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Vol. 191 No. 4210

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On the cover ...

Photographed at the 2003 Rushden Cavalcade of Historical Transport & Country Show, Pride of Northamptonshire *was built in 1906 by John Fowler & Co. (Leeds) Ltd. and belongs to R. E. Care of Northamptonshire. A general purpose engine, it would have been originally sold to power some type of belt driven plant such as a threshing box, pump or circular saw, and for towing that equipment from one workplace to another.*

A little unusual maybe in that it is a compound engine when many would probably have opted for the cheaper single cylinder version, perhaps the original owner had his eye on reduced running costs. Fowler could, of course, offer single cylinder or compound engines to choice and could add any features considered appropriate for the work planned for the engine.

(Photograph by Neil Read)

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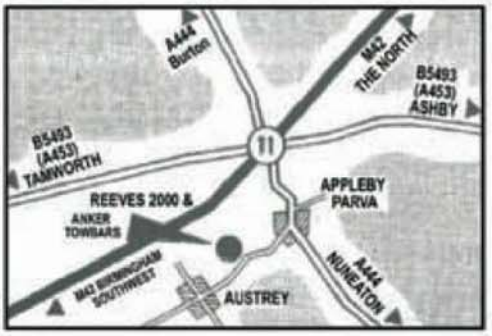

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Harrison M400 Saddle Drilling Attachment,unused £ 150.00
Harrison M300 Manual £ 15.00
Harrison Mill Power Feed Gears POA

COLCHESTER SPARES AND TOOLING

Colchester Bantam Manual £ 15.00
Colchester Student Roundhead Manual £ 15.00
Colchester Student Roundhead Catchplate £ 30.00
Colchester Student Roundhead 10" 4 Jaw Chuck (Model 41-L0) £ 150.00
Colchester Student Roundhead Tailstock £ 150.00
Colchester Student 1800 Manual £ 15.00
Colchester Master 2500 Manual £ 15.00
Colchester Bantam/Chipmaster Tailstock £ 150.00
Colchester Bantam/Chipmaster Saddle,Apron & Cross Slide £ 275.00
Colchester Bantam/Chipmaster Capstan Attachment £ 400.00
Colchester Bantam/Chipmaster Topslide Assembly £ 150.00
Colchester Mascot 1600 Travelling Steady £ 75.00
Colchester Triumph 2000 S/C Gearbox Casing £ 150.00
Colchester Triumph 2000 Gap Piece £ 75.00
Colchester Triumph 2000 50" Rear Splash Guard £ 100.00
Colchester Triumph 2000 Capstan Attachment £ 500.00
Colchester Triumph 2000 Capstan Attachment £ 500.00
Colchester Student 1800 Changegear Guard £ 30.00
Colchester Student 1800 Headstock Sleeve £ 20.00
Colchester Student 1800 Rack (new) £ 75.00
Colchester Student 1800 Headstock Internal Gears POA
Colchester Student Roundhead Rack £ 25.00
Colchester Student Roundhead 12" Faceplate £ 65.00
Colchester Student Roundhead Americal Toolpost £ 20.00
Colchester Student Roundhead Headstock Sleeve £ 25.00
Colchester Student Roundhead Change Gears,each £ 15.00
Colchester Student Roundhead Travelling Steady £ 50.00
Colchester Student Roundhead 18" Faceplate £ 85.00
Colchester Student MkII Apron Assembly £ 175.00
NEW 160mm 3 Jaw Chuck, L0 Fitting £ 185.00
NEW 200mm 3 Jaw Chuck, L0 Fitting £ 225.00
Colchester Mascot Roundhead 20" Faceplate £ 100.00
Colchester Mascot Roundhead 12" 4 Jaw Chuck £ 100.00
Colchester Mascot Roundhead 10" Catchplate £ 30.00
Colchester Mastiff D1-10 Camlock 20" Faceplate,Drilled £ 100.00
Colchester Bantam 2000 Capstan Attchment £ 350.00

MEASURING EQUIPMENT, MICROSCOPES, PROJECTORS ETC

Mitutoyo PJ250 Profile Projector £1250.00
Mitutoyo PJ300 Profile Projector £1250.00
Baty Shadowmaster R770 Optical Profile Projector £1200.00
Baty 700 Optical Profile Projector, 30" x 30" Screen £1000.00
Baty SM20XL Optical Profile Projector £ 500.00
Brown & Sharp Validator 50 CMM, Granite Base, Computer, Probes, Etc £1850.00
Vis 6"/150mm Vernier Caliper with Fine Adjustment, 1/1000/0.05mm £ 18.00
OMT Toolmakers Microscope on Cabinet with many accessories £1500.00
Vickers M10 Microscope £ 150.00
Nikon Binocular Microscope £ 150.00
M & W 0-1",1"-2" Micrometers,each £ 20.00
M & W 3"-4",4"-5",5"-6", Micrometers,each £ 25.00
M & W 10" - 11" Micrometer £ 40.00
M & W 11" - 12" Micrometer £ 45.00
M & W 12" - 13" Micrometer £ 50.00
M & W 15" - 16" Micrometer £ 60.00
M & W 17" - 18" Micrometer £ 65.00
M & W 18" - 19" Micrometer £ 65.00
M & W 19" - 20" Micrometer £ 85.00
KS 0-1", 1"-2" Micrometer each £ 15.00
KS 2"-3", 3"-4" Micrometer each £ 20.00
KS 7"-8", 8"-9" Micrometer each £ 35.00
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KS 11"-12" Micrometer £ 45.00
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KS 16"-20" Adjustable Micrometer £ 200.00
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KS 175-200mm, 200-225mm Micrometer each £ 35.00
KS 225-250mm, 250-275mm Micrometer each £ 40.00
KS 275-300mm Micrometer £ 45.00
KS 300-400mm Adjustable Micrometer £ 150.00
KS 400-500mm Adjustable Micrometer £ 200.00
KS 500-600mm Adjustable Micrometer £ 250.00
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Mitutoyo 101-117 0-1" Micrometer £ 25.00
Mitutoyo 101-111 0-25mm Micrometer £ 25.00
Mitutoyo 101-118 1"-2" Micrometer £ 30.00
Mitutoyo 103-180 3"-4" Micrometer £ 45.00
Mitutoyo 103-186 9"-10" Micrometer £ 75.00
Mitutoyo 123-102 Disc Micrometer 25-50mm £ 75.00
Mitutoyo 129-110 0-75mm Depth Micrometer £ 65.00
Mitutoyo 129-132 0-6" Depth Micrometer £ 85.00
Mitutoyo 103-148 275-300mm Micrometer £ 75.00
Mitutoyo 139-175 100-300mm Tubular Inside Micrometer £ 250.00
Mitutoyo 141-133 2"-12" Internal Micrometer £ 100.00
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Mitutoyo 523-103 Dial Snap Meter 50-75mm £ 175.00
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Mitutoyo 104-151 8"-12" Adjustable Micrometer £ 150.00
Mitutoyo 104-138 6"-12" Adjustable Micrometer £ 165.00
Mitutoyo 104-136 150mm-300mm Micrometer £ 150.00
Mitutoyo 400-500mm Adjustable Micrometer £ 300.00
Mitutoyo 103-927 1-75mm Micrometer Set,Boxed £ 100.00
Mitutoyo 114-113 1"-1.6" 3 Flute Micrometer £ 125.00
Mitutoyo 159-101 Combimike 0-25mm £ 40.00
Mitutoyo 159-104 3" – 4" Combimike £ 50.00
Mitutoyo 159-103 Dial Reading Combimike 2"-3"/50-75mm £ 75.00
Mitutoyo 159-104 Dial Reading Combimike 3"-4"/75-100mm £ 80.00
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Mitutoyo 129-110 0-75mm Depth Micrometer £ 65.00
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Mitutoyo 7305 Dial Thickness Gauge £ 30.00
Mitutoyo 516-602 Slip Gauge Accesory Set £ 150.00
Mitutoyo 2915-10 Dial Indicator, .1/5" 0-100 .110" £ 25.00
Mitutoyo 513-118 Dial Test Indicator 0-20-0 .4/.001" £ 40.00
Mitutoyo 101-105 0-1" Ext. Micrometer .001" Std. Ratchet £ 20.00
Mitutoyo 1041E Dial Indicator .5 3.5 0-25-0 .01mm £ 20.00
Mitutoyo 1929-40 Dial Indicator 1.4/1 50-0-50 .10mm £ 20.00
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Mitutoyo 536-145 Vernier Caliper-Grooved 0-150mm .05mm £ 100.00
Mitutoyo 573-203-10 Dgi. Offset Caliper,12"/300mm .0005"/.10mm £ 150.00
Mitutoyo 513-117 Dial Test Indicator 0-40-0 .8/.01mm £ 35.00
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Mitutoyo 345-712-10 Digimatic Inside Mic. 1-2" £ 125.00
Mitutoyo 500-327 Water Resistant Digi-Cal 4"/100mm .0005"/0.01mm £ 100.00
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Mitutoyo 368-820 Holtest Internal Mic. 7-8" .0002" £ 200.00
Mitutoyo 368-821 Holtest Internal Mic. 8-9" .0002" £ 200.00
Mitutoyo 368-822 Holtest Internal Mic. 9-10" .0002" £ 200.00
Mitutoyo 368-823 Holtest Internal Mic. 10-11" .0002" £ 250.00
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Vertical Z-axis	280 mm
Transverse Y-axis	150 mm
Optional	180 mm
Power	1,4 kW, 230 V, 50 Hz
Spindle speed r.p.m.	180 - 3000
Swivel range both sides	90°
Tool holder	MT 2Optional MT3 or SK 30
Drilling stroke	40 mm
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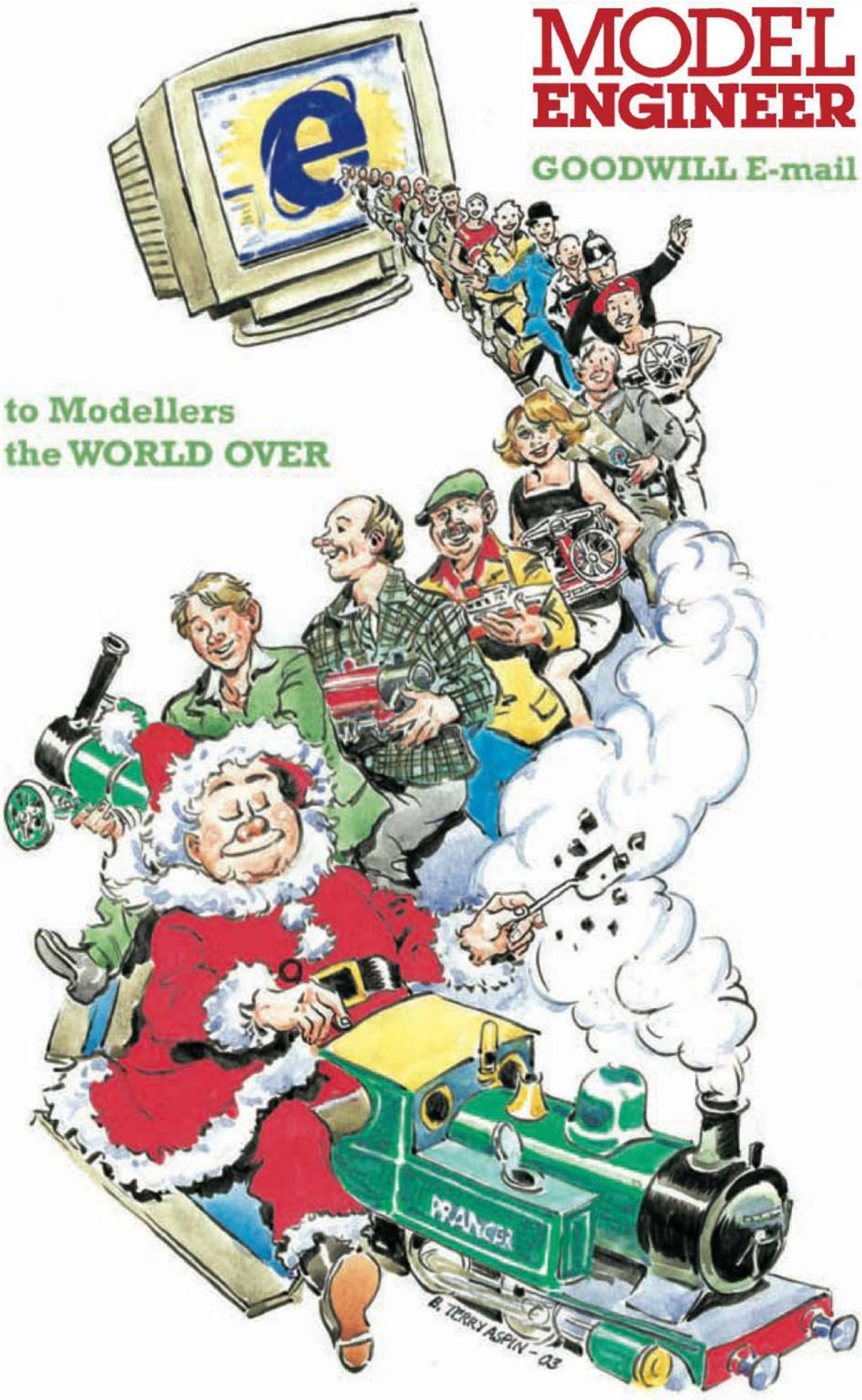


SMOKE RINGS
With the Editors

Season's Greetings

All of us involved in the day-to-day preparation of this magazine wish all our readers at home and abroad the Compliments of the Christmas Season. We hope that those able to take a brief respite from the routine round of work will have an opportunity for an enjoyable holiday with perhaps the chance to spend a few hours in the workshop on a current project. We hope that those who for whatever reason have to work during the Christmas period will also be able to enjoy at least part of the time

For many, the traditional Christmas holiday period includes the few days between Christmas itself and the New Year. Conforming to recent practice, rather more than half of the past 72 Model Engineer Exhibitions have been held in late December and/or early January at various venues in and around London including the Old Horticultural Hall, Seymour Hall, Wembley Conference Centre, Wembley Exhibition Hall, Alexandra Palace, the Grand Hall Olympia and more recently the prestigious Sandown Park Exhibition Centre where this year's event, the 73rd Model Engineer Exhibition will be presented Monday-Wednesday 29-31 December 2003. It would be good to see you there, and we are sure you will find much to enjoy and to stimulate your interest.

You will be able to study a display of fine models, miniatures and model engineering artefacts. You will have the opportunity to examine the models on display on club stands, and to discuss these and your own interests with the knowledeable stewards who will be on hand on these stands. You will also have the chance to look at the stock for sale on innumerable trade stands. Why not save the cost of postage or carriage on your next order? Contact your favourite supplier and ask for your parcel to be brought to the Model Engineer Exhibition for collection from their stand. You know it makes sense!

The forthcoming Model Engineer Exhibition could provide the ideal stimulus for choosing a new project for the New Year. Whether embarking on a new project, continuing with an existing one, or maybe even bringing your latest masterpiece to a satisfying conclusion, may we also take this opportunity to hope that 2004 will be a year which will see much activity in your workshop.

Exceptional auction

We thank Ron Moulton for bringing the following information to our notice.

Over 1000 internal combustion engines, 120 racing cars, aircraft and marine examples of highest quality are to be auctioned by Christies South Kensington 20 January 2004. This remarkable collection had been brought together by the late Miguel de Rancougne, a dedicated enthusiast for all forms of quality in model engineering, and for internal combustion in particular. Initially his interests centred on cars. He was a Gold Medallist with a 1:4 scale A. C. *Cobra* which he co-entered with Col. Peter Peyman in the 1963 Model Engineer Exhibition. The many tether cars he collected became a historic record in their own right, and his assembly of multi-cylinder car engines became a hallmark for Miguel's astute selection of distinctive subjects. He intended it to be the finest collection of its kind in Europe.

As Director-General of Saint-Gobain Glass, his extensive travels brought him into contact with thousands of fellow collectors world-wide. The International fraternity of specialists welcomed his extensive knowledge, natural charm and remarkable memory. His acquisitions ranged from historic pioneering examples of I.C. engines through many weird and wonderful experiments to successful production ventures. The Godefroy brothers' 60 degree Vee twin monosoupape that made the first I.C. powered model flight in 1910 shared space on Miguel's crowded shelves with the Savage engine of 1941, the first to have a drive shaft in-line with the cylinder. Every configuration of four-stroke aspiration from wick feed to supercharging can be found in the extreme variety which he had culled from all quarters of the World.

Among the unusual are a 2.5cc engine from Mongolia and a 14-cylinder double-row radial from Canada. Classic British designs by Edgar Westbury and Gerald Smith will be seen in the company of US contemporaries Feeney, Ferguson, Forster and Brown. Numerous products of his native France include early designs by Gems Suzor, Prosper Allouchery, Maraget and Gladieux to represent that Nation's part in restoring model aero engine production in the post-war years. Similarly the gamut of high speed larger capacity racing engines from the USA is well represented from the same period. For the *cognoscente*, names like McCoy, Hornet, Hassad, Dooling, Arden, Anderson and Atwood will revive recollections of pre-noise abatement years.

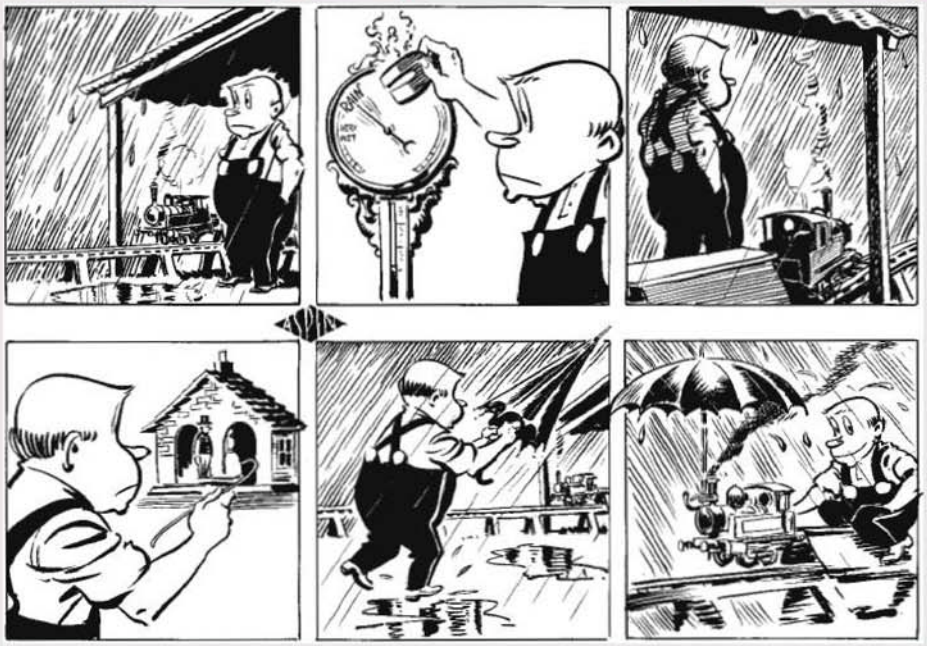
Among these highly competitive engines, Miguel's fascination for multi-cylinder units is most obvious. Twins in all configurations, flat boxers, narrow and wide angle Vees, tandem twins, two-stroke, four-stroke, elderly (very!) and modern vie for space among five-, seven-, nine-, eighteen- and even six-cylinder radial engines. Scale models of aircraft engines vary from the liquid cooled Curtiss OX-5 to a magnificent Pratt & Whitney *Wasp Jr.* with smaller scale *Cirrus* and an impressively large de Havilland *Gypsy Major* adding to an exemplary display of model engineering at its best. Numerous commercial radials from Japan, Germany and the US are in most cases as-new, some of them no longer in production and thus attractive to dedicated collectors.

Oldest engine in the auction is the 60 degree Vee-twin by the Godefroy Bros. which in 1910 made the first powered model aircraft flight of over 471 metres in Europe.

First ever in-line 10cc petrol ignition engine, one of twelve made in 1941 by Augie Savage (USA). The same principle is used in the Glowplug Aero '35' manufactured in 1963 which is also in the auction, as well as Russian in-line examples.

A colour illustrated catalogue can be ordered by telephone at 020-7930-6074, payment to be made by credit card. Viewing will be possible during Sunday 18 January 2004 between 13.00-16.00, on Monday 19 between 0900-19.30, and on the morning of the auction from 0900-11.00 at **Christies, South Kensington, 85 Old Brompton Road, London SW7 3LD**. Overseas enquiries should be made to +44 (20) 7930-6074.

CHUCK the MUDDLE ENGINEER — by B. TERRY ASPIN



POST BAG

Engineering and perception

SIRS, - I was interested to see that you have initiated a discussion of the meaning of 'model engineer'. There seems to be no disagreement about the meaning of 'model', it's the 'engineer' bit that has no firm meaning — or rather it has so many meanings that it doesn't have much of a meaning at all. A century or two ago there was less ambiguity, just as a baker was the man who baked the bread and the joiner was the man who made joints in wood, and not forgetting the turner who was the man who turned parts on a lathe; the engineer was the man who worked the engine. In his day, he was highly respected because he was in the forefront of the surge of new machines and processes which in a few decades transformed the economy of this country. So it's nothing to do with the engineering institutions, they are just Johnnies-Come-Lately jumping on the respectability bandwaggon.

We now have to define 'engine' and like 'engineer' this too has a vague meaning. I think it would be better to start with a new name and I have long thought that the activities in which readers of *Model Engineer* magazine are engaged are best described by the American term 'home mechanic'. If the definition of 'mechanic' is checked, I think it more nearly describes the sort of person that reads this magazine. Perhaps 'artist' might be a better name, and certainly more lucrative, as I see that a model of a cannon made from wood and scrap metal in 1965 by Pino Pascali (little known outside his native Italy) was recently sold at Christie's for £1,570,000. This sum was realised because the life sized fake cannon was considered to be *"a seminal work in the Arte Povera movement"* (see *The Daily Telegraph*, 27 October 2003).

I have drifted a long way from the purpose of this letter, which was to introduce the separate diagram enclosed herewith. Following the talk about the scope and meaning of model engineering I now realise that if readers were to see it, some of them would be querying the connection of puzzles with model engineering. In mitigation I would say that I thought it might be appropriate for the Christmas edition of *M.E.* and I know that contributions of a lighter nature sometimes appear at this time. I would also point out that readers really need a good three dimensional grasp of engineering objects to pursue their hobby and this puzzle may help in this respect. If nothing else, at least the editorial wits may be sharpened over Christmas!

H. D. Turner, Wakefield.

Assistance requested

SIRS, - My dear wife has seen fit to purchase a lathe for my birthday without, I must add, any consultation with yours truly — a perfect surprise. The lathe in question is a Myford type M of 1946 vintage. The lathe itself is in remarkably good condition for its years with little modification.

The only alteration which has come to light so far is the substitution of the countershaft pulleys with a V-belt type, and the belt itself has been changed to a convenient automotive fan belt. I'm somewhat dubious of this change and would like to revert to the original flat belt system. However, I have no information regarding the speeds at which the spindle should run and am therefore unable to determine the required pulley sizes.

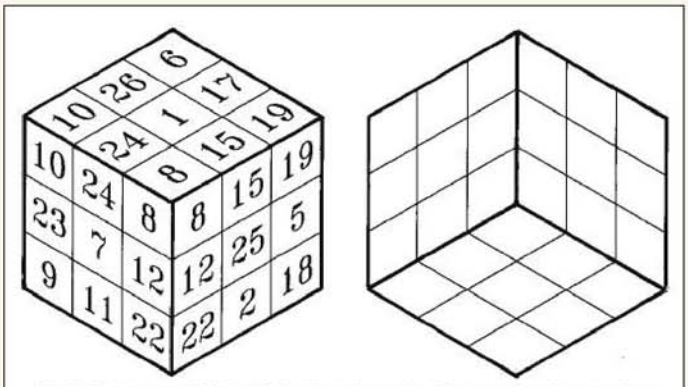
The other matter concerns what lubrication should I use?

Has any reader a handbook or any further information for this machine? I have contacted Messrs. Myford who are only able to supply a sales brochure. Any reasonable costs will be covered for photocopies and postage, etc.

I would also appreciate any information about the *M.E.* Steam Lorry which I believe was serialised in these pages many years ago, but I'm unable to track down any firm information.

Dave Evans, by e-mail.

(Check ***www.lathes.co.uk*** *for a really comprehensive range of information, etc. concerning all types of machine tools, including the Myford M type lathe. Alternatively, contact Tony Griffiths of* ***lathes.co.uk*** *by mail or 'phone at Wardlow, Tideswell, Buxton, Derbyshire SK1 8RP; tel: 01298-871633; fax: 01298-872874 — Ed.)*



Mr. H. D. Turner of Wakefeld writes: I was looking at a book recently on the front cover of which was an illustration of the cube shown in the diagram (above right). There was no mention of this magic cube in the book and so there is no knowing what the three hidden faces look like (above left). I assume that they are similar to those on view but with different numbers. Can readers determine what they are? Only an ability to add and subtract is required.

Gyroscope vehicles

SIRS, - Further to David Wilcox's article, I have been collecting information on monorail railways for many years and can confirm that at least three inventors built monorails stabilised by gyroscopes.

The model referred to by Bill Steer and described in *Model Engineer* 23 May 1907 was subsequently developed by Louis Brennan into a full size vehicle some 40ft. long, 10ft. wide, and weighing 22 tons. It had two gyroscopes spinning at 3000rpm in opposite directions in partial vacuua. Each weighed $1^1/2$ tons! Further details were reported in *Model Engineer* 25 November 1909 and 17 March 1910, and photographs at the time show the vehicle in action with about 40 passengers aboard on the experimental line in Gillingham in Kent.

The other two inventors were Mr. Scherl, a German who demonstrated his invention, which used just one gyroscope, in Berlin and New York in 1910, and a Russian, His Excellency M. Peter Schilovsky. A description of the latter's approach was published in *Model Engineer* 16 June 1910. Again one gyroscope was used. Bassett-Lowke built the original model to his design. The gyroscope wheel was 8in. diameter, weighed 12lb. and *"is driven by one of the new Stuart 'Simplex' high-speed engines, with a single $^5/8$ x $^5/8$ in. cylinder"* according to *Model Engineer* 16 June 1910.

Both Brennan and Schilovsky also thought the gyroscope could be adopted for road transport and both built cars which looked normal enough for the time except they only had two wheels in line. An 'under carriage' was lowered on one side when not in use to stop the cars falling over. His Excellency is said to have driven his car (built to his design by Wolseley Tool and Motor Car Company) around Portman Square and Regent's Park causing much confusion!

Adrian S. Garner, Surrey.

Gyroscope monorail car

SIRS, - I write following Bill Steer's letter about the model monorail (*M.E.* 4207, 31 October 2003). Louis Brennan also built a full-size gyroscope monorail car for the British War Department. It resembled a flat-bed lorry on roller-blades. It could stay upright even with all the load over to one side, and when switched off, would subside very, very slowly. Great fun, but fatally flawed as a battlefield tool. The most obvious is that every car must have power on board. Every car needs something to lean on when in store or in transit, or when powered-down. A crippled car would block the line and be the very devil to recover. Less obviously, the saving in track costs is largely illusory. The single rail makes it harder to distribute weight to the ground. Far from being half the hassle, it has to be of heavier section, and is liable to snap the sleepers or sink into the mud. Although Brennan's demonstrator was scrapped, it did inspire a network of lightweight man-powered monorails, used by the British in the Great War.

Brennan's vision went far beyond military logistics. He envisaged monorails running at 120 to 130mph, with perfect compensation for lateral acceleration. He correctly foresaw several concepts important for the development of such high-speed trains in the late 20th century: the wheel-rail interface, powered suspensions, closed-loop control systems, and streamlining.

When I worked on British Rail's Advanced Passenger Train, we credited him publicly for these insights. We even evaluated gyroscopes under electronic control as a potential method of tilting a modern railway car. But the key snag with his high speed dream wasn't the gyroscopes, it was the double-flanged monorail wheels. Far from reducing friction, these would have been unstable at quite low speeds, with lots of noise, vibration and wear. The self-steering action of a conventional railway wheelset is a hard act to follow.

None of these dificulties matters a jot in a scale model. Brennan's original model, described in Bill's letter, still survives in the store-rooms of the London Science Museum. A 21st century model

The stepped hard plastic packing blocks to which Mr. D. Dew refers are inexpensive and available in the UK from DIY stores.

would be a fitting tribute to an Irishman of genius.
David Halfpenny, Derby.

Downright dangerous!

SIRS, - Bill Steer's letter (*M.E.* 4207, 31 October 2003) jogged my memory. I believe I can answer his query as to why gyroscope vehicles never caught on, either on rail or road. It is not the difficulty or expense of keeping a gyroscope going, as very little power is required; the real problem concerns cornering.

Many years ago, I recall seeing an old photograph of a gyroscope-balanced two-wheeled car built before WW1 for service on the poor roads of Imperial Russia. It was made and exported by the Wolseley car company.

When you take a corner on a motorcycle you lean into the bend so that the outward (centrifugal) force generated by the change of direction balances the downward force of gravity. The two forces combine to pass through the point of contact between the tyres and the road, and the motorcycle achieves a good degree of stability, with the centrifugal force effectively increasing the pressure on the tyres and thus their ability to grip the road. This is about the best description I can make of it, though technically it might not be absolutely accurate.

The point is that in a gyroscopically balanced vehicle, centrifugal force makes it lean the opposite way (outwards) on a bend in the road or track. Imagine how uncomfortable, not to say downright dangerous, this would be on a road vehicle. The caption to the photo of the Wolseley confirmed that it did lean outwards on corners, from which I conclude that motorcycle type steering could not counteract the forces generated by the gyroscope.

On a rail vehicle, the advantage of a monorail system's ability to use sharp curves would be negated by the gyroscope system. A system designed to force a gyroscope vehicle to corner like a motorcycle would presumably have to incorporate some form of steering mechanism, which is a complication rail vehicles do not need, even if it could be made to work reliably. I suspect this is why the gyro-car or gyro-train never quite caught on.
Norman Eastwood by e-mail.

Bargain basement

SIRS, - Here are a couple of 'bargains' I have found, but not from our usual suppliers.

1: With MDF 'wood' printed floorboards come stepped spacers like the stepped saw-tooth Picador 'parallels'. When the floor is finished the redundant adjustable spacers remain. Made in a very hard black plastic they are really excellent as packing for use on the milling machine, etc., especially since they can supplement the Picador design. They can be purchased in the 'fitting kit' without the boards *(B&Q sell packs of ten pairs for £1.49 — Ed.)* or better, scrounged from someone who has laid a floor.

The Picador type have 1/16in. increments with 1.2in. or 1.7in. mid-heights. The flooring 'spacers' have 0.2mm (0.008in.) steps and only 3/8in. mid-height. As I write this note, two stacks of three pairs, each about 1in. high, are in use as heel blocks on my milling machine.

2: Beautifully polished granite/marble surface plates sound much too grand for the home workshop, but these are available as kitchen chopping boards for less than a tenth of the price of the 'real' thing. I was recently trying out a new flatness measuring instrument, used like a spirit level but cheaper and quicker. I tried it on my wife's slab which appeared to be well within 0.003in. all over!

The slabs are sold at craft fairs, so this information was collected by my wife. They appear to be the waste from making something else, hence the price of only £11 for an 11 x 16in. slab some 9/16in. thick. They are available in various other non-standard sizes, and ovals and rounds to 22in. diameter at £24! Contact Celli Marble on 012740-593515 to find out which shows/craft fairs they will be attending.

One would make a lovely Christmas present for the good lady, and as it wouldn't be used in the evening …
David Dew, Norfolk.

Iron wheels on *Sans Pareil*

SIRS, - Vincent Henshaw, in his letter *(M.E.* 4198, 27 June 2003) explains that he fitted cast iron wheels to his 7 1/4in. gauge *Sans Pareil* entered in the Model Engineer Exhibition last December, because it was modelled in the condition the locomotive was in after rebuilding in 1837.

He is gracious enough to accept responsibility for not providing this information, but it does highlight the need for Judges' notes explaining the background to a model and any particular features. Such information is of great help to Judges, particularly in the case of models of older historic exhibits.
Dennis Monk
Darley Abbey, Derby.

Control box problems

SIRS, - Over the last few years, since I purchased my Clarke CL300mm lathe, I have had a problem with the 2 amp fuse blowing when the motor stalled while taking a cut. I had to keep a supply of fuses in stock.

Recently, the control box ceased to operate. I contacted Clarke's repair department; they told me to send it to be checked at a cost of £45 for the first hour, on top of which there would be a cost for parts, etc.

I decided to look around. One company said it couldn't be repaired; another local firm collected the control box and quoted me £120 for its repair. At that price, I decided to fit a new control box and contacted Chester who supplied me with a modified new box for £120, which I duly fitted.

In the meantime, I thought of trying a new variable speed control switch on the old box and purchased one from Clarke at a cost of £6.34. At the same time, I asked Clarke about the fuse. They assured me that I could fit a heavier 3.16 amp fuse. When I had fitted the fuse and switch, I put the old box back on the lathe and find it to be running better than ever.

When I first had problems with the 2A fuse blowing, I had contacted Clarke who told me at that time that I should not fit a heavier fuse. I am sure that other owners of the Clarke CL300mm lathe have had similar problems. I hope that what I have found and described above is of help to them.
G. M. McLatchie, Strathclyde.

Thread equivalents

SIRS, - It occurs to me that some readers might be confused by the American screw sizes specified by Ted Hansen in his recent articles describing the construction of a model hacksaw machine.

I am planning to make some accessories designed by Rudy Kouhoupt and described in his book *The Shop Wisdom of Rudy Kouhoupt,* so I have had to work out a table of suitable BA sizes to match the American number sizes. It is included below for the benefit of readers:

AMERICAN		BRITISH ASSOCIATION		
	Outside Diameter		Outside Diameter	Threads per inch
Size	(in.)	BA Size	(in.)	
0	0.060	11	0.059	82.0
1	0.073	9	0.075	64.9
2	0.086	8	0.087	59.2
3	0.099	7	0.098	52.9
4	0.112	6	0.110	47.9
5	0.125	5	0.126	43.1
6	0.138	4	0.142	38.5
8	0.164	3	0.161	34.8
10	0.190	2	0.185	31.4
12	0.216	1	0.209	28.3

The data is taken from *Zeus* tables and *Machinery's Handbook,* rounded off to three significant figures.
Neil Heppenstall, Cheshire.

Chris Vine and Elizabeth Wormald

present a simple project that is ideal to encourage youngsters to the delights of model engineering.

In steam and all aglow - including Rudolf's red nose - a Happy Christmas project!

STEAM POWERED CHRISTMAS TREE

It all started when Chris built a small 7¼in. gauge railway on which to run a small steam locomotive. This has proved a source of great entertainment to some of the neighbours, none more so than Elizabeth aged 12. It wasn't long before she had become a proficient driver, able to light the fire and keep it going, watch the water level, operate the injector and oil everything before the run. Above all, she was able to drive with great skill, especially in the wet or when there are leaves on the line which gives almost no traction at all. In fact quite a few youngsters have driven the engine and, it must be said, that there has never been a crash or even an incident when they are driving. Adults are much more accident prone!

One day after a steam-up, I asked Elizabeth if she would like to make something herself in the workshop and this was greeted with an enthusiastic *"Yes please!"* The question was what to build that was straightforward and would also capture her imagination. A steam engine seemed to be ideal because they can usually be made to work, and an oscillator is about as simple as you can get. It was also important to build a boiler as it is much more interesting to see the engine operating on steam than compressed air, and getting up steam is half the fun. The only remaining question was what should it drive? I have always thought that engines running idle are disappointing, but it is difficult to find something useful that such small power plants can run. Clearly a small dynamo could be driven but such a small amount of electricity would be produced that it would not be easy to find something to run off the electricity.

Light emitting diodes (LEDs), consume very little power and, with the idea of putting them on a tiny tree, the Steam Christmas Tree had been invented. Elizabeth then came up with the idea of a steam powered 'Rudolf the Fibre Optic Nosed Reindeer' to have an illuminated nose and standing under the tree. Drawings of the engine and boiler occupied a few evenings and then we were ready for construction.

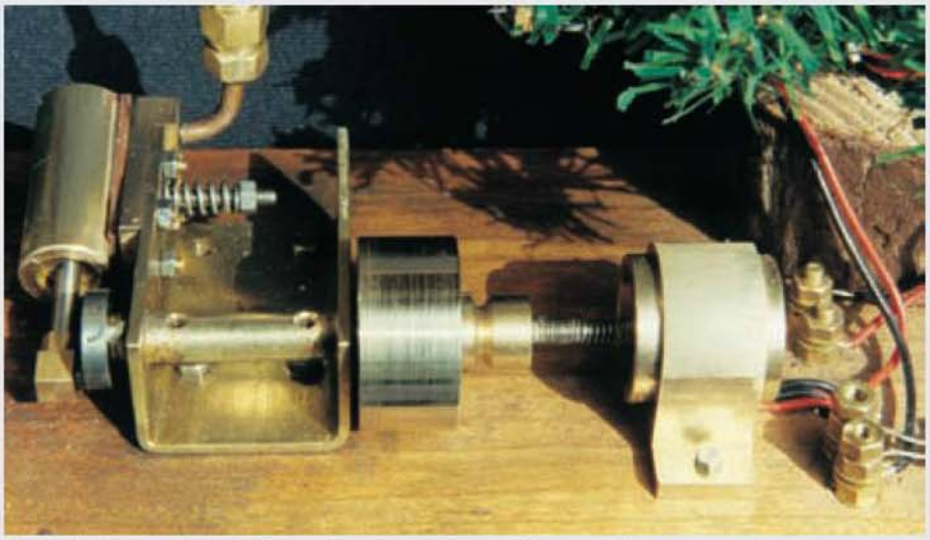
The main objective of this article is to inspire other model engineers to allow a young person, into their workshop for a supervised construction project. I can truthfully say that during the whole project not a single thing has been broken, not even a 10BA tap. A real benefit of a collaboration like this is the opportunity to bring science to life and to show the practical side of things which are taught in many schools in a very dry and theoretical way.

Generally speaking, I was on hand to offer advice while Elizabeth did and made everything herself. At the outset it was very much a case of step by step instructions but, by the end of the project, it was more a case of guidance together with a watchful eye to catch things before they went wrong. Safety in the workshop is obviously something which has to take top priority when someone else is there.

The engine itself is a single cylinder, single acting oscillator with a ¼in. bore and ⅜in. stroke. The frame of the engine is a channel section made from folded-up brass sheet with a tube soldered across one end as the main bearing. One side of the frame forms the valve face against which the cylinder operates making for a very simple construction. All parts are made of brass except for the crankshaft, piston rod and cylinder pivot which were all stainless steel. Making the engine involved the use of the lathe and drilling machine, tapping threads, filing, marking out, soft-soldering, reading drawings and working out a sequence of doing things.

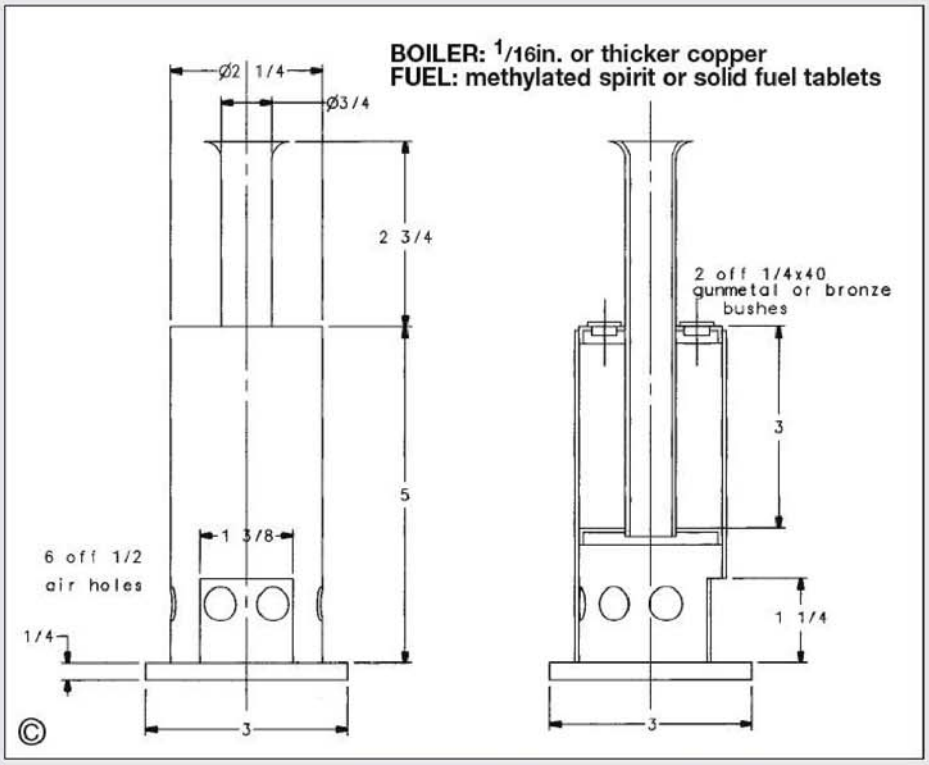
The boiler was made out of various bits of copper tube that were to hand and silver-soldered together. It is enormously strong, being 2in. dia. and 3/32in. thick. It was hydraulically tested to 120psi but its bursting pressure would be several thousand psi. The question of what fuel to use was answered on a camping trip with the discovery of the amount of heat given off by the solid fuel fuel blocks sold at any camping shop. This saves the problem of spilled meths and has a completely different smell when burnt indoors. It may be different but it is still pretty bad and should be kept well away from the turkey!

The size of the boiler might seem rather large for such a small engine, but we wanted it to be able to run continuously under its considerable load. Christmas tree lights going out while waiting for the boiler to make more steam would have been a sign of poor engineering. In fact, it turns out that



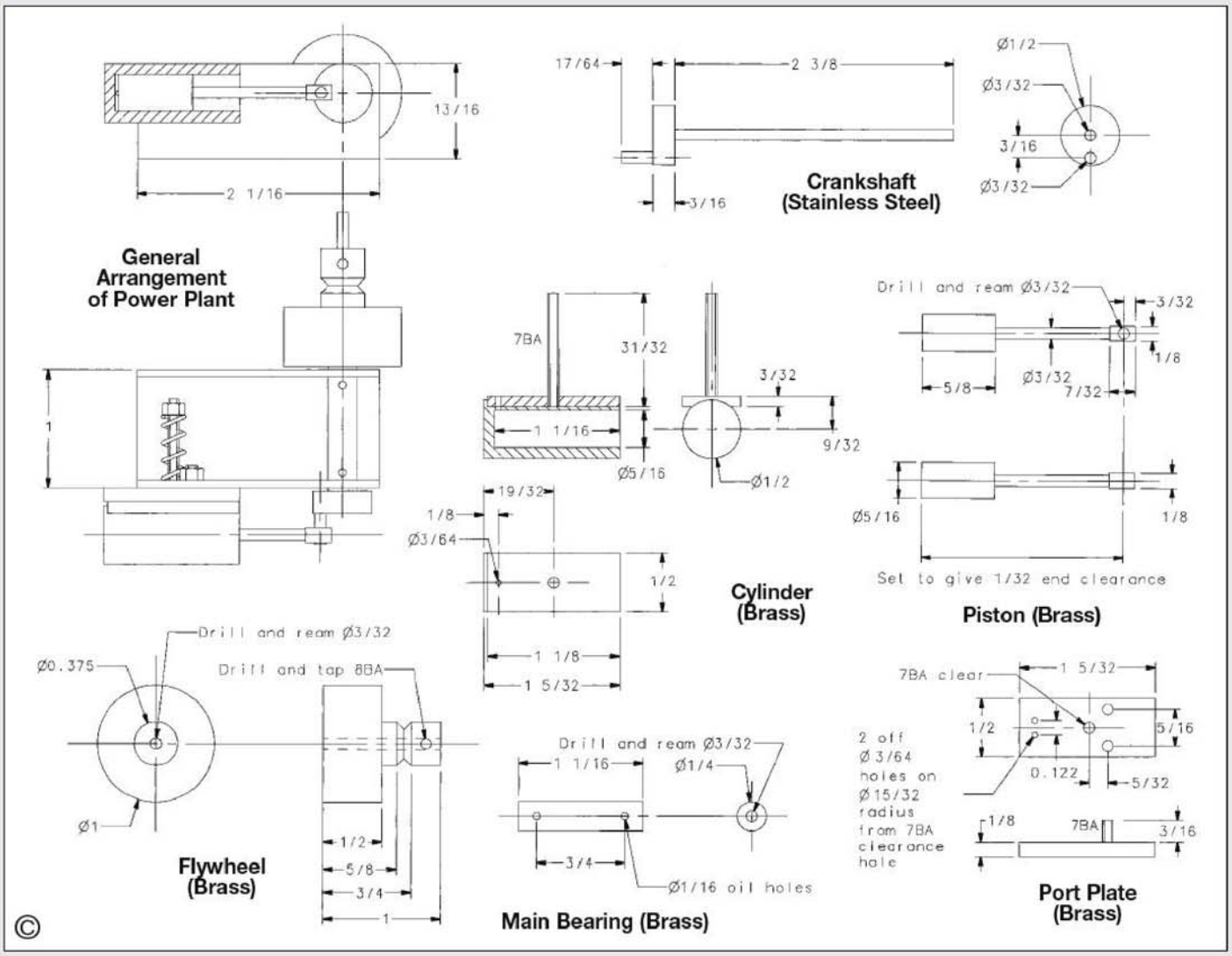
The oscillating steam plant drives a tiny alternator rescued from a broken computer tape drive unit via a spring coupling which is forgiving of slight axial misalignment.

Elizabeth gained confidence and ability as she built her model under Chris Vine's guidance.



the boiler is just about the right size as it keeps up about 25psi for 20 minutes using three tablets of fuel. Enough water probably remains for another tablet to be put in the fire, but there is a good margin of safety if just three are used.

Boiler fittings include a safety valve made with a stainless steel spring pressing down on a stainless steel ball, a pressure gauge and a stop valve. These last two, while not essential, add greatly to the character and interest in running the plant and help to give a better understanding of what is going on.



Other readers may be willing and able to introduce a young person they know to the pleasures of model engineering by means of a festive project such as this.

The dynamo is based around a tiny motor, some 1/2in. dia., rescued from a broken computer tape drive. I suppose it should really be called a generator as it is an alternating current machine with no brushes. It might even be a stepper motor but whatever, it produces a remarkable amount of power for something so small. We tested it by spinning it with the lathe with several LEDs connected to see what speed would be required. About 1500-2000rpm produced good results which were considered to be well within the capability of the engine.

We wanted the result of our labours to look good as well as to work and thought that the computer motor, as it was, looked out of place. To get over this a brass case was made to disguise it and to maki it look a bit old-fashioned. This involved plenty of machining as it was made from a piece of solid brass. As well as the lathe, the milling machine was used for the first time.

The engine, boiler and dynamo were bolted down to a nice piece of cherry wood scrounged from the local bespoke kitchen manufacturer. Just 6in. high, the Christmas tree was duly wired up with some 18 LEDs. Since we were dealing with alternating current, half were wired in each direction so that use was made of the current travelling in both directions. In fact the motor had two separate windings or phases so both were used. A little coil spring was used as a coupling to the engine to allow for a little misalignment, the spring being simply sprung round the two shafts. Driving one way the coil will tend to tighten its grip.

Rudolf caused more than his share of problems, the first of which was to find him. After looking everywhere, he was eventually tracked down at a professional cake maker. The only difficulty was that he was so small that an LED was bigger than his nose. The way around this was to drill a hole from the nose to the underside and pass some fibre optic threads through. An LED at one end of a bit of brass tube with the fibres glued in the other end worked well. These fibres came from an old Halloween toy witch with glow-in-the-dark hair! Rudolf was ceremoniously glued in position under the tree and unceremoniously wired up to the power station.

At last the great day arrived, about a week before last Christmas. Everything was complete and had been tested on its own, but would it all work together and would the boiler make enough steam to keep the engine running continuously? The boiler was filled with water, the engine oiled and the fire lit. It took about 5 minutes to get steam up, using the first tablet of fuel. Another tablet was added to the fire and after a bit of clearing of condensate the engine burst into life and the tree and Rudolf lit up true Blackpool style.

I will leave it to readers to imagine Elizabeth's grin and satisfaction at having made something that worked, was not bought in a shop and which no one else has got. As an aside, a running joke in the workshop was along the lines of *"I bet there is not one other person on the planet tonight who is fixing a fibre optic nosed reindeer under a steam Christmas tree."*

In true model engineering spirit we have not patented this device as, of course, the lights on most Christmas trees are powered by steam, it is just that the steam bit is usually at the other end of the national grid! So we welcome news of any others that may be built.

Elizabeth says *"One of the best bits of the whole project was silver-soldering the boiler; the blow lamp was roaring scarily and the heat on my hands and face was enormous. When everything got to bright red hot the little bits of solder we had put round the joints suddenly ran like water. When it had cooled I took it outside to drop in the water tank outside and found that in the dark it was still glowing red. It made the most amazing sound when it went in the water."*

FOR YOUR BOOKSHELF

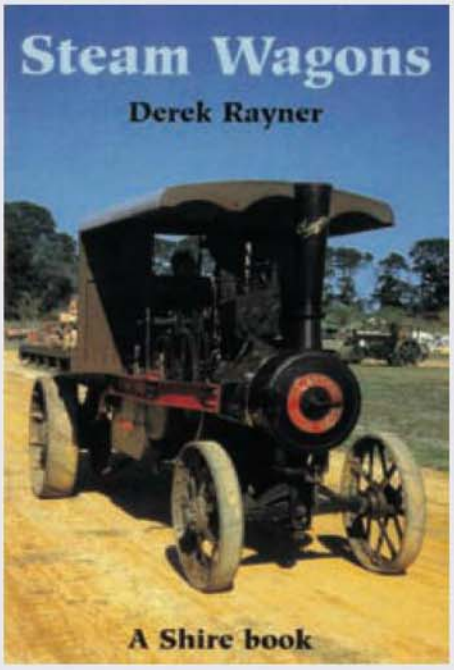
STEAM WAGONS
by Derek Rayner
Published by Shire Publications
ISBN 0-7478-055-1 Price: £4.50

This book is another from the popular Shire book series and is an admirable, concise history of these favourites of the steam rally scene. So used has the modern world become to the concept of conveying goods by lorry that the reader may be forgiven for thinking that such vehicles have existed since the dawn of motorised transport. However, as Derek Rayner explains, the steam wagon was predated by the traction engine by some forty or fifty years and, although the odd wagon was built by individual makers, it was not until the last decade of the nineteenth century that much effort was expended on developing a vehicle that carried its payload directly on its own chassis.

To some extent, this state of affairs was the result of unfavourable legislation that made the commercial exploitation of such vehicles very difficult, and it was not until the notorious 'Red Flag Act' of 1865 was finally rescinded in 1896 that development began in earnest.

The steam wagon was only really successful for a relatively short period although the commercial use of such vehicles lingered on well into the second half of the twentieth century. Technical innovation there was in plenty and, in its 40 pages, this little book deals first with the early years and mentions some of the makers. Two chapters are then devoted to looking at the two main steam wagon types: the overtype and the undertype respectively. The commercial demise of the steam wagon is then discussed as well as their rebirth during times of national crisis or as objects of interest on the rally field. A final chapter then looks at some examples of foreign built wagons.

As with most books in this series, a comprehensive appendix is included listing both British and foreign makers, a bibliography, a list of places to visit and addresses of relevant clubs and societies. The photographs are excellent, the period ones giving insight into the uses to which these wagons were put during their heyday. The modern photographs used are in full colour. Good value for money!



Steam Wagons (ISBN 0 7478 0551 2) is written by Derek Rayner and is available in softback at £4.50. It is published by Shire Publications, Cromwell House, Church Street, Princes Risborough, Buckinghamshire, HP27 9AA; tel: 01844 344301; fax: 01844 347080; email: shire@shirebooks.co.uk; website: www.shirebooks.co.uk. *Neil Read*

'HOPKINS' HOT AIR ENGINES

James G. Rizzo
in Malta, makes a trial assembly of the components made so far and continues construction with the engine base and water pump.

Part III continued from page 561 (M.E. 4208, 14 November 2003)

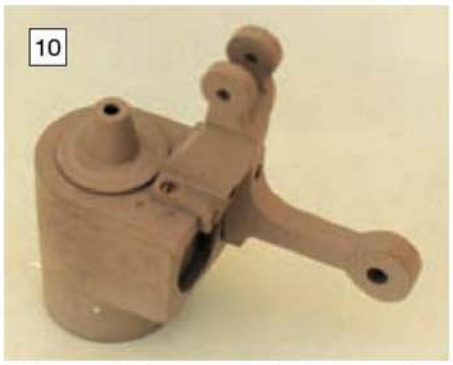
We have reached the stage when a first trial assembly can be made (**photo 10**). The cylinder head, fitted with the displacer rod guide, is bolted to the cylinder block. The beam bracket, with the beam pinned on, is located and held in place with a temporary adhesive (such as Blu-Tack). The flywheel bracket is screwed to the edge of the cylinder head by the top and front bolts.

The next step in this trial assembly involves the crankshaft sub-assembly. The crankshaft housing is secured into the flywheel bracket and the crankdisc/crankshaft unit inserted into the housing. This trial assembly will confirm the position of the beam bracket if a 1/8in. (3mm) flat bar is placed between the rocking beam slotted end and the crankdisc, with a similar test between the displacer rod guide and the opposite rocking beam end. Once the position of the beam bracket is confirmed, the necessary marks can be made and the cylinder head drilled and tapped.

The displacer connecting rod (**fig 22**) from the rocking beam to the crankpin on the crankdisc is prepared for assembly. The approximate distance between the two centre holes is 3 1/32in. (77mm). The big-end is first prepared by drilling and inserting a 3/32in. (3 x 8mm) I/D ball race. The big-end is placed on the crankpin and the precise position of the small-end marked by the pin on the rocking beam end. The small-end is then drilled to take the pivot pin and the action of the mechanism tried for free running.

The connection at the other end of the beam is a little more complex in that there are two parts between the rocking beam and the displacer rod, (**fig 23**). The top part is a link cut and shaped to resemble a figure of eight from a 1 3/16in. (30mm) length of 5/16 x 3/8in. (8 x 10mm) brass flat. One end is reduced to fit into the rocking beam end while the other end is slot drilled to a depth of 1/2in. (13mm) with a 1/8in. (3mm) gap. The distance between the centres is 7/8in. (22.5mm). Both centres are drilled to take a 1/16in. (1.5mm) steel pin.

The bottom part is made up of two pieces soldered together. The top piece is cut and shaped from a 1 25/32in. (45mm) length of 1/8 x 13/16in. (3 x 20mm) flat brass. The top end should revolve freely in the top link while the bottom end is soldered to the cone-shaped 'hat' which sits on the displacer rod end. The cone-shaped displacer rod-end is machined from 1 3/16in. (30mm) O/D brass, drilled to take the displacer rod and tapped to take a 6BA (3mm) grub screw. This allows for any fine adjustment to the length of the displacer rod at the end of the stroke. The movement of the beam relative to the displacer vertical movement should be checked at this stage.



Trial assembly of power cylinder, displacer rod guide, beam bracket and flywheel bracket.

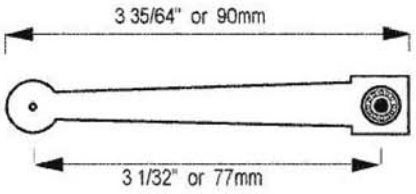


FIGURE 22 - DISPLACER CON-ROD

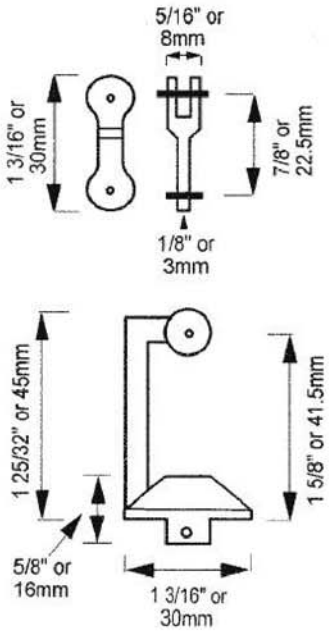


FIGURE 23 - DISPLACER LINK AND ROD END

The power cylinder is epoxied in place followed by a second trial involving the power piston and the power con-rod. With the power cylinder in place, it is fairly easy to calculate the total length of the power piston with the clevis and the con-rod. Any minor adjustments should be made at the clevis threaded end. A minimal gap of 1/32in. (0.8mm) should be allowed at the top of the stroke (TDC).

The displacer cylinder is next fitted temporarily in place. A washer approximately 1/32in. (1mm) is placed in the bottom of the cylinder which is then slid into the cylinder block with the displacer at the bottom of the stroke (BDC). A mark is made on the cylinder wall, the washer removed and the displacer cylinder finally inserted with a smear of epoxy resin adhesive inside the cylinder block and on the top end of the cylinder.

An alternative method of securing the displacer cylinder to the block is by brazing a brass flange to the cylinder and bolting it to the bottom of the cylinder block. This method requires alteration to the length of the displacer cylinder — approximately 2 3/4in. (70mm) instead of 3 35/64in. (90mm). There is also the advantage of easy assembly and dismantling in the case of any problem with the displacer; however the mounting of the engine to the base may be affected.

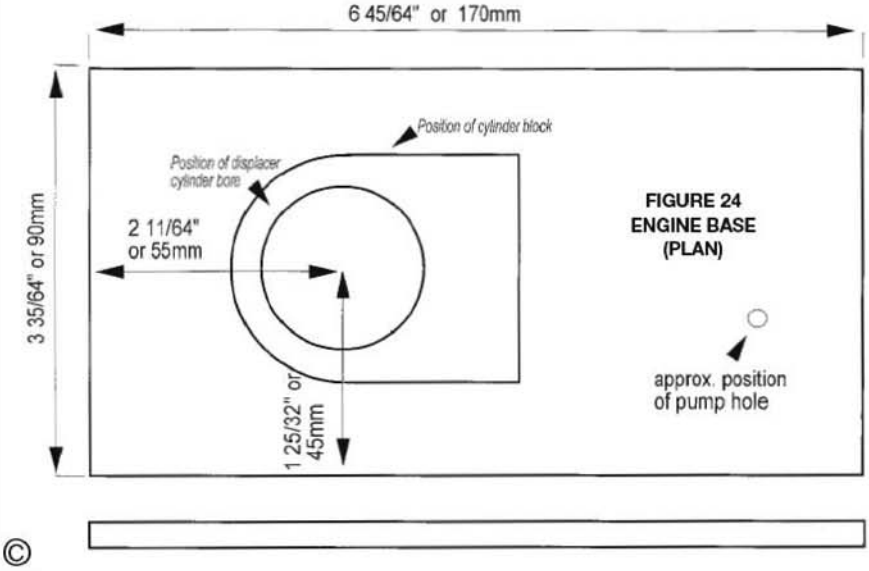


FIGURE 24 ENGINE BASE (PLAN)

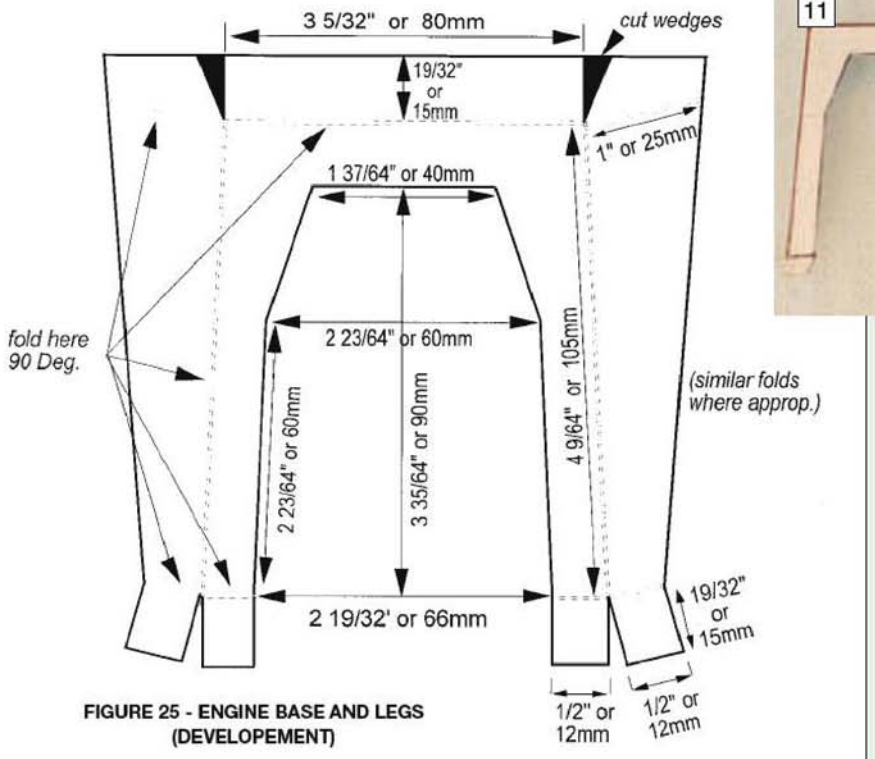


FIGURE 25 - ENGINE BASE AND LEGS (DEVELOPEMENT)

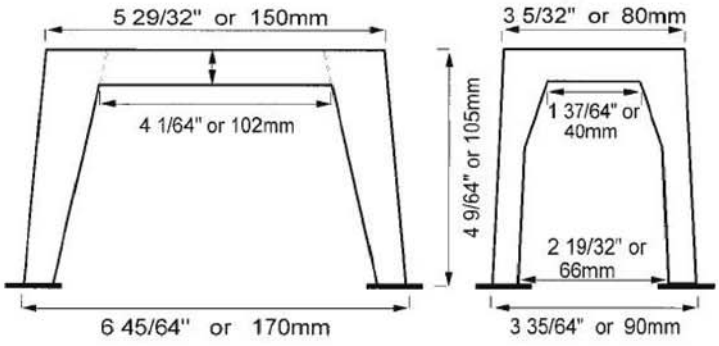


FIGURE 26 - ENGINE BASE (ELEVATIONS)

Engine base

The engine base and legs described here differ from the patent drawing and resemble more those of the Rider Ericsson hot air pumping engine. The base (**fig 24**) is a 1/4in. (6.0-6.5mm) aluminium alloy plate, 6 45/64 x 3 35/64in. (170 x 90mm), bored at a point 2 11/64in. (55mm) from the left hand edge. The bore is enlarged to take the displacer cylinder with a small annular gap of about 1/32in. (0.8-1mm). The cylinder block is bolted to the base with four 4BA (4mm) bolts.

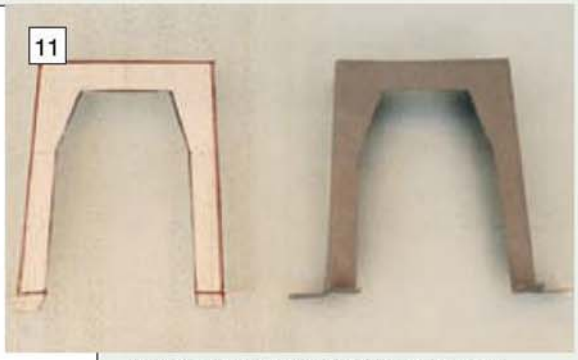
The legs are cut and shaped from 18 gauge sheet metal as shown in the pattern (**photo 11**) cut to the dimensions shown in **fig 25**. In order to make it easier to cut the inner parts of the legs, the template may be cut in two halves and then brazed together after the folds have been made.

Once the front and rear legs have been screwed to the base, the sides are measured, cut, folded, shaped and brazed to the legs. **Figure 26** shows the front and side elevations. Finally, four round or square discs, drilled to take 2BA (5mm) bolts, are brazed to the legs and the whole unit is screwed to a wooden base.

Once the engine has been mounted on the base, a mark is made where a pump is to be installed. The crankpin is turned to bring it to its lowest point (displacer TDC) and a line is scribed on the aluminium alloy base along the crankpin length. At a point approximately 1/4in. (6mm) from the power con-rod big-end centre, another mark is made to cross the previous scribed line. With the engine removed the base is drilled and tapped 1/4in. x 26tpi (6 x 0.75mm) to take the pump rod housing.

Water pump

This is an optional component. There is no mention in the patent application as to what use the Hopkins caloric engine was designed, and we can only presume that a full size engine would have been used either to pump water, or as a prime mover. Without neither a pump nor any load, this model simply runs away with speeds in excess of 600rpm. A water pump enhances the

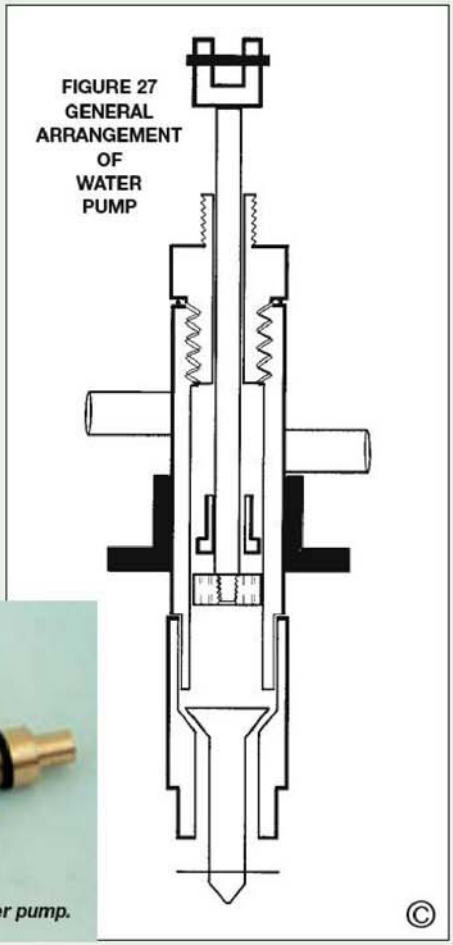


Pattern and 18swg leg for the engine base.

presentation of this model engine in two ways, slowing the speed and allowing the rocking beam mechanism to be better appreciated while performing useful work.

The pump (**fig 27**) is a plunger type and fairly easy to construct. **Photograph 12** shows the parts of a similar pump constructed for another engine. Two slightly different models were made, the one used with Hopkins Mark I has a glass cylinder and is used as a demonstration model while the one used on the Mark II has a brass cylinder. The system is the same with plunger valve, sealing disc, pump rod and the non-return valve at the bottom, all machined from brass. The reader may opt to choose either pump for both engines. The main difference between the two pumps is the internal diameter of the pump cylinder which in turn affects the diameter of the plunger valve, the sealing disc and the non-return valve.

The following description of the process of machining and fitting the pump is rather detailed, however there is no short cut for this precision equipment. Any slight deviation may mean a non-functional pump.



Components of a similar water pump.

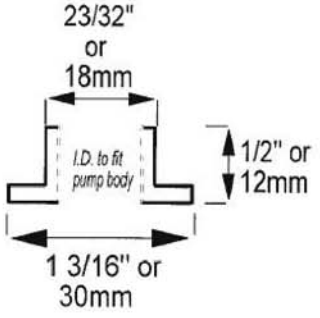
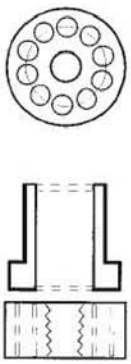


FIGURE 28
WATER PUMP
BASE

FIGURE 29
PLUNGER VALVE
AND SEATING



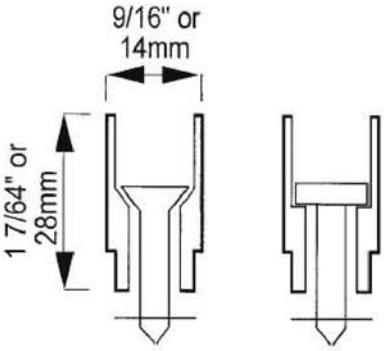
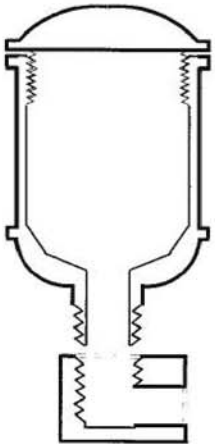


FIGURE 30
NON-RETURN VALVES
(ALTERNATIVES)

FIGURE 31 - PRIMING CUP
AND CONNECTOR



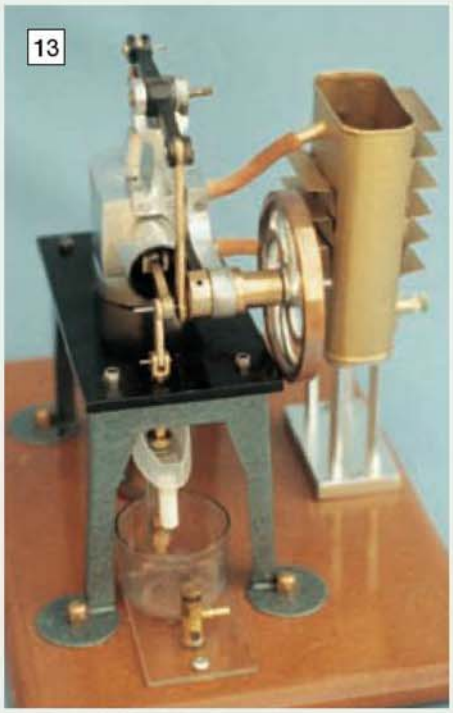
The details which follow are for the larger all-brass pump. The 2in. (50mm) cylinder is machined from 19/32in. (15mm) brass, drilled through 11/32in. (8.7mm). A length of 1 37/64in. (40mm) is enlarged and reamed 13/32in. (10 mm). The bottom end of the cylinder is reduced externally to 9/16in. (14mm) for a length of 3/8in. (10mm). The top end of the cylinder is then tapped 3/8in. x 26tpi (10 x 1mm). The pump base (**fig 28**) is machined at this stage. A 1/2in. (12mm) length of 1 3/16in. (30mm) brass is bored precisely to fit the pump body — i.e. 19/32in. (15mm). A length of 3/8in. (10mm) is reduced to 45/64in. (18mm). Permanent fitting to the pump body takes place later on during assembly.

The plunger valve is machined from 25/64in. (10mm) brass slightly reduced just enough to pass through the body of the pump without undue friction. A short piece — about 1/8in. (3mm) — is drilled and threaded 8BA (2mm). While still in the chuck, a groove is cut into the face of the workpiece about 3/32in. (2.5mm) from the edge. The best technique for this is to have a sharp tool with a fine point which is placed against the face of the workpiece which is then turned slowly to make a groove deep enough for 1/16in. (1.5mm) holes to be drilled within the scribed groove. The workpiece is placed vertically in a vice and holes are drilled close to each other to obtain maximum volume of water throughput, (**fig 29**).

The sealing disc is machined from the same brass rod, reduced to 23/64in. (9mm) O/D, drilled and reamed 5/32in. (4mm). The shape of the sealing disc, as shown in fig 29, allows it to slide smoothly along the pump rod.

The pump rod is cut and finished from 5/32in. (4mm) brass or stainless steel rod. Initially 3 1/2in. (90mm) long, the pump rod may be shortened depending on the connecting rod/clevis fittings when the pump is installed in the engine base. The rod is reduced and threaded 8BA (2mm) for a length of 1/8in. (3mm).

The cylinder bottom end is closed with a machined fitting (**fig 30**) which also holds the non-return valve. This end is machined from 1 7/64in. (28mm) long brass rod with a slightly greater O/D than the pump cylinder. It is drilled through and reamed 5/16in. (8mm). A length of 9/16in. (14mm) is bored and enlarged to 9/16in. (14mm) to give a precision fit onto the pump body. The step between this bore and the 5/16in. (8mm) bore may either be machined V-shaped or square. This operation is important as the finish of this step provides the sealing of the non-return valve.



The Author's Mk I Hopkins engine.

The non-return valve is a delicate piece of work and requires precision fitting. Figure 30 shows two types of valve seating, one V-shaped and the other square. The valve is machined from a length of 1/2in. (12mm) brass, its finished length is 1in. (25mm) but a longer piece is required for holding in the chuck. A length of 7/8in. (22mm) is reduced to 5/16in. (8mm) O/D, then milled on both sides to leave a very narrow tongue. To keep the valve from moving too far up the pump cylinder a 1/32in. (0.8mm) stainless steel pin is inserted at the very far end. This pin is only inserted (and glued) in place after the cylinder bottom end has been machined and checked in place for accurate sealing by blowing and sucking into the component.

The next part of the pump to be machined is the top end/rod guide fitting as shown in fig 27. This is machined from a 1in. (25mm) length of 19/32in. (15mm) brass rod, drilled and reamed 5/32in. (4mm). One end is reduced and threaded 3/8in. x 26tpi (10 x 1mm) to fit into the pump body. The remainder of the brass piece is reduced and threaded 1/4in. x 26tpi (or 6 x 0.75mm). This end fits into a hole in the engine base which is similarly tapped. The approximate position of the pump is shown in fig 24.

For the pump to function properly there are two more machining and fitting steps to conclude, the outlet pipe and the priming cup connection. The outlet pipe, cut from 1/4in. (6mm) I/D brass pipe, is inserted about 3/16in. (5mm) below the threaded top end, while the priming cup pipe is inserted just below the threaded top end — i.e. slightly higher than the outlet pipe (see fig 27). At this stage the pump base is secured with epoxy resin adhesive to the pump body at a point just below the outlet pipe.

The priming cup (**fig 31**) is machined from aluminium alloy bar 1 1/4in. (30mm) O/D, hollowed out and internally threaded to take a machined cap. The other end is reduced to form a 3/8in. x 26tpi (10 x 1mm) nipple. This priming cup was used only on the Hopkins Mk. II.

The top surface of a 3/4in. length of 1/2in. square brass (12 x 12 x 18mm) is drilled and tapped 3/8in. x 26tpi (10 x 1mm) to take the cup nipple while the long end is cross-drilled to take a 1/4in. (6mm) I/D brass pipe which leads from the cup to the top end of the pump.

The pump is actuated by a crank at the flywheel end, or by a crankpin on the crankshaft boss. The pump works best with a short stroke and therefore the stroke should not exceed 3/8in (10mm).

A clevis is machined from 3/8in. (10mm) square brass, drilled and tapped at one end to take the pump rod (alternatively drilled 4mm and cross drilled to take a grub screw); the other end is slot drilled to take a 1/8in. (3mm) thick con-rod.

The pump con-rod is approximately 1in. (25mm) between centres. The best way of gauging this is by measuring the distance between the crankpin at BDC and the centre of the clevis pin when the pump rod is at its lowest position. A clevis which allows minor adjustment to the con-rod length is an advantage. The con-rod is fitted with a ball race to match the crankpin.

Readers should note that the pump actually fitted to the prototype Mk. I illustrated here differs from the foregoing description in a couple of respects. The priming cup was replaced by an oblong plastic container (**photo 13**). The top end/guide rod bush was drilled with a number of 1/16in. (1.6mm) holes to serve as the exit port for the pumped water. The outflow goes into the plastic container and from there into a holding tank. Priming the pump is by sealing the vertical outlet pipe by closing it with a finger, and pouring water into the oblong plastic container.

To be continued.

The 0.039in. diameter governor link pivot pins were turned from 1/8in. dia. mild steel.

The ball turning device used to turn the governor weights; note the safety advice in the text.

The method used to index the mitre gears while being cut in the lathe.

A MODIFIED PISTON DROP VALVE STEAM ENGINE

H. Beech

concludes the description of his engine starting with the governor.

Part II continued from page 555 (M.E. 4208, 14 November 2003)

The governor was built more or less to the design of A. Haworth and, as he pointed out, it is slightly over scale. It is a working governor of small size although I made some parts slightly smaller to avoid an overweight appearance. One change was the use of a belt drive instead of the gear drive specified. Apart from the flexibility this gave to change the speed, this form of drive was considered to be more interesting.

After some trial and error, the governor speed was found to be about 230rpm and at an assumed crankshaft speed of 100rpm this gave a pulley ratio of 2.3:1. The gears used for driving the governor shaft and piston valve eccentrics were made on the basis of the recommendations in the book by Ivan Law. Two sets of mitre gears were made in the lathe using the 60 tooth bull wheel of the lathe for dividing purposes. Each gear had 15 teeth, a number chosen for reasons that will be explained.

In the first phase the cutter takes a straight cut through the blank. In the second phase the cutter is lowered a specified amount and the blank rotated followed by a further cut. Phase three is as for phase two, with the cutter being raised and the blank rotated in the opposite direction. The milling cutter spindle was held on the vertical slide so that the cutter could be raised or lowered by the required amount. 25% of the pitch rotation of the blank could therefore be achieved by a one-tooth rotation of the lathe bull wheel. For this set up, the blank was turned and held in the lathe chuck and the vertical slide mounted on the top slide set over at 45 degrees.

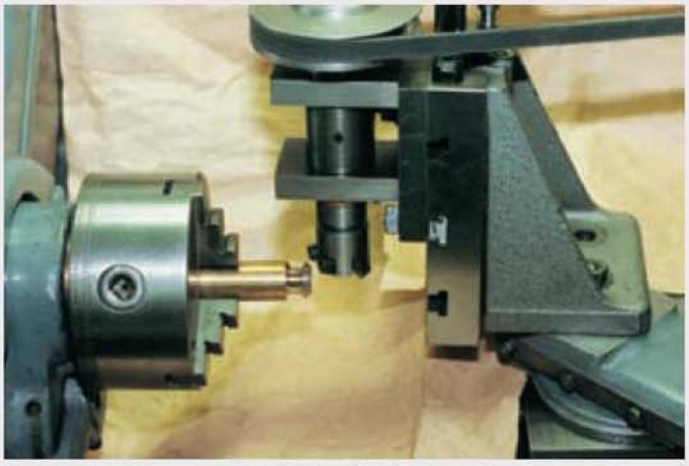
Gear cutters were made from 1/4in. thick gauge plate by boring holes at the centres specified for the size of gear and then cutting away surplus material and backing off to provide clearance before hardening. This procedure may not be as good as that recommended, but it seems to work.

Because of the taper on the central pillar it would be a little difficult to set it up to mark off the various slots, but by doing this in the lathe before parting off it was no trouble. Slots are cut into the side of the central pillar to carry the trip lever, damper and shaft bearing; these were milled in the lathe. Lugs fitting into these slots were secured with soft-solder, on the assumption that solder would be more than adequate, and if not there were serious governor problems elsewhere.

The governor weights were turned using a ball turning device shown in *Model Engineer* some years ago. However, a word of caution: do not let the cutter holder get beneath the work as it will be dragged under with possible serious consequences. The photograph of the ball turning operation was posed for the camera and shows this about to occur. The stops on the device should be adjusted to prevent it happening.

The approximately 1/32in. dia. pins retaining the pivot pins in the governor links were turned in the lathe. After several unsuccessful attempts to reduce the diameter of a piece of 1/16in. dia. rod, it was found that by chucking 1/8in. dia. bright mild steel and setting the cross-slide to take a 3/64in. cut with a knife-tool, pins could be made without difficulty and the head formed before cutting off. A jig for cross drilling the pivot pins was described by the author in *M.E.* 3971, 17 June 1994.

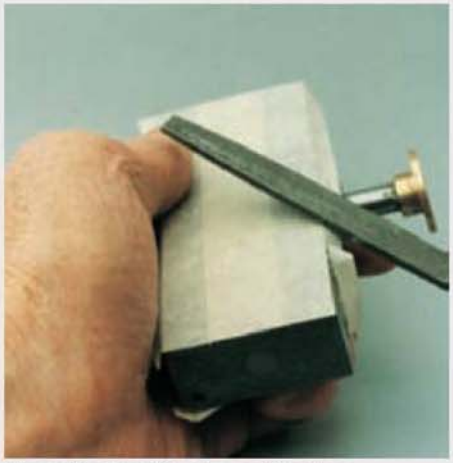
The governor drive belt is made from the leather which is sold for binding the worn cuffs on sports jackets, etc. Despite changes in fashion, this is still available from some leather shops.



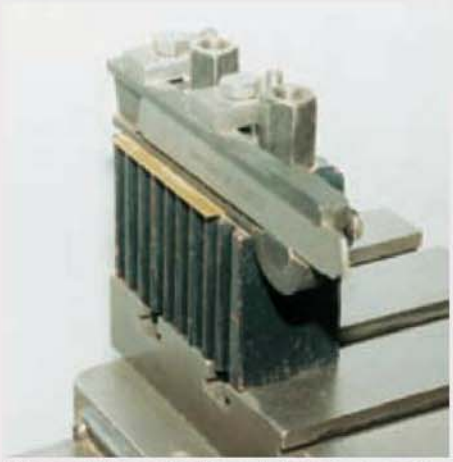
Cutting the mitre gears with a milling spindle mounted on the top slide. Drive was via a motor mounted on the lathe bed and tensioned by a spring.

The manual drive mechanism housed in the base. The spring loaded lever brings the tyred wheel into contact with the flywheel.

The appearance of items like pedestals was improved by the addition of a body filler fillet.



The method used to trim masking tape to an edge using a smooth file.



This useful, improvised rear tool post was made from a cylinder offcut.

Needless to say, all parts of the governor had to be carefully made, right through to the bars which operate the inlet cams, so that friction is minimised and lost motion in the links is eliminated as the force and movement provided by the governor are relatively small.

Air pump and jet condenser

The bracket supporting the tail rod guide was fixed to the base plate so that the driving links, air pump, jet condenser, and condensate tank are kept in alignment and independent of support from below. This was of considerable benefit when working on the pipework with the base plate temporarily held in the vertical position. The tail rod guide bracket was fabricated to the original design but the stroke of the air pump was reduced, producing the knock-on effect referred to earlier.

While the crosshead movement remained the same, the triangular links, pump crosshead guides, etc. had to be altered to suit the pump stroke. A loose wooden trim was fitted around the condensate tank to make it appear that the tank was supported on the base.

Pipework

In order to help in setting the valve gear, piping was arranged to supply each cylinder separately, as well as exhausting from the H.P. to the L.P. cylinder and then to the condenser.

Base plate

The base plate originally specified was about 2in. deep, ribbed, and of a cast material, but there seemed little chance of obtaining anything of this order, so a compromise was made using 1/8in. mild steel plate with a 1/2in. square trim bolted to the underside. It could have been made using 1/2in. x 2in. bright mild steel but it would not have gained greatly in appearance and there would be undesirable extra weight.

By using a 1/8in. thickness of plate it was found that bolts could be used to secure the various components and hole positions could adjusted slightly if necessary, whereas holes for studs would not have had this facility.

4BA holes were tapped into the underside of the 1/2in. square bar for securing the base plate to brackets for working on it in the vertical position. These holes were later fitted with cheese head screws to act as dowels in the supporting base.

Low pressure cylinder

After laying out the H.P. cylinder, governor and crankshaft on the base plate, the time had arrived to find a suitable L.P. cylinder. After trying various suppliers without success, contact was made with Alyn Foundry, of Wrexham, North Wales (usual disclaimer). I was encouraged to look through their stock of patterns, select one and modify it to suit. From this an excellent casting was produced. Machining the cylinder followed previously published guidelines, and its location on the base plate determined the location of the remaining components.

Supporting base

This consisted initially of an open topped box on which the base plate could be rested to give access to the underside during construction. To give the appearance of stone blocks, strips of 1/2in. x 2in. wood were grooved and the corners bevelled before gluing and nailing to the box.

After other work and painting was complete a search was made for a polished base to finish it all off. Something like 3/4in. mahogany or veneered chipboard were considered, but by chance in the DIY supermarket I came across a range of doors made for fitting to cabinets, etc. with nicely rounded edges, smooth finish and centre panel, and one just the right size to suit the supporting base — an excellent item, and ready made.

Manual drive

It may not always be convenient to have steam, air or electricity available to demonstrate the movement of various parts of the engine, so rather than pull the flywheel around on such occasions a simple manual drive mechanism was fitted in the supporting base.

It consisted of a hand driven wheel being brought into contact with a rubber tyred wheel which was simultaneously brought into contact with the flywheel. The tyred wheel was mounted on the end of an arm brought into contact by depressing a spring loaded lever adjacent to the handle, used for rotating the drive wheel.

Valve setting

Valves were set on each cylinder with compressed air separately supplied. The L.P. cylinder was straightforward but the H.P. cylinder required more attention. One important detail was the marking and noting of the valve positions for opening and closing of the inlet and exhaust as these are hidden when the engine is assembled. Another was to ensure an uninterrupted supply of air; not always obvious as only a small volume and low pressure are required in this application.

Painting

These notes are not a guide to painting models but describe some of the experiences of a first time spray painter. After completing the model, by chance I came across an article by *Tubal Cain* (*M.E.* 3945, 21 May 1993) which included a useful contribution on this subject.

Previously, painting had been by brush with reasonable results, but this time spray was to be used, and this was to be from paint supplied in aerosol cans from the motor spares shop.

All painted surfaces were spray painted and for this purpose were set up on a turntable within a cardboard box which latter acted as a spray booth. The turntable consisted of a small freely revolving wooden platform on top of an old cast iron pulley.

It became evident that it was important to provide a matt finish on fabricated metal items to key the priming coat; whether some form of grit blasting would help in this may be worth considering for future models.

One other important ingredient for success is patience. Without this, components will carry finger-prints, paint runs and blobs, bits of swarf, etc., and possibly even be the wrong colour. It was helpful to have other work waiting at the bench or lathe, or do something else while the paint was drying to ensure that the painting process was not rushed.

Before painting, some fabricated items such as bearing pedestals had the corner between the base and the vertical pillar filled with a fillet of body filler and then filed smooth. This gave a much better appearance. Non-painted areas were covered with masking tape applied with a slight overlap and then trimmed off with backward strokes of a smooth file.

Instructions on the can were quite clear: wear a mask and provide plenty of ventilation, do not be tempted to give a quick burst to a small item without using the mask as there will be a lot of spray in the air in the vicinity of the booth. While the instructions on the can are self-explanatory, the following notes may also be of interest:

1: Spray with the painted surface laid flat to reduce the possibility of runs and do not spray too thickly. For all items with the surface laid flat there are vertical, or near vertical edges which is where runs can occur.

2: Items for spraying should be supported in the centre to avoid the layer of paint on the turntable joining that on the item and the two sticking together.

3: Attempts to spray a number of small items simultaneously are likely to result in excessive spraying of one item.

4: Spray into the booth at the side of the item to clear the nozzle and see exactly the direction of the spray, and then keep it moving across the

surface to be painted before finishing to one side back into the booth. Using aerosol cans for spraying a large number of small components is not very economical, but it is consistent and gives a good finish.

5: Steps were taken to protect finish painted surfaces during assembly by strategically placed cloths and by not resting tools and parts on the base plate. Where it was decided not to use washers under nuts to protect the paint from being scratched when tightened, the underside hexagon corners were relieved with a smooth file while held on a screwed rod in the chuck. In this way the nut would bear on a circular area, the diameter equal to the across the flats dimension.

6: During the building and testing of the engine, minor scratches occurred and because of the difficulty of spray painting the assembled engine, these were made good with a fine camel hair brush. Paint was sprayed into the corner of a container and the solvent allowed to partly evaporate so as to leave a viscous liquid for use with the brush.

7: After fixing the wooden strips forming the blocks to the supporting base, a first coat of acrylic primer was applied. This was followed by two further coats, but these were applied thickly with a dabbing action to produce an uneven surface. Colour coats were finally applied in a slightly uneven manner to break up the regular pattern.

Identification

A brief note is set in a small frame saying what the engine is and the type of valve gear. Perhaps it may help the non-technical.

Photographs

For readers who may be interested, the photographs were taken with an Olympus OM 10 SLR camera using a tripod and self timer where possible and supplemented by a simple magnifying lens for close ups. Not being a photographer to start off with I found that, like paint spraying, a bit of patience is required, if only to read the instruction book before operating the shutter.

WORLD TIME DIAL CLOCK

Ian Beilby

begins work on his novel and attractive clock with the plates, pillars and the great wheel arbor.

Part II continued from page 558 (M.E. 4206, 17 October 2003)

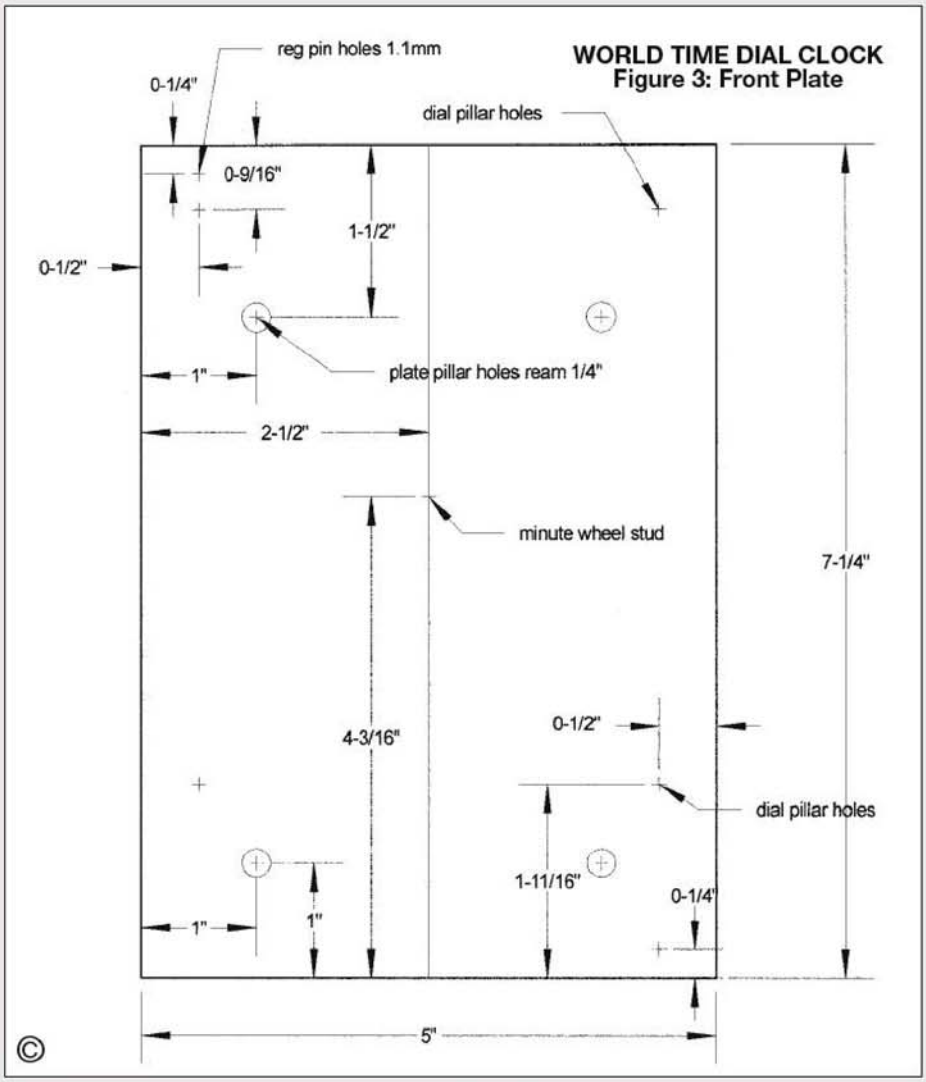
The first items which require our attention are the clock plates. If they have been guillotined to size, other than finishing the edges with a fine file and emery sticks, no other work should be required before marking out the frontplate as dimensioned in **fig 3**. If the plates have been sawn, a check should be made with a 6in. engineer's square to ensure that both plates are square before finishing. The plates can be coated with marking out fluid, but speaking for myself, I find I am able to see the scribed lines on plates well enough and so don't use it. The centre line is scribed on the frontplate, as are the positions of the pillar holes and the register pins which may then be marked with the centre punch.

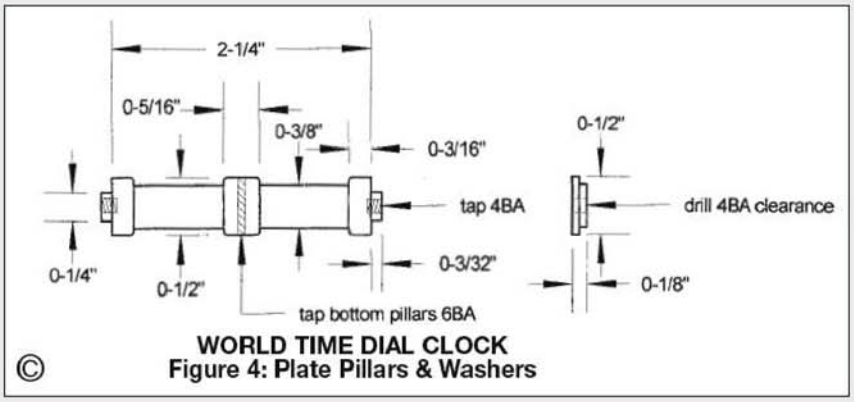
In clockmaking, a number of drilled holes have to be accurately positioned, especially later on when it comes to depthing the wheels. Great care should therefore be taken when marking out the position of these holes, and when positioning the centre punch. I have recently purchased an optical centre punch which I find most convenient and accurate in use. The body of the punch is positioned over the scribed lines and a magnifying lens with crossed hair lines is inserted. When the crossed lines of the lens are moved into correct alignment with the scribed lines, the lens is removed, a centre punch inserted without disturbing its position, and the punch is struck with a hammer to produce an accurate punch mark on the line.

The two plates should then be clamped together with a pair of toolmakers' clamps and the holes for the register pins drilled through both plates. These holes are then taper broached from the frontplate, the toolmakers' clamps removed, and the plates separated.

Once apart, the *inner* faces of the two holes should be lightly chamfered to house any burrs produced by broaching thereby preventing the mating surfaces from bulging after driving in a tapered steel clock pin from the frontplate.

The frontplate should be placed over a steel stake and the pin driven in from the front of the plate. The backplate should then be tried for fit and the hole in the backplate opened out with the tapered broach until the two plates fit snugly together without play. Any surplus length can then be cut and filed off the pins. While the plates are





WORLD TIME DIAL CLOCK
Figure 4: Plate Pillars & Washers

still registered together, two small diagonal lines should be filed across their bottom edge in order to identify their relative positions when assembling and dismantling during construction.

The plates should then be placed together and secured with toolmaker's clamps before drilling and reaming the four 1/4in. diameter pillar holes. The plates are then separated and the four pillars made.

Left: machining the waisted sections of the plate pillars with a round nose brass turning tool.

Right: a pair of finished plate pillar sets with screws and washers.

Below: plates and pillars on initial assembly.

Pillars

Four identical sets of machined pillars and washers are required; **fig 4** shows their dimensions. As the same machining operations are required on all four pillars, it pays to plan the work in advance and perform the same operations on each pillar in turn. Since the spigots must be concentric they are best machined in the collet chuck or between centres.

In clockmaking, many components are made with reference to others which have been already made, and are therefore removed from the lathe during construction. The use of a collet chuck enables the work to be removed from the lathe, and returned, thereby ensuring that the component still runs true — on the assumption that the collet and its housing are accurate, clean and free from burrs or other damage.

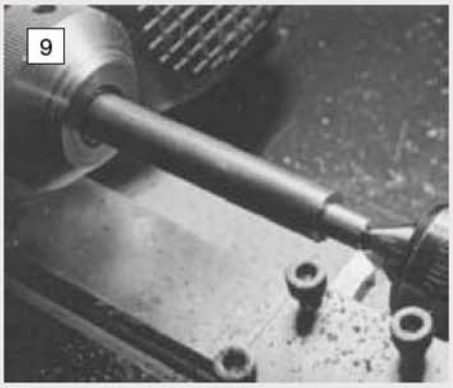
Four 2 5/8in. lengths of 1/2in. brass are sawn, deburred, cleaned and held in the collet chuck. The first operations are to face one end, form a centre with the centre drill and turn the 1/4 x 3/32in. spigot. I usually ream a 1/4in. hole in a piece of brass the same thickness as the plates for use as a gauge to determe the correct spigot diameter. The fit should be good, but not too tight, and at a length of 3/32in., just less than the thickness of the plate. The shoulder of the pillar should be slightly undercut in order that the full diameter of the pillar bears against the plate. I usually undercut the shoulder by hand using a graver. These operations are carried out in turn on all four pillars.

From the shoulders just turned, and using the Vernier gauge set to 2 1/4in., the position of the second shoulder is marked on all four pillars and the spigots faced, centred, turned and undercut as for the first end. All four pillars should be checked to ensure that each 2 1/4in. shoulder-to-shoulder length is identical to all the others. If this is not the case, the 3-jaw chuck may be used to grip the shortest pillar by its 1/4in. spigot, with the shoulder pressed firmly against the chuck jaws and the outer end spigot supported by the revolving tailstock centre.

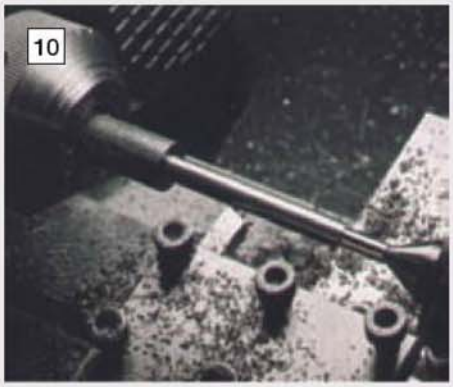
A very light-facing cut is then made across the shoulder and the saddle locked. Without altering any of the lathe settings, the same operation should then be carried out on the remaining three pillars. All the pillars should now be the same length. If you have had to reduce the length of the pillars by more than, say 1/64in., you may have to undercut the shoulders again, and care must be taken not to reduce the diameter of the spigots.

Using the 1/2in. collet chuck, each of the pillars is then gripped in turn for drilling 3.1mm (No. 31) from the tailstock, and tapping 4BA. The pillars should then be coated in layout marking fluid and the 3/16in. shoulders and the 5/16in. centre of the pillar marked out using odd-leg calipers.

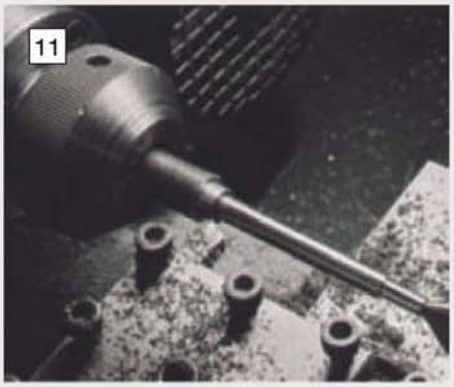
Each pillar is then held by its spigot in a 1/4in. collet, supported once more by the revolving tailstock centre. Using a small parting tool, plunge cuts are made to define the waisted sections of each pillar. The parting tool is then replaced with a round nosed brass turning tool which is traversed left and right to reduce each section of pillar (**photo 6**). Left-hand and right-hand knife tools are used to produce sharp shoulders. Some hand



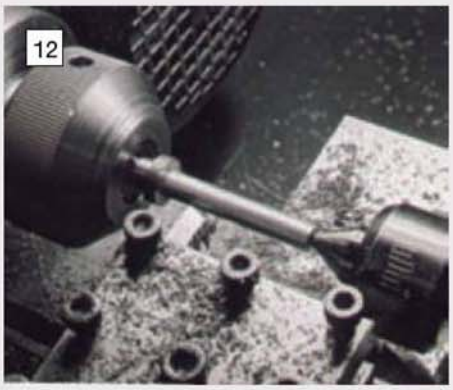
Turning the back pivot on the great wheel arbor.



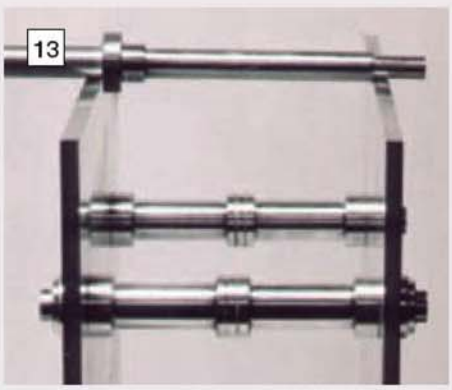
Machining the great wheel arbor continues.



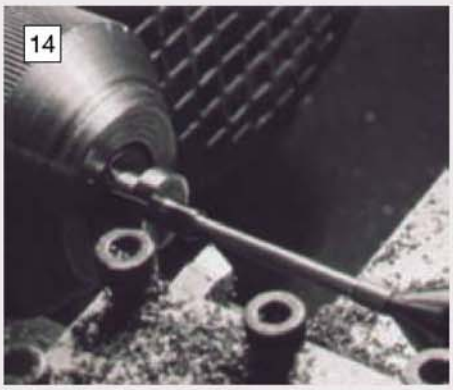
Turning the wheel seat on the great wheel arbor.



Machining the other half of the great wheel arbor.



Checking the shoulder-to-shoulder distance.



Turning the great wheel arbor 7/8 x 1/8in. seating.

Great wheel arbor with machining completed.

Great wheel arbor cross drilled and brought to length.

work with a graver will produce a slight curve over the tops of the shoulders. Finally, the centres of the two bottom pillars should be drilled and tapped 6BA for the seatbolts.

As the pillars are completely detachable from the plates, my routine is always to number the pillars and plates using 1mm number punches so that they can be returned to their correct location after dismantling the clock for cleaning or routine overhauls. I normally number the pillar on the face of the undercut shoulder, and mark a corresponding number on the backplate, adjacent to the pillar hole.

Washers

The plates and pillars are fastened together with 4BA steel screws and washers. A total of 10 washers will be required, including a set for the back cock pillars which will be machined later. In order for the full diameter of the washers to make proper contact with the plates, their rear faces should be slightly recessed.

A length of 1/2in. brass rod is gripped in the collet chuck and drilled 4BA clearance (3.7mm or No. 27). The recess can be machined or made with a hand graver and the washer then parted off to 1/8in. thickness

When the ten washers have been made, a 4BA threaded mandrel is held in the 3-jaw chuck and the recessed side of the washer screwed tightly against the jaws of the chuck. A decorative groove can then be machined on the front of the washers. Two finished pillars with washers and screws are shown in **photo 7**.

The pillars should be inserted into their respective holes in the backplate and secured with four washers and screws. The top plate should then be tried for fit. The holes in the top plate may require slight attention from the broach, working from the inside of the plates, in order to allow the top plate to be removed and assembled with ease. When making a clock from scratch, the plates are assembled and dismantled many times, and unless the holes in the top plate are eased slightly, there is a risk of the top plate jamming. Both plates can now be assembled with the pillars which are screwed up tightly with the washers and screws (**photo 8**).

A true plate-to-plate dimension can now be obtained and work can proceed on machining the great wheel arbor.

Great wheel arbor

This component is shown in **fig 5** and is machined from 1/2in. EN8 steel. Since the arbor pivots must be concentric, it should either be turned between centres or with the use of a collet chuck. I will describe the procedure using a collet chuck. A 4 1/4in. length of steel should be cut, held in the 1/2in. collet and both ends faced and centre drilled. A length of some 3 1/4in. is drawn out of the chuck and supported on the revolving centre in the tailstock. The 3/16 x 1/8in. back pivot should be turned first, sufficiently overlength so that the centre hole can be removed later (**photo 9**).

In clockmaking, the plate holes are broached to accept the pivots, so the actual diameter of the pivot is not critical, however the finish of the pivot is most important. A smooth, parallel, highly polished finish is required completely without marks and/or ridges. When the pivot diameter approaches 3/16in., the pivot file should be used, followed by the burnisher in order to achieve a good finish.

The 1/4 x 17/8in. dimension is turned next (**photo 10**) but before starting work on this particular feature, since a commercially available 30 hour click pulley is to be used which runs on this arbor, it is as well to check that the pulley is actually bored 1/4in. diameter.

The wheel seating can then be turned 3/16 x 5/16in., the 5/16in. diameter best left slightly oversize (**photo 11**). Since the wheel will be secured to the arbor with Loctite, a close fit is required here. The 5/16in. wheel centre can then be broached to fit the arbor.

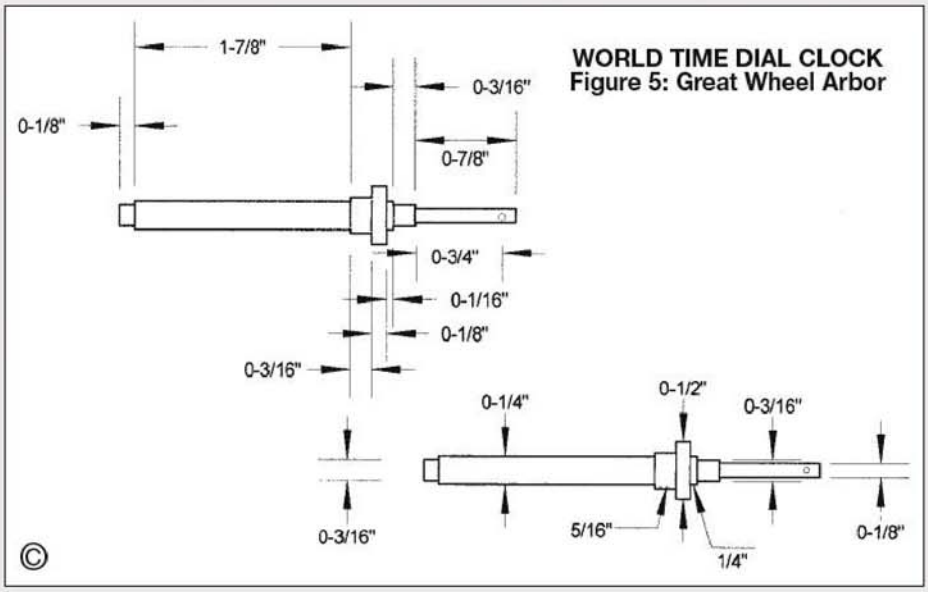
The work is then reversed and held in the 1/4in. collet, the outer end supported on the tailstock centre and the remaining dimensions machined (**photo 12**).

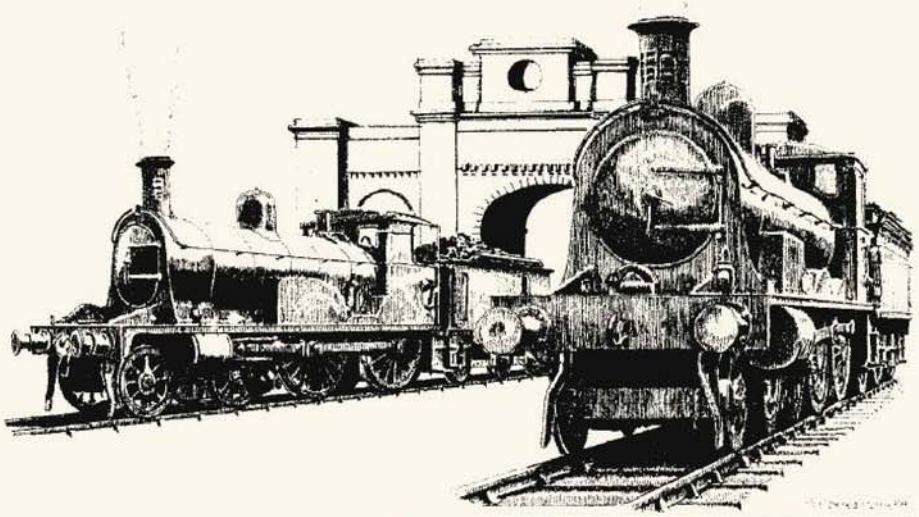
The arbor should first be reduced to 1/4in. to form the 1/16in. shoulder. The 3/16 x 3/16in. front pivot is then machined. The arbor will have to be removed from the lathe to check the actual pivot shoulder-to-shoulder distance against the assembled plates (**photo 13**); there must be a little end shake between the plates, but not too much!

The pivot must again be turned with care to ensure it is parallel, well finished and brought to a high polish, as before.

Finally, the 7/8 x 1/8in. dimension is turned (**photo 14**) and cross-drilled at 1/4in. for a tapered steel clock pin. The machined arbor is shown in **photo 15**. The arbor centres can now be removed, taking note of the dimensions given in fig 5. **Photograph 16** shows the finished arbor.

To be continued.





THE HIGHLAND RAILWAY JONES 'BIG GOODS' & LOCH 4-4-0

LOCOMOTIVES IN 5in. GAUGE

Neville Evans

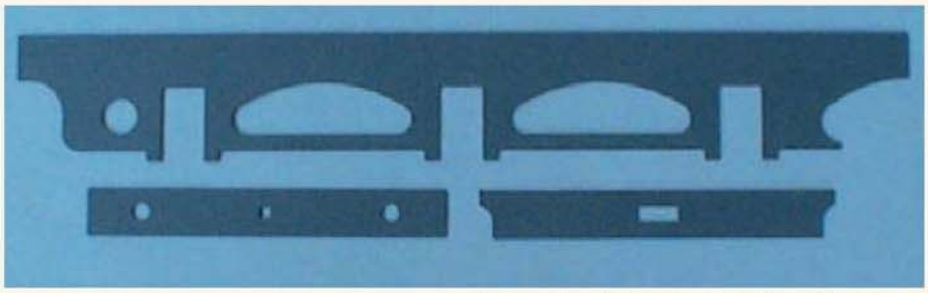
describes the tender axlebox assemblies and the wheels and axles before discussing inside cylinders and 00-gauge live steam.

Part XXXII continued from page 568 (M.E. 4208, 14 November 2003)

As can be seen from the accompanying photographs, the castings for the tender axlebox assemblies are mostly made by the investment or lost wax process, with the exception of the horn cheeks which are sand cast in gunmetal. It is important to machine the step detailed in the horn cheek, as it locates and supports the whole axlebox assembly. The top of the step is rounded off so as to fit the radius in the corner of the cut-out.

The axlebox is a lost wax casting and is designed to be used in conjunction with the BA 87 Z needle roller bearing. These items are sealed on one end, so be sure to insert them the right way round, with the seal on the open side. An alternative is to bush the box with a suitable phosphor bronze or gunmetal bush. Actually, a hard brass will do just as well. If you decide to use a plain bearing, make sure that the oilways are connected to the oil box and that you provide a trimming as shown on the drawing, which will help to eliminate over-oiling of the bearing. Don't go for fine sliding fits, steam engines seem to work much better when slight play has developed in joints and bearings, to avoid tightening up when a little bit of muck gets in.

The front cover can be made detachable or as a fixture. My own engine has a fixed cover with roller bearings. The cover has been assembled with its 10BA studs and minute 12BA nuts and is sealed for life with instant gasket. One could even Loctite it on. Incidentally, I never bother to drill such small nuts when retapping, but simply bung the 10BA tap through, I've never had any grief from this unseemly looking practice. When the engine is given its annual once-over, I shall just slip out the tender wheel sets, inspect, and lightly grease the innards, making certain that I don't overgrease the needle rollers. Rolling bearings, whether ball or cylindrical, don't take kindly to too much lubricant sloshing around inside them. The problem is that high internal pressures can be generated that lead to overheating. The same remarks about the axlebox cover also apply to the alternative plain bearings. There should be no need for an access point on the outside in a small engine, a once-a-year 'shufti' will do very well.



Laser cut tender frames and buffer plates are available from Practical Scale.

The rather obtrusive little oil boxes were highly polished in Highland Railway times and can be held on by a single special screw which in turn can be drilled to form the oil channel from the oil box to the axlebox proper. Years ago my *Hielan' Lassie* had small oil boxes with cotton or woollen trimmings; these worked very well in regulating the flow of oil to the various bearings and I can thoroughly recommend them. Seal the underside of the box where it sits on the axlebox top plate.

The spring buckles and suspension stirrups are cast in stainless steel. Actually, it is much easier to cast in stainless than in mild steel. The addition of chromium and other metals improve the free running properties of the molten metal, which means that the results are much better. The little lugs come as part of the set and need to be positioned very carefully because, due to poor full size design, it is not possible for the two spring stirrups to adjust themselves to movement of the top spring leaf. All modern spring designs use separate buckles at the ends, as do the compensated leaf springs on the locomotive. The reason is that the suspension lugs on each end of the top spring leaf move in and out as the leaf flexes. The joints need quite a lot of slop in them if they aren't self adjusting as built, to avoid over-stressing the

Patterns for the lost wax castings available from Practical Scale for the Higland 'Loch' and 'Big Goods' locomotives.

assembly. It can be seen then that the 3 1/4in. dimension in the lug holes must be held accurately when silver-soldering these lugs to the top leaf. I suggest that a simple jig as shown on the drawing will be of great assistance.

The spring leaves are made of spring steel throughout, and are of a pattern devised many years ago by Doug Hewson (01652-688408), who can also supply suitable steel strip. The main leaves are made of 5/16 x 20 gauge steel as supplied. The two top leaves, however, have to be machined down from 1/2in. wide x 1/16in. thick material. The object of the exercise is to make up individual spring assemblies while the steel is still in its annealed state. The whole spring is hardened by heating to cherry red and plunging into clean cold water. The next stage is the tempering process. The top leaf is polished, and the whole spring gently heated until the top leaf turns blue. The assembly is then quenched in rape seed oil, that is ordinary cooking oil, which also leaves a lovely black finish on the spring. The top leaf is now taken out, its ends cleaned up, placed in the jig, and the two end lugs are silver-soldered on. To preserve the finish, the oil plunge can be repeated.

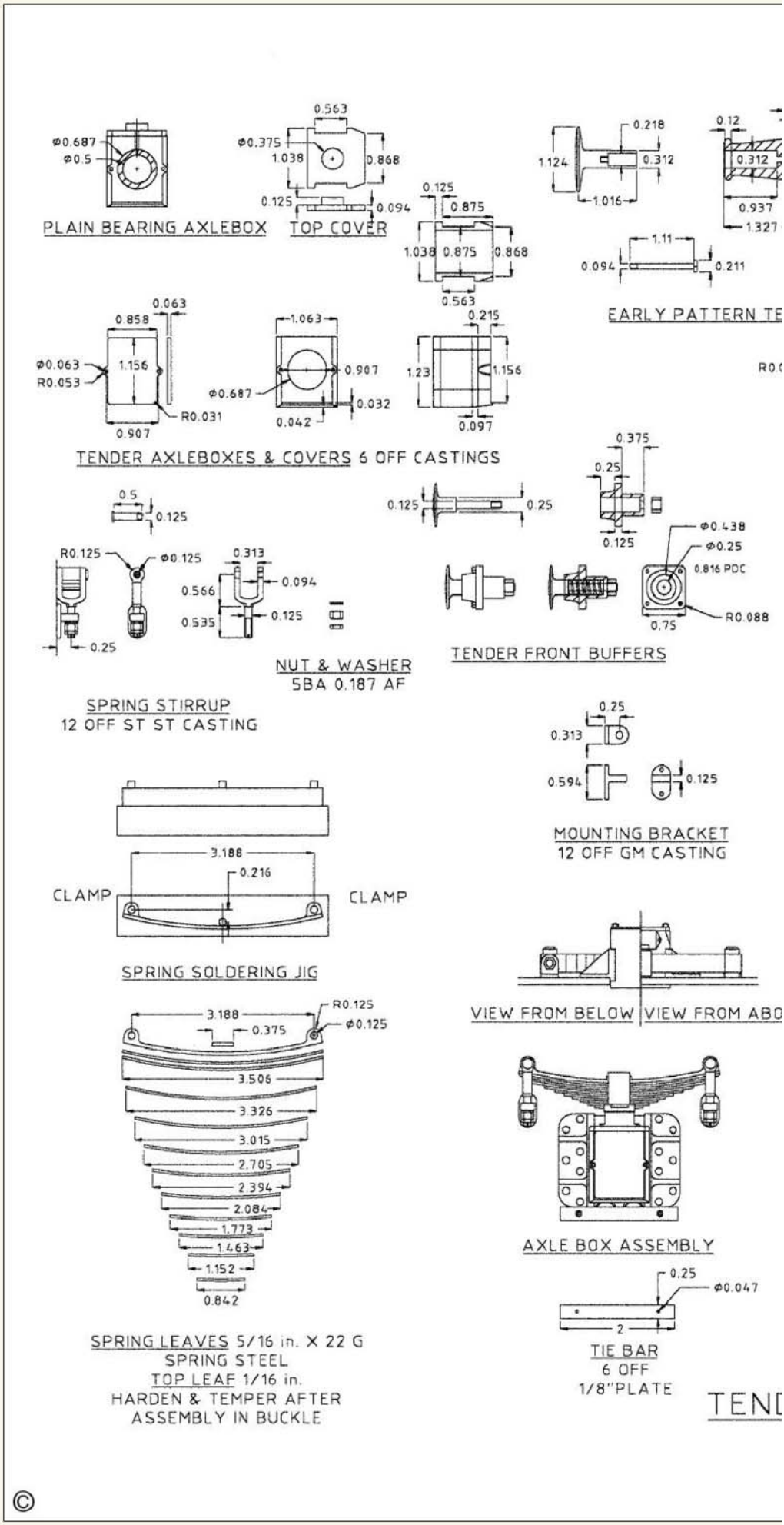
It may be thought that springs made in this manner, which actually gives an accurate true to scale spring, will be too hard for running on ordinary tracks. In fact, a member of the Bridgend club came along the other day, with a tale of problems with a kit built 1400 Collet 0-4-2 tank, one of the original Winson batch, not to be confused with the later ModelWorks series which I understand are very much better. He had discovered that the system of including filler leaves made of Tufnol just didn't work as the springs collapsed almost immediately. I gave him enough of Doug Hewson's steel to make up a pair of new rear springs, which are of course very obtrusive on the 1400, and he went away rejoicing.

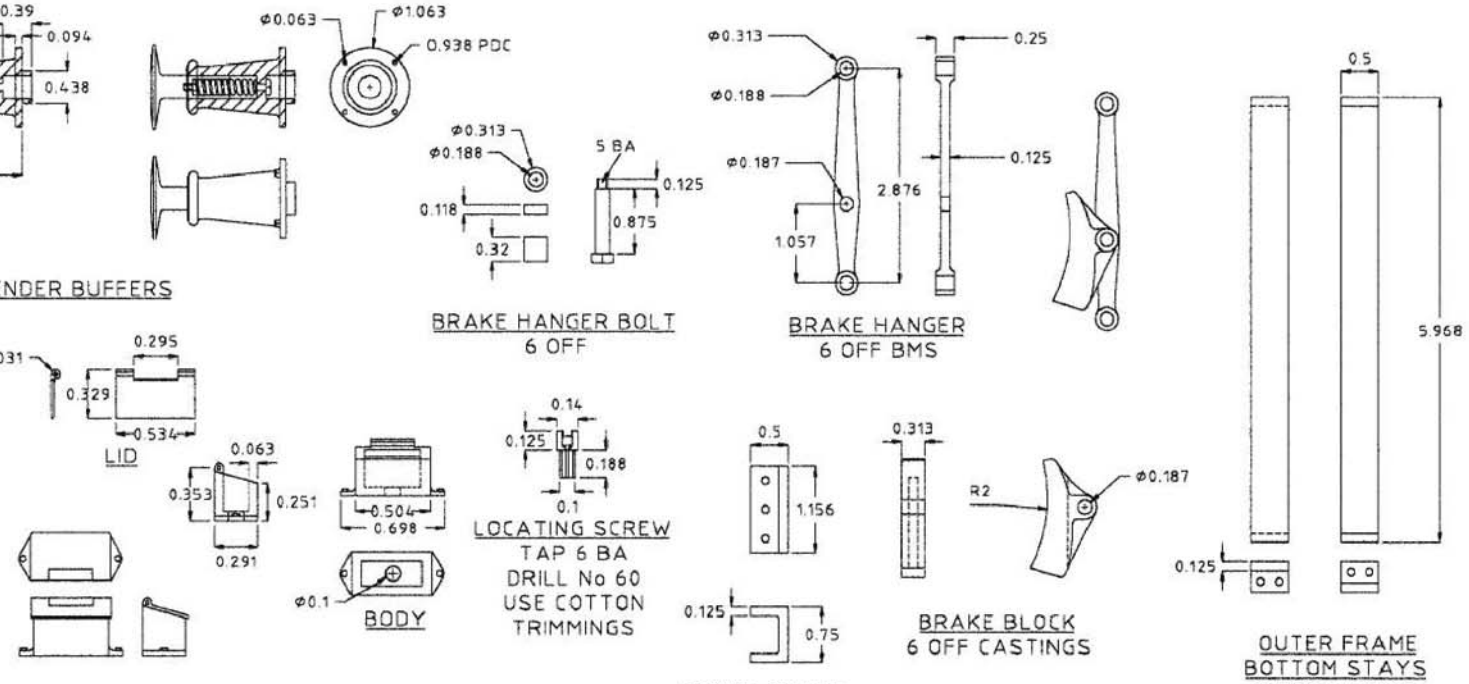
He made up the springs by the process just described and reports no further problem. The spring leaves themselves are held into the buckle by a short leaf on the very top and by a grub screw inserted into the bottom of the buckle itself. This replaces the practice of drilling all the leaves and inserting a pin through them. I've always thought that this is a bad idea, as it weakens the spring in the worst possible place, to the detriment of all concerned.

Wheels and axles

The tender wheels are so similar to the bogie wheels as to merit no further description. The axles are a slightly fancy shape, which we can use to our advantage. Note that if you are using ground silver-steel, as recommended, you'll have to make sure that the trade mark, which is stamped onto one end of each bar, is cut off first. Don't reduce the end, to make a positive stop for shoving the wheels onto, this was never full size practice and it isn't necessary in a small edition.

One of the few disadvantages of using Loctite to secure wheels is that it can be a bit difficult to ensure an even spread of the glue if the wheel has to be pushed 1/2in. or so onto the axle to its final position. I make certain that both surfaces to be bonded are thoroughly, if thinly, covered in adhesive and am always concerned about the film left on the bit of axle that is left sticking out — if you see what I mean. This is especially



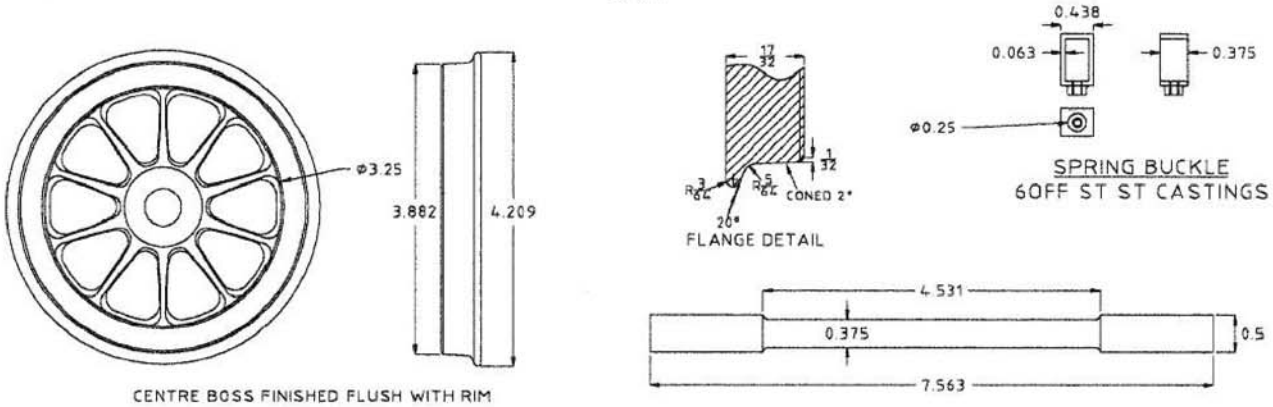


NDER BUFFERS

BRAKE HANGER BOLT
6 OFF

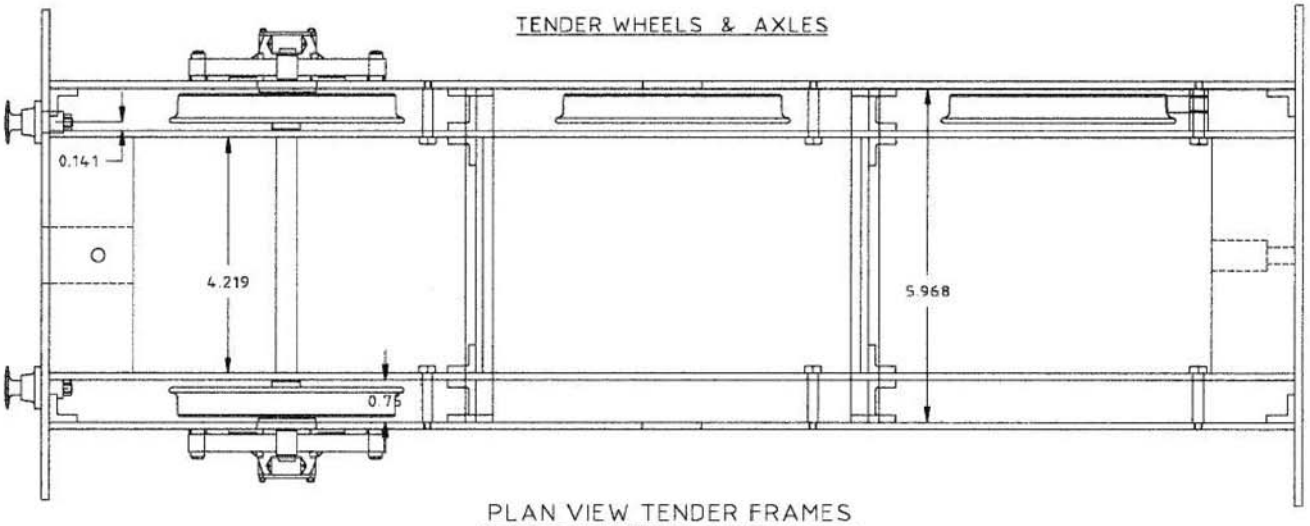
BRAKE HANGER
6 OFF BMS

OIL BOX 6 OFF POLISHED BRASS CASTINGS



VE

TENDER WHEELS & AXLES

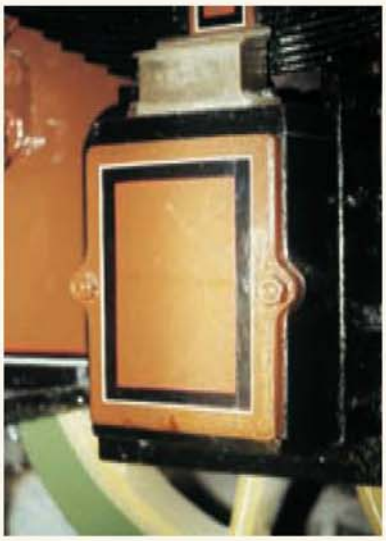


PLAN VIEW TENDER FRAMES

DER AXLE BOX ASSEMBLY

SUPPLIER

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



Axlebox details of HR No. 103 at Glasgow Museum; note stirrup link and suspension bracket and the finish of the spring buckle.

true of built up crank axles, where a careful order of assembly has to be determined and maintained. Therefore, I recommend that the wheels are slid on until they fall into the waisted part of the axle, when adhesive can be applied to first the axle and then, carefully, with the aid of a piece of bent wire, to the inside of the wheel. This means that there is an adequate film of glue between the wheel and the axle. Take pains to ensure that the first wheel is the correct distance from the outside end of the axle and then place the second wheel at the required back-to-back measurement.

Inside cylinders

I must admit that I share Ron Isted's enthusiasm for the Edwardian steam locomotive, though I doubt very much that an engine built in 1883 could by any stretch of the imagination be called Edwardian. More Victorian I would say. His description of the Stroudley cylinder was very good. This inside block and passage system, with double valves between the cylinder bores and divided exhaust passages was, I believe, first used on the Highland Railway by Stroudley, then perpetuated (I nearly said perpetrated) on the North British, the Caledonian and the LSWR by Stroudley's ex-pupil Dugald Drummond (just imagine giving Dugald 50 lines for talking out of turn). It was also used by Dugald's brother Peter, on the Highland, with his version of Dugald's hopeless E9 class, called the 'Small Bens', and then on his move to the GSWR.

The feature of increasing the area of the exhaust ports by splitting them into two separate systems, top and bottom, and leading the lower passages between the main bores and the frames, however, could under no circumstances be called steam jacketing. True cylinder jacketing implies heating the bores by passing live steam around them to eliminate condensation. This was a feature of many traction engines, and was used by Chapelon (to whom we doff our caps) as an alternative to superheating the H.P. cylinders of his last locomotives. To pass cool exhaust steam around the block only serves to make matters worse by lowering cylinder temperatures, which increases condensation.

Judging by Stroudley's reported comments in his paper to the Civils in 1885, as stated in Mr. Isted's article, the reason might be that he didn't understand how steam engine cylinders actually worked. The fact is, however, that these locomotives *did* work. By the standards of the day they were deemed to be brilliant performers. The Caledonian 'Dunalastair 1s', for example, were straight Drummond and used these divided passage cylinders, MacIntosh merely added a slightly enlarged boiler barrel and took all the credit. The answer may be that they possessed a very free exhaust, rather like the SECR E1, D1 and L1 classes, rebuilt from dubious antecedents, for the Dover boat trains. These little engines could develop over 1000dbhp at the cost of a largish coal bill. As Harry Holcroft said, they took steam in great gulps and had a very free exhaust.

As to the problem of placing valves between the bores, in model sizes there just isn't one. In the very early 1900s, Henry Greenley published a very sound design in 2½in. gauge, which has been used as the basis of all later schemes. In the 1960s, Martin Evans described a most satisfactory design for *Boxhill*, an LBSC terrier tank. Don Young modified and enlarged the bores in the '70s, for his *Fishbourne,* an Adams LSWR 0-4-4 tank. I produced my own version in the '80s for *Didcot,* a GWR 0-4-2 tank, all these in 5in. gauge. Much interest has been shown in this type of cylinder over the last year or so, probably because of the fact that in 1945, at the end of the last war, I believe about 64% of the locomotives on Britain's railways were inside cylindered with valve chest between the bores. The GWR alone had thousands of them.

I have therefore drawn, and will publish in the not too distant, a set of cylinders suitable for many thousands of British locomotives, from 4-4-0s to 0-4-0s. They may be machined from gunmetal bar (or whatever comes to hand), and will come complete with Stephenson's valve gear that can be built with any length of eccentric rod and be suspended either in the centre of the link, or from one end of it. Actually, Simon and I have been concentrating on the top suspended link, which is easier to make because, as you have to provide pins for the eccentric rods to waggle the link with, you may as well use one of them as a suspender. You thereby kill two birds with one stone and can beef up the link to make it more sound as an engineering prospect.

The latest printouts reveal valve events that are as accurate as can be achieved with centre suspension. Watch this space.

Stop press

One of the problems associated with describing two different locomotives at the same time is that although they may share many features, they also share many differences. A perfect example of this state of affairs is the blowdown valve, which fits neatly in the 'Big Goods', for which it was designed, but fouls the rear axle of the 'Loch' which in my imagination it also fitted.

The simple answer is not to scrap the whole locomotive, but to use an angle fitting as shown. This angle has the triple feature of not hitting the clack valve when it is being assembled on the boiler, it moves the blowdown valve to a more suitable position, where it doesn't foul the back axle, and it also places the screw in the vertical plane so that said blowdown valve doesn't come unscrewed whenever you try to use it.

The promised land?

A few days ago (time of writing) a leaflet was pressed into my hot and sticky palm, which described a steam powered, electrically fired, 00-gauge loco. In the late 1960s, I believe, I can remember that the Gauge 1 Society carried out lengthy experiments into the electric firing of small locomotives. These experiments were reported in *Model Railway News* and described limited success with an ex-Bassett-Lowke LNWR *Claughton*.

However, the whole series of articles was accompanied by a health warning, as high voltages were used and descriptions of engines being welded to the track served to put nearly everyone off. I use the word 'nearly' because, as luck would have it, Richard Hallam actually persevered with the system of electric powered, live steam in 00-gauge, with the result that Hornby have presented us with everyone's dream. A practical, true-to-scale live steamer at 4mm to the foot. The icing on the cake is that just as their predecessors of nearly 65 years ago, (I refer of course to Hornby Dublo and the 3 rail *Sir Nigel Gresley*), their first locomotive is another LNER A4 Pacific, in the shape of the immortal *Mallard*.

Unlike the early efforts of the G1 society, the new engine is truly sophisticated, with a boiler in the tender, superheater, throttle and regulator which, I believe, also gives forward and reverse. This is an altogether outstanding achievement, which surely points the way to the future of small scale railways. I can't wait for Christmas, when I hope to receive my first set. If all goes well, my plan is to concentrate on 00-gauge live steam in the attic, to the exclusion of the other small gauges.

Deryck Goodall keeps hinting as to when it's going to arrive and I can foresee that it will immediately be spread over his workbench in a thousand pieces.

To be continued.

REPLICA MID 19th CENTURY PORT BOTTLE TILTER

P. D. Cater
describes a perfect Christmas project.

I first became interested in engineering at school when, in the third year, we were given a list of subjects to choose from. I chose Metalwork and Geometric and Engineering Drawing. The very first item I produced was a G-clamp, for which I won The Woods of Colchester Craftsmanship award.

I then discovered a talent for engineering, which I enjoyed very much. The teaching staff from the Metalwork Department gave me every encouragement and when it came to choosing my fourth year options I decided to take engineering to GCE O-Level standard. After making other small objects including a junior hacksaw with a cast aluminium alloy handle and a brass handled screwdriver, I was entered for the O-Level exams but my engineering teacher recommended I also entered for the CSE for which students had to supply a project. The school's choice of projects included a clock, which was battery operated, a small vice, or a small steam engine kit. I felt that, from the choice given to the class, no real challenge was involved. At this stage in this account I must say that of a class of ten, I was the only female student.

Feeling somewhat disheartened with the choice, I approached my engineering teacher and asked if it would be possible to make something different. He said that if I found something I would like to make, he would consider allowing me to make it. With much encouragement from my parents I spent time in our local Library looking through many old and antique books. An illustration which finally caught my eye was of a mid-nineteenth century port tilter. It satisfied the requirements of the CSE examination in that it involved turning, screwcutting, silver-soldering, forming and bench work.

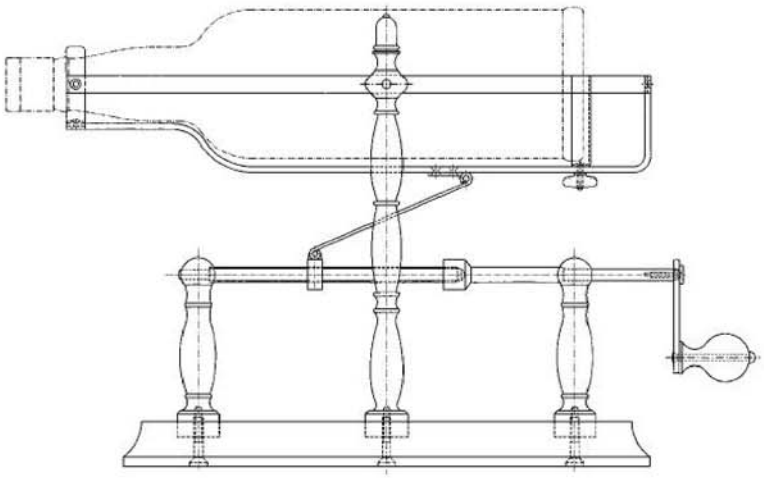
To draw up the port tilter from only one picture was not particularly easy, so to make sure the scale was correct, I made a wooden prototype which gave me a better overall view of how it would look when finished. I then approached my engineering teacher with the drawings for the nineteenth century port tilter and explained how I would set about making it. A couple of days later I was given permission to start the project.

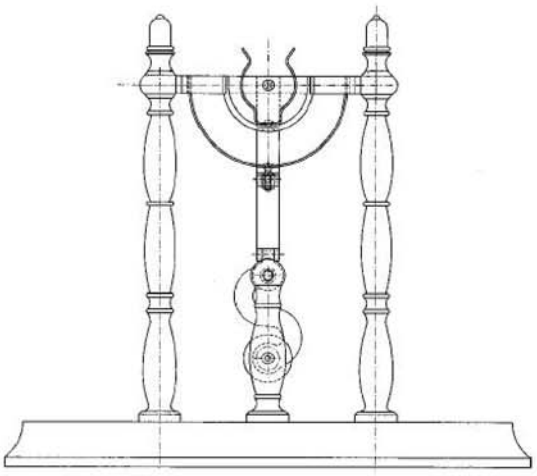
The end result was entered for the Model Engineer Exhibition where it was awarded a Silver Medal. It was felt that the time has arrived to bring it to the attention of a wider audience.

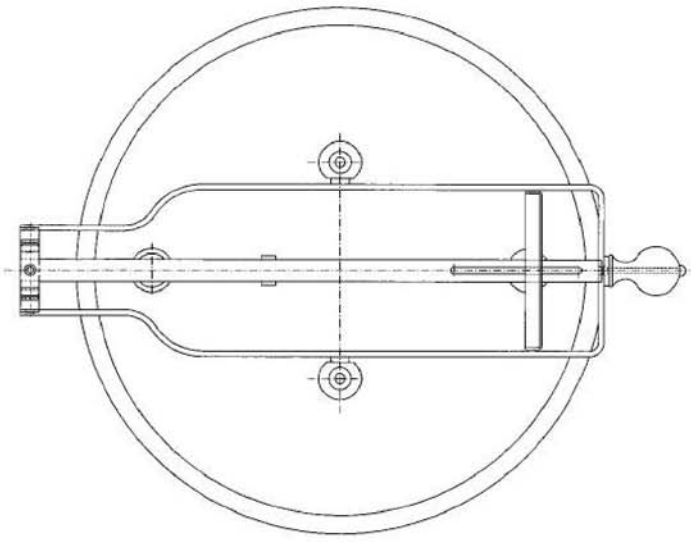
Making a start

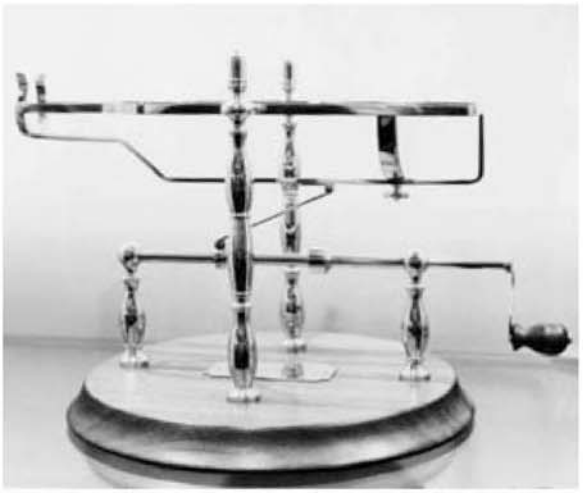
The manufacture of the port tilter was planned as follows:

1: Turn the large and small ornamental pillars.
2: Form the bottle cradle.
3: Make the special nut, flat hinge, turned hinge pins and cradle swivel pins.
4: Make the screw, handle support shaft, locking screw and wooden handle rivet.
5: Fabricate the bottle frame adjuster, threaded rivet and knob.
6: Produce the wooden base and leg fixing countersunk screws.









The design of the port bottle tilter is very much of the Victorian period and would make an attractive addition to any dining table.

7: Final polishing of all brass parts.
8: Pre-assembly.
9: Final assembly.

I was particularly fortunate in being allowed to use a lathe owned by a local company to turn the four pillars. However, before starting to cut any metal, it was decided to make templates of the pillars to assist the development of uniform shapes, thus the two respective pairs would be the same. Various form tools were made using a bench grinding machine. Final shaping of the pillars was achieved by file and emery cloth.

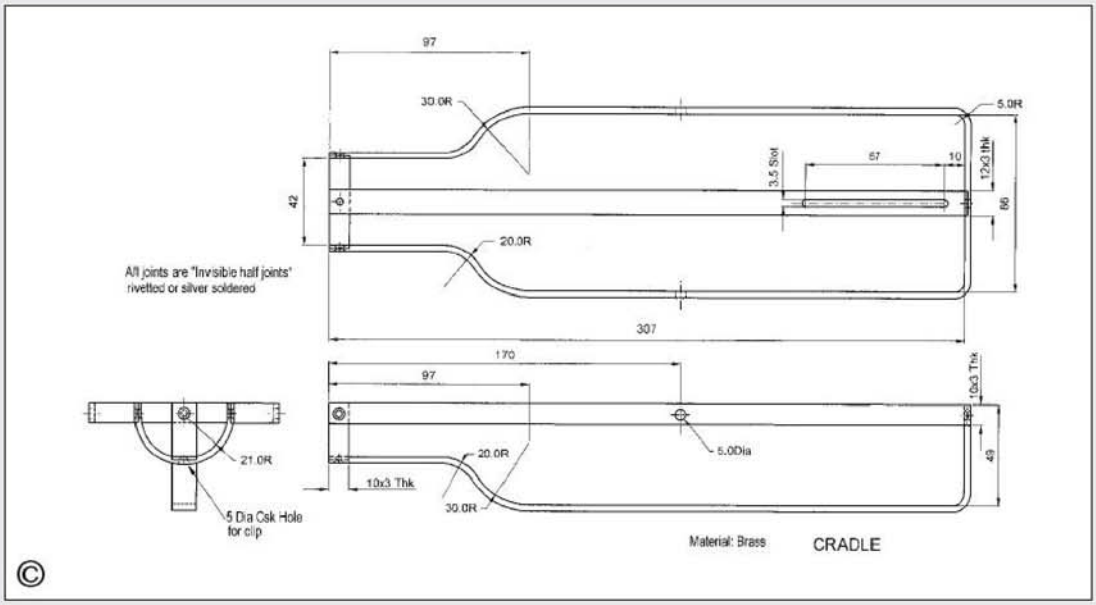
The small pillars were made from 25mm diameter brass rod, allowing sufficient length to hold them in the chuck and part off. Removing the excess metal by straight turning helped to reduce the amount of cutting required of the form tools. The lathe I used was fitted with a saddle hand wheel dial thus enabling greater accuracy and repeatability on the length positioning.

A radius turning attachment was used for the 'ball' shape on the end of the small pillars. Parting off completed the first stage.

Emery cloth was wrapped around the 22.5mm diameter parallel portion to avoid any damage from the chuck jaws. Then, using a dial test indicator, the pillars were trued, faced to length, drilled and tapped 2BA. The small pillars were then marked out, clamped in a vice with support packing, drilled, and reamed 5mm diameter. They were then both counterbored 8mm diameter with a flat bottoming drill to the same depth.

To produce the large pillars, a sacrificial centre was necessary, so extra length was allowed which would be machined off later. The procedure was similar to the small pillars, but with a revolving centre in the end to give extra support due to the extra length and pressure of the form tools. The form tools used needed to be fed in more gently. After the major shape of the large pillars was formed they were parted off.

These too were reversed to face, drill and tap 2BA. To remove the sacrificial centre and form the end, a piece of emery cloth was placed round one of the shaped diameters and then the leg was trued with a dti. The sacrificial centre was then turned off and the pip machined using a form tool for the main end radius. The pip was formed with a file and emery cloth. *(Readers may consider gripping the parallel portion of the pillar and mounting the remote end in a fixed steady for added security with these operations — Ed.)* The large pillars were then marked out, clamped, centre drilled and reamed to depth to obtain a press fit for the swivel pins.



Bottle cradle

The bottle cradle was made wholly in my garage during the summer holidays. I had a bench with a metal-work vice fitted with aluminium alloy soft jaws, so using the drawings of the cradle I formed the brass with a soft faced mallet (at all times care was taken not to damage the brass). To check that the bottle frame was flat I used a small surface plate and made any minor adjustments necessary to ensure that the bottle of port fitted the frame. In order for the frame to look as though it was made from one piece of brass, half joints were filed to match the 'mating' parts.

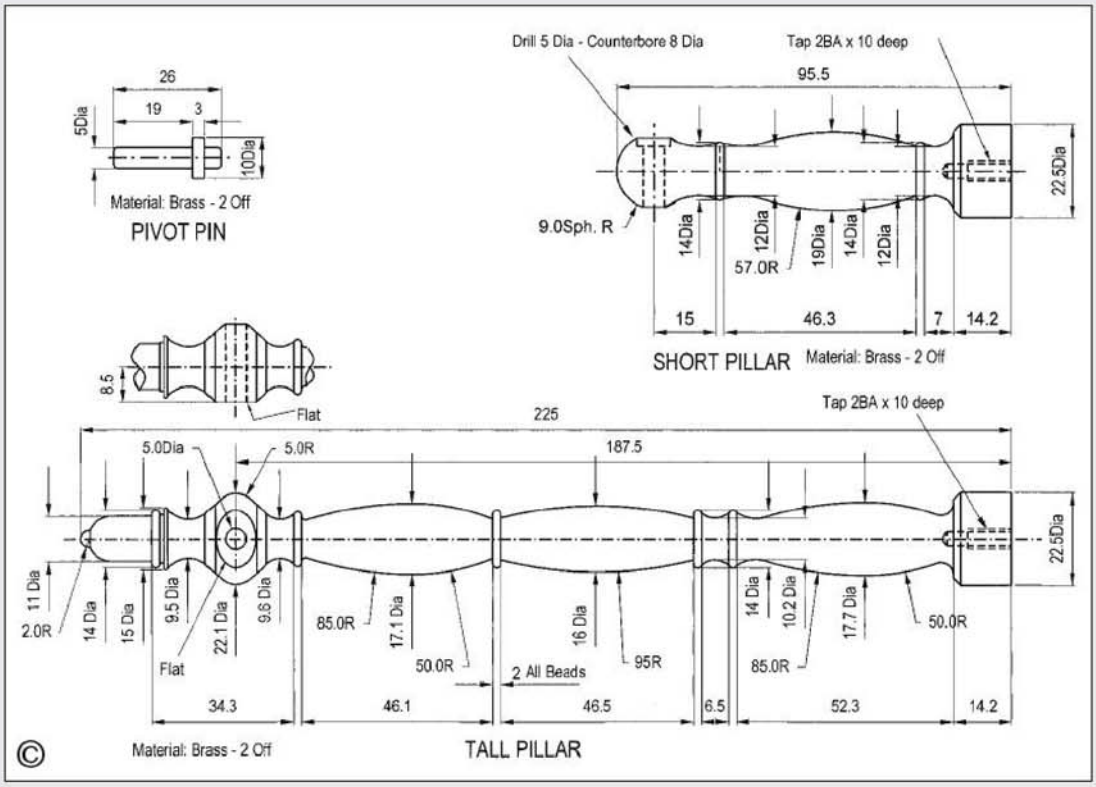
To make the bottle neck clip a piece of thin sheet brass was used to obtain the spring effect. This was also formed in the vice around a piece of metal bar of the appropriate size. Next, holes were drilled and countersunk from both sides of the brass in the half joints.

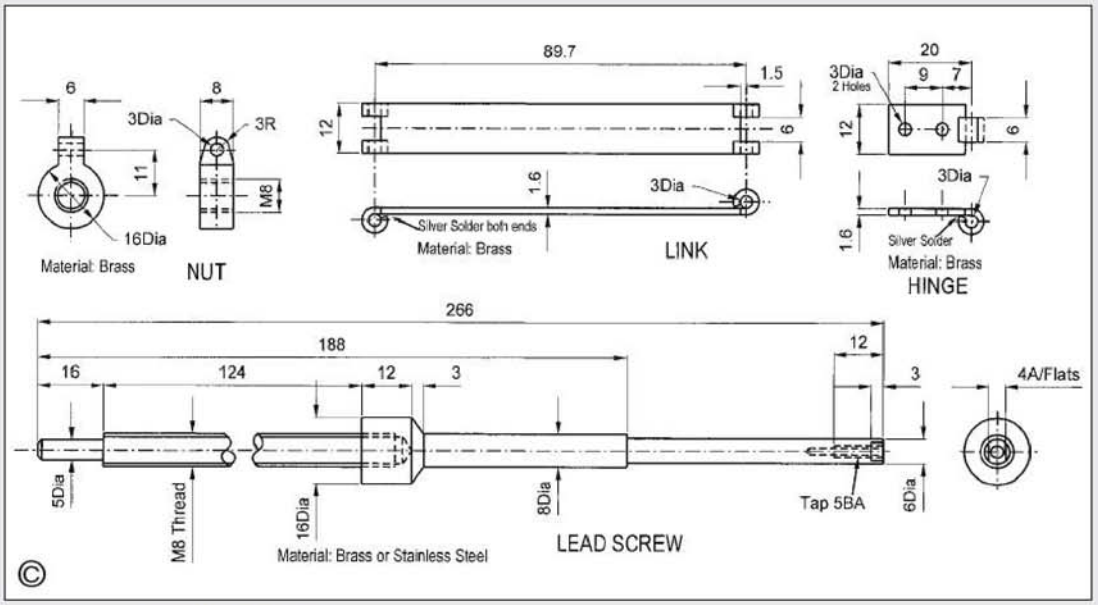
Riveting the frame together was extremely difficult, particularly since the aim was that the rivets should be invisible after being fitted and polished. To obtain the slot in the lower part of the cradle it was set up in a vertical milling machine and cut with a slot drill. Two holes were also drilled to take the hinge bracket rivets.

A special nut was cut from solid bar to take the end of the hinged link. The centre was drilled and tapped M8. Then the top of the nut was drilled 3mm to locate one end of the link. The link itself and the hinge were formed from thin sheet brass and the ends were bent round a small diameter rod. The ends were silver-soldered to give added strength.

Slots were filed in the ends to give the hinge effect (the hinge pins were then turned and riveted in place). The hinge was riveted to the lower part of the bottle frame.

Two special pins which fixed the bottle frame to the large legs but also enabled the frame to pivot, were turned from brass bar.





Screw and handle fittings

First, I had to find a way of preventing the thread unwinding itself from the small pillars. This was achieved by counterboring the small pillars in the manner shown in the drawings. Two steps were turned; one on the screw thread itself and the other halfway down the handle support. These two steps located against the counterbored faces in the small pillars. This way, when the handle was turned, only the hinged nut moved back and forth. The leadscrew was produced by hand, using an M8 die and die holder. A step was then turned at one end.

The unthreaded portion of the leadscrew was turned from brass rod, one end in the chuck and a revolving centre in the other. Straight turning produced the diameters required and a tool set at 45deg. produced the chamfer. The large diameter was then set true in the chuck, faced, centre drilled and tapped to take the special handle rivet.

The S-shaped handle was cut and filed from brass sheet in the garage. Two special rivets were then turned. The first had one end threaded and the end turned to the required shape. The extra piece turned on the end provided added strength to the S-shaped handle and made it easier to rivet in place. The second rivet was to fix the wooden handle to the S-shape handle.

Bottle frame adjuster

The diameter of a large bottle of port was measured and a piece of aluminium alloy of the required diameter, was obtained. A small radius was filed all around one edge of the aluminum alloy block. A disc of thin brass sheet was cut out and annealed on our gas cooker at home. The brass was then placed over the aluminum alloy disc held in the vice (with soft jaws) and gently worked with a rubber mallet. The edge was slowly formed until it was at 90 degrees.

When the operation was completed the brass adjuster was cut off at the required length and the edges filed to size. A hole was drilled through the bottom to take the rivet. The rivet was turned, threaded and riveted to the adjuster; two flats were then filed on the rivet to enable it to slide up and down in the milled slot of the bottle frame.

Wooden base

The wood was marked out to the appropriate size. It was then sawn roughly into a disc. A faceplate was attached to the base of the wood. It was then put on a wood turning lathe and the shape was obtained by using wood turning chisels. The handle was also made on a wood turning lathe.

The wooden base was marked out appropriately and the centres of the four holes were centre drilled and drilled 6mm diameter. The holes were then counterbored with a flat bottom drill to the required depth. This enabled the pillars to be located accurately and provided additional support.

Pre-assembly

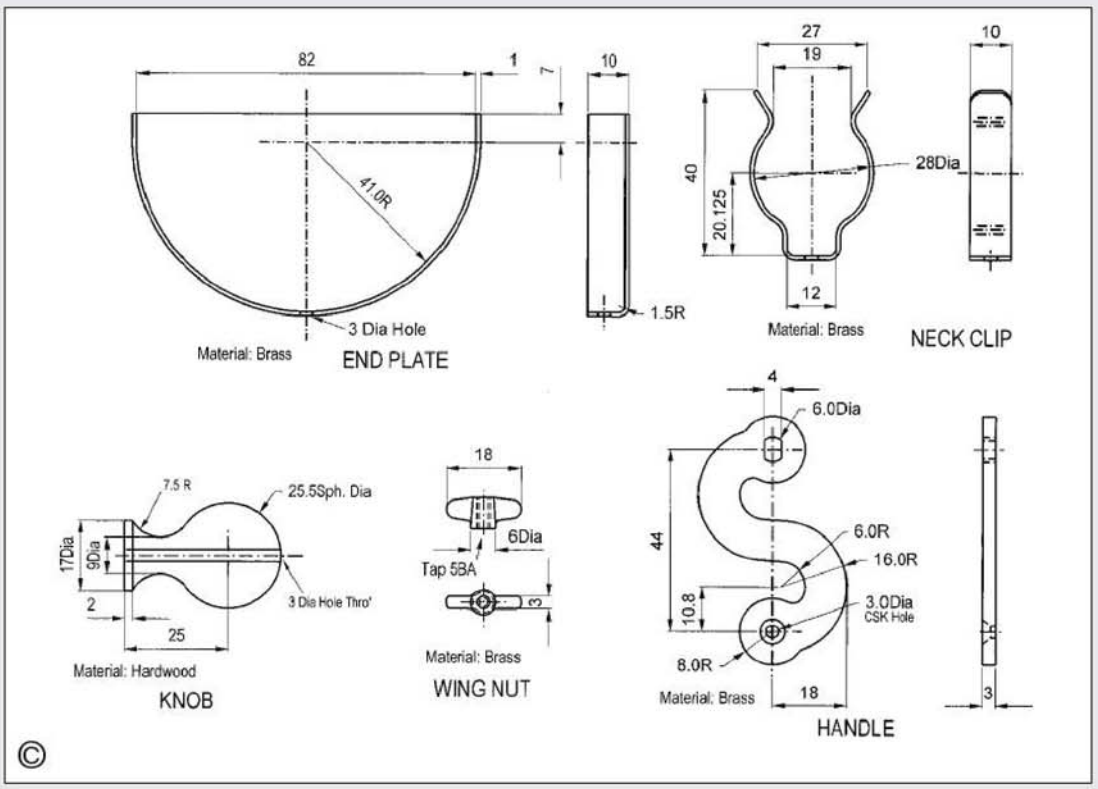
The wooden handle and the special rivet were fixed to the S-shaped handle. Some parts were rough polished and finally assembled, before the final polishing was carried out. I would like to point out that all buffing was carried out on a buffing disc fitted to an ordinary power drill held in a bench vice. The high standard of polishing was due entirely to my own perseverance over many weeks. At this stage the brass nameplate was also cut out, filed and polished. It was then sent for engraving.

Final assembly

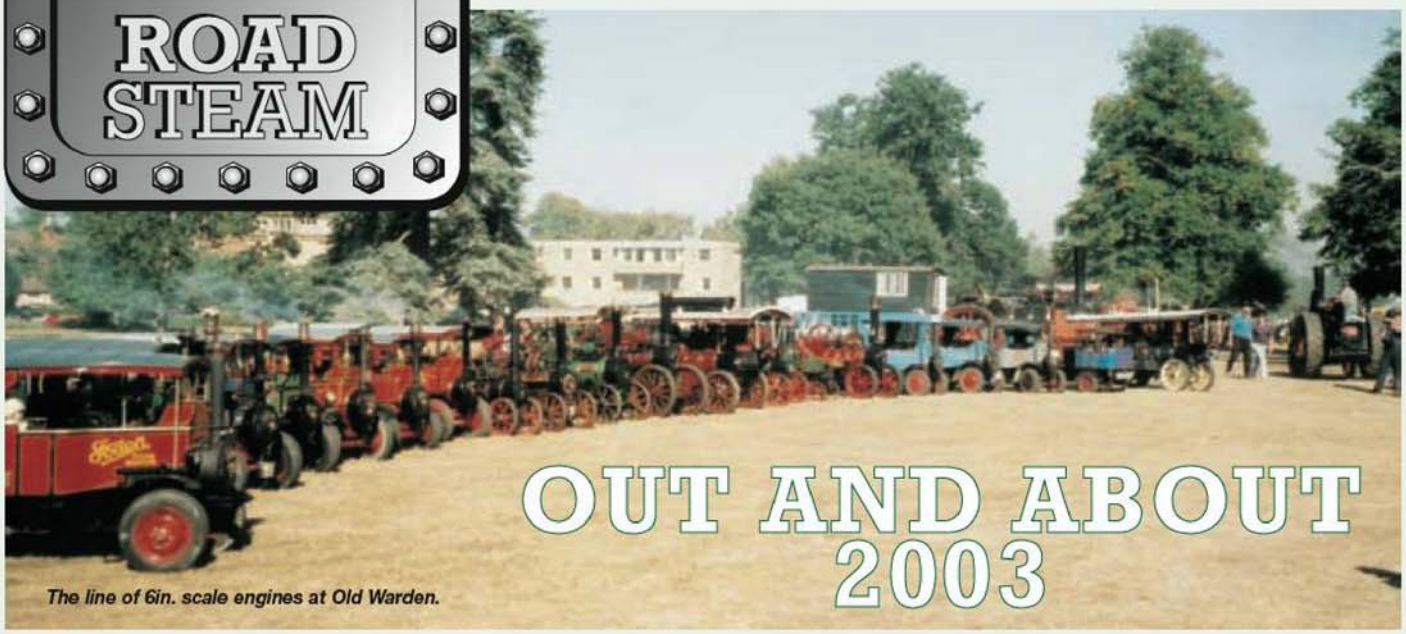
The wooden base and wooden handle were both wax polished prior to final assembly. The two large pillars were located in the wooden base and the two cradle swivel pins were tapped home. The bottle frame was then placed between the pillars which were then secured by means of the countersunk screws. Next the length of thread was lightly secured into the handle support and the screw threaded through the hinged nut.

The short pillars were placed in position on the lead screw and the handle screwed on and riveted to permanently lock it in place. One small leg was placed on the screw end and the other on the handle support. The two small pillars could then be located into the wooden base and secured.

Green baize was glued underneath the wooden base to prevent scratching the polished dining table, and the end plate was finally fixed to suit the bottle of port in use.



ROAD STEAM



OUT AND ABOUT 2003

The line of 6in. scale engines at Old Warden.

Martin Wallis
recalls some of his personal favourites from a warm, sunny summer of rallys and other events.

The short days and dark evenings are a far cry from the wonderful rally weather of the Summer of 2003, a year to remember. As ever, I have far too many pictures to be able to include them all, but I hope to offer a fair representation of some of the models 'out and about' this year.

Easter Sunday

The Burrell Museum in Thetford hosted their very well-known and highly regarded model rally on Easter Sunday in the car park of an adjacent superstore. Among the multitude of exhibits, some in steam and some static in the museum, were several engines out for the first time.

A fresh engine, the 4½in. scale freelance Sentinel outline steam lorry built by Ivan Jarman some 20 years ago and recently bought by Melvyn Saberton, was much admired. The model has a copper boiler and is fully sprung front and back. The power department is courtesy of an inside cylinder 5in. gauge railway locomotive, no doubt lifted from another project. The wagon has a two speed transmission using bicycle chain and dog clutches. When purchased, the model had a large box on the back which Mervyn has removed and converted into a trailer of his own construction.

The Burrell Museum rally was the first public outing for David Hall's immaculate 3in. *Little Samson* which attracted a great deal of interest. David was kept busy most of the day receiving compliments and answering questions.

Rushden

Models of steam rollers are less common than other classes of engines, and a well built and well finished model steam roller will always attract a great deal of attention. This was certainly the case at the Rushden Rally, near Wellingborough, with the first rally appearance of a beautiful 4in. scale Garrett single cylinder roller built by Dave Robertson. This model was purchased as a kit of parts from another model engineer and completed by Dave, taking a little over 2 years to do so. The model is based on a 10 ton Garrett roller and is believed to weigh 11-12cwt. The working pressure is 120psi.

The castings for the gears and cylinder, and other smaller components, are from the 4in. scale agricultural engine marketed by Bob Whitehead. The wheel spokes are welded to the rim with a capping piece to simulate the 'cast-in' appearance of the full size. The front fork is not a casting but is a hollow fabrication from 4mm and 6mm steel plate, a strong arrangement which is much lighter than a solid casting. The swan neck is also a fabrication.

Since the roller has the same diameter wheels and the same gear ratios as the 4in. Garrett agricultural engine, it is just as fast as the 'host' model. The engine has proved very powerful, pulling four adults up a steep hill with no wheel slip. No problems have been reported on wet grass, the weight being insufficient for it to 'get set' like a full size roller.

Harrogate

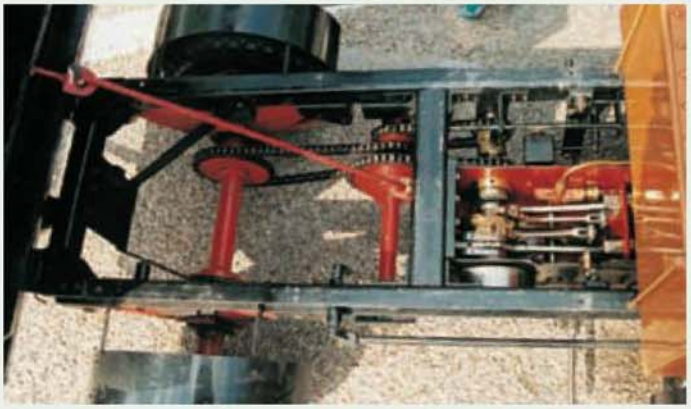
The Model Engineering Exhibition at Harrogate proved as good as ever with visitors filling both of the large halls on all three days of the exhibition. The traders were out in force selling just about anything you could wish for.

The paved area just outside the main doors was popular with the larger road steam exhibits, which ranged from 3in. to 6in. scale. The builders were always happy to chat with the multitude of interested visitors, so much so that photography was occasionally far from easy. Among the engines was a steam bicycle. Regrettably, the builder could not be located to confirm the details at the time of taking the picture, but the bicycle would appear to be of the builder's own devising. It comprised of a pair of horizontal copper boilers in a black box behind the seat supplying a pair of oscillating cylinders mounted one each side of the seat post. The boiler was propane fired and a generous feedwater tank was situated behind the front wheel.

Mann steam lorry

A fine 9in. to the foot Mann steam lorry, owned by Mark Harris, made her first public appearance in several years at the Sellindge rally. The model

This 4½in. Sentinel outline steam lorry and trailer was being driven around the Thetford car park all day.



The Sentinel's compact 5in. gauge power plant fits neatly in the chassis; note the two speed chain drive and dog clutch.

Derek Birkumshaw's fine 4½in. Wallis and Steeven's Simplicity *roller.*

David Hall's immaculate 3in. scale Little Samson *made its debut appearance at Thetford.*

The front fork and swan neck of Dave Robertson's beautifully turned out 4in. Garrett roller were both fabricated.

The fine detailing and care in construction is evident in this view of Dave Robertson's 4in. Garrett roller.

was built by John Liming in 1988/89 and Mark is its fourth owner, excluding dealers.

The lorry is not a 'close scale' model and employs a number of commercial and reclaimed parts. The chassis is from a 1950s 3 ton Comma lorry, the front and back axle are from a *Sherpa* van, the wheels from an Austin A40 with the hubs opened up, the rear springs are from a Dennis dust cart, and the list goes on. Few but the most discerning would spot the difference and the lorry proved to be a very good looking and popular exhibit.

The steam is not superheated and subsequently is quite wet. While the recommended maximum speed is 16mph, she is comfortable at 20-23mph on the level. Her second owner, George Stafford, a butcher, was responsible for having the wagon sign written.

A driver's eye view on the 4in. Garrett Roller seen at the Rushden Rally; note the twin water gauges and the hornplate mounted feed pump on the right-hand side.

Diamond T

A very fine and unusual model Diamond T 980, still in its first year of rallying, was also at the Sellindge rally. The unusual scale of 3.77in. to the foot came about because 13in. O/D tyres were available for the model to represent the full size 48in. O/D tyres. The model was busy all weekend giving rides to appreciative adults and children alike. A typical load was three adults on the back and a further three or four adults or children on a trailer drawn behind.

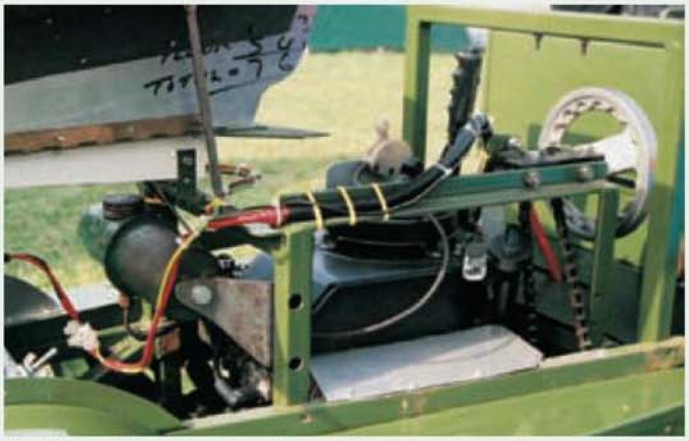
Like the Mann steam wagon, many recycled parts have been cleverly used. So much so that the entire enterprise was built for less than £100, which included the cost of the paint: a tin of Dulux Weathershield 'Olive Green'.

The sheet metalwork was made from the sides of a filing cabinet, with the radius on the cab sides being 'as found' on the filing cabinet corners. The engine is from a 5hp Briggs & Stratton ride-on lawn mower complete with electric start, the back axles were also from ride-on lawn mowers, and the front wheels were donated from an old go-cart. The louvres on the engine casings were purchased from the kitchen counter at B&Q. It is good to see that so much pleasure may be had from such a modest outlay.

Creating a great deal of interest, and the centre piece of Bob Whithead's stand, was his latest design: a 6in. scale 4CD Garrett tractor. His open plan stand was packed with visitors all day.

Regrettably, few details of this interesting steam bicycle were obtained. However, the name 'David Broadbent' was stamped on the chassis and a plate proclaimed it to be 544cc.

Three 4in. DCC Fosters were to be seen at Harrogate, all demonstrating the highest standards of workmanship. Two were exhibited part built in the hall and this one, by Tony Baldwin, was outside and in steam.



The Diamond T engine compartment with Briggs and Stratton engine.

At just under 4in. to the foot this model Diamond T was an appreciable size.

A replica steam car I had not seen before was a full size 'model' of a typical North American steam powered carriage of approximately 1897-1902 built by Ray Milliken. It had three cylinders taking high pressure (400psi) steam from a boiler fuelled by kerosene injected through 3,500 jets. The car develops about 15hp and does 8-10mpg on kerosene and about 1mpg on water. A note on the car observed that the legal speed limit is 15mph but the actual top speed is perhaps some 40mph. The vehicle was beautifully made and was a pleasure to view, both static and in motion.

Half size steam lorries

In the larger scales, an increasingly popular model is the 6in. scale Foden steam lorry, a miniature large enough for a whole family to fit in the back and ride around. A very fine pair of Foden lorries, two of three being built together, were present at the Hollowell rally. Three chassis and the bodywork were undertaken by Alan Young, the three boilers by Maskells of Bedford, and the sets of motion were made by Mick Cox. The green one is owned by Alan, the blue one by Steve Bowdidge, and the third lorry by Mick. This latter lorry, a three way tipper, is very nearly completed. The Fodens weigh about one ton each.

The wheel rims are from the Mk.1 *Fiesta*, which takes a scale size and section tyre. The wheel middle, or knave, is from a *Sherpa* van with the stud holes filled in and the correct ten stud pattern drilled in their place. The gears were cut locally at Apple Rochester gears in Wellingborough and the copper chimney caps were spun by Mick Cox.

Later, one of the last rallies of the year, the Bedford Traction Engine Club's Old Warden rally, rather eclipsed the pair of lorries by exhibiting no less than 11 half size Foden overtype lorries. The Old Warden rally was this year themed as a 'half size' models event and proved very successful indeed, attracting models from a wide area.

Zeta *at the Great Dorset Steam Fair, the 4in. Fowler B6 road engine built by Graham Hunt.*

Great Dorset Steam Fair

The GDSF (accepted shorthand for the event) had no fewer than 80 models in steam, to my knowledge beaten only by the Lincoln rally which topped 100. It was my first visit for many years and was made possible by the early Bank Holiday. This year owners of the models were required to submit a written risk assessment, which is not as painful an exercise as a few might claim. A draft document may be downloaded from the NTET web site and individualised as appropriate. A risk assessment is simply a formal written recording of the potential hazards (i.e. risks) of steaming a model in public and is a written record of what to the vast majority of model engine owners would regard as old fashioned common sense.

The model section was ably hosted by Brian and Vilia. The models had their own covered space in which to park up should it rain. In the time honoured tradition of the GDSF, a large proportion of the models were working whether on a threshing drum, baler, saw bench, water pump, dynamo, or of course steam ploughing on a strip of specially prepared land. The only working scale exhibit which seemed to be missing was a stone crusher which would have been very useful for dealing with some of the larger lumps of coal for the smaller exhibits. A very nice touch was an exhibitors' get-together on the Friday evening which included a raffle and a full two-course meal. A small financial contribution was made by each exhibitor and Vilia and her friend Joyce made a trip to the local supermarket and prepared what must be the best food at any rally in the country. I know all the model exhibitors would

The CEK three wheel steam car **Kiswasti** *built by Mr. Cholton. Incredibily, construction was started in 1947 and it's still unfinished!*

A 9in. Man steam lorry weighing 2 tons 2cwt. was to be seen at the Sellindge rally. In this view a full size Sentinel stands behind.

like me to record their thanks to Brian, Vilia and Joyce for a wonderful evening.

Among the models at the GDSF was a close scale 4in. Fowler B6 road engine built entirely from copies of works drawings, available from Reading University. The model was built by Graham Hunt and is called *Zeta* after one of the famous Norman Box engines. This superb model was constructed over five years and weighs 15cwt.; it was hauling a 4in. scale Tasker timber drogue showing an equal fidelity to prototype. Graham made all his own patterns.

Another beautiful road engine built with casting from many of the builder's own patterns was a close scale 4in. Burrell 3-speed road locomotive built by Keith Morris from Gwent. The engine is one of five being built by a group of friends and was the first in steam. The GDSF was only the model's 5th steaming. Keith cut his own gears, including the diff., and all of the cutting, drilling, and preparation of the steel plate work for the boiler. With five engines being built progress involved the delivery of no less than 5 metres of boiler tube.

The crankshaft was assembled by press fitting and electric welding. All the steam passageways are cast into the cylinder and Keith has a series of photographs of the assembly of the boxes and cores, demonstrating a stunning level of ingenuity and skill.

One of the longest builds seen this year must surely be the CEK three-wheel steam car *Kiswasti* which was started in 1947 and is not considered fully complete. The car is fitted with a Bolsover Express boiler with a 250psi working pressure. I understand the boiler was described by the Bolsover brothers from Whitby in *Model Engineer* magazine in the 1920s.

Other than the boiler, the car and power plant are entirely the design of the builder Mr. Cholton. The engine is fabricated in steel, including the cylinders which are $2^1/2$in. and $3^1/8$in. bores x 3in. stroke. Burning kerosene, steam is raised in four minutes. The car has no clutch, two speeds, and features a chain drive to the back wheel.

A superb replica steam car of circa 1897 to 1902 built by Ray Milliken.

The controls of Ray's steam car. It has tiller steering.

The 4in. Burrell 3-speed road locomotive built by Keith Morris; valve chest name plates have yet to be fitted.

Two of the trio of 6in. scale Foden steam lorries at Rushden, mentioned in the text.

KEITH'S COLUMN

SAINT CHRISTOPHER
A GWR LOCOMOTIVE for 7 1/4in. gauge

Keith Wilson

continues work on the tenders with the water gauge, vents, sole plates, water control valves and pipework for the brake system.

Part XLVI continued from page 580 (M.E. 4208, 14 November 2003)

Before finally sealing the tender body, the water gauge must be fitted. The prototype gauge is calibrated in thousands of gallons; just how accurate it was I wot not, but the Swindon drawings shew a cylindrical float with a flat on it mounted on a swivelling arm pivoted at the front of the tank. A short way out from this pivot was attached a vertical rod (also pivoted) with the top thereof rising through the tank top and into the water gauge. The front of this gauge was graduated in steps; I am not certain what these steps were, but I suspect 500 gallon increments. The float was so arranged that the flat mentioned above was parallel to the tank floor (soleplate); this provided some extra travel and therefore improved accuracy in the near-empty state — a condition which should never arise if at all preventable.

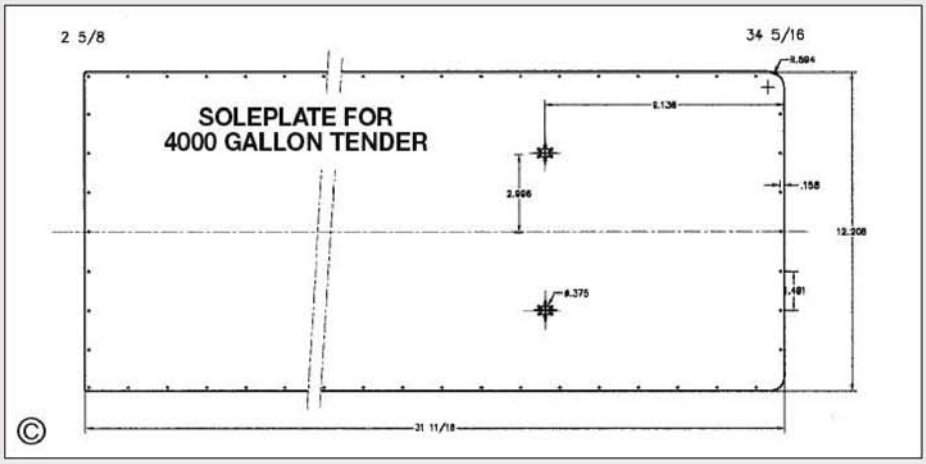
Many years ago, I tried to make a fair working copy of this system, but this time old square-cube works against us and although it can be made, certain problems immediately arise. From what do we make the float? With some difficulty, I made several using 0.005in. brass shim using domestic scissors to cut out the pieces and a small electric soldering iron to assemble them.

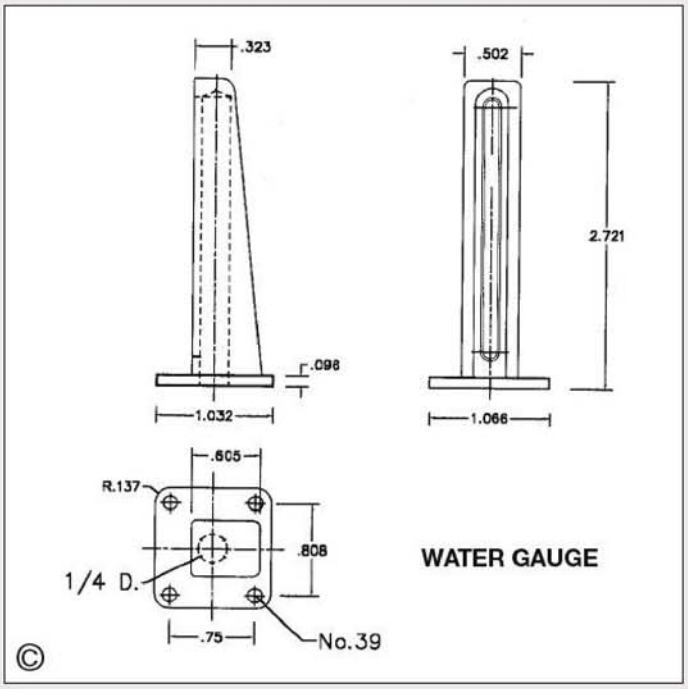
But how to test? The slightest leak would clearly be fatal, yet no way can we fit a bush for pressure testing, so push it under some hot water in a glass or tub, observe about 1001 teeny bubbles pouring out, note the location(s) thereof and remove from water ere water has time to penetrate the cylinder. This procedure will eventually produce a sealed unit, but leaks seem to develop in use (I don't know why) and you end up with a waterlogged water gauge. A bit of a tricky situation can arise if water gets into the cylinder, for no way can it be poured out. I can only be removed by careful heating to boil the water gently out.

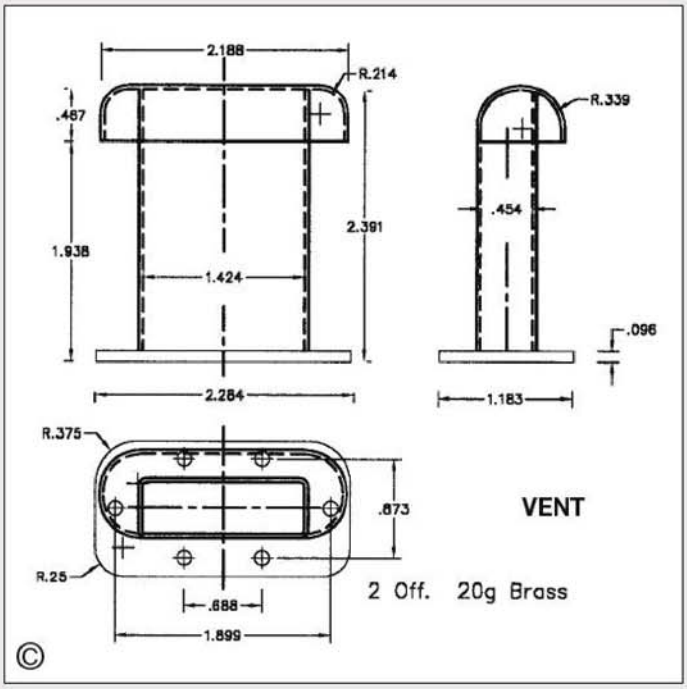
So I tried a table-tennis ball which is very light, very tight, but cannot be soldered. Making a thin fuse wire cage for these balls proved tricky but successful, and several tenders were made with this style of float.

The pivoted swivelling arm must perforce be very light, 1/16in. brass wire being suitable, but 3/32in. brass rod is not too heavy for the job. Some tricky bending work is required with this arm, likewise for the upper part. If the arm is formed into a little loop about 1 1/2in. from its pivot, a similar loop in the bottom of the vertical bit will suffice. Some success my well be achieved with an arm about 3 1/2in. long pivoted about halfway up the tank front.

However, an easier way for us is to use one of the little plastic canisters in which 35mm films are packed. We are not so concerned with accuracy of reading; we simply need to know when the tank needs to be topped up. Hence, the pivoted arms can be dispensed with and the upper rod bonded into the lid of the canister, if 3/32in. brass rod be used then a threaded end and a couple of 7BA brass nuts will secure it all with a dollop of Araldite for good







Water valve body (several).

Wilson's Words of Wisdom:
Always listen to the experts. They'll tell you what can't be done, and why. Then do it.

PTFE water valve cocks.

measure. The lid forms a tightly sealed fit onto the canister. If the length of the upper rod length is arranged so that the gauge shews empty when the float is on the bottom, feeling the indicator will immediately shew the state of the tender water level. The top of this upper rod is bent so that it protrudes through the slot in the front of the gauge, and a little cross-piece of wire is silver-brazed to this.

Use a piece of 9/16in. square brass to make the water gauge. Although the width is shewn as 0.502in., that's computer logic for you — make it 1/2 inch. It is a plain drilling and milling task, silver-braze onto the base. There was more than one version of this gauge, mine is fairly close to the 4000-gallon type.

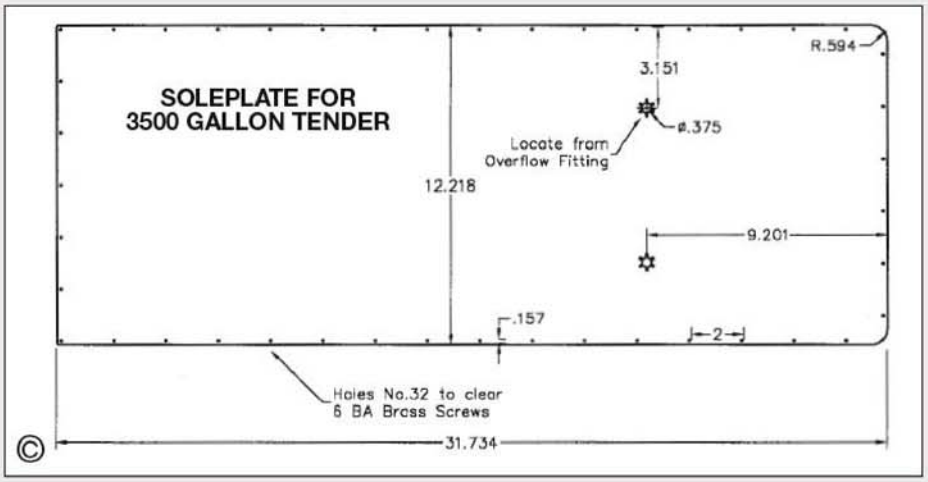
Vents

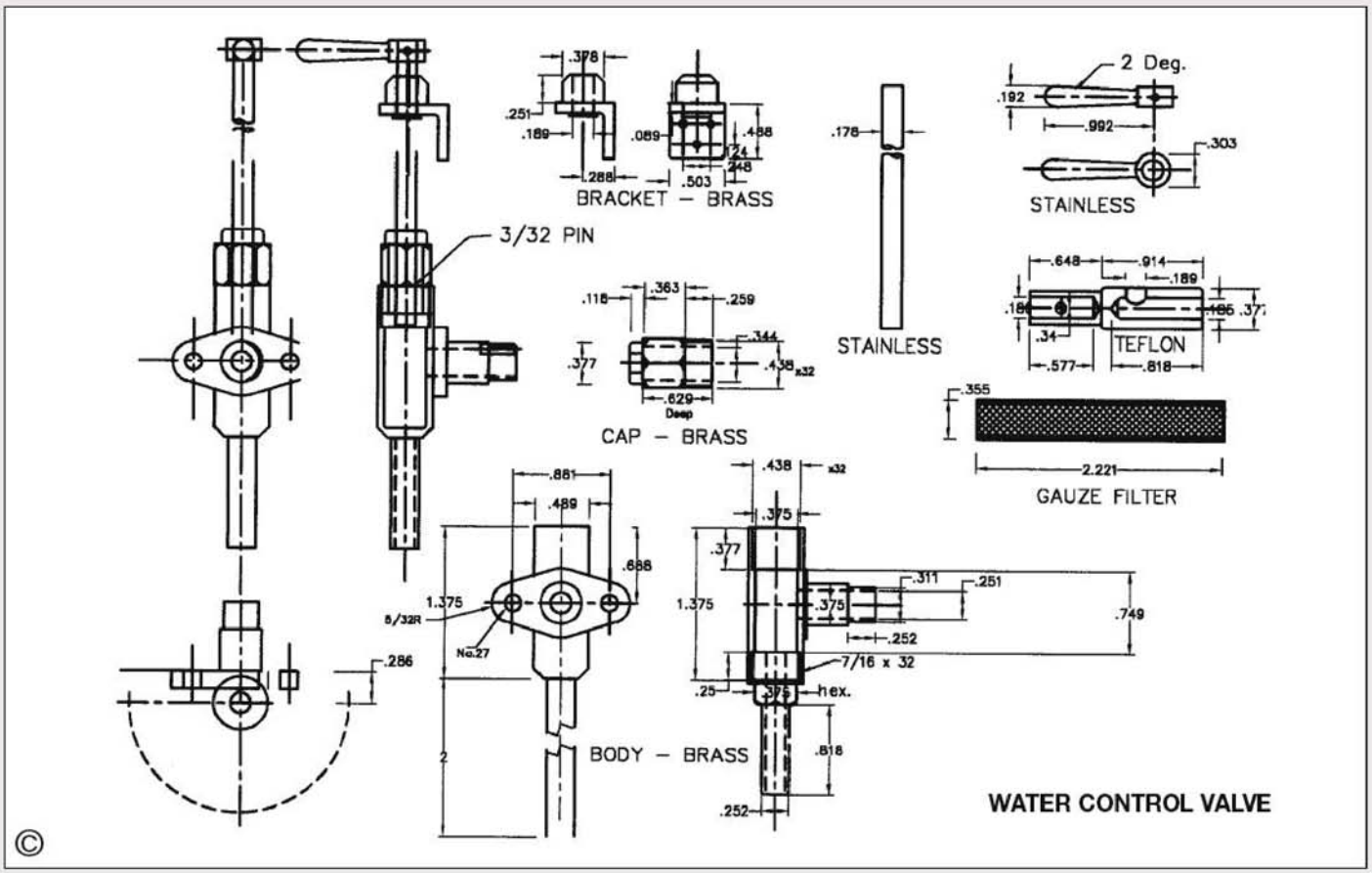
The vents are the same for both tenders and are fairly large, for while leaks around the filler cap can cope with normal injector feed, when the scoop is dipped into the trough at 60-odd mph, the inrush of some 3000 gallons of water in about 15 seconds needs some bigger outlet(s)!

The vents and water gauge are secured with brass studs and nuts. Once bolted firmly home, a dose of plumber's solder sweated over the nuts, etc., is a good aid to rigidity.

What next, eh?

Ah! Soleplates! Apart from these, all items this time are common to both sizes of tender. The last part of the tank to be fitted, they seal in all other parts. Although I have shewn fixing holes at about 2in. intervals, 4in. intervals will suffice, and when the footplates are fitted it is nigh on impossible to see them in any case. Rivets would obviously present some difficulties, so 6BA brass roundhead screws are recommended. Inserting the soleplate into the tender is somewhat tricky, for the two overflow pipes seem to have minds of their own — as you will discover for yourselves! You will find that a fairly big countersink in the lower bush is helpful. Choose from plumber's solder or Araldite for sealing the tender. Since there are pros and cons for each, it is a matter of choice. ▶





10¼in. gauge GWR 47xx with 4000 gallon tender.

Water control valves

These are required to control water to the injectors, and are the result of some experimental work. My first versions of these were screw-valves disguised as handbrake columns and water-scoop columns, giving a fine control. I then changed to brass tapered cocks, but these are not too easy to keep loose and tight at the same time; loose in the ease-of-operation sense, tight in the water sense.

I tried replacing the actual valve with PTFE. (Polytetrafluorethylene) and realised on my next batch that the taper was unnecessary. I changed to parallel reamed bores in the valves and PTFE cocks turned to about 0.001in. oversize. The very low friction of this substance makes it ideal for such applications.

The body of the valve is fabricated in brass. The stainless steel stem drives the valve through a 3/32in. pin and fits loosely into the valve itself so that the valve is to some extent self-aligning.

While a small amount of air leaking into the water feed pipe is not fatal to its operation, the least amount the better. To this end, a 3/16 x 5/16in. O-ring is fitted inside the cap to seal the operating shaft. Air leaking *into* the pipe? Most certainly, for directly the injector picks up and feeds, it sucks quite hard at the intake, as demonstrated by its ability to lift water by suction. I know not what the degree of vacuum can be, but can assure you it's there.

When aligning the handle, aim it so that the valve is fully open when the handle is pointing forward, i.e. toward the front of locomotive. This is very useful, and 'scale' to boot.

The easiest way of doing this is to set the valve in the body with the opening at the back, and put the little handle on the top of the shaft with a wee drop of Loctite 601 on the joint. Point the handle forward, opposite to the valve hole, let it set, then drill a hole through the handle and shaft (1/16in. dia. is okay) and fit a convenient pin (a 1/16in. copper rivet does nicely). If the hole through the handle is lightly countersunk at each end, the rivet can he hammered in tightly and trimmed off flush.

The gauze filter is a bit of a pain; 80-mesh brass gauze is stocked by Reeves and others and is okay for the job. Cut it to size allowing a little overlap, use finger pressure to roll it over a wooden former, and an electric soldering iron to take care of the assembly. Electrician's flux-cored solder will do fine for this; it melts more easily. It is much easier to flatten one end of the gauze cylinder than it is to cut a piece to fit, and the result is no less efficacious. To stick it on the end of the valve body, said soldering iron is unlikely to be man enough for the job. However, impossible as it may beseem, the oxyacetylene torch, used correctly, will do the trick. But — and a big but, too — heat only the valve body, letting it in its turn pass on sufficient heat to complete the job. Use the smallest jet; I made a special one with a No. 75 or so hole which needs some careful pressure setting, but does a lovely job on these small assemblies.

As encouragement, the two trickiest tasks forced on me with oxyacetylene equipment were a: to fix in the crownstays on a *Rob Roy* boiler through the hole for the backhead bush (the original builder had silver-brazed the backhead in place before doing the crownstays) and b: during a power cut, to soft-solder a couple of wires onto a spare car headlamp bulb. Both tasks were completed, but not wordlessly!

Some have rejected the use of filters on the valves, claiming that a better position for a filter is at the filler cap, but there are snags. If the filter is not rigidly fixed, people filling the tender will usually pull it out in order to see the water level in the tender; if it is fixed that it is harder to see when the tender needs replenishment. I once tried the effect of a filter built in below a hefty side-to-side baffle plate, but it did not seem to offer much advantage. A filler-cap filter reaching to the tender bottom or little above it avoids these problems. It is a matter of choice.

Some folk like to have access to the filters to clean them, but this is not necessary. The easiest way to clean them is with the engine in steam — usually the time when cleaning is recognised as needful anyway(!) by bunging up the overflow. Use a piece of wood — tapered or flat — to prevent the overflow overflowing and turn the steam valve full on. The pressure will blow the filter clear instantly and you will hear a sharp crackling sound emanating from the tender. This noise is caused by the sudden condensation of the steam, some energy being released in the form of sound. The steam only needs to be on for a few seconds; any sludge on the filter won't be on it any more and will sink to the bottom of the tender to be washed out at leisure. A big drain-plug in the soleplate of a tender is optional.

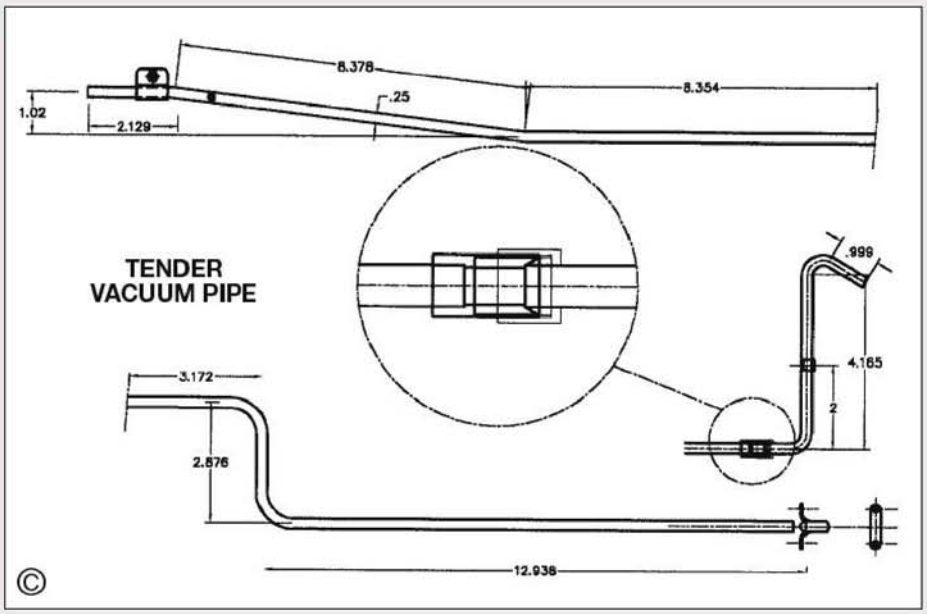
Incidentally, I don't recall mentioning injectors so far in the Saint/47 series, but a fairly comprehensive article dealing with squirts appeared in the last *Slogger/Logger* article, so there is little point in repeating it.

Pipes of nothing!

I shew a suitable layout of pipework for the brake system through the tender. It is in plan form only, except for the vertical connection at the rear end. A short piece of 5/32in. pipe is carefully silver-brazed into it just after the first bend. Pointing downward, this matches the brake cylinder access pipe, to which it is coupled by means of a length of 3mm bore plastic tube.

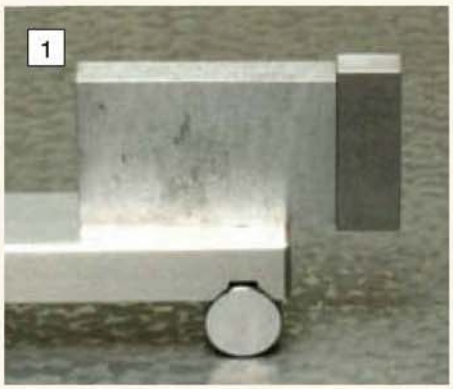
The bracket at the front attaches the pipe system to the tender frames, and another P-shaped bracket (not shewn) fixes it about halfway along the Z-bend. The rear end is supported by the vertical section which fixes to the rear buffer plate.

To be continued.

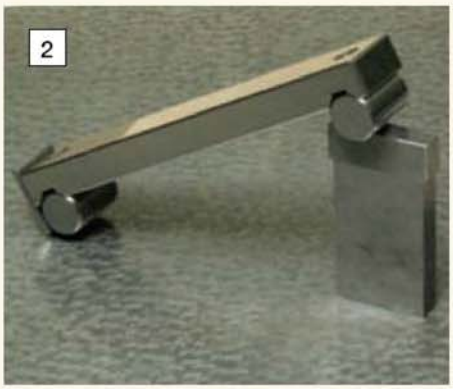


PETE'S PAGE

Peter Spenlove-Spenlove talks about these useful and accessible workshop standards.
●*Part I*



A 0.5000in. gauge block wrung onto a 2.0000in block to form a stack 2.5000in long. The blocks cling together by molecular attraction across the interface without any form of external mechanical clamping.



The 2.5000in. stack in use with a 5in. sine bar to give an angle of 30 degrees. Sine bars are often drilled and tapped or have plain through holes to permit the attachment of an accurate square to increase the range of angle settings.

GAUGE BLOCKS

From time to time in these pages one sees references to slip gauges, slip blocks or gauge blocks. These gauges are purchased in boxed sets and since one of the earliest makers was C. E. Johannson many apprentice trained tool room engineers know them by the nickname of 'Joeys'.

Gauge blocks are made from hardened steel and the size, or thickness, is marked on each piece. That size will have been achieved to within very close limits of accuracy. The two faces are mirror smooth and flat enough to stick to another piece by molecular (or is it atomic?) attraction when perfectly clean and dry (**photo 1**). They do not stick together by suction as is often thought as has been demonstrated by placing a slip 'stack' in a vacuum where they remain assembled. In plan view each piece is approximately 3/8in. wide by 1 1/4in. long and will all be the same in a set. The actual size will vary between makers. The thickness is the important dimension and a set will typically start with a block 0.100in. and range up to 6 inches. The size, flatness and parallelism of every piece is controlled to very close limits and a workshop micrometer is not good enough to test a 'Joey'.

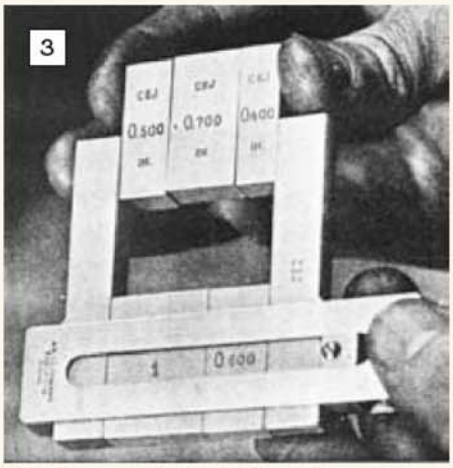
The Standards Room in an engineering works would use gauge blocks to calibrate or test measuring equipment such as snap gauges, micrometers and vernier calipers. A large works may have two qualities of set of gauge blocks. The best — inspection or reference grade — was never used in the workshops. A lesser grade was used in the workshops for daily use at the bench, for setting up work to a sine bar (**photo 2**) or for use on a grinding machine. Both grades, whether inspection or workshop, are very accurate and we, as model engineers, cannot begin to realise their potential. We do not have at our disposal the types of machine tool that are able to machine or grind to parts of 0.0001 inch.

One of the uses of gauge blocks in the workshop is to set accurate angles using a sine bar as shown in photo 2. The size of the gauge block stack for the required angle is derived from trigonometric tables. However, I doubt if any of us could work to the angle so set. Our home machines are just not good enough.

I have an old set of gauge blocks that was condemned and discarded. Some of the blocks are almost unworn and are useful for checking my micrometers, but others in the set are worn by as much as 0.0005 inch. This may not sound like much but gauge blocks are usually made up into stacks (**photo 3**) and errors can accumulate.

To avoid excessive wear of one block in a set due to continuous use, some of us used to make our own special block. This would be kept for use when the job came our way again. We made ours of hardened steel. The faces were ground on a surface grinder using a magnetic chuck with suitable support for thick (tall) blocks. We could not achieve the mirror

A commercial boxed set of slip gauges. This full set comprises 81 blocks plus two protectors which will permit the user to set dimensions to the nearest 0.0001in.



This slip gauge stack is held in a clamp with over-length end pieces and is in use as a caliper to check another slip gauge combination.

super finish or the accuracy of a real 'Joey' but we could grind to within 0.0001in. or so of size and then lap our block on a cast iron lapping plate using metal polish as an abrasive medium. Over the years we tended to accumulate a number of home made 'Joeys'. Each one was carefully marked for size and perhaps a works job number. The habit of rubbing a 'Joey' on the magnetic chuck to make sure it was seated metal on metal, and not trapping cutting oil or grinding debris, was a common way to wear out a gauge block. Magnetic chucks are very difficult to clean properly.

I doubt if any reader will want to make a full set of 'Joeys' as this will involve making a minimum of 34 pieces for a 'single piece of each size' set. Many tool rooms have double sets with two blocks of each size. My old set, made by the Coventry Gauge and Tool Co. (trademark Matrix), has two of each size.

Table 1 below lists the sizes available to me or, at least, the sizes to which they were made when new. By combining some of these sizes it is possible to make up stacks of great accuracy. Some sets include end pieces (**photo 3**). The end pieces are accurately finished on one face. They are longer than the normal gauge blocks so that when they are wrung onto the stack their ends stick out and form jaws. One at each end of a stack enables things like inside micrometers to be checked. The clamp is a slotted bar that is arranged to hold the stack and end pieces firmly together using a knurled screw.

It was thought that some readers may wish to make some 'Joeys' as we did in the tool room. Why not – it could be another evening class job when the surface grinder is available for a quarter of an hour or so. I shall discuss techniques in the next part of this article.

●*To be continued.*

TABLE 1

0.1001	0.1002	0.1003	0.1004	0.1005	0.1006	0.1007	0.1008	0.1009
0.1010	0.1020	0.1030	0.1040	0.1050	0.1060	0.1070	0.1080	0.1090
0.1100	0.1200	0.1300	0.1400	0.1500	0.1600	0.1700	0.1800	0.1900
0.1000	0.2000	0.3000	0.4000	-	-	1.0000	2.0000	4.0000

For most model engineering applications, readers may disregard the top (tenths of a thou.) row. The 4in. block may also be disregarded if the slips are intended only for use with a 5in. sine bar, table or centres. Feeler stock should be used if less than 0.100in. is needed. A useful block size is 0.5in x 1.5in x the thickness required.

ADHESIVE TAPE DISPENSER

Len Walker

describes a useful and attractive novelty item.

Why bother to make your own tape dispenser when you can buy one so cheaply? Well, I started off with a shiny plastic dispenser which seemed to be just the job. However, after repairing it several times, adding plastic 'splints', which seemed to accelerate the demise of the unmodified original areas, I decided that I could make a better one.

The result is shown in the photograph. It is made from odd pieces of 1 x 1 x 1/16in. aluminium alloy angle and 1/16in. sheet. What probably distinguishes it from the others, apart from its durability, is that the cutting edge is made from a short piece of high-speed steel (HSS) hacksaw blade. This really does a super job, a great improvement over the flimsy plastic teeth on the original. I used a piece from a 14 teeth per inch Starrett HSS blade which seemed just right, but no doubt a more common 18tpi blade would serve. I feel that too fine a pitch would spoil the cutting action. As drawn, the dispenser takes standard rolls of 19mm wide Sellotape, but could easily be adapted to suit other tapes.

Construction is simple; the body is stuck together with Araldite and the cutting blade holder is secured by two 6BA screws. This will enable your grandchildren to fit a new piece of hacksaw blade if it is ever required!

Construction

Making the details is straightforward and calls for little comment from me. However, there is one useful tip, perhaps worth passing on. Making accurate holes (say 3/4in. dia.) in sheet material is not so easy. A method I have often used is to drill and file out the hole just undersized, using a fine half round file. Now, prepare a slightly tapered piece of 3/4in. dia. material — metal or hardwood will do — by wrapping a strip of 240 grit wet or dry abrasive paper around it. Twist and push this through the hole. In no time you will have an accurate, round, polished hole of the chosen diameter. No sweat!

The 0.750in. dia. should be a push fit in the previously formed hole in Detail 3, and the 1.015in. dia. polished. Detail 7 can be made slightly long,

The finished tape dispenser is a handsome and durable addition to any office or study.

pressed into Detail 6, then faced off flush when the 11/16in. dia. recess is formed.

Order of assembly

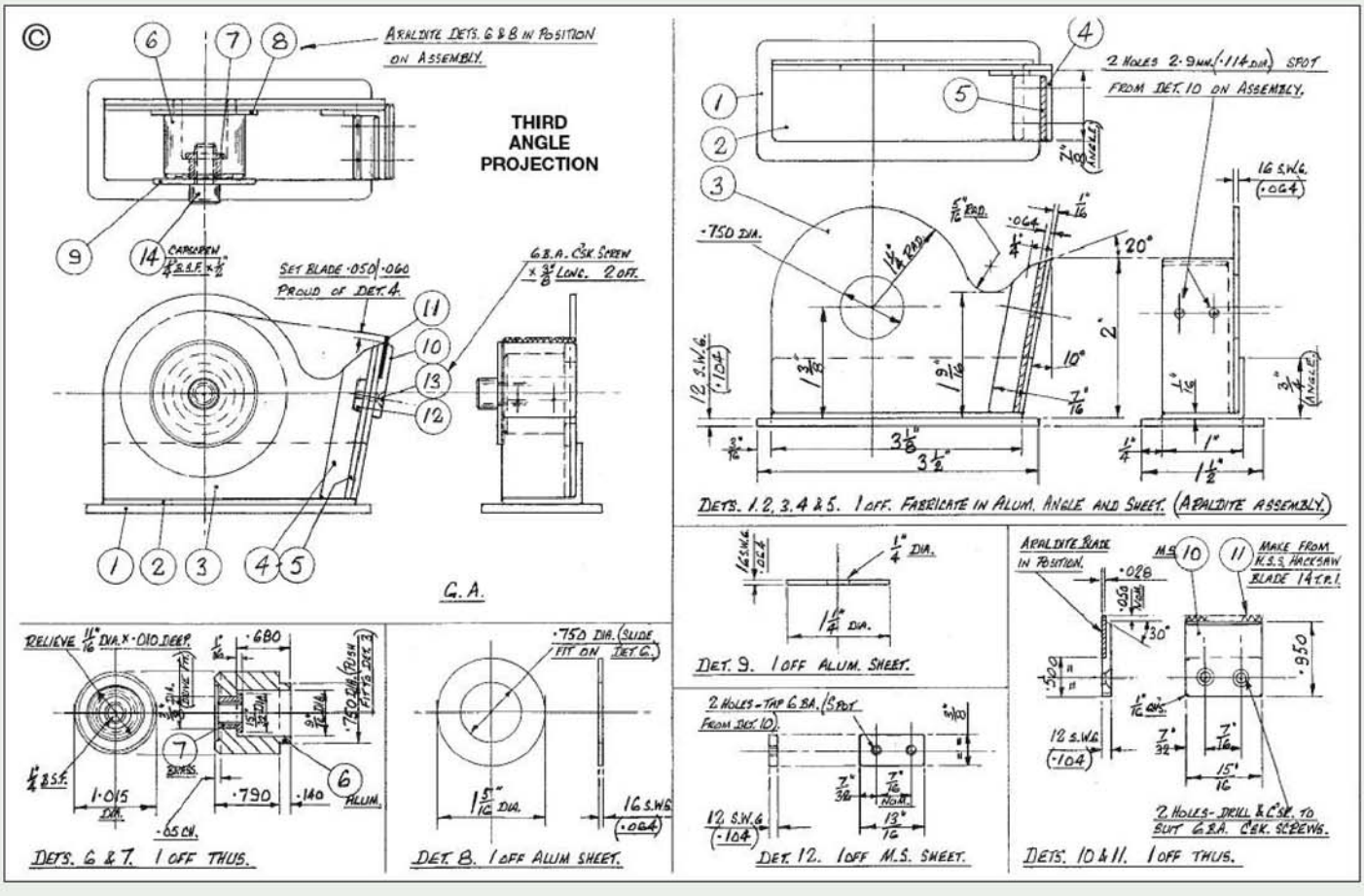
I suggest that you first Araldite Details 1 and 2 together and leave them nipped up in the vice overnight. Meanwhile, join Details 4 and 5 and leave them clamped together. Secure the blade (Detail 11) to Detail 10.

After cleaning-up, secure Details 4 and 5 to Detail 3. Clamp the blade and holder in position shown on the General Arrangement, spot the position of the two fixing holes from Detail 10, then drill two 6BA clearance holes right through. With the 'nut plate' (Detail 12) clamped in position, spot the location of the two tapped holes. Drill and tap Detail 12 6BA as shown. Secure in position with a touch of Araldite.

Araldite Detail 6, Detail 7 and also Detail 8 to Detail 3, applying a thin film to each mating face. Clamp together, and leave overnight.

After a final tidy up, thoroughly degrease and apply two coats of Japlac gold enamel (but avoid the cutter teeth, also the inner faces of Details 8 and 9). This will give a really professional (and durable,) finish to your dispenser.

Load your reel of tape, assemble the retaining washer and cap screw you are in business. The final result was quite satisfying. The dispenser felt really solid compared to the flimsy plastic original. The HSS cutter worked like a charm, and the gold finish gave a touch of class. Well worth the effort! Good luck, and work safely.



CLUB CHAT
With Malcolm Stride

I would like to wish all readers and contributors a Very Happy Christmas and a Prosperous and Healthy New Year. I would also like to give my personal thanks to all who have sent information in for this column; without you all there would be no *Club Chat*. Hopefully, I will be able to meet some of you at the Model Engineer Exhibition at Sandown Park Exhibition Centre, 29-31 December.

UK News

Members of **Bournemouth DSME** are arranging an end of running season barbeque combined with a twilight run. They report that since the start of operations at their Littledown site, membership and general interest in the society has grown. This is obviously very good news for the society. Chairman Dave Martin mentions a recent trip to Spain were he found an old narrow gauge locomotive and carriage on static display. This was a 'Prim a Carrilet' used to transport large numbers of citizens from the local town to Salou to enjoy the beaches. It last ran in 1975.

George Howard is scheduled to address **Cheshire Live Steamers** on the topic of 'Dialects' on 14 December. The newsletter was produced under extreme difficulty because the Production Department (John Lilley) computer was infected by the internet 'worm' virus which was, as Eddie the Editor commented, *"created by some boneheaded moron."* Having recently suffered a computer failure, I can sympathise. Can I also recommend the free AVG virus checker from **www.grisoft.com** Regular upgrades are also free. Eddie Oldham reports that he has found the best 'marking out fluid' available. It comes in the form of 'Pentel' marker pens which are spirit based and so do not easily rub off.

Chichester DSME now have an almost completed station building to their credit. As you will see from the accompanying photograph it looks very authentic, albeit small in size. It is to be named 'Chichester, Bramble Halt'. Project leader Brian Bird expressed his thanks to all those who helped with the project, particularly Phil Hammond *"who has put in a huge number of hours."* They report the attendance of more visitors to their Blackberry Lane site than ever. The club locomotive *Speedy* now has a new boiler and will be completed ready for next year.

Fylde SME hosted the 2½in. Gauge Association Northern Area Autumn Rally at their Thornton track. Visitors began to arrive by 10:30am and included Alfred Lloyd from Rugby on his Vincent motorcycle. Several engines were in steam including Peter de Salis Johnston with his *Millennium Fay*, Dave Ilott with his *Dyak*, John Tomlinson with his Glasgow & South Western 2-6-0, Steve Eaton with his A3 *Dick Turpin* and Barry Harrison on his wife's *Austere Ada*.

High Wycombe MEC have received notification that the annual Halton Show will not take place this year because the MoD have other plans for the future use of the two hangars which were used to hold the show. This is sad news because the 2003 event would have been the 25th anniversary show. Highlights from the track evenings this year included the visit by Roel Voetberg from Zwolle in the Netherlands. Roel brought his 3½in. gauge 2-6-6-0 narrow gauge Mallet compound which took Roel some 10 years to build. This was steamed and then hauled two passenger cars round in the gathering dusk. The newsletter carries details of an interesting internet site **www.wheeler-steam.co.uk** which contains details of cut-away and elevation drawings of locomotives and traction engines by the late Geoffrey Wheeler. Many readers will remember these as the superb cut-away drawings that appeared in the *Eagle* many years ago. This causes me to wonder if the Mekon is the one responsible for the computer virus attack reported above!

The decision by **King's Lynn DSME** to remove the loop in their track and run with a smaller circuit has proved a good move as they have had good running sessions with none of the previous problems encountered. Some re-ballasting is being done and about 3 tons have been put down so far.

Maxitrak Owners Club has just celebrated its 10th year of existence whilst the company is celebrating 25 years since the first batch of *Simplicity* locomotives were sold by founders Andy Probyn and Bill Bridges. The club rally was held on the very hot 3 August at the Leatherhead Society track with a good selection of locomotives in attendance which included 2 *Arthurs*, 1 *Opal*, 1 *Pearl*, 2 *Rubys*, 1 *Ruston*, 2 *Coronations* and 4 *Dixies*, plus Gil Jones with his 1in. Burrell traction engine. The Owners Club is still looking for a Chairman, so if any Maxitrak locomotive owner out there is interested, I am sure you will be warmly welcomed.

Negotiations are ongoing on the lease for the proposed new clubhouse building planned by the **City of Oxford SME**. Hopefully we will soon be able to report further good news. The society has inaugurated a new trophy, the 'Saville Bradbury Member of the Year' award. It is to be awarded to the member who receives the most votes at the AGM. Work is continuing on the site with progress on the new signalling and repairs to the clubhouse roof. They report that track fires have been a hazard this year, as no doubt they have been at other clubs, including my home club. Member Ron Head has made some calculations to assess the loss of stability on passenger trucks when the passengers lean out to talk to each other. The results, as anticipated, reveal a considerable loss of stability when this happens, so warning

John Sanderson steams his 2/5 full size 1901 Thomycroft steam wagon past The Green in Whissendine just after the start of the return leg of the road run during the recent Melton Mowbray DMES Whissendine 2003 rally. He is overtaking Dave Robertson with his 4in. scale Garrett 10 ton steam roller, completed just before the rally and built from a pile of rusty castings and parts designed for a model of the first steam roller built by Garretts of Leiston and which was being driven at a true scale speed for a roller.

Alan Gent driving his 3in. scale Marshall 7nhp general purpose engine* Pride of the Road *and built to the Chris Lord design, just past the half way point of the road run in Whissendine (Photos: Norman Smedley)

The smart new Chichester DSME station building is to be named* Chichester Bramble Halt. *(Photo: Brian Bird)

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.

Bill Eisenlohr	*New Jersey LS*
Arthur Podmore	*Cheshire LS*
Margaret Smallwood	*York City DSME*

notices have now been produced. This was all triggered by a derailment which occurred earlier in the year. The annual 'Dreaming Spires' rally was a success with 43 locomotives, one steam wagon and one traction engine together with visitors from many clubs. The photos show many of them joining in with the socialising and driving. The club has also celebrated carrying its 200,000th passenger. The lucky recipient of all the attention was reported as being 'singularly unimpressed' by the occasion, probably because he was only two years-old! A tip from John Oldland is to use 'non-fling' chainsaw oil on the motion of locomotives.

Lots of work has been taking place at the **Rugby MES** site with the completion of 7¼in. gauge track laying in the cutting and the raised track steaming bays and lifting platform being used for the first time. The council has built a new exterior wall, lopped dead branches off trees and re-laid the tarmac entrance. The newly found well has been used to supply locomotive running water and will eventually be fitted with a pump to replace the existing bucket and rope arrangement. The club hosted the 'Curly Bowl' competition in September and reported perfect weather for the event. The family of the late Dr. John Farrington have donated the locomotive *Y Marchog Ddu* (*The Black Night*) to the club; it was renamed *Dr. John* in his honour at a ceremony in June. Mrs. Francoise Farrington carried out the ceremony and members of the family had several rides round the track. The locomotive has been rebuilt by Stuart Robinson and commemorative plates have been fitted.

The attendance figures for the recent exhibition held by **St. Albans DMES** exceeded last year's figures and the Treasurer is reported to be a very happy man. Other clubs involved were **North London, Welwyn, Luton** and the **North London Meccano Club**. All areas of the exhibition were reported as being very busy with plenty of boating and flying activity in addition to the model engineering activities. Michael Dyer reports a new source of spark arrestors. He has adapted a stainless steel sink strainer to fit into the top of the locomotive chimney. He found the original strainer in a farm shop! Member Peter Haycock has finished his Robey traction engine and was awarded a Very Highly Commended Certificate at the exhibition. Hopefully we shall soon be hearing about his next project! The winner of the Clifton and Vice President's Trophies was Guy Ellerby's unusual Springer traction engine. This has a locomotive style cab and looks very different to most conventional traction engines. Our congratulations to Guy, Peter and to all the other trophy winners.

The bi-annual track inspections carried out at **Staines SME** will be somewhat less costly in future. They have obtained agreement from the local council that they can carry out the inspections themselves instead of paying a hefty fee to an outside agency for the privilege. The newsletter also bears the names of a Scottish engineering couple: Mac Hinery and his girl friend Lou Brication — you can blame a Staines member for that! The Editor reports that several members are having *"their arms forced up their backs"* to cajole them into speaking at winter talks. Members will be looking forward to their annual wine and cheese evening on 10 December. It was suggested that the *"gentlemen may wish to mix in with the ladies instead of sitting or standing at the furthest end of the room from them."* Sounds pretty radical to me! The suggestion has also been made to produce a 2004 calendar based on the much publicised style employed by the ladies from the Womens' Institute. Items on the agenda for working parties include completion of the station move and replacement of some timberwork immediately after the traverser. Some minor track problems have also to be addressed. These were probably caused by this summer's hot weather.

Members of **Sutton Coldfield MES** are still trying to scheme out an acceptable enlargement to the clubhouse to facilitate the obtaining of planning permission. The problem is that they fall into green belt land. Members are also planning to sort out the many items stored in the existing building with a view to deciding *"Do we really need this?"* Other readers will no doubt have carried out similar efforts themselves and will know that even when a lot has been disposed of, it is difficult to notice anything missing and that any space cleared soon fills up again. The recent LNWR rally hosted by the society was extremely well attended with five locomotives in steam throughout the day on both tracks.

With the loan of a mechanical digger and two men for a day, enabling the completion of the trench work for the retaining wall and building, **Taunton ME** are making considerable progress with their new site. The stock shed has progressed to the stage of damp proof courses and hardcore being laid for the floor. The 'workers' are being encouraged to use hard hats when working on the site. Designs have been produced for the track work and a good start has been made on this. Along with many other societies, Taunton is having to increase subscriptions to meet increased costs, most notably insurance which seems to be reaching dizzy heights everywhere.

A recent visit by **Tyneside SMEE** members to the **Beamish ME Group** was judged a *"real success despite the terrible weather."* Visitors saw a static display of locomotives and wagons and had a chance to drive locomotives on both the adhesion track and the unusual rack railway nearby. The visitors also had a tour of the workshop followed by cakes/pies/biscuits and tea by 'the chief cook', 85 year-old Matt Copeland. Some members also

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.

DECEMBER

12 **Historical MRS (Essex Area).** *Christmas DIY Meeting.* Contact Jem Harrison, 27 Colne Place, Basildon, Essex SS16 5UZ.
12 **Hereford SME.** *Christmas Social and Judging of Annual Photographic Competition.* Contact Richard Donovan: 01432-760881.
12 **North London SME.** *An Evening With Brendan Corcoran.* Contact David Harris: 01707-326518.
13 **Erewash Valley MES.** *Santa Specials.* Contact Jim Matthews: 01332-705259.
13 **Guildford MES.** *Christmas American Supper.* Contact Dave Longhurst: 01428-605424.
13 **SM&EE.** *Christmas Party.* Contact David Boote: 01202-745862.
13 **Southland SME.** *Train Runs.* Contact Peter Stark: 03-21-89702.
13 **Surrey SME.** *Santa Specials.* Contact John Cook: 020-8397-3932.
13 **York City & DSME.** *AGM.* Contact Ken Bateman: 01904-421445.
13/14 **Leighton Buzzard NG Rly.** *Santa Specials.* Enquiries: 01525-373888.
13/14 **Romney, Hythe & Dymchurch Railway.** *Santa Specials.* Information: 01797-362353.
13/15 **Centurion SME.** *Open Weekend.* Contact Rudy Du Preez: 012-9986780.
14 **Cheshire Live Steamers.** *George Howard: Dialects.* Contact Tricia Sturgeon: 01606-48586.
14 **Frimley & Ascot LC.** *Santa Run.* Contact Bob Dowman: 01252-835042.
14 **Harrow & Wembley SME.** *Santa Run.* Contact Dr. Roger Greenwood: 020-8427-2755.
14 **Hornsby ME.** *Running Day.* Contact Ted Gray: 9484-7583.
14 **Malden DSME.** *Santa Run.* Contact John Mottram: 01483-473786.
15 **Hornsby ME.** *Meeting.* Contact Ted Gray: 9484-7583.
15 **Lancaster and Morecambe MES.** *Video: The Pioneer Line.* Contact Harry Carr: 01524-411956.
15 **Leicester SME.** *Your Model Night & Bits & Pieces.* Contact Raymond Wallis: 01162-858824.
15 **Steam LS of Victoria.** *Committee Meeting.* Contact Graham Plaskett: (03) 9750-5022.
16 **Chesterfield MES.** *Meeting: Members' Slides.* Contact Mike Rhodes: 01623-648676.
16 **Nottingham SMEE.** *Christmas Get-Together.* Contact Graham Davenport: 0115-8496703.
16 **South Durham SME.** *Afternoon Steam-Up.* Contact B. Owens: 01325-721503.
16 **Stafford DMES.** *Quiz & Mince Pies.* Contact Chris Dobbs: 01889-270533.
16 **Surrey SME.** *Chairman's Evening.* Contact John Cook: 020-8397-3932.
16 **Taunton ME.** *Mince Pies & Natter.* Contact Don Martin: 01460-63162.
16 **West Wiltshire SME.** *Bring & Buy.* Contact R. Nev. Boulton: 01380-828101.
17 **Andover DMES.** *Christmas Party.* Contact John Berry: 01960-882616.
17 **Bournemouth DSME.** *Christmas Party.* Contact Mike Baker: 01202-383653.
17 **Chingford DMEC.** *Cheese & Wine Evening.* Contact Martin Masterson: 0208-989-5552.
17 **Fylde SME.** *Meeting.* Contact Alan Reid: 01253-882872.
17 **Historical MRS (North West Area).** *Track Night & Mince Pies.* Contact David Goodwin: 01224-880018.
17 **Leeds SMEE.** *Quiz Night.* Contact Colin Abrey: 01132-649630.
17 **Leighton Buzzard NG Rly.** *Santa Specials.* Enquiries: 01525-373888.
17 **MELSA.** *Meeting.* Contact Graham Chadbone: 07-4121-4341.

An enthusiastic group of Japanese kindergarten children were made welcome at Mr. S. Ishikawa's 3½in. gauge private railway. (Photo: Kimio Hoshino)

visited the Stephenson Memorial MLA trials at **South Durham SME**. Nigel Potter of West Cumbria won the best 3½in. gauge class and was overall winner with his B2. Ken Ellwood (who built Nigel's B2) also from West Cumbria won the 5in. gauge class with his *Boxhill*, and Alan Bones of TSMEE won the 7¼in. class with his *Holmside*. A special mention was made of 11 year-old Joseph Gibbons who drove his father's 3½in. gauge *Atlantic* and completed his 20 minute run with no problems. Can we add our congratulations to Joseph and all the winners? Although fewer visitors attended than last year, the society Autumn rally was successful. One notable event was the near escape of the gazebo in a very strong gust of wind. Based on experience and several reports received, it seems that model engineers and gazebos do not mix very well. Any other gazebo tales will be welcome. At a recent 'Bits and Pieces' evening Jack Heyes produced his 'Human Transporter' based on the American 'Segway' idea. Details of such things can be found on the internet at **www.travel.howstuffworks.com/ginger.htm**

York City DSME reports a steadily increasing membership which is now approaching 140. The society website has also recorded over 10,000 'hits' which, as they say *"is a fair old number."*

World News

Australia

Adelaide Miniature Steam Railway Society has been busy with several maintenance tasks at their track site, most of them in the rain! This was offset by some good weather for some running days so equilibrium was restored. The newsletter also contains an article about the unusual Laxey water wheel on the Isle of Man.

Canada

Assisted by his wife Dianne, Harold Boddy recently gave a presentation on ornamental lathe work to members of the **Steam Locomotive Society of Victoria**. Harold described some of the history and demonstrated the operation of the Holtzappel headstock. He showed several examples of such work. Member Dave Smith urges people to build some rolling stock in order to provide realistic trains for their locomotives to pull and also as a quick job(?) between locomotives.

New Zealand

Auckland SME is holding a competition to decide on a name for their new station building. The winner will receive a dinner for two at a local restaurant.

Canterbury SMEE have obtained planning permission for their proposed new track site. This will accommodate a 7¼in. and 5in. gauge ground level track, a raised 5in., 3½in. and 2½in. track, a large boat pond, traction engine tracks, service and storage areas and a clubhouse. Development is proposed in three stages and donations from various sources have already resulted in large amounts of materials, etc., being made available. I am sure every reader will wish them well with this mammoth project.

Japan

Some members of the **Japan Coupler Friends Club** recently hosted a visit by a group of kindergarten children at Mr. S. Ishikawa's private 3½in. gauge track. With fine weather, about 40 youngsters visited and enjoyed the rides. Our thanks to Kimio Hoshino for the photographs.

South Africa

Various maintenance and building projects are under way at **Centurion SME**, including repairs to the inner track, levelling of paving slabs and modifications to the pits in the station area. Proposals are also being put forward for a new steaming bay roof.

Gerald Hall has taken on the role of Secretary of **Durban SME** and can be reached on 031-205-1089 (home) or 031-460-3687 (business). The club is proposing to hold a mini-exhibition on their running days to show the public the results of their workshop efforts.

United States

Ronald Heller from **New Jersey Live Steamers** comments on the growing trend for people to buy ready made 'diesel' locomotives to run on model rail tracks. He maintains that this is because that is what they grew up with, and the numbers of those who grew up with steam is steadily declining. The track Chairperson, Mike Plihcik would like all members with 1½in. scale locomotives to sign up to maintain an assigned section of the track.

The Editorial Team would like to express particular thanks to all who send in copies of their Club magazine, News Sheets, Newsletters, details of meetings and other contributions for inclusion on these pages.
The encouraging increase in their number has made individual acknowledgement impractical owing to the time constraints of the editorial process but please be assured that we are extremely grateful for the effort made to submit items for this column and *Club Diary*.

18 **Adelaide Miniature SRS.** *General Meeting.* Contact E. J. Wakefield: 8362-3269.
18 **Cardiff MES.** *Club Chat.* Contact Trevor Jenkins: 029-2075-5568.
18 **Colchester SMEE.** *Festive Evening Meal.* Contact L. G. Hammond: 01376-511686.
18 **East Somerset SMEE.** *Christmas Social Evening and Bring & Buy.* Contact Roger Davis: 01749-677195.
18 **Leyland SME.** *Christmas Dinner & Dance.* Contact Mark Entwistle: 01772-422411.
18 **Rugby MES.** *Christmas Social.* Contact David Eadon: 01788-576956.
18 **Sutton MEC.** *Quiz Night.* Contact Mike Dean: 0208-657-5401.
19 **Canvey R&MEC.** *Christmas Party.* Contact David A. Clark: 01375-846921.
19 **Colchester SMEE.** *Quiz & Fizz Evening.* Contact L. G. Hammond: 01376-511686.
19 **Rochdale SMEE.** *Faj Collin: Design Hiccups.* Contact Mike Foster: 01706-360849.
19 **Romford MEC.** *Members' Bring & Buy Sale.* Contact Colin Hunt: 01708-709302.
19 **Romney Marsh MES.** *Video Evening.* Contact John Wimble: 01797-362295.
19 **Steam LS of Victoria.** *Gathering.* Contact Graham Plaskett: (03) 9750-5022.
20 **Chesterfield MES.** *Running Day.* Contact Mike Rhodes: 01623-648676.
20 **Historical MRS (Bristol Area).** *Arthur Turner's Christmas Show.* Contact Gerry Nichols: 0117-973-1862.
20 **Historical MRS (Scottish Area).** *John Frater: Getting The Best (Worst) from Photographs.* Contact Richard Crockett: 01896-750730.
20 **Luscombe Valley Railway.** *Humbug Day.* Contact Richard Knott: 01202-709833.
20 **Reading SME.** *Club Running.* Contact Graham Bustin: 01189-615450.
20 **Southland SME.** *Train Runs.* Contact Peter Stark: 03-21-89702.
20 **Talyllyn Railway.** *Carol Train.* Enquiries: 01654-710472.
20 **Steam LS of Victoria.** *Club Run plus Evening Spit-Roast Dinner.* Contact Graham Plaskett: (03) 9750-5022.
20/21 **Chesterfield MES.** *Steaming at Papplewick.* Contact Mike Rhodes: 01623-648676.
20/21 **Leighton Buzzard NG Rly.** *Santa Specials.* Enquiries: 01525-373888.
20-24 **Romney, Hythe & Dymchurch Railway.** *Santa Specials.* Information: 01797-362353.
20-24 **Talyllyn Railway.** *Santa Specials.* Enquiries: 01654-710472.
21 **Ascot LS.** *Members' Pre-Christmas Steam-Up.* Contact Ivan Hurst: 01276-28803.
21 **Harlington LS.** *Mince Pie Run.* Contact Peter Tarrant: 01895-851168.
21 **Hornsby ME.** *Sailing Day.* Contact Ted Gray: 9484-7583.
21 **York City & DSME.** *Running Day.* Contact Ken Bateman: 01904-421445.
21 **Tyneside SMEE.** *Christmas Party.* Contact Ian Spencer, 0191-2843438.
22 **Bedford MES.** *Social and Mince Pie Evening.* Contact Ted Jolliffe: 01234-327791.

23 **Historical MRS (East Lancashire/North Manchester Group).** *Christmas Railway Quiz Night.* Contact John Sykes: 01706-823989
26 **Canvey R&MEC.** *Boxing Day Steam-Up.* Contact David A. Clark: 01375-846921.
26 **Cardiff MES.** *Boxing Day Steam-Up.* Contact Trevor Jenkins: 029-2075-5568.
26 **Colchester SMEE.** *Boxing Day Steam-Up.* Contact L. G. Hammond: 01376-511686.
26 **Guildford MES.** *Boxing Day Run.* Contact Dave Longhurst: 01428-605424.
26 **High Wycombe MEC.** *Boxing Day Steam-Up.* Contact David Savage: 01494-527402.
26 **Leeds SMEE.** *Boxing Day Steam-Up.* Contact Colin Abrey: 01132-649630.
26-28 **Leighton Buzzard NG Rly.** *Mince Pie Specials.* Enquiries: 01525-373888.
26 **Leyland SME.** *Boxing Day Steam-Up.* Contact Mark Entwistle: 01772-422411.
26 **Maidstone MES.** *Boxing Day Run.* Contact Martin Parham: 01622-630298.
26 **Malden DSME.** *Boxing Day Steam-Up.* Contact John Mottram: 01483-473786.
26 **Reading SME.** *Boxing Day Steam Up.* Contact Graham Bustin: 01189-615450.
26 **Stockholes Farm MR.** *Members' and Family Day.* Contact Ivan Smith: 01427-872723.
26 **Sutton MEC.** *Boxing Day Run.* Contact Mike Dean: 0208-657-5401.
26 **Sutton Coldfield MES.** *Boxing Day Steam-Up.* Contact Neal Harrison: 0121-378-3992.
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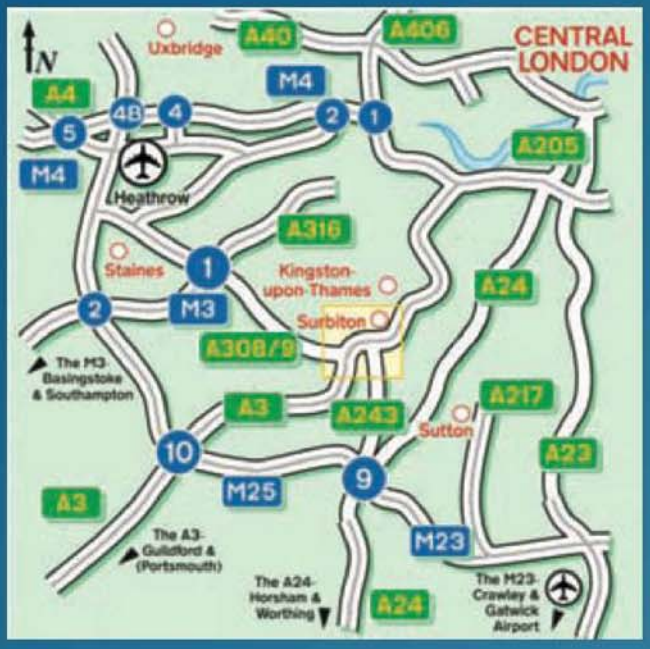

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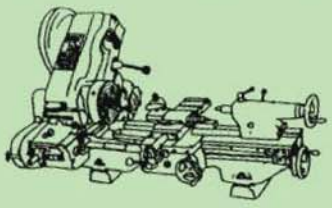

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MILFORD 12" Pedestal Grinder.....£325
VICEROY Grinder, pedestal model.....£145
VICEROY Buffers, pedestal models.....each £250
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MISCELLANEOUS / FABRICATION MACHINERY

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ALCOSA hearth.....Just in £245
WELLSAW 4" hacksaw.....£325
RJH vertical 4" linisher + built in dust extractor.....£625
RJH horizontal 4" linisher + built in dust extractor £625
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MYFORD CAPSTAN ATTACHMENT (LARGE BED TYPE).....£550
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STARTRITE 14-S-5 woodworking band saw £775
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