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Vol. 200 No. 4318

1-14 February 2008

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The SMEE provided track running for visitors to the Centenary Model Engineer Exhibition at Ascot. In this issue, on page 159, we review all the club activities. (photograph by Mike Jones)

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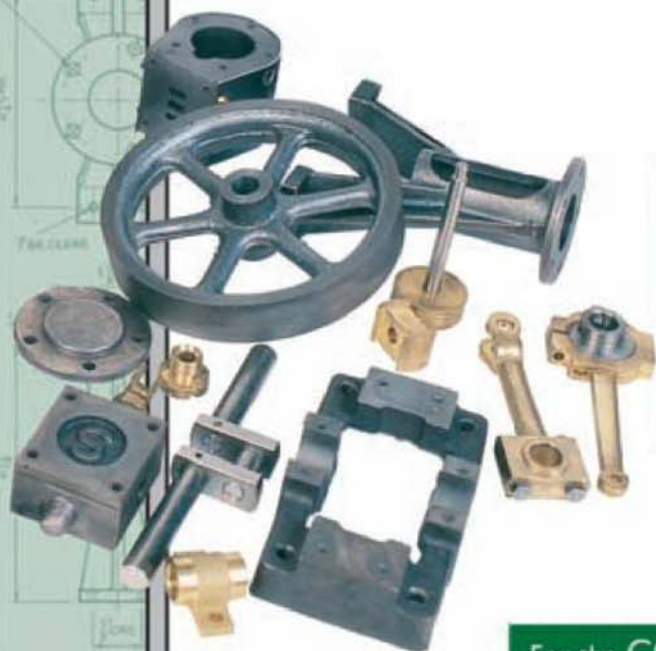
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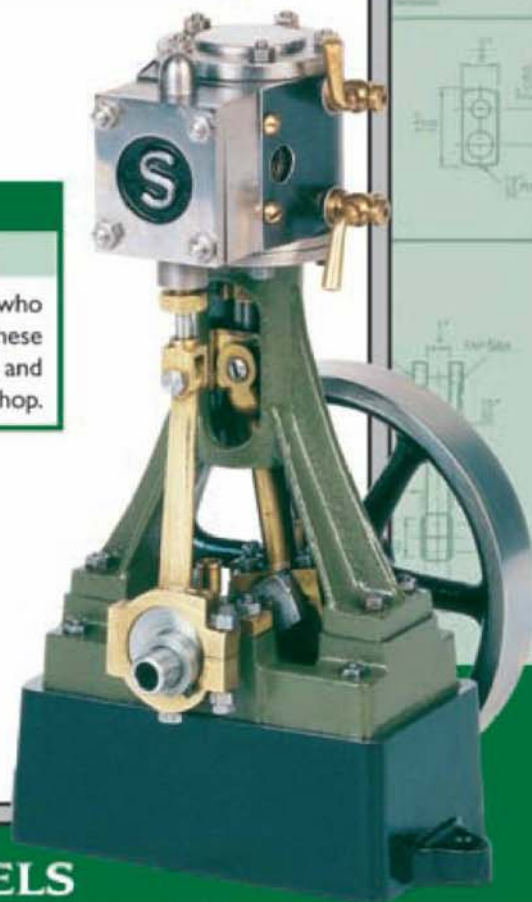
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A3	1/4 x 3/8 - 1/2 - 5/8 - 3/4 - 7/8 - 1.	11.75
A4	5/16 x 1/2 - 3/4 - 1 - 1 1/2	14.55
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F2	1/4 - 5/16 - 3/8 - 7/16 - 1/2	29.20

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G1	5/32 - 3/16 - 7/32 - 1/4 - 9/31 - 5/16	10.95
G2	1/4 - 9/32 - 5/16 - 3/8 - 7/16 - 1/2 - 5/8	30.50

BRASS ANGLE

H1	1/4 x 1/4 x 1/16	5/16 x 5/16 x 1/18	
	3/8 x 3/8 x 1/16	1/2 x 1/2 x 1/16	11.35
H2	5/16 x 5/16 x 1/16	3/8 x 3/8 x 1/16	
	1/2 x 1/2 x 1/8	3/4 x 3/4 x 1/8	21.15

DRAWN STEEL ANGLE

H3	16mm x 16mm x 3mm, 20mm x 20mm x 3mm, 25mm x 25mm x 3mm	13.50
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SEAMLESS COPPER TUBE

J1	1/16 x 28g - 3/32 x 28g - 1/8 x 24g - 5/32 x 24g	09.10
J2	3/16 x 22g - 1/4 x 20g - 5/16 x 20g - 3/8" x 22g	11.30

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M1	152" - 193" - 220" - 248" - 275" - 324"	13.85
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M2	193" - 220" - 248" - 275" - 324"	04.50
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BRASS FLATS

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N5	1/4 x 3/8 - 1/2 - 3/4 - 1	35.45

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P1	3/16 - 1/4 - 5/16 - 3/8 - 7/16 - 1/2	13.65
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P2	5/8 - 3/4 - 1	23.75
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PHOSPHOR BRONZE ROUND

Q1	1/8 - 5/32 - 3/16 - 1/4	12.70
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Q2	5/16 - 3/8 - 1/2	32.95
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SILVER STEEL

S1	3/32 - 1/8 - 5/32 - 3/16 - 7/32 - 1/4 - 9/32 - 5/16 - 3/8 - 7/16 - 1/2	22.45
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S2	3mm - 4mm - 5mm - 6mm - 7mm - 8mm - 9mm - 10mm - 12mm	19.50
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ALUMINIUM FLATS

R1	1/8 x 1/2 - 1/8 x 1 - 1/4 x 1/2 - 1/4 x 1 - 1/4 x 1 1/2 - 1/4 x 2	18.90
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R2	3/8 x 1/2 - 3/8 x 1 - 3/8 x 1 1/2	15.55
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R3	1/2 x 1 - 1/2 x 1 1/2 - 1/2 x 2	23.75
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R4	1/2 x 2 1/2 - 1/2 x 3	27.85
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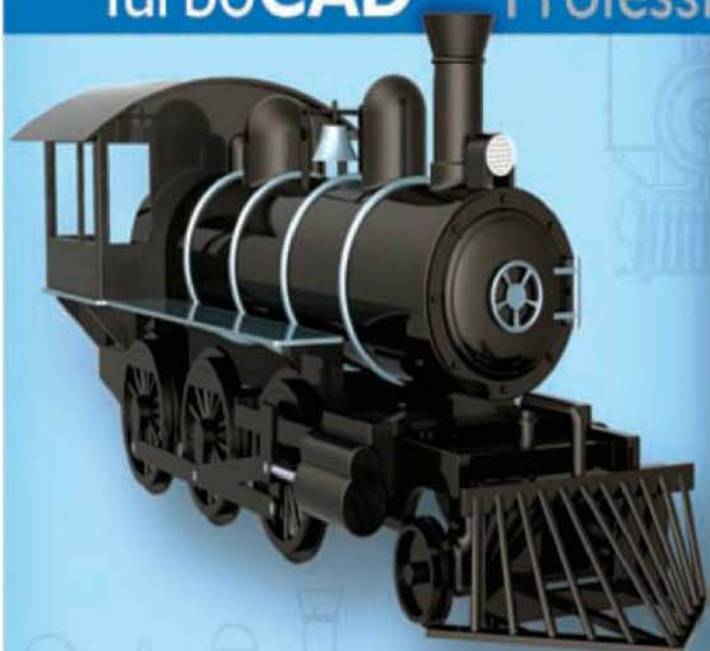
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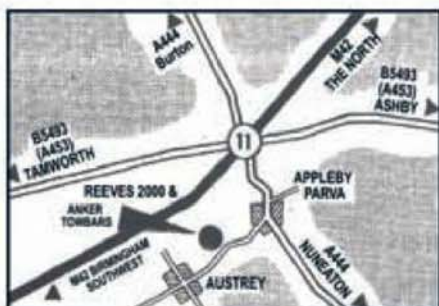
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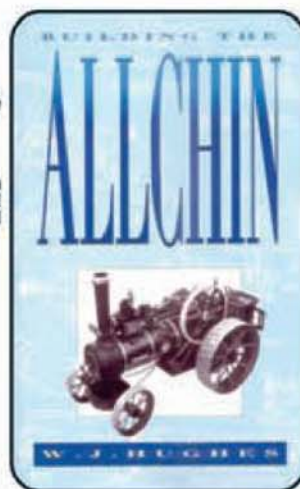
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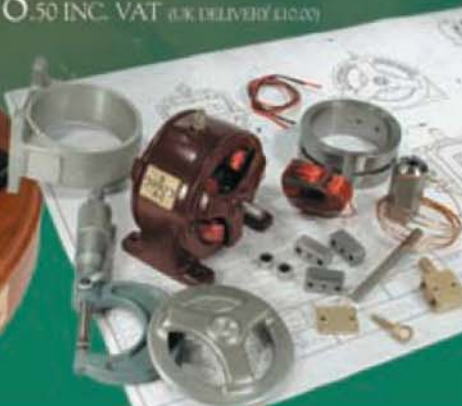
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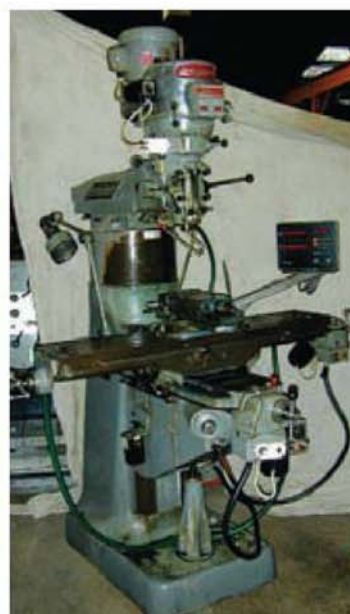
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WILLIAM DONALD BRIEN CRISP 1929-2007

An appreciation

I first met Don, as he was almost universally known, in the mid-summer of 1968 during his first 'reign' as President of Birmingham Society of Model Engineers, which I also joined in July of that year. This was around the same time that Alfred J. Reeves died. Don and Alec Farmer bought out his company and under new leadership A J Reeves & Co (Birmingham) Ltd eventually became the "World's largest Model Engineering Suppliers".

After two years their 'empire' had grown to the extent they needed someone to take on office duties including answering correspondence and I had the privilege of being accepted on to the team in October 1970. Don was my office tutor and I came to know his great ability and patience when dealing with 'Joe Public' and how such a unique business operated and I owe a great debt of thanks to him for that.

He coupled looking after the financial side of the business, editing, producing and printing in house several editions of the sales catalogue until the work became too large and the actual publishing was put out. Computer technology was embraced early on and together with his eldest son John, who had joined the company in 1974 on leaving school, worked diligently on producing a sales and stock control system to use this facility.

Don was always ready to laugh. I remember a customer named John, a Cornishman who lived in South Wales and who wrote his orders in poetry and we would take time out in the lunch hour to reply in kind. I still chuckle at Don's reply on one occasion that read "O John, you are a one. You forgot to put your invoice number on."

Of his background I remember little though he was professionally knowledgeable of ciné film and film projection.

His National Service had been with the Royal Air Force and in private life he had been encouraged to combine engineering and modelling and, at the time I first knew him he had almost – I use that word advisedly – almost completed a 3½ inch gauge LBSC Doris 4-6-0 but failed to lag the boiler or paint it other than the chassis and tender. Don would generously invite almost anybody to drive Doris, including me, and it performed this task year after year after year.

Don's enthusiasm for the model-engineering hobby never wavered. He continued to work for Birmingham SME in various offices including Secretary, Social Secretary, Vice president, and completed a second term as President.

With both directors of a model engineering suppliers being equally enthusiastic model engineers was a great advantage to the club being 'helped' in ways members were often unaware of.

He continued his modelling in a joint venture with co-director Alec in building a pair of 7¼ inch gauge GWR pannier tank locomotives to the design acquired by Reeves in the mid 1980s where it was intended that he would make the two chassis and Alec would complete both boilers and superstructures.

These miniatures were eventually completed in the late 1990s except that Don's lacked the cylinder cladding plates. It was seen running at the society's ground with the builder as passenger in September 2007 with grandson Leigh on the footplate.

He had a fascination for railway signalling and, prior to the building of those two locomotives, he had studied for, and built, a fully mechanically and electrically interlocked 24-lever signal frame that was installed in a custom-built building at the BSME ground to operate half of the ground level circuit and the island platform and sidings at Illshaw Heath.

Unfortunately specialist knowledge of signalling is required; few model engineers follow that particular trait and so it was difficult to engage sufficient staff to operate it at times when several trains were in operation at one time. It is still in (simplified) use.

Soon after he retired in 1993, Alec Farmer having retired twelve months earlier, and both retaining their directorships of Reeves, Don developed an irregular heartbeat, which set him back health wise though he wasn't going to let that interfere with his hobby.

In retirement and in addition to the aforementioned locomotives, he completed the build of an unusual miniature, a large horizontal steam mill engine with drop valves, which had been published in the *Model Engineer* way back in the 1920s. The part-finished model had been acquired in the 1970s and had waited patiently for completion.

Don's health deteriorated when he developed cancer in the years after the company went into liquidation at the end of year 2000. The reasons for the end of that, the original company, will probably never be fully explained.

He and his first wife Norma were well suited. She, too, was a most generous lady and they had a lively and loving family of three children, John, Sally and Stephen. Sadly Norma died in 1975. In May 1976 Don married Pat who had been the Reeves telephonist. They had a happy, loving marriage until Don passed peacefully away on 3rd December 2007.

Generous - is a word that sums up Don to a 'T'. If something was wanted, and he could supply it, it was as good as done. Not just of material things, but also of his personal time, energy and enthusiasm.

Don you will always be remembered as 'one of the best'. Long may your memory be kept with us.

David Piddington



LNER No. 10000

SIRS, - Being more than somewhat impressed by Ron Price's locomotive models, his LNER 10000 also intrigued me. While the LNER was 'incubating' the locomotive, my family moved from North Northumberland to the South of the County.

When dog walking, we often passed Geordie Stephenson's cottage, and there was a place where, taking another route, we could observe the mainline trains progressing from Newcastle-upon-Tyne to Edinburgh.

Sometimes we saw 10000 passing by, but it was then known by the name 'Hush-Hush'. I do not know whether the name resulted from it being the 'new secret weapon' of the LNER, or because it ran more quietly than the 'common herd', but my congratulations go to Ron Price for preserving a piece of railway history.

Derek Cooke, Australia.

Screws in gunsmithing

SIRS, - Following the discussion in *Model Engineer* about screw head types, conventional slotted-heads, the various cross-head styles, etc., (M.E. 4300, 25 May 2007) I thought it might be interesting to look at the practices employed in gunsmithing.

Screws in guns have to stay put under some pretty rugged conditions. While guns are designed so that the main stresses of firing do not fall directly on screw heads or threads, screws still play an important part in the overall strength of both shotguns and rifles. Consider the fact that when you pull the trigger on a 12-bore shotgun you set something like 1,650ft/lb of energy on the loose in a few milliseconds, and you will see what I mean.

Screws other than those with plain, slotted heads are very rare on shotguns. I have seen a few cross-head screws on cheap East European imports, while very small socket-head grub screws are sometimes used in applications like trigger adjustment mechanisms, but

these are the exceptions.

The slotted-head screws used to hold the components of a shotgun together do differ in one important respect to those used in most other engineering applications. They have extremely narrow screwdriver slots, often no more than the width of a slim knife blade.

This feature is largely in the interests of elegance. Another feature of shotgun screws is that gunsmiths always finally tighten them so that the slots are all lined up with the long axis of the gun – in other words, with the barrels. To achieve this, it is often necessary to individually 'fettle' a screw head to fit. In fact, a good sign that a gun has been worked on by an unskilled amateur is that the screw slots point all over the place!

I am not a skilled model engineer, but it does occur to me that very slim screwdriver slots would make many a model look much more 'in scale' than the normal, commercially-available wide-slotted variety, and the practice of lining up the slots would greatly enhance the appearance.

These fine-slotted screws do, of course, require screwdrivers to be prepared properly for their fitting or extraction. Gunsmiths, for some long-forgotten reason, call screwdrivers 'turnscrews', and you can buy gunsmiths' turnscrews from specialist suppliers. They are expensive, so most gunsmiths buy conventional flat-blade screwdrivers and grind suitable profiles on the tips.

The profile should be thick enough to only just enter the slot, and only fractionally less wide than the diameter of the head. For countersunk screws, it is often wise to take the sharp corners off the blade, to prevent damage to the countersink.

Most importantly, however, the blade should be hollow ground, rather than brought to a conventional tapering point. This allows for a very secure location in the slot, and ensures that it doesn't jump out when a large amount of torque is applied.

This latter point is very important on gun screwdrivers.

Screw heads are often located within elaborately-engraved surfaces, which would be ruined with one screwdriver scratch. A chipped or burred screw head could be disastrous, too, because screw heads in such locations are often themselves engraved. This makes them virtually irreplaceable.

Now, you may think that screws with very thin slots cannot be fitted to full tightness, or removed when partially seized in place. They can, but the torque you apply will be governed by how well you harden and temper your screwdriver tip after grinding.

In the past I have made many screwdriver blades out of silver steel. I have found that, if you follow the instructions for hardening and tempering a chisel, you won't go far wrong. I have also used the old trick of a straight quench from dull red into very salty water with some success.

Finally, before anyone asks, I do not know of a commercial source of narrow-slotted screws. The few I have needed I have made myself, either from bar stock or by turning down the heads of hex-headed bolts. That's fine if you need up to half a dozen, but extremely tedious if you need more!

Mike George, Technical Editor, Sporting Gun.

Superheating and thermodynamic efficiency

SIRS, - I read with interest the article on superheating by Mr. D. A. G. Brown (M.E. 4307, 31 August 2007). He is correct in his conclusion that superheating has very little effect on the thermodynamic efficiency of a steam engine. However, he does not mention the beneficial effect it has by reducing condensation of the steam on entering the cylinder. This is well documented in the literature and Mr. John Olsen (M.E. 4310, 12 October 2007) discusses it at length.

Mr. Olsen then goes on to the effect of temperature on thermodynamic efficiency.

The fraction, n , of the heat received that can be converted into work by a thermodynamically reversible

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engine working between upper and lower absolute temperatures T' and T'' is limited by

$$n < 1 - (T''/T')$$

The temperatures are those at which heat is transferred between the surroundings (boiler, condenser, and atmosphere) and the working substance (water). In the case of superheated steam the greater part of the heat has been transferred at the saturation temperature in the boiler and only a small fraction at the superheat temperature in the superheater. Therefore, in Mr. Olsen's example with 50deg. C of superheat above the saturation temperature of 170deg. C and exhaust temperature 100deg. C, the limiting efficiency is still approx. 16% and not the 24% stated. To increase the Carnot limit the steam must be produced at a higher temperature in the boiler with consequent higher pressure.

One is tempted to ask how the engine knows how the steam attained its temperature and how much heat it is therefore allowed to convert to work. It doesn't, of course, but the question is worth pondering.

The engine passes repetitively through a cyclic process and the time average of its thermodynamic properties is constant. No permanent changes occur in the engine. The process by which heat energy is converted into work energy is driven by thermodynamic changes in the surroundings, i.e. the boiler supplying the heat and the condenser or atmosphere

receiving the heat in the exhaust.

The only known force bringing about change is the spontaneous, relentless move towards greater chaos. By chaos I mean the degree of randomness or disorder in the spatial distribution of particles (atoms, molecules) and the distribution of energy amongst them. The quantity called entropy is a measure of this. If you observe the creation of order, e.g. the crystallisation of water to ice, be assured that behind the scenes even greater disorder is being created, in this instance the dissipation of latent heat of freezing to the surroundings.

When a quantity of heat, q , is transferred at temperature T the increase in disorder in the recipient is measured by q/T . significantly, a given q creates more chaos the lower the temperature. Thus, if the surroundings (boiler) at temperature T' transfer heat q' to the engine and after converting some of it to work, w , the engine transfers heat q'' to the surroundings (condenser) at temperature T'' the net increase in chaos in the surroundings is

$q''/T'' - q'/T'$ which must be greater than zero if it is to occur at all.

For this to be true, $T''/T' < q''/q'$ and q'' cannot be zero, i.e. the engine must reject some of the heat received in order to work at all.

Meanwhile, the greatest quantity of work, w , that can be performed by the engine on the surroundings, e.g. hoisting a load against the force of gravity,

is the energy it receives minus the energy it rejects, i.e. $w < (q' - q'')$.

But, $n = w'/q' < (q' - q'')/q'$ i.e. $n < 1 - (q''/q')$

Alternatively, $q''/q < (1 - n)$

Combining this condition with that obtained above we arrive at

$$T''/T' < q''/q' < (1 - n)$$

i.e. $n < 1 - T''/T'$, the Carnot limiting law.

The above, of necessity simplified, hopefully provides a little insight into the origins of the Carnot limiting law and its application.

Reduced to its simplest terms, we are exploiting the natural tendency for heat to pass from hot to cold. Our heat engine gets in the way, snitches some disordered heat energy and orders it into work. Not too much, mind, or nature will notice and the process will not occur. Apparently, the greater the temperature difference the more we can snatch and still get away with it!

Derek Biddle, by e-mail.

Uranus

SIRS, - We often read articles on various part-built locomotives and then never hear of them again. So, having brought just such a locomotive, I thought I would update readers on its progress.

The engine, which was featured in *Model Engineer* in 1944 was a 5in. gauge Uranus under the title Uranus Doubled. It was being built by J. A. Hurst of Peterborough who took it to rolling chassis form with a boiler which required soldering.

In 1987, A. P. Jones of Peterborough purchased the locomotive and had the boiler and some other parts finished. The locomotive is named Mercury and I understand that there were two others to the design around at the time.

Do any of our readers know where they are now, as I am trying to get Mercury finished by the back end of next year and it would be good to meet up with

the other two locomotives if they still exist.

Malcolm Barlow, Yorkshire.

Don Young Atlantic

SIRS, - I would greatly appreciate your help in making contact with any readers who have built the Great Central Atlantic 8B to the design of the late Don Young.

I used to correspond with a gentleman by the name of Stan Plater who had done so, but have lost touch with him.

I would be very pleased if you could publish my request along with my telephone number (0116 2775097) if this is possible.

Any phone calls or correspondence will be gratefully received.

Royce A. Limb, Leicestershire.

Turbinia enjoyed

SIRS, - I greatly enjoyed the first instalment of the article on *Turbinia* by Mr. Ron Isted. Being from the North-East originally, I knew quite a bit about the vessel. I had seen it in the Newcastle Museum and was an admirer of its sleek lines and high performance (for the day).

I was a little surprised to read about the newspaper report of the escapades around Spithead, but was greatly disappointed to read that they were fictitious. A story like that is well worth repeating, even if the facts were bent a little. Just like today?

I read out extracts to my wife who was also amused by it. One thing that struck her: we all know that any ship is a 'She', but in that case what about a 'Man-of-War'? Shouldn't that be a 'Woman-of-War'?

Bill Purvis, Warrington.

Nylon for gear blanks

SIRS, - A good source of nylon for gear blanks is Axminster Power Tools Nylon Wheeled Castors. I have used them with hobs made to Jock Smiths' design (*Model Engineer*, 17 March 1995). I didn't get around to making gears using this method when I last demonstrated some of their milling machines, but I'm hoping to in the near future.

Joe Douglas, Devon.

Parts to identify

SIRS, - Do any readers recognise the model steam engine parts that I came across in my late father's belongings? Any details of provenance, technical drawings, etc., would be most gratefully received. Even though at present I have little model engineering



know-how I would dearly like to complete this project as a tribute to my late father, Dr. D. F. Presland.

David Presland, by e-mail.

Making the m of the Myford

PART 1

Graham Howe relates how he looks after his ageing ML7 and why he developed a taper turning attachment.

Each year I strip down the cross saddle and carriage from the lathe bed for a maintenance check. My ML7 is now well over 30 years old and has been used for model making as a hobby and invariably most of the work is done near the headstock end causing the usual wear.

You can easily appreciate this wear by traversing the carriage along the bed with the saddle gib strips a good fit at the headstock end and feel it tighten up as you move towards the tailstock end. The bed on

my ML7 is induction hardened, which does minimise wear but cannot eliminate it.

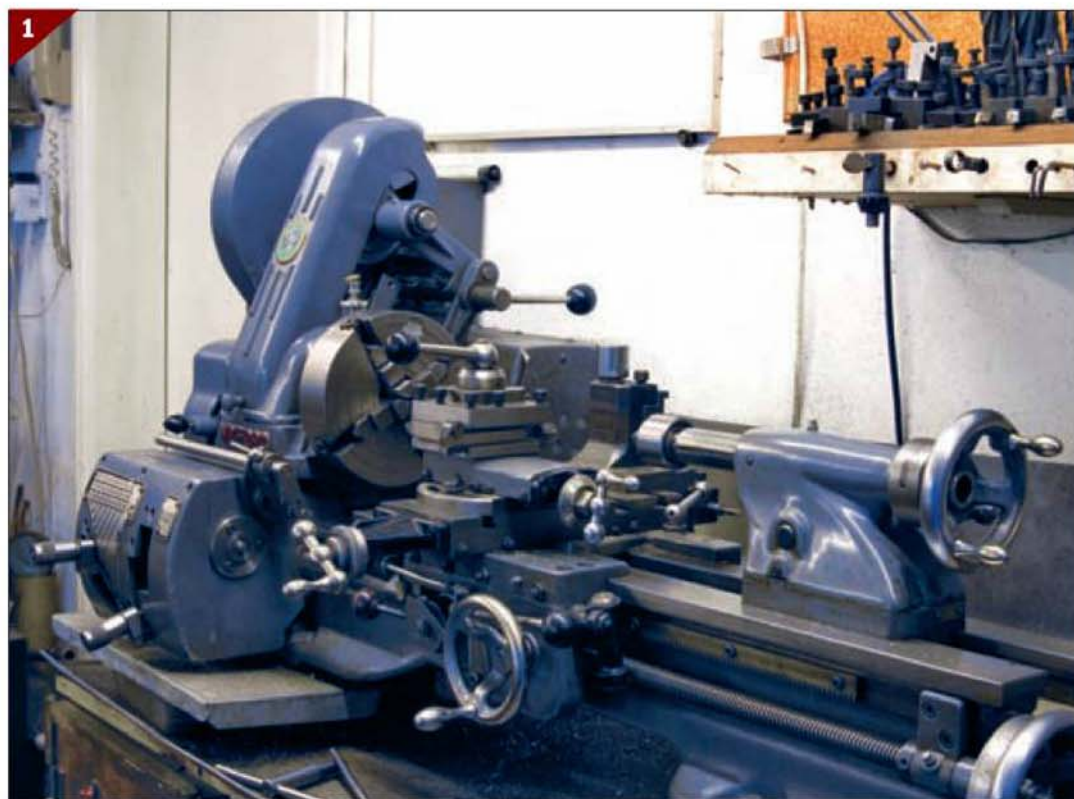
The first task is to check the top surface of the slide ways for any raised areas caused by dents and scratches. Unfortunately each year presents a few more, usually the result of carelessness such as dropping the chuck key or tool holder.

While this can look bad it is not a major cause of worry so long as the raised areas are eliminated. I do this using a honing stone and afterwards ensure it is well cleaned. The

dents act as oil reservoirs and so long as they are few and small in area no problem, only personal pride is hurt!

First a word of caution. The following truing-up process will only work if the lathe bed has been regularly checked and maintained. If wear builds up without attention then the only remedy is a trip to Myford's for a bed re-grind and that can prove expensive and in my case incredibly inconvenient as I live on the Isle of Man.

The following process is really a good clean-up of the bed and very small surface-



1. The Howe Myford, complete with home-made gearbox.

ost

wear adjustments using a hone. If the bed ways are soft then scraping could achieve the same results but only very, very small amounts need to be removed each time, just enough to take-out any binding. Incidentally, I believe to continue using a machine that binds is probably the worst thing you could do as this binding will continue to get appreciably worse after each adjustment to compensate for slackness near the headstock end.

The checking and remedial process is necessary to ensure the bed slide ways are truly parallel. Take note of the bearing surfaces (X). With my lathe the bearing surfaces are the front and rear but on some it follows the true narrow guide principle.

X1

R

X2

In any event you need to note the surface that is unused (R) and thus in perfect condition as originally machined, in my case the rear of the front slide.

Using this as a reference first check along the whole length the front slide (R to X2) for any variation in width. I use a digital caliper for this which enables the first reading to be set to zero and all subsequent readings show a plus or minus. The caliper is accurate to 0.0005in., but even this accuracy may be too coarse to measure the wear.

Take great care to get true readings. The likely amount of wear is probably just a few tenths of a thou and so the caliper is not always precise enough to measure exactly. If the caliper is locked after measuring mid-way along the bed then you can reasonably judge the variance in sizes

2. Taper turning attachment in position - note cross-slide lock handle with square hole for easy location and quick removal if needed.

3. Taper turning attachment with a setting piece of 0.3490 in. to give an angle of 2 degrees. Exact angles can be set using a combination of setting pieces, with individual pieces for special angles as in Morse Tapers.

4. Attachment in storage box with setting pieces. The chart in the box top shows pieces needed for different angles.

down to very small amounts. This is not a process to hurry and re-checking of results needs to be done frequently.

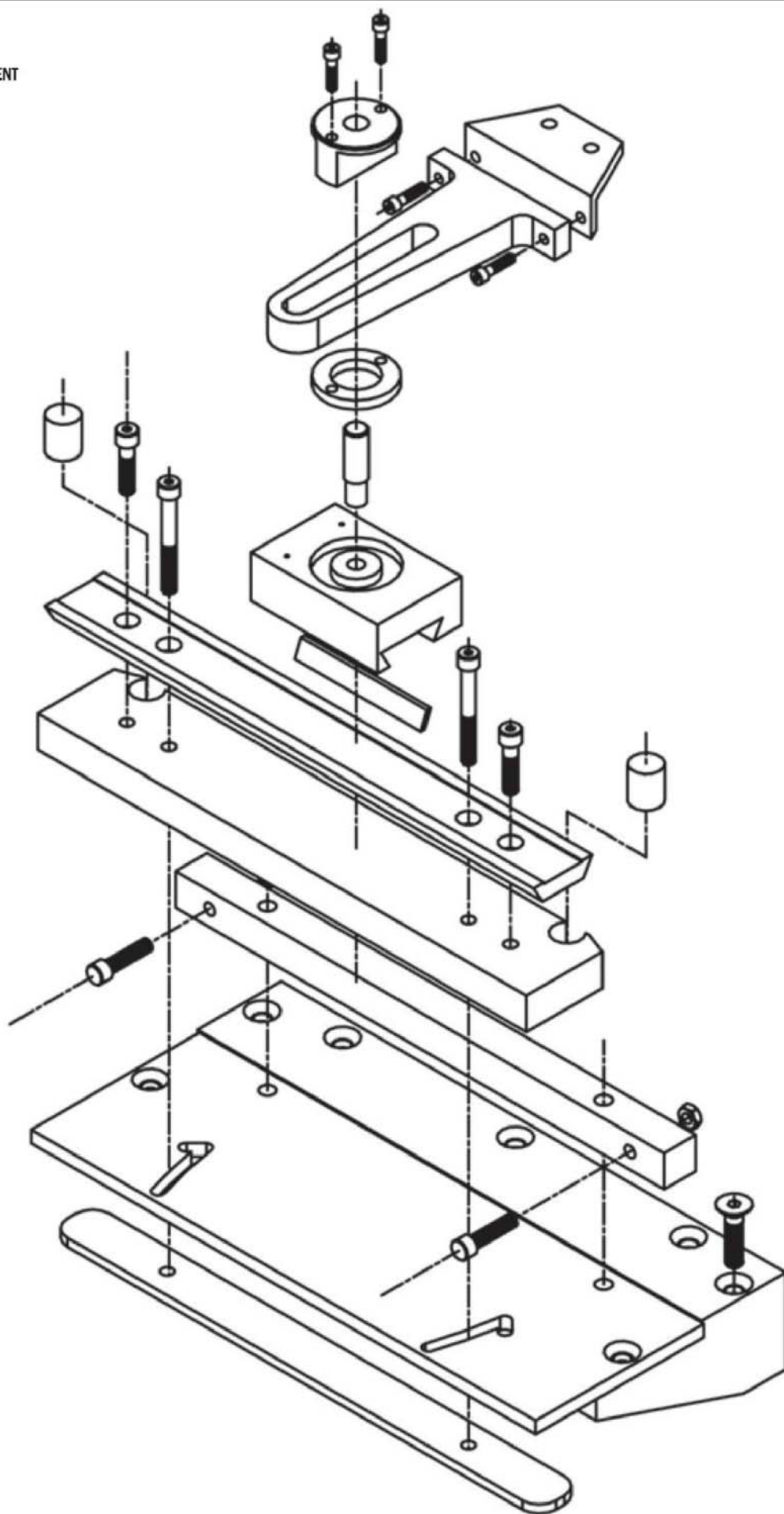
Using a honing stone any variations where the caliper starts to bind can be eliminated. The stone will only remove the smallest amount and should be done extremely sparingly and such that the squareness of the slide is maintained.

In practice these 'high points' will almost always be at the tailstock end reducing gradually to about mid position. I am always surprised how quickly this task is accomplished and



Fig 1

TAPER TURNING ATTACHMENT



again you must ensure very thorough cleaning afterwards. If the wear is substantial then this method will not work and could make things a lot worse. I only do this check once a year and then only if the table movement towards the tailstock starts to show binding.

If regular attention is paid to checking for any wear or binding then the method outlined will work well, it has for me. You now have the front bed slide perfectly parallel and can now tackle the rear slide in the same way to address the bearing surface by measuring over the front and back bearing surfaces (X1 to X2). Once this is completed the slides are perfectly parallel to the original register. The acid test after assembly of the now thoroughly cleaned slideways is confirmation that the carriage will now move evenly from end to end.

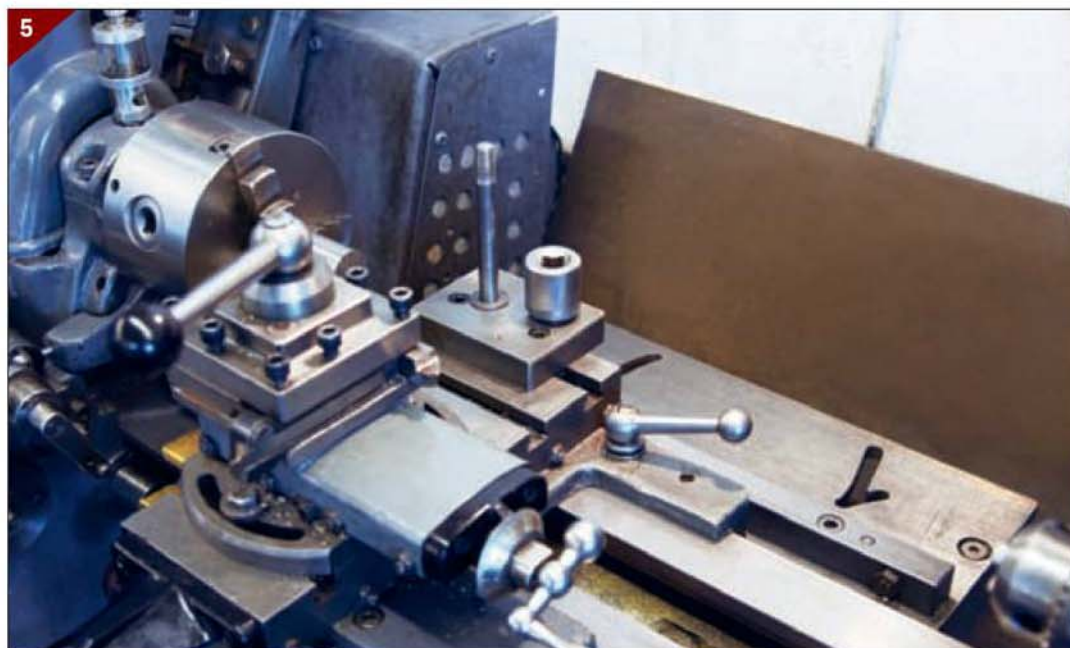
The steel plates beneath the saddle, which prevent lift need to be inspected for wear. Since the bearing surface is only about $\frac{1}{4}$ in. wide some wear is often seen.

I am fortunate to have a surface grinder and these plates are given a quick re-surface and honed with a stone to ensure a smooth surface. Reassemble, adjusting the gibs as Myford recommend.

My method is to take out all play and back off the adjustment screw a minute fraction of a turn. It is important that all play is eliminated with no undue pressure on the bearing surfaces otherwise wear will soon occur.

A point worth a mention is the adjustment of the front saddle gib screw nearest the tailstock end. This can easily be stressed so I back this off by about $\frac{1}{8}$ to $\frac{1}{4}$ of a turn. Lubricate all saddle points with the less than perfect oil gun and test the results!

The objective is to have a slide movement that is silky-smooth all along its travel but show no hint of sideways movement or binding. All this takes time and usually I find that after adjustment and say a few days use the slide needs additional



adjustment. I think this is down to the slides, gibs and screws all bedding in. Once again a word of caution, using an incorrectly adjusted slide will cause wear quickly and produce poor surface finishes plus a loss of accuracy due to 'sticky' slides.

Traversing the saddle the full length of the bed will now feel smooth with no tightening. A job well done. I have fitted a piece of thin brass sheet 2in. wide to the front of the saddle which protects the slides. The underneath of the sheet has a piece of felt glued to wipe swarf away.

Finally, the need to ensure the lathe is turning parallel. To do this you need a test piece (I keep these on hand for this job) about 7-8in. long and about 1in. diameter. The middle 5in. are turned down to by about 0.050in. on the diameter. Mount the test piece in the 3-jaw chuck; I have a centre-pop on the bar to align to the No. 1 chuck jaw. Take a 0.002in. cut across both collars without the tailstock and measure. If the diameter of the collar at the free end is larger than the front collar, increase the height of the front foot at the tailstock end, or under the back if smaller.

This is where the jacking feet come into use. No need to buy the Myford version as a pair can easily be made from 1.25in. square mild steel. Now that the lathe turns parallel

I then set another test-piece between centres. This is about 12in. long and 1in. dia. relieved in the middle 9in. Again take a 0.002in. cut over both collars and measure. Adjust the tailstock set-over.

I only make a change to the set-over for this test as it is a long job to get it exactly right. This was one of the main reasons I designed and built the taper turning attachment.

I designed this attachment based on the standard Myford version but instead of the pivot point being centered, it is from either end. The basic principle is following a Sine Bar and a spacer is used at one end to set the angle of taper. The register points on the table are 10in. apart so the spacers can provide very accurate tapers if made to 0.0001in. accuracy.

The lathe must be correctly levelled and true. The attachment is initially set to turn parallel and then the spacer is placed at either end (depending on taper direction) and the main slide then clamped. The significant advantage of this approach is the simplicity of setting known angles with no dials or witness marks to judge.

First test using a spacer for a 2 Morse Taper, proved to be spot on when tested in the lathe. A basic set of seven spacers provides for angles from 1 to 7deg. in quarter

5. Base unit of the attachment showing the support block and post for the rear tool posts. Note the nut is permanently fitted with a socket that can be tightened with the lathe chuck key. The support block protects the top slide when the block is rotated. More on the tool posts next time.

steps, 2 Morse Taper, and standard taper pin.

I have changed the design for clamping the cross-slide extension to the jig. Originally, the clamping method was by a cap screw. This method works alright but requires an accurate spacer washer below to ensure the clamped area is not distorted.

The new design does away with the single large cap screw and spacer washer. A post is now permanently fixed to the slide and a recess in the top of it provides space for a washer, which is clamped to the arm with two small cap screws.

This method automatically adjusts for height and ensures the arm remains un-distorted. In addition, the arm is now attached using an angle piece which fastens to the cross slide table rather than the back end of the cross slide. This modification enables the arm to be secured more easily, (see **fig 1**).

Next time, some other useful items for the ML7.

● To be continued.

A steam-power turbo electric intercity train

PART 1

Werner Jeggli from Switzerland introduces us to his unique steam-powered turbo-electric Gauge 1 'inter-city' train.

In an earlier article, *Telsa Steam Turbine Locomotive*, I described the development of my Gauge 1 (45mm) inter-city train *Der Mathematiker* through the year 2005 (M.E. 4281, 1 September 2006). Since then, work has progressed in steps. First, a more powerful, by-directional steam impulse turbine was tried and, finally, a turbine electric drive, described here, was installed.

Train description

The model is built to a scale of 1:32. The overall length of the train is 3.85m and the total weight (fuelled up) is 16.8 kilogrammes (**photo 1**).

Locomotive, tender and coaches can tilt (plus or minus 6deg.) by centrifugal force and spring assist from the trucks. Because of the inherently low centre of gravity, the train is able to negotiate a well-

maintained track of 3m radius at a scale speed of 200km/h [124mph] (1.74m/s actual) without any problem. The smallest radius track it can negotiate is about 1.8 metres.

The locomotive holds the liquid gas tank and boiler and a secondary exhaust steam condenser. It rides on two six-wheel trucks, of which only the rear one is motorised, **photo 2**.

The tender houses the

1. The complete 'Der Mathematiker' turbo-electric train seen in a composite photo.

2. The locomotive and tender seen in close-up with outer casings on.



ed,

main condenser, cooling fans, turbine-generator unit, condensate tank, radio remote control unit and the battery pack. On the tender's side the logo appropriately shows a mathematical infinite series formula which answers the ancient paradox of the race between the fleet-footed Achilles and the tortoise. It is a proposition which, though valid logically, flies in the face of common sense.

If the tortoise is given a head start, which seems to be fair, Achilles will never be able to overtake it. That is because when Achilles reaches the point the tortoise was at the start, she has had time to crawl a certain distance. If Achilles now arrives at this second point, the tortoise is again a bit further, etc. There seems to be no way, Achilles can win – but, as life proves, he does! It is unlikely that *Der Mathematiker* will ever enter into a race with a tortoise. But should this happen, I only hope it does not run out of steam!

The five coaches are named after great mathematicians:

Archimedes, Greek, 284-212 BC, mathematical achievements - Square root (π), big numbers, sphere volume (restaurant car).

Al Karismi (also Al Kwarismi), Arab, lived 778-850, mathematical achievements - decimal system, trigonometrics, cone sections; founder of algebra

Newton, English, lived 1642-1727, mathematical achievements - differentiation and integration methods

Euler, Swiss, lived 1707-1783, calculus, network theory (topology)

Gauss, German, lived 1777-1855, mathematical achievements - complex numbers, space curvature, probability theory, algebra theorem (passenger coach with rear cab coach).

Locomotive construction

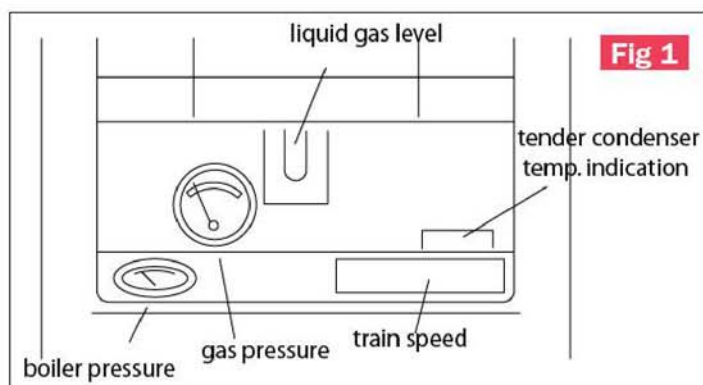
The pictures and drawings in this article will show construction details and the location of the various control elements required for operation of the train. **Photograph 2** shows the locomotive and tender with their outer casings (bodies) on. The engine is 630mm long, 96mm wide, 135 millimetres high and weighs 6.3kg (dry).

The sides and roof are made of aluminium 1.0mm thick and the front is 0.8mm thick copper. The body is held together with copper rivets and epoxy.

Photograph 3 shows the locomotive with the outer casing (body) removed. Within the tilting frame (horizontal aluminium profile) are mounted, from left to right: cab instrumentation, battery for temperature indication, liquid gas tank (shaped to best utilise available space) with its gaseous/liquid selector valve, condenser (initially the first stage, now the second stage for turbine-electric operation), a burner regulating valve and the boiler. The chassis rides on two trucks and two posts hold the tilting centre as high up as possible.

Boiler

The silver soldered boiler is made of a copper tube of 63/60mm [63 O/D and 60mm I/D] with an overall length of 289 millimetres. Four copper stays (4mm dia.) are used and the boiler was tested to a pressure of eight bar.



The firebox is made of copper pipe set at a 30deg. angle to the boiler. The tubes used are 32/29mm with a length of about 160 millimetres. A socket is provided on the rear wall (steam side) of the boiler for a thermo-couple with a range of 0-650deg. C.

There are four horizontal, copper flue tubes. The two inner ones 12mm O/D accept one super heater tube each; the two outer ones are 10/8mm and joined to firebox with copper-phosphor brazing.

Superheat is provided through an assembly of a copper tube (4/3mm dia.) and a stainless steel tube (4/3mm), the firebox element, which are silver brazed together.

A rectangular liquid gas tank was made from 1mm thick copper sheet and reinforced with three stays. It was silver soldered and given a test pressure up to eight bar. For future projects, two millimetre sheet should be used!

The gas used is butane. Propane or butane/propane mixes do not work properly. Filling quantity is shown on the sight glass. The capacity



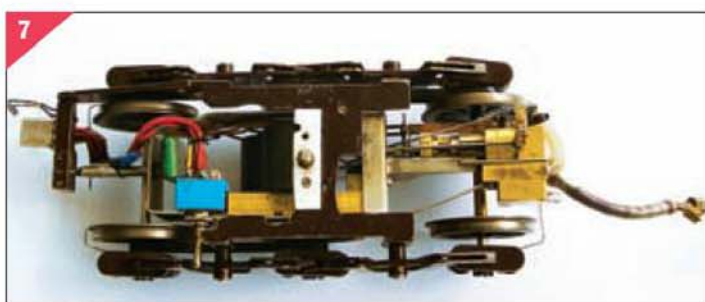
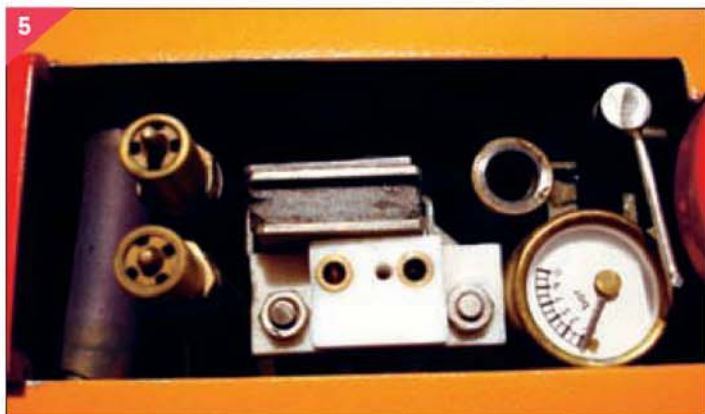
3. The locomotive with casing removed showing boiler, secondary condenser and the compact nature of the equipment.

4. The 'driving cab' full of instrumentation for monitoring the locomotive's performance. See fig 2 for a legend of the instruments and gauges.

of the tank is about 90g or approximately 160 millilitres.

A 90mm long 'poker' style burner is made from stainless steel tube (10/9mm dia.) with 0.5mm cross-slots. The jet orifice of 0.25mm feeds the burner tube. ➔





5. Top view of locomotive at the far right side of photo 3. See fig 1 for functions of the controls.

6. Motorised truck from below (see text for description).

7. Motorised truck from above. Note the white Teflon saddle and the plug-in centre pin.

with water, and fuel can be accomplished at access points along the top (photo 5 and fig 2). Various adjustments for operating can be achieved along the locomotive and tender as shown.

Locomotive Trucks

The locomotive runs on two six-wheel trucks, only the rear one is powered. The wheels are spoked pattern of cast iron 40mm diameter. The axles are sprung, spaced 65mm apart and run in 2 x 6 x 2.5mm sealed ball bearings.

In photo 6, from left to right, is the parallel/series motor selector switch (pale blue box), two drive motors working on same (middle) axle. From the centre driven-wheel set, a tooth belt drive (made by Optibelt or Gates) drives the two other wheel sets in the truck and the feed pump (photo 6 and photo 7).

The two DC-micro drive motors, which have precious metal commutation, provide the power. These are made by Faulhaber and rated for a 7,792rpm no load speed at 24 VDC.

Igniting the boiler is done with a piezo-electric mechanism, taken from a stove lighter.

The boiler is protected against running dry with a bi-metallic strip mounted in the chimney. If the flue exhaust reaches about 240deg. C, the trip will snap the gas regulating valve shut (see fig 2). The temperature at which activation occurs can be adjusted through the chimney.

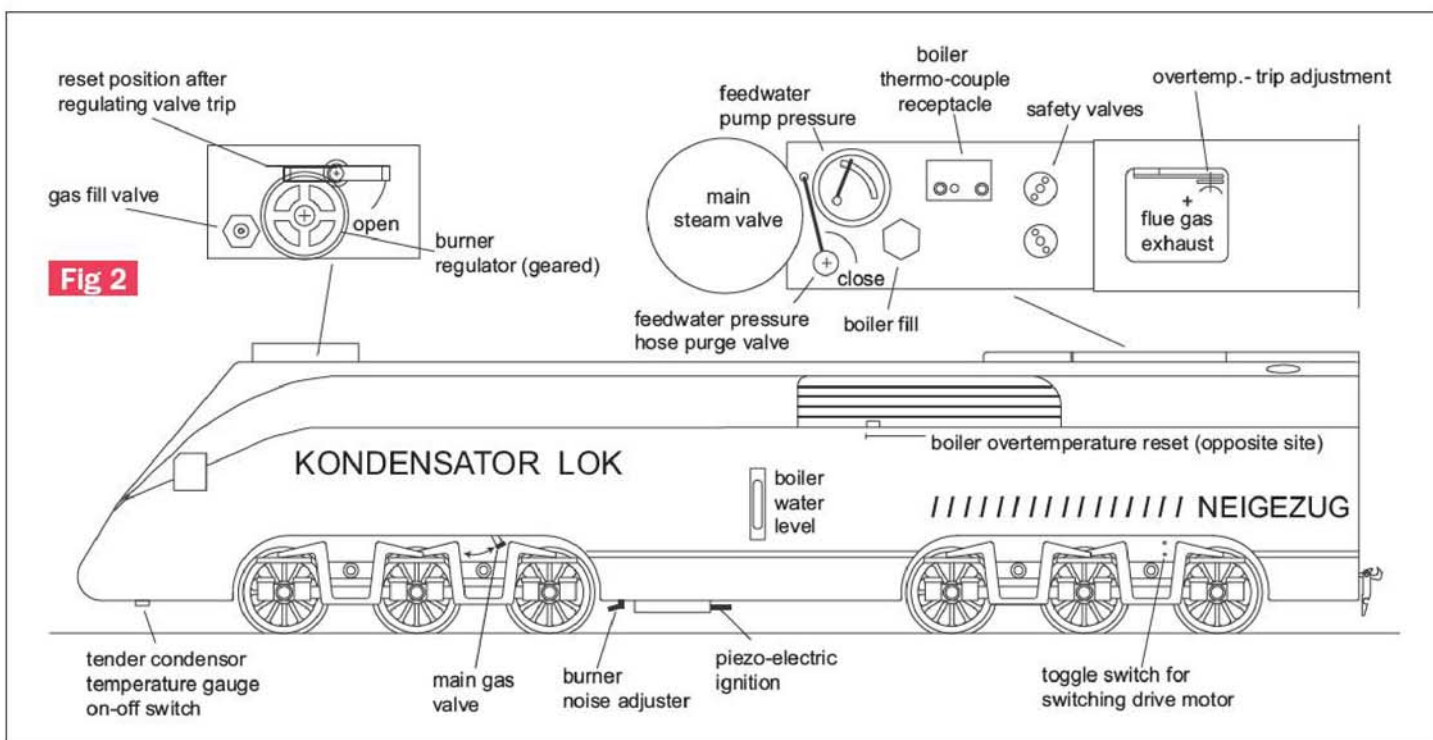
Burner sound is manually adjustable by a lever covering and uncovering a small opening in firebox front plate. This can be used to acoustically check burner operation.

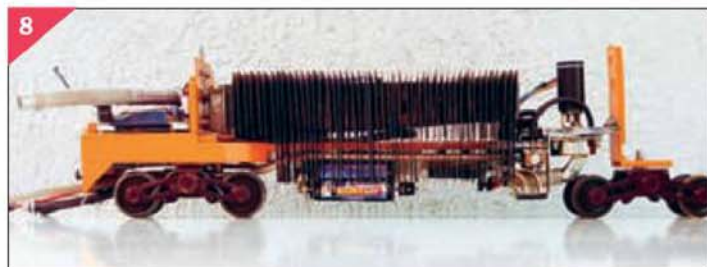
Instrumentation

Figure 2 illustrates the position and function of the external controls used in running the locomotive. The operation of locomotive can be monitored through the cab instrumentation (photo 4 and fig 1). Refilling

Tender

The tender minus its tilting body and cooling fans is shown in photo 8. Figure 3 shows the external controls for the tender.





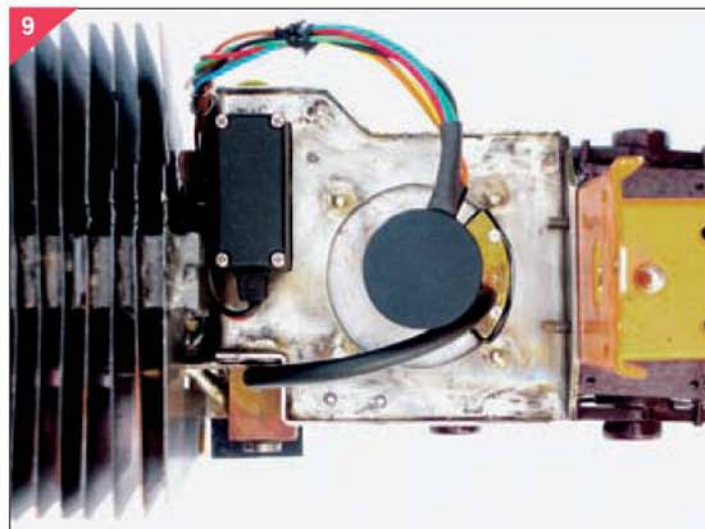
The length, including the coupling hook, up to pivot pin for first coach is 425mm and it weights 3.2kg empty. The body shell, like the others in this train, is made from 1mm thick aluminium sheet.

On the front truck (LH in **photo 8**), the wheel dia. is 31mm while the rear one is 28mm.

From left to right in **photo 8**, one sees the condensate tank, atop the LH truck. The remote control receiver and decoder sits on top of the tank. The first stage condenser (with fins) dominates the vehicle, underneath are auxiliary power batteries and to the right, the turbine-generator unit.

The copper condenser is 205mm long with 0.6mm walls which are corrugated for maximum surface area. Inside is a turbulator strip of spirally twisted bronze strip, 8 x 0.25millimetres. The total surface area of the condenser is 1,850 square centimetres, assisted by three electric computer fans which provide draught over the cooling fins. These can be switched on in various configurations based on need, but usually two are needed.

Figure 4 shows the connections between the locomotive and tender and



external controls on the tender.

Photographs 9 and 10 show the generator and turbine from the top and side. A brushless DC-motor is used as 3-phase generator. A no-load voltage of 24 VDC is produced when it is connected to a 3-phase rectifier bridge and run at about 40,000rpm. The steam turbine runs in ceramic ball bearings to be able to sustain these speeds reliably.



8. The tender with its body removed.

9. Top view of the turbine and electric generator.

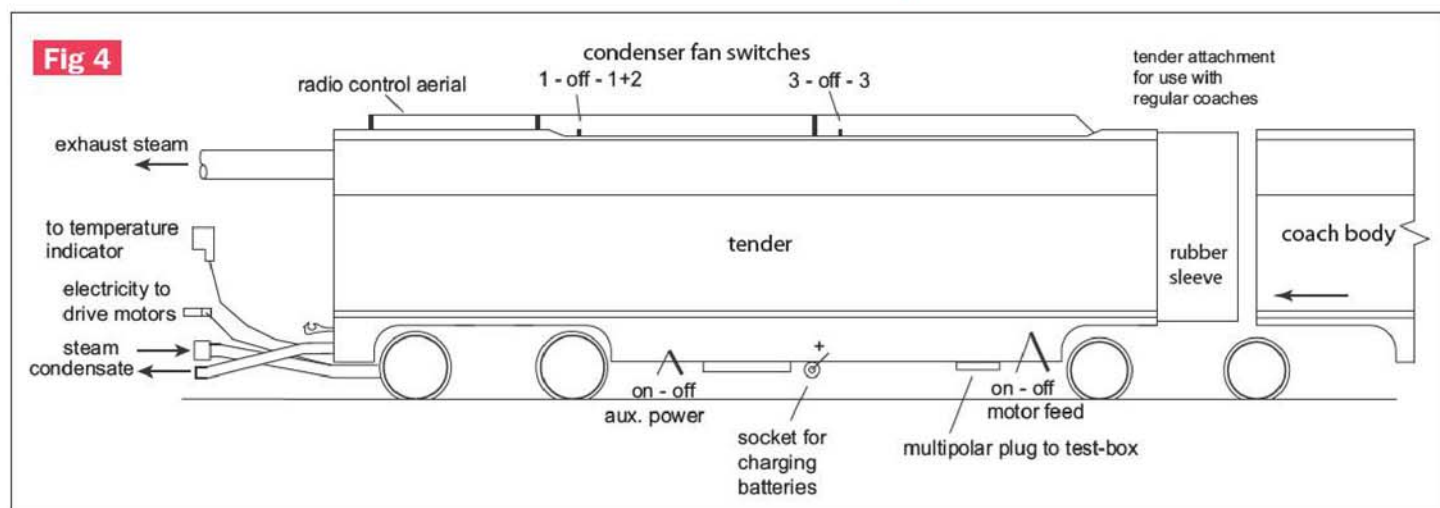
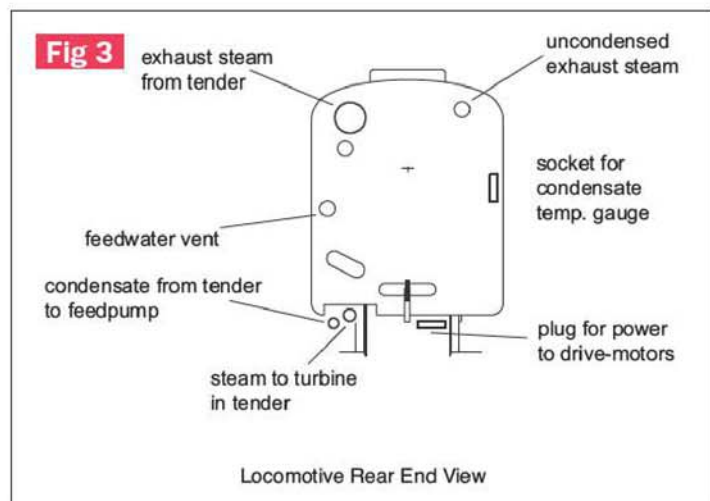
10. Side view of the turbo and generator with the steam supply (tube) crossing in front of the generator.

Coaches

Four of the five coaches are 545mm long; the final car is 630 millimetres. The frames of the coaches are built from aluminium profiles. The bodies are 1mm aluminium sheet with exception of last car's end, which is copper. The average car weight is about 1.3 kilogrammes.

The trucks are all sprung and the axles (with 28mm dia. wheels) run in ball bearings.

● *To be continued.*



Making small washers in plastics

Peter Spenlove-Spenlove

describes a tool for making burr-less washers in plastics and shim stock by drilling the I/D.

1. Some washers in PTFE, nylon and red fibre, but not leather or rubber which are too soft. These were made by punching the discs, then drilling in the special tool described.

2. The type of punch and die tool used to cut washer discs. The punch with the pip was not used. One without a pip was.

3. This punch and die can produce discs $\frac{3}{4}$ in. dia. in sheet plastic, but not brittle materials such as acrylic which usually shatters.

4. The tool for drilling washer discs.

Fig 1. A tool for drilling washer discs in the lathe. One plug is installed and some discs placed in ready for the second plug to be grip them firmly for drilling. This tool is designed for making PTFE and nylon washers whose bore is close to the O/D and where other methods may cause cracking and splitting.



Some hard nylon washers were wanted, cut from bar or $\frac{1}{2}$ in. sheet.

They had to be true, flat and with no burrs, and cheap. Turning in the lathe was out because our turning tools would cause drilling and/or parting tool burrs. The dimensions were $\frac{7}{16}$ in. O/D x $\frac{5}{16}$ in. I/D. My usual punches were no good, nor was the $\frac{7}{16}$ in. punch as shown with a $\frac{7}{32}$ in. pip (photo 2).

A new pip-less silver steel punch was made to cut the O/D as shown in photo 3. As the I/D was too close to the O/D, the material tended to distort or crack, if the I/D hole was punched first. So instead, the I/D was drilled without burrs or damage.

The drilling tool

A piece of round bar was drilled and reamed right through (photo 4). Each end was tapped leaving about 1in. of reamed hole in the middle. Two plugs were turned, threaded and drilled $\frac{5}{16}$ in. (the washer's I/D) right through (fig 1).

One plug was screwed in and a small batch of about eight or 10 washer discs was inserted to lie in the central reamed part. Make sure the discs are gripped tightly. If not, they will spin in the tool and be ruined.

The second plug was screwed in to firmly grip the discs. The tool was mounted in a 3-jaw chuck on the lathe and a new, sharp $\frac{5}{16}$ in. drill was inserted in the tailstock chuck. The speed was kept slow (700-800rpm) to avoid heating the drill.

Heat will 'weld' the drilled washers together with a burr on separating. In fact, the water suds pump was turned on to keep everything cool after drilling several batches.

Usage tips

Similar tools were used to make thin metal washers



in materials such as shim stock. The first and last washers might be damaged, so make spare discs.

This method of drilling does not work with softer materials such as rubber, felt and leather, etc.

As the drill is enclosed in the tool while drilling, it will get hot if one works too cautiously. Withdraw the drill quickly, lest a heat build up 'welds' the drilled washers together.

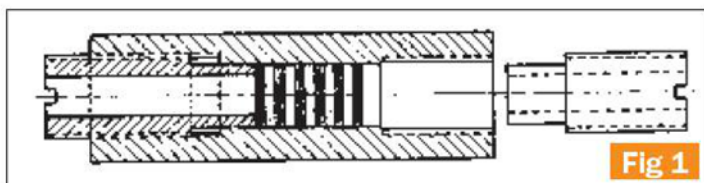
Consider drilling half way in, then withdraw the drill quickly to clear the chips from the flutes. It is friction from a clogged flute which generates heat. If water suds are available, use it to cool the drill



and squirt some into the hold.

If red or black vulcanised fibre is being drilled, test it in the suds first, lest it is porous. This could make such washers unsuitable as electrical insulators. This material should not need cooling during drilling.

ME



RACHEL

A wall steam engine

PART 8

Continued from page 38
(M.E. 4316, 4 January 2008)

Stan Bray shows how to make the crankshaft, eccentrics and straps.

From the drawings it is difficult to decide how the crankshaft (item 19) would have been made in full-size practice, the shape of the webs is such that it may well have been cast, although because of its size it is quite likely to have been either forged or machined from the solid. It is a little awkward to manufacture and some readers may well feel inclined to dispense with the shape and simply to make the webs from rectangular bar, in which case it will simply be a case of drilling two holes in each of two short lengths of bar and securing mild steel rod through them.

It is always best to pass the main shaft right through and then cut out the centre portion as this ensures accuracy. The round bar can be either silver-soldered in place or secured with a retaining compound.

The crankshaft shown in the photographs is more representative of the original although not quite the right shape, it was formed in exactly the same way as referred to above. Two lengths rather longer than required of 12mm square bar were used for webs and were drilled as required. The holes that were to accept



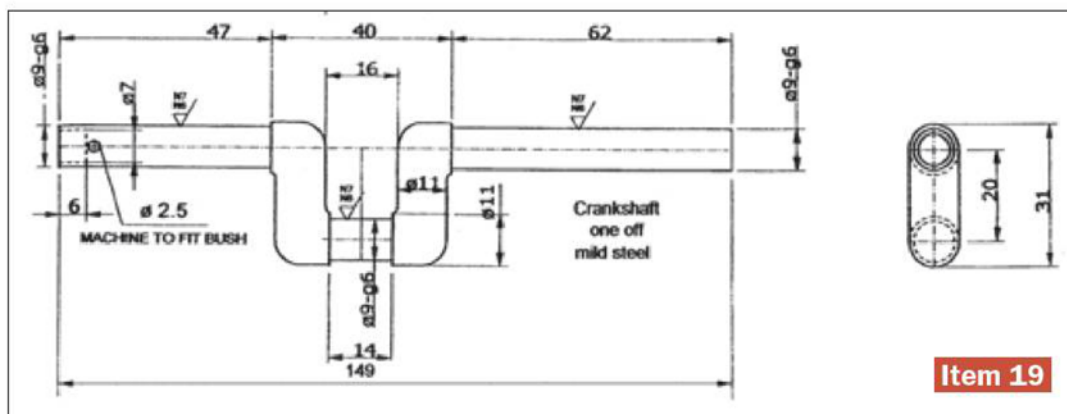
the journal were only drilled 8 x 10mm deep and finished with a D-bit to give them a flat bottom. The additional length allowed the pieces to be held securely in the 4-jaw chuck of the lathe and the length between the holes was machined to the correct diameter. The pieces were cut and faced to length and then filed by hand to form the shape as shown in the drawings.

A length of bar was machined at each end to a good fit in the two 8mm dia. holes of the web and a suitable length of bar machined at either end (note that one end is drilled for the governor) they were then passed through the two holes

50. There are several ways in which the crankshaft can be made, possibly the one most likely to be a reasonable replica of the original is to fabricate and here we see one of the webs being machined to shape.

51. Make up the crankshaft by pushing the main shaft right through both webs, check that it will run true by rotating it in the lathe and when satisfied as to the accuracy, silver solder the assembly together. Make sure the solder does not encroach on areas that will eventually be bearing surfaces,

52. After silver-soldering the parts together, cut out the unwanted section, it will be possible to carry out any further dressing that might be needed.



at the same time slipping the journal in the 8mm holes. Prior to this assembly the bores were well fluxed and when assembly had been completed the job was silver-soldered together

Finally, the shaft was cleaned and generally tidied up, with any required radii on the webbs added at this stage. Readers will notice that each end of the webs are shown with a radius and these are important, otherwise there is insufficient clearance available for the yoke.



53. Apart from the length of throw, both eccentrics are identical and are machined from mild steel bar. Use a sharp parting off tool that has been ground with a square edge to make the grooves.

54. Mark off and centre punch the position of the crankshaft hole in each eccentric and then set it up in the 4-jaw chuck for boring. Because the rims are very narrow and therefore quite fragile protect them with shims. It can be seen here that a continuous aluminium strip has been wound round the eccentric before it was put in the chuck.

55. Having satisfied oneself that the eccentric is correctly positioned, it can now be bored. Start with a centre drill, but do not rely on a drill for the final bore, either ream it, or use a boring bar as it must fit accurately on the shaft, this applies in particular to the eccentric for the valve gear.

56. Finally, the eccentrics both have to be cross drilled and tapped for the grub screws that will hold them to the crankshaft. The length of the screw should be such that the head is well below the running surface and the hole has to be deburred to prevent undue wear on the strap,



Eccentrics

Two eccentrics are called for, one to operate the valve gear and a second one to operate the feed pump, and they are identical in size apart from the throw or to put it another way the position of the hole. Start with the metal in the 3-jaw chuck, face it off and make the groove. The groove should

be made with a parting off tool ground square, making a number of small cuts until the required width is achieved. The end of the material should be centred with a small centre drill. Finally, the eccentric is parted off and the operations repeated for the second one.

Pump eccentric (item 20)

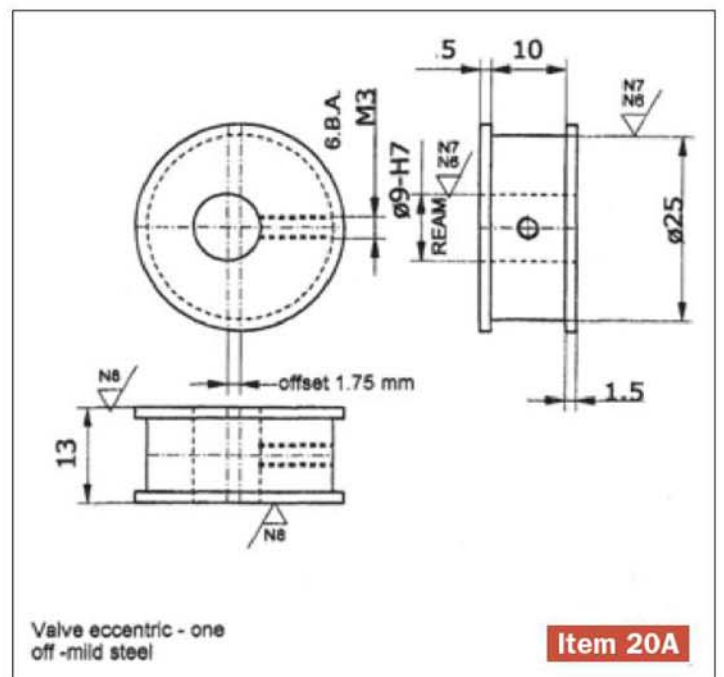
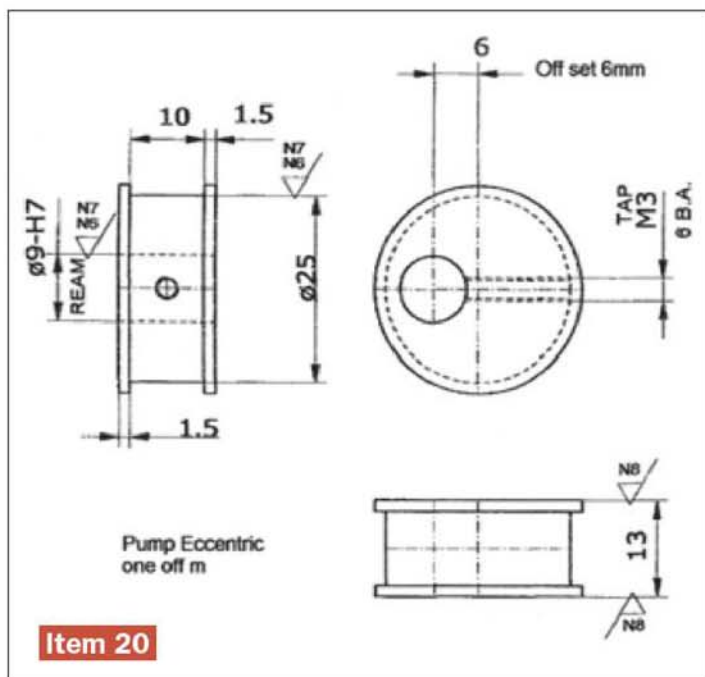
In the case of the eccentric used for the pump it will be quite practical to use a pair of dividers to mark the off centre position for the hole and centre punch to make an indentation. The material can be set up in the 4-jaw chuck, using a wobbler in the centre punch mark to get the alignment correct.

It is a good idea to put a small piece of soft material between each jaw and the lips of the eccentric, otherwise it is inevitable that there will be some damage. In fact on the model a strip of aluminium

shim was wrapped around the circumference of the eccentric, which made adjustment easier that when separate pieces are used on each jaw. Once satisfied that the correct position has been obtained the eccentric can be centre drilled, - drilled and reamed to fit the crank shaft,

Valve eccentric (item 20A)

Because of the very small offset of 1.75mm and the need for greater accuracy than was required for the pump a different approach is needed for the valve eccentric and if anything it is even easier that the one used for the pump. Put the eccentric in the 3-jaw chuck and slip a spacer 1.75mm thick between it and one of the jaws and tighten up. The spacer will push the centre of the eccentric over by the required amount and it can then be drilled and reamed. The spacer should go across both lips





of the eccentric and an easy way to get a suitable one is to machine a length of round bar to the required diameter.

Both eccentrics are cross-drilled to accept grub screws with which they are secured to the crankshaft, drill the holes for the grub screws across the place where the hole is nearest the rim.

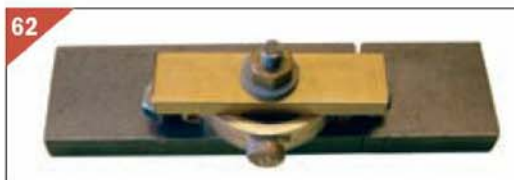
Eccentric straps (item 21)

Bronze castings are supplied for the eccentric straps and they are machined in a similar fashion as the casting for the big end bearing. After an initial clean with a file, start by drilling and tapping for the screws that will hold both parts together and then sawing through the centre

to make two separate pieces. Rejoin the parts and mark each pair so that you know which part goes where, then using a 4-jaw chuck they can be bored to size and at this stage both are of equal dimensions.

The small bosses that the oil caps screw into need to be machined to make them

circular, then drilled and tapped and this is a job for the lathe and once again the method used will depend on what machining equipment is available. In the case of the



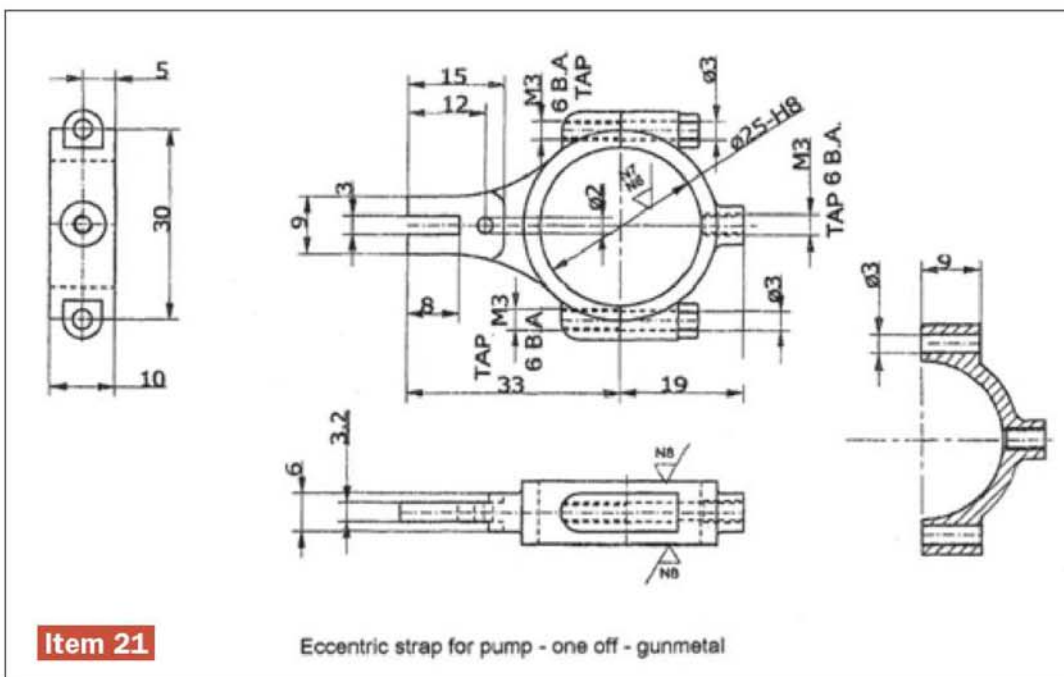
57. Identical castings are supplied for the eccentric straps and much of the machining will be the same, only where they connect to their respective shafts will differences occur. After the castings have been fettled the first task is to drill and tap them for the bolts that will rejoin them after they have been bored. This is not too easy with just a drilling vice, as the castings tend to move when pressure is applied. The photo shows a drill being used to set the casting square, but as soon as pressure was brought to bear it started to rotate.

58. Because of the difficulty in holding the straps in the drilling vice they were bolted to an angle plate, checked with a square for alignment and a plate bolted to the plate in contact with the casting to prevent any rotational movement.

59. With the drilling completed the casting was transferred to the milling vice and sliced in two with a slitting saw.

60. The castings were bolted back together and bored to size in the 4-jaw chuck, one side was faced at the time of boring the casting was then turned over for facing the opposite side. When facing the second side, spacers should be put between the face of the chuck and the casting to ensure that it is absolutely flat and that both sides will be true to each other.

61. On the end of the small section is a boss for an oiler, which needs to be machined round. It is difficult to hold this in a chuck and so a simple jig was made up to hold it. This consisted of nothing more than a short length of flat steel bar with three tapped holes. The outer holes held 2BA bolts that fitted against the side of the casting, the centre one is longer and is designed to accept a clamping bar.





engine under construction it was found to be impractical to machine the bosses when the straps were held together and while it probably was just about possible to put the end to be machined in the 4-jaw chuck to work on it. There were two reasons for this, firstly the amount of metal that could be gripped in the chuck was absolutely minimal and there was every possibility that the part would be forced from the chuck during machining operations. Secondly, any attempt to tighten the jaws was going to cause damage to the metal. The idea of slipping in some aluminium shims material to protect the component was tried but this made the grip even less secure, so something different was called for.

The problem was very easily and quickly solved by making a small clamp to hold the part and let it be said, the clamp is not exactly high tech. Three holes were drilled in a line along a short length of scrap mild

steel. The piece used was about 3in. long by $\frac{3}{16}$ in. by $1\frac{1}{4}$ in., but almost anything can be used as long as it will fit in the chuck and is big enough to hold the work. Three holes were drilled in line and all tapped 2BA and again the thread size is within reason not important. However, the hole spacing is. The centre hole is for a clamp, the other two are spaced so that they prevent the part from twisting during machining operations.

Hexagon headed bolts were used but round head screws would do the job equally as well. The actual spacing of the holes will therefore depend entirely on the size of the heads of the bolts being used. Once the jig has been made, the work is fixed to it and it is put in the 4-jaw chuck and adjusted drilling and tapping the work is then very easy.

From here on it is just a case of giving the parts a good clean up and useful for this are the sort of sanding block sold for home decorating purposes and

62. The photo shows how the combination of clamping bar and side bolt will secure the casting rigidly in position.

63. The clamping bar holding the casting is held in the 4-jaw chuck, this allows as much adjustment as required for truing up. As well as machining the boss round, the end was faced with a slot drill and it was then drilled and tapped for the oiler. The jig can also be used to drill, tap and thread, the other end of the eccentric that is to work the valve gear.

64. The end of the strap that will connect with the pump has a flat section and a slot for the priming handle. The photo shows the flat section being machined to shape and size.

65. The flat section is slotted for the tongue of the priming handle. A hole is also required for riveting the connecting rods and priming handle to the eccentric. Note the use of a parallel to ensure the casting remains at 90deg. during the milling operation.

66. The connection to the pump consists of two bars and sandwiched between them is the priming mechanism, the handle of which is mainly a filling job. However, a short 1mm dia. hole is called for in one end and the photo shows the steel bar used to make the handle being set up ready to drill the 1mm dia. hole.

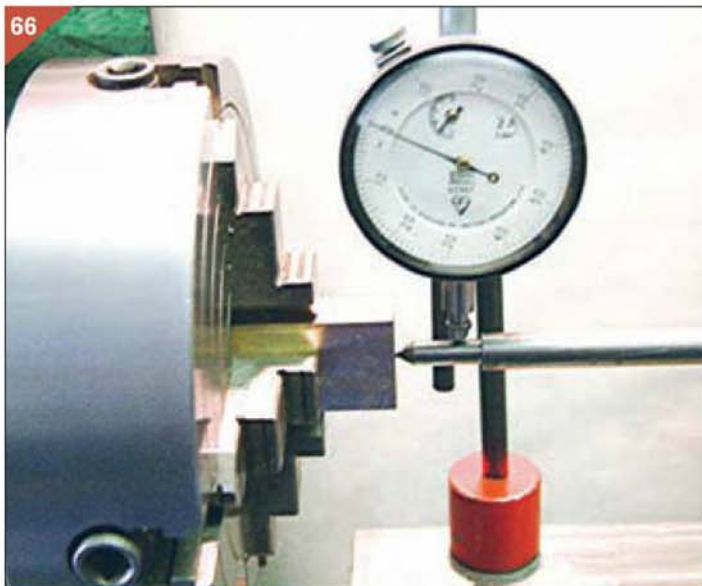
67. At the pump end of the priming unit is a tiny catch, the drawings suggest the use of mild steel but it will be easier to make it of brass, the photo shows the block being drilled.

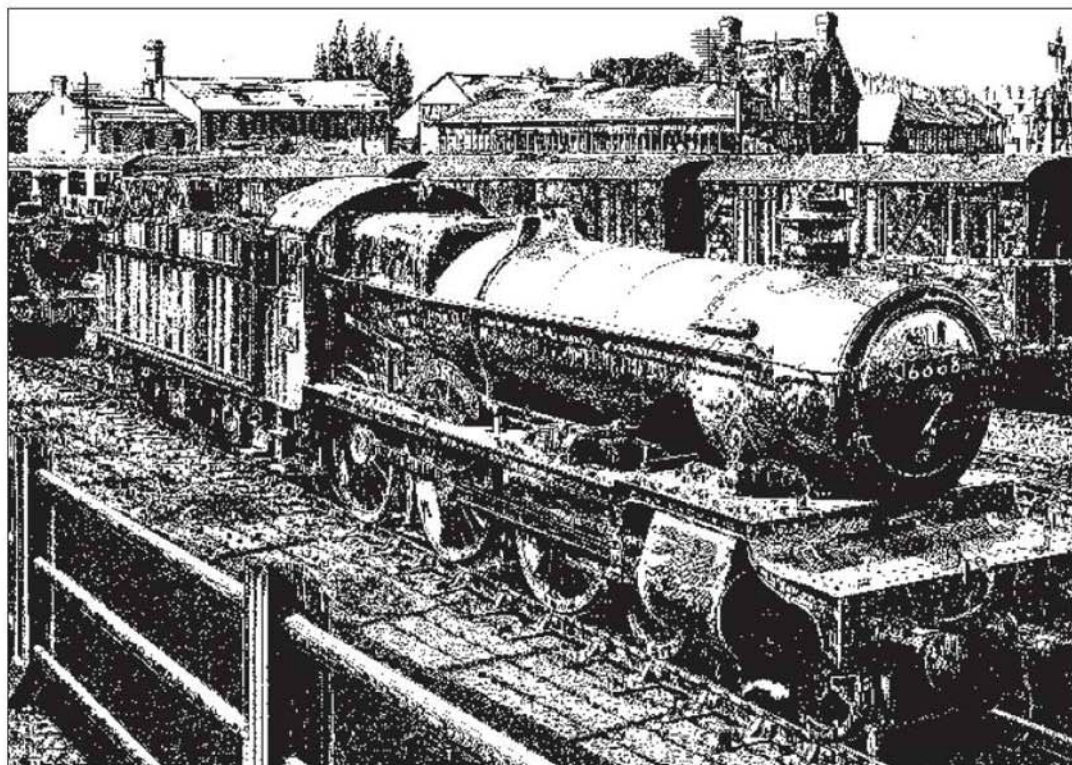
68. The tiny catch that fits on the end of the block has a 1mm dia. slot in it. Not too many readers will have a milling cutter of that size and chain drilling and filing is hardly a practical proposition. A simple cutter was therefore made from silver steel that is little more than a short length of the correct dia. silver steel sliced in two and hardened and tempered then either mounted in a miniature collet or soft soldered into a piece of brass rod.

consisting of a layer of emery paper on a sponge base. They are available in various grades and wrap themselves very nicely round

such odd shaped pieces as the straps. They were also used to clean up the big end bearing.

● To be continued.





PENRHOS GRANGE

PART 31

Continued from page 32
(M.E. 4316, 4 January 2008)

Neville Evans
continues
development of
hydrostatic lubrication
with a design for 'the
oil control switch' on
GWR locomotives.

I have shown an automatic on/off switch in the lubricator circuit, as well as an alternative, simple, manually operated cock. I have enlarged the valve a little to simplify construction and to enable it to work more efficiently. Whichever variation is used, the valve is positioned on a backplate which is bolted to the underside of the regulator body. In point of fact, the jockey valve is really just the on/off cock, operated by a lever which is actuated from a slide incorporated in the regulator switch plate. The GWR of course used exactly the same arrangement, of which mine is simply a scaled-down version.

The valve is of straightforward construction, apart from its rather diminutive proportions. The only tricky part is the fitting of the rotating plug cock. The cock is sleeved with PTFE which needs to be squeezed slightly to obtain an oil-tight seal. Actually I don't suppose it matters if there is a slight weep through the valve when it

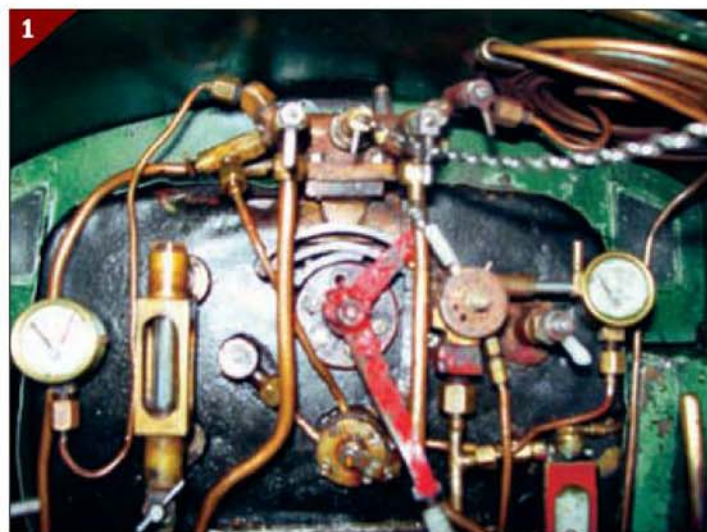
is shut, as it all finishes up in the same place anyway.

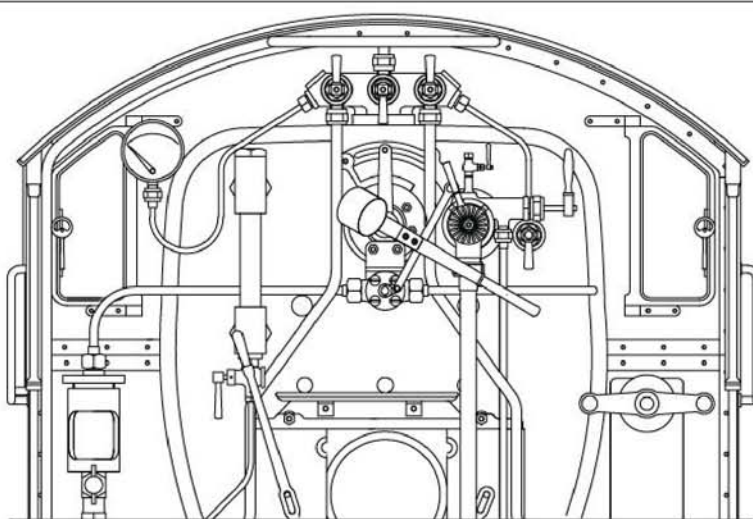
The brass tube that is press fitted through the centre of the cock, simply stops the PTFE sleeve from turning and shutting off the oil supply. I suggest that the cock body is made the same length as the inner valve body, and that the sleeve is made a thou. or so longer than the body plus the thickness of the two paper gaskets. This means

that the sleeve will be slightly compressed by the tightening of the four 10BA screws that hold the body to the backplate. The O-ring stops leakage through the spindle. The fitting process will have to be conducted with a bit of trial and error so as to allow the valve to turn easily.

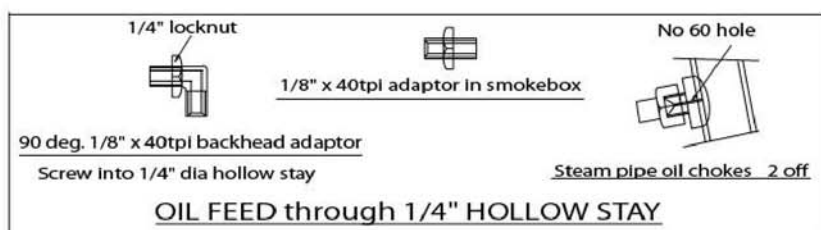
Don't forget that there is full boiler pressure exerted on the O-ring. The sleeve is first machined to a light press fit into the body and left about 0.020in. oversize. ➤

1. The backhead of Ivor Roberts' 61XX locomotive. Note there are no union nuts on the jockey valve.



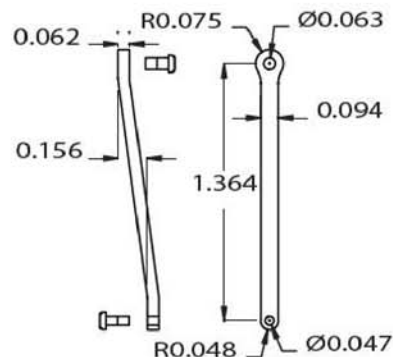


BACKHEAD LAYOUT with SIGHT FEED & JOCKEY VALVE
SHOWING OIL FEED via SIDE of BOILER UNDER CLEADING

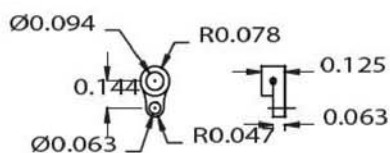


The brass tube is slipped in and the whole assembly is chucked by the spindle and turned with a razor sharp tool to give a push fit in the valve body. If any trouble is experienced with the brass tube turning in during machining then a touch of Loctite should hold it firmly.

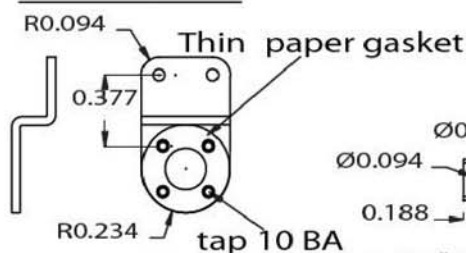
I couldn't resist the temptation to include another few schemes which appeal to me because of their simplicity of design and construction. The oil line up to the smokebox for instance can run up one of the two 3/4 in. stays that lie above the firebox door, or it can be placed under the lagging, as per the prototype, to emerge low down not too far from the steam pipes. My preference would be for the hollow stay route, Deryck Goodall suggests the use of a banjo and bolt to connect the stay to the oil line from the jockey valve. I would use a simple right angled connection with a locknut, as per the small drawing under the drawing of the backhead,



Valve link

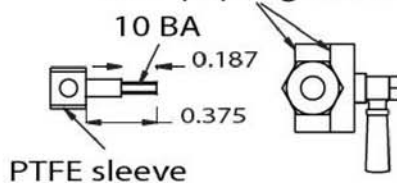


Valve link lever

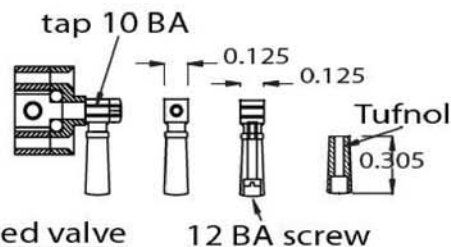


Valve backplate
 measure from job

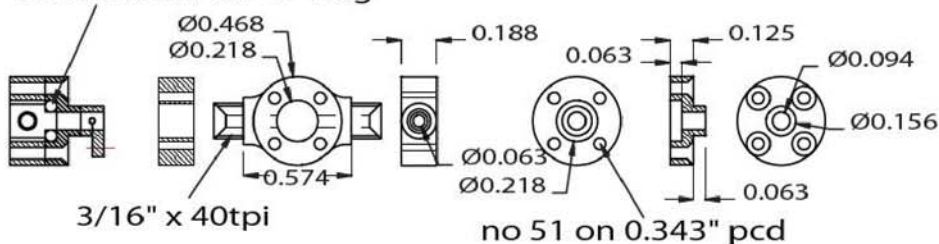
Thin paper gaskets



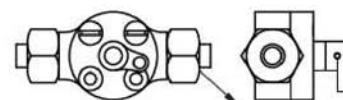
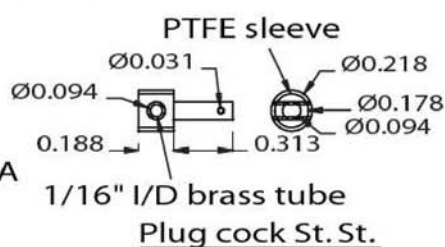
Manually operated valve



1/16" x 3/32" id. "O" ring



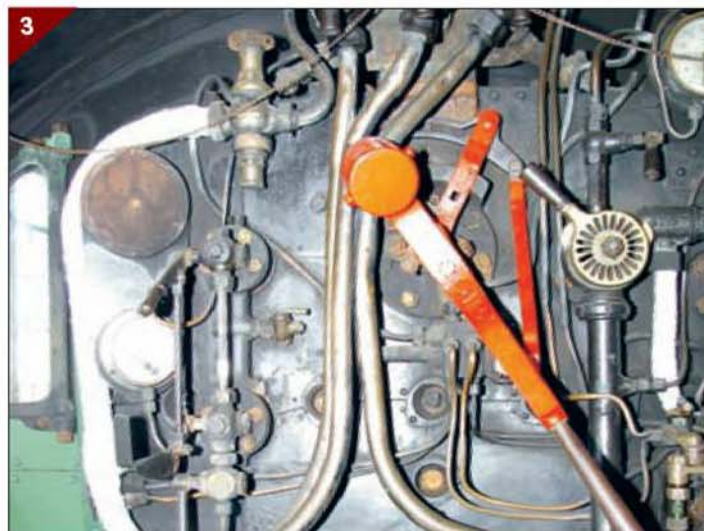
Valve body





either directly connected to said valve, or via a union and cone. Due to tight clearances I would suggest the use of a flat-ended union at the jockey valve end

to forestall any connection problems. Please don't do as I nearly once did and connect the right-hand stay on the backhead to the blower valve, and the



right-hand stay looking inside the smokebox from the front, to the blower. For some reason it wouldn't have worked.

● To be continued.

2. The condenser coil can be seen on the cab roof, note too, the small hollow handles.

3. A 'Manor' backhead - note the jockey valve linkage and rerouted injector pipes.

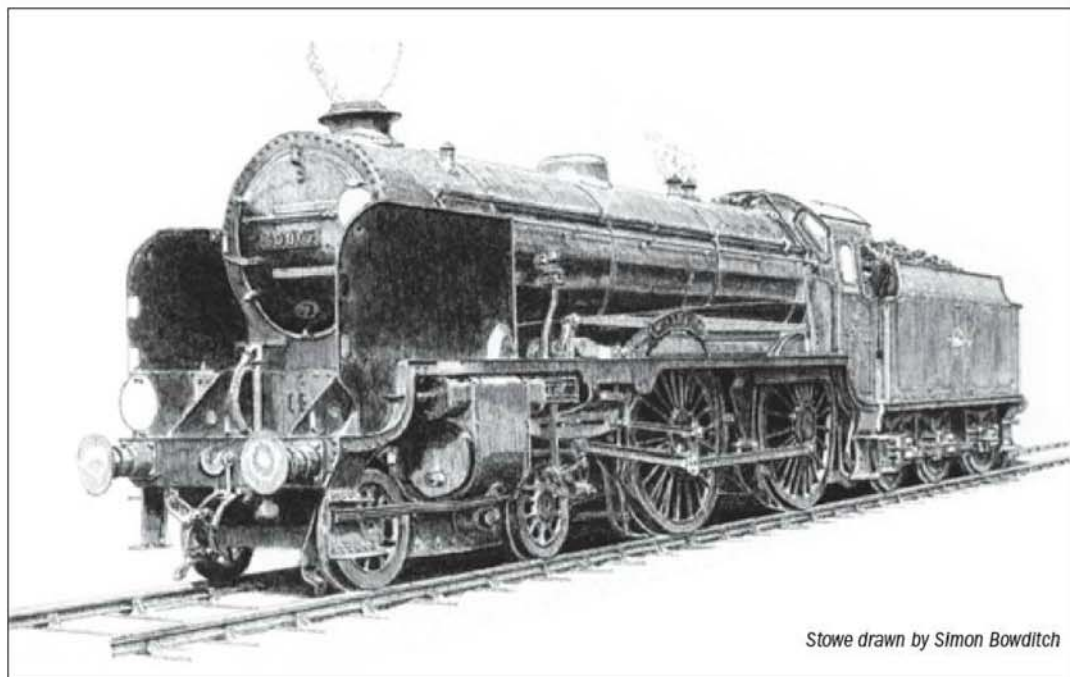
STOWE - Southern Railway Schools class locomotive

PART 17

Continued from page 568
(M.E. 4312, 9 November 2007)

Neville Evans

returns to Stowe to clear up some items and includes drawings for the smokebox and backhead layouts.



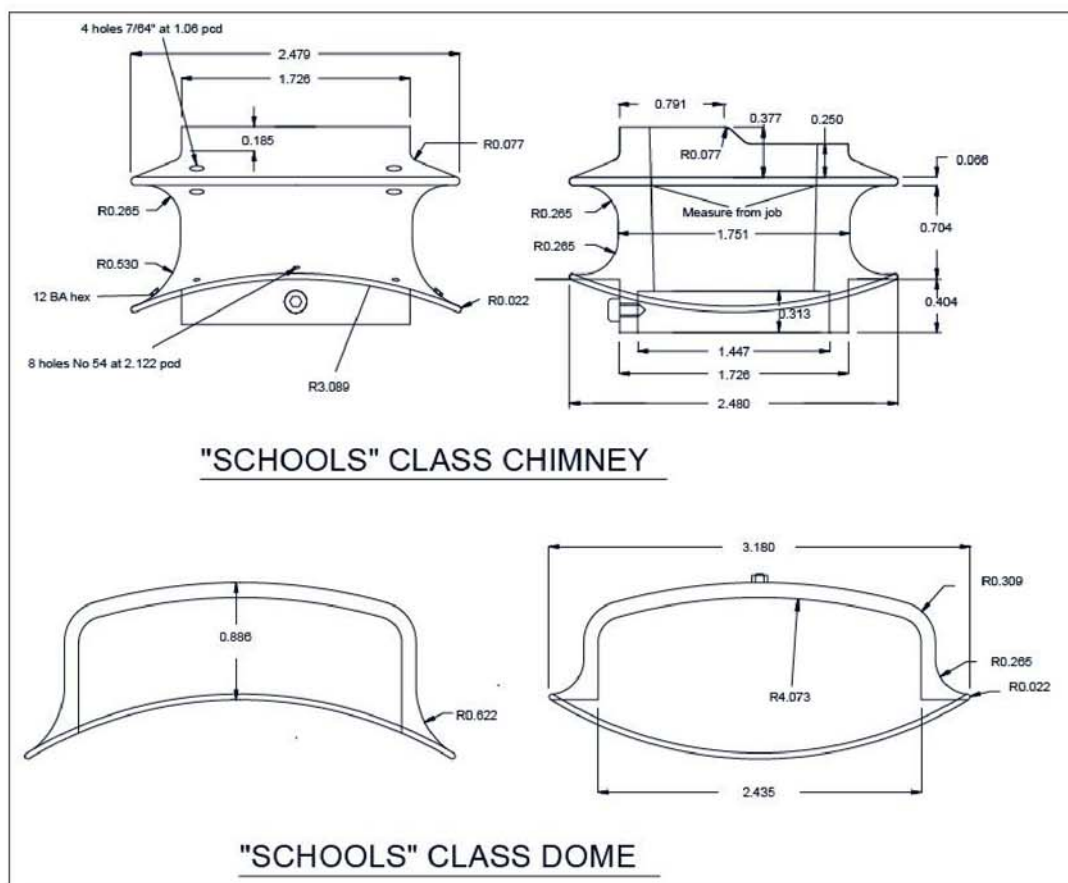
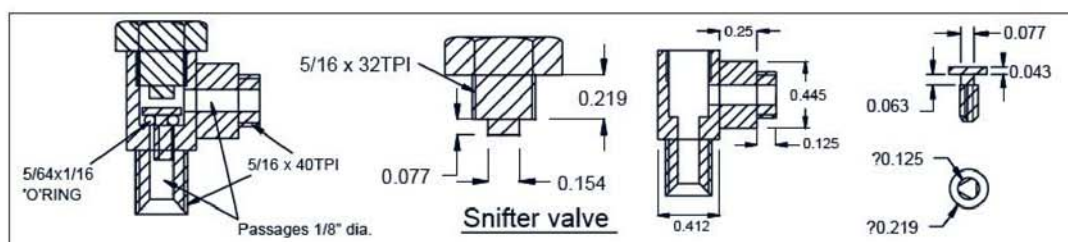
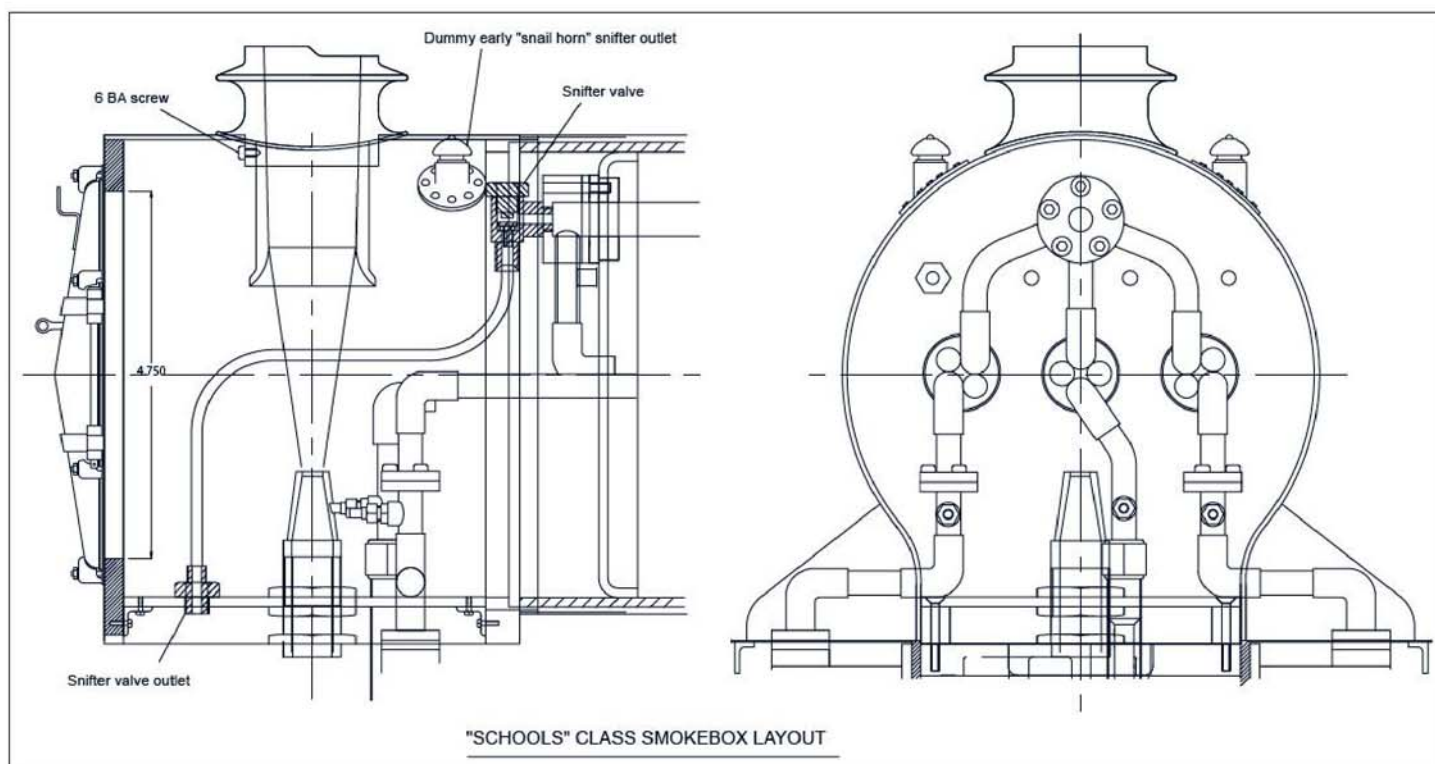
Stowe drawn by Simon Bowditch

The good news for the Southern enthusiasts is that I haven't deserted them. There were, however, one or two items on the GWR engines

that had to be cleared up, and now was the time.

I was talking to Derek Tulley just recently. Derek made the point that the backhead drawing in 'Stowe'

Part 15 (M.E. 4310, 12 October 2007), is a little ambiguous and difficult to follow. He referred to the four 10BA screws that hold the firebox door assembly



to the boiler backhead. The idea is that the top two screws are fitted to the two 1/4 in. stays above the door. The bottom two screws go into two blind bushes underneath the door.

I have included a few drawings that were to hand. Some builders have asked for details of the snifter valve, with particular reference to the well-known 'snail horn' snifter valves that were fitted to the locomotives in their earlier days. The valves were removed from Southern locomotives in general, from 1946 on, as they were deemed not to warrant the time and money spent in their maintenance. I have drawn, and would recommend the fitting of a single snifter valve, which exhausts through the bottom of the smokebox. The two outside valves are just dummies, and a drawing will appear together with the rest of the smokebox details in the next part, with average luck.

The distinctive and to my mind, very attractive, chimney and dome are also included. Mike is busy with patterns even as I write, and castings will be made available in the near future.

● To be continued.

SENTINEL DG8 WAGGON

PART 5

Continued from page 35
(M.E. 4316, 4 January 2008)

Alan Beasley
completes the work
on the engine of his
detailed model.

Photo**graph 35** shows the pair of camshafts, the inlet at the top, exhaust below, with the drive gears that are a keyed sliding fit. Each camshaft is of a built up construction on a $\frac{3}{16}$ in. diameter silver steel shaft and runs in three $\frac{7}{16}$ in. bore sintered bronze bearings fitted into the crankcase. The cams were made individually, case hardened and polished, pinned together for each valve set, then these cam groups assembled onto the shafts with Loctite and the nut on the end, right of photo, used to clamp them together. The groove in the nut is for the arm of the camshaft sliding mechanism to engage.

Photograph 36 shows the inlet cams in more detail. From the hexagonal collar they are reverse, all valves open and then the three forward cams for different cut-offs. There is then a spacer, and the sequence repeats for the next inlet valve for the other end of the cylinder, which is set at 180deg. phase. The cam followers are plain silver steel with a suitably radiused tip to enable them to ride over the cams as they are shifted laterally and they operate in reamed aluminium bronze guides clamped into the front of the crankcase.

35. Camshafts, Inlet upper, exhaust lower.

36. Inlet cam group and drive gear.

37. Crankcase casting.

38. Crankcase casting, camshaft area detail.



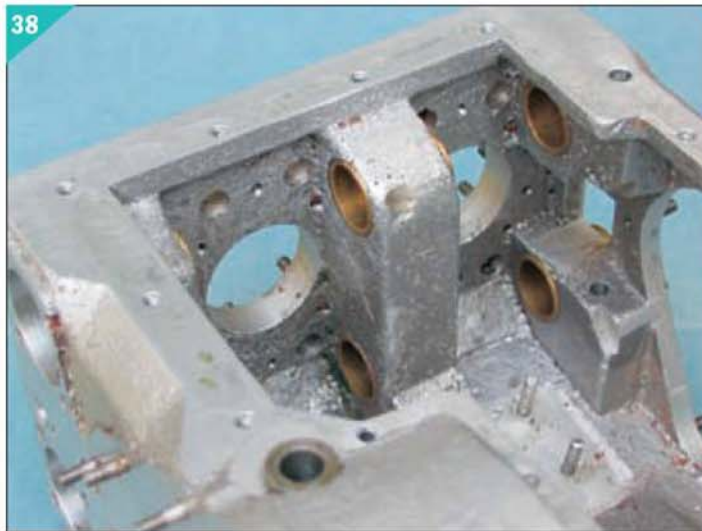
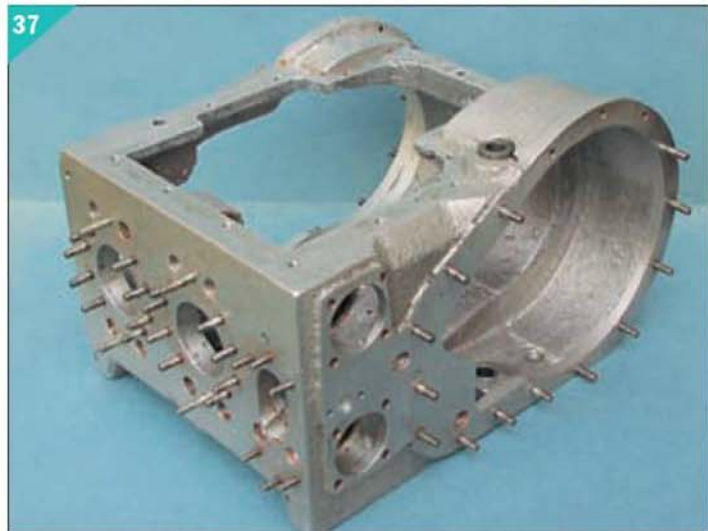
The crankcase

The next item to consider is the box to hold all the above bits, the crankcase, which is shown in **photo 37**. As can be seen, it is a fairly complicated casting with a lot of holes. Most of the outer and inner surfaces are as cast and some were impossible to machine, so some accuracy was required in the pattern making.

Photograph 38 shows some detail of the casting at the inside front where the camshafts fit.

Photographs 39 and 40 show assembly of the crankcase just prior to fitting the side covers. In photo 39 the vertical rod operates the gearshift by sliding the gears on the crankshaft,

the gears shown here are for the low road speed, the large diameter gear is bolted to the differential casing. The camshaft drive gears can be seen; there is an idler gear on the inside of the casing, see **photo 42**, that meshes with those two gears and the small gear on the end of the crankshaft. **Photograph 40** shows the other side of the engine with the high road speed gears, the gearshift fork can be seen projecting below the crankshaft gear. The structure to the right of the photo houses the ends of the camshafts and the shifting mechanism operated by the lever sticking out of the casing above them.





39. Engine assembly, feed pump side.

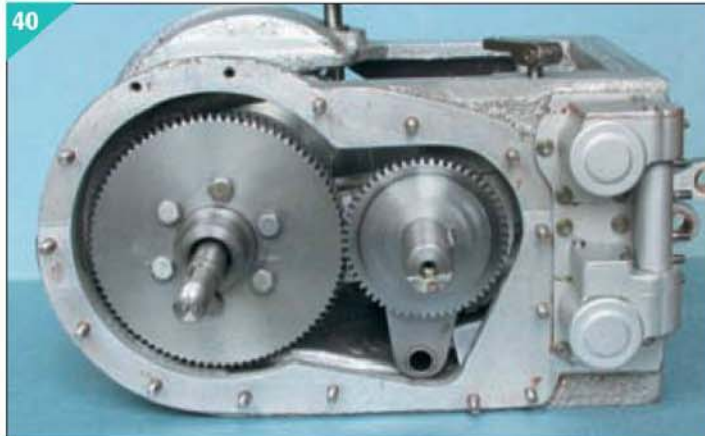
40. Engine assembly, camshaft shift side.

41. View into assembled crankcase.

42. Assembled crankcase, cam drive gears.

43. Cylinders assembly.

Photographs 41 and 42 show views into the assembled crankcase prior to fitting the Perspex top cover. As can be seen there is not a lot of spare space, in fact the connecting rods have to be assembled to the crankshaft before it is fitted in place. Photograph 42 shows the camshaft drive idler gear that also drives the engine boiler pump via the link on the phosphor bronze bolt.



Cylinders

The business end of the engine is shown in **photo 43**, the cylinders are 26mm bore by 34mm stroke, (approx. 1 x 1 1/4 in.). The inlet manifold is at the top, feeding the inlet valve ports at each end of the cylinders, and the exhaust manifold is at the bottom. The manifold pipe work was lagged with a couple of layers of cotton tape; it probably doesn't do a lot, especially when it gets oily, but it looks the part. The cylinders were lagged with proper ceramic fibre insulation sheet, with a tinplate cladding sheet. The pushrods can be seen to the left of the photo, the ends of the valve springs can just be made out projecting from the brass valve spring shrouds. The vertical brass cylinder is the boiler feed pump anti water hammer bottle. The copper tube is the lubricator oil pump feed to the inlet manifold. The cylinders were machined from cast cored gunmetal rod, with machined brass blocks silver soldered on for the valve

pockets and manifold faces.

Photograph 44 shows the engine poppet valve parts, the new valve seat body, spring shroud and valve. For practicality and accuracy the valve guide and seat were machined as one item from 3/8 in. diameter aluminium bronze rod, the design being the same for both the inlet and exhaust valves, the steam flow being past the valve head and exit by the hole in the side of the body. These valve bodies were then sealed into the valve pockets on the cylinders by Loctite 542, which is a hydraulic thread sealant product and which has done the job extremely well. An 8BA brass setscrew was used to physically locate the bodies in the correct positions.

Fabricated valves

The valves were fabricated from stainless steel, the shanks being of 3/16 in. rod with heads silver-soldered on. These were then skimmed true with the shank held in a collet chuck. I did not find it necessary to lap



44. New valve parts.
45. Worn valve stems.

in the valves, the seats had been turned, which avoided getting grinding paste where it was not wanted. I was quite surprised by the wear on some of the valve stems, up to 5 thou, and being mainly on one side of the stem, as shown in **photo 45**, upper valve. I can only assume that was due to a sideways load imposed by the steam due to the side port. I do not know if the worst wear was on the inlet or exhaust valves.

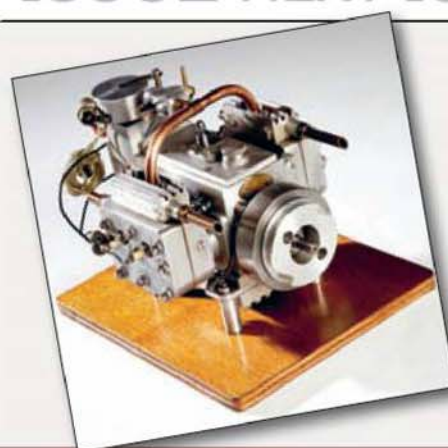
The valve springs took a little experimenting to get right, too stiff and the cams could not be easily slid past the cam followers, and wear rates would have been high. They were wound from spring steel wire on the lathe. The cams don't show any evidence of valve bounce! Valve adjustment is made by the nuts on the stainless steel pushrods at the cam follower end and is set at about 5 thou positive clearance.

● *To be continued.*



ISSUE NEXT ISSUE NEXT ISSUE NEXT ISSUE NEXT ISSUE
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- The I/C engines of Len Mason
- New project - A self-starting steam engine
- Welding helmets reviewed
- Parting tool
- Loan models at the Centenary Model Engineer Exhibition
- Detailed locomotive profile by Peter Rich



Plus all your regular favourites

Contents subject to change

ON SALE 15 FEBRUARY 2008

Locomotive

Mike Jones

takes advantage of his Didcot Railway Centre meeting venue to photograph their collection of GWR locomotives plus some interesting visitors.

As a venue for a monthly meeting of the editors of *Model Engineer*, what could be better than the Didcot Railway Centre? It just happens that getting to Didcot is easy for most of us - that's our excuse! Once a month we gather inside an ex-BR railway carriage painted in GWR chocolate and cream livery and plan future issues of *M.E.*

Normally, arrival at the centre is a predictable affair. There's a line of freight wagons parked to our left and there may or may not be a locomotive parked in front of the shed. But on 4 May 2007, the place was humming. Locomotives everywhere. Ahead of me were half a dozen sitting in front of the engine shed (**photo 1**), to the right a string of four more, including 4-6-0 *Hinderton Hall* (5900), two prairie tanks (2-6-2T) 6106 and 5722, and an 0-6-2T (6697) (**photo 2**).

It seemed as if workers at the centre had gone slightly mad and dragged all their precious



beauties outside at once.

I'd never seen so much of the collection sitting outside and it was magical. The place took on a feel of what I imagined the it was like as a working engine shed. The only thing missing was smoke and steam.

I walked further on towards our meeting, there were many locomotives whose designs were familiar, like the 2884 class No. 3822. (**photo 3**). It was a bit like the pages of a plans book had come to life. The mind ticked off the types of locomotives and whether there was a published model design for it ("yes" was usually the answer).

When I spotted the *City of Truro* (3440) (**photo 4**) I could hardly believe my luck. I'd last seen her, years ago, on

the turntable at the National Railway Museum being ignominiously turned around for demonstrations. Never had I been so close to this famous locomotive. Her good looks come from the details based in another brass-trimmed era. A moment of admiration picked out the lining along the edges of frames and the bogie splashers with their brass trim, to name but a few details. None of it strictly necessary, of course, but it came from an age where these amenities were expected on machines.

In our meeting, the view from the carriage window over the shed roof was a glimpse of the chimney, safety valve bonnet, a bit of boiler and the splashers of *Earl of Bathurst* (5051)

Shunting was taking place. ➤



Locos at Didcot





The rumble, squeaks and groans of a protesting out-of-steam locomotive were clearly audible as it was pushed hither and yon around the yard by the growling diesel shunter. Remarkably, the shunter didn't have just one engine in tow, it moved three or four at a time.

The editorial meeting ended, my choice was simple: catch my train in 15 minutes, or wait an hour and take photos of this extraordinary grouping of locomotives - I stayed.

In the engine shed only the Wantage Tram Corporation (WTC) No. 5 locomotive, an auto-trailer coach and a crane were left (**photo 5**). Remarkably, the WTC's *Shannon/Jane* was 150 years old in 2007.

The afternoon sun showed that most locomotives had been moved from their morning positions. From a vantage point atop the coaling station hill, dock tank locomotives (1338 and 1340) looked like a strange push-me-pull-you creation (**photo 6**). Number 1338 was built in 1898 and 1340 in 1897.

A temporary lull in activity provided a chance to grab some photographs of less-illustrious locomotives than the mainline stars. The 57XX class number 3738 reminded me of all the 'Pansy' models I've seen in green and black over the years (**photo 7**).

Separated from the 0-60T (3738) by a shunter's truck, was Taff Vale Railway No. 85 built in 1899 to haul coal trains South Wales (**photo 8**). She was another visitor to the Didcot from the Keighley and Worth Valley Railway.

Steam locomotives can be works of art and it is so easy to be drawn in by the details and become enthralled with this or that particular type – until you see the next one and its details seduce your attention. So it was with the *City of Truro* (3440) which was coupled to TVR 85 in afternoon sun (**photo 9**). Many 'Truro' photos were taken, but perhaps the most surprising modern detail was the notice in the cab stating that the maximum speed for the locomotive was 60mph! It is easy to 'harrumph' and bemoan the fact that she isn't allowed to go faster, but she is a national treasure and some care needs to be taken for future generations.

Shunting began again after a lull and the push-me-pull-you near-twins were off to another place on the site (**photo 10**). Shortly afterwards, some of the other GWR tank locomotives were being shunted (**photo 11**).

A cold steam locomotive being moved makes certain characteristic noises. The cylinder drain cocks make a slow whoosh-whoosh-whoosh sound. There is a general groan and rumble – partly from the track and a bit from the suspension. On GWR locomotives, as I discovered, the cross-head driven vacuum pump emits a distinctive pop-pop-pop.

At last the grand plan for the Bank Holiday events emerged from all the shunting. Some of the locomotives were in front of the shed with head codes, as if

ready to steam out into Didcot Parkway Station to assume mainline duties (**photo 12**).

Finally, as I was leaving I caught sight of 6697 parked by the entrance. (**photo 13**) I nearly missed my train because I stopped for 'just a few more pictures'.

The seductive thing about photographing locomotives is that all their details are so interesting it becomes hard to stop, particularly if you have a digital camera, so film and processing are not a factor. It is fun to visit the heritage railways and sites like Didcot Railway Centre. It is also hugely rewarding to volunteer at these places. If you live too far away to visit regularly and you don't



want the maintenance bills of the prototype, you could build a model – nearly all of those pictured in this article have

published designs, the only question is, which one? I'm still deciding...so many beautiful locomotives!

ME

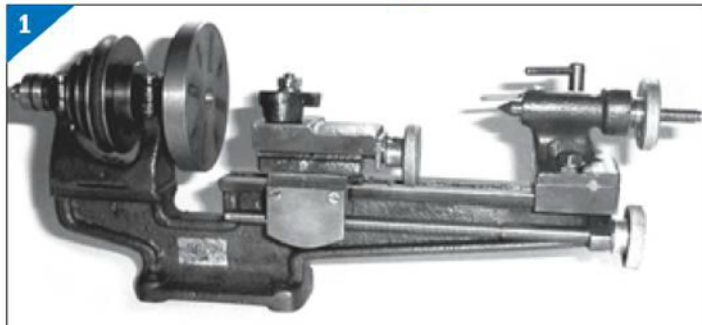


Flexispeed lath and milling mac

Tony Griffiths details some of the various incarnations of these popular model engineers' machines.

Originally based near the centre of Sheffield, Flexispeed offered its first product in 1947, a very basic plain-turning model engineers' lathe. This machine was to prove popular and with a small horizontal miller, continued in production for nearly 50 years, passing through several changes of ownership and numerous alterations to the design. It was marketed variously as the Meteor, Hector, Norfolk and Simat 101 - and finally the Perris, in which form it was adapted, almost unaltered, as the first Cowells lathe.

Although more heavily constructed, the early



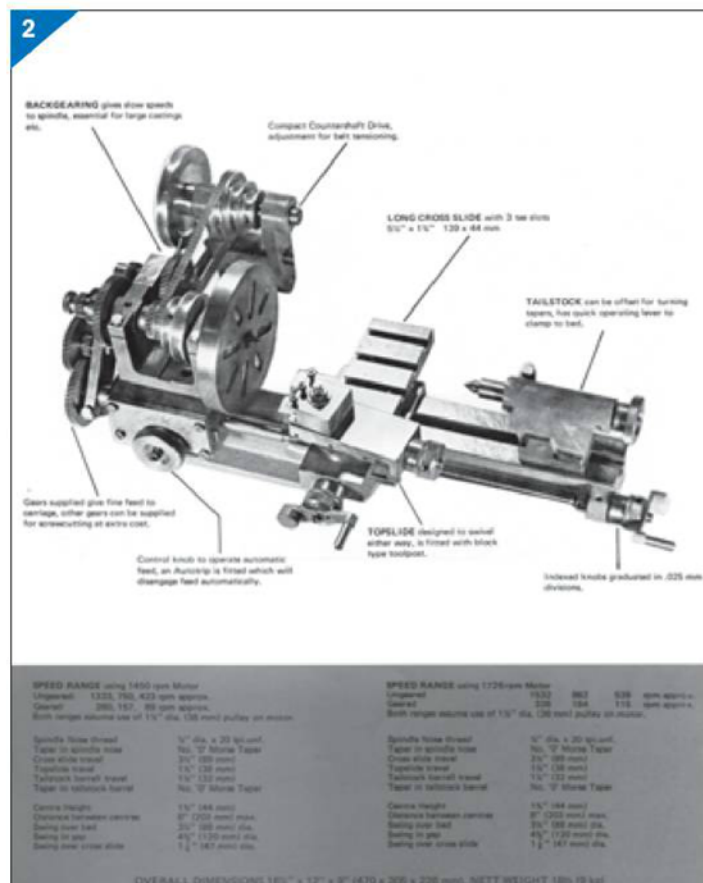
Flexispeed was not dissimilar to the Super Adept made by F. W. Portass. Back in 1947 Adept was quoting 12 months for delivery signalling room for competition. The Mk. 1 Flexispeed, some 13in. long, was a very simple plain-turning device with a 1½in. centre height, a capacity between

centres of 5¼in. a flat-topped, 1⅜in. wide V-edged bed with a 4¾in. capacity gap.

The ½in. diameter headstock spindle was bored through ¼in., had a ½in. BSF (British Standard Fine) nose thread and ran in split plain bearings closed down by set screws. A single swivelling toolslide was fitted together with a 2-speed pulley designed to be driven by a miniature M-type V-belt or a round leather (or plastic) belt; both the headstock and set-over tailstock were fitted with short No. 0 Morse taper centres.

In 1951 a Mk. 2 machine was introduced that boasted a considerably improved specification. Although at first the original headstock and spindle assembly were retained (with the 1½in. centre height) a choice of 8 or 12in. between centres was offered and both a backgear and a neatly engineered worm-drive fine feed to the carriage were incorporated - the latter assembly granted Patent number 642,260).

This was to prove a very much more versatile and useable lathe especially when, at some as-yet-to-be-determined point, the headstock was made a separate casting with the centre height increased to 21in. (though the spindle and



1. Original Flexispeed Mk 1.
2. Perris catalogue extract.
3. Perris lathe.

es hines

bearings remained unaltered). The new lathe had an all-steel backgear assembly mounted on an eccentric shaft, with a reduction ratio of 4:1; the flat-topped, V-edged bed was of the same cantilever pattern as before (allowing it to be bolted down without distortion) but, at 1½in., was just a little wider.

Capacity in the gap was 5¼in., the ways carefully finished by hand scraping and drive to the carriage was by a two-stage worm-wheel drive - one worm was carried on the end of the headstock spindle, the other on the end of the 7/16in. diameter, square-thread 12tpi leadscrew. However, there was power feed towards the headstock only, with a handwheel for manual advance and retraction of the carriage.

A compound slide rest was supplied as standard with the cross slide carrying a single (central) T-slot and the top slide fitted with a 4-way toolpost. As standard the lathe was supplied complete with simple sheet-metal guards over the headstock and leadscrew drive mechanisms, a 4in. diameter faceplate and hard and soft No. 0 Morse centres.

To cater for all sections of the market the Mk. 2 was available in four versions: the Model A had backgear and auto traverse, the B auto traverse only, the C backgear only and the D as a plain lathe with just hand feed to the carriage. Optional extras included a tiny bench-mount countershaft with a 5in. driven pulley, a 4-jaw chuck (with its mounting thread cut into the main body), a plain vertical milling slide, fixed steady, tailstock die holder and a tailstock chuck.

In 1951 the Flexispeed Model

A was listed at £11 9s 6d with the countershaft £1 7s 6d the 4-jaw chuck £1 17s 6d. All these changes left the simple Adept far behind but, surprisingly, and only because of its considerable price advantage, the Adept kept selling.

The next incarnation of the Flexispeed came in the 1960s - with identical example badged both Flexispeed and Meteor - and was produced after the company had moved to Southampton, occupying premises in the Town Quay Works. This model had comprehensive guarding of belts and gears and a heavier, though no wider bed with a hollowed-out section below the headstock designed to accept a dog clutch on the leadscrew.

An optional and, in relative terms, very expensive screwcutting attachment was available; with its 10 changewheels this accessory added 48% to the basic (1965) price of £31 9s 6d. Even when the changewheels were set up with a compound reduction for a fine feed to the carriage the relative coarseness of their pitch (for the size of lathe) meant that slowest rate obtainable was too fast; to get round this the worm-and-wheel drive to the leadscrew was left in place - a most unusual arrangement.

Backgear was also offered and, when fitted together with the screwcutting attachment, made the machine into a very effective lathe able successfully

to turn a wide variety of work. At this point the backgears were all contained within the span of the headstock bearings and not, like earlier and later versions, straddling that to the left.

Although sold with the Flexispeed name cast into the bed the only advertisements seen for this later version show the Meteor 11 model, but it is known that when the lathe was supplied with a single tool slide and without the automatic carriage traverse it was known as the Meteor 1.

The pitch of the leadscrew was coarsened from 12 to 8tpi with the fine feed rate of the carriage, using the original worm-and-wheel arrangement, set at 0.0015in. per revolution of the spindle. While the turning capacity of the lathe was unchanged the finish was improved by the use of chrome-plated handwheels and levers - and then promptly ruined by castings painted in a ghastly light blue Hammerite.

By the end of the 1970s The Norfolk Lathe & Tool Company Ltd. of North Walsham had taken over the lathe and offered it both as a finished unit and a kit of parts for home assembly. Manufacture and marketing eventually passed into the hands of Alphabeta Engineering, North Walsham, Norfolk when it became known as the Simat 101. In an attempt to make the lathe self-contained it was offered in a deluxe version with a motor and simple countershaft unit made from propriety Picador

parts. S. Tyzack & Son of London, well known for their tool sales and lathe factoring service, also marketed a version of the 1950s Flexispeed, the Zyto Model F.

While Flexispeed prospered by keeping their lathes up-to-date with the ever-increasing demands of model engineers, Adept appear to have become stuck in a time warp and, until the end in the early 1960s, offered the same machines as introduced in 1931 and 1933.

Perris lathes

At some stage the original Flexispeed design was adopted by Perris Engineering - a company, according to ex-employees, that was a happy place to work, with the genial Mr. Perris in personal charge. After what must have been a very reasonable production run (the lathes are surprisingly common on the used market) the end came suddenly with the staff arriving one Monday morning to find 'closed' notices on the factory doors - the death of Mr. Perris during the weekend, as he returned from an exhibition, being sufficient for the creditors to call time.

Besides marketing a version of the tiny Norwich-built Jason (as the Pixi) later Perris lathes appear to have been built in at least two versions: the PL90 Modelmaker with a cantilever bed, and a version developed from it which, while generally of the same layout and sharing many parts (and obviously a Perris) was a tidied-up and rather better-looking design. Because no type designation is known for the latter model it will be referred to as the PL90 Mk.2.

Well-engineered, and a fully specified lathe in miniature, the PL90 was offered as a built up model ready to use, or as a kit of parts. The unfinished version was fully machined, with all holes drilled and tapped, and complete with instructions detailing clearly how to assemble it correctly. The heart of the lathe was a flat-topped, 60deg. V-edged bed of cantilever form with a 44mm centre height, capable





4. Rear of milling machine.



5. Milling machine side view.

of accepting 200mm between centres and a maximum diameter of 120mm (by 19mm thick) in the gap. It could be ordered as a simple plain-turning model, with no backgear or screwcutting, or with one or both of those extras supplied when new - or even later, as funds permitted.

The headstock was located by a tenon in the gap between the bed ways and carried a 0.25in. bore, No. 0 Morse spindle with a 0.5in. x 20tpi U.N.F. threaded nose running directly in the surrounding cast-iron; the holes in the headstock forming the bearings were slotted horizontally and the clearance setting achieved by nipping the top section down with a clamp screw.

Like all such spindle arrangements, common in the miniature lathe world, great care has to be taken not to use these screws as a form of adjustment; over tightening will lead to fracture of the headstock casting and a difficult and expensive repair. If the spindle develops play it is far better to have the headstock bored out and a new spindle made – a job that should be within the grasp of any competent general engineering workshop. A 3-step headstock pulley was fitted, for drive by a 5mm diameter round plastic belt.

Depending upon the desired speed range it could be powered directly from an

electric motor - in which case only very high speeds for turning tiny components would have been available - or through the optional speed-reducing countershaft that was mounted on an arm bolted to the back of the bed. With a remotely mounted 1,425rpm motor fitted with a 1in. pulley the countershaft gave approximate spindle speeds of 423, 750, 1333 in open drive and 89, 157 and 280rpm. in the optional 4.75 : 1 ratio backgear.

For a miniature lathe the carriage was of heavy construction with an especially large (139 x 44mm) 3 T-slot cross slide with 89mm of travel (designed to make the most of mounting a vertical milling slide) and a 360deg., 1.5in. travel swivelling top slide. An inverted conical boss on its base retained the top slide (mimicking the system used on a Super 7) with pusher screws engaging it from both sides of the cross slide. The friction-set zeroing micrometer dials were clearly engraved, fitted with knurled finger grips and with a useful if simply constructed handwheel on the cross slide. The dials were marked with 40 divisions in millimetre graduations, each representing 0.025mm of slide movement, or 0.00098in., the makers pointed out that as this was so very close to 0.001in. it was hardly worth offering alternative screws, nuts and dials for the UK and other imperial markets.

The auto-traverse fine-feed attachment (a full set of screwcutting changewheels was extra) drove through a neat dog-clutch arrangement with engagement by a knurled-edge

handwheels and disengagement through a useful (and safe) adjustable automatic throw-out. The metric-pitch Acme thread leadscrew ran through a cast-iron whole nut on the apron and so, with no rack-feed to advance the carriage, all movements had to be by hand through a wheel (with micrometer dial) fitted at the tailstock end.

The set-over tailstock was well constructed, clamped to the bed by a captive lever working on a cam and, with a 32mm travel barrel and No. 0 Morse taper centre, was aligned (as on Series 7 Myfords) by vertical ways down the centre of the bed.

Flexispeed milling machine

The Flexispeed horizontal bench miller was produced from the early 1950s until the late 1970s and was made in two versions, the Mk. 1 and Mk. 2. The Mk. 1 was a relatively simple affair with parallel sides to the main column and a 3-step V-belt drive pulley carried between the spindle bearings with a bench-mounted countershaft available as an option.

By comparison, the Mk. 2 (called Venus in the advertising literature) was a substantially different machine with a much improved and strengthened column (with angled sides) bolted to a hollow, box-section, 13.25 by 10.5in. cast-iron base. The drive system was completely re-engineered and integrated into the machine. The 2,850rpm, ¼hp, 1-phase motor was held within the base and drove first to a large intermediate M-section V-pulley (with a concentrically-mounted 3-step pulley with 1⅝, 2⅝, and 3⅝in. steps), running on a stud fixed into the back of the main column. From the intermediate pulley the drive was taken straight to the back of the spindle for three directly-driven high speeds or, for slow speeds, diverted through a set of lathe-like 4:1 ratio backgears. The result, when used with the recommended motor, was a useful set of six speeds from 126 to 1,500rpm.

The motor switchgear was fitted into the side of the base and the belts and gears neatly enclosed under a tight-fitting cast-aluminium cover that hinged backwards from a lug on the rear of the base plate.

The No. 2 Morse taper spindle ran in split, parallel, adjustable phosphor bronze bearings and, although the front one was 1.125in. diameter, these could not be considered the most rigid of assemblies for the rigors of milling. Socketed into the spindle was a 3in. long, ⅜in. diameter horizontal cutter arbor with a ½in. bore and a round overarm support carried in extensions to the main casting that reached above each main bearing.

The overarm was not locked into place by split compression fittings, or even close-down slots, but by the simple and crude expedient of bolts (or socket-headed screws) that threaded through the casting on the right-hand side and bore against the side of the arm.

The knee was elevated by an 8tpi square-form screw that, instead of having to pass inconveniently downwards through the bench (like so many other small millers) was arranged so that it rose upwards with its operating handwheel at the top. The screw was fitted with a micrometer dial calibrated in 0.005in. increments.

The 11 x 3.5in. table, with a vertical movement of 6in., a cross feed of 2¼in. and a longitudinal travel of 11in. carried two T-slots and was driven by chrome-plated handwheels graduated in 0.0025in. divisions.

Although it was claimed by the makers to be "of the finest quality grey iron and slides are hand scraped and fitted to close limits", in the early 1950s, at just over £30, including a No. 2 Morse taper arbor, the Flexispeed was relatively expensive at just over half the price of a standard Myford ML7 lathe. The miller stood 20in. high, weighed 100lbs and was finished in Hammerite light blue.

ME

CENTENARY MODEL ENGINEER EXHIBITION

THE CLUB STANDS

Malcolm Stride visits the numerous club stands at the Ascot Exhibition.

The number of club stands at the show this time reached 33 which I think is the highest ever.

Some regulars did not attend, but the numbers were more than made up by newcomers. It was particularly gratifying to see several clubs making the long journey from the north of the country to attend. I suspect the new date had an effect on this. I would like to express my thanks to all those clubs that made the considerable effort to attend the show this time.

As always, the Best Club Stand Award was very difficult to judge with so many excellent displays on show. In the end, it was decided that the **Nederlandse Vereniging van Modelbouwers** deserved the award, not only for the variety of unusual models on display, but also for the effort made to come to the show and the way those manning the stand engaged the visitors.

I have picked a selection from the many photographs I took at the show and will make my (of necessity brief) comments on each club in alphabetical order.

7¼" Gauge Society

Locomotives and rolling stock in this gauge are always

impressive and the society had displayed a short goods train to draw attention to its activities.

Ascot Locomotive Society

This very local society had a small display inside and was also running for visitors on its own permanent track within the bounds of the racecourse about half a mile along the straight mile of the race course. members of the Ascot Society were also generous in giving their time in helping with the organization of the event and local liaison.



Frimley & Ascot Locomotive Club

The 7¼in. gauge enthusiasts also had this fine display to inspire them. The centrepiece was Peter Gardner's delightful *Copperknob* complete with some worried looking passengers in the carriages behind. A more modern train can be seen in the background.



Gas Turbine Builders Association

The Gas Turbine Builders Association always attracts much interest and my photograph shows stalwart Peter Hill explaining some of the intricacies to a visitor.



City of Sunderland MES

This society was one of those to make the long journey from the north and I am sure all visitors appreciated the fine range of quality models on display including the fine I/C engines by Mr. D. Bramwell.



Gauge One Model Railway Association

The gauge one track was tucked away under one of the escalators but still attracted many visitors who could marvel at the workmanship on these small gauge live steam models. The GWR 0-6-0 locomotive shown is obviously very much a working model.



Ground Level 5in. Gauge Main Line Association

For those who like to operate large scale prototypical railways, the GL5 Association is the society to join. I liked this wagon with its varied load of bricks and roofing materials.



Guild of Model Wheelwrights

Their display was in the 'collections room' and, as always, provided a superb show of unusual models. The photograph (by Mike Jones) shows a range of different wagons from one part of the display.



GWR Preservation Group

This group was busy raising funds for its various projects preserving the heritage of Brunel's famous railway.

I/C Engine Builders Group

Every time I visited this Group the stand was very busy, but I did manage to capture Norman Lawrence's fine part-built Napier



Dagger (left) together with Brian Perkins' Silver Medal-winning Bristol *Hydra*.



Ickenham DSME

The Ickenham Society always puts on a good display and this photo shows a variety of larger locomotives with a couple of nicely displayed small scale slate wagons in the foreground.



Luton & District MBC

Luton DMBC is another society that I have not seen at the show before and I picked the fine steam pilot boat *Britannia* from the excellent models on display. As can be seen from the background, members interests also extend to aircraft and military vehicles.



Lynton & Barnstaple Railway Trust

Another society busy raising funds for full-size preservation was the Lynton & Barnstaple Railway Trust.

Model Power Boat Association

The MPBA protects the interests of model boat enthusiasts nationwide and had a photographic display of the wide range of model boating activities available at clubs across the country.



Napier Power Heritage Trust

A regular exhibitor at the show, this year I picked the model of Sir Henry Seagrave's Napier Lion-powered *Golden Arrow* land speed record holding car which set a record of 231.4mph in 1929.



National 2½" Gauge Association

This is another of the many national organisations catering for particular branches of model

engineering and is seeing a resurgence of interest in this gauge of late. This is possibly because models of locomotives such as this Rhodesian Bayer Garratt are still manageable in this scale.



Nederlandse Vereniging van Modelbouwers NVM

So we come to the best club stand. There were several unusual models on this stand, but in the end I had to show the part-built hydraulic mobile crane which towered over anything else in the show and will be a fine model when completed. The upturned chassis is to the right of the picture. Model vehicles seem to be popular in Holland, more so than elsewhere.



North London SME

This society always puts on a good and varied display of models and this year was no exception. I think they must have brought more models than intended because an extra table had to be pressed into service to display them all!



Northern Association of Model Engineers

The Northern Association had brought a selection of models from member clubs including this Clayton Undertype Wagon and the railway wagon. There was also a good photo display of association activities on the stand backing.



Phoenix Model Marine Club

Another model boat club with a wide variety of models was the Phoenix MMC and I have picked this fisherman going about his business in the company of his dog as my highlight.



Pickering Experimental Engineering & Model Society

Pickering was another of the new visitors from the north and very welcome they were too. In among the range of models on display was this fine Blacker Type B power hammer by C. Bramley.



Pinewood Miniature Railway

A very local society to the venue their stand had some nice examples of 5in. gauge locomotives including the BR

2-6-4 tank, a nice Metropolitan Growler and the 4-4-0 tender locomotive seen in this view.



Reading SME

Another club with a short journey to the show and the members involved brought a fine selection of models along. I have picked this triple expansion engine by John Withers as my choice.



Ruislip Lido Railway Society

Another regular at the show they were present once again raising the profile of the railway.



Society of Model & Experimental Engineers

The members of this long-established society had spent a lot of time and considerable effort building a new stand for the show and it was packed with models and also had several 'satellite' areas where members were dispensing advice to visitors on a range of topics. A member from

Switzerland was Jorge Hugel who is seen showing his 'Unbalance Demonstrator' to SMEE member Brian Davies.



Society of Ornamental Turners

This society's demonstrations and displays always attract a lot of interest and this year was no exception. I was pleased to comply with a request by Bob Wade to photograph this superb Perspex box which was one of many items displayed on the stand.



South Downs Light Railway Society

Being in the south of the country, it seemed appropriate to have a very large Southern Railway locomotive on display. A magnificent *King Arthur* in 10½in. gauge, seen below, was therefore most suitable as the centrepiece of their stand.



Southern Federation of Model Engineers

The familiar figure of Brian Thompson from the Southern Federation was seen throughout the show publicising the activities of the association.



St. Albans DMES

One of many societies supporting a variety of model engineering activities, St. Albans always put on an excellent display and Malcolm Beak's twin-cylinder marine steam plant encompasses both model engineering and model boating activities.



Staines SME

Another regular at the show and among the items on display was a part-finished chassis by R. Weston to the *Canterbury Lamb* design by LBSC (shown overleaf). This 3½in. gauge design is from the early 1950s. ➤



Stirling Engine Society

This is another society that always has a lot of interest in their displays and demonstrations and many visitors were fascinated by the variety of hot-air powered devices running on the stand.



Victoria Model Steam Boat Club/Blackheath MBC

These two clubs had combined to bring a selection of models to the show and they ranged from a selection of straight running and other steam boats to the somewhat faster tethered hydroplanes.

Wirral MES

The final society in this year's report had also made the long



journey south for the show. Among the models present was this *Lion* by J. Swindlehurst which I think had also made the trip to Lionsmeet at Bristol a couple of months earlier.

That rounds off what was a very good selection of club displays last year and I look forward to seeing many of those present again at this year's show on 19-21 September, again at the Ascot Racecourse venue. **ME**

Notices

The following events will be held at the **Harrow & Wembley SME's** track at Roxbourne Park, Field End Road (opposite Venue 5), Eastcote, Middx:
14 and 15 June
- Open Weekend.
21 and 22 June
- Possible visit by South African Live Steamers.
23 to 25 August -
Open Weekend.

Miniature traction engines are welcome at both open weekends and the contact for all events is Roy Goddard (E. RSGwatford@aol.com).

Lancaster & Morecambe MES

We have received an update from **Lancaster & Morecambe MES** which among other things indicates that the society has a new secretary. The holder of the position is now Mike Glegg, 2 Peacock Drive, Garstang, Lancashire PR3 1LF; T. 01995 606767, E. mike@flonova.co.uk
The society has a full programme of meetings at the Cinderbarrow site which will be publicised

in *Club Diary* and Mike is the contact for further details.

Cardiff MES

Another society with a full programme is **Cardiff MES** and the events will also be in the diary section. Cardiff MES is located in Heath Park (entrance opposite 167 King George Fifth Drive) Cardiff. The contact for further information is Don Norman (T. 01656 784530, E. don.norman@virgin.net).

Whissendene 2008

Some advance warning that this year's Whissendene Rally organised by **Melton Mowbray DMES** will be held over the weekend of 7/8 June.

UK Club News

The turntable at **Bournemouth DSME** is now fully operational meaning that trains can now run in both directions. It is proposed to build new trolley storage along the embankment and a volunteer is needed to dig some trial holes in said embankment to "find out what we may be up against". Chairman David Martin visited

Manchester for a few days to "do the cultural bit" and visited the Lowry Museum, the Imperial War Museum and the Museum of Science and Industry. David was very impressed with the tram system in Manchester. This note reminds me of my time as a computer trainer because the company I worked for had an office alongside the Manchester ship canal opposite the site of the Lowry Museum. We watched progress on the building of the museum and the lifting bridge across the canal, one end of which was right outside the office door. Unfortunately when the final section of the bridge supports were being installed with a very large crane, it was discovered that they did not fit, which provided good entertainment for all those in the office at the time and completely disrupted the training course!

Canvey Railway and MEC Chairman Brian Baker is very happy with the way the 2007 season has gone for the club. He reports that "membership has continued to increase, takings on the railways have

held up well and the club is more active than ever". The only downside is that the club is having to install a Mosquito ultrasonic noise generator to deter youngsters from hanging around the ground level station. The effectiveness of this will be of interest to many clubs and I will report the results in due course. In the meantime if any society has experience of this approach, I would very much like to hear from you.

Crawley Model Engineers

report that passenger numbers last year were up to 7,833, an increase of 2,421 on the previous year. It was hoped to beat the 8,000 mark for the first time, but the last day of the running season was a washout although the disappointment was tempered with a large box of bread pudding and some tea to wash it down.

Mike Glegg from **Lancashire & Morecambe MES** has sent an update and included a picture from the summer open day. The subject (photo 1) is visitor Dave Kinsella from **Rochdale MES** with his 5in. gauge Crab awaiting the starting signal to haul an unfitted goods train at Cinderbarrow. The wagons were constructed by LMMES members Malcolm Ford, Stan Jackson, Ron Strachan and Mike Glegg.

Manx Steam & MEC carried 12,175 passengers on the Orchid Line last year which provides funds to carry out several projects this year including some repainting of bridges and wooden structures, overhauling the semaphore signalling system and some track realignment. An estimated 80 people attended the barbecue last year on a dry cool evening and the single seven coach train was running with full loads of passengers for most of the evening. The train was double-headed by Jo and Ardwhallin with *Slieauydey* occasionally banking at the rear. Chris Wedgewood has rebuilt a 1904 Turner-Miesse steam car (photo 2), including making a new steam generator with 200ft. of thick walled steel tubing. The car has no throttle, speed is controlled by shutting off the boiler water



supply. The car has a 3-cylinder poppet valve engine and steam pressure varies between 200 and 1,000psi.

The talk at the October meeting of **Melton Mowbray DMES** was by Keith Hales from CuP Alloys on the subject of silver soldering. Two interesting tips were mentioned in the notes, the first is to add 25% kitchen salt to the flux when brazing aluminium bronze and the second was to avoid using abrasives when cleaning before brazing, use wire wool.

The Model Engineers Society (NI) hosted a visit by the Damhead, Drumawhey and Dublin societies in October and had three locomotives and numerous members from the visiting societies. After all the effort driving, the visitors were filled up with stew, curry, burgers, sandwiches and a selection of deserts.

Work on the steaming bay resurfacing at **Mold MES** is almost complete and the safety handrail down the bank is now *in situ*. The open day was held in some good weather and the level of attendance helped offset the loss of income from some other cancelled events. Re-sleepering on the track is continuing and completion of the exercise will improve running conditions and safety. Discussion is taking place regarding a possible rebuild of the small gauge tracks with a view to incorporating some improvements. Dave Riches recommends a cleaner for brass called Hotspot which can be found in hardware type shops and comes in a handy screw top tube. Dave reports that "the cream acts quickly

and produces a high shine with minimum residue". Club membership has been growing steadily in recent weeks with several active steam engine builders among those joining.

Members of **North Norfolk MEC** were out in force for the '1940s weekend' last September at the North Norfolk Railway and the club cake and book stalls proved a hit with the visitors with consequent good boost to club funds. The miniature railway was also doing good business alongside its full-size brother with eight engines in steam. The bits and pieces evening had several interesting items on display including a 0-4-0 locomotive kit, originally from Bonds 'o Euston Road (for which the owner is seeking plans), a model of the *African Queen* steam launch, a small sailing dinghy with crew member, a collection of mechanical adding machines and Norman Lawrence's Napier *Dagger* engine which many will have seen at the Model Engineer Exhibition.

Ted Roberts stood in at short notice to give a talk on the development of full-size rail gauges at **Stamford MES** in October after the scheduled speaker had to pull out due to sickness. Ted's talk was entitled 1435 and All That. Ted started by saying that 1435 was the year the Turks invaded Thebes but that this had no connection with the standard rail gauge of 4ft. 8½in. which formed the subject of the talk. Ted described how some 13,000 miles of 5ft. gauge track in the United States was converted to 4ft. 9in. gauge in a period of two days in May 1886. The

1. Dave Kinsella from Rochdale MES with his 5in. gauge Crab at Lancashire & Morecambe MES.

new gauge meant that standard gauge equipment could run on it with no problems.

Martin Hulse from **Sutton MEC** is bemoaning the fact that going to the pub on Thursday lunchtimes is dangerous. He was accosted by the Chairman asking for help and as he says "it is difficult to escape when your glass is not yet empty and you wonder if he is going to offer you an extra pint". The result of all this is that he is now the Editor of *Newslink*, the club newsletter. We wish him well in his new post and hope he got the extra pint! He is obviously going to be successful because he has already threatened to fill the newsletter with his interests unless he gets some contributions from others! The previous Editor, Laurie Brittain held the Editorial reins for over 20 years which must make him one of the longest-serving newsletter editors we have seen, unless you know different? David Donoyou has donated his 3½in. gauge *Black Five* to the club and it is to be retained as a club locomotive. It will be put into service once a new tender has been constructed to replace the original which had been stolen. Refurbishment of the raised track continues with five new concrete pads and new style track supports cast between running days.

Further progress is being made on the ground level track project at **Tyneside SMEE** with the timber ➡



2. Chris Wedgwood's 1904 Turner-Miesse steam car at on the Isle of Man (photo: Collin Heard).

spacer beams cut and drilled and a start made on the formwork for the track bed. The forms will be used around 13 times each which is about twice the standard construction industry rate, but as Eddie Gibbons says "we are driven by economy and not speed and we will take the necessary care won't we?" Work to be carried out before the concrete pouring can start includes opening up a length of drain trench (for which young fit diggers are being sought) and breaking out some concrete bases near the museum corner (being sold on the premise that "road breakers can be fun!").

Work at **York City DME** has included the completion of the two bunkers for gravel and ballast and cutting up of felled timber ready for the November bonfire. The fencing of the storage compound for surplus materials is now to be put into progress. Once this is done

the majority of the area inside the ground level track will be cleared and levelled.

World Club News

Canada

British Columbia SME report that passenger numbers on the Burnaby Central Railway exceeded 34,500 last year, including just over 1,300 passengers in just over three hours on the Halloween evening.

As seems usual at **Toronto MES**, the December meeting featured some interesting projects from members and visitors. Sameer Haqqi, a guest of Dave Sage, is building a 9ft. span model of the Lockheed Super Constellation. Sameer's uncle had piloted a similar aircraft and stories of his flying tweaked Sameer's interest. He is constructing his radio controlled model in foam plastics and asked if any TSME member could help in the machining of components for the model's flap mechanism.

Geoff Kingma showed the shaper indexer he has made from castings obtained from New Zealand. He explained, with pictures, how he set up

and machined the castings, and the various other components.

Jim Stupps, another visitor, brought in a Gauge '1' live steam model of a Midland Compound *Atlantic* that his father had made. It is fitted with Joy valve gear and has yet to be pressure tested. Jim asked for advice on how best to hook up the locomotive to run on air, so that he could show his grandchildren what their great grandfather had made.

Rob Stellik talked about the robotic fire-fighter that he is in the process of designing. The basic rules of the competition are that the robot, fitted with suitable sensors, must locate and extinguish a candle that is positioned in a 'room' of a small (8 x 8ft.) layout. Rob showed the alternative drives – 2, 3, or 4 wheeled, some or all wheels being steerable. He asked if any member could machine a few of the drive components for him (a few names were exchanged). Interestingly, it takes only 7 to 10 seconds or so for these robots to find and extinguish the candle!

Dave Bray brought in one of the wheels he has machined from cast iron, for a Welsh slate wagon he is building in 4 3/4in. gauge to go along with a Hunslet locomotive. Dave explained the machining stages he went through, to finish the wheels. Each stage being carried out on each of the four wheels before moving onto the next stage.

Dave Powell showed his steam wagon chassis. He had found that the differential had seized up, and it took him some careful thought to determine the cause. A shaft on one side had rusted up and seized in its bearing, but also, he found that the shaft did not have adequate support when under heavy load. He has now added another bearing to give the cross shaft extra support from the chain drive, and he expects this to solve the problem.

New Zealand

The main entertainment at the October meeting of **Auckland SME** was the annual auction. Mike Jevremovic from Green Bay Auctions was auctioneer, assisted by member Graeme Bell. A full table of items was

worked through with some generating some enthusiastic bidding. The latter included a 1960s built M.E. electric clock, a set of drawings for a NZR 'J' class 4-8-2 and a sheet metal folder. The annual exhibition in September was a success with 20 locomotives and stationary and traction engines of all types on show as well as a good selection of other model engineering subjects.

The October meeting at **Hutt Valley MES** was described as "a boomer" with 20 members

DIARY DIARY

FEBRUARY

- 1 **Ickenham DSME**. *Talk on Railway Signals*. Contact Ian Mortimer: 01895 635596.
- 1 **Portsmouth MES**. *AGM*. Contact John Warren: 023 9259 5354.
- 1 **Romford MEC**. *Competition Night*. Contact Colin Hunt: 01708 709302.
- 1 **Saffron Walden DSME**. *Club Night*. Contact Jack Setterfield: 01843 596822.
- 1 **Maidstone MES (UK)**. *Quiz Night*. Contact Martin Parham: 01622 630298.
- 1 **Rochdale SMEE**. *Visit to Aquajet, Thorley*. Contact Geoff Dowden: 0161 633 9675.
- 2-10 **Hutt Valley MES**. *Otago Display Week*. Contact Gavin McCabe: 567 4487.
- 2 **SM&EE**. *Michael Tucker: Making Model Buildings*. Contact Maurice Fagg: 020 8669 1480.
- 2 **York City & DSME**. *Richard Gibbon: Scrapheap Challenge - Paddle Boats*. Contact Pat Martindale: 01262 676291.
- 3 **Maidstone MES (UK)**. *Annual MMES Lunch*. Contact Martin Parham: 01622 630298.
- 4 **Leicester SME**. *Keith Adams: Rutland Small & Beautiful*. Contact John Lowe: 01455 272047.
- 5 **Ickenham DSME**. *General Interest Night*. Contact Ian Mortimer: 01895 635596.
- 5 **Oxford (City of) SME**. *Talk: Thames Valley & Chiltern Air Ambulance*. Contact Chris Kelland: 01235 770836.
- 5 **Taunton ME**. *Quiz Night*. Contact Nick Nicholls: 01404 891238.
- 6 **Birmingham SME**. *Club Auction*. Contact John Walker: 01789 266 065.
- 6 **Bristol SMEE**. *AGM*. Contact Trevor Chambers: 0145 441 5085.
- 6 **Chingford DMEC**. *Bits & Pieces*. Contact Ron Manning: 020 8360 6144.

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.

Reg Davies Sutton MEC
John Nicolaides Toronto MES

present. Various items were on display including a freelance traction engine, a set of parts for a Quorn cutter grinder, a "glued" crankshaft for a Burrell traction engine and a Mitutoyo vernier calliper with a round body and some additional spiked arms. The owner of the last item could not find details in any tool catalogue, so if any reader has or knows of something similar we would be pleased to hear from you. The main subject for the evening was a discussion on the use of

CAD systems by Ross Johnson.

The running day on 21 October at **Maldstone MES** was described as "very pleasant". The number of visitors was lower than normal, so members had more time to themselves. The re-powered (now petrol-engined) club locomotive performed very well, although the report writer (no names no pack drill) found things improved when he sorted out the difference between the choke and the petrol shut-off levers!

Humour Time

The following note and picture (photo 3) were found in the newsletter of **York City DME**, attributed to John Chambers whose words I quote here:

"Recently I went down to London to sample the Croydon Tramlink. At the Harrington Road stop, the attached, surely unique, sign caught my eye. Is it just my warped sense of humour, or does it really imply that the braking power of the trams is not all that it should be?"



3. The sign spotted by John Chambers on the Croydon tram link.

DIARY DIARY DIARY DIARY DIARY DIARY DIARY DIARY DIARY DIARY

- 6 **Leeds SMEE.** Peter Southworth: A Garratt Turbine Loco. Contact Geoff Shackleton: 01977 798138.
- 6 **Tyneside SMEE.** Stuart Davidson: Boiler Making. Contact Malcolm Halliday: 0191 2624141.
- 7 **Cardiff MES.** Jonathon Hicks: Great Uncle Ossie's War. Contact Don Norman: 01656 784530.
- 7 **Sutton MEC.** Bits & Pieces. Contact Bob Wood: 020 8641 6258.
- 7 **Worthing DSME.** Bits & Pieces. Contact Bob Phillips: 01903 243018.
- 8 **Brighton & Hove SMLE.** Railway Shorts - Archive Films. Contact Mick Funnell: 01323 892042.
- 8 **Colchester SMEE.** Martin Hunt: Moscow Transport & Culture. Contact K. Wraight: 01255 434091.
- 8 **Hereford SME.** Colin Dix: Traction Engines. Contact Nigel Linwood: 01432 880649.
- 9 **Dublin SMEE Ltd.** Meeting. Contact Colm de Brun: (01) 868 2549.
- 9 **Glasgow & S.W. Rly Ass'n.** Ian Lothian: Favourite Places, Favourite Trains. Contact Bruce Steven: 0141 810 3871.
- 9 **SM&EE.** Training Seminar. Contact Maurice Fagg: 020 8669 1480.
- 10 **Sutton MEC.** Track Day. Contact Bob Wood: 020 8641 6258.
- 10 **York City & DSME.** Running Day. Contact Pat Martindale: 01262 676291.
- 11 **Bedford MES.** Jim Bassett: History of Fairground Rides. Contact Ted Jolliffe: 01234 327791.
- 12 **Chingford DMEC.** Keith Brunt: An illustrated Talk. Contact Ron Manning: 020 8360 6144.
- 12 **Dockland & E. London MES.** Meeting. Contact John Slocombe: 01708 222658.
- 12 **King's Lynn DSME.** Surprise Evening with David Grimes. Contact Mike Coote: 01533 673728.
- 12 **Northampton SME.** AGM. Contact Pete Jarman: 01234 708501 (eve).
- 13 **Birmingham SME.** Mr Smallman: The Ffestiniog Railway. Contact John Walker: 01789 266 065.
- 13 **High Wycombe MEC.** Peter Smith: Modelling the Royal Carriages. Contact Eric Stevens: 01494 438761.
- 13 **Norwich DSME.** Bits & Pieces. Contact Shirley Berry: 01379 740578.
- 13 **St. Albans DMES.** Colin Gent: Rolls-Royce Merlin Aero-engines. Contact Roy Verden: 01923 220590.
- 14 **Cardiff MES.** Forum. Contact Don Norman: 01656 784530.
- 14 **Halesworth DMES.** Meeting. Contact Chris Walliman: 01362 695735.
- 14 **Melton Mowbray DMES.** Work in Progress. Contact Phil Tansley: 0116 2673646.
- 14 **Sutton MEC.** Gauge 1 Round-Up. Contact Bob Wood: 020 8641 6258.
- 15 **Ickenham DSME.** Ken Marroitt: RB211 Aero Engines. Contact Ian Mortimer: 01895 635596.
- 15 **Rochdale SMEE.** Meeting. Contact Geoff Dowden: 0161 633 9675.
- 15 **Romford MEC.** AGM. Contact Colin Hunt: 01708 709302.
- 16 **York City & DSME.** John Chambers: End of BR Steam. Contact Pat Martindale: 01262 676291.
- 17 **Birmingham SME.** Club Competition Day. Contact John Walker: 01789 266 065.
- 17 **Frimley & Ascot LC.** Club Run. Contact Bob Dowman: 01252 835042.
- 17 **Halesworth DMES.** Sunday Steam-Up. Contact Chris Walliman: 01362 695735.
- 18 **Leicester SME.** Brian Healy: Around the World on Public Transport. Contact John Lowe: 01455 272047.
- 19 **Chesterfield MES.** Meeting. Contact Mike Rhodes: 01623 648676.
- 19 **Nottingham SMEE.** Keith McDonald: Hot Modelling/Cold Showers. Contact Graham Davenport: 0115 8496703.
- 19 **Taunton ME.** Don Bishop: Developments on the WSR. Contact Nick Nicholls: 01404 891238.
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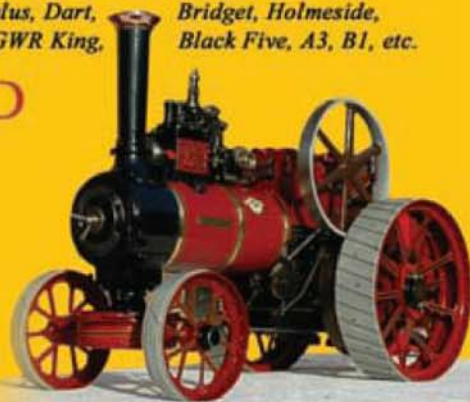
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Denbigh No.6 flypress + stand



Sharp vertical / horizontal + slotting head / powered table



Starrite 18-S-5 bandsaw; 18" throat / 5 speed / non ferrous



Boxford 280 precision lathe



Denford vertical CNC mill 'asis'



Boxford CUD 5" centre height precision lathe



Hayes Diemaster milling machine - sure quality!!



Myford Super7B lathe + stand



SIP 39" high, 16 speed, 2MT 5/8", rack table NEW



Colchester Chipmaster (240 volts)



Gabro 2ft box and pan folder

COMING IN WE HAVE:
Boxford collets + drawbar £175,
Boxford dividing head complete + plates £825,
Boxford vertical slides from £345,
Colchester Chipmaster £1250,
Harrison vertical mill £1625,
Harrison M250 lathe, gear cutters, broaches,
New Leyton 50" rolls,
Marlow vertical mill £950,
Micrometers boxed from £10,
Rapid hacksaw £145,
Denford Micromill
Sharp milling machine,
Blacksmith dollies.



Myford ML10 3 1/4" x 13" lathe



Harrison pedestal grinder



CMZ 40" rolls (brand new)



Edwards 50" (1.5M) x 16g box and pan folder



Raglan 5" lathe + gearbox and variable speed



Boxford 1130 5 1/2" x 30" + stand



Colchester Student, gearbox + gap



Eagle Model 3 + magnetic chuck



Herbert small surface grinder (240 volts)



Milling/Drilling ground X-Y table



Tom Senior 'E' type milling machine extremely rare in this condition



Myford ML7 + clutch lathe



Bridgeport slotting head



Myford Super 7B, gearbox, power feed + stand



Emco Compact 10 lathe + stand



Harrison Grad wood



PLEASE PHONE 0208 300 9070 TO CHECK AVAILABILITY OR TO OBTAIN OUR LIST

DISTANCE NO PROBLEM! DEFINITELY WORTH A VISIT ALL PRICES EXCLUSIVE OF VAT

Just a small selection of our current stock photographed!

NEW stock rolling in daily!



Boxford STS 1020 lathe



Myford vertical slides



Gear involute cutters 'More just in'



Clarkson 40INT collet chuck + collets
(we have 2MT-5MT and 30INT to 50INT in stock!!)



Denford Micromill like new



Tom Senior slotting head



Bar Tube holding vice (reversible jaw)



Morse taper / International tapers in!!



Tom Senior swivelling machine vices



More broaches metric and imperial



Burnerd Boxford 4jaw chuck
(more variations available)



Wolhaupter 3MT boring and facing head



Harrison L5 travelling steady
(L5A, L6, Student, Master also)



Eclipse angle plates



'LO' Colchester drive/catch plates



Myford MA99E collet chuck collets



Q and S 6" power hacksaw + coolant



Myford Super 7B lathe
+ poer cross feed and stand



Modelmark etc. letter / number sets in!!



Colchester Student fixed steady
(more sizes available)



Burnerd 'LO', D13 & D14 collet chucks

Also:

- Myford Fixed steady £90
- Myford travelling steady £40
 - Colchester Bantam travelling steady £45
- Viceroy fixed steady £125
- Baty 0-1" (calibration certificate) NEW £30
- Baty 0-25mm (calibration certificate) New £30
- Micrometer 11"-12" M & W £55
- Micrometer 12"-18" M & W £120
- CEJ metric slips (as new) £245
- Engineers flat's £125 each
- Harrison (lathe) jig boring table £345
- Boxford (lathe) jig boring table £145
- Burnerd 3 jaw chuck for Graduate wood lathe £70
- Draw sets (9 and 15 draws) metre high £65 each
 - Meddings EMG tool grinder £475
- Marlow vertical mill (3MT) £950
- Viceroy vertical mill (30INT) from £495
- Super Brown cut-off-saw £345
 - Pedrazzoli Aluminium cut-off-saw £345
- Viceroy sharpedge 10" wheel £150
- Clarke Strongarm 1 ton (fold up) crane £125
- Epco 1 ton quality engine crane £245
- Clarke profile router 145 £175
- RJH Gerbil 2020 vacuum plastic cutting mch. £275
- Clarke 812V vacuum forming machine £345
- Draper WTL 100 wood lathe £100
- Multico K3 mortiser £475
- Startrite 145 sawbench £395
- Startrite 275 sawbench + sliding table £1950
- Startrite TA1250 sawbench + bells & whistles £2250
 - Startrite 14-S-5 bandsaw £595
- Black & Decker radial saw £345
- Minor linisher 4" wide/ bench type £145
- Scripta (Graphograph) bench engraver + type £245
- Oxford 110amp oil cooled welder £90
- Jones and Shipman No.2 arbor press £175
- Hearths (small pedestal model) £70
- Flamefast DS220 hearth £245
- Holbeck-Leba oven £145
- Crompton 240 volt Myford motors NEW £155
- G & C 2hp 240 volts 1420 revs £120 each
- Brook 3hp 240 volts 2850 revs motor £120



'LOO' face plate + we have loads more from Myford to Colchester Mascot



EME (Elliot) swivel tilt vice



Boxford dividing headcomplete



Dickson toolposts to suit Colchester Mascot (others available)



Micrometers in (most sizes and makes)



Archer tapping head 2MT
(more sizes available)



Myford accessories in by the shelf full!!

THESE ARE ALL
NEW MACHINES AT
PRICES COMPARED WITH
RE-CONDITIONED OR
SECOND-HAND EQUIPMENT



SAWS



LATHES



MILLS



DRILLS

Chester Machine Tools



DB7VS

£405

Features
Digital Spindle Speed Readout • Hardened and Ground Vee Bedways • Offset Tailstock • Variable Spindle Speed • Metric & Imperial Thread Cutting • Longitudinal Power Feed • Cast Iron Construction

Distance between Centres 300mm
Swing 180mm
Motor 750W

H80 BANDSAW



£84

Features
Max Cutting Capacity 10" Wt
Max Cutting Capacity 6" Ht
Rake Angle 45°
Motor 400W
Power Switch On
Pushing Bar
Stainless Steel

Round Work Square Wt 13mm
Round Work Square Ht 13mm
100 x 100 x 40mm
S40-500-480

626 MILL



£1234

Features
1.5HP Motor • Metric or Imperial Machines • MT3 or B6 Spindle Taper • Head Swivels 90 degrees • Head Tilt 45 degrees • One Shot Lubrication System

Standard Accessories
Machine Work Light • Central Lubrication System • Machine Stand • Table Guard • Drawbar • Manual & Parts List

Including Power Feed
Face Mill Capacity 70mm
Table Size 156x740mm
Motor 1.5hp

CONQUEST LATHE



£243

Features
• Variable Speed • Cast Iron Construction • Easily Portable • Metric or Imperial Thread Cutting • Can be installed and Cutting Metal Within 5 Minutes

CHAMPION 20 V MILLING MACHINE



£659

Features
Variable Spindle Speed • Cast Iron Column • Digital Quill Depth Readout • Column Guideways • Tilling Head • Large Table Size • Wide Spindle Speed Range

Standard Accessories
Drill Chuck • Drill Chuck Arbor • Chuck Guard • Drawbar • Manual & Parts List

Face Mill Capacity 60mm
Table Size 100x180mm
Motor 1hp

CRUSADER LATHE



£1528

Features
13-4 Conquest Spindle • Hardened & Ground Bedways • Independent Leadlines and Feed Rod • Gap Bed • Taper Roller Bearings • Cast Iron Bed

Distance between Centres 310mm
Swing 300mm
Motor 1.5hp

CRUSADER including D.R.O. £1680



100mm 3-jaw Chuck
£35.00



80mm 4-jaw Chuck
£25.00



K Series Machine Vice
£59.00



100mm Rotary Table
£84.00



180mm Self-Centering 4-jaw Chuck
£64.00



Boring Tool Set MT3 MT3
£50.00



12" Disc Sander
£76.50



Drill Grinding Attachment
£17.00



Set of 2.3.6" Engineers Squares
£13.60



Hobby Coolant System
£51.00



Flexi-Grind 1000W Bench Grinder
£67.00



8" Bosch Hand Shears
£47.00



24v Flood Arm Mag Base Lamp
£18.50



18mm T Slot 96 piece Clamp Kit
£34.00



V Block and Clamp 50mm Capacity
£12.77



8 Ton Portable Hydraulic Press
£110.00



Mini Quick Change Toolpost
£23.00



Toolbox 6-drawer
£51.00



Lifting Crane 1 Ton
£110.00



2" Tube Notcher
£49.00



3/4" Parting Blade & Holder
£12.50



20 Ton Hydraulic Press
£212.00

All prices exclude VAT. Delivery Free to UK mainland - excluding certain Scottish postcodes



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