fill in their locomotive type and number plus other details like what time they would arrive and be ready for booking on etc.

The week before the event I listed all the locomotives and drivers and then filled them in on the Loco Shed Departure Schedule with due regard for the type of locomotive and the train to be worked. The names were then transferred to the Drivers Roster sheets and these were handed to the drivers as they arrived.

The Loco Shed Departure Schedule was given to the Shedmaster which enabled him to sort out which locomotives needed to be where at what time on a steaming road. I had also asked Alan Worden if we could clear all their passenger carrying stock out and use the shed as the locomotive running shed. This not only worked very well for the Shedmaster but also provided a very photogenic spot with all the locomotives lined up either before they were steamed or just sitting there simmering between duties.

Since then a few refinements have been made to the timetable but then last year it was completely re-written to take account of the new yard being opened. However, the main line train paths were kept largely the same, it was just that now none of the trains arrived back at the same place as they departed from. The one exception to this is the Pick Up Goods train which always returns to its home base, as it would have done full size.

At this year's Rallies we had more new drivers turn up with some very nice locomotives. Alan Anstis came for the first time with his fairly recently completed 9F. It is a proper black 9F and Alan has built two tenders for it, one of which is his driving truck so it is certainly not one of the chipboard box brigade. Dennis Lock from the Hereford Society also dipped a toe in the water with his LMS Jinty, the first time we had had one of those there.

In July the GL5 Main Line Association held their rally there and again it was nice to see some different faces. Graham Cooling counted 184 wagons and over 30 items of coaching or parcels stock over that weekend.

At the May event there were 38 locomotives there on the Saturday, I think about 20 at the GL5 meeting and 43 at the August event.

Once again a big thank you has to go to the Ryedale ladies team who provided food and drinks every day at the two main events, plus various visitors who always muck in and help.

If you want to see 40 or so high quality locomotives and over 200 items of exhibition standard rolling stock all running from eight in the morning until six at night, Gilling is the place to be. If you want to join in just bring a shunting pole and bags of enthusiasm, oh, and we can lend you the shunting pole!



CLUB CHAT

With Malcolm Stride

UK News

Amnerfield Miniature Railway has sent in details of events this year. These include a diesel and electric locomotive visitor's day on 10 June and a steam locomotive visitor's day on 1 July. Contact for more information is David Jerome tel: 0118-9700274. I might even see you there since the track is only a couple of miles from my home.

Projects for the year at **Bournemouth DSME** include laying power cables to the new station building, a new platform and fencing and the traverser. I suspect that members are busy on these already although I would hazard a guess that work has been held up due to the long winter we seem to be having.

Canvey Railway and MEC has a new secretary in the person of Greg Ridgewell. Unfortunately we have not been provided with contact details so cannot pass them on. Volunteers are being sought to help move the ballast heap prior to starting work on the new carriage shed.

One of the many societies with parties visiting Harrogate this year will be **Fylde SME** which is planning a trip.

The 14th Annual Sweet Pea Rally is to be held at the Stoke Park track

site of **Guildford MES** on Saturday/Sunday 10/11 June this year.

Limited camping and caravan facilities will be available and those interested should contact Jim Wilson at 14 Newfield Avenue, Farnborough, Hants GU14 9PQ; tel: 01252-657914; e-mail jiml.wilson@ntlworld.com

At the time of writing, members of **Leeds SMEE** are busy preparing for the Harrogate Show where the society will be exhibiting.

The new Honorary Secretary of the **North Cornwall MES**, is Geoff Wright, who can be contacted on 01566-86032. Geoff tells us that the society, based in rural Cornwall, near Bude, is looking for new members, to whom a warm welcome will be given. The society meets at the track HQ every first Tuesday evening of the month during the winter/spring months, and every first and third Tuesday evenings during the summer and runs at least one Sunday each month during summer months, although members are welcome to use the track at any time. The society has a small raised continuous 5in. and 3 1/2in. gauge track, set in about an acre of grassland, suitable for up to three locomotives running at the same time. Although the member interest is predominantly in steam locomotives, there are members who have interests in traction

engines and model boats, as well as other model engineering activities.

There are currently several new locomotives on the way to completion, including a *B1 Springbok*, a *Maid of Kent*, and a *Speedy*, and the society is very much looking forward to seeing these, as well as the 'older' locomotives, on the track later this season. Visitors from other societies and clubs will be made most welcome. Geoff says he'll be delighted to chat to you!

North Staffs MES is celebrating its 70th anniversary during 2006. The broad spectrum of model engineering is encompassed within the Society's activities as it was at its inception in 1936 but increasingly with active lady members taking a full part.

The Society's 1000ft. multi-gauge track in Brampton Park, Newcastle-under-Lyme is in regular use each summer Sunday afternoon when the society is 'at home' to the public as well as being used by members throughout the year.

A profusely illustrated talk by David Bradbury on 'Steam in Staffordshire' will bring to an end the busy winter programme of evening talks held each month at the Tunstall Community Centre. A gala dinner is to be held in May to add to the celebrations. Further information can be had about the society and its activities by contacting Social Secretary Stuart

Daw at jakdaw@ntlworld.com

In the February *Prospectus* from **Reading SME**, the Editor suggests that "hopefully by the time March comes around the weather will be warmer, so we can start on some concreting and track support beam replacement." I am writing this on 20 March and have to say that he is a better Editor than he is a weather forecaster! The new 'O' gauge layout continues to make progress with buildings and rolling stock being constructed by the group.

Romney Marsh MES is to attend the Folkestone Model Railway Exhibition again this year and is looking for suggestions for a theme for the stand. Bernard Haste reports on the development work he has been doing on his proposed model of a 1979 lorry mounted crane. Bernard reports that the model will need a space 40ft. long and 6ft. wide in order to be displayed built up to its full size. He has made some progress already and we look forward to more news as time (and Bernard) progresses.

Adrian Dixon, Secretary of the **South Lakeland MES**, has sent us news of happenings at the society. It now has a website at www.slmes.co.uk and is also planning to increase the track length from the present 600ft. to around 1400 feet. The pavilion at the track site was repaired last year with materials donated by the local council who owns it.

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.

APRIL

- 29/30 **Leighton Buzzard NG Rly. Indian Holiday.** Enquiries: 01525-373888.
- 29 **MELSA. Labour Day Weekend.** Contact Graham Chadbone: 07-4121-4341.
- 29 **National 2 1/2in. Gauge Ass'n. Spring Rally at Romney Marsh.** Contact Clive Young: 01233-626455.
- 29 **National 2 1/2in. Gauge Ass'n (Southern Region). Spring Rally.** Contact John Cook: 0208-397-3932.
- 29 **Romney Marsh MES. 2 1/2" gauge Association Rally.** Contact John Wimble: 01797-362295.
- 29 **Tyneside SMEE. Track Work Day.** Contact Ian Spencer: 0191-2843438.
- 29 **Urmston DSME. May Day Steam.** Contact A. L. Fussell: 0161-748-0160.
- 29 **York City & DSME. Duckers & Son - Modelling in Miniature.** Contact Pat Martindale: 01262-676291.
- 30 **Amnerfield Miniature Railway. Public Running.** Contact David Jerome: 0118-9700274.
- 30 **Bedford MES. Public Running.** Contact Ted Jolliffe: 01234-327791.
- 30 **Bristol SMEE. Public Running.** Contact Trevor Chambers: 0145-441-5085.
- 30 **Claymills Pumping Engines. Open Day.** Contact B. Eastough: 01283-812501.
- 30 **Guildford MES. First Public Running.** Contact Dave Longhurst: 01428-605424.
- 30 **MELSA. Sunday in the Park.** Contact Graham Chadbone: 07-4121-4341.
- 30 **New Jersey Live Steamers, Inc. Steam-Up.** Contact Karl Pickles: 718-494-7263.
- 30 **Rugby MES. 2 1/2" Gauge Society Meet.** Contact David Eadon: 01788-576956.
- 30 **Steam LS of Victoria. Working Bee & Barbecue.** Contact Graham Plaskett: (03) 9750-5022.

MAY

- 1 **Bedford MES. Public Running.** Contact Ted Jolliffe: 01234-327791.
- 1 **Bristol SMEE. Public Running.** Contact Trevor Chambers: 0145-441-5085.
- 1 **Cardiff MES. Steam-Up and Family Day.** Contact Don Norman: 01656-784530.

- 1 **Claymills Pumping Engines. Open Day.** Contact B. Eastough: 01283-812501.
- 1 **Leighton Buzzard NG Rly. Indian Holiday.** Enquiries: 01525-373888.
- 1 **MELSA. Labour Day weekend.** Contact Graham Chadbone: 07-4121-4341.
- 1 **Northampton SME. Public Running.** Contact Pete Jarman: 01234-708501 (eve).
- 1 **Stockholes Farm MR. May Day Running.** Contact Ivan Smith: 01427-872723.
- 1 **Surrey SME. Public Running.** Contact John Cook: 020-8397-3932.
- 1 **Urmston DSME. May Day Steam.** Contact A. L. Fussell: 0161-748-0160.
- 2 **British Columbia SME. Model Contest.** Contact Sean Laurence: (604) 931-1547.
- 2 **Canvey R&MEC. Seen on the Table 2.** Contact Brian Baker: 01702-512752.
- 2 **North Cornwall MES. Meeting & Maintenance Evening.** Contact Ray Reed: 01237-424254.
- 2 **Peterborough SME. Bits & Pieces.** Contact Ted Smith: 01775-640719.
- 2 **Romney Marsh MES. Track Meeting.** Contact John Wimble: 01797-362295.
- 2 **South Durham SME. Meeting.** Contact B. Owens: 01325-721503.
- 2 **Stamford MES. Keith Hansel: Making Fairground Models.** Contact Derek Brown: 01780-649630.
- 3 **Bradford MES. Spring Auction.** Contact John Mills: 01943-467844.
- 3 **Bristol SMEE. Peter Heimann: Introduction to Clock Making for model engineers.** Contact Trevor Chambers: 0145-441-5085.
- 3 **Leeds SMEE. Matthew Read: History of the Royal Observatory.** Contact Colin Abrey: 01132-649630.
- 4 **South Lakeland MES. Meeting.** Contact Adrian Dixon: 01229-869915.
- 5 **Aylesbury (Vale of) MES. Dr. Arthur Tarrant: Isle of Wight Railways.** Contact Andy Rapley: 01296-420750.
- 5 **Maidstone MES (UK). Bits & Pieces and Fish 'n' Chips.** Contact Martin Parham: 01622-630298.
- 5 **North Norfolk MEC. Model Motorbike Engines.** Contact Gordon Ford: 01263-512350.
- 5 **Nottingham SMEE. Graham Davenport: Visit to the 12th Model Engineering & Modelling Exhibition.** Contact Graham Davenport: 0115-8496703.

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.

Dennis Mortimer
David Nettleship

Romney Marsh MES
Romney Marsh MES

The boating enthusiasts at St. Albans DMES are celebrating their return to the small lake following its draining and refurbishment over the winter. Several members braved the cold weather on 15 January and several boats "sailed and motored merrily alongside the ducks who squawked happily too." The society is also celebrating member Fred Bearton's success at Sandown in winning a Gold Medal and the Tom Nevins Trophy for his superb steam crane. Fred spent many hours measuring the original in North Wales and the model certainly reflects his efforts.

Welling DMES has notified us of its open days this year. By the time you read this the first will have passed but the second is on the 23 September and further details can be obtained from R. C. Hawes at 7 Brendon Road, New Eltham, London SE9 3RP.

World News

Australia

Warren Williams, Editor of *Galston Valley News*, the newsletter of the **Hornsby Model Engineers**, is complaining that "the years are definitely going faster" and is standing down as Editor after six years. I thank Warren on behalf of our readers for his contributions to this column over that period. The new Editor is Terry Bradley. I am sure we all wish him every success and look

forward to receiving his contributions in the future. The 32nd birthday celebrations were in danger of being without steam locomotives when a 24-hour total fire ban was imposed by the authorities due to the dry conditions at the track site in the bush. Fortunately it rained during the night and the ban was relaxed allowing steaming to take place.

New Zealand

Locomotive number 2970 was taken out of service for a week at the **Hutt Valley MES** in order that Gavin McCabe could carry out some servicing and maintenance work. The work included replacing the original chain drive with a heavier one and replacement of some bearings. This was in addition to an oil change and check over on the engine.

Locomotive maintenance has also been the order of the day at **Maidstone MES** where the 7¹/₄in. gauge battery locomotive has been given a new set of batteries. These had a good test at the January running day because the local Greek community held their picnic next door to the track resulting in lots of children wanting rides. The members present were rewarded with some of the Greek party's barbecue food.

United States

The New Year was welcomed in style at the **New Jersey Live Steamers** who had the "campfire blasting and the holiday lights blaring" at the traditional midnight run. The locomotives were driven by Paul Kurtz and Adam Mandinger who had their locomotives in steam as the clock struck midnight with the semaphore lit up with '2006'. Around 20 members braved the wet and chilly weather to welcome in the New Year meaning that there was plenty of food left over for the "New Year's Day Crowd". The society is pleased with the increasing activities of the junior members at the track site with several being regular steamers at all the events. This must be good for the future of the society and we hope they all read *M.E.*! The youngster's interest may be boosted by the annual Rail Camp event sponsored by the **National Railway Historical Society** which sets up the event for high school students to learn about the railway movement. Those interested can find more details at www.railcamp.com. The society is celebrating its 40th Anniversary this year with a live steam meet from Thursday 20 July to Sunday 24 July at its Southaven County Park track on Long Island.

South Africa

The **Knysna SME** has sent us a copy of its newsletter which contains the proposals for common boiler testing regulations put forward by Chairman Ron Etter. Several clubs have already indicated that they will adopt the proposals. The new steaming bay has been completed during the year and several new locomotives are nearing completion including Ron Etter's magnificent *Shay*. I have seen some video of this locomotive during construction and it sounded very sweet running on air. Elliot Gordon continues his series of articles on using CAD systems with a look at 3D CAD drawings. He says that "to develop a 3D model (3 planes X, Y, Z) view from a 2D drawing we have to be able to take a main element of the 2D view as a starting point and extrude it to get the depth or length for the third dimension. Having done this we have to switch between 2D and 3D views constantly adding and extruding elements that are required to create the final drawing. All the elements of the drawing are positioned on the drawing relative to the working plane for that view". Elliot also comments that "this is a very simplistic explanation". Having attempted this, I think the description is accurate; it is the task itself that becomes somewhat mind-bending. Perhaps I just need more practice!

- 5 **Portsmouth MES. Meeting.** Contact John Warren: 023-9259-5354.
- 5 **Rochdale SMEE. Graham Hardy: The LNWR.**
Contact Mike Foster: 01706-360849.
- 5 **Romford MEC. Competition Night.** Contact Colin Hunt: 01708-709302.
- 6/7 **Dockland & E. London MES. Public Running.**
Contact P. M. Jonas: 01708-228510.
- 6 **Isle of Wight MES. Track & Pond.** Contact Les Morgan: 01983-875118.
- 6 **New Jersey Live Steamers, Inc. Work Day.** Contact Karl Pickles: 718-494-7263.
- 6/7 **Romney Marsh MES. RMES Open Weekend.**
Contact John Wimble: 01797-362295.
- 6 **SM&EE. P. Kilbane: Measurement of surface and roundness in the real world.**
Contact David Boote: 01202-745862.
- 6 **Welling DMES. Open Day.** Contact Reg Hawes: 0208-859-1952.
- 7 **Basingstoke DMES. Public Running.** Contact Guy Harding: 01256-844861.
- 7 **Cardiff MES. Open Day.** Contact Don Norman: 01656-784530.
- 7 **Edinburgh SME. Newliston House Open Day, Locomotives Running.**
Contact Robert McLucke: 01506-655270.
- 7 **Guildford MES. Diesel Electric Day.** Contact Dave Longhurst: 01428-605424.
- 7 **Plymouth MSLS. Public Running.** Contact John Brooker: 01752-671722.
- 7 **Rugby MES. Models Day.** Contact David Eadon: 01788-576956.
- 7 **South Durham SME. Running Day.** Contact B. Owens: 01325-721503.
- 7 **Sutton MEC. 71st Annual Exhibition.** Contact Bob Wood: 0208-641-6258.
- 8 **Bedford MES. D.A.G. Brown: Co-ordinate Drilling.**
Contact Ted Jolliffe: 01234-327791.
- 8 **Saffron Walden DSME. Club Night.** Contact Jack Setterfield: 01843-596822.
- 9 **Basingstoke DMES. Meeting.** Contact Guy Harding: 01256-844861.
- 9 **Dockland & E. London MES. Bring & Buy.** Contact P. M. Jonas: 01708-228510.
- 10 **High Wycombe MEC. AGM.** Contact Eric Stevens: 01494-436761.
- 10 **Hull DSME. Alan Dixon: Telescopes.** Contact Tony Finn: 01482-898434.
- 10 **Norwich DSME. Simon Wood: Current Engineering.**
Contact Paul Reed: 01603-462925.
- 10 **St. Albans DMES. M. Fopp: Building a plane in my Garage.**
Contact Roy Verden: 01923-220590.
- 10 **Stockholes Farm MR. Members' Evening Running.**
Contact Ivan Smith: 01427-872723.
- 11 **Cardiff MES. Forum.** Contact Don Norman: 01656-784530.
- 11 **Worthing DSME. Bits & Pieces.** Contact Bob Phillips: 01903-243018.
- 12 **North London SME. AGM.** Contact David Harris: 01707-326518.
- 13/14 **Chesterfield MES. Rally & Open Weekend.**
Contact Mike Rhodes: 01623-648676.

- 13/14 **Merstham Model Steam Show** at St. Nicholas School, Taynton Drive, Merstham, Surrey RH1 3PU. Adults £6, Senior Citizens £5, Children £4. Enquiries: 01737-760400.
- 13/14 **Romney, Hythe & Dymchurch Railway. Steam and Diesel Gala.**
Information: 01797-362353.
- 13 **South Lakeland MES. Open Day.** Contact Adrian Dixon: 01229-869915.
- 13 **York City & DSME. Alan Hopwood: Repair and Adjustment of Exacta cameras.** Contact Pat Martindale: 01262-676291.
- 14 **Basingstoke DMES. Shunting Competition.**
Contact Guy Harding: 01256-844861.
- 14 **Bristol SMEE. Public Running.** Contact Trevor Chambers: 0145-441-5085.
- 14 **Canterbury DMES (UK). Public Running.** Contact Mrs P. Barker: 01227-273357.
- 14 **Edinburgh SME. Newliston House Open Day and Club Track Running.**
Contact Robert McLucke: 01506-655270.
- 14 **Harlington LS. Public Running.** Contact Peter Tarrant: 01895-851168.
- 14 **High Wycombe MEC. Club Running afternoon.**
Contact Eric Stevens: 01494-438761.
- 14 **Leeds SMEE. Running Day.** Contact Colin Abrey: 01132-649630.
- 14 **Leighton Buzzard NG Rly. Teddy Bears' Outing.** Enquiries: 01525-373888.
- 14 **Saffron Walden DSME. Running Day (public running after 2pm).**
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- 14 **St. Albans DMES. Puffing Field Morning.** Contact Roy Verden: 01923-220590.
- 14 **Worthing DSME. Public Running.** Contact Bob Phillips: 01903-243018.
- 15 **Peterborough SME. Keith Hale: Soldering & Brazing.**
Contact Ted Smith: 01775-640719.
- 16 **Chesterfield MES. Paul Pratt: South American Railways.**
Contact Mike Rhodes: 01623-648676.
- 16 **Erewash Valley MES. David Chapman: Slide Show.** Contact Jim Matthews: 01332-705259.
- 16 **Northampton SME. Running Night.** Contact Pete Jarman: 01234-708501 (eve).
- 16 **North Cornwall MES. Meeting & Pre-season Steam-Up Evening.**
Contact Geoff Wright: 01566-86032.
- 16 **Nottingham SMEE. Tim Coles: GT3 Gas Turbine Locomotive.**
Contact Graham Davenport: 0115-8496703.
- 16 **South Durham SME. Afternoon Steam-Up.** Contact B. Owens: 01325-721503.
- 16 **Bristol SMEE. Meeting.** Contact Trevor Chambers: 0145-441-5085.
- 17 **Guildford MES. Last Bits & Pieces.** Contact Dave Longhurst: 01428-605424.
- 17 **Leeds SMEE. Meeting.** Contact Colin Abrey: 01132-649630.
- 17 **Maidstone MES (UK). Members' Playtime Run.**
Contact Martin Parham: 01622-630298.

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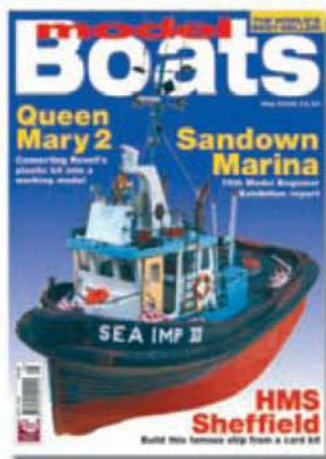
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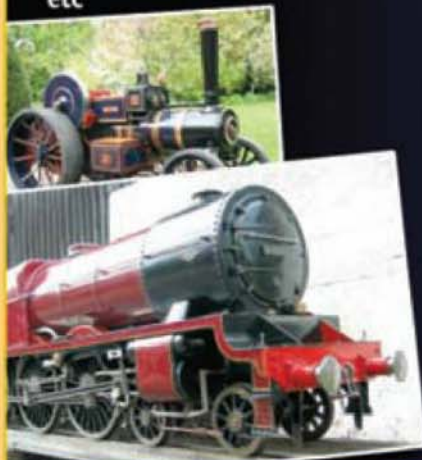
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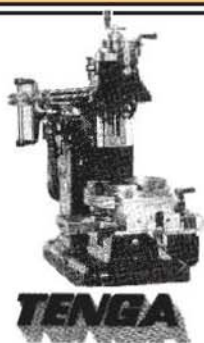
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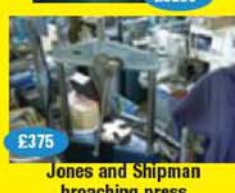
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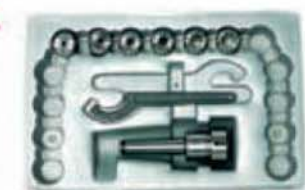


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